ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2020

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT, AND RELATED AGENCIES

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ENERGY AND WATER DEVELOPMENT, AND RELATED AGENCIES APPROPRIATIONS FOR 2020

THURSDAY, FEBRUARY 7, 2019.

ENERGY TRENDS AND OUTLOOK

WITNESSES

HON. LINDA CAPUANO, ADMINISTRATOR, ENERGY INFORMATION ADMINISTRATION
DR. JAY HAKES, FORMER ADMINISTRATOR, ENERGY INFORMATION AGENCY
ETHAN ZINDLER, HEAD OF AMERICAS AND POLICY ANALYSIS, BLOOMBERG NEW ENERGY FINANCE
AMY MYERS JAFFE, PROGRAM DIRECTOR FOR ENERGY SECURITY AND CLIMATE CHANGE, COUNCIL ON FOREIGN RELATIONS
MATT SONNESYN, VICE PRESIDENT FOR INFRASTRUCTURE, ENERGY AND ENVIRONMENT, BUSINESS ROUNDTABLE

Ms. KAPTUR. Good morning. The committee will come to order.

I want to thank all of my colleagues for taking time to be with us this morning. The subcommittee will begin our very first hearing in this new 116th Congress in what promises to be a very busy and, I hope, productive year.

I would like to welcome our new and returning members to the subcommittee. We are thrilled to have each of you, representing very unique and diverse segments of our landscape across the country. And, actually, we have members in all corners and the center of our country, so it is pretty representative.

Energy is essential to sustaining life on Earth, to driving our economy and the millions of jobs associated with it, and assuring our freedom. We begin our work this Congress by looking at how much energy our Nation produces and consumes currently, how that has changed over the last five decades, and what prospects look like for the future. So we are very grateful to this particular panel.

After World War II, our country began consuming, almost unconscionably, more energy than we could produce domestically. Our Nation increased imports of energy, creating dangerous economic vulnerabilities and strategic dependencies on other countries. The harsh reality of that dependency struck our homeland hard with the Arab oil embargoes of the 1970s. Our economy was walloped by America's reliance on imported oil.

President Carter's foresight, along with congressional leadership, created the Department of Energy in 1977 to propel our Nation on a challenging path to become energy independent. Now we look

back about four decades, and by investing in research and development, we have created the foundational power to meet that strategic objective, but we have just begun, just begun to set a path toward permanent energy security.

For example, the Department of Energy helped develop the drilling and extraction technologies credited for the recent growth in domestic oil and gas production. Who could have imagined that a half century ago? And today, our Nation produces over 90 percent of our current energy needs as a result of progress on all energy horizons. That is quite a sweeping achievement.

There are new challenges to meet the goals of energy security and sustainability, including the increasing demand from enormous world population growth, the continuing industrialization that we see globally, the depletion of finite traditional sources of energy, and the consequences of environmentally damaging energy sources, including some fossil fuels. Fortunately, a sustainable energy supply and clean energy vision combines perfectly with the need to address the climate crisis. The future of our planet ecosystem and the lives of billions around the globe are depending on a shared vision of a livable future.

The Department of Energy, with the finest scientists in our world, has been driving innovation and partnering with the private sector to achieve continuing and significant reductions in the cost of clean energy. For example, First Solar, with more than 17 gigawatts of cadmium telluride solar modules sold worldwide, was born in my district at the University of Toledo, thanks to the genius of Dr. Harold McMaster and Dr. Norm Nitschke. This was made possible by a partnership on photovoltaics with the Department of Energy. By the way, that company is going to double its production floor very soon.

So how do we achieve the interdependent goals of energy independence, reducing pollution, and creating jobs? We deliver new technologies that are better and cheaper than their 20th century alternatives. That means we must provide robust, stable Federal support for energy research and development at the Department of Energy. This won't be easy. We are still facing sequestration with no budget deal in place for the next 2 years yet. But I am committed to working to ensure continued progress in these important areas.

In closing, our Nation must keep investing in energy solutions, making them better and more affordable, reaching more people in more places. I look forward to hearing from our expert witnesses who can frame the context of our work as we begin this year. And let us now turn to our very able and hardworking ranking member, Mike Simpson of Idaho, for his opening statement.

Mr. SIMPSON. Thank you, Chairwoman Kaptur. Since this is our first hearing of the year, let me take the opportunity to say congratulations to you on becoming the chair of the Energy and Water Appropriations Subcommittee. I have enjoyed working with you the past several years and look forward to continuing that productive relationship in this Congress.

I would like to echo your welcome to our witnesses. We thank you all for being here this morning and look forward to hearing

your perspectives on where we have been, where we are now, and where we are going with respect to energy.

Reliable, affordable energy sources are essential to our Nation's continued economic growth and national security. We have seen time and again how rising energy costs or disruptions in energy supply can cause economic pain on a national and individual level. The Federal Government interacts with the energy sector in many ways. The focus of this subcommittee, of course, is deciding on and overseeing investments in research and development.

Federal R&D involves our understanding national laboratories—involves our understanding of the national laboratories, as well as partnerships with universities and the private sector. It spans the continuum from basic science research to early stage applied energy activities to mid stage and late stage demonstration projects. It addresses activities in electricity, transportation, industrial and residential and commercial sectors, and it focuses on a wide variety of energy sources, including nuclear, coal, natural gas, petroleum, hydro, solar, wind and other renewables, as well as energy efficiency.

I look forward to hearing from each of our witnesses about the successes of past investments and the promise of new investments, both in continuing our improved current technologies as well as ensuring that the United States will continue to be a leader in developing new energy technologies of the future.

Again, I thank Chairwoman Kaptur for calling this hearing, and I look forward to hearing from our witnesses.

Ms. KAPTUR. Thank you, Mr. Simpson.

I think we are all excited for our witnesses joining us here today and for your lifetime of service to our country both in the public and private sectors.

First we will have Dr. Linda Capuano, who is the administrator of the U.S. Energy Information Administration. Prior to her appointment to lead EIA, Dr. Capuano was a fellow at the Baker Institute's Center for Energy Studies and on the faculty of Rice University's Jones Graduate School of Business.

Next we will have Dr. Jay Hakes, who has authored a book titled, "A Declaration of Energy Independence." Dr. Hakes was previously an administrator for the Energy Information Agency and served in President Carter's administration, directed the energy office in the Florida governor's office, and served for 13 years as director of the Jimmy Carter Presidential Library. We are just so honored that you are here today.

Following that, we have Mr. Ethan Zindler, who is head of Americas and Policy at Bloomberg New Energy Finance. Bloomberg NEF is an amazing source of insight, data, and news on the transformation of the energy sector, and we read you.

Then we will have Ms. Amy Myers Jaffe, who is the program director for Energy Security and Climate Change at the Council on Foreign Relations. Ms. Jaffe previously served as executive director for energy and sustainability at the University of California Davis and was formerly a fellow at the Woodrow Wilson International Center for Scholars.

And last but not least, we will have Mr. Matt Sonnesyn, who is vice president for Infrastructure, Energy, and Environment at the

Business Roundtable. Prior to joining the Business Roundtable, Mr. Sonnesyn spent a decade working for U.S. Senator Lamar Alexander, one of our good friends even on this side of the Congress.

Thank you all for taking time to be here today. Without objection, your written statements will be entered into the record. Please feel free to summarize your remarks in about 5 minutes each, starting with Dr. Capuano.

Thank you, Doctor.

Ms. CAPUANO. Thank you, Chairwoman Kaptur and Ranking Member Simpson, members of the committee. I appreciate the opportunity to be before you today (off mic). You have some charts before you, and I will—they are up here, so you will be able to follow.

This is a transformational time for the United States energy industry. The United States is now the world's largest producer of crude oil. We have surpassed Saudi Arabia and Russia. The United States produced almost 11 million barrels per day in 2018, and EIA expects that production will continue to remain greater than 14 million barrels per day through 2040.

This graph shows that after decades of importing more energy, the blue line, than we export, the brown line, EIA now forecasts the United States will become a net energy exporter in 2020. In addition, our natural gas plant production set an all time high in 2018 reaching 4.4 million barrels per day. The combination of crude oil and NGPL production and our refining capacity has led the United States to become a major exporter of crude oil and petroleum products.

By the fourth quarter of 2020, EIA expects exports of crude oil and petroleum products from the United States to exceed imports by an average of .9 million barrels per day. However, much of the U.S. crude oil production is light to medium grade, so the United States will continue to import in order to meet the specific needs of U.S. refiners that are optimized to process heavy grades.

In addition, crude oil will be imported to offset infrastructure constraints that limit the movement of produced oil to East and West Coast refineries. As a result of advances in hydraulic fracturing and horizontal drilling, producers are developing shale resources that were previously uneconomical to develop. And tight oil production accounted for 58 percent of total crude oil production in 2018 and will continue to drive U.S. production increases in the long term.

Petroleum liquids are available for export because, as you see on this graph, petroleum consumption has slowed, the brown line, as production has increased. The U.S. will become a petroleum liquids net exporter in the fourth quarter of 2020. The steady increasing U.S. crude oil production contributes to a relatively steady oil price of $73 to $74 per barrel until 2022, after which crude oil prices are projected to steadily rise to $108 per barrel by 2050.

This graph shows that similar developments in domestic shale and natural gas resources enabled the United States to become a net exporter of natural gas in 2017, when natural gas production, the blue line, exceeded consumption, the brown line.

U.S. natural gas production reached a record high of 30 trillion cubic feet in 2018, and EIA expects growth to continue. As natural

gas production continues to grow and exceeds consumption and as liquified natural gas terminals and pipelines are added, net U.S. natural gas exports will continue to grow. And we expect prices to remain below $5 per million BTU through 2015 because the increase in lower cost resources, primarily in the tight oil plays in the Permian Basin, will enable higher production levels at lower prices during the projection period.

Abundant domestic natural gas production and relatively low natural gas prices have also led to changes in the electric power generation, as shown on this graph. Despite relatively flat demand for electricity in the United States during the past decade, this graph shows that natural gas, the brown line, and renewables, the yellow line, are projected to displace less economically competitive sources of electric power generation.

Natural gas became the largest share of electric power generation in 2016. In addition, enabled by technology advances and supportive policies, EIA projects that U.S. wind and solar capacity and generation will continue to grow and surpass nuclear in 2020, the green line, and coal, the blue line, after 2025.

As a result of the fuel mix changes, EIA projects that after 2020, carbon dioxide emissions will remain at least 2 percent lower than the 2020 levels through 2050. This graph shows the downward trend in carbon dioxide intensity by energy use sector. Carbon dioxide intensity is the carbon dioxide emission per unit energy output in BTUs. All end-use sectors—transportation, industrial and commercial and residential buildings—show declines in carbon dioxide intensity as natural gas and renewables' share of the fuel mix continues to increase.

So as I said, this is an exciting and transformational time for the United States energy industry as world energy markets adjust to the United States becoming a major global supplier and exporter for years to come.

Madam Chairwoman and members of the committee, thank you for the opportunity to present this information. And that concludes my testimony.

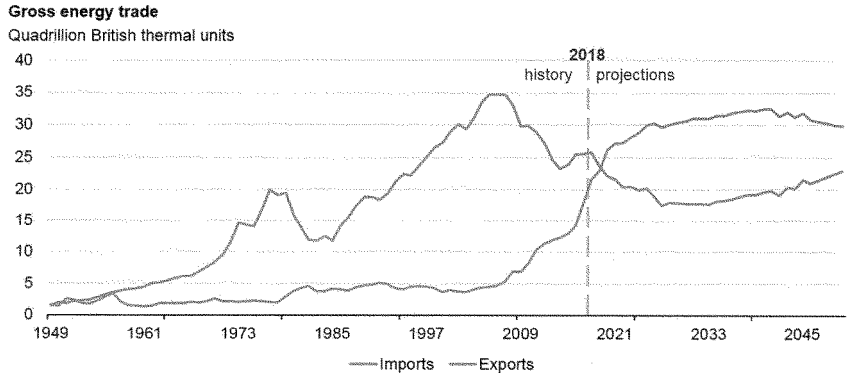
[The information follows:]

Statement of Linda Capuano
Administrator
U.S. Energy Information Administration
U.S. Department of Energy
Before the
Energy and Water Development Appropriations Subcommittee
United States House of Representatives
February 7, 2019

Chairwoman Kaptur, Ranking Member Simpson, Members of the Committee, I appreciate the opportunity to appear before you today to provide testimony on U.S. energy trends.

This is a transformational time for the United States energy industry. After decades of the United States importing more energy than it exports, EIA now forecasts that our country will become a net energy exporter in 2020 (Figure 1). The crossover to being a net exporter occurs as crude oil production continues to increase. The United States produced almost 11 million barrels per day (b/d) of crude oil in 2018, exceeding our previous 1970 record of 9.6 million barrels per day. EIA expects that U.S. crude oil production will continue remain greater than 14.0 million b/d through 2040.

Figure 1. U.S. energy imports and exports, 1949-2050

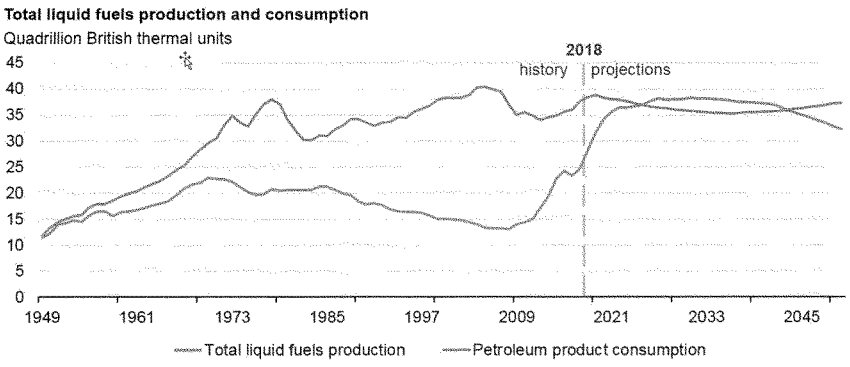


Source: U.S. Energy Information Administration, Monthly Energy Review and Annual Energy Outlook 2019

The U.S. oil and natural gas industry—which consists of natural gas, crude oil, and other liquids production—has seen impressive growth as hydraulic fracturing and horizontal drilling have led to economically competitive development of shale resources that were previously uneconomical to develop (Figure 2). Nearly all of the growth in U.S. crude oil production in 2018

came from tight oil formations, and tight oil production accounted for 58% of total crude oil production in 2018 compared with 53% in 2017. In comparison, tight oil production accounted for less than 7% of total U.S. crude oil output as recently as in 2000.

Figure 2. U.S. liquid fuels production reached historically high levels



Source: U.S. Energy Information Administration, Monthly Energy Review and Annual Energy Outlook 2019

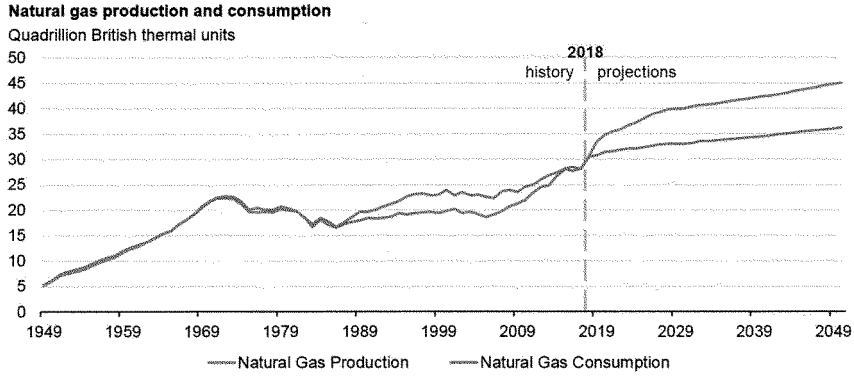
The United States became the world's largest producer of crude oil in 2018, surpassing Saudi Arabia and Russia. Our natural gas plant liquids (NGPL) production, a component of all liquid fuels production, set an all-time high of 4.4 million b/d in 2018. The combined increases in crude oil and NGPL output, coupled with our sophisticated and plentiful refining capacity, have led the United States to become a major exporter of crude oil and petroleum products. By the fourth quarter of 2020, EIA expects exports of crude oil and petroleum products from the United States to exceed imports by an average of 0.9 million b/d. In sharp contrast, the United States imported 6.2 million b/d more crude oil and petroleum products than it exported in 2013.

However, although imports have declined, the United States will continue to import crude oil, particularly heavy and medium crude oil to meet the specific needs of many U.S. refiners. An increasing share of United States crude oil production is expected to be light and sweet oil, but many refineries, such as those on the Gulf Coast, are optimized to process heavy crude oil grades.

In addition to configurational mismatches between production and refining, transportation constraints will also continue to lead refiners to rely on crude oil imports to meet refining capacity. For example, insufficient infrastructure exists to move sufficient crude oil production supply from the Gulf region to meet domestic refinery demand on the East and West Coasts. This robust import-export trade indicates the United States is emerging as a globally significant *merchant refiner*.

Similar developments in domestic shale natural gas resources have enabled the United States to become a net exporter of natural gas. In 2017, total natural gas exports from the United States exceeded imports for the first time since the 1950s. In 2017, U.S. natural gas production exceeded consumption for the first time since 1966 (Figure 3). Since then, U.S. natural gas production has reached a record high of 30 trillion cubic feet (Tcf) in 2018. We expect these trends to continue. As a result, net U.S. natural gas exports will continue to grow as liquefied natural gas (LNG) and pipeline exports increase.

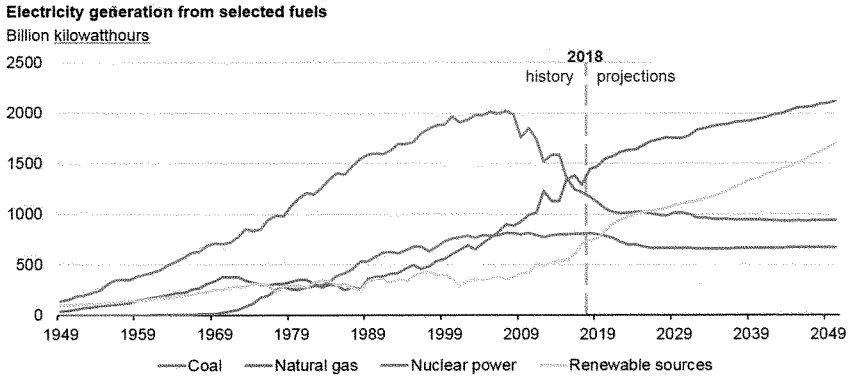
Figure 3. Natural gas production continues to exceed consumption



Source: U.S. Energy Information Administration, Monthly Energy Review and Annual Energy Outlook 2019

Abundant, domestic natural gas production and the resulting relatively low natural gas prices have led to other changes in the U.S. energy landscape. Despite relatively flat demand for electricity in the United States during the past decade, natural gas and renewables displaced less economically competitive sources of electric power generation, and natural gas became the largest share of electric power generation in 2016 (Figure 4).

Figure 4. Natural gas is the dominant fuel for electric power generation



Source: U.S. Energy Information Administration, Monthly Energy Review and Annual Energy Outlook 2019

Technological advances and supporting policies in the production of energy in the United States have also enabled gains in U.S. wind and solar capacity and generation, which have been growing consistently and reached all-time highs in 2018. According to our just-released *Annual Energy Outlook 2019* (AEO2019), under current policies and regulations, EIA's Reference case projects that generation from all renewable sources will surpass nuclear in 2020 and coal after 2025. Most of the growth in renewable generation has come from wind and solar energy. As a result of renewables growth, EIA projects that after 2020, carbon dioxide (CO2) emissions will remain at least 2% lower than the 2020 level through 2050.

Short-term energy trend highlights

Energy commodity prices saw annual increases in 2018 compared with 2017; however, commodity prices ended 2018 lower than they began the year

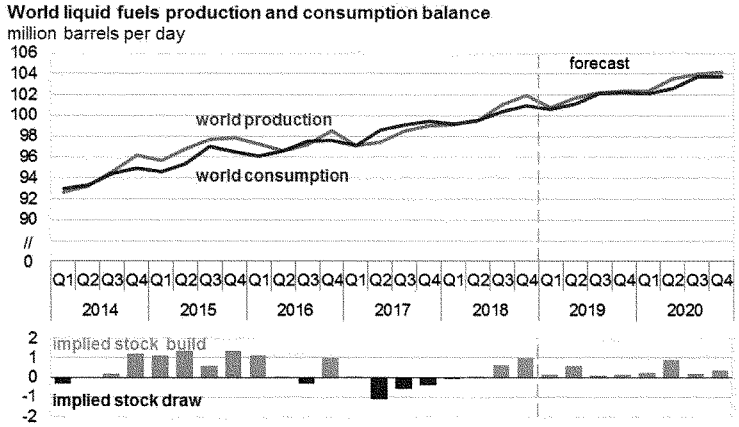
Crude oil prices had been increasing for most of 2018 in response to the increased potential for supply constraints and declining global petroleum inventories throughout much of 2017. The potential supply constraints include the declining Iranian exports as a result of U.S. sanctions targeting its oil sector; declining production in Venezuela; and periodic disruptions from other producers, including Libya and Nigeria.

Brent crude oil reached a four-year high of $86 per barrel (b) on October 4, 2018. However, several factors contributed to the subsequent sharp fall in crude oil prices. Crude oil production in the United States, Russia, and Saudi Arabia increased to or near record highs. Concerns about slowing global economic growth and its impact on oil demand also contributed to recent declines in crude oil prices. Waivers granted to certain countries that import Iranian crude oil also helped to ease concerns about crude oil availability in the near term. Crude oil prices ended 2018 lower than where they started at the beginning of the year for the first time since 2015.

The West Texas Intermediate (WTI) crude oil prices ended 2018 lower than $50/b despite having increased to almost $71/b in July 2018, the highest average monthly price for WTI since late 2014. Prices have remained at about $50/b so far in 2019.

EIA expects that, in the short term, similar market trends will continue to prevail as global oil production is expected to exceed global consumption in 2019 and 2020; however, the global market is expected to become more balanced in 2019 and 2020 (Figure 5).

Figure 5. Oil supply growth continues to slightly outpace consumption growth in 2019 and 2020



Source: Short-Term Energy Outlook, January 2019

Henry Hub natural gas prices remained lower than an average of $3.00 per million British thermal units (MMBtu) in seven months in 2018 and an average of $3.15 per MMBtu for the year. Spot natural gas prices remained lower than$3.00 per MMBtu for much of the year as domestic production reached new record highs, which more than offset the effects of record levels of consumption and exports (Figure 3).

EIA estimates that coal production fell by about 20 million short tons (MMst) in 2018, despite a 19 MMst increase in coal exports. Average coal prices were $2.07 per MMBtu in 2018 and are expected to remain at about that level in 2019 and 2020. Low natural gas prices have primarily contributed to reduced demand for coal in the United States, with coal accounting for 28% of total U.S. electricity generation in 2018, compared with 45% in 2010. Natural gas accounted for 35% of total U.S. electricity generation, compared with 24% in 2010.

Residential sector retail electricity prices averaged 12.9 cents/kilowatthour in 2018, and prices are expected to rise to 13.3 cents/kilowatthour in 2019. Similarly, industrial and commercial electricity prices are expected to rise in 2019.

Among renewable sources, hydroelectricity continued to provide the most electricity generation in 2018, with wind generation trailing only slightly behind that of hydroelectricity. EIA expects that wind generation will exceed that of hydroelectricity in 2019. Overall, renewable generation provided 17% of total U.S. electricity generation in 2018.

Long-term energy trend highlights

EIA's *Annual Energy Outlook 2019* (AEO2019), released on January 24, 2019, projects that the United States will become a net energy exporter in 2020 and is projected to remain so through 2050 as a result of large production increases in crude oil, natural gas, and natural gas plant liquids (NGPL) coupled with slower growth in U.S. energy consumption.

The United States produced 10.9 million barrels per day (b/d) of crude oil in 2018, passing the 10 million b/d mark for the first time and surpassing the previous record of 9.6 million b/d set in 1970, according to the *Short-Term Energy Outlook*, January 2019. The growth in liquid fuels production is projected to continue through 2050. In the short term, EIA also forecasts the United States to be a net exporter of petroleum in the fourth quarter of 2020, with liquid fuel net exports exceeding crude oil net exports by nearly 0.9 million b/d.

Similarly, natural gas production reached an all-time high in 2018. Production of natural gas and NGPL is expected to have the highest growth of all fossil fuels and account for nearly one-third of U.S. liquids production through 2050. Natural gas prices are projected to remain comparatively low through 2050, leading to increased use of natural gas across end-use sectors as well as increasing LNG exports.

The electric power sector is projected to see a notable shift in fuel mix. Growth in solar, wind, and natural gas-fired electricity generation is projected to be accompanied by additional retirements of coal and nuclear power plants. As a result of this changing fuel mix, the electric power sector is projected to see a steady decrease in carbon dioxide (CO2) intensity after 2030. Carbon dioxide intensity refers to CO2 emissions per unit of energy output in British thermal units.

Total energy

The United States becomes a net energy exporter in 2020

The United States is projected to become a net energy exporter in 2020 in the AEO2019 Reference case for the first time since the 1950s. The projected changes are driven mostly by evolving trade flows of liquid fuels and natural gas. The United States will remain a net energy exporter through 2050, as increases in domestic crude oil, natural gas, and natural gas plant liquids production continue to outpace growth in domestic consumption of petroleum products.

EIA projects that energy exports will exceed imports until the 2040s, when falling domestic crude oil production leads to a decrease in exports, and a growing U.S. economy and higher domestic gasoline consumption leads to an increase in imports.

Although the United States is expected to become a net energy exporter, heavy and medium crude oil will continue to be imported through the projection period to meet the needs of many U.S. refiners. Much of the United States' crude oil production growth is expected to be light

and sweet (low sulfur) crude oils, but many U.S. refineries, such as those along the Gulf Coast, are optimized to process heavy, sour (high sulfur) crude oil grades.

In addition to configurational mismatches between production and refining, transportation constraints also will continue to cause refiners to rely on crude oil imports to meet refining capacity. For example, insufficient infrastructure exists to move sufficient crude oil production supply from the Gulf region to meet domestic refinery demand on the East and West Coasts.

The United States will continue to be a net exporter of coal and coke, but exports are not expected to increase because of competition from other global suppliers closer to major consuming markets.

Petroleum liquids production

U.S. crude oil and natural gas plant liquids production exceeds their peak 1970 levels; consumption of petroleum liquids remains lower than its 2004 peak level

The United States is now the largest producer of crude oil in the world. According to AEO2019 projections, U.S. crude oil production will continue to grow as upstream producers increase output because of rising prices and cost reductions.

U.S. crude oil production continues to set annual records, exceeding 14.0 million b/d in the mid-2020s and remaining higher than that level through 2040. The continued development of tight oil and shale gas resources, particularly those in the East and Southwest regions, supports growth in NGPL production. NGPL production, already at a record high, is projected to grow in the long term, exceeding 6.0 million b/d before 2030.

Petroleum product consumption is projected to remain mostly steady through the projection period, although projected consumption is sensitive to changes in assumptions regarding oil prices and economic growth.

As a result of increasing crude oil and other petroleum liquids production and relatively unchanged petroleum product consumption, the United States is projected to be a net exporter of petroleum on a volume basis from 2020 to 2049.

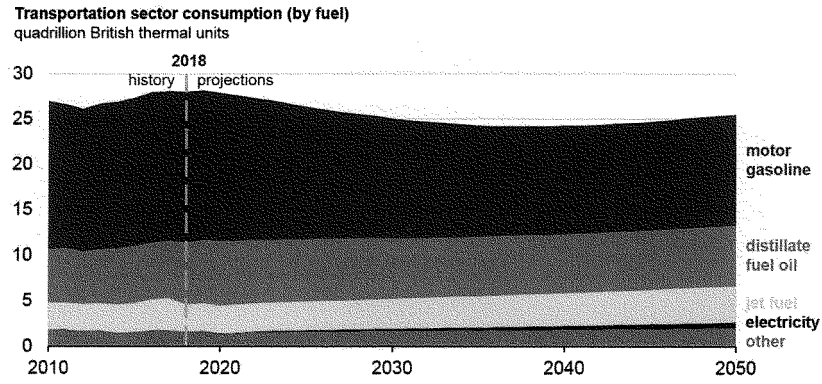
Petroleum liquids consumption

Transportation energy consumption generally declines between 2019 and 2037 as fuel economy increases offset growth in vehicle miles traveled

Figure 5 shows jet fuel energy consumption will grow more than any other transportation fuel during the projection period as increases in GDP lead to growth in air transportation that outpaces increases in aircraft fuel efficiency. Electricity use in the transportation sector starts from a relatively low base and continues to grow through 2050.

Motor gasoline and distillate fuel oil's combined share of total transportation energy consumption decreases through 2050 as a result of gains in energy efficiency supported by current laws and regulation. However, assuming no further policy actions, increases in fuel economy standards are projected to reduce the total consumption of motor gasoline through the mid-2020s.The plateauing of mandated energy efficiency gains after 2027 and the increase in vehicle miles traveled (VMT) as the economy continues to grow, results in motor gasoline consumption increases in the second part of the projection period (Figure 6).

Figure 6. Transportation sector consumption declines through 2037



Natural gas

Natural gas production growth outpaces natural gas consumption growth

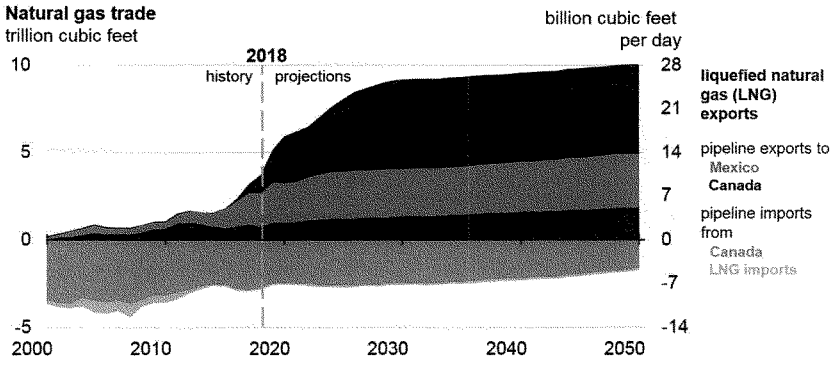
Domestic natural gas production increases through the projection period, driven by tight and shale natural gas production. The size of the associated resources and the improvements in technology allow for the development of tight and shale resources at lower costs. In particular, the eastern United States is projected to drive the growth in natural gas output, followed by production growth along the Gulf Coast. Dry natural gas production reaches 43.4 trillion cubic feet (Tcf) by 2050.

Growth in drilling in the Southwest region drives increases in natural gas production from tight oil formations. Because drilling activity in oil formations primarily depends on crude oil prices rather than on natural gas prices, the increase in natural gas production from oil-directed drilling puts downward pressure on natural gas prices.

Offshore natural gas production in the United States remains mostly unchanged during the projection period as production from new discoveries generally offset declines in legacy fields.

The projected growth in U.S. natural gas consumption, although significant, is not expected to keep pace with production growth, allowing net natural gas exports to continue to grow through 2050 (Figure 7). As additional LNG export terminals are constructed, growth in exports is projected to be led by waterborne trade, but LNG exports will remain highly sensitive to crude oil and natural gas prices.

Figure 7. Net exports of natural gas will continue to grow through 2050



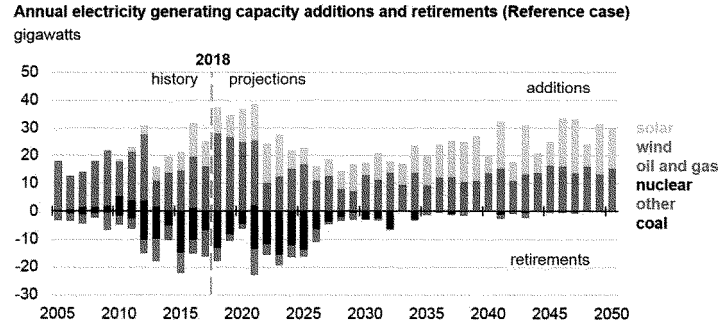
Electric power

Electric power and industrial demand drive natural gas consumption
Continued, relatively low natural gas prices will lead to increasing use of natural gas across most end-use sectors. The industrial sector is projected to be the largest consumer of natural gas, as the chemical industry and industrial heat and power grow through the projection period.

Relatively low natural gas prices also lead to higher use of natural gas for electric power generation. Natural gas-powered generation is projected to grow through the projection period and remain the largest fuel by share in this sector through 2050 under current laws and regulations in the Reference case.

Additions to electric power generation will be met by natural gas and renewables
Generation from renewable electricity sources, including hydroelectricity, grows the most during the projection period. This growth is initially supported by various tax incentives that are scheduled to phase out through the 2020s. Without further policy incentives, renewable generation continues to grow, but at a slower rate, as capital costs to construct new generating capacity continue to decline.

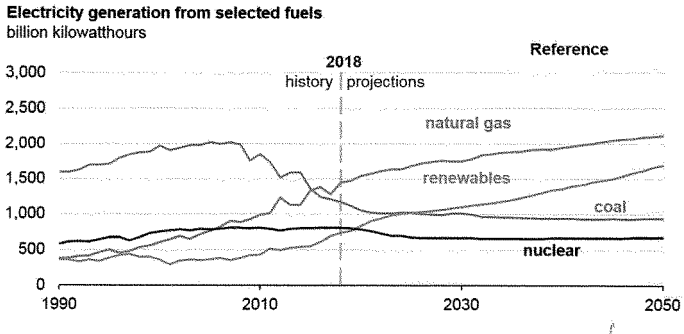
Figure 8. Natural gas and renewables additions dominate



Although coal and nuclear continue to decrease in nearly all cases, these fuels will continue to play a role in the U.S. electricity generation mix through the projection period. Renewable electricity generation surpasses nuclear generation in about 2020 and surpasses coal in about 2025 (Figure 9).

Long-term trends in capacity additions for electricity generation are dominated by the addition of solar and natural gas capacity. Wind capacity additions are more modest, while less economically competitive coal, nuclear, and natural gas plants are expected to see capacity retirements. About 42% of coal-fired capacity and about 22% of current nuclear capacity is projected to retire by 2050.

Figure 9. Electric power generation mix sees a transformation in the medium term



Natural gas prices and policy incentives drive the growth in electricity generation fuel mix. In the AEO2019 Reference case, relatively low natural gas prices lead to natural gas-powered generation growing steadily and remaining the dominant fuel through 2050. However, because of the high sensitivity to natural gas prices, the AEO2019 also modeled a high natural gas price case where renewables are projected to become the leading source of electricity generation by 2030.

Carbon dioxide

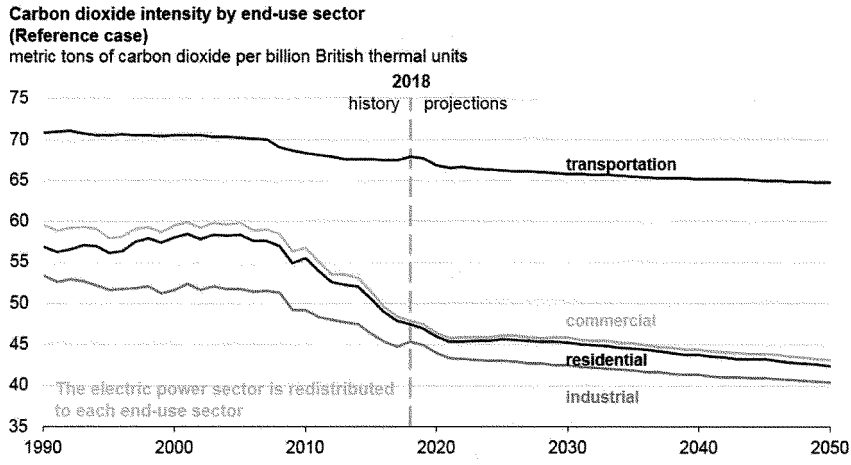
Despite overall increases in energy consumption, carbon dioxide intensity declines across end-use sectors

Changes in the fuel mix primarily drive the lower carbon dioxide (CO2) intensity, which can vary greatly depending on the mix of fuels consumed in each sector. For example, the generation fuel mix in the electric power sector now relies on less carbon-intensive sources, such as natural gas and renewables. In contrast, a decade ago, the electric power sector relied on coal as a feedstock. Given the projected trends in the electric power sector fuel mix, CO2 emissions will continue to decrease through 2050.

In 2018, CO2 emissions increased by 3% as a result of increased energy consumption. Consumption rose as a result of robust economic growth and unfavorable weather conditions. EIA projects that emissions will remain at least 2% lower than the 2020 level across the projection period. However, EIA projects that energy-related CO2 emissions will initially decline through 2040 and then increase in the last decade of the projection period. This pattern primarily follows petroleum emissions. Petroleum emissions are projected to decline until 2040, but they will then rise as vehicle miles traveled increase and motor gasoline consumption begins to increase again toward the end of the projection period. The increase in gasoline consumption is a result of current regulations not requiring additional fuel efficiency increases after 2027. This projection is highly uncertain because many fuel efficiency standards are currently under discussion.

Natural gas CO2 emissions are projected to increase through 2050, and coal-related CO2 emissions are projected to decline as coal-fired electric power plants retire. The generation fuel mix in the electric power sector has changed significantly since the mid-2000s, with lower generation from high-carbon intensive coal and higher generation from natural gas and carbon-free renewables, such as wind and solar. This change resulted in the overall CO2 intensity of the electric power sector declining by 25% from the mid-2000s to 2018 and continuing to decline through 2050. Electric power, however, can be considered in the context of each end-use sector, and Figure 10 shows CO2 intensities with the electric power sector redistributed to each end-use sector. Carbon intensities are calculated as carbon dioxide emissions per unit energy output in British thermal units.

Figure 10. Carbon dioxide intensity by end-use sector



Note: Carbon dioxide intensities are calculated as carbon dioxide emissions per unit energy output (in British thermal units).

About EIA

The U.S. Energy Information Administration (EIA) was established by the Department of Energy Organization Act of 1977 as the primary federal government authority on energy statistics and analysis. EIA is one of the 13 principal federal statistical agencies and is responsible for collecting, analyzing, and disseminating relevant, accurate, and timely energy information to inform public and private decision making.

EIA neither formulates nor advocates policy conclusions; and, by law, its data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government. Therefore, EIA reports should not be construed as products of the U.S. Department of Energy or other federal agencies.

EIA *Annual Energy Outlook* (AEO) and *Short-Term Energy Outlook* (STEO)

EIA prepares short- and long-term energy outlooks. The *Short-Term Energy Outlook* (STEO) examines trends over the next one to two years. The *Annual Energy Outlook* (AEO) models projections over the long-term.

EIA's AEO2019 was released on January 24, 2019. The AEO is the annual report on the long-term outlook for the energy system of the United States and provides data projections through 2050. Like all modeled projections and forecasts, the AEO2019 projections depend on input assumptions that are highly uncertain. However, the Reference case assumes current laws and

regulations remain unchanged during the projection period, which makes it useful as a baseline that can inform potential future policy discussions.

EIA's STEO is a monthly forecast covering the current and upcoming calendar year, and it provides monthly forecast data for supply, consumption, and prices across energy commodities. The STEO published January 15, 2019, is the first to include forecasts for 2020.

Conclusion

This is an exciting and transformational time for the United States energy industry as world energy markets adjust to the United States becoming a major global supplier and exporter for years to come.

Madam Chairwoman and Members of the Committee, thank you for the opportunity to present this information. This concludes my testimony.

Energy trends and outlook



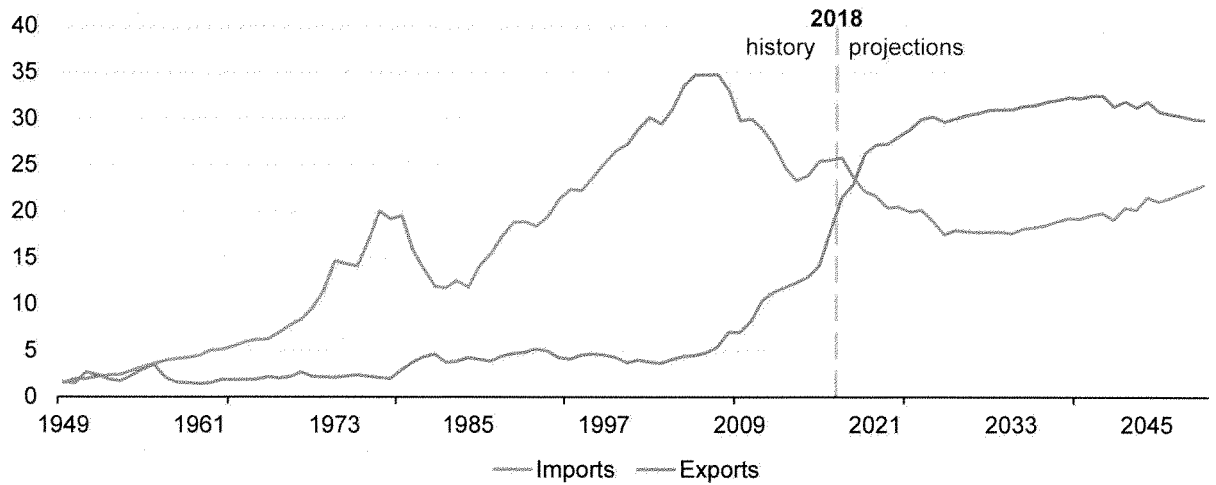
For
House Appropriations Committee
Subcommittee on Energy and Water Development
February 7, 2019 | Washington, DC

By
Dr. Linda Capuano, Administrator

Following decades of net energy imports, EIA forecasts that the United States will become a net energy exporter in 2020

Gross energy trade

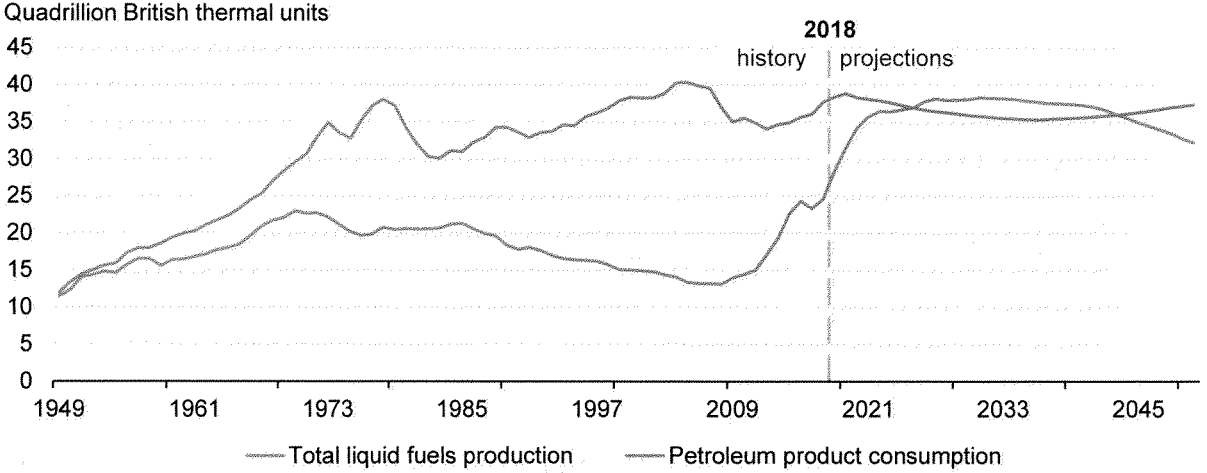
Quadrillion British thermal units



Source: U.S. Energy Information Administration, Monthly Energy Review and Annual Energy Outlook 2019

U.S. petroleum liquids production exceeded the previous record set in 1970 as technology innovation transformed the oil industry in less than a decade

Total liquid fuels production and consumption

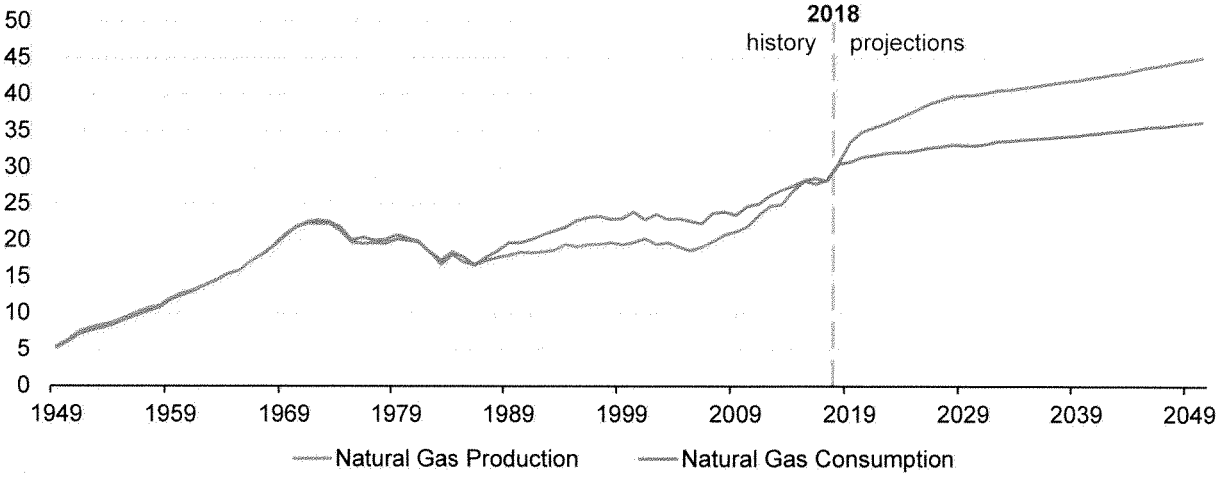


Source: U.S. Energy Information Administration, Monthly Energy Review and Annual Energy Outlook 2019

Driven by shale gas development, U.S. natural gas production exceeded consumption in 2017 for the first time since 1966

Natural gas production and consumption

Quadrillion British thermal units

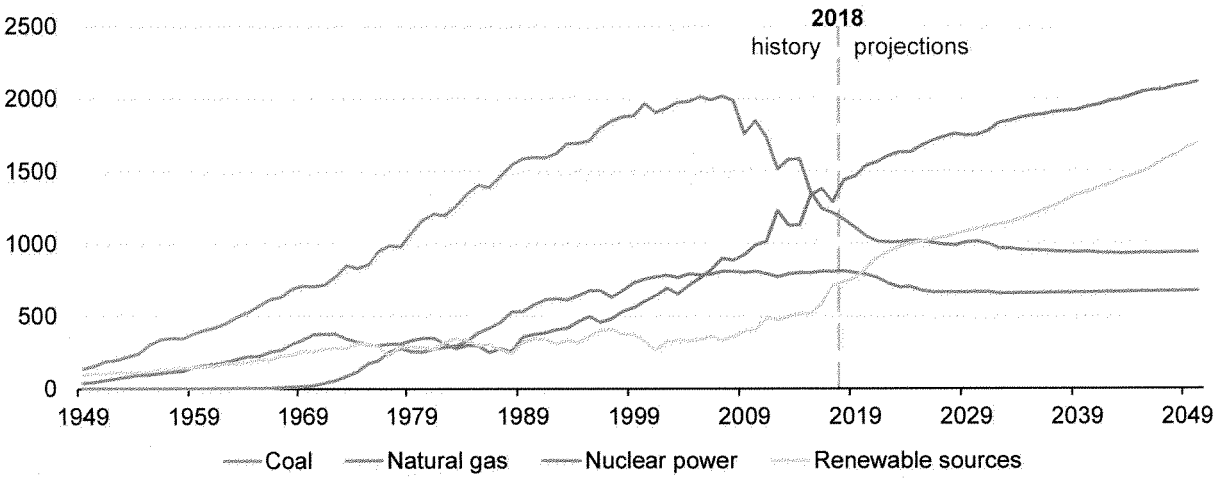


Source: U.S. Energy Information Administration, Monthly Energy Review and Annual Energy Outlook 2019

U.S. natural gas-fired electric power generation displaced coal in 2016, mainly as a result of low natural gas prices

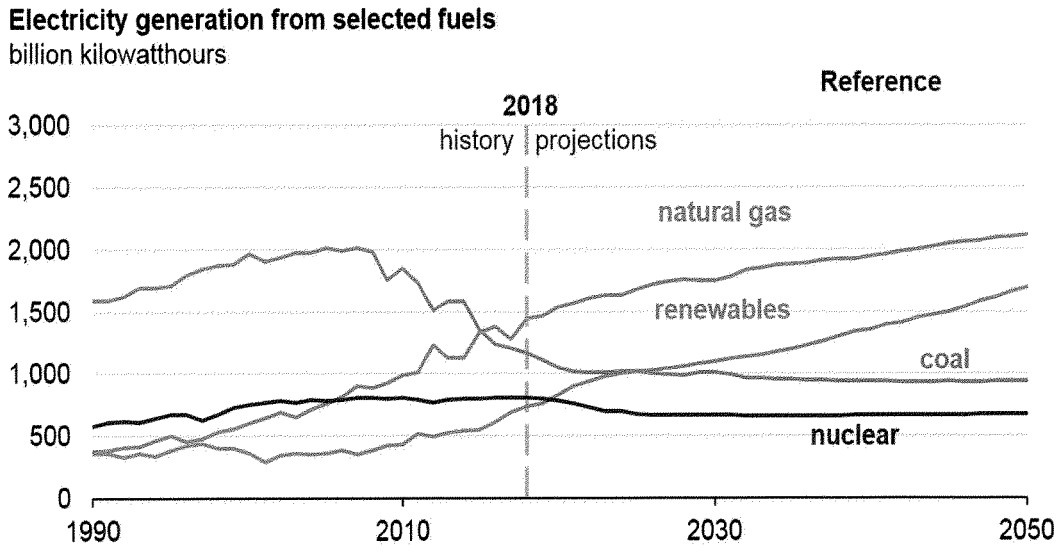
Electricity generation from selected fuels

Billion kilowatthours



Source: U.S. Energy Information Administration, Monthly Energy Review and Annual Energy Outlook 2019

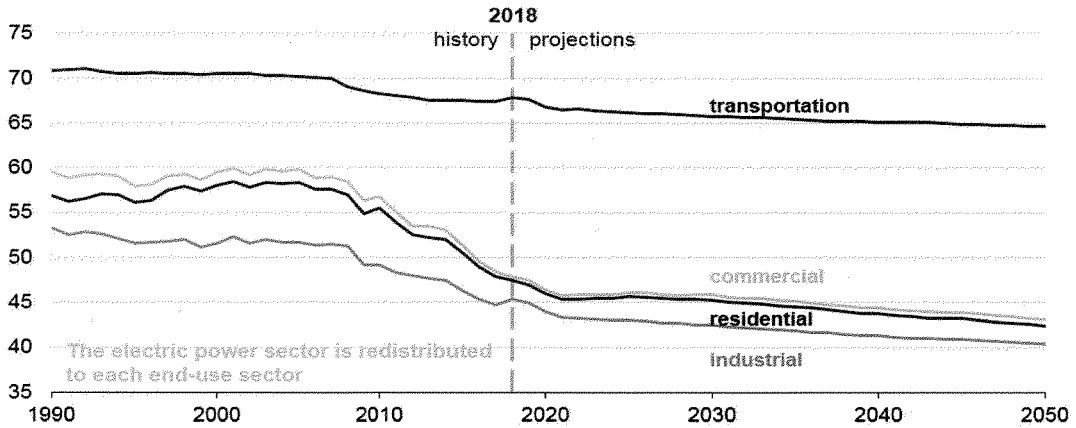
Electric power generation fuel mix



Source: U.S. Energy Information Administration, Annual Energy Outlook 2019

Carbon dioxide intensity by end-use sector

Carbon dioxide intensity by end-use sector
(Reference case)
metric tons of carbon dioxide per billion British thermal units



Note: Carbon dioxide intensities are calculated as carbon dioxide emissions per unit energy output (in British thermal units).

Source: U.S. Energy Information Administration, Annual Energy Outlook 2019

For more information

U.S. Energy Information Administration home page | www.eia.gov

Annual Energy Outlook | www.eia.gov/aeo

Short-Term Energy Outlook | www.eia.gov/steo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer

Today in Energy | www.eia.gov/todayinenergy

State Energy Profiles | www.eia.gov/state

Drilling Productivity Report | www.eia.gov/petroleum/drilling/

International Energy Portal | www.eia.gov/beta/international/?src=home-b1

Ms. KAPTUR. Thank you so very much, Dr. Capuano.

Dr. Hakes, please begin.

Mr. HAKES. Thank you. I would like to thank Chairwoman Kaptur and Ranking Member Simpson for their invitation today.

As has been said, many people trace modern energy policy back to the Arab oil embargo which lasted from October 1973 to March of 1974. And some people of us still remember the long gasoline lines of that time. But it was just one of—if we could go ahead to charts—it was just one of many things that happened in the seventies that disrupted the oil market, including the fall of the Shah and other things.

During this period, energy attracted the attention of Presidents and Congresses. Presidents Nixon and Ford called for energy independence. Jimmy Carter declared energy the moral equivalent of war. Congress passed the Energy Policy and Conservation Act in 1975, President Carter's energy package in 1978, and other energy legislation with large bipartisan votes.

In addition, Congress created the Department of Energy in 1977, and by that time, the Congress had already broadened the mission of the national nuclear labs to include other forms of energy, and they became much more broader-based science labs.

Some Federal policies during this period, such as Federal price controls and allocation, produced more problems than they solved. Let's recognize the actions of the 1970s left legacies that proved valuable in later years. A partial list would include—if we could go to the next slide. That is—you probably have already seen this, but this is the graph that the American Association for the Advancement of Science prepares every year, and it is the nondefense research budget, and you can see energy is that green part of the bar, and there is this huge spike up in the late seventies, which is a delayed reaction actually to the Arab oil embargo, and you can see it really tapered off. It is hard to believe, but in the late seventies, energy was pretty much equal with health and research spending. You can see today that is not the case.

But as we go on, we can see other things that happened in that period. If we go to the next slide. And things like the strategic petroleum reserve. If we go to the next slide, we can see automobile efficiency standards. These were all new approaches to energy, and in some cases, they produced results that have been overlooked by historians.

And if we go to the next slide, we did, from the late seventies to the mid eighties, at least till 1985, have—our oil imports were cut in half, from 8.6 million barrels a day to 4.3, and we were building the strategic petroleum reserves. So for a time, the U.S. had become more energy independent.

The years of heightened interest in energy also planted many seeds. If we can go to the next slide. This is the installation of the old-fashioned thermal solar panels on the White House in June of 1979. And at the time, President Carter set a goal of 20 percent renewable energy by the year 2000. For many years, however, the dream that advanced photovoltaic solar panels would play a major role in U.S. energy supply remained a road not taken. In recent years, though, we have seen a solar boom and an even bigger boom in wind.

And if we can go to slide eight. This is just for large capacity solar, but if you want a dramatic line graph, I would say that falls in the category of a dramatic line graph.

And as part of this, if we go to the next slide, that is a solar farm in the background there in Plains, Georgia, and southern company, Georgia Power, built a one-megawatt facility on Carter's property. That is a personal photo. I was one of the speakers at that event. And I would say that he probably felt a little bit of vindication seeing his former peanut land now producing solar energy.

There is a similar story for hydro-fracturing, actually, that has also been overlooked. The Ford and Carter administrations both provided technical assistance, R&D, and tax incentives to encourage the development of what was called unconventional resources. These early actions helped the brilliant Texas oil man George Mitchell persevere in his long struggle to make the new technology market competitive. Again, it was not until the 21st century that we witnessed the fracking boom that revolutionized American energy production.

Energy trends have gone through many ebbs and flows since the Arab embargo. My written testimony provides some additional information on the later years. In addition, I will, of course, be happy to answer any questions that you have.

[The information follows:]

Foundations of Modern U.S. Energy Policy

Testimony of

Jay Hakes

Before

U.S. House of Representatives

Energy & Water Appropriations Subcommittee

February 7, 2019

I would like to thank Chairwoman Kaptur and the other members of the committee for their invitation to discuss historical perspectives on the state of energy in America today.

My federal experience on energy issues goes back to the Carter administration and later included seven years as Administrator of the U.S. Energy Information Administration, the government's premier source of energy data and analysis. More recently, I have spent considerable time relooking at major data series and visiting numerous presidential libraries to better understand the links between the country's energy past, present and future. Some of my findings are presented in my book *A Declaration of Energy Independence: How Freedom from Foreign Oil Can Improve National Security, Our Economy, and the Environment* (SLIDE 1) and numerous articles.

U.S. Energy Policy After the Arab Oil Embargo

Many energy experts trace modern energy policy to the Arab Oil Embargo, which lasted from October of 1973 to March of 1974. This period evokes memories of frustrated motorists having to wait in line for hours to purchase gasoline, if they could find it at all. Some people were even placing their personal storage tanks in their yards or car trunks. On another level, the image of America held hostage by a newly empowered oil cartel reflected a perceived decline in U.S. global influence, which had rested, in part, its ample energy resources and the ownership of massive reserves abroad through major international companies.

Moreover, numerous other disruptions in the Middle East during the decade, either directly or indirectly, impacted the supplies and prices of gasoline in the United States (SLIDE 2). As the Organization of Petroleum Exporting Countries (OPEC) continued with lower levels of production, even after the embargo ended, the upward pressure on oil prices contributed to high rates of inflation and economic turmoil around the world.

These challenges helped focus the attention of the White House, the Congress and the public on the need to address the national security, economic and (as the historic clean air legislation of 1970 took effect) environmental challenges of energy. Energy became a major topic in the news. Presidents gave nationally televised addresses on the need for "energy independence" (Richard Nixon and Gerald Ford) and declaring energy "the moral equivalent of war" (Jimmy Carter). How to deal with energy was not without controversy, especially during the clash over deregulation of natural gas prices. Still, Congress passed the Energy Policy and Conservation Act of 1975 (under President Ford), President Carter's energy package of 1978, and the Energy Security Act of 1980 with overwhelming bipartisan support. In addition, Congress created the Department of Energy in 1977 and broadened the mission of the national nuclear labs to include other forms of energy, such as wind and solar. Motorists, at least for a while, complied with a federal speed limit of 55 mph.

Some federal policies during this period produced more problems than they solved. Price controls and federal allocation of fuels, for instance, inhibited the flexibility of energy markets and made the energy crises of the 1970s worse than they would have been without such federal intervention. Ford and Carter started the process of decontrolling oil prices. Ronald Reagan quickly finished the job of deregulation.

Less recognized, the actions of the 1970s left numerous legacies that proved valuable in later years. A partial list would include:

- An expansion of federal spending on energy research & development to record levels (before or since) that advanced many important technologies (SLIDES 3 and 4).
- The Strategic Petroleum Reserve, which provides stocks of crude oil available for emergencies (with most additions to the reserve coming during President Reagan's administration).
- Better insulation of buildings, which sharply reduced the waste of energy.

I would also include:

- Automobile efficiency (Corporate Average Fuel Efficiency or CAFE) standards that reduced the amount of oil needed for transportation (SLIDE 5).
- Cooperative arrangements with other industrialized nations to reduce dependence on Middle Eastern oil.
- Backing out oil from most electric generation.
- Allowing motorists to turn right on red lights (traffic permitting) to reduce fuel consumption from idling, a practice taken for granted today.

These new approaches to energy, along with higher energy prices, led to major results that for a long time were overlooked by historians. Most strikingly, from 1977 to 1982, the United States slashed its net imports (imports minus exports) of oil from 8.6 million barrels per day to 4.3 mbd (SLIDE 6). Due to big cuts in oil consumption in the U.S. and other industrialized nations, in tandem with added production in Mexico and the North Sea, OPEC lost its clout in world markets. The United States, with much lower imports and a growing petroleum reserve, achieved (for a time) a considerable measure of energy independence.

The years of heightened interest in energy also planted many seeds – some of which bore no fruit at all and others that led to major advances decades later. In June 1979, Carter dedicated an array of old-fashioned solar thermal panels on the roof of the White House (SLIDE 7) and set a national goal of 20 percent renewable energy by the year 2000. Moreover, he and the Congress established strong tax incentives and research programs for all forms of renewable energy help reach that goal. For the many years, however, the dream that more advanced photovoltaic solar panels would play a major role in U.S. energy supply remained "a road on taken." In recent years, though, we have seen the arrival of a solar boom (and an even bigger boom in wind). The growth in solar in the past eight years has been, after decades of delayed market penetration, has been dramatic (SLIDE 8). EIA projects this trend will continue in the coming years. In 2017, Carter, at the age of 92, dedicated a ten-acre solar farm on ten acres of formerly agricultural land. That project now feeds 1 MW into the Georgia Power (Southern Company) grid (SLIDE 9). The former president was obviously very pleased to be part of the belated solar revolution.

The growth of hydro fracturing (fracking) of oil and gas followed a similar path. During the Ford and Carter administrations, the federal government provided technical geological assistance, R&D, and tax incentives to encourage the development of "unconventional resources." These early actions helped the brilliant Texas entrepreneur George Mitchell persevere in his long struggle to make fracking market competitive. It was not until the 21st century that we witnessed the oil and gas boom that revolutionized American energy production.

Later Developments in Energy

After 1985, low energy prices and stable supplies led to a decline in American interest in energy policy. Reliance on foreign oil began to rise once again. Indeed, a big boost in production by Saudi Arabia during the first war with Iraq was needed to avoid a major oil shortage. Net oil imports – at a low point of 27 percent in 1985 later reached 60 percent after the turn of the century. During this period of some complacency about energy, there were, nonetheless, several important adjustments in U.S. energy policy. A few of these (SLIDE 10) were:

- Appliance efficiency standards began in the late 1980s and helped reduce the tie between economic growth and energy consumption.
- In the early 1990s, the U.S. Energy Information Administration became one of the first federal agencies to put its data and analysis on the web, which contributed to greater accessibility of its information by policymakers and the public and to the more efficient operation of energy markets. (Some in the Congress wanted to put EIA behind a pay wall, but the House Appropriations Committee played a major role in stopping the idea.)
- The Environmental Protection Agency phased in higher standards for clean air, which had important ramifications for energy industries.
- In 2005, the Congress passed legislation to encourage a revival of the nuclear industry and expanded use of biofuels.

It was not until 2007, however, that Congress passed another broad-based energy bill with strong impacts. Security issues after 9/11, the revived clout of OPEC, high oil prices and environmental concerns all contributed to a renewed focus on energy. One feature of the Energy Independence and Security Act was its rejuvenation of auto efficiency standards, which had not been increased

since the late 1980s. Another provision was escalating efficiency standards for lighting that would phase out traditional incandescent bulbs, invested by Thomas Edison in 1880. As a result, more efficient, longer lasting Light-Emitting Diode (LED) bulbs now dominate the lighting market. This energy legislation passed the Senate by a comfortable vote of 86 to 8 and the House 314 to 100.

The years of Barrack Obama and Donald Trump have experienced energy issues as a frequent source of contention. This period is, perhaps, a topic best left to a separate analysis. In short, President Obama promoted aggressive R&D across a broad range of fuels ("all of the above") and used his rule-making authority, often under the Clean Air Act, to expand environmental protection. President Trump has moved to repeal or weaken many of the regulations of recent years and stressed his commitment to protect the American coal industry against the forces that have led to its rapid decline.

It would be a mistake to focus entirely on federal policies when examining energy trends in recent decades. States have been active in adopting many of their own responses to the modern challenges of energy. The most noteworthy has been the adoption of renewable portfolio standards that require a minimum percentage of electric power come from (generally) wind and solar (SLIDE 11). Iowa was the first state to establish an RPS and Hawaii has the most aggressive standard of 100 percent renewables by 2045. RPS policies exist in 29 States and the District of Columbia. Many adopting this strategy are part of the "wind belt" in the central part of the country. Texas generates the most wind power, with Iowa and Oklahoma ranking second and third. Other states are located where solar resources are abundant. California, North Carolina, and Arizona have installed the most solar capacity.

The Modern Energy Revolution and an Agenda for the Future

As mentioned previously, the past dozen years have seen the most dramatic reversals in energy trend lines in American history. Most have delivered important benefits for national security, the economy and the environment. Most experts failed to anticipate the extent of these changes or even the direction of the change.

The major barometer of this change is the decline in net energy imports (SLIDE 12). As late as 2007, net imports stood at 60 percent. As of last year, they had fallen to 13 percent – back to the level of the late 1950s! My book, published in 2008, suggested that it was in the national interest to get net imports out of the danger zone of 60 percent to something in the range of 30 percent. A few commentators viewed my scenario as "Pollyannaish." In fact, I had not fully understood how low imports could go. The new situation depends on the free trade of imports and exports and does not remove the United States from international market and political forces. It does, however, reduce the chances that the American economy can be held hostage by a foreign power.

During this same period, the country experienced a boom in the production of oil and gas that has led to exports of oil (a ban on the export of crude oil was not lifted until December 2015) that helped offset supplies that were still imported. The increases in U.S. production (with estimates for 2018) have been:

- Natural gas up 45 percent.
- Oil up 115 percent.

As these historic surges began, the book market was flooded with warnings of "peak oil." They argued that the production of oil was in a steady decline that could not be reversed. With rapid advances in technologies, these dire forecasts were rendered inoperative.

The energy boom has included wind and solar power. These resources started from a tinier base than oil or gas. The increases since 2007 are, nonetheless, extremely impressive (again, with estimates for 2018):

- Wind up 660 percent.
- Solar up 1,380 percent.

Ironically, the documentary film "A Road Not Taken" about the failure of solar energy to match the aspirations of the 1970s was released in 2010.

Meanwhile, energy consumption has plateaued since 2007, suggesting that sustained energy efficiency can help break the link between economic growth and energy use.

As is often the case, the past provides insights on future directions. Solar power, batteries for storage of intermittent energy, and electric vehicles are, to various degrees, penetrating the market. These three technologies benefit national security, the economy and the environment (including the atmosphere). Fortunately, each of these are still "immature" technologies, meaning there is plenty of room for sustained improvements in efficiencies and cost. One goal of national energy policy should be to build on the momentum that already exists and expedite deployment of these technologies to the extent possible.

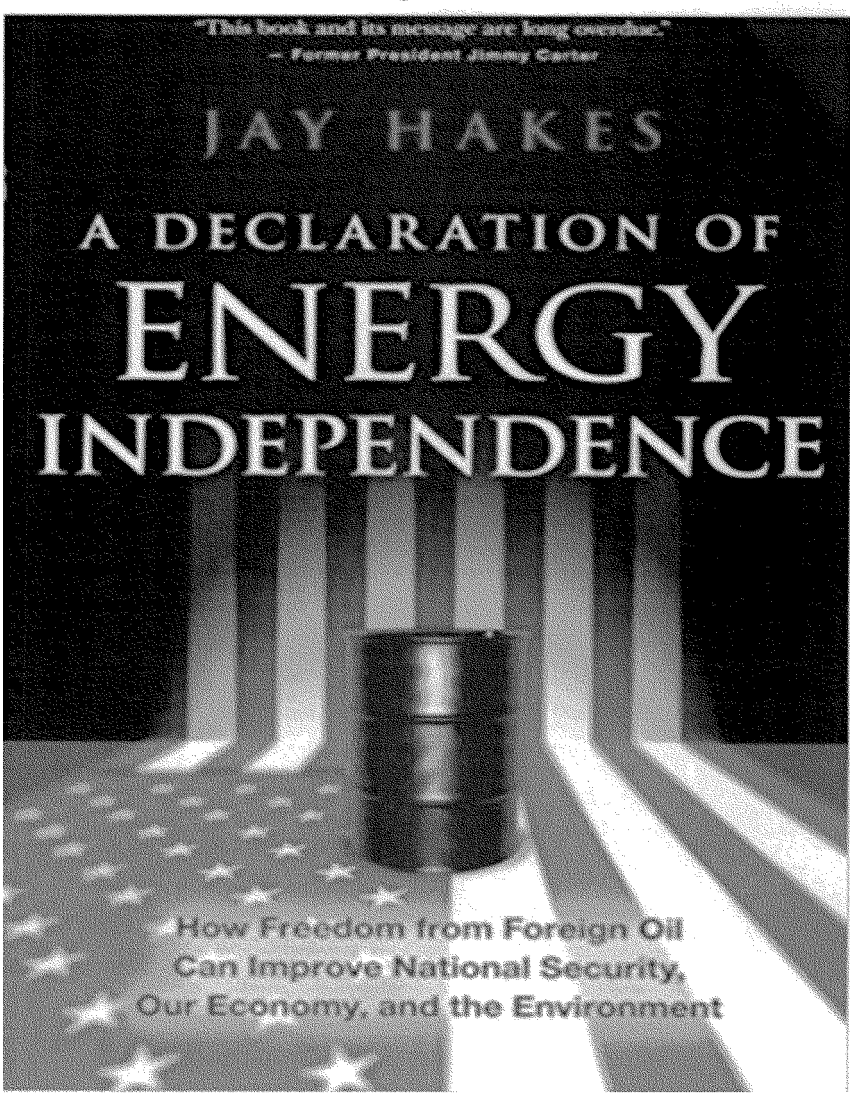
I would add another technology to the list of those that merit extra support. Long-time observers of electric generation often advise against "putting all our eggs in one basket." Recognizing that renewables with storage will be able to play a much greater role as technology progresses, maximizing the reliability of the grid probably will require at least one other source of power. One option might be natural gas plants with sequestration of carbon emissions. This is certainly feasible technically. However, it will take more R&D and considerable time before it can penetrate the market at significant levels.

I am, of course, happy to answer any questions from the committee today or later.

Bio: Jay Hakes is a writer and speaker based in New Orleans specializing in the history of U.S. energy policy, climate change and the American presidency. He is the author of *A Declaration of Energy: How Freedom from Foreign Oil Can Improve National Security, Our Economy, and the Environment* and numerous articles. During his career in government, he held numerous positions dealing with energy: Assistant to the Secretary of Interior, Director of the Florida Governor's Energy's Energy Office, Administrator of U.S. Energy Information Administration, and Director of Research and Policy for the report *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling*. He also served for thirteen years as Director of the Jimmy Carter Presidential Library in Atlanta. Hakes holds a PhD from Duke University.

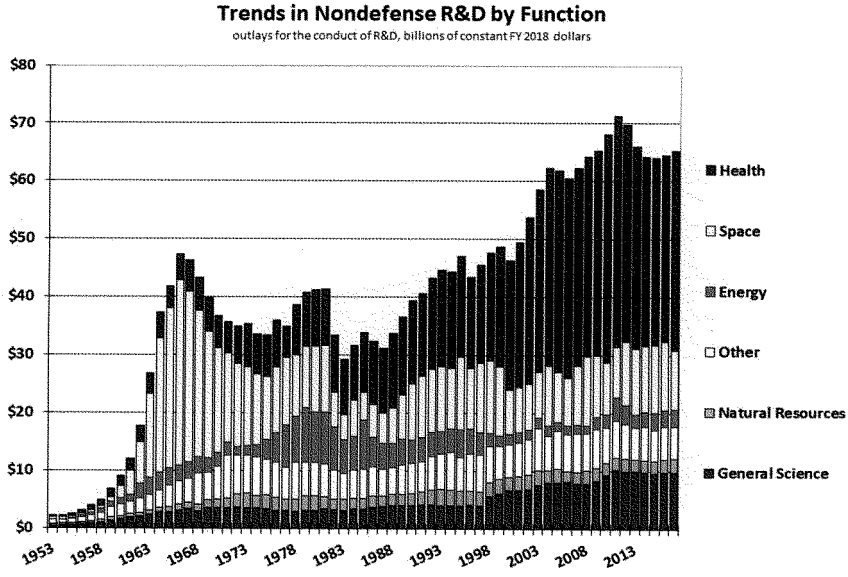
(Slides 1-12 on following pages)

1


"This book and its message are long overdue."
– Former President Jimmy Carter
JAY HAKES
A DECLARATION OF
ENERGY
INDEPENDENCE
How Freedom from Foreign Oil
Can Improve National Security,
Our Economy, and the Environment

Major Disruptions of 1970s in Middle East:

- Arab Oil Embargo/Gasoline Lines
- Transfer of Ownership of Oil Companies to Host Countries
- Fall of the Shah of Iran
- Russian Invasion of Afghanistan
- Outbreak of Iran-Iraq War (1980)



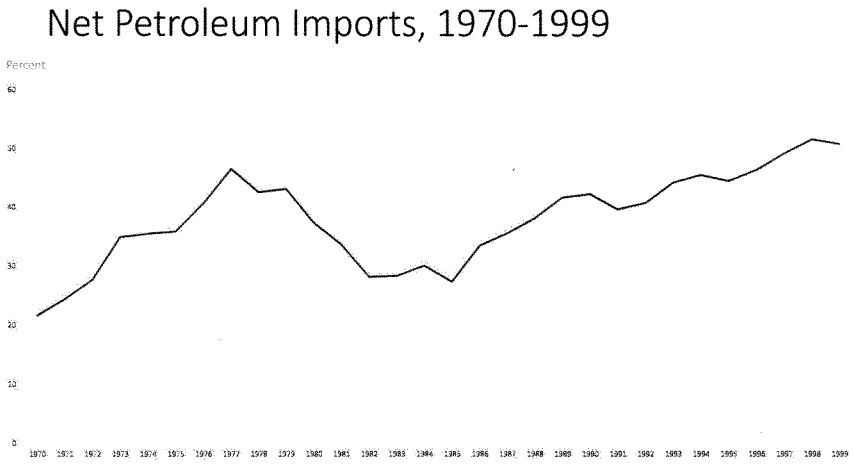
Source: AAAS, based on OMB Historical Tables in *Budget of the United States Government FY 2019*. Some Energy programs shifted to General Science beginning in FY 1998. © 2018 AAAS

Legacies of 1970s:

- Expansion of federal spending on energy research & development to record levels (before or since) that advanced many important technologies.
- Strategic Petroleum Reserve available for emergencies (most purchases coming under Reagan).
- New approaches to the insulation of buildings that sharply reduced the waste of energy.

More Energy Legacies from the 1970s

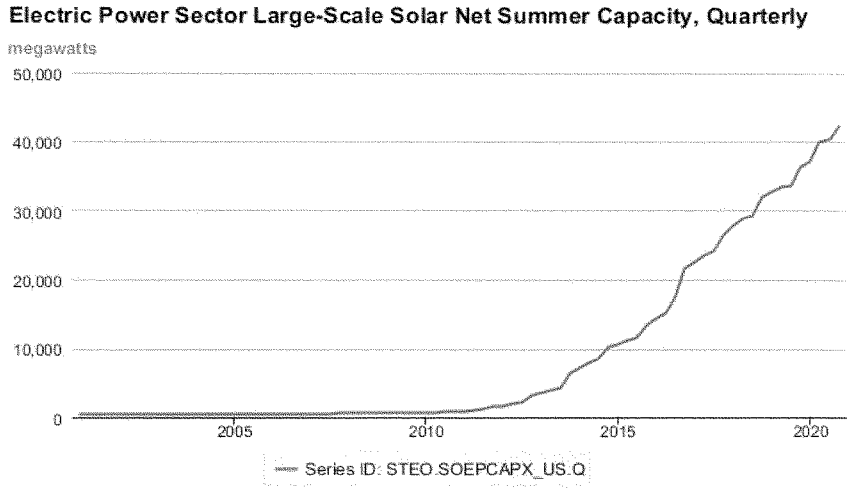
- Automobile efficiency standards (CAFE) that reduced the amount of oil needed for transportation.
- Cooperative arrangements with other industrialized nations to reduce dependence on Middle Eastern oil.
- Backing out oil from most electric generation.
- Allowing motorists to turn right on red lights (traffic permitting) to reduce fuel consumption from idling, a practice taken for granted today.


Net Petroleum Imports, 1970-1999
Percent
60
50
40
30
20
10
0
1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999

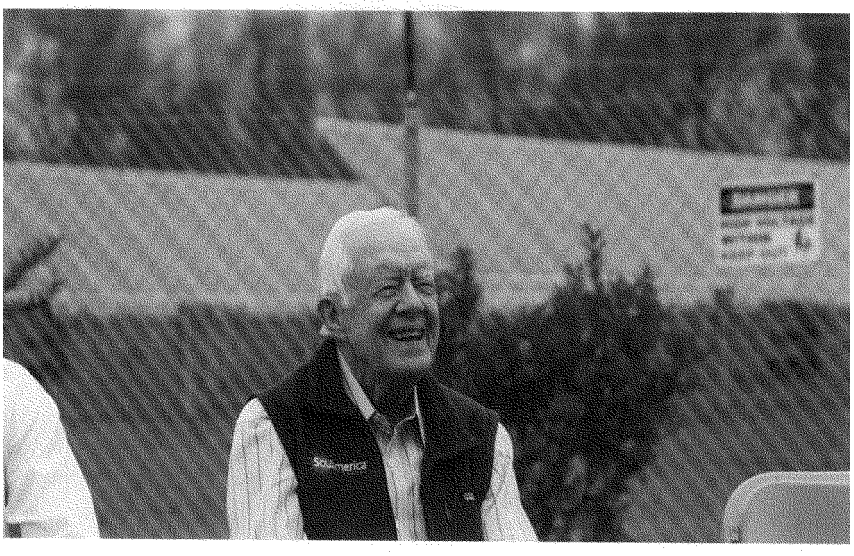
7



8


Electric Power Sector Large-Scale Solar Net Summer Capacity, Quarterly
megawatts
50,000
40,000
30,000
20,000
10,000
0
2005
2010
2015
2020
Series ID: STEO.SOEPCAPX_US.Q
eia
Source: U.S. Energy Information Administration

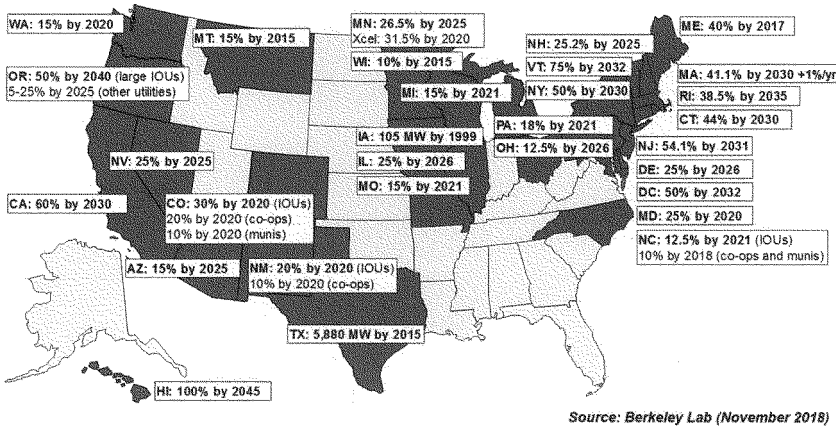
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Select Additions to U.S. Policy, 1987-2007

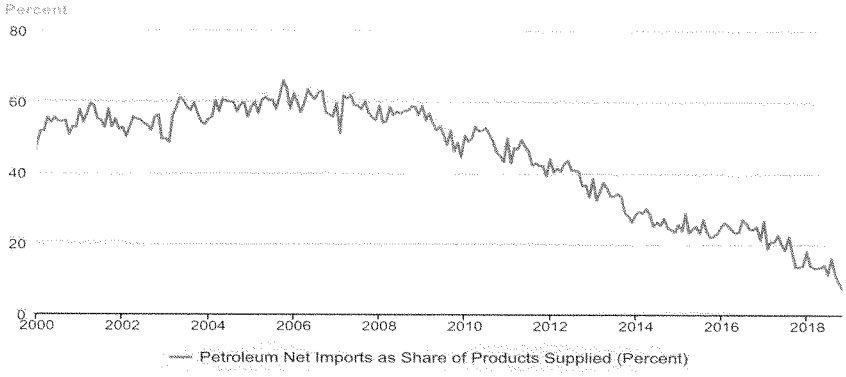
- Appliance Efficiency Standards.
- U.S. Energy Information Administration Web Site.
- Higher Standards for Clean Air.
- 2005 legislation to encourage greater use of nuclear power and biofuels.
- Energy Independence and Security Act of 2007.

Renewable Portfolio Standards (2018)



Source: Berkeley Lab (November 2018)

Table 3.3a Petroleum Trade: Overview



eia Source: U.S. Energy Information Administration

Ms. KAPTUR. Thank you very much, Dr. Hakes.

Mr. Zindler, you may begin.

Mr. ZINDLER. Good morning, and thank you for this opportunity, Chairwoman and Representative Simpson. I appreciate this.

I am here today in my role as an analyst with Bloomberg NEF, which is a division of financial information provider Bloomberg, L.P. Our group provides investors, utilities, oil majors, policymakers, and others with data and insight on the energy world and other sectors of the global economy undergoing rapid transformation. My remarks today represent my views alone and not the corporate positions of Bloomberg, L.P., and, of course, they are not investment advice.

Madam Chair, how the world generates, delivers, and consumes energy are all—so yes, don't invest. We are good, okay. Sorry. The lawyers made me read that.

My remarks today represent my views—as you said, how the world—as I was trying to say is how the world generates, delivers, and consumes energy are all changing rapidly and very radically. These changes have allowed new industries to flourish. The wind and solar power sectors now employ over 450,000 Americans, while over 2.2 million Americans perform work related to energy efficiency. Meanwhile, major capital flows are supporting these industries. Our firm counted $332 billion invested worldwide in new energy technologies last year and has seen over $3 trillion invested over the last decade.

We believe that more change, much more change inevitably lies ahead. In fact, the riskiest bet that investors, utilities, car makers, oil makers, and even policymakers can make is to assume that the energy world that we have today is going to be the one that we have tomorrow.

To take one example, consider how personal transportation is changing and the implications for motor fuel demand. In 2013, pure electric vehicles represented well under 1 percent of total vehicle sales in the U.S. By the fourth quarter of 2018, they actually hit 4 percent. China, which is the world's largest market for vehicles, added 1.1 million electric vehicles in 2018. Today, there are over 5 million electric vehicles on the roads worldwide, and by 2030, we project that 1 in 11 cars will be an EV, and by 2040 it will be one in three.

Growth will be propelled by declines in the cost of lithium-ion batteries, the most expensive components in any EV. Typical battery pack prices have already dropped 85 percent since 2010. As China, South Korea and others ramp productions, economies of scale will depress prices further. By the mid 2020s, consumers will choose EVs purely based on price not subsidy, and this important crossover could happen sooner if oil prices rise.

But more important than what I think is what the oil majors have been saying. More importantly, Total, Shell, and Chevron have all invested in or outright acquired electric vehicle charging companies or power utilities. One potential reason, electric transportation will by 2040 subtract 7½ million barrels a day of demand for crude products, in our view.

More change is also inevitable in the power sector, driven by cost declines and a move towards decentralized energy. Prices for photo-

voltaic modules, the solar panels you might put on the roof of your home or business, have fallen from about $4.50 a watt in 2008 to about 25 cents a watt as of the end of last year. And if you want to know the price of solar, you literally need to check up on it every 3 to 6 months, not every 3 to 6 years.

For many Americans, the decision to go solar is now very much driven by economics and really nothing else. I would also note that PV panels function perfectly well in cold weather. By the end of the decade, solar will be cost competitive in most parts of the U.S., without the benefit of subsidies. PV generation will grow from about 3 percent to approximately one-quarter by 2050.

The wind industry can tell a similar story. Last year, wind accounted for about 6½ percent of U.S. power, and while new wind farm completions will likely slow once the current production tax credit phases out, wind's share of generation should still rise to 14 percent by 2030, particularly if offshore projects planned for the eastern seaboard come to fruition.

Greater penetration of these technologies must be accompanied by greater deployment of flexible resources, such as pumped hydro projects, demand response programs, and batteries of various shapes and sizes.

Utility companies, along with the slew of energy storage startups, are starting to respond. AES, AEP, Southern California Edison, and Southern Company, to name just a few, are deploying batteries large and small onto the grid right now. I would add that our firm will detail all this in an annual fact book that we are going to put out next week with the Business Council for Sustainable Energy.

I just would like to close with making one last point about energy consumption and its role in climate change, because no responsible conversation about energy policy can take place without thinking about CO_2 emissions. Last year, U.S. emissions bucked what had been an 11-year trend generally downward. Instead, emissions rose by about 2½ percent, by our estimate.

The economy grew much faster in 2018 and that probably played a role. But the year also saw more extremely hot and cold days, which appears to have prompted greater use of air-conditioning and heating. That in turn boosted CO_2 emissions. This raises the possibility that as we live with the effects of climate change today, it is becoming more challenging to cut emissions and address climate change tomorrow.

As you can tell, I am fundamentally optimistic about the transformative potential of new energy technologies, but I am under no illusions. The dramatic changes we anticipate over the next three decades will not sufficiently cut CO_2 emissions in the U.S. or worldwide to curtail the worst impacts of climate change as detailed by the world scientific community. In other words, technology and economics alone cannot save us, at least at the current pace that we are going. New and better policies are needed to accelerate the transition, but that is where policymakers and not energy analysts must have their say.

So with that, I will stop and say thank you once again for this opportunity.

[The information follows:]

Testimony before the
House Appropriations Subcommittee on Energy and Water Development
Ethan Zindler
Head of Americas
BloombergNEF
February 6, 2019

Good morning and thank you for this opportunity, Chairwoman Kaptur and Representative Simpson.

I am here today in my role as analyst at BloombergNEF, a division of financial information provider Bloomberg L.P. Our group provides investors, utilities, oil majors, policy-makers, and others with data and insights on the energy world and other sectors of the global economy undergoing rapid transformation. My remarks today represent my views alone, not the corporate positions of Bloomberg L.P. And of course, they do not represent specific investment advice.

Madam Chair, how the world generates, delivers, and consumes energy are all evolving rapidly – and radically.

These changes have allowed new industries to flourish. The wind and solar power sectors now employ over 450,000 Americans while over 2.2 million Americans perform work related to energy efficiency.

Meanwhile, major capital flows are supporting these industries. Our firm counted $332 billion invested worldwide in new energy technologies last year and over $3 trillion in the last decade.

We believe more change – much more change – inevitably lies ahead. In fact, the riskiest bet investors, utilities, carmakers, oil companies, and policy-makers can make is to assume that the energy world we have today is the one we will have

tomorrow.

To take one example, consider how personal transportation is changing and the implications for motor fuels demand. In 2013, pure electric vehicles (EVs; not hybrid cars) represented well under 1% of total vehicle sales in the U.S. By the 4th quarter 2018, they hit 3% (over 5% if hybrids are included). China, the world's largest car market, added 1.1 million pure EVs in 2018.

Today, there are 5 million pure EVs on roads worldwide. By 2030, we project one in 11 cars will be electric. By 2040, one in three.

Growth will be propelled by declines in the costs for lithium-ion batteries, the most expensive components in any EV. Typical battery pack prices have already dropped 85% since 2010. As China, South Korea, and others ramp production, economies of scale will depress prices further.

By the mid-2020s, consumers will choose EVs purely based on price – not subsidy – and this important cross-over could occur sooner if oil prices rise.

We at BNEF are hardly alone in our outlook. The major oil producers have repeatedly raised their own projections for EV sales in recent years. More importantly, Total, BP, Shell, and Chevron have all invested in or outright acquired electric vehicle charging companies or power utilities.

One potential reason: electric transportation will by 2040 subtract 7.5 million barrels/day of demand for crude products.

More change is also inevitable in the power sector, driven by cost declines and a move toward "decentralized energy".

Prices for photovoltaic modules – the solar panels you might put on the roof of

your home or business – have fallen from approximately $4.50/Watt in 2008 to about $0.25 as of year-end 2018. For millions of U.S. businesses and homeowners, the decision to "go solar" is being driven by the chance to cut monthly electric bills or lock in fixed rates for power. I'd also note that PV panels function perfectly well in cold weather.

By the end of the next decade, solar will be cost competitive in most parts of the U.S. – without the benefit of subsidies. PV generation will grow from about 3% today to approximately one-quarter by 2050.

The wind industry can tell a similar story as its generation costs have sunk by more than half since 2009 thanks to larger, more efficient turbines. Last year, wind accounted for about 6.5% of U.S. power. While new wind farm completions will likely slow once the current Production Tax Credit phases out, wind's share of generation should still rise to 14% by 2030, particularly if offshore projects planned off the eastern seaboard come to fruition.

Greater penetration for these technologies must be accompanied by greater deployment of "flexible resources" such as pumped hydro projects, demand response programs, and batteries of various shapes and sizes.

Utility companies, along with a slew of energy-storage start-ups, are starting to respond. AES, AEP, Southern California Edison, and Southern Company among others are deploying large-scale batteries on the grid, or at smaller scale "behind the meter" in homes and businesses.

I would note that our firm will detail all of this activity in our annual Factbook on clean energy activity, which we will release next week in partnership with the Business

Council for Sustainable Energy.

I'll close with a point about energy consumption and its role in climate change. Because no responsible conversation about energy policy can take place without thinking about CO2 emissions.

Last year, U.S. emissions bucked what has been an 11-year trend generally downward. Instead, they rose 2.5% economy-wide from the prior year, based on our preliminary analysis of EIA data.

The economy grew much faster in 2018 and that probably played a role. But the year also saw more extremely hot and cold days, which appears to have prompted greater use of heating and air-conditioning. That, in turn, boosted CO2 emissions.

This raises the possibility that as we live with the effects of climate change today, it is becoming more challenging to cut emissions and address climate change tomorrow.

As you can tell, I am fundamentally optimistic about the transformative potential of new energy technologies. But I am under no illusions.

The dramatic changes we anticipate over the next three decades will not sufficiently cut CO2 emissions in the U.S. or worldwide to curtail the worst impacts of climate change as detailed by the world's scientific community.

In other words, technology and economics alone cannot save us. New and better policies are needed to accelerate the transition.

But that that is where policy-makers, not energy analysts, must have their say. So with that, I will stop and say thank you again for this invitation.

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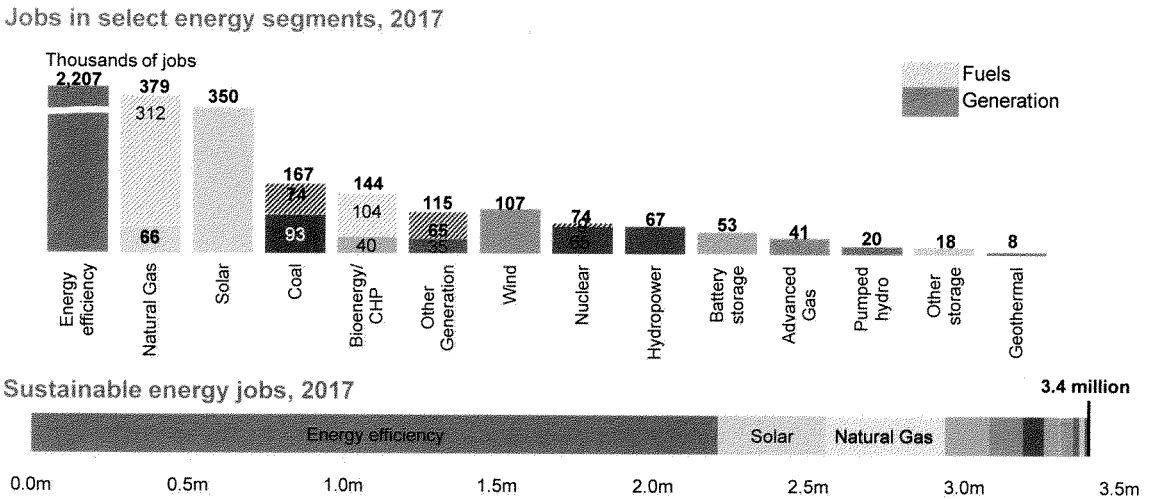
Clean Energy Technology Trends

Testimony before the House Appropriations Subcommittee on Energy & Water

Ethan Zindler

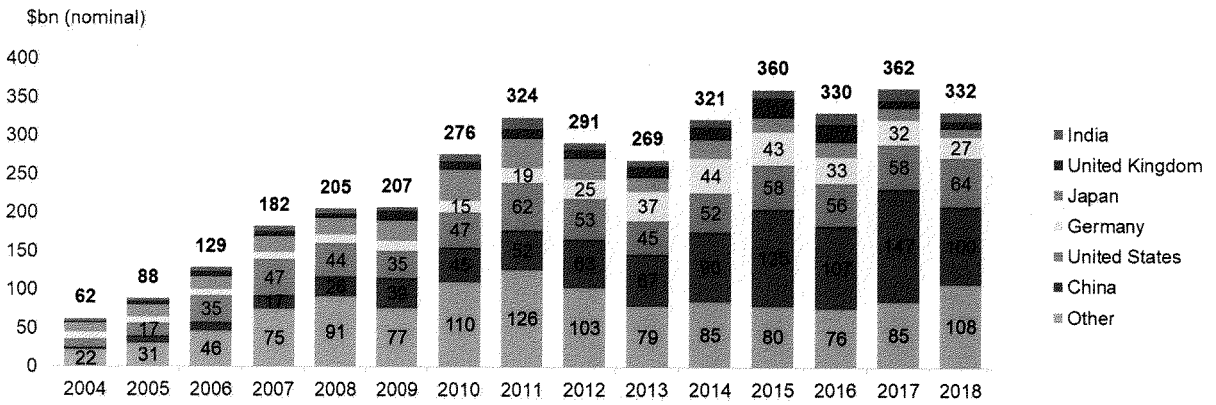
February 07, 2019

Jobs in select segments of U.S. energy



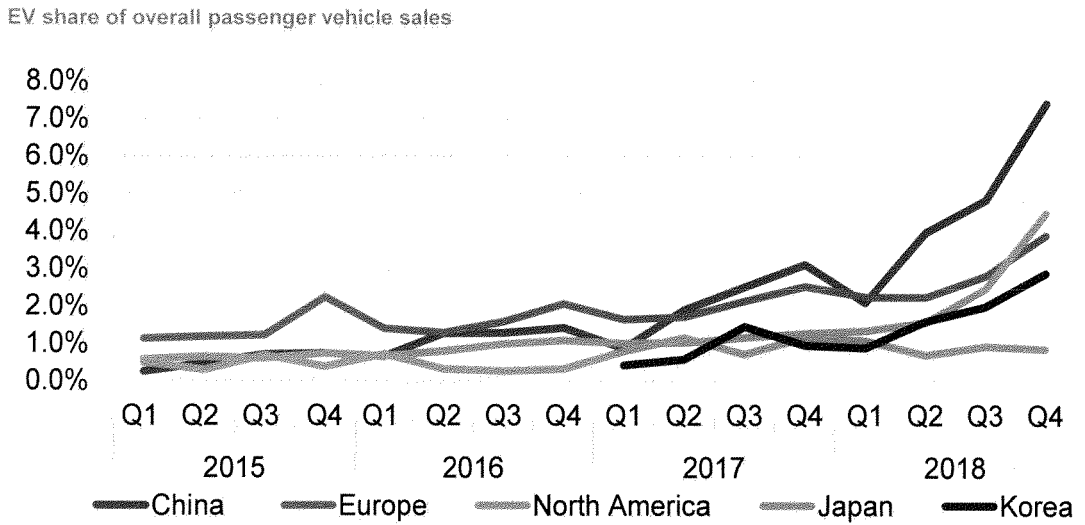
Source: The U.S. Energy Employment Report, NASEO and EFI. Notes: The data provided relies on thousands of data points provided via survey. Transmission, distribution, and oil/petroleum jobs not included as available data does not break out the portion of those jobs relevant to the electricity sector. See footnote on next slide for details on the definition for "Advanced Gas." Chart to appear in 2019 Sustainable Energy in America Factbook

New investment in clean energy: >$3 trillion to date



Source: BloombergNEF Notes: Includes new investment in wind, solar, biofuels, biomass, waste, energy smart technologies (such as electric vehicles and lithium-ion batteries), and other renewables/low carbon services.

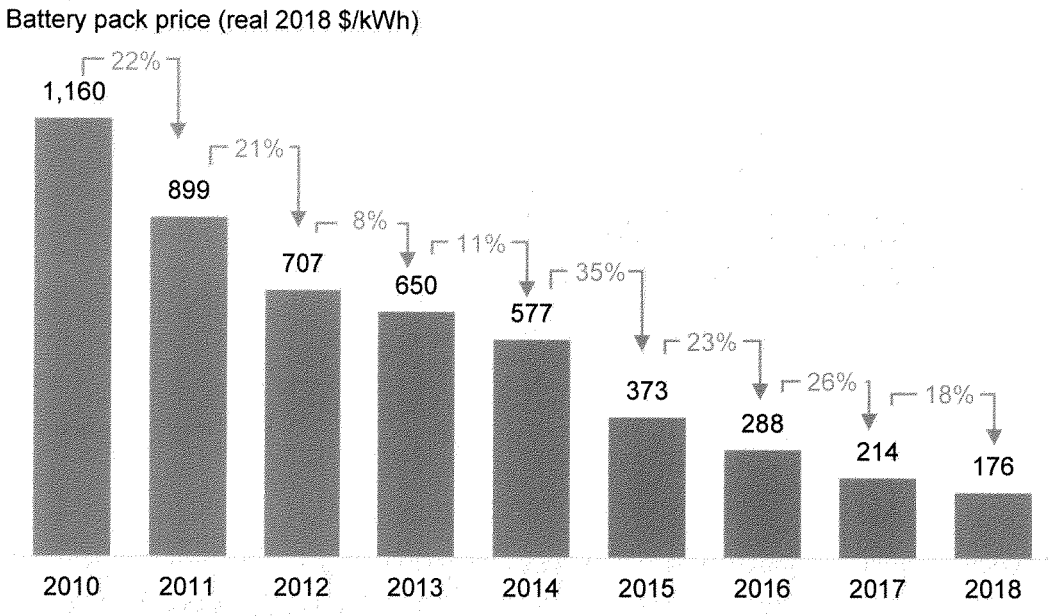
Electric vehicle sales: accelerating



Source: China Association of Automotive Manufactures, BloombergNEF.

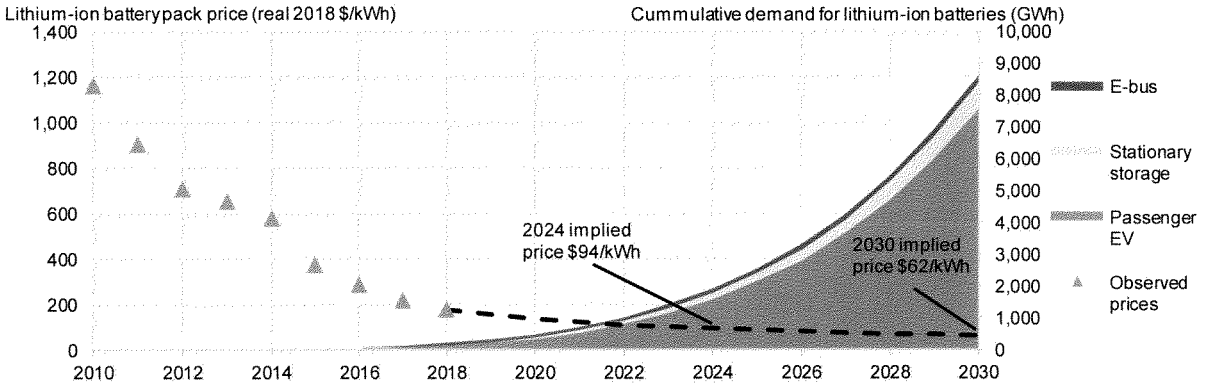
BloombergNEF

Lithium-ion battery prices: down another 18% in 2018



Source: BloombergNEF. Based on confidential survey of buyers/sells or li-ion batteries conducted annually by BNEF.

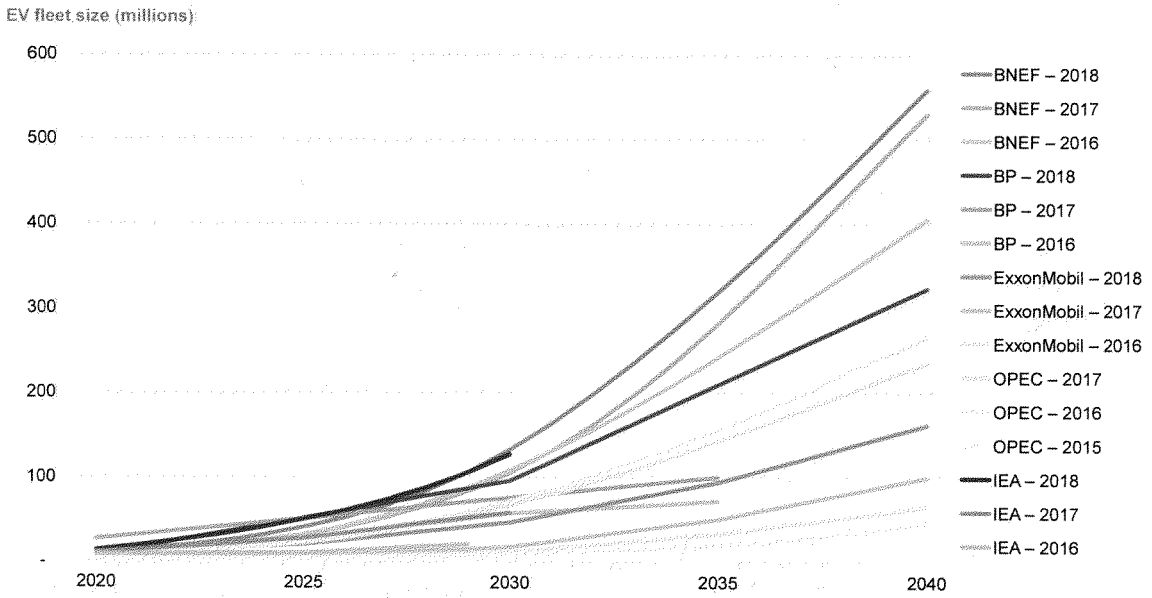
As battery prices fall, EV sales will rise



Source: BloombergNEF. Note: Prices have been changed to real 2018 dollars

BloombergNEF

Electric vehicle forecasts: trending upward

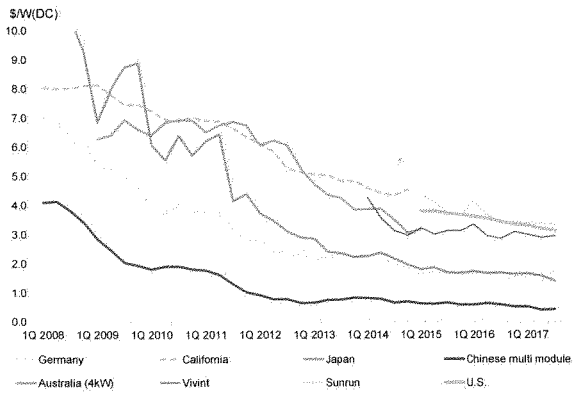


Source: BloombergNEF, organization websites. Notes: BNEF-2016, BNEF-2017, and BNEF-2018 represent our revised annual forecasts. Some data points for BP, ExxonMobil and the IEA are estimated based on organization charts, reports and data (estimates assume linear growth between known data points). Outlook assumptions and methodologies vary. BP only forecasted through 2035 in its 2016 and 2017 outlooks. The IEA only forecasts through 2030. The IEA forecasts multiple scenarios (base case values are shown here). ExxonMobil and IEA forecasts prior to 2018 included BEVs, PHEVs and FCVs; all other forecasts include just BEVs and PHEVs. See organization websites for authoritative viewpoints.

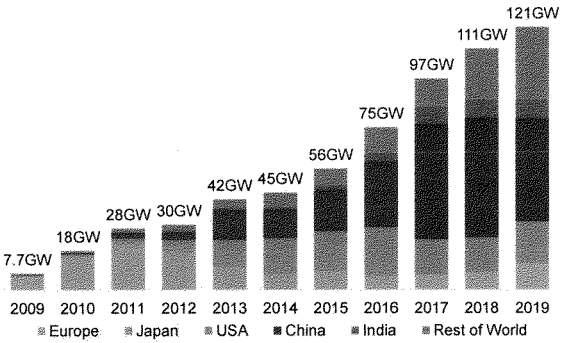
BloombergNEF

Solar: costs keep dropping, build keeps surging

Residential solar costs

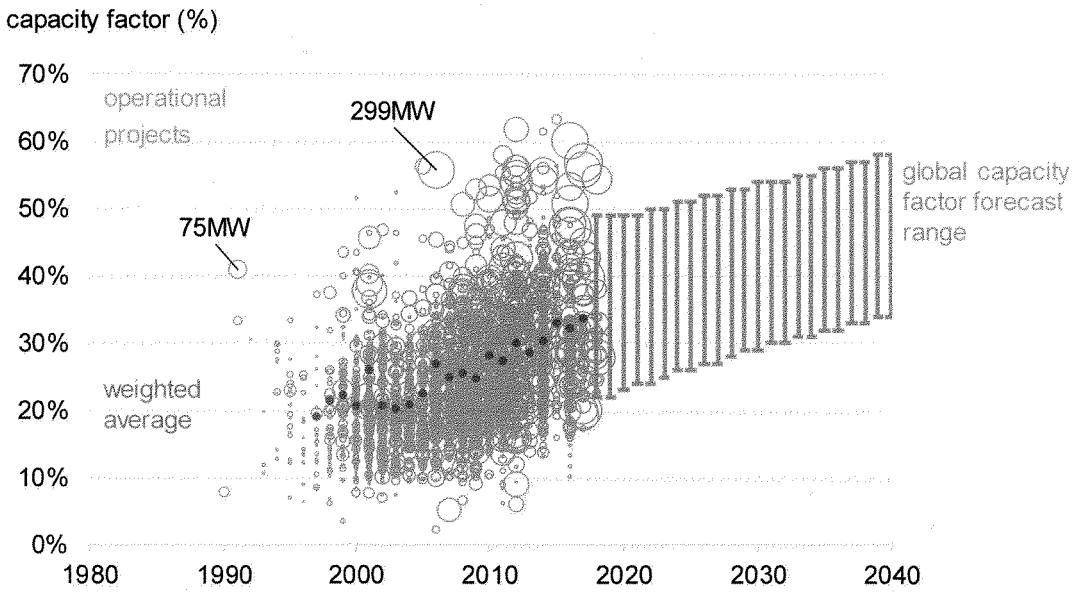


Total photovoltaic build



Source: BNEF. Data potrayed for residential solar on a $ per installed Watt basis. Build figures are given in gigawatts.

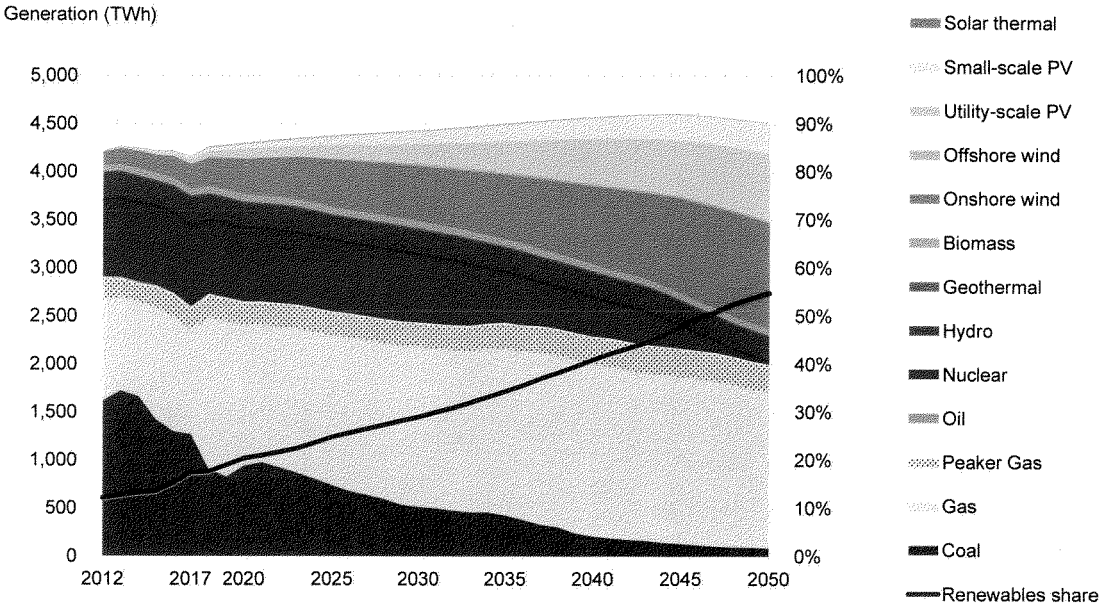
Bigger wind turbines are making more productive use of wind



Source: BloombergNEF Note: onshore wind capacity factors

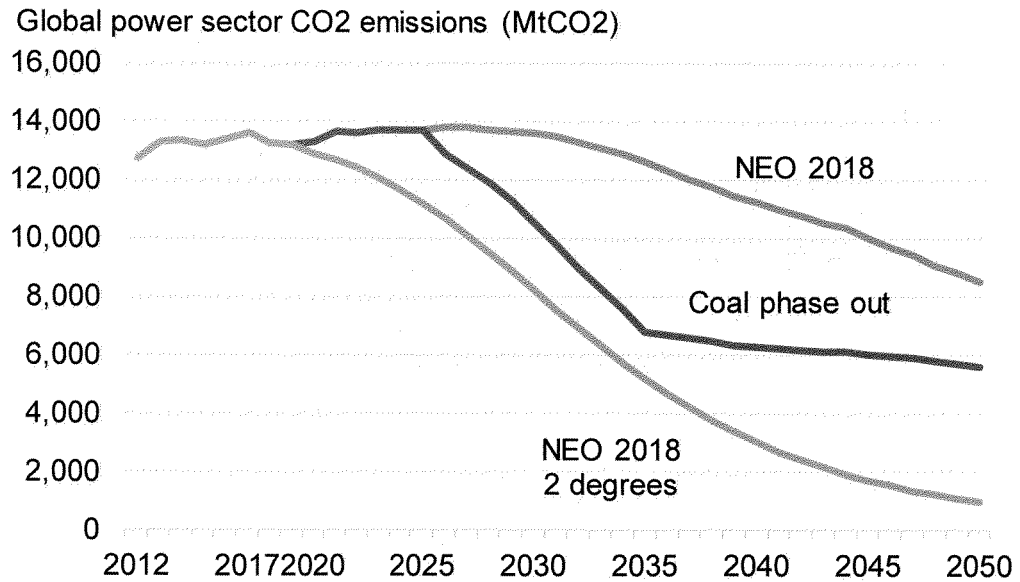
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Natural gas and renewables will dominate U.S. power generation



Source: BloombergNEF New Energy Outlook projection to 2050.

Technology alone won't save the day



Source: BloombergNEF 2018 New Energy Outlook (NEO). Blue line represents BNEF central scenario for global CO2 emissions. "Coal phase out" scenario depicts emissions if all coal-fired power plants are brought off line in 10 years. "NEO 2018 2 degrees" shows the level of CO2 emissions reduction required of the power sector to keep global temperature rises within 2 degrees C.

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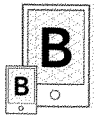
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Ms. KAPTUR. Thank you very much, Mr. Zindler.

Ms. Jaffe, please begin.

Ms. JAFFE. Thank you, Chairwoman Kaptur, for having me, and Ranking Member Simpson. It is a great honor to talk to you today. I am going to talk to you about the—following on on Dr. Hakes, I am going take us to the present on OPEC and the challenges we face.

So next slide. We are still calling on our allies from the Middle East to cope with sudden market changes for basic American fuel prices.

Next slide. We have made incredible strides through technology and innovations, as Dr. Hakes mentioned, originally supported by DOE, in increasing our access to domestic oil and gas. But as you can see from this chart of the global supply, and this chart goes forward to what we are going to see for the next 6 months, the United States, which is the orange bar, is still pretty small when you look at the global scale of the amount of oil that is used.

Next slide. We have an additional problem today, which is that Saudi Arabia and Russia have formed a new political alliance to manage oil supply globally, and we saw that issue arise over and over again this past fall as oil prices were rising above $80 towards $100.

Next slide. And we can know from watching the headlines in the news that there are many countries that are major oil suppliers today, like Venezuela, and I hope possibly not but also declining production in Mexico, China, and other countries provides a risk, even as U.S. oil production rises to meet some of the holes created by the problems in these other countries.

Next slide. We are very benefiting from the energy and clean tech technology that we have developed partly with public support through our national labs and through DOE, because it takes 60 percent less oil to generate a dollar of GDP today than when Dr. Hakes served. So that is an important thing, but we have made no progress on that metric in the transportation sector.

Next slide. If we did not have the CAFE standards, if they had been rescinded, the extra oil that we are producing today in the United States would just have met extra demand.

Next slide. Even with the little piece that we are talking about whether or not we are going to sustain from the extra rules that California and 13 other States are following to advance vehicles, we would still lose part of the uptick of the amount of oil that we could see leaving U.S. shores to help our allies abroad not be dependent on a Russia or other countries that we would like to put sanctions on.

So we are not out of the woods. Even with the great progress that we have had on the domestic net oil balance, we still have a problem, and it is a problem that is compounded by the fact that not only has China spent $47 billion on various incentives at the local, state, provincial, and national level to support their solar industry to try to put companies like First Solar out of business, right, but they are now going to invest $6 trillion in self-driving vehicles, in battery storage, in artificial intelligence, and other clean tech, and in advanced nuclear, and if we don't step up to the challenge we need to understand what that means.

If we are going to buy Chinese products for our electricity grid, for our self-driving vehicles and robo-taxis, we have to worry about maintaining the safety of those digital devices and our entire electricity grid from hacking. And how are we going to do that if we are not using American products, if we are instead using Chinese products?

So it is a national security imperative that we support the R&D in these areas, lidar, all these technologies that are going to come in the energy sector, smart grids, metering. These are all technologies that are going to come, as Ethan Zindler has outlined, and they need to come from American companies. They need to be produced here in the United States, and that will create jobs.

So how do we do that? One thing that was on the docket at the Department of Energy that has not moved forward was to have regional innovation centers, not necessarily 100 percent with public funding, but partnering our national labs and our public sources and universities together with private finance, private companies in clusters; that would be innovation clusters. And some of those could be taking undeployed manufacturing assets in places like the Rust Belt and other places where we need to create new jobs and reconstituting them with these innovation hubs to do R&D for new development, incubate startup companies, help large corporations move forward on something like including 3D manufacturing and other advanced manufacturing. People do not realize how much oil we could squeeze out of the economy using advanced manufacturing and shrinking the international global supply chain to being a regional U.S. and America supply chain.

So there is a lot of interesting things that could be done. I look forward to exploring those with you further as we continue our discussion.

[The information follows:]

COUNCIL on FOREIGN RELATIONS

February 7, 2019

Does OPEC Still Matter?

Prepared statement by
Amy Myers Jaffe
Director, Program on Energy Security and Climate Change
Council On Foreign Relations

Before the
U.S. House of Representatives Energy and Water Development Appropriations Subcommittee, Committee on Appropriations
United States Senate/ United States House of Representatives
1 Session, 116th Congress

Hearing on Energy Trends and Outlook

The United States needs to give further examination of its long run strategy regarding the Organization of Petroleum Exporting Countries (OPEC). While it is true that we use 60 percent less oil per dollar of Gross Domestic Product (GDP) than we did in the 1970s, oil's concentration in the U.S. transportation sector continues to leave the United States, and importantly, average Americans vulnerable to oil price shocks. Oil still currently has few substitutes in the existing U.S. domestic transport fuel system and therefore since it is difficult to shift away from its use in our daily lives, consumers bear the burden of any manipulation OPEC can wring onto global oil prices. Sharp oil price increases affect consumer spending patterns and consumer confidence, particularly influencing purchase patterns of durable goods like vehicles. Moreover, high oil prices still have large impacts on emerging market countries and this can, in turn, negatively affect global trade and financial markets which matter to the U.S. economy. Despite rising U.S. domestic oil production, temporary international events that affect oil supply can give OPEC, and even Saudi Arabia on its own, substantial if brief market power. The result can be extreme oil-price volatility that can still harm the global economy and financial system, despite long-run expectations of abundance. The U.S. Congress should maintain, or better yet, strengthen policies that support the makers of electric cars and other programs that promote advanced alternative fuel automobiles and trucks in the United States because alternative engine technologies help wean the global economy off its reliance on OPEC oil more rapidly. As recent commodity price volatility and OPEC deliberations show, that will take more than just exporting an additional one or two million barrels a day of oil from U.S. shores. That's because instability in many oil producing regions will continue to threaten global oil supply. The U.S. should also consider stronger efficiency standards for

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delivery trucks and large freight vehicles. Congressional leaders should also press the Trump administration to quickly settle favorably with California and the 13 other states that follow California's policies on standards for diversified fueling options to ensure that OPEC's current ability to manipulate oil prices is permanently and effectively ended by curbing demand for oil from the transportation sector. More weight should be given to the fact that use of alternative fuels in cars and trucks (biofuels, electricity, and natural gas) would free more U.S. oil for export to water down remaining OPEC market power.

Does OPEC Still Matter?

It is true. There is a coming wave of energy innovation that could some day soon mean that Saudi Arabia and its colleagues in OPEC will play less of a role in changing global energy markets. Saudi Arabia's leadership – as well as Russia's President Vladimir Putin – is well aware of this existential problem and are taking steps to try to maintain global influence, together and separately. Technological gains, while important to cultivate, are nonetheless not a spigot. Their exploitation requires the investment decisions of dozens of independent private companies who are following market signals and government incentives. When those market signals and government incentives are unsteady, it weakens the benefits this innovation has to the U.S. consumer. The gradual nature of the digital energy transformation means that temporary events, most recently the economic crisis in Venezuela and U.S. sanctions on Iranian oil, can give OPEC, and even Saudi Arabia on its own, substantial influence over global oil prices. That means major oil producers still have some leverage over a U.S. president, constraining U.S. foreign policy. This proved an uncomfortable fact this past autumn and for the fragile global economy more generally. We are still asking our "allies from the Middle East" to increase oil supplies but with what strings attached. There is still reason to seek out policies that will reduce this interdependence, even if we choose to support our allies for a wider variety of interests. Our alliances should be based on common security interests, shared values and aligned co-benefits. They should not be based on the worry about blackmail.

Last year, even with higher U.S. oil production and exports, global oil demand was sufficiently robust that unexpected supply outages gave OPEC + Russia sudden market power. We started to see a large increase in oil prices that the U.S. Treasury department and others believed would destabilize the global economy and financial system, in a manner perhaps not as severe but certainly reiminscent to 2007 when oil prices rose significantly. This situation gave Saudi Arabia and Russia undue leverage over global financial trends and was reflected in the U.S. President having to deal with OPEC in a way that seemed very similar to years past when the United States had less of its own oil. Here is what Saudi Arabia had to say when U.S.-Saudi tensions were high amid investigations over the death of *Washington Post* columnist Jamal Khashoggi.

If Saudi Arabia "receives any action it will respond with greater action" and it cited its "influential and vital role in the global economy."

More indirectly, in its state controlled media, editorial commentary was less diplomatic:

"If the U.S. sanctions are imposed on Saudi Arabia, we will be facing an economic disaster that would rock the entire world..."

2

"If the price of oil reaching $80 angered President Trump, no one should rule out the price jumping to $100 or $200 or even double that figure." [i]

There are many oil producing regions where political instability, civil war, corruption and populism will thwart steady oil supply in the coming years. That will create an opening for increased U.S. oil and gas exports but it will also be unpredictable, cause swings in oil prices and giving OPEC temporary leverage and influence over market trends. In recent years, the sudden supply outages from geopolitical factors has been as high as 4 to 5 million barrels a day. That is why we are still seeing oil price volatility despite the general trend of abundance created by steady U.S. production growth.

The United States is rapidly moving towards net oil exporter status. Doesn't that mean the U.S. no longer has to worry about oil shocks?

Oil is a global commodity and as mentioned, oil markets are not fully competitive because of the intervention of OPEC. OPEC can still influence oil prices and oil price changes still affect U.S. consumers. Gasoline and diesel consumption accounts for 65 percent of U.S. oil consumption so any change in oil prices instantly affects consumer budgets through fuel and heating oil prices. Oil price shocks have preceded 10 out of 11 of the last U.S. recessions since the 1960s.

Sudden increases in oil prices also sends dollars to oil producing states whose economies have difficulty absorbing surpluses. This aspect still plagues financial markets via sudden changes in liquidity. When oil prices rise suddenly and strongly, other kinds of bubbles can form in financial markets as oil surpluses are suddenly invested in other instruments. The higher U.S. oil production, the more capital remains in U.S. domestic markets and the less that goes abroad, and this is helpful to the U.S. trade deficit, with implications for the current account. This new fact is one reason the dollar no longer automatically weakens significantly when oil prices go up. Oil imports are only 30 percent of U.S. oil consumption today, versus over 50 percent just a few years ago. This has helped mute the impact of oil shocks or OPEC on the U.S. economy.

But oil price shocks still matter. Even with the large drop in the oil intensity of the U.S. economy over the years, in 2007, rising oil prices led to spending on light duty trucks to fall significantly, leading to a large number of job losses in the U.S. motor vehicle and parts industry.[ii] Oil price shocks still affect U.S. consumer spending by stimulating a loss in consumer confidence[iii] as well as leaving less disposable income. But the U.S. economy uses considerably less oil to generate its GDP today than it has in past years. There is practically no oil used in electricity generation in the United States and the commercial sector use is also greatly reduced. Oil is also used less to heat our homes. Our economy is more efficient and the flexibility of the labor market makes it easier for businesses to cope with sudden changes in energy prices, and businesses like airlines and freight companies can hedge their fuel in futures markets and use digital optimization for logistics to reduce the amount of oil it takes to offer the same services to customers. But rising energy costs can still hamper employment and our overwhelming reliance on oil in vehicles still presents a problem for consumers when oil prices rise suddenly. We can fix all these problems but it will take political resolve.

If U.S. oil production is rising, doesn't that mean we don't need efficiency standards for cars?

It's a matter of arithmetic. If U.S. oil demand is rising, then increasing U.S. oil production will be needed to satisfy that rising oil use and cannot serve to lower U.S. dependence on foreign imported oil.

That could leave us right back where we started with continued exposure to physical supply cutoffs. In other words, because efficiency standards for cars and light trucks have been lowering our oil use, every extra barrel of U.S. oil production has been going to replace a barrel of imported oil on a one for one basis. When oil demand goes up, new U.S. production would have to be used to meet that demand and imports would still be needed. Depending on high U.S. oil use would be without continuation of efficiency standards for cars, imports could even rise over time, especially if Americans continue to prefer larger vehicles and ride hailing services, autonomy and on-demand deliveries add to the number of trips and vehicle miles traveled per vehicle.

To be specific, if today's corporate average fuel economy standards (CAFE) disappeared, the U.S. would not be able to become a net oil exporter in the 2020s. By 2030, U.S. net oil exports would be marginal, if at all, instead of accelerating to 4 to 5 million barrels a day. What is desirable is to have a trend line where U.S. oil use is falling and U.S. production is rising, allowing the United States to have a supply cushion when political turmoil in countries like Venezuela, Nigeria or Liyba tighten oil markets.

Freezing the CAFE standards after 2020 and curbing promotion of electric cars in California and other states with electrification programs could add up to 220,000 b/d to 650,000 b/d in new oil demand by 2030, depending on oil price and economic trends.

China has become the world's largest importer of crude oil, surpassing the United States. How does China's rising need for oil influence the geopolitics of oil?

As China's thirst for oil has grown, so has its geopolitical relationships. China's search for oil resources through the late 1990s to today has embedded China strategically in a large number of oil producing countries, including those in the Middle East, Caspian Basin, and Latin America. China's active role in the oil economies of Venezuela and Iran has created diplomatic problems for the United States as it has tried to use sanctions as a tool to effect changes in those countries' policies. China's oil for loans program with Caracas has contributed to Venezuela's current crisis in multiple ways by fostering corruption and distorting its revenue streams from oil exports. China's loans in other countries such as Ecuador and Angola have proven to be destabilizing to the recipient countries governments and their national budgets. As these economic costs mount, it could become more problematical for regional stability in various locations of importance to U.S. interests.

China has also been the major destination for Iranian oil exports in the face of tightening U.S. sanctions on Tehran. Beijing has also been moving forward with its opportunistic partnership with Moscow, with energy investments and loans assisting the Kremlin to resist pressure from the West.

China is expected to invest more than $6 trillion in clean tech in the coming decades. What does that mean for the United States?

China's energy pivot in not a small, at the margin strategy but part of a larger strategic orientation. China is building spheres of energy dependence via its Belt and Road Initiative (BRI) and via planned expansion into the nuclear energy export market. China envisions building 30 nuclear plants as part of its BRI infrastructure export program and is also looking to dominate global trade in solar panels, wind farms, and eventually battery storage. The U.S. Department of Energy estimates that China's government has already provided $47 billion in funds, incentives, loans and tax credits to its solar manufacturing sector since the sector was prioritized. China now dominates that global industry and is

moving to do the same with electric vehicles, with over 100 local companies producing electric cars and buses in over 800 different styles and models. Chinese federal and local incentives for electric cars are roughly 10 times those in the United States and there are over 1 million electric cars on the road in China today. China is also making a push in autonomous vehicles, drones and other digital technologies that will position it well in the future computer-assisted economy. This new wave of energy innovation—driven by the convergence of automation, artificial intelligence (AI), advanced manufacturing, and big data analytics—is likely to remake transportation, electricity, and manufacturing sectors across the globe and position China to advance its economic and geopolitical status. The United States will need to compete in digital innovation in the energy sector to maintain U.S. global competitiveness—not only for spurring new markets, industries, and companies, but also in producing more cost-effective supply chains, boosting manufacturing productivity, and lowering the U.S. economy's oil intensity.

Moreover, many of the innovative energy technologies being pursued by China have dual-use military applications. Energy innovation and entrepreneurship ensure U.S. national security vis a vis China by providing the U.S. military and space program a technological edge. Failure to keep up could some day be more costly to the United States. It is unimaginable to think of what it might now mean for the United States had it opted against pursuing space technology research in the aftermath of the Russia's successful launch of Sputnik in 1957.

Implications for US Innovation Policy

The United States should rethink its innovation policies, seeking to collaborate internationally on nonsensitive energy and carbon capture technology and domestically promoting long-term investment in advanced nuclear technology, advanced manufacturing, and other emerging energy technologies. Such investment has multiple benefits both in reducing OPEC's market power over the long run while ensuring that the U.S. economy will remain globally competitive as trade in clean technology products grows as expected in the coming decades. Many U.S. start-ups and innovation companies have turned to China as a source of more patient capital than the limited U.S. private sector finance, in light of the decline in U.S. public sector support under the Trump administration, potentially damaging future U.S. competitiveness and, in some cases, national security. China's statist policies often include forced technology transfers to Chinese domestic firms as a precondition for investment and access to Chinese markets. Smartly, the Trump administration is trying to reverse this trend via trade negotiations and proposed restrictions on technologies that might have a military dual use, such as AI and lidar. The 2019 U.S. National Intelligence Strategy specifically mentions emerging digital technologies and AI as enabling U.S. adversaries, noting, "without common ethical standards and shared interests to government these developments, they have the potential to pose significant threats to U.S. interests and security."[iv] The United States can ill-afford to have its future autonomous vehicles infrastructure, domestic freight logistics, and updated electrical grid dominated with Chinese products that might lack the same kind of cyber protections that U.S. designed products could offer to the U.S. military, national guard, and average Americans alike. It should also think twice to cede the development of nuclear power in the developing world to China, whose industry may not engage policing non-proliferation as part and parcel of its nuclear power export program.

Washington needs to rethink its industrial innovation policy and consider what steps need to be taken to ensure that the United States maintains its nuclear technology capabilities and safeguards its digital energy technology edge over China and other strategic and economic competitors. National efforts

should be supplemented with participation in multinational initiatives that prioritize global benefits over national priorities. A reevaluation of its industrial innovation policy would enable the United States to find areas for collaboration with China, easing tensions arising from technology programs that will now have to be fenced off as proprietary as part of the new Committee on Foreign Investment in the United States (CFIUS) rulemaking passed by Congress and other proposed Trump administration policies. U.S. participation in global research initiatives should focus on partnering industry with governments on targeted technologies that do not have strategic applications, such as carbon capture and storage, direct air capture, and clean water technologies.

For more strategic energy technologies vitally important to U.S. economic competitiveness and military preparedness, the Department of Energy (DOE) should host regional centers of innovation that would bring together local business, academic institutions, and national labs to promote critical proprietary R&D in energy innovation to meet the challenge of China 2025 and improve U.S. energy security, weaken OPEC, promote technology exports, and reduce carbon emissions by continuing to promote technologies that lessen the oil intensity of the U.S. economy. DOE initiatives contributed to technology development now being used in the U.S. unconventional oil and gas development and in fuel cell technology.[v] Pentagon funding led to the development of GPS, self-driving capabilities, and other digital technologies now used across the U.S. tech sector. To replace existing supply chains that favor competing countries such as China, the U.S. government should explore public-private partnership opportunities for heavy industrial products and durable goods that can be built in the United States with advanced manufacturing techniques.

As suggested by former Michigan governor Jennifer Granholm, the federal government can work with states to study existing industrial ecosystems in the rust belt and elsewhere to develop new technology business clusters based on underutilized factories, skilled workforce, and natural resources.[vi] Clean tech manufacturing has overlap with skills that were used in now defunct products across the United States. The federal government can improve job growth and technology advancement by tying government-sponsored R&D more closely to private industry innovation via the creation of research collaboratives that are jointly funded by the private and public sectors. Government agencies such as the Department of Defense could serve as early adopters of technologies that would emanate from the collaboratives. As part of this effort, the public sector, both local and federal, should consider expand funding of education initiatives, partnering not only with major research universities but also with trade schools and community colleges, to plan effective and affordable curricula for workers to train in the new energy technology fields. Corporations should adopt reverse-mentoring programs and cross-skill training between recruits and experienced workers to share knowledge to promote innovation.

[i] https://www.cfr.org/blog/deja-vu-saudi-style

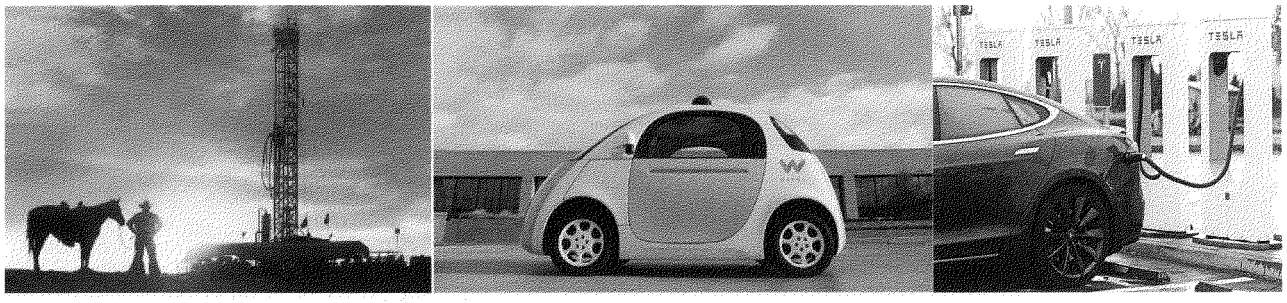
[ii] Hamilton, J.D., Causes and Consequences of the Oil Shock of 2007-2009, Brookings Papers, 2009

[iii] Edelstein, P. and Kilian, L. How Sensitive are Consumer Expenditures to Retail Energy Prices, Journal of Monetary Economics, 2009

[iv]. Office of the Director of National Intelligence, "National Intelligence Strategy of the United States of America 2019," http://dni.gov/files/ODNI/documents/National_Intelligence_Strategy_2019.pdf.

[v]. Loren Steffy, "How Much Did the Feds Really Help Fracking?," *Forbes*, October 31, 2013, http://forbes.com/sites/lorensteffy/2013/10/31/how-much-did-the-feds-really-help-with-fracking.

[vi]. Mark Golden, "Stanford Professors Recommend Climate and Energy Priorities for Next U.S. President," Stanford Unviersity, http://stanford.edu/2016/05/11/stanford-professors-recommend-climate-energy-priorities-next-u-s-president.

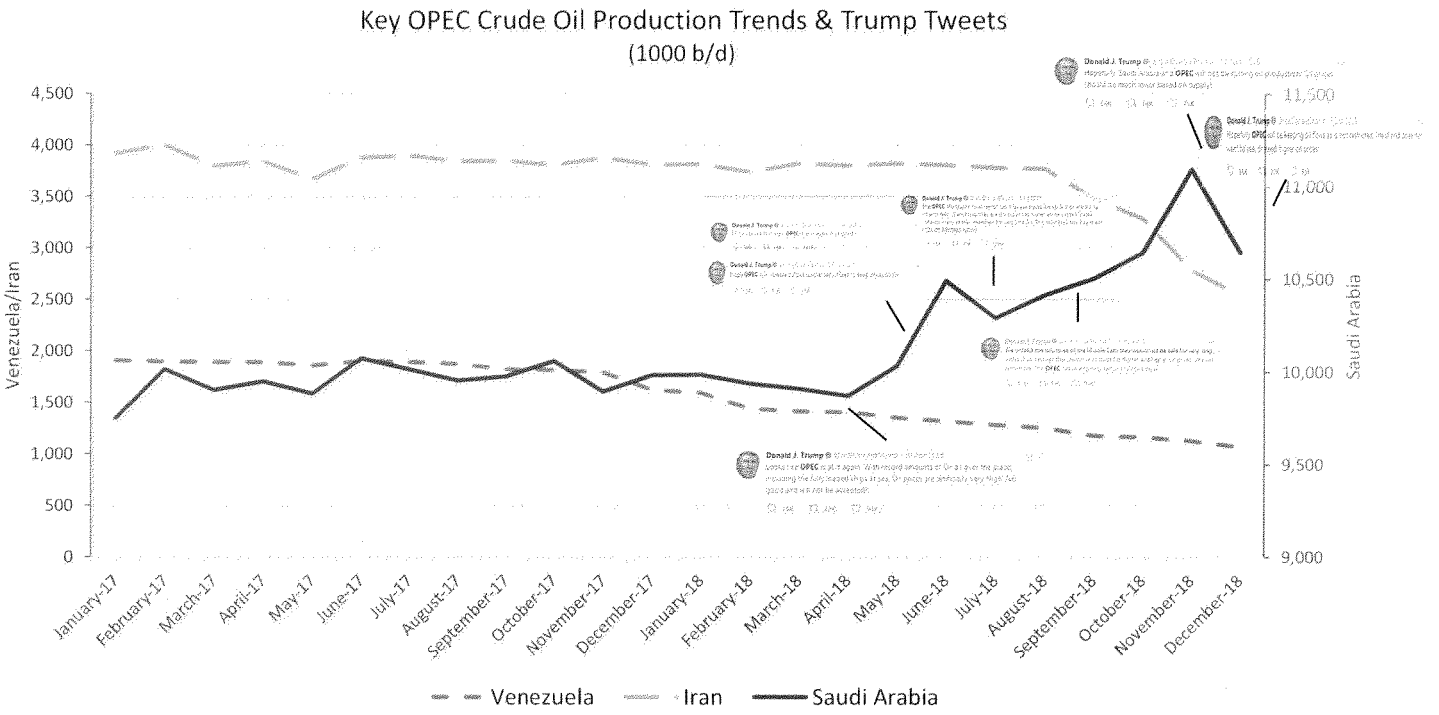


Amy Myers Jaffe
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Council On Foreign Relations

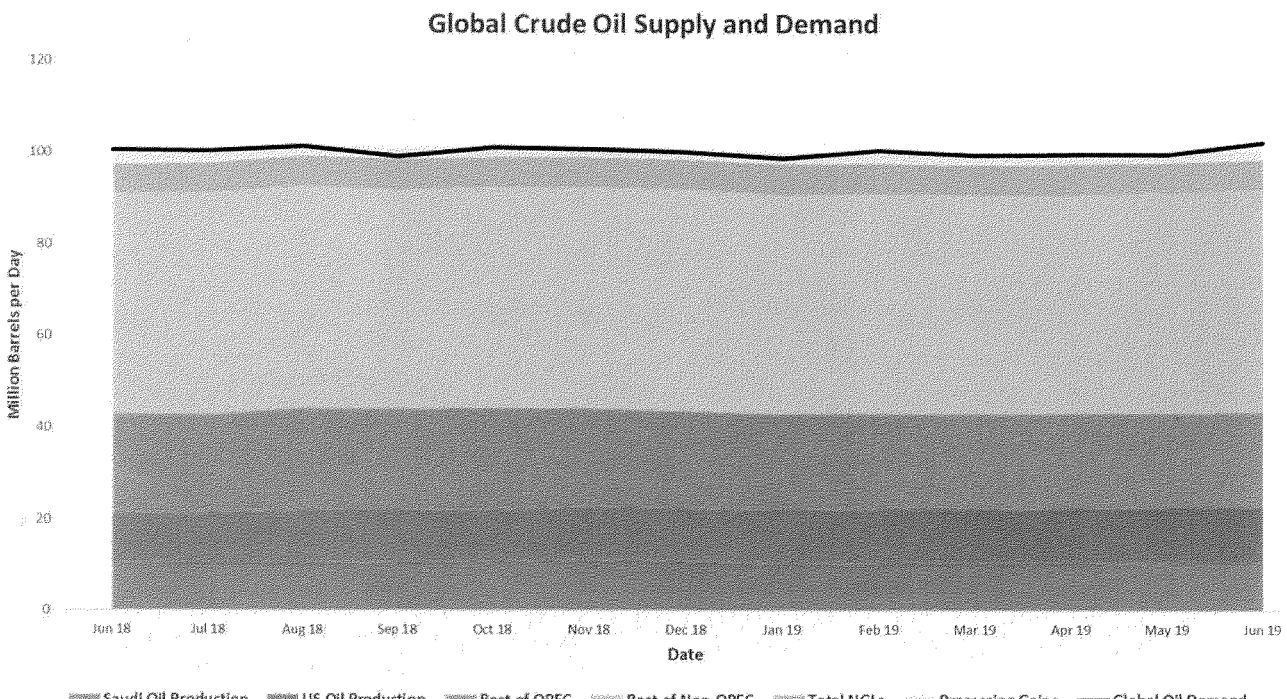
Presentation to U.S. House of Representatives Energy and Water Development Appropriations Subcommittee

February 7, 2019

Recent Events Suggest OPEC Still Has Market Power

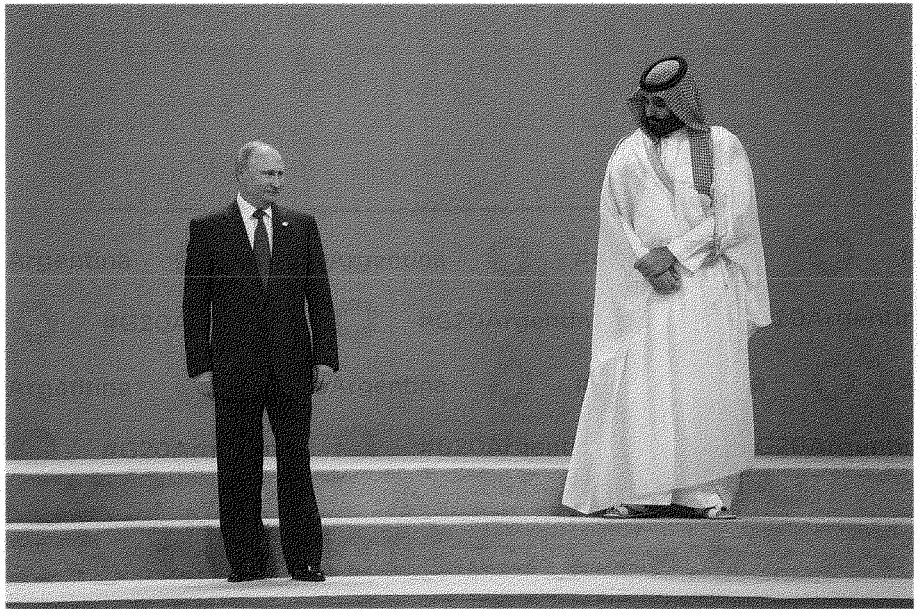


Putting U.S. Production in Perspective



Saudi-Russia oil alliance is problematical

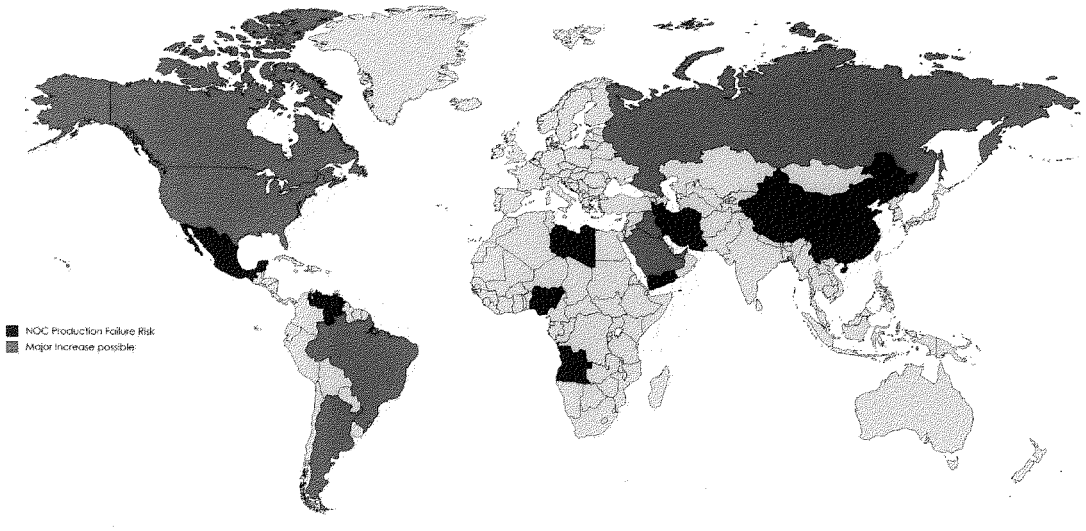
Russian and Saudi leaders at the G-20 in Argentina



Navigating the Saudi-U.S. and Saudi-Russian bilateral relationship has proven tricky.

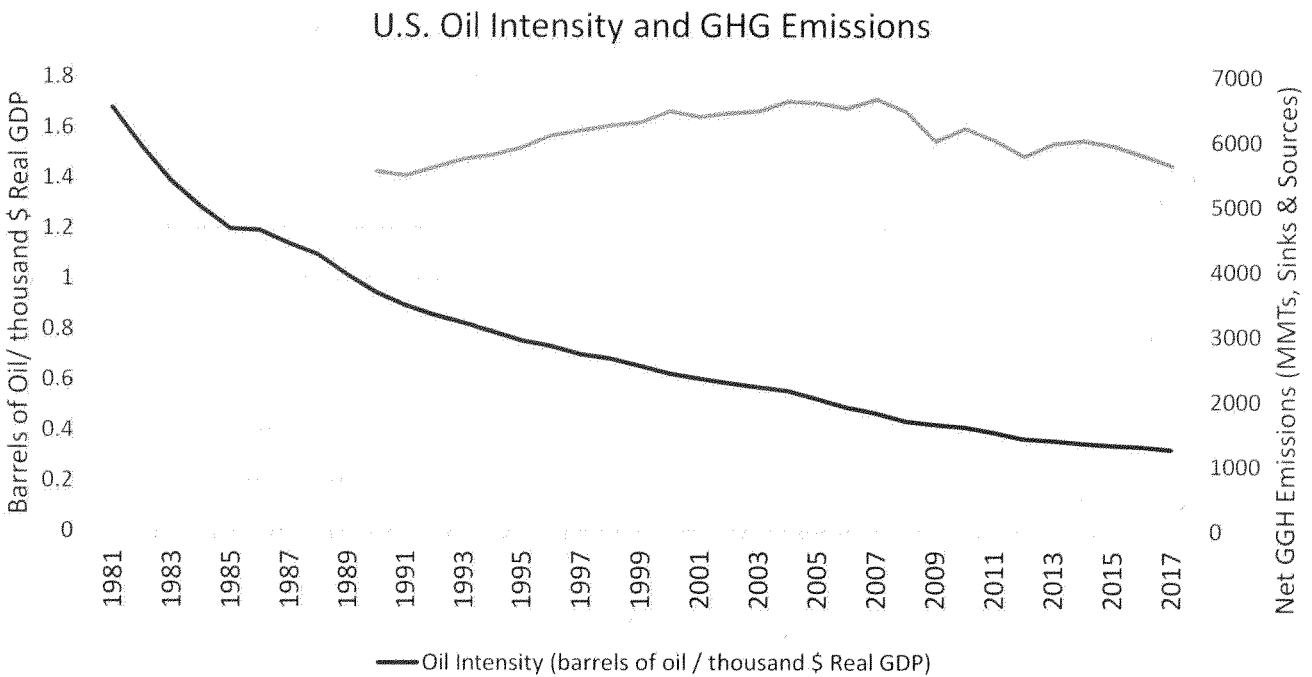
As kingdom's economic problems worsen, alignment with Russia could strengthen.

Rising Oil Production Potential VS NOC Supply Risk
Corruption Scandals, Failing States, and States Raiding NOC Finances

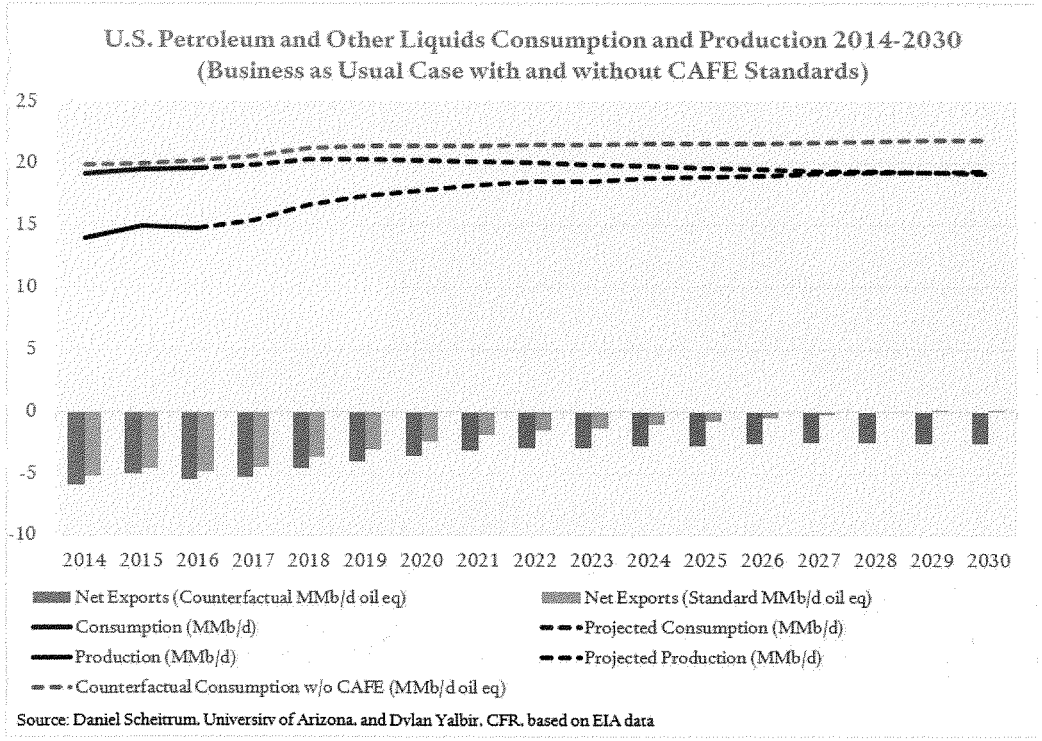


Shorter cycle times will leave NOCs with less capital flexibility.
NOCs likely to have more difficulty staving off declines in mature fields.
Majors are favoring short cycle projects such as shale in the Americas, brownfield extensions and development of satellite reserves. Interest in long cycle projects like Venezuelan heavy oil and Arctic development is sinking. Longer term, any higher oil prices could breed structural decline in oil use, creating intractable problem for OPEC.

Sectoral distribution of oil use has become more limited. Now concentrated in transport which socks consumers more than it damages entire economy.



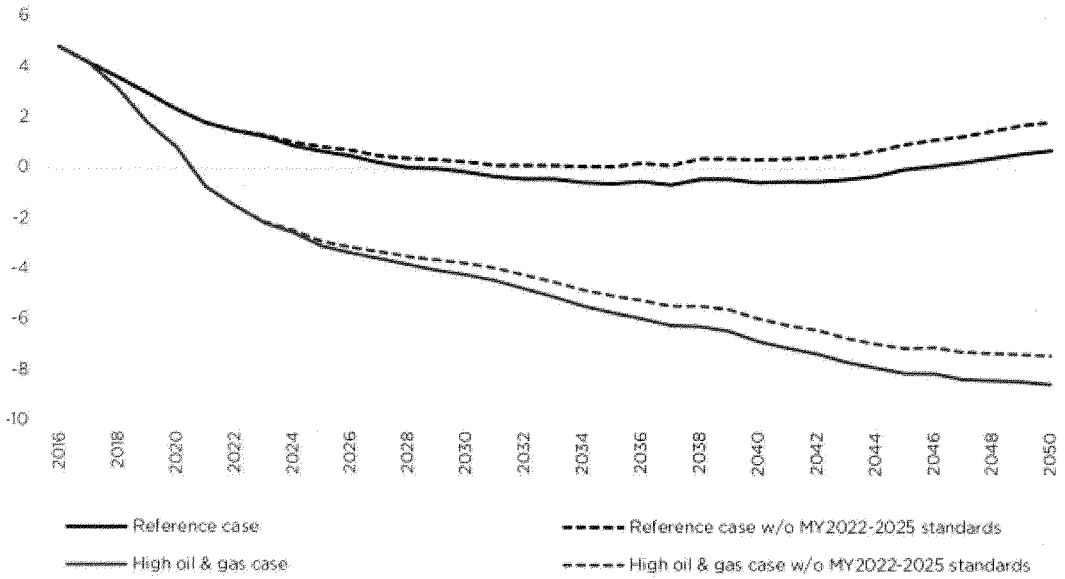
When it comes to OPEC, U.S. fuel efficiency standards still matter



Source: Daniel Scheitrum, University of Arizona, and Dylan Yalbir, CFR, based on EIA data

When it comes to OPEC, U.S. fuel efficiency standards still matter

Figure 2: US net imports of crude oil and petroleum products in the EIA's AEO 2018, projections with and without MY 2022-2025 standards (millions of barrels per day)

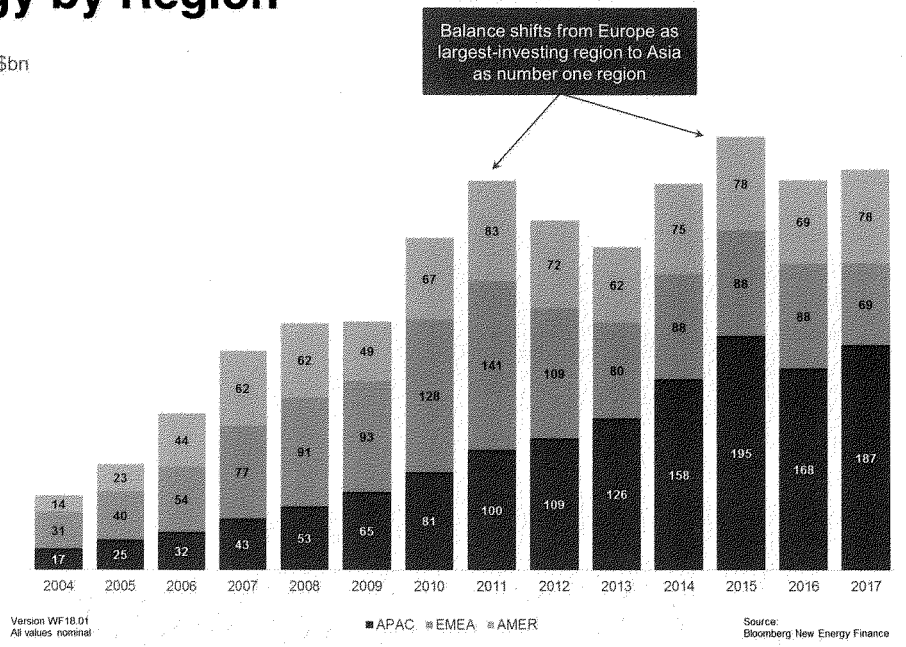


Source: EIA, EIA

Annual Trends, New Investment

Global New Investment in Clean Energy by Region

2004 – 2017

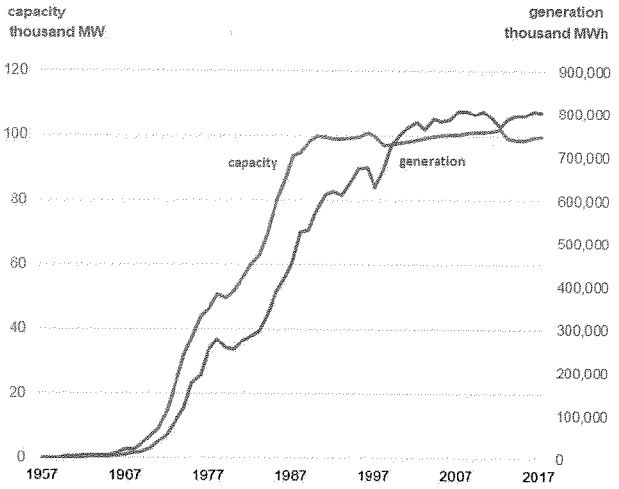


Average Age of U.S. Nuclear Generators is 37 Years Old

New Technology:

- Small Module Reactors (SMR):
  - "Automatic" Safety Features
  - Scalable Sizing
  - Low Cost
  - Highly Flexible for Renewables
- Generation IV Reactors:
  - 3 Models Under Development
  - Improved Safety
  - Ability to Consume Nuclear Waste
  - High Efficiency and Flexibility

U.S. nuclear electricity generation capacity and generation, 1957-2017



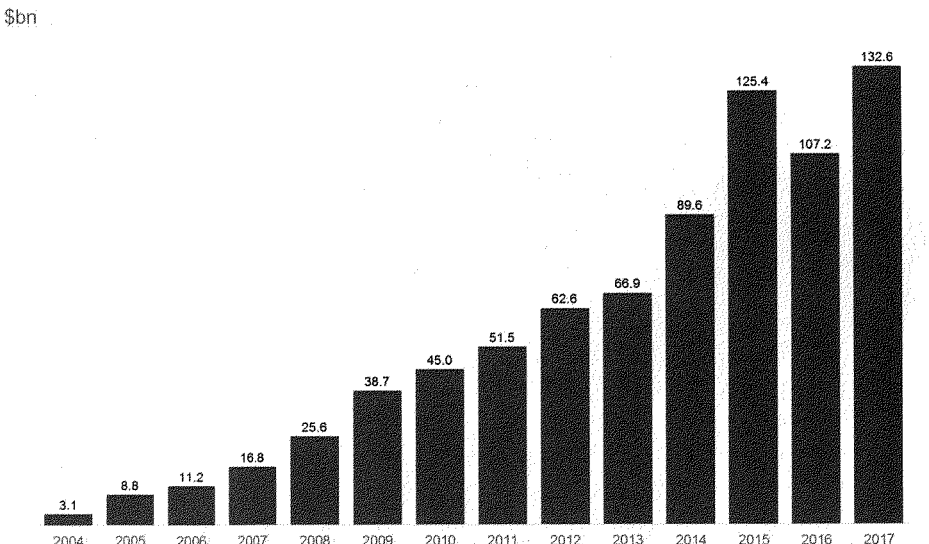
Note: Capacity is net summer; MW is megawatts; MWh is megawatthours.
Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 8.1, March 2018

eia

Annual Trends, New Investment

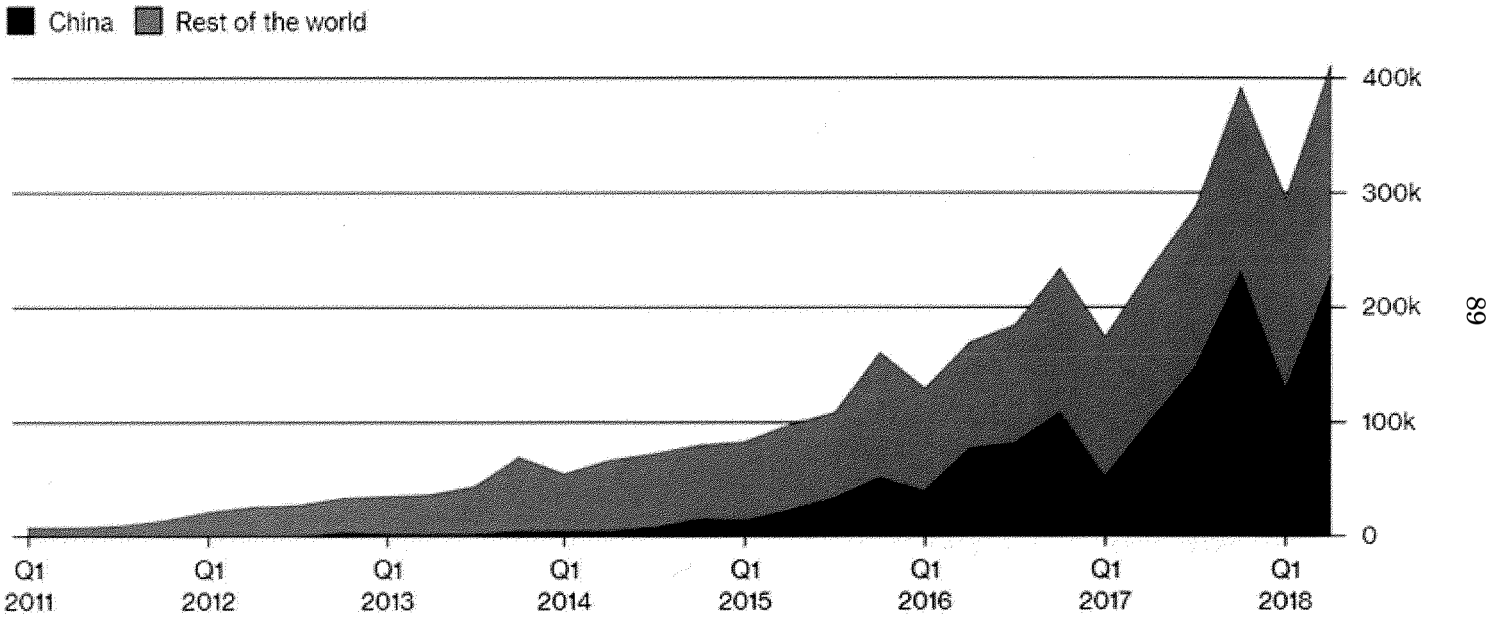
New Investment in Clean Energy China

2004 – 2017



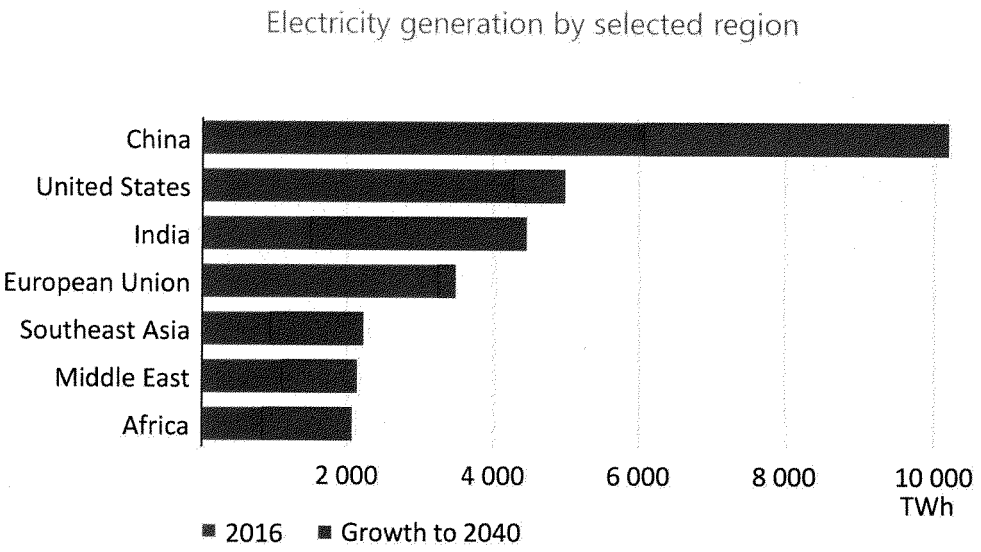
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All values nominal

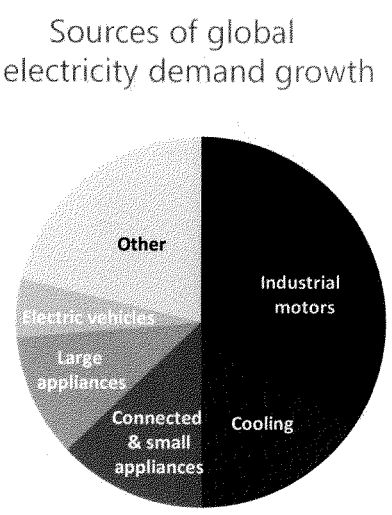
Source:
Bloomberg New Energy Finance



Data: Bloomberg Intelligence

IEA says the future is electrifying, but what if…





India adds the equivalent of today's European Union to its electricity generation by 2040, while China adds the equivalent of today's United States

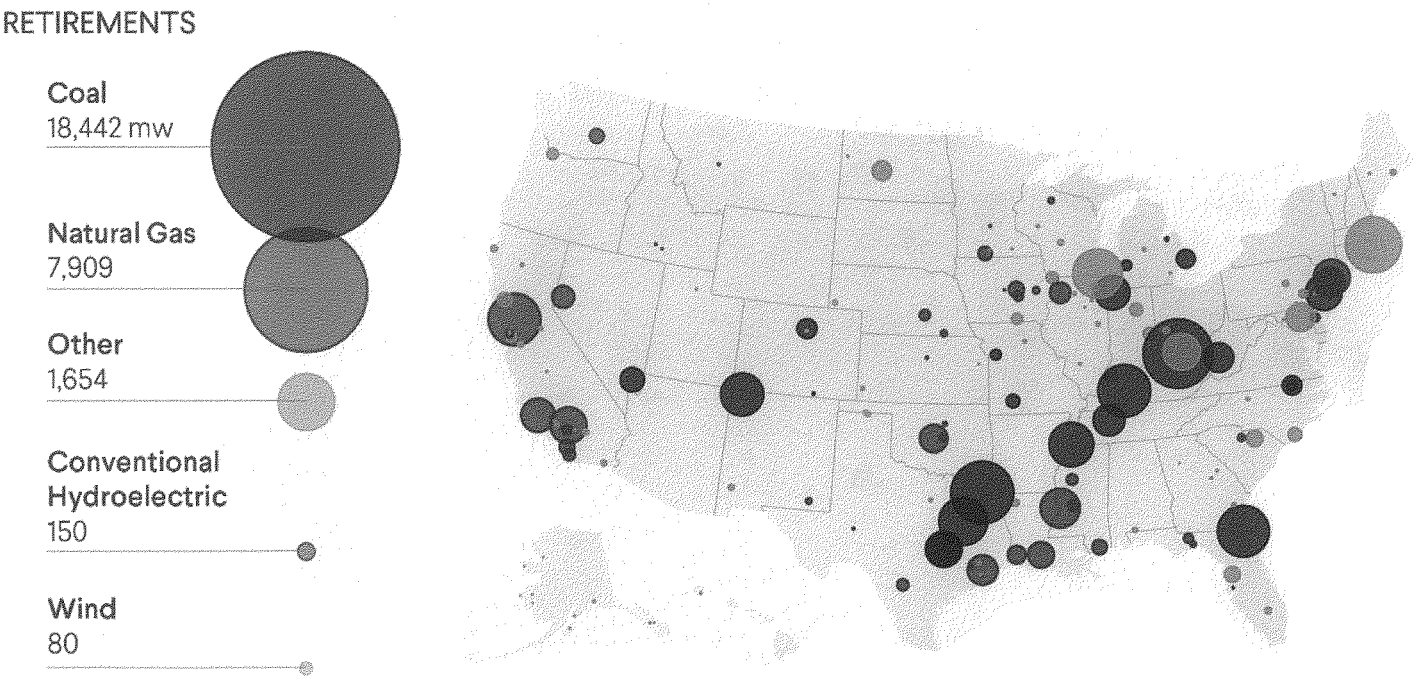
In the United States, Natural Gas and Renewables are Replacing Coal.

Hawaii and California targeting 00% renewables. In midterms, winning governors pledged 100% renewables from:

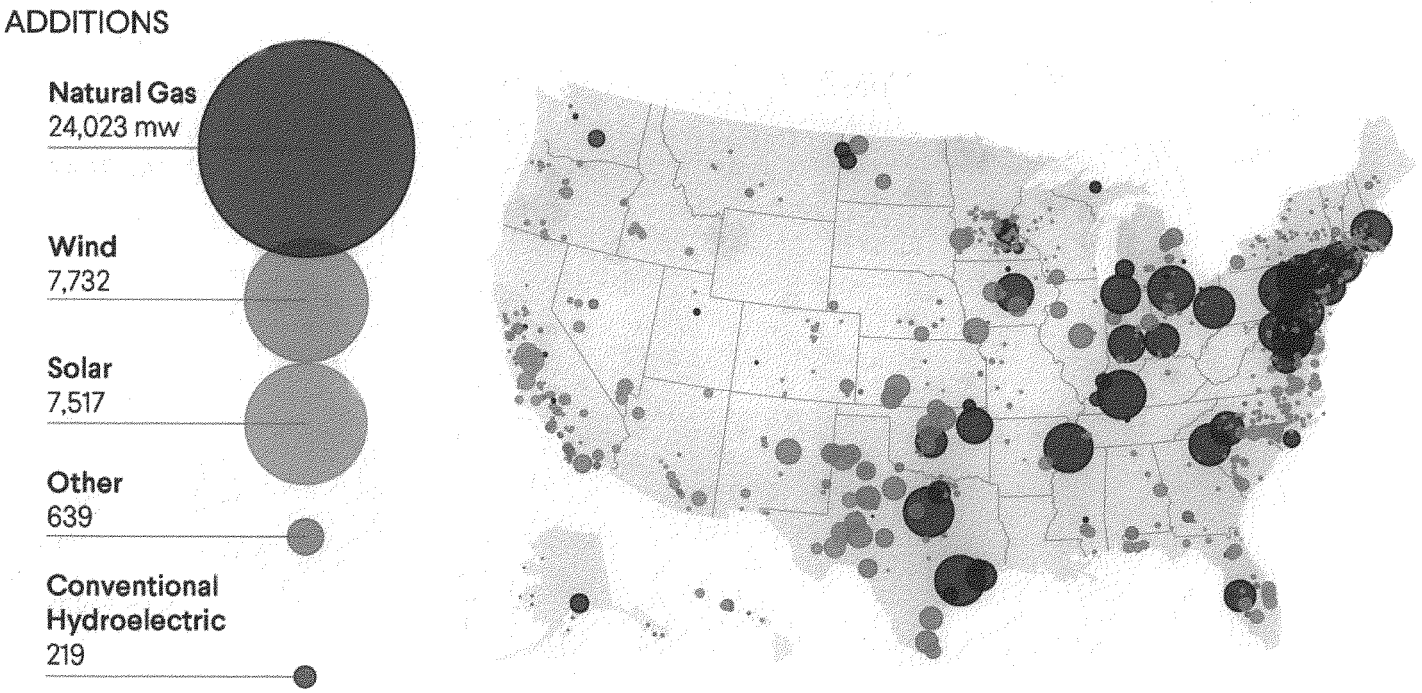
Colorado
Connecticut
Nevada
Maine
Oregon
Wisconsin

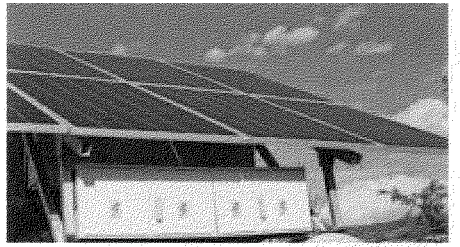


U.S. Power Plant Retirements, January 2007 – August 2018



U.S. Power Plant Additions, January 2007 – August 2018







China dominates **top 10** solar ranking partly because biggest sales market but also due to emerging industrial policies related to China 2025.

It's not just U.S. shale. China will be a major energy exporter via its technologies. India could copy…

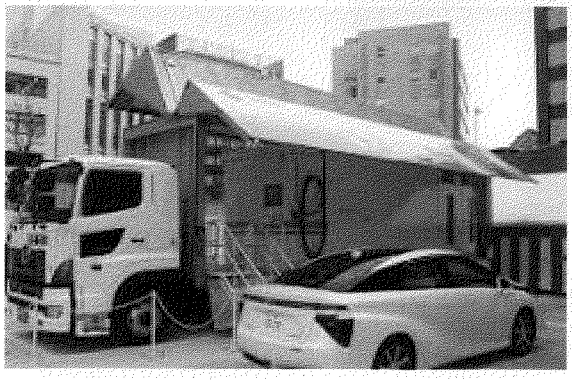
Highest Ranking Solar Panel Manufacturers

Jinkosolar	China
Trina Solar	China
Canadian Solar	Canadian
JA Solar	China
HanwhaQ	South Korea (Solarfun,China)

Replacing
First Solar (US)
Renesola (Japan)
Sharp (Japan)
Sunpower (US)





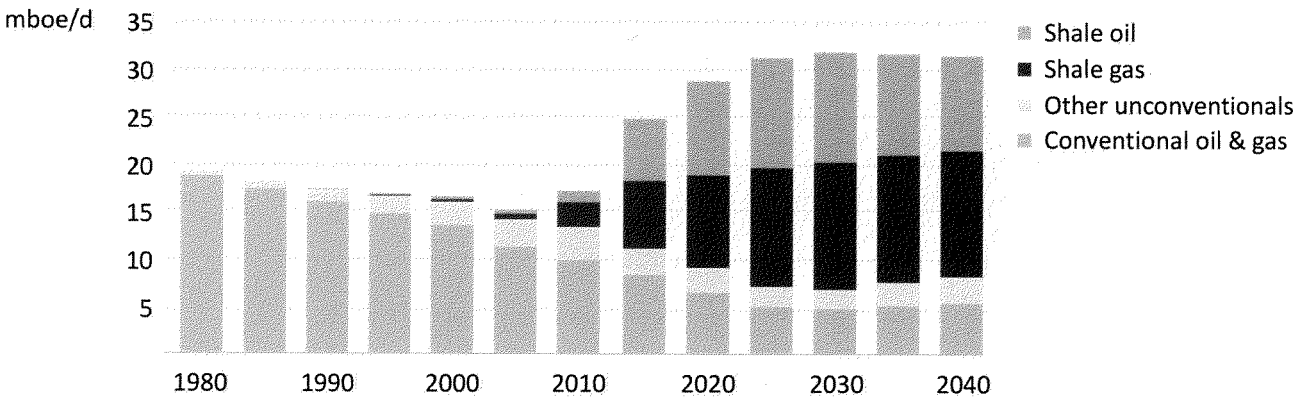


Hydrogen Fuel Cells

Could natural gas distribution companies deliver directly to stationary fuel cells bypassing electricity distribution?

Germany, Japan still making large bets on hydrogen fuel.

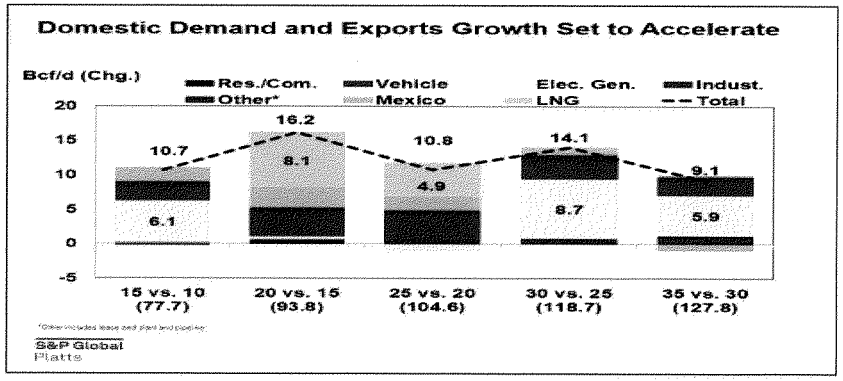
By 2040, U.S. will account for roughly 20 percent of global natural gas production.

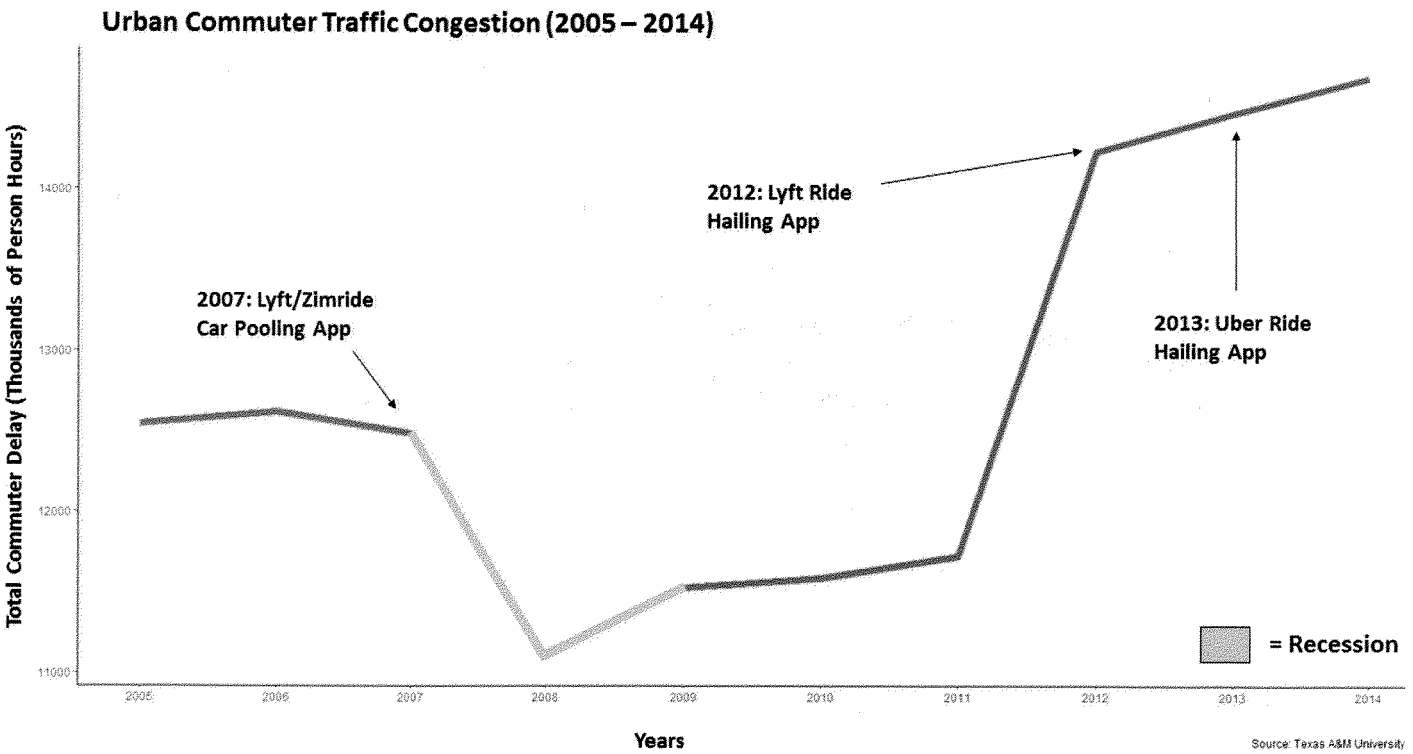


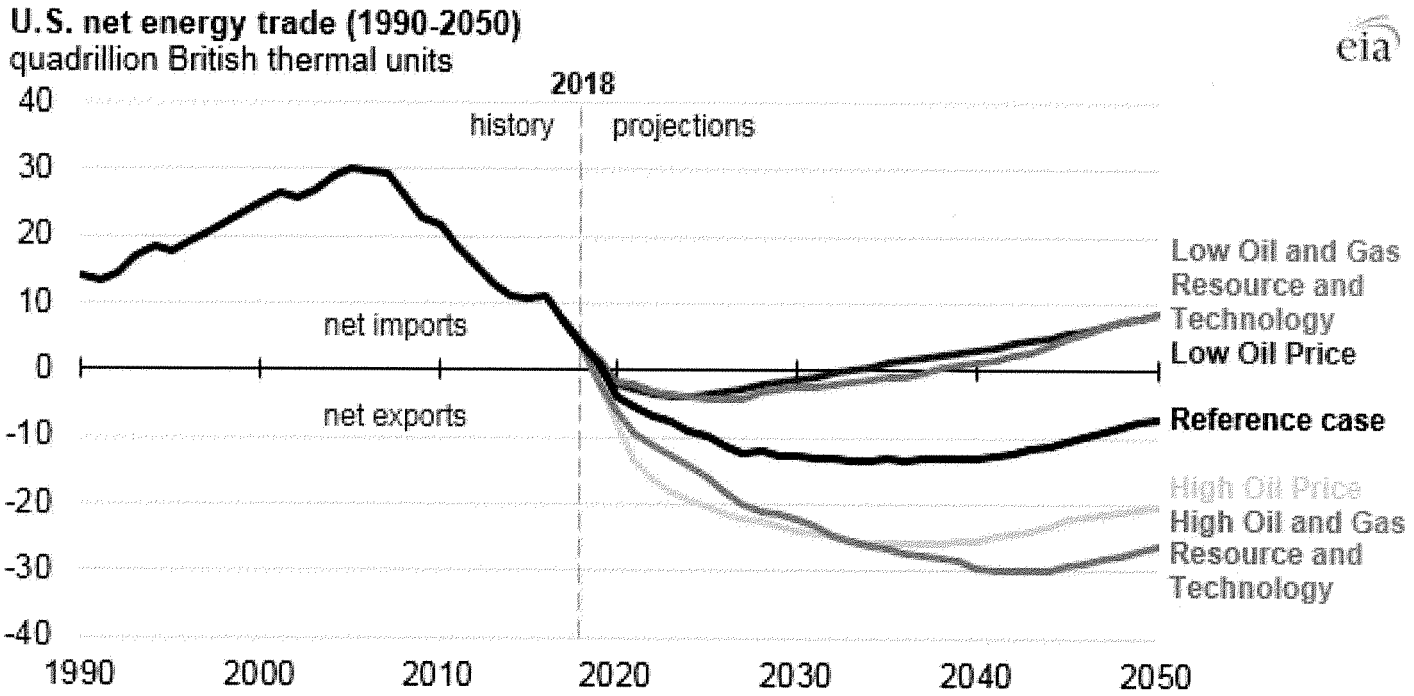
Rising global natural gas demand will be driven by industrial and power demand in Asia and Africa

Russia will respond to rising U.S. LNG exports with price cuts

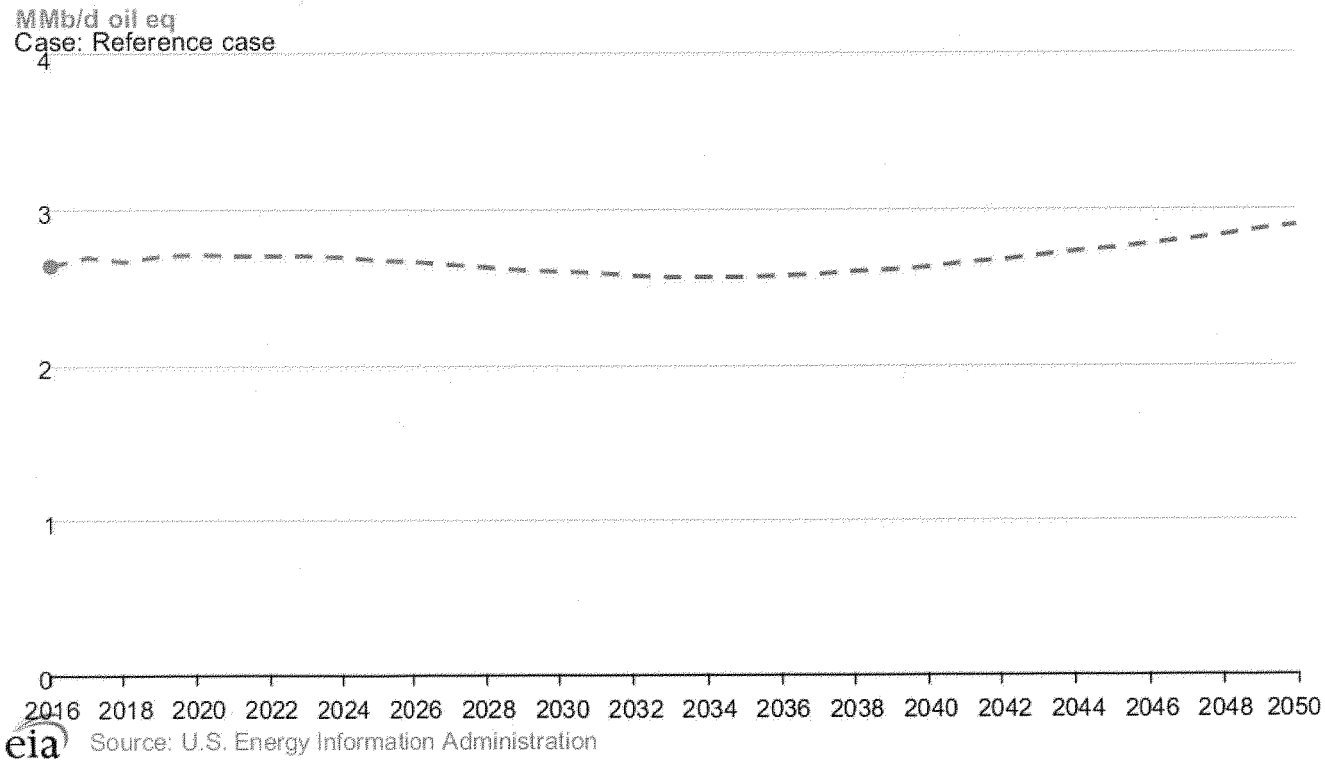
- U.S. LNG exports expected to continue to rise significantly in 2018 to 2025 timeframe.
- Trade war interfering with previous high interest in U.S. gas on gas deals. If LNG exports don't materialize as substantially as projected, expect lower U.S. prices late 2019 into 2020.
- Still, economics could help. Golden Pass and spot deals could substantially undercut even Russian gas prices.




Urban Commuter Traffic Congestion (2005 – 2014)
Total Commuter Delay (Thousands of Person Hours)
14000
13000
12000
11000
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Years
2007: Lyft/Zimride Car Pooling App
2012: Lyft Ride Hailing App
2013: Uber Ride Hailing App
= Recession
Source: Texas A&M University


U.S. net energy trade (1990-2050)
quadrillion British thermal units
eia
2018
history
projections
40
30
20
10
0
-10
-20
-30
-40
net imports
net exports
1990
2000
2010
2020
2030
2040
2050
Low Oil and Gas Resource and Technology
Low Oil Price
Reference case
High Oil Price
High Oil and Gas Resource and Technology

Transportation: Energy Use by Mode: Freight Trucks



Ms. KAPTUR. Thank you so very much, Ms. Jaffe.

And finally, let me recognize Mr. Sonnesyn. I hope I am pronouncing that correctly.

Mr. SONNESYN. Sonnesyn, that is correct. Thank you, Madam Chairwoman, and thank you, Ranking Member Simpson.

Business Roundtable is an association of CEOs of America's leading companies, and we work to promote a thriving U.S. economy and expanded opportunity for all Americans through sound public policy. And when it comes to energy, we support policies that build on America's strengths in technology and energy diversity, encourage investment in innovation in our Nation's vibrant energy sector, and preserve environmental quality for the 21st century and beyond.

I am going to just sort of paraphrase a little bit off my colleagues and not repeat their testimony, but a couple key points that emerged that I was stressing in my written testimony as well.

One, America is today a global energy super power, particularly in oil and natural gas. That is not what we expected 10 or 12 years ago. So what happened? What changed? It has largely been driven by hydraulic fracturing, a technology that the chair rightly noted was partially developed through DOE research and funding.

So what does that imply then about other things going forward? We have seen also, by the way, increased adoption of renewables, great energy efficiency, also both driven in part by research at the Department of Energy.

So as we look ahead and as we look at some of the challenges that we have, I think we recognize, America's CEOs, the real and growing threat of climate change, and we believe that America's business leaders have an obligation to contribute to an environmentally responsible future. In fact, many of our members are actively reducing their carbon footprints at their business operations right now. We have a large initiative going on at Business Roundtable, you can see at sustainability.brt.org, where CEOs are talking in videos about how each of them are doing this today.

And so we believe that improving energy efficiency, increasing utilization of low carbon fuels and renewables, and continuing to advance technology are essential to achieving the lower carbon future for which we are striving.

Later this year, Business Roundtable will release a report highlighting some of the potential breakthrough technologies that could fundamentally change the U.S. and global energy landscape for the better, just as those technologies that have been researched in the past have done and brought us to the point we are at today. So I thought I would just list a few of those and talk about them briefly as we are continuing to review them ourselves.

First, advanced nuclear. Advanced nuclear energy is a term that encompasses both small modular reactors and nonlight water reactors, involves new methods of operation, new types of coolants, and new form factors. It holds the promise of flexibility, dispatchability, extraordinarily high energy density, increased safety, and the ability to be used in both electric and nonelectric applications, while producing zero carbon emissions. It also has the potential to be much cheaper than nuclear has been in the past.

Two, carbon capture utilization and storage, often referred to as CCUS. It has become increasingly clear that to tackle climate change we don't only have to reduce emissions, but we have to figure out ways to capture and/or utilize the emissions that we are making now or store them. This already has a great deal of research base at DOE and elsewhere. There is some demonstration projects on this, and I think we see this as an area of potential further growth.

Three, hydrogen. Like electricity, hydrogen is a flexible energy carrier that can be produced from a range of primary energy sources and used across a variety of sectors with significantly lower levels of emissions of greenhouse gasses and other air pollution. Hydrogen can serve to store and transport renewable energy, to power vehicles, to heat buildings, or be used as renewable feed stock in industrial production, like steel.

Four, energy storage, and I think Mr. Zindler was referring to this a little bit earlier. Because renewable power today primarily from wind and solar is intermittent, meaning that you can't control when the sun shines or when the wind blows, the ability to store that energy when it is generated and then dispatch it when you need it is important, and that is what storage enables us to do. And while U.S. energy storage deployment is expected to accelerate markedly over the next few years, current technology isn't enough to meet all the potential demand that we see ahead. This is an area where greater research could be of great benefit.

And five, advanced substitute materials. I know you all have thought a lot about advanced materials. This is not a new subject for the subcommittee. But when you think about clean energy technologies, batteries, solar panels, wind turbines, all of these things rely on near critical or critical minerals like lithium or neodymium. So, for example, if you wanted a range of advance battery technologies that do not rely on critical minerals, you are going to have to find a substitute advanced mineral—or material to help develop that technology, and that is another area that could really help as we move forward.

So, in conclusion, for companies and individuals to harness the opportunities presented by today's energy landscape, public policy should support resilient, efficient infrastructure and a stable regulatory regime, but we also need technological innovation. And we appreciate the work of this subcommittee in funding the research enterprise at the Department of Energy at the national laboratories, ARPA–E, and elsewhere. And while we recognize it is difficult to know what will be tomorrow's breakthrough technology that will make the biggest difference, it is hard to imagine that we will find that breakthrough technology without government-sponsored research.

Thank you, and I look forward to your questions.

[The information follows:]

PREPARED STATEMENT OF MATTHEW E. SONNESYN
VICE PRESIDENT, INFRASTRUCTURE, ENERGY and ENVIRONMENT
BUSINESS ROUNDTABLE

"ENERGY TRENDS AND OUTLOOK"

Before the
U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

Good morning, Chairwoman Kaptur, Ranking Member Simpson and Members of the Energy and Water Subcommittee. I am Matt Sonnesyn, Vice President for Infrastructure, Energy and Environment of Business Roundtable.

Thank you for inviting me to this hearing to examine current energy trends and the outlook for energy in the United States.

Business Roundtable is an association of Chief Executive Officers (CEOs) of America's leading companies working through sound public policy to promote a thriving U.S. economy and expanded opportunity for all Americans. Business Roundtable is the only national organization that exclusively represents chief executive officers. These CEO members lead companies that employ more than 15 million people, generate more than $7 trillion in annual revenues, and invest nearly $147 billion annually in research and development. As major employers in every state, Business Roundtable CEOs are responsible for creating quality jobs with good wages.

When it comes to energy, Business Roundtable supports policies that build on America's strengths in technology and energy diversity, encourage investment and innovation in our nation's vibrant energy sector, and preserve environmental quality for the 21st century and beyond. Business Roundtable policy on these issues is developed through its CEO Committee on Energy and Environment. I oversee policy development and advocacy for this Committee.

As I prepared my testimony for today's hearing on "Energy Trends and Outlook," I had to remind myself of the need to practice humility when making predictions about the future, especially when it comes to energy. Just 10 years ago, the National Academy of Science – an institution for which I have tremendous respect – wrote a bleak report on "America's Energy Future." In that report the Academy emphasized, among other things, that the then-growing U.S. reliance on foreign sources of oil and that the long-term reliability of traditional sources of energy, particularly oil, was in doubt. The Academy concluded that "a meaningful and timely transformation to a more sustainable and secure energy system will likely entail a generation or more . . ."[i]

Fast forward to today, and the picture is remarkably brighter than the Academy expected it to be.

In my testimony, I would like to take a moment to review where we are today and how we got here. I will walk through some of the challenges facing us as we go forward. And then I'll highlight a key to helping us overcome these challenges: research and development of promising new technologies, an area where this Subcommittee plays a critical role.

America is a Global Energy Superpower

America has re-emerged as a global energy superpower. Fueled by an impressive combination of ingenuity and investment, developments over the last decade have fundamentally altered the U.S. energy landscape. The implications of this energy renaissance are profound. In fact, in 2017, for the first time since 1957, the United States was a net exporter of natural gas. And last year, the U.S. passed Russia and Saudi Arabia to become the largest crude oil producer in the world.[ii] In its most recent long-range energy outlook, the Energy Information Administration predicts that U.S. oil and natural gas production will continue to grow into the future under most scenarios.[iii] Surging oil and natural gas production has dramatically reduced U.S. reliance on foreign sources of energy, and we continue to use energy more efficiently and some of our fastest growing sources of electricity are from renewable resources. Our newfound energy abundance has driven new investments in our economy and in the process has created hundreds of thousands, if not millions, of good paying jobs.

The CEOs of Business Roundtable are optimistic about America's energy future. As major domestic energy producers, energy consumers and technology developers and suppliers, our companies are uniquely positioned to help the nation make the most of this opportunity. Indeed, the unlocking of previously difficult-to-access resources, such as oil and natural gas from shale formations, is a textbook example of the private sector's ability to innovate, capitalize on new opportunities and keep the U.S. firmly on the path toward a secure and sustainable energy future.

While the shale revolution is rightfully credited with transforming the U.S. into an oil and gas superpower, the U.S. also has made impressive gains in adding renewable sources of energy to our energy mix and in using energy more efficiently.

Renewables. Over the past decade, the power-generating sector has experienced a boom in its use of renewable energy. Costs for solar and wind power have fallen rapidly, and the underlying technologies have improved. Renewables (primarily wind and solar) have accounted for the majority of U.S. electric generating capacity added each year since 2013 (though in 2018, renewables were edged out by additional natural gas additions).[iv] Over the past decade, installed U.S. wind capacity has tripled and solar capacity has increased six-fold.[v] While much of this results from state renewable portfolio standards and U.S. tax policy, an increasing share comes from U.S. businesses demanding that their electricity be generated by lower-carbon fuels. Corporate contracts for renewable energy have risen sharply over the past five years. The recent Business Roundtable "Embracing Sustainability Challenge" has shown that several member companies are actively making such purchases today.

At the same time, one should avoid overstating the penetration of these technologies in the market. Wind and solar today account for only 7 percent of power generation in the United States. While the cost barrier has fallen remarkably for renewables, the intermittency of generation from these sources creates significant challenges to further deployment.

Efficiency. As the United States. makes a transition toward lower-carbon sources of electricity generation, the nation has also become much more efficient in its use of power. Even as the economy continues to grow, energy demand is generally flat or declining across most sectors in the United States.[vi] With continued improvements in the energy efficiency of lighting, appliances, vehicles, industrial processes and more, it is unlikely that energy demand will grow significantly. Energy efficiency has been improving in the U.S. transport sector as well.

The Challenge: Delivering Affordable, Reliable Energy While Reducing Environmental Impacts

America's energy sector creates jobs, contributes to growth, and improves competitiveness throughout the economy. Delivering secure, diverse, affordable, and reliable energy to U.S. businesses and consumers is essential to maintaining economic growth and improving standards of living. At the same time these objectives must be accomplished even as the United States reduces environmental impact and, specifically, addressing climate change.

More than 10 years ago, Business Roundtable CEOs identified the potentially serious consequences of climate change for society and ecosystems, agreeing that steps to reduce the risks of global temperature increases are prudent. CEOs recognize the real and growing threat of climate change and believe that America's business leaders have an obligation to contribute to an environmentally responsible future. Indeed, members are actively reducing the carbon footprints of their business operations.

Business Roundtable believes that improving energy efficiency, increasing utilization of renewables, continuing to advance technology and working at a global level are essential to reduce GHG emissions while ensuring economic growth. The United States remains a global leader in research, development and commercialization of energy efficiency, renewable energy, new nuclear and other energy technologies. We believe that the U.S. should capitalize on these advantages and accelerate development of a portfolio of affordable, diverse and efficient options for meeting our economic, environmental and energy challenges. The development and global deployment of new, efficient low-greenhouse gas (GHG) technologies is vital to an effective long-term response to concerns about global climate change.

This Subcommittee has an important role to play in helping ensure that the United States maintains its leadership in developing energy technologies. Research, development and demonstration (RD&D) investment in new low-GHG technologies must be increased in the public and private sectors to levels commensurate with the magnitude of the climate challenge. These RD&D programs should coordinate more effectively across economic sectors and focus on technologies with the greatest promise of reducing GHG emissions on a life-cycle basis. Such

programs should also bear in mind that climate change is global in both its causes and impacts, requiring a global response.

Researching and Developing Tomorrow's Breakthrough Technologies

The most significant breakthrough technology of the last decade – hydraulic fracturing – was funded in its earliest stages in part by research dollars from the Department of Energy[vii] – funds provided by this Subcommittee. We do not always know where our next technological breakthroughs will come from, but we do know that we will need them to continue providing diverse, reliable, affordable and sustainable supplies of energy to power our economic growth while also reducing environmental impact.

Business Roundtable will release a report later this year highlighting some of the potential breakthrough technologies that could fundamentally change the U.S. and global energy landscape for the better. Let me preview that report by listing a few of the promising technologies we are currently researching:

Advanced Nuclear. Nuclear power currently provides roughly two-thirds of America's carbon-free power. However, the current generation of nuclear power plants is struggling to stay economically competitive and attempts to build new plants have either failed or gone significantly over schedule and budget. A new generation of nuclear power will likely be required for America to realize an economical, dispatchable, low-carbon power system.

Advanced nuclear energy – a term that encompasses both small modular reactors (SMRs) and non-light water reactors – involves new methods of operation, new types of coolants, and new form factors. Advanced nuclear holds the promise of flexibility, dispatchability, extraordinarily high energy density, increased safety, and the ability to be used in both electric and non-electric applications – all while producing no carbon emissions. Advanced nuclear reactors have the potential to be far cheaper than traditional light-water reactors and to respond to demand peaks and utilize energy storage technologies to better integrate with high levels of variable renewable energy.[viii]

As of early 2018, more than 70 advanced nuclear projects were being pursued by companies, universities, and national laboratories across North America.[ix] Advanced nuclear development in the United States, however, is hindered by a lack of high-assay low-enriched uranium (and U.S. enrichment capacity to produce it), lack of a centralized fast reactor testing facility, shortcomings in materials engineering, and regulations designed for the last generation of reactors that do not necessarily correspond with the attributes of advanced reactors. The projected timelines for actual deployment are also distant. Although the first advanced reactors – SMRs – could be online by the mid-2020s,[x] the Department of Energy (as of early 2017) had set a goal that at least two non-light water advanced reactor concepts reaching sufficient maturity and progress in licensing review to allow construction to begin by the early 2030s.[xi] In addition, advanced nuclear will have to prove cost-competitive with renewables and natural gas.

Carbon Capture, Utilization and Storage. It has become increasingly clear that tackling climate change will not only require reducing emissions, but also addressing emissions that have already been emitted or are still being emitted. Carbon capture, utilization, and storage (CCUS) refers to a suite of technologies that selectively capture carbon dioxide from flue gas or the atmosphere and then either repurpose the captured carbon dioxide in the production of commodities -- such as for carbon fiber or fuels -- or store it, often underground.
A solid base of experience and infrastructure already exists for CCUS. Carbon capture projects were first deployed in the United States for enhanced oil recovery nearly half a century ago.[xii] Today, over 20 million metric tons of carbon dioxide is captured from U.S. manmade sources each year and transported through over 5,000 miles of carbon dioxide pipelines.[xiii] In addition, recent years have seen the commercialization of the first carbon capture system at a U.S. coal-fired power plant and initial testing of a new design for a natural gas plant that can capture these operations' carbon dioxide emissions.[xiv]

However, fewer than two dozen large-scale CCS facilities operate globally,[xv] and CCS developments in the power and industrial sectors are far from reaching the required scale (and affordability).[xvi] Projects face hurdles including unique environmental permitting requirements (including those for carbon dioxide pipelines), uncertain long-term liability, financing difficulties associated with high capital cost and often first-of-a-kind commercial projects, and the slow development of climate policies around the world.[xvii]

Hydrogen. Like electricity, hydrogen is a flexible energy carrier that can be produced from a range of primary energy sources and used across sectors. Because of its flexibility and wide array of potential applications, hydrogen has the potential to contribute to a future energy system with significantly lower levels of emissions of greenhouse gases and other air pollution.

Hydrogen could serve to store and transport renewable energy, enabling large-scale renewable energy integration and long-duration energy storage. It could be used to power vehicles, to meet about 10 percent of global demand for heating in buildings, and/or to be used as a renewable feedstock in some industrial production, such as steel.[xviii]

In the United States, 10 million metric tons of hydrogen are already produced annually, mostly through steam-methane reformation of natural gas.[xix] By adding CCUS, this could become "low-carbon" hydrogen.[xx] There is also the possibility of producing zero-carbon renewable hydrogen by powering electrolysis with wind or solar.[xxi]

However, realizing the promise of hydrogen would require massive increases in investment, deployment of hydrogen infrastructure, and expansion of manufacturing capacities.[xxii] In addition, hydrogen will have to compete against other technologies, for example in such as areas as transportation, where batteries are experiencing growing market share and declining costs. Still, the current drive for a low-carbon energy system, long-term energy storage, and reduced greenhouse gas emissions give reason for cautious optimism about the future of

hydrogen, particularly in sectors – like industrial manufacturing – where GHG emission reductions are otherwise difficult to achieve.

Energy Storage. The intermittency of renewable generation underscores the need for continued R&D in another potential breakthrough technology: energy storage. Driven by sharply falling battery prices, government policies, and growing adoption of electric vehicles (EVs) and distributed energy generation, U.S. energy storage deployment is expected to accelerate markedly over the next few years.[xxiii]

In the electricity sector, energy storage technologies are currently dominated by lithium-ion batteries but also include other battery technologies, fuel cells, compressed air, thermal storage, flywheels, and pumped hydroelectric storage. Additionally, with the recent focus on electrification of transport, specifically for passenger cars, sales of battery-electric vehicles (and plug-in hybrids) have been growing; they have just reached 1 percent of vehicle sales – and make up a far smaller percentage of the overall fleet.

Improvements in battery (and other storage) technologies could have large implications for the future energy mix. Continued improvements in battery technologies and costs could make variable renewable generation into a dispatchable resource, provide a range of services to the grid, and accelerate the electrification of transport. As with renewables, precipitous declines in price and improvements in technology have led to a rise in deployment of energy storage. New battery chemistries are also being explored, including ones that do not rely on critical minerals such as lithium and cobalt, although producing these new configurations on a commercial scale could prove difficult

Advanced Substitute Materials. As this Subcommittee well knows, developing new advanced materials to replace existing materials that are in limited supply or are otherwise difficult to acquire hold great potential. Many clean energy technologies, from batteries to solar panels to wind turbines, rely on critical or near-critical minerals such as lithium and neodymium. Limited supplies of these minerals could present an obstacle to further commercialization and deployment of these technologies. Progress has already been made in reducing reliance on such minerals for permanent magnets and for lighting,[xxiv] and a range of advanced battery technologies that do not rely on critical minerals are under development.[xxv]

As for vehicles, a key method for improving their efficiency is "lightweighting" – replacing heavier materials such as steel with lighter ones such as various polymers and alloys – as it takes less energy to move and accelerate a lighter vehicle. Using lightweight materials and high-efficiency engines made possible by advanced materials in a quarter of the U.S. fleet could save more than 5 billion gallons of fuel a year by 2030, without sacrificing safety.[xxvi]

With regard to construction, new combinations of materials could reduce emissions associated with cement and concrete production. For example, a range of materials have been developed or tested to supplement clinker in Portland cement.[xxvii]

Some of these alternative materials require additional testing to ensure adequate performance. Others need government standards or changes to existing regulations to allow greater use of them in the market. Whatever the case, materials science will clearly continue to advance and contribute to the evolution of the energy sector.

Conclusion

As the nation's business leaders, the CEO members of the Business Roundtable understand the opportunities and challenges presented by today's changing energy landscape. For companies and individuals to harness these opportunities, public policy should support a resilient, efficient infrastructure and a stable regulatory regime. Ensuring robust, affordable energy for the world while reducing emissions and facilitating consumer choice represents a considerable challenge – one that requires technological innovation, sound policies, and political and corporate commitment. It also requires stable, predictable and supportive government policies, including expeditious permitting of needed infrastructure to allow resources to be added when and where they are required.

We particularly appreciate the work of this Subcommittee in funding the research enterprise of the U.S. Department of Energy at the national laboratories as well as ARPA-E. Realizing a energy and environmental future that benefits the world and all Americans will continue to require precommercial funding for research and development covering a range of promising technologies. While it is difficult to know which technology will produce tomorrow's biggest breakthrough, such a breakthrough is highly unlikely to come to fruition without government-backed basic research. The uncertainty surrounding such future technology also heightens the importance of researching and developing a broad portfolio of technologies.

Thank you, Madame Chairwoman and Members of the Subcommittee for your dedication to advancing the nation's energy future. I look forward to your questions.

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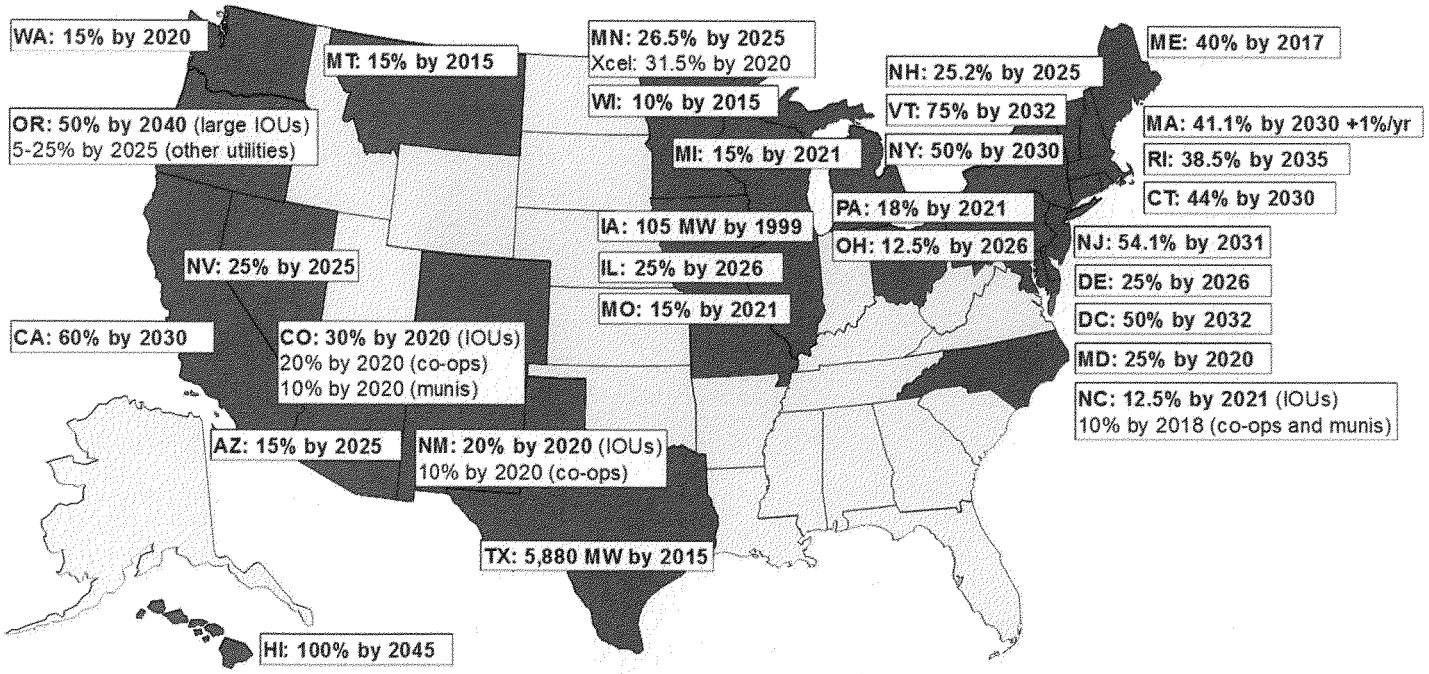
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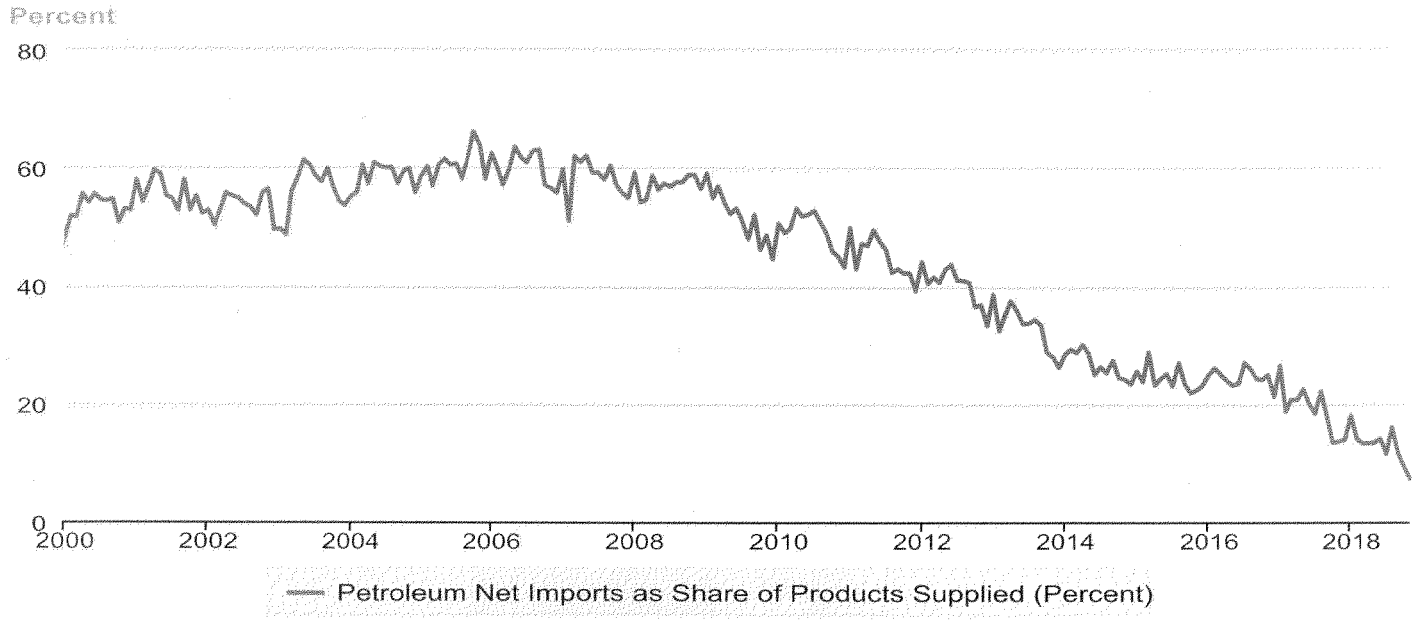


Source: Berkeley Lab (November 2018)

Select Additions to U.S. Policy, 1987-2007

- Appliance Efficiency Standards.
- U.S. Energy Information Administration Web Site.
- Higher Standards for Clean Air.
- 2005 legislation to encourage greater use of nuclear power and biofuels.
- Energy Independence and Security Act of 2007.

Table 3.3a Petroleum Trade: Overview



eia Source: U.S. Energy Information Administration

Ms. KAPTUR. Thank you, Mr. Sonnesyn.

And thank you all. You are just really an outstanding panel. I wish every citizen of this country could hear what you've said this morning.

Before we begin with questions, I would like to remind members about our hearing rules for this year. First, I intend to convene our hearings on time, and for those members present in the room, when I gavel in at the beginning of the hearing, I will recognize you for questions in order of seniority, alternating between majority and minority, until all who arrive prior to the gavel have asked questions. For those of you who arrive after the hearing has started, I will recognize those members solely in order of arrival, again, alternating between majority and minority.

And lastly, I intend to observe the 5-minute rule for questions and answers, and will now begin our questioning under normal rules. And I would like to give members a chance to ask questions, so I will just ask one question at the beginning and then we will turn to Mr. Simpson.

To Mr. Hakes and Ms. Jaffe, our primary responsibility, our first responsibility is to protect and defend the American people against all enemies, foreign and domestic, but we know that dictators and authoritarians dominate global energy markets and do not share our most fundamental value, surely liberty. They often assert their dominance by actual withholding of energy supplies or they employ cyber hacking, which is happening to companies that I represent, hundreds and hundreds and hundreds of times a week, or even many of these countries just threaten to withhold their energy supplies.

For example, we have seen bad actors like Russia threaten to disrupt natural gas supplies to Europe or use cyber capabilities to attack electricity generation in Ukraine.

So, Mr. Hakes and Ms. Jaffe, what are some examples of how other governments have used energy supply as a weapon against the United States or other countries? And what more can be done to make our country less susceptible to the whims of dictators and authoritarians who are using energy as a weapon as we speak this morning?

Mr. HAKES. One of the tools that a historian has is access to previously classified material, some of which wouldn't even be seen by senior members of government. And I can assure you that the use of oil for political purposes is greater than is reported in the press, now that we have access to the diplomatic documents. So this is a long-time problem in American foreign policy that countries who have power from their oil exports are willing to threaten, in effect, the American government.

I would share with you, right now, my concern is a lot in Europe where they are very dependent on the gas from the Soviet Union. I think that is a problem. Perhaps the more robust liquified natural gas market will help in that respect. And then we always have to be concerned about the flows of money into the Middle East that can sometimes leak out into terrorist organizations. So I think those concerns continue to be something to keep very much on the front burner.

Ms. KAPTUR. Thank you.

Ms. JAFFE. Let me just remind the committee of something you already know. If we lower our oil use here in the United States, then we have more oil and gas to export to our allies so they are less dependent on the countries that the chairwoman is mentioning. So it is not necessarily bad for our industry here to also pursue clean solutions, and we need to lower the oil intensity of our transportation sector.

When I worked in California, I worked specifically on looking at what we could do in our freight and trucking industry, because whereas every American might not be able to afford today to buy an electric vehicle, and therefore, it is hard to gear that up in a very fast fashion, there are great benefits that can come in the freight sector from all kinds of technologies, including alternative fuels for trucks. We could impose higher performance standards for even the largest trucks, and it would innovate to technologies that would then make our companies more competitive to sell those kind of vehicles abroad.

China now dominates the electric bus market. They dominate the natural gas truck and some of the electrified larger vehicle markets. We can take that back, and we could have a huge squashing of the oil intensity of our transportation networks through the freight system.

We already have great progress that has been made through what I call optimization programs. So when your delivery service, I won't mention corporate names, but when you buy something online and it is coming to you through a delivery service, they actually use big data to program how those trucks move around the United States. One of those services told me that in 2017, they eliminated 100 million miles of vehicle miles traveled just by scanning your package and letting the computer decide which truck delivers it when. So there is a huge power in these technologies, these optimization GPS-style technologies. GPS is yet another technology that came out of the DOD.

We are going to have a unique opportunity. In everybody's district, you are going to have, unfortunately, natural disasters or other kinds of weather events that mean we have to replace infrastructure. We need to spend those dollars not raising a building up 4 feet above the ground; we need to spend those dollars modernizing our infrastructure, modernizing our grid, modernizing our buildings, so that we are both making new jobs through innovation and improving the resilience of our existing infrastructure.

Ms. KAPTUR. Thank you very much.

Out of courtesy, Mr. Simpson.

Mr. SIMPSON. Thank you, Chairwoman.

I appreciate all your testimony and all of you being here today. It is an interesting subject, one that we don't know a lot about, frankly. It is always hard to predict where you are going and how you are going to get there. You know, it is interesting, I would buy an electric car tomorrow, but I live in Idaho, and I might drive 500, 600 miles a day, that is not unusual. And if the charging station that I—if they had one—that I stopped at and it takes an hour to charge my car, that is a problem. So there is a lot that needs to be done in that regard.

The other thing that a lot of people don't understand, if you go out to the Idaho National Lab, they are working on rapid charging stations and all of this kind of stuff. They have a thing where you are going to be able to take your electric car and just pull into your garage, and there is something that is in your floor that, you know, you don't have to plug it in or anything.

But the thing I found amazing is the impact that if, you know, 10 percent of the people got electric cars, that would have on our electrical grid. It is not conditioned to withhold the impact on our electrical grid, and we don't do enough in making sure that we have an updated and modern electrical grid system, because I was shocked at how much energy it takes to do that. I mean, it was the comparison of houses, and I thought that has got to be wrong, that can't be true, but it is. And it is something that we have got to address, besides the security of the electrical grid system.

But this subcommittee has tried to balance funding—and I will ask anyone that would like to answer this—has tried to balance funding needs across all stages of research, from basic science research to early stage applied energy research up through mid and late stage research and demonstration and across a wide variety of technologies for all components of the energy sector. The idea being that all stages are necessary, and you never know where the next breakthrough is going to develop.

Would you recommend we continue that general approach or would you approach things differently if you were in our seats? Anybody like to answer that? Go ahead.

Mr. HAKES. Yes, I have my favorite list. I mean, I think everybody here would agree batteries ought to be right up there and get special treatment. And then I will put in a plug for one that I think has been overlooked and I have talked with a number of senior officials about this, and I think more is being done. If you are looking at where we want to be 30, 40 years from now, I think we are going to have a very strong wind and solar basis. And the question is, what goes with that? And it could be small nuclear. And it could also be natural gas that is sequestered. And, you know, we made a big push for coal sequestration, and that didn't work out quite so well in some of the projects, but I think gas has some advantages in that respect.

And so if I was going to mention one thing that normally doesn't get mentioned that ought to be highlighted a little bit, because you don't want to put all your eggs in one basket. So I am very optimistic about the future of wind and solar, but I would like to have a few other things sitting out there, and so that is one area that I would like to see get some attention or more attention.

Ms. JAFFE. So let me just say, so when I worked at the University of California, I was actually on what we call the—we had a Climate Leadership Council at the UC, and I also worked very closely with the whole systems innovation office. And we put together an initiative that was how do you partner the labs, universities with the actual private sector, and by doing so, you know, shaping the private sector's choices.

We are coming out with a big report from the Council on Foreign Relations in the next couple of weeks on how digital, digital devices and digital innovation is going to affect the energy system of the

future, and that gets to Ranking Member Simpson's concerns about the grid, because they are going to have to be these digital solutions and we are going to have to think about how we integrate either small nuclear advanced or how we integrate batteries into this system. It is going to take differences in how we organize and then the technologies we deploy as we rebuild systems where they need to be rebuilt. California, of course, is going to have huge needs.

So I feel like instead of just having, you know, straightforward public funding and funding for universities and the labs, which has been very effective but maybe not at the pace we need, we are going to hear about the new—green new deal today, and a lot of talk is going to be about pace, right. So this idea of these innovation clusters where you are actually getting these small startup companies or the larger large players that have capital to deploy and getting them to deploy the technologies that we actually need and not necessarily technologies that might add to the problem, might make the grid more unstable or technologies that might add to how much oil we use, right. Because if everybody is taking Uber, and we triple the number of trips we take in a gasoline car, the fact that we are increasing our oil production is not going to matter. We have to use those technologies in a way that it supports public transportation. We need to use these technologies in a way that it gets us to the goals that we want.

And so for me, that is setting up the platform to having the labs working together with these companies and the young people. I mean, you are going hear from the sunrise movement. You know, the young people are inspired to work for companies that are doing these innovations. We need them to stay in science for national security reasons. And by asking these companies, even the energy companies, to partner in these clusters together with our labs and together with our scientists and innovators on campuses, I think we are going get a better result than if we let the private sector do it by itself or we put a tax on the private sector to do this or that.

I think that creating these sort of—if you think about the Silicon Valley culture and how having everybody in that same culture, and that involved the universities that were around Silicon Valley—many of you have never heard of Santa Clara University, it was a pivotal university involved in that process—by creating these clusters where we really man our workforce, really man the younger generation starting with students and universities and feeding them into these clusters in the Rust Belt, in other places, this is the way, in my opinion, to do it.

Mr. SONNESYN. If I may just add, Congressman, to answer you directly, research development and demonstration are all critical to the process, in our view. You do need to cover that gamut. If you just wait for the last part to be done by others, we may not get there. And a diverse portfolio across a variety of technologies is also helpful, because we don't know which technology will take off 10 years from now.

Ms. KAPTUR. Thank you, Mr. Simpson.

Congressman Pocan.

Mr. POCAN. Thank you, Madam Chair, and thank you to the panel. I appreciate you being here today.

A couple of graphs really kind of stood out to me, and I just want to ask some questions based on that. One on the energy consumption by energy source. When I look at the very small amount when it comes to solar and wind and other renewables, we put 8½ kilowatts of solar in our house about 3 years ago. There is nothing like paying $7 a month for your utilities, because in Wisconsin, we still have to pay a little something. But when you are a frugal Wisconsinite, that makes you smile. And yet then I look at the research and development, and when we really wanted to address an issue like putting someone on the moon, we put a huge spike of investment in that research and development, and apparently, I didn't know we still have a lot of money, three times what we are spending on energy, it looks like, going into space research and development. Yet what I have been told when we looked at this and when we looked at our solar and while the cost was coming down, it still maybe wasn't the best return for people. We know it is about 11 years for us is what it is going to take to actually pay down the solar. For most people, that is probably not where you would invest to do it. We did it for a lot of other reasons. We also have a Volt. I also have a Jeep Wrangler because I live in a rural area, so I guess I have neutralized myself out on that level.

But my question, I guess, comes to, what is it that really is the best way—like, I just think is it research and development that we need to put far more money in? I have companies in my district that a byproduct of some other research is they figure out how to cut the really thin cells in solar so they don't have to be made in China, they can be made in the U.S. Battery research that lithium batteries don't catch on fire, so a submarine doesn't have a fire because that would be bad. We are doing things like that. So research and development, is that the issue, or is it the incentivizing of the market? Because part of why people buy solar was because there was a Federal tax credit and there was also a State tax credit, but that still made it an 11-year buyout on that.

What is it that we really have to do in order to see those markets increase far more? Because I understand we were now—we are putting more oil and gas out and all that. I just don't think that is the future at all, and I think the demographics you have shown say that. What is it that we really need to be doing now to best move these forward?

Mr. ZINDLER. If I can jump in and just say, you know, you need an all-of-the-above energy policy that doesn't just apply—you know, just thinking about the actual fuels, but you are thinking about the policies too. And, of course, to the other question from the ranking member about sort of where to prioritize, you tell me how much money you have got to spend and I can sort of tell you where I would suggest that you prioritize. I mean, some of the technologies that Mr. Sonnesyn mentions are extremely expensive to demonstrate at scale, like small modular reactors, carbon capture, storage. Important—potentially incredibly important technologies, but they are at the—they are really at the, you know, development stage where you need to test them big, and you are talking not millions, but billions of dollars to look at that.

And then there is a lot of stuff much further up the chain with less money that is where you should probably focus it because that——

Mr. POCAN. So let me be a little more specific and maybe that will help. I am interested in wind and solar and things that we have an abundance of that are free, that don't rely on another country, that will decrease our budgets in defense and other areas eventually when we get there. So specifically in those areas, I am looking for what can we best do to increase that use.

Mr. ZINDLER. In terms of what would affect the market, I mean, the first thing, if you want to just continue with the growth of those technologies, both have tax credits that are due to phase out. And if you want to continue to grow the market at the same pace, renewing those would probably help, but that is a short-term thing. I think longer term, the questions and issues that were raised around flexibility of the system and accommodating batteries is very, very important.

I would note that the batteries, when paired with the solar system right now, can qualify for the investment tax credit, and that is making batteries plus solar actually become much more rapidly cost competitive, and that is really important. So something like that might be another thing to think about if we are thinking truly short term. But there is obviously—you know, energy you want to think in a much grander scale as well, and overall, as was noted by the ranking member and others, the system is going to demand flexibility. You throw a lot of new intermittent things onto the grid like renewables, you need to find a way to accommodate all of those.

But I think it is important to recognize that they are coming, because the prices are coming down fast enough that they are coming. Whether it is now or later, they are going to come, so you need to build a grid that accommodates them.

Mr. HAKES. I pointed out in my written testimony that the fast movement on wind and solar is not just due to R&D. The State renewable portfolio standards have driven the market, and when you get the market, then the private sector really has an incentive to tweak the system, reduce costs and compete. So the Congress, in the 2007 legislation, came that close to putting in a renewable—national renewable portfolio standard. It didn't quite make the 60 votes in the Senate. So that is working both sides of the equation, the R&D side and the demand side.

Ms. JAFFE. Let me add that the oil and gas industry had the benefit of the MLP tax structure, so that private equity, investor money, whether that is private money or family office money or, you know, even your pension fund, could invest. We do not count renewable energy as energy production. It is somehow in the mining definition. We don't allow renewable production to count. That seems to me really ridiculous. Why is energy production from solar any different? You have the stream of the energy produced, right? So looking at how to restructure renewable energy inside the financial system so that you can get private capital.

I can tell you, from being an adviser to the UC pension fund, that many pension funds are looking for ways, their constituency and their pensioners want them to invest in renewable energy, but,

you know, they also have pension obligations. So we have to make sure you don't lose that money, right? So having the tax status for projects that respond to PPAs that are part of the RPS, so that you can get capital into those programs faster is probably something—and then there have been bills proposed and they just die and they didn't make the tax reform bill. Unclear why.

Mr. POCAN. Thank you very much.

Ms. KAPTUR. Thank you very much.

Congressman Calvert.

Mr. CALVERT. Thank you, Madam Chairman. I appreciate the time.

Dr. Capuano, is that how you pronounce it?

Ms. CAPUANO. Capuano, yes.

Mr. CALVERT. Thank you. You mention in your testimony insufficient infrastructure that exists to move crude oil production supply from the Gulf region to meet our domestic refinery demand both on the East and West Coasts. I am wondering because of the news out of Venezuela right now, because of our dependence on heavy crude in the refining process, especially in those refineries that we have in the Gulf region between Louisiana and Texas, how that is going to affect the crude oil production in the short term? Obviously, this is going to be a problem. Venezuela still has the largest proven oil reserves of any country in the world, and certainly has an impact on the production of oil. So what would your response be?

Ms. CAPUANO. If we talk about Venezuela, that is mostly heavy crude, the heavy grade, and there are other countries that can supply that, such as Canada and Mexico. And so EIA monthly puts out a short-term energy outlook where we look at the available production supply globally and look at the outlook for balancing the needs of the United States refiners and other consumers.

And at this point, while there will be a shift obviously in the flow of oil to compensate for the fact that Venezuela is going lower, so we will see that adjustment. We don't see it as having a major impact, a shock impact, and so we will adjust. And again, I will refer you back to our STEO, and we are happy to share the detailed data from the STEO that will show you how we have done those calculations.

Mr. CALVERT. Okay. Thank you.

Innovation in my home State of California is a big deal. Patents, intellectual property are a big deal. I think 50 percent of all patents still are filed in the State of California for whatever reason.

Mr. SIMPSON. Fifty percent of the population.

Mr. CALVERT. You are probably right. God knows how many people we have.

We talk about innovation and we talk about research, and I am certainly in favor of doing all that, but most inventions, most breakthroughs are done not by the government, but by innovators. You mentioned, Dr. Hakes, Mr. Mitchell. He didn't work for the United States Government, and he innovated his way into a new technique.

Obviously, we have been researching fracking for 100 years, and it took him, his persistence, by the way. He ran into a lot of roadblocks along the way, but he was able to understand what he had to do to create what we now take for granted in modern day

fracking technology. I am sure some people wish he never came up with it, but nevertheless, he did, and that changed this country overnight.

And I liked your testimony, sir, about we can't expect what the next breakthrough may be. You know, we have been investing a lot of money in fusion here since the 1950s, and we always expect a breakthrough around the corner. You know, we are still investing in ether, and if that happened, of course, that would change everything. You know, we wouldn't have to worry about nuclear waste, and all the rest of it, and it would be a free reign.

So what about those new breakthroughs, and how do we protect intellectual property and those inventors that are going to come out with that breakthrough? I really believe in a capitalist society that the innovators are the ones that are going to come up with the ideas. The Elon Musks of the world are going to come up with the next solution, so I just wanted to throw that out there.

Yes, Dr. Hakes.

Mr. HAKES. George Mitchell is one of my favorite subjects. I actually I think was the first Federal official to attend his first profit making well using the fracking technique, I think, in 1999. But he lays out—he never expected he could protect his patent, so he bought a lot of land that was really cheap because it was only valuable if you could use his technology, and then he made the money off the land. It is very hard to protect patents in energy.

But there is not time to get into it today, but there was a journal article in the Journal of American History in 2012, where the historian Diana Davids Hinton interviewed Mr. Mitchell before he died, and the story of how he developed that technology. And if there is a way of getting that into the record or something, I recommend that obscure academic article to everybody.

Ms. KAPTUR. Dr. Hakes, please make it available to us.

Mr. HAKES. Okay.

Ms. JAFFE. Let me just add that what you are really referring to, Representative Calvert, is what we call in the, you know, research world the valley of death, right? So you have a technology like the fracking technology that started with Gas Technology Institute where George Mitchell served on the board. And, you know, how did he—he was dedicated. This is a man who studied physics as a hobby. He used to fly Stephen Hawking to his ranch, and he was 100 percent committed. Didn't matter how many times they failed. He was committed, he believed in the technology, and he personally took that technology over the valley of death.

So what the committee really wants to look at is not—I mean, you are mentioning there is technologies you invested in that could work, and then they don't make it commercially. So what you are really looking to do is you have to have basic research, because without basic research you don't even know what technologies are possible. But you still need to have some kind of funding, whether it is through the small business bureaus or whether it is through, you know, some other way, where you can move a technology that a business person thinks is promising, like for solar panels or Tesla's batteries, which work in a totally different system, and get them to be commercial.

Mr. CALVERT. If the gentlelady will yield back. I always believed that business is not going to invest usually in the basic physics and the issues of that. It is the applied side. And they only get that information out there to the entrepreneurs for them to come up. Government invents very little. I mean, we can point to a few exceptions, but the private sector has been the primary success in driving the economy. That was the point that I wanted to make.

Mr. ZINDLER. Can I just add just quickly a little bit of context? And first, Congressman, I very much share your admiration for entrepreneurship. Our firm was a startup company. We were bought by Bloomberg about 9 years ago. We are very proud of that. But I also would argue that nothing takes place truly in a vacuum. And one thing, you know, we track very closely is the amount of venture capital that gets invested in new energy technologies. And there was a boom in that kind of investment, and it was about 2008 and 2009.

And since then, generally speaking, the amount of money that has flowed in from the true venture community has been lower, and part of it is because they learned that actually developing an energy technology at the applied level is really, really expensive. It goes beyond the 10 to 20 to even a couple hundred million——

Mr. CALVERT. I don't want to take up all the time, but, you know, I am an old salesmen, and you always sell the sizzle and not the steak. You always make money on the up side, not when you plateau the market, so I agree with you on that.

So with that, I will yield back my time.

Ms. KAPTUR. Thank you.

Congressman Fleischmann.

Mr. FLEISCHMANN. Thank you, Madam Chairman. I wanted to begin by congratulating you on your chairmanship, and also Ranking Member Simpson. This is a very special committee, the Energy and Water Subcommittee of Appropriations, and I see some new members on the other side, and I want to welcome them as well. We work in a very bipartisan way most of the time, and it is a cherished position here.

To the panel, thank you. This has been very informative and also very enjoyable. Thank you. I have learned a lot from your commentary today and your thoughts. I have got two questions. And I represent the Third District of Tennessee. My largest city is Chattanooga, which has been a gig city and it has got a smart grid and it is incredible, but I also have a little city called Oak Ridge, birthplace of the Manhattan Project, Oak Ridge National Laboratory. I think if it is involving DOE, we kind of do it in Oak Ridge.

And I would like to start by asking this question. Advanced manufacturing has revolutionized many industries. Oak Ridge National Laboratory in my home district is a leader in advanced manufacturing. How do you see progress in advanced manufacturing impacting some of the transient outlooks you have discussed today? And bear in mind, I do have a second question, so in interest of the 5-minute rule, I will ask for rather brief answers.

Ms. JAFFE. Advanced manufacturing could be a fundamental technology to lower the oil intensity and lower greenhouse gas emissions in the United States and internationally.

Mr. FLEISCHMANN. Thank you.

Anyone else?

Mr. ZINDLER. Just very quickly, it is already playing a major role in the production of photovoltaic modules, solar panels and the cells mainly, frankly, because the plants are getting bigger and bigger, more automated. Frankly, less human labor is required to run them, and that is already taking place.

Mr. FLEISCHMANN. Very well.

How are advances in artificial intelligence, which I will refer to as AI after this, going to impact the outlook for energy production, distribution, and use, and are we seeing any trends yet? Are there any examples you can point to that might help illustrate the potential benefits of AI, and maybe ask—tell us where research is needed to realize the benefits of AI with respect to energy. And I will open that for anybody who would like to comment.

Mr. SONNESYN. Well, I will take a low-level shot at that, Congressman. When we think about AI, we are thinking about there is a trend of digitalization overall that we are seeing on the grid and the use of energy. This is something that is happening, whether you think about Alexa turning on or off your power or your heat before you get home because she knows you are on the way, to something a lot more advanced. But the point that I am making is that the ability of the grid to start thinking for itself to respond to demand changes to be able to balance out the different desires and needs of different customers over time is really important, and that is a place where AI could play an important role.

Mr. FLEISCHMANN. Thank you.

Ms. JAFFE. And it is a very important role that it can play, and Tesla has this technologies and others, on smart inverters, so if I am—if I am having my solar panel on my home or I am having an area that has a microgrid and there is a problem with the overall grid, then I have this automated technology that can separate out my microgrid from the larger grid and so you can maintain services for a hospital or some other feature that has created this, but it can contribute to the overall grid, again, automatically through this AI technology.

So this is a very important technology, and I mean, we need to think about how we are going to move to self-driving, which AI is a big component of that and processing the lidar, you know, in the vehicle or in the infrastructure that is going to be associated with self-driving. And we are—I mean, regulation in self-driving is way behind the actual technology development. So thinking about what technologies are needed to make that really a dominant technology is going to have big implications for military technologies. Understanding that and then thinking about how to deploy capital and regulation is going to be very important and challenging in the next couple of years.

Mr. FLEISCHMANN. Thank you very much. I thank the panel.

Madam Chairman, I yield back.

Ms. KAPTUR. Thank you very much, Congressman Fleischmann.

Okay. Congresswoman Frankel.

Ms. FRANKEL. Now it is my turn?

Ms. KAPTUR. Now it is your turn. Thank you for waiting.

Ms. FRANKEL. No problem.

Hi. Hello. Thank you very much to this panel, and you all seem very knowledgeable and accomplished. But, you know, there has sort of been a disconnect for me on the testimony in this way: You know, we started off with a chart. There is so many papers I can't even find it, but I believe the chart showed that we are exporting more crude oil over the years, okay? So I know this is going to sound—this is a rhetorical question. I think climate change affects the whole world, and so it doesn't really—I know—I think it was Ms. Jaffe, you said something like, well, we can squeeze more oil to export if we could do better in the United States, but that doesn't seem to me to solve the problem of climate change, right? I am not trying to put you on the spot.

Ms. JAFFE. It does in the following way.

Ms. FRANKEL. Okay.

Ms. JAFFE. If we lower our emissions, which, number one, means we are going to use less oil and gas here, right?

Ms. FRANKEL. Right.

Ms. JAFFE. And we do these transformative technologies, we win in two ways. Number one, we are developing technologies that are going to meet the demand of the future world that is going to want those technologies, so it becomes an export-oriented industrial policy. But in the meantime, you have got other countries who aren't doing that, and we might as well be the ones to supply them and not have them get their supplies from Russia and the Middle East, right, and have the geopolitical problems where we have to now intervene on the geopolitical problems.

So my view is it is a win-win. We are going to have a transition. During this immediate moment of transition, let's get our energy here to focus on clean tech and innovation and get oil intensity of our transportation sector down so that we can provide the energy that is needed immediately for countries that have not been able to transition yet, and let's be positioned then to sell those same countries the technologies we have to reduce emissions globally. That would be my position.

Ms. FRANKEL. That sounds like a good idea. I mean, getting—but my next question is, if you have an opinion, how does—and this is really a followup on what you just said. How does us pulling out of the Paris Agreement, how do you think that affects what you just told me?

Ms. JAFFE. Can I take that one?

Ms. FRANKEL. Yes, go ahead. Yes.

Ms. JAFFE. We need to meet the Paris Agreement. And as Administrator Capuano has explained, natural gas and solar and renewables is going to reduce our emissions in the electricity sector and give us a glide path, right? So I believe that we could have an EPA—force the EPA to have a tender where every State could contribute its additional donations. So we stay with the CAFE standards, which gives us a certain amount. We actually—to meet the Paris accord commitments, we only have to come up with an additional 600 metric tons of contribution beyond CAFE and beyond what is going to happen in the electricity grid naturally through commercial trends. Right? So let's mobilize. And I believe that the EPA could do that through a tender.

You know, if West Virginia doesn't want to participate, then have them tender something that works for them, but have every State tender so that we can close that gap and stay in Paris. And it costs the White House nothing, because every State, every State wants to do clean energy. Every State wants to address climate change in some fashion. I lived in Texas and I lived in Houston, and I evacuated multiple times, right? You have innovators in Austin and other places in Texas that would bid into this program, right, and I think now is the time.

We stay in Paris. We have a national initiative. And everybody can play their part by offering how they are going to do it, whether it is New York City or some other locality. Every one of you have mentioned really interesting projects happening in your district. This can be done. It is not as hard as it looks.

Ms. FRANKEL. So that is—oh, go ahead, Mr. Hakes.

Mr. HAKES. I was just going to say that I think the real turning point for us in the next year or two is whether we address the rising emissions coming out of the transportation sector. So the Paris Agreement itself has rather modest goals in a way, and it is voluntary, and we won't even meet those goals unless we aggressively move on improving efficiency standards. And one of the things that those efficiency standards will do will lead us to the electric car. I mean, if you look at the way those regulations have been written, you get double credit for electric cars and things like that.

So from a policy—now that I am not at EIA anymore, I can talk more about policy. But from a policy standpoint, that is going to be the big driver. And in looking at the automobiles and trucks and making that transition, and because carbon stays in the atmosphere for over 100 years, the sooner we make that transition the better, so we can explain what we did to our grandchildren.

Ms. JAFFE. And let me just say, the oil and gas industry has lasers, has drones, has sensors so they can actually capture their methane leakage, find the leaks and shut them down. And we are letting them off the hook here on the Hill. And we are letting the EPA do what it wants to do, when we could just have legislation that says, you know, this is the target for methane leakage, and then all of a sudden, you know, all these problems with natural gas and all these problems, we are reducing a huge contribution to being able to stay in Paris just with that one policy.

And honestly, the oil and gas has the technology to do it today. They are being forced to do it in Colorado already. That leads to new products. When I am an oil company and I come up with new technologies to find and capture my methane, I can then export that technology to other countries that they do the same similar thing. So those are all products, whether that is supporting a company in somebody's district that has drones, whether that is supporting somebody's company in a district that has sensors or laser technology, all these technologies are being used in Midland, Texas, on the shale by the more innovative companies. And that is creating an entire—another cottage industry of jobs which are now being happening in Colorado because they have the regulation. That should be a Federal regulation.

Ms. FRANKEL. I think I have run out of time, but it was very interesting. Thank you very much.

I yield back.

Ms. KAPTUR. Thank you. Thank you, Congresswoman Frankel.

Congressman Newhouse, and then we will move to Congressman Kilmer.

Mr. NEWHOUSE. All right. Thank you, Madam Chair. And thank you for holding this hearing. Mr. Simpson, thanks for allowing me to be on the panel with you today.

Mr. SIMPSON. It was a hard choice.

Mr. NEWHOUSE. That is why I keep thanking you. I apologize, but I had another hearing at the same time, so I am trying to be in two places at once. You can imagine how that works out.

So I have a couple of questions. I have the honor of representing a district that is home to the Pacific Northwest National Laboratory, which I think probably many of you have heard of. And as you know, our national labs are critical to the energy innovation ecosystem that we have in this country. I have been to the lab a number of times, and I am continually impressed by the kind of work that goes on there. I have seen firsthand how the infrastructure there at the lab, combined with the truly highly talented people, the researchers there are able to span the breadth of the very basic research through applied R&D that brings new ideas to address the challenges that we are talking about today facing our energy system.

So what I would like to do is hear from the panel perspectives on where our national labs fit into the innovation ecosystem and their role in DOE's applied R&D programs in ensuring that the federally funded research, you know, gets out of the labs and into the hands of the people that can actually, you know, place this in the market. Are there lessons that we can learn from the past on how labs in the Department can do that better? And I would love to hear that, and, again, I believe Ms. Myers Jaffe——

Ms. JAFFE. Jaffe.

Mr. NEWHOUSE [continuing]. Has addressed that to some extent, and certainly I would like to hear from some of the other panel members on your ideas as well.

Mr. HAKES. Well, I think I have been to most of the energy labs at one time or another, including Hanford, and to me, what I love to see at just a practical level, I think it probably was about 2010 when it was a real pivotal movement in solar technology and some scientist friends at Georgia Tech, I was living in Atlanta at the time, invited me over, and it was a project funded in part by Oak Ridge, partly by the private sector. The university was obviously a part of it.

And some of the top brains in our country were going to work every day trying to figure out how to make those panels more efficient and cost less. And I came back home and I told my wife, I said, I am feeling pretty good about this, because if these people are spending that kind of—doing it—so I think you can't do this without the labs because they have got the basic science, and they are brilliant people. And they bring a perspective, a long-range perspective. But in many cases, it is the partnerships with universities and the private sector where that is when it really zooms, but you can't do it without these magnificent labs.

Mr. SONNESYN. If I can just add, I think some of the most effective projects are those where, once you get past the basic level of research, the applied research, having partners from the private sector participating in that project along with universities is part of how then you have an investment by the private sector in what is the outcome of the project, but also in recognizing the commercial viability of it long term. And so as they are engaged in that applied research, certainly when you get to the demonstration project, it really helps it continue on. That is one of the ways that you get over that valley of death, by creating these consortia of participating partners.

Mr. NEWHOUSE. Do you guys see any way we can improve over how we have done this for a while? You certainly have experience with that.

Ms. JAFFE. I think that part of the issue is how do we fund the younger scientists to go to the national labs. So I am a young person coming out with a degree in a program. I have spent 5 years in computer science or 5 years in energy science or I have master's in those fields, and I am highly qualified. And how do I incentivize you to work at a national lab and not go to Google and work on something that might create emissions instead of removing emissions, right? I think that has to have to do with scholarships for post docs, scholarships for people when they are in their Ph.D. Maybe it has to do with the giving people student loans and getting them into the national labs. I mean, maybe something in the way we do, you know, Peace Corps but for serving in the national labs in STEM.

I think there needs to be something where the funding stream literally is going into the younger scholars being able to stay in the field, because I can tell you from working with Ph.D. students for the last 20 years, getting a Ph.D. student to come and be able to afford to do it and then helping them stay in the research area and not have to take a private sector job is very challenging, right?

And so I think that is an area of focus that maybe—I don't know, I am not familiar with what the committee has looked at on appropriations, but looking at that line item for how much funding do we provide for a young person who is in university today to go through the process of getting their degree and working in a national lab, I think that probably needs more attention.

Mr. NEWHOUSE. I appreciate that. Certainly, those people coming to the tri cities of Washington for the first time are going to stay. It is a great place.

Thank you very much, Madam Chair. I appreciate it.

Ms. KAPTUR. Thank you, Congressman Newhouse. Thank you for coming back. We have had a really great turn out this morning of our members. I am proud of them.

Congressman Kilmer.

Mr. KILMER. Thank you, Madam Chair, and thanks everybody for being here. And I want to thank the chair; when we met earlier this week, she encouraged all of us to talk about some of the things happening in our district, and I guess I wanted to start there.

In my neck of the woods, we actually have DOE's only marine sciences lab, and they do research into renewable energy, as well as trying to understand their environmental impacts. Everything

from looking at how offshore wind turbines impact birds to the environmental impacts of hydropower to impacts of marine hydrokinetic devices on marine animals.

And I guess I wanted to ask this question probably to Dr. Capuano and maybe Mr. Zindler. I wanted to get your sense of how do you see these sorts of technologies fitting into a clean energy future? And what does, you know, widespread adoption look like? What is the maximum potential there and what is the scale of investment that would be needed to actually realize that potential?

Ms. CAPUANO. So I can talk about the foundation and let you—so let's talk a bit about the projections that you see in the EIA report. So the way that we construct our models, we obviously put in all the legislative laws and regulations that are required, so anything that requires absorption of renewables goes in first. After that, it is an economic model where we do assume a certain amount of improvement in technology, a certain amount of improvement in production cost and cost reductions, and so it then goes into an economic competition.

So what I think is important when you look at our long-term projections, which can help answer your question, is that as you see current legislation rolling away, you will see whether or not that technology has both been invested in enough and had had enough support through the legislation to then be able to compete on its own.

And often, what you will see, let's say, in solar and wind is while as the legislation rolls off the next 10 to 20 years, you will see that it can compete but it is absorbed at lower rate. So I would say the same thing for the technologies you are talking about. Of course, that is a case assuming nothing changes. There will—I assume there will be discussions of new legislation and the challenges that are there.

Now I will turn it over to you to talk about a view of the future.

Mr. ZINDLER. Sure. Just real quick, and I wish I could remember our exact numbers for forecast, but for offshore wind, it has been a long time coming in the U.S. Basically, our country has developed—I think there is about half a dozen offshore wind turbines off the coast of Rhode Island, and that is just about it. But now we actually seem poised for a real scale up. It is actually an exciting time in terms of there have been offshore leases held along the East Coast. They have been bid very competitively, and maybe more importantly than sort of regulatory picture, which has come into focus, is the fact that overseas, particularly in Europe, we have seen the costs of offshore wind come down very dramatically, much faster actually than we even have been anticipating. And so that is making this stuff actually become much more viable.

When you are talking about the East Coast, and particularly New England, developing a wind project onshore is challenging because of permitting issues. There is just not that much land, and you obviously have a community, and I am from there, that doesn't like a lot of change and doesn't like how things can change the views. Offshore you can find a lot more space. The winds are stronger. The capacity factors are higher. That is an area that we think really will grow.

We are less bullish, I would say, about some of the other technologies around marine and others. Just I have been around, I have been doing this for a while, I have seen a lot of really interesting technologies be tested and not really achieve cost competitiveness yet or scale. Hopefully they will, but we are not there yet.

Mr. KILMER. I also wanted to ask, in the time I have permitting, about grid storage technologies, which seemed like as we work towards a clean energy future, that is going to be important, just given the variability in terms of hydro and solar and—excuse me, wind and solar. Also important not just in the future, but today, a lot of my district is pretty remote. At the end of the transmission lines we have more outages and particularly as more severe weather events happen.

I wanted to get, and maybe to Mr. Sonnesyn and Mr. Hakes, if you have any thoughts on how we can accelerate innovations in grid storage and especially for a future after today's lithium-ion technologies.

Mr. SONNESYN. So let me start with we expect a lot more storage to be coming online in the short term, but probably not grid scale, it is more small scale. But if you think about how many new electric vehicles might be on the road and how they are able to plug in then, depending on the smart technology that is involved there, you could see some back and forth between those batteries overnight and in and out of the grid, et cetera. So there is some potential there in the shorter term.

In the longer term, though, what I was referring to about advanced materials research is really critical if we are not going to have—be dependent entirely on lithium for the future of those batteries, as an example, and I think that is why we think this is so important for the future.

Mr. KILMER. Thank you. Thanks.

I yield back. Thank you, Madam Chair.

Ms. KAPTUR. All right. Thank you very much.

I would like to continue with some questions, if I might, and it relates to the job sector. It is interesting, if you look down a chart, a table, showing all the congressional districts in the country, from one to 436 counting the District of Columbia, I along with some other members of this panel and several of our key appropriators this year who will hold gavels, their districts rank in terms of median household income in the bottom 40. And there are certain places in this country that haven't caught wind of either new innovation or they come from places that where the traditional employers have literally bottomed out and jobs outsourced to other places.

So, Ms. Jaffe, I appreciated what you said about the offshoring of many of our jobs and the type of competition we face, raw competition with no bumpers. And places in our country have been very, very hurt where people had a very strong work ethic. If I think about the coal belt as one of those places, though I don't directly represent coal in my region, I have visited these areas. I spent time with one of our former chairman of the full committee, Mr. Rogers, yesterday just talking about the struggle of Kentucky, the State of Kentucky and West Virginia and southern Ohio and Appalachian Regional Commission and so forth.

So one of my questions to you really is the energy sector, and it is a hard question, but we believe, according to the statistics available, about 6½ million Americans work in the energy sector. And by 2030, there are projections that say maybe another million-½ will work in that sector. Many of them will be in construction and installation, maintenance, transportation, and 200,000 more with computer and math skills.

So as you think about the future of this sector, I don't know if you agree with those projections or not, but can you think about how the Department of Energy in the past as it invested in R&D created industries that then employed thousands of people so as we can anticipate the future, what work should we do at the Department, perhaps in conjunction with the private sector, to follow on Ms. Jaffe's recommendations about ensuring that we will have a workforce that will have the skills, but also in the places where people don't want to move but the jobs have evaporated?

We face that directly in coal country. I happen to come from a region in the nuclear power arena where we could lose two of our major nuclear power plants in northern Ohio. The adjustment associated with that is significant, and I have asked myself the question, if we are going lose a quarter of the nuclear power in the country, is that really a good thing? From a market standpoint, it is happening because of natural gas, but the question is, is there fallout long term from losing the skills and the knowledge that exists in the commercial sector that has a benefit also on the security front for our country?

So I am interested in your thoughts about the future of the workforce in energy and what more we might do here to draw people into the field to make sure that they are properly skilled up but that they also be able to work in regions that have been so depleted through no fault of the work ethic of the people there.

Mr. ZINDLER. If I could start, and I will try and be quick to give everybody a chance because it is a really interesting question. First, on the question of nuclear, I would just argue that, look, 20 percent of our power roughly comes from nuclear energy, and it is 100 percent zero CO_2 emitting. So any practical conversation around addressing climate change has to think very carefully about letting nuclear reactors continuing to retire. Just put that—make that one quick statement.

And then on the work question, look, we are probably among the most optimistic about how much solar we think is going get built, and a lot of it is going to be distributed solar, meaning stuff that is on the rooftops of businesses and homes. And that is—the great news about that as far as labor is concerned is that can't be outsourced. That has got to be done locally and that has to be done by guys and gals in hardhats who get up on roofs and do that hard work. And, you know, to be clear, they are doing everything they can to make that more automated and less labor intensive. The industry is trying to get that way. But at the end of the day, you still need people who actually do this work.

Ms. KAPTUR. Could I interrupt you and just ask, have you ever seen a good solar roof? I know about the appliances that are put on the roof, the panels, but have you ever seen in any company in our country or at any lab really integrated solar roofing in a garage

with an envelope so when Congressman Simpson drives his car in, the solar that was produced all day long fires up the car if it is an electric vehicle? I can't figure out why solar roofing hasn't matured?

Mr. ZINDLER. That is a bigger question. It has begun to mature in some markets, but of course, the real questions always are in terms of what makes solar truly economic is, one, how much sun have you got where you live, and that varies by different parts of the country, and two, how expensive is the power that you buy from the grid? So if you live in an expensive market and you have got a lot of sun, then you are pretty motivated to put PV on your roof really regardless of what the subsidies are. Then in other markets, it really depends on what kind of supports there are to financially subsidize it at the current moment.

Ms. JAFFE. So let me just say that people are working on solar building materials, and at UC Davis we had the house of the future, right? That was an integrated home where the electric vehicle helped serve as battery storage in the evening for an entirely—you know, in fact, the whole region where my professorial office was was called the West Village, and it was, you know, mixed use. So we had housing, we had, you know, laboratories, we had restaurants in places that the students would go, and it was an entire section of the campus, 100 percent what we call net zero. In other words, all the energy that was used in that area was produced on that site, and we had, you know, solar arrays. You parked your car under solar arrays. We had charging stations that went with those solar arrays. We had a solar tower that, you know, did our electricity in the offices.

I mean, the technology exists, and that is why I mentioned the valley of death because, you know, some of it is the cost of the technology, but some of it is just, you know, the means to deploy it. I mean, one of the reasons why we did that at Davis was to show that it could be done, and it was 100 percent commercial real estate developer that put it together. It was not—the State didn't pay a penny. You know, it was commercially done.

So the technology is there, and it is really—you know, when I worked at Rice University, there is a gentleman there who literally developed a paint that conducts electricity. He had a mug cup that was like a battery, right? And people are working on foam that would go in cars and would be a battery in the car to lighten the car. So there is a lot of technologies, and it is really about commercializing them, right, and how do you get there?

So at the UC, we had the investment office, you know, used to invest and give money to venture capitalists as part of, you know, 1 percent of our investment to, you know, be sort of forward looking. And then it suddenly occurred to us, why are we paying some other venture capitalist to bring us a company from someplace else when we could actually have venture capital for our own labs that are part of our system? And so we actually created an entity where we would take this investment percentage that we did with venture capital anyway and do it with our own labs and find our own products that were being developed in our own labs.

So that is why I kind of harp on this idea that there are already these financing streams that exist, and instead of having them, you

know, develop an app that people don't need, right, if we had these clusters that involved the venture capital community and involved the private equity community and involved public funding at the same time, you could leverage the public funding by marrying it together and removing the risks for like a pension fund or other kinds of institutional investors to invest in these things to scale them. So that really, I think, is why I say it is about building like an ecosystem that goes beyond just the public funding, because as people mentioned, you know, you can have something that is a brilliant idea in the lab and how are you going to get it out to be a commercial venture?

Ms. KAPTUR. Well, I think we would appreciate very much your summarizing that idea as well as your idea on attracting talent into our labs through special funding assistance and funding streams. I would be very interested in incorporating those suggestions into the record. And thank you.

Dr. Hakes, and I will turn over to Congressman Simpson, but you wanted to comment as well?

Mr. HAKES. Yes. I think your point on the solar roofing is a very active example where you have a technology that seems to have great promise, but all these technologies, whether it is fracking or solar or whatever, have all these hiccups along the way. And in that particular case, is it the roofing industry or is it the solar industry that controls the roof and gets the permits and all that? And that is going to have to kind of be worked out on the local level. Experience teaches us it probably will, but right now, there is a little dispute kind of going on there that has to be worked out.

On your earlier question too, I would just say, looking back on my days at DOE, one of my fondest memories now was attending the science fair each year. You know, that is one of the things that the Energy Department is the parent agency for, and there was a lot of pressure on us from the Secretary's office to attend. And looking back, I think, thank God, I enjoyed that.

And so I think one thing members might want to do is have promotions in their district to get more schools to participate in the science fair and maybe drop by for the national competition. They probably would be pleased as punch to have someone from the Appropriations Committee show up. But looking back on that, it is that next generation that we need to solve the problem, and not just in Silicon Valley but all over the country. And to me, science fair, which is a DOE function, is a great way to do that.

Ms. KAPTUR. I just wanted to state that in terms of what Ms. Jaffe said about the modular home or the work that has been done on that campus at one of the California universities interests me, and I am very interested in the housing unit or the multifamily unit and what we do to propel it forward to be more energy efficient, including the roof where we lose most of the energy. I met with a modular developer yesterday, one of the largest ones in the country who basically develops in the west, and I was learning about new technologies with insulation, concrete, and steel to replace traditional roofing. And I find the Department a bit sluggish in its attention to where most people live.

Everybody has to live somewhere, right, so there are dwelling units, and we can really revolutionize that industry, but I don't see

as much attention. This particular developer actually had solar facing walls that did solar thermal and can cut the energy bill for a given individual family by almost a quarter. And that was just one major developer, but it was interesting to me to hear it from a developer, I didn't hear from DOE. Too bad. And so I am just interested in any innovation you can see on that front that you might provide for the record.

I want to go to Mr. Simpson now.

Mr. SIMPSON. Thank you.

Interesting testimony. I will just ask this as a rhetorical question, why is hydro not renewable? That is just bizarre as far as I am concerned. Congress decided that. If we put in new turbines that are more efficient, then that increase in production is renewable, but the electricity that is produced otherwise is not a renewable energy. I find that really strange.

Anyway, you do know, Ms. Jaffe, that we do have innovation hubs in the Department of Energy? We fund those—I think they started under my good friend when I was chairman, Secretary Moniz. They wanted more of them. We just didn't have the money to do the increases that they wanted. But we still fund the energy innovation hubs that do just what you said. They bring together the private sector, the government, and others to work on specific issues. There are different types of innovation hubs.

We also have a university program funded through this committee. I think NE has part of it, the NRC has part of it. And I find it interesting in your testimony—I am sitting there and I am comparing it to the lab I know best, which is the Idaho National Laboratory. And when you testified, I am going, yes, that is what they are doing. And I am sure if you talk to Mr. Newhouse, if you talk to Mr. Fleischmann——

Ms. JAFFE. I think it is——

Mr. SIMPSON [continuing]. You would find the same thing is true in other places. Let me explain what I am talking about.

Ms. JAFFE. Okay.

Mr. SIMPSON. In Idaho, the State of Idaho went in and built a building called CAES Center. It has got Boise State, Idaho State, University of Idaho and Wyoming, and the private sector involved in there, and they are bringing students in from these universities that do energy research. And the lab hires many of those people to keep them in the stream, because that is why they do it.

If you go out and look at what they are doing in batteries and stuff, it is the private sector that is going to the national lab, under work for others, to have them do the research on batteries, and they are paying for a lot of it. So a lot of this is going on. I know I am going to sound like someone who doesn't believe in climate change, and I am not a rocket scientist, but I can tell you the climate is changing. And our policies in the future need to observe that, and we need to look at that in the future.

I noticed, Mr. Zindler, you said that technology wouldn't catch us up with climate change and address the problem, that new policies need to be—you know, that is easy to say. What are those new policies? That is what I want to know as a policymaker that will get us to where we want to go.

But I come back to electric cars. Electric cars is not the answer. It is a part of the answer. But if all I am doing is replacing the production of the energy that my car produces with the energy produced in a coal fired plant, I am not saving anything on carbon, because electricity doesn't form changes without a loss of energy. And so if all I am doing is taking this car and I am plugging it in, but now my power plant is having to produce more carbon, I haven't really saved the environment anything.

Now, in Idaho, where most of the power is hydroelectric, it probably is a good idea in that I have reduced the carbon emissions in my area because we have noncarbon producing electricity or at least a large part of it. So, I mean, it is not as simple as a lot of the stuff that we are talking about. And I am glad to see that both of you mentioned nuclear energy, because I don't think you can seriously talk about climate change without talking about nuclear energy. And they are doing some incredible work in what the future of nuclear energy is going to be. It is not going to be these 3,000 megawatt plants that cost billions of dollars to build. They are going to be in small modular reactors and microreactors and those types of things, and they are doing some incredible work in that degree.

But, you know, we oftentimes think we are being brilliant at the time. I remember when we eliminated MTBEs from gasoline. So we needed an oxygenation agent. We went to ethanol. Recent studies show that you produce more carbon in producing the ethanol than you save by putting ethanol in your car. Does that make sense? I don't think so, but try to get rid of it. You cannot do it. There are too many corn growing States in this country. So it is a challenge.

We not only have to look at what we would like the world to look like; we have to look at the world as it exists and how can you change it and what is the impact on the economy to do it. And that is sometimes challenging.

Mr. ZINDLER. If I could, sir, on the electric vehicles, I would respectfully just disagree in the sense that, A, they are more efficient, and B, and more importantly, they are essentially a reflection of what is becoming a rapidly decarbonizing power sector. So if you look at some of the charts that Administrator Capuano showed, the power sector itself is reducing its CO_2 emissions very rapidly thanks to natural gas, yes, and renewables. And by the way, hydro I consider renewable as well. And, you know, about 37½ percent of our power now has zero carbon, and that has been rising very dramatically. So that——

Mr. SIMPSON. And that is why I say, it is going to be produced by carbon free emissions, then it makes sense.

Mr. ZINDLER. But that trajectory is going to continue, sir.

Mr. SIMPSON. And I think that is fine.

Mr. ZINDLER. Coal plants are going to continue to retire because they are being outcompeted by natural gas——

Mr. SIMPSON. I think that is true.

Mr. ZINDLER. So I think, if you look at where—if we try to skate to where the puck is going, I mean, in terms of electric vehicles, if we look 10 years out, we look at a decarbonized power sector; that is how we want our vehicles to be fueled essentially and——

Mr. SIMPSON. By the way, I have no problem with that.

Mr. ZINDLER. So I guess——

Mr. SIMPSON. There are too many people in this world who think, hey, I can just plug in my car. This energy comes out of the ethos somewhere, and that is not true.

Ms. JAFFE. But if your car can travel 100 miles on this many BTUs of energy and a gasoline car takes 10 times that amount or five times that amount of BTUs of energy, you are still ahead of the game by being an electric car.

Mr. SIMPSON. As long as you can charge it.

Ms. JAFFE. And they have shown that even if that car was charged with coal, it is still better because it is a more efficient car.

Mr. ZINDLER. Sorry.

Mr. SIMPSON. Some of them are. I mean, my wife was getting 60 miles to the gallon. She didn't have an electric car. She had a hybrid.

Ms. JAFFE. Right.

Mr. ZINDLER. Some of the same technologies are in that hybrid as are electric cars.

Mr. SIMPSON. I know they are. She is the only person I know that has actually run out of electricity and gas in a car. And I said, how the hell did you do that? They put this gauge in there, you know. And she said, I fill it up so infrequently, I just never looked at it.

Mr. ZINDLER. That says something in and of itself, right? That is great.

Last quick thing on EVs just that, look, electric vehicle adoption will not be even across all parts of the U.S. simultaneously.

Mr. SIMPSON. That is right.

Mr. ZINDLER. There are a lot of two-car families. I am one of them. We have an electric vehicle, which is our short-haul vehicle. We keep it in the garage. That is what we do. We got another car we use when we want to go drive and visit, you know, family. But I will be clear, I think people who live in rural areas, it is going to be a while before you could go fully electric. That is just the reality of the life of traveling longer distances.

Mr. SIMPSON. The other fascinating thing I would say before you can answer is if you go to the Pacific Northwest, we have had low cost energy production because there has been hydroproduction. Guess what? BPA is in a real challenge right now, Bonneville Power Administration, because they can no longer sell their energy into the California markets because you can get energy cheaper and you can get it by hydroproduction, which has always been the low-cost producer, and that is going to be a challenge for us.

Mr. SONNESYN. Congressman, just to build on your theme of we have also got to deal with the energy grid and the energy sources that we have today, the largest reason we have reduced carbon emissions recently has been the adoption of natural gas as we have retired coal-fired power plants. So thinking about what is the infrastructure that we need in order to deliver that increased amount of natural gas across the country and are we permitting the pipelines, et cetera, that we need to get that lower carbon emitting cleaner natural gas where we need it. That is a critical part of this equation that will be related to whether it is electric vehicles or

just anything that you are turning on in your house if you want to have that lower carbon future.

Mr. SIMPSON. Right.

Ms. KAPTUR. Thank you, Mr. Simpson.

This is a great hearing. We just again thank you all for coming.

I wanted to go to Congresswoman Frankel, and then we will go back to Congressman Newhouse.

Mr. SIMPSON. I said so many things that I am in trouble for.

Ms. FRANKEL. I have—I think I have a question. I don't know if it is one or two questions related to some research that one of my local universities is doing. First, they have been using—testing ways to use ocean waves and tides and currents to produce renewable energy. So I just question whether you have ever heard of that and what you think about that.

Wait, before you answer that, I am going to say both my questions. And the other question I have, which is related to I think what you have said today, what I have heard, is that the biggest bang for our buck in terms of reducing carbon emissions is with the use of automobiles and trucks and all that. Is that—okay.

So the other thing, when I went to FAU, they showed me sort of the highway of the future where everybody was in a driverless car, and then the lanes, you did not go like, you know, one step going that way and one going that way, but it was like going—the cars were all going in all different directions next to each other and it was based upon the traffic load.

So my question there is, I know you have been talking about electric cars and so forth, but how does this all connect with some of the future transportation, like the driverless cars or maybe roads where you have the different lane capacities or lane directions? Okay. That is two questions.

Mr. HAKES. Maybe I can answer the first one.

There are several ocean technologies. There is ocean thermal, which is the difference between the cold water and the hot water that can generate energy. And then there is the power of the waves. Hawaii has been the location of most Federal projects on both of those technologies, and they have made a decision to go with solar.

Like many things, the wave power, in a sense, is free, but the capital structure is fairly expensive, and it has maintenance issues because waves are very strong. But in an all-of-the-above approach, it certainly might be something that could play a role in the future.

The electric car opens up so many avenues. Most people who drive electric cars end up liking them a lot better than their older cars because they accelerate faster, they work better with your iPhone, and all sorts of things. So this futuristic world, which I don't pretend to understand—I am sort of leaving that to my grandchildren—but I think almost all of that will work better with the electric car.

In my book, I try to stress the importance of balancing national security, the economy, and the environment. And some policies are what I call "threefers"; they actually work in all three areas. And having super-efficient cars is good for the national security, it is good for the economy, and it is good for the environment and opens

up this whole bright world of things that we can't even imagine today.

Ms. FRANKEL. Does anyone want to add what you think is the relationship, the future relationship, between driverless cars and—yes?

Ms. JAFFE. So the driverless car, I mean, the thesis or the theory—because you already—I can't remember which member mentioned this—we already have the technology for buses, which was being deployed in the Pacific Northwest, where the bus drives up and there is a pad on the ground and it wirelessly charges it and then continues on its route.

Mr. NEWHOUSE. That is in my district.

Ms. JAFFE. Right. Brilliant project, right?

So we are moving towards wireless charging. So I am not having to have a trolley that has a wire in a city; I might get to the point where I could have a trolley that just has these mats.

Ms. FRANKEL. No, I meant driverless.

Ms. JAFFE. But in a driverless car——

Ms. FRANKEL. Oh, okay.

Ms. JAFFE. Let me keep going.

Ms. FRANKEL. Right.

Ms. JAFFE. So in a driverless car—they are experimenting with a road in China, so it is like, what are we doing? They are literally building a road where the road is both solar and it has wireless charging. And you are going to have these driverless cars that are going to supposedly go on this road and they are going to self-charge themselves, and it is going to self-charge themselves with solar, right?

So maybe you want to take that on for me, Ethan.

Mr. ZINDLER. Yeah, I have been on that road. It is, like, about a kilometer along, and it goes very, very slowly as you go around.

Look, there are a lot of interesting technologies out there. I think putting solar on the ground that you drive over with multi-ton vehicles is not the greatest idea.

Ms. KAPTUR. Congressman Simpson just asked, what if your cat runs over it?

Mr. SIMPSON. Or even walks across it.

Ms. JAFFE. Yeah.

I think where we are going to go—and that is why it is very important to understand the technology, and that is why we are doing a paper on it at the Council—is understanding how these robot taxis—so people believe that we are going to move to these robot taxis, which are being experimented on in Arizona and other locations, and therefore we are going to lower our emissions. And the devil is really going to be in the details. You know, are we going to talk about the efficiencies of those vehicles? Because right now those experiments that are taking place are taking place with gasoline cars that are not necessarily efficient. Right?

So, you know, we really have to think about the technology and what do we want from this technology, what purposes do we want it to serve.

The other research that has come out is all this sort of robotization of service of "I don't own a car, so I feel like I have no carbon footprint," because I really should be like Ranking Member Simp-

son's wife, in a car that really is, you know, lowering its carbon footprint, but I am actually just using—I won't name the name of the services—taking these trips on demand, and I am thinking that I am lowering my carbon footprint, but am I really? Because if I would normally have taken the Metro for that trip but now I am jumping in a gasoline car, what the research is showing is that you are actually raising your emissions.

So I do think that this topic is one that is extremely important for the Congress. You are spot-on understanding and wanting to understand the technology and then thinking about how to deploy the technology in a way that is taking us where we want to go.

Ms. KAPTUR. Thank you.

The gentlelady's time has expired.

Let me just say that all of the testimony that you have presented this morning will be posted on the Energy and Water Subcommittee website at appropriations.house.gov.

You have really presented excellent testimony, and this has been a really good interchange this morning.

Congressman Newhouse.

Mr. NEWHOUSE. Thank you, Madam Chair. I appreciate having the honor of the last question, I guess, going over time a little bit.

I just wanted to talk a little bit or ask you a little bit about the balance of having renewable energy, maintaining a baseload electrical energy, and how we balance that.

In the Northwest, as has been talked about, I mean, we are blessed with the hydroelectric dam system which has provided us that baseload power. So, obviously, a dam, that is a battery system, but there is certainly a need for increasing the utilization of batteries. The Pacific Northwest National Laboratory really has been at the leading edge of developing some of that technology.

Some of you have talked about the battery systems and the implementation into our system. Do you think we are at the point where private industry is going to be able to get us to where we need to be there? Or is this going to continue to require an investment by the Federal Government into some of the research necessary to get us to that point where we need to be?

Mr. HAKES. You know, I think that the contracts that are going out today for solar-battery packages, the batteries will last for about 4 hours. And so that represents a considerable improvement, but when you are looking at where we need to be in the future, not sufficient.

So I would think there is probably a lot of basic science that is going to have to be developed in the battery area, as well as looking at other forms of storage. A battery is not the only way to store things. Hydrogen can store—and pumped hydro, salt beds, other things. So I think there is a lot of high-tech and scientific work still needed in this general area of storage.

Mr. NEWHOUSE. Good.

Mr. SONNESYN. You stole it from me. That hit it pretty well.

Mr. NEWHOUSE. Okay. Okay. Good. Good. Well, I appreciate that.

Mr. ZINDLER. I will just add one quick thing——

Mr. NEWHOUSE. Please.

Mr. ZINDLER [continuing]. Which is, our view, and I think a lot of us would agree, is that the grid, in terms of the amount of capac-

ity you have online, will grow. My view and our firm's view is that the actual demand for electricity won't really grow very much because the economy has been getting more and more efficient.

But especially if you are talking about climate change and these kind of extreme ups and downs in terms of demand, you need to have a lot of flexibility in the grid. So your question is dead-on in terms of worrying about it.

I think that sometimes there is a confusion between the issue that, sort of, the technical ability of the grid to take on variable resources, like renewables, and the economic impact. Technically, we have seen places like Germany and others take on very large percentages, some days as high as 50 percent, being produced by renewables. That has not been an issue. But, economically, it is a different story. Because when you get renewables onto the grid, they essentially have zero marginal cost, and so they bring the price of power down and they hurt the fossil generators. And that is a reality, that is an economic reality.

So, as you think about integrating these resources, you need to think about how you compensate everybody in a way so that we make this transition in a way where we are not caught, you know, flat-footed.

Now, there has been a lot of talk from the administration around this question, and I want us to be clear about it. I am not saying that you need to, like, pay coal plants to continue to exist. But I do think that you need to think carefully about adding battery storage and how hydro plays a role and these other technologies as well, because we are going to have a system that is going to require greater flexibility.

Mr. NEWHOUSE. So maybe we don't need to look much further than our own noses. You know, a hydroelectric system is truly a—there is a value there in battery storage that perhaps is unappreciated. And to the point of BPA not being competitive with some of the renewable resources, maybe there is a value that needs to be placed on that battery system.

Ms. JAFFE. Let me just say that the professors that have worked on the 100-percent renewables targets have specifically mentioned hydro. And the Northwest hydro has a role even in California being able to achieve the 100-percent renewables. So hydro plays an incredibly important balancing role, where it is located, in being able to balance renewables.

So the question is—and SMRs could play the same role, you know, as they are being developed, with that goal in mind.

So it is really about incentivizing the grid. And I know this isn't a Federal policy; it is really more somewhat a State matter, but you do have some regulatory. Right now, in our system in the United States, utilities make return by building infrastructure, and they are incented to add traditional infrastructure. They don't get anything if they add a distributed energy resource or they put in a battery or something like that. They don't get any return. And so we need to change the incentive structure for how utilities make profits.

New York State is doing some very experimental things, where they needed a substation, it was going to cost $1.2 billion, and they put out a tender for solutions instead of just letting the utility do

the substation, and they found that these kind of technologies that we have talked about today were able to solve the needs of a particular location in New York for $200,000.

And promoting these new technologies we are talking about, whether—I think they, in the end, wound up going with solar and battery storage. But they are having to reform their entire pricing system, and it is both how do we incentivize utilities to work with these different, smaller providers, and it is also making sure that when we do rates base that we are not having some wealthy corporation putting in a distributed network with solar and batteries for their operations and they getting the, you know, 2-cent electricity and then low-income people are stuck with the cost of supporting the utilities' transmission and expensive activities and their electricity bill is going up. Right?

So there has to be a new way of taking the benefits of renewables and having our pricing system reward everybody along the grid and not just the people who put the advanced technology in. And that is also something that New York State is doing some innovative things with, where they actually divide the benefit one-third to the utility, one-third to the provider, say, of the solar and battery storage, and one-third goes back to ratepayers.

And so it really is going to take, you know, a very complicated reform to actually integrate this technology in a way that is fair and a way that reduces costs.

Mr. NEWHOUSE. Well, my time is up. I want to thank all of you for being here and thank Ms. Kaptur and Mr. Simpson for having this very interesting conversation. Thank you.

Ms. KAPTUR. Great. Thank you for participating.

I wanted to say, I will be submitting several questions to you to the record. If you can't answer them that is all right. I don't want to ask questions about them now, but I will tick off the general subject areas, some of which we have covered.

Number one, relating to the future of housing and energy systems and what that energy envelope looks like. Where are path-breaking efforts being be made? What can we learn from them?

Number two, I come from a heavy industry part of America. I probably represent one of the major production corridors for our heavy trucks like Ford F–750 as well as top-selling vehicles like the Chrysler Fiat, Wrangler, and Cherokee. Not very far from my district is the production of the Abrams tank. So you can get a sense of what this district might look like: fifth-largest rail center; big steel mills, many of which are falling on hard times.

I met with the head of one of these companies, and I said, "What can I do to keep those jobs here?", and his answer was, "Cut my energy bills by over a third." How do we integrate energy into this very unique part of America that is essential to our defense industrial base?

Number three, the older cities of the industrial North are struggling with their bottom line. How do I relieve the energy costs in these cities to their water treatment and their sewage treatment, which are a major part of their operating budgets? What can we learn from other places in the country to help us help them?

Number four, landfills that leak methane. What do we do? What is the role of the Department of Energy, or is that just EPA's job?

Five, cryogenic hydrogen or hydrogen. I think, Dr. Hakes, you mentioned hydrogen this morning. Very interested in the cost-effectiveness of various hydrogen technologies and applications that perhaps have a broader use.

Many of you have referenced nuclear power production in your testimony. If you were sitting in our position and you were watching America lose 25 percent of its production facilities, what would you do?

And then, finally, for compact plasma systems, what can you tell us about their deployability? Where do they sit on the development curve for future energy systems?

I will also give you this final challenge. The power and water systems west of the Mississippi River and in the TVA corridor look very different than in my part of the country, which is commercial nuclear power, commercial gas. We sit in the private market; we don't have any Federal connect. It creates a lot of competitive challenges to us vis-á-vis other parts of the country.

I said something to Senator Lamar Alexander about why a certain automotive company had located to Tennessee and did the power rates of the TVA have anything to do with why that didn't locate in my part of the country. He goes, "Absolutely not. There's no relationship between TVA power rates and the movement of industry."

I am very interested in any comments you have about the dissimilarity between power production facilities in different parts of the country and the rates that are yielded as a result and what places in the country that operate in the purely commercial marketplace. How can they compete? How do we compete against maybe hydropower that might exist in other places? This is a very complicated discussion, but I am interested in your comments there.

My final question to the record, and then we will go to Mr. Simpson for any final comments. I am very, very concerned about the role of Russia in Europe and particularly with the supply of power. Nord Stream 2, we read, might be completed by the end of this year.

Our transatlantic allies are our closest allies. How do you see that geopolitical relationship between the United States and Europe, Russia's increasing power supply to the continent, Nord Stream 2, and what we might do as the leader of the free world to help our European brethren have more than one source?

Does anyone want to make a comment on that? Have you thought about it? Is this something that you have reported on? Or would you like to think about it?

Mr. HAKES. Think about it.

Ms. JAFFE. I would just say that the LNG exports are going to be, I think, a critical feature in providing diversification to the Nord Stream 2.

And, you know, I mean, different policies have been mooted. I mean, the administration was looking at actually even putting sanctions on the German suppliers that are going to be involved in doing Nord Stream 2. But it is—I can send you a paper—it is a pretty complex issue, because Germany would like to be the hub for the movement of all natural gas around Europe, and there are

other countries in Eastern Europe and Southern Europe that would of course like to have U.S. LNG and more open access in trading. And I think that those countries have U.S. support to try to work against the sort of German alliance to try to have Nord Stream 2 be such a critical feature of the market.

And I would say that there are some—I don't know how to put this. There are some business interests in Germany that motivate some of the policies and some of the benefits they would get from controlling movements of natural gas to Europe that even goes beyond the Russian part of the question.

And U.S. LNG and our support for Eastern Europe, we are moving in the right direction on our policy, and we need to stay the course on that. It is important, you are correct, in making sure that Europe has a diverse energy supply.

Ms. KAPTUR. I will give you an anomaly here. You might take it back to your colleagues. And I am looking for commentary on this.

The shortest distance to ship by sea from the United States to Europe is through the Saint Lawrence Seaway or from a relationship with the Canadians to ship from the Straits of Canso or Halifax. And I am talking about LNG.

The greatest discovery of natural gas on the continent sits in Ohio and western Pennsylvania, in the Marcellus and Utica shale.

The dots are not connected, commercially.

Mr. ZINDLER. Just very quickly, actually, there will be a terminal—there is a terminal in Maryland also that is coming—to export. And I would just—I will share with you and the committee afterwards our forecast on LNG exports for the U.S. And we do project those to rise.

I wanted to say that the first port of call may not always be Europe; it may also be Asia. But just providing more to the market is going to help relieve some of the pressure on pricing.

Ms. KAPTUR. Thank you all very much.

Congressman Simpson.

Mr. SIMPSON. I just want to say, I thank you all for being here. Very interesting discussion. And if I sound like I am trying to be a hard-ass, I am really not. I am just raising questions. Because nothing is as simple as we oftentimes make it. It is always very complicated.

In fact, one of the challenges we have had in this committee over the years, we have tried to get the private sector involved in some research and development of things that are of their interest. Trying to determine when they want to put dollars in is another challenge. They almost want it at the end of the project, where it is, you know, "Okay, I'll buy it." They need to be more involved up front in the research and development. The days of the Bell Labs are over. The government is doing most of the research in these very expensive endeavors.

And I would just say to Chairwoman Kaptur, I understand your issues, but, every part of the country has a competitive advantage with something. You just mentioned one in your area: shortest distance of shipping to Europe. We are at a disadvantage to you from that. We are at an advantage in the cost of our electricity. So every part of the country has a different advantage and disadvantage from where they are located and what their own circumstances are.

Lastly, I just want to say, if you ever see me in a driverless vehicle, you will know that hell has frozen over. I am 68, and it will either be my funeral car or hell has frozen over.

Ms. KAPTUR. Thank you, Ranking Member Simpson. We want you to stay here for a very long time, so you drive what you wish.

All right. We are going to conclude this morning's hearing early this afternoon. And I would like to thank our witnesses for joining us today.

I ask the witnesses to please ensure for the hearing record that questions for the record and any supporting information requested by the subcommittee are delivered in final form no later than 3 weeks from the time that you receive them.

Members who have additional questions for the record will have until the close of business Monday to provide them to the subcommittee.

Ms. KAPTUR. And I would like to remind members that our next hearing is Tuesday, February 12, at 10:00 a.m. to examine the U.S. Department of Energy's Weatherization Assistance Program.

This hearing is adjourned.

And thank you all. You were magnificent.

RESPONSES BY
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TO
QUESTIONS FOR THE RECORD
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
U.S. HOUSE COMMITTEE ON APPROPRIATIONS

Hearing on Energy Trends and Outlook
Thursday, February 7, 2019

GENERAL

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1. Top R&D Priorities

Question: In your opinion, what are the top priorities or most effective areas to invest in energy innovation?

Answer: While we don't always know where the next breakthrough technologies will emerge, Business Roundtable believes that investments should focus on potential breakthrough technologies that, if successfully developed, could address the need to provide affordable, reliable and sustainable supplies of energy for a growing global population while also reducing environmental impact, including by addressing the climate challenge. As I noted in my prepared testimony, Business Roundtable will release a report later this year highlighting some of the potential breakthrough technologies that could fundamentally change the U.S. and global energy landscape for the better. These include advanced nuclear, which could provide an economical, dispatchable, low-carbon power source; carbon capture, utilization and storage, which could significantly mitigate power sector and industrial process emissions, while allowing fossil fuels to remain an important source of energy in these sectors for many years to come; hydrogen, a flexible energy source that can be produced from a range of primary energy sources and can be used across sectors; and advanced substitute materials that could be applicable to virtually every sector of our economy, not just the energy sector. The U.S. has leadership in these technologies and their successful development and deployment will not only help meet the world's energy and climate needs but will be an important driver of future economic growth.

2. Technology Areas and Research Needs

Question: For areas where you would like to comment, please elaborate on the near- and long-term technology potential, barriers to development, and research needs for any of the following technology

areas: renewable energy; energy storage; crude oil and petroleum products; natural gas; nuclear energy; coal; carbon capture, utilization, and storage; energy efficiency; transportation; or cybersecurity.

Answer: In my prepared remarks, I discussed the research needs and potential for advanced nuclear, carbon capture, utilization and storage and advanced materials, which have applications across all sectors of our economy. Business Roundtable also is investigating the potential for energy storage technologies, including barriers to their development and deployment. We will have more to say on these issues once our report is finalized.

3. Stable R&D Funding

We often hear about the necessity of stable and predictable funding for energy research and development.

Question: Can you please elaborate on why that's important for researchers and private sector?

Answer: Research and development into the types of breakthrough technologies I have described is inherently risky, expensive, time consuming and while the potential pay-off is large, failure rates are high. Without stable and predictable government funding, it is difficult to attract researchers, scientists and the private sector capital necessary to advance the science. Having a stable, predictable funding plan eliminates one of the inherent uncertainties associated with this type of research. Business Roundtable recently released a report, *Innovation Nation: An American Innovation Agenda for 2020* (available at: https://s3.amazonaws.com/brt.org/BRT_Innovation_report_pages_001_lowres.pdf) that highlights this need. We noted the importance of "creating and maintaining the right conditions for American businesses to make what are often risky and long-term investments in developing, testing, commercializing and deploying new technologies" and that "[a] shared commitment to making smart, sustained and strategic investments in R&D will mean that more of the world's intellectual property and more high-value jobs are created in the United States and that more American businesses are the standard bearers for innovative technologies and processes." Among our recommendations in the *Innovation Nation* report particularly relevant to the Subcommittee are the following:

- Boost federal funding for R&D, with a focus on strategic investments in basic research. Develop and implement whole-of-government strategic planning for R&D. The federal government should develop and execute a whole-of-government approach for strategic R&D investment, including clear articulation of near-, medium- and long-term research priorities. A whole-of-government strategic plan should include clear and specific objectives and benchmarks, results-driven planning and execution, a predictable funding stream, and effective coordination and collaboration across agencies and federal labs.
- Increase funding for basic R&D. The federal government should build on last year's increase in funding for basic research to sustain a 4 percent annual growth rate, adjusted for inflation, in federal spending on basic research in the coming years. Such a trajectory would be consistent with long-term historical growth rates in federal spending on basic research that were sustained from the 1970s through the 1990s.
- Improve collaboration among federal research labs, universities and the private sector. The federal government should improve and expand collaboration to accelerate the transition of promising technologies from the laboratory to commercialization in the marketplace. a. Incentivize and support regional cluster initiatives. The federal government should support

regional cluster initiatives by funding grants and innovation challenges that promote local community development, incentivize industry-aligned workforce preparedness programs, and strengthen information-sharing and monitoring efforts around cluster initiatives. This effort should include:

- Focusing federal support on providing robust, long-term and predictable funding streams to help scale up innovation clusters and advance a forward-looking vision for local economic growth through innovation.

CHAIRWOMAN KAPTUR

4. Energy in Housing

Question: Relating to the future of housing and energy systems, where are path-breaking efforts being made?

Answer: While many Business Roundtable member companies are engaged in research in this space, it is not currently something with which I am familiar. I note, however, that according to DOE's Building Technologies Office, there is significantly more that can be done in the U.S. specifically with residential and commercial buildings efficiency, which represents a large portion of U.S. energy consumption.[1]

Question: What can be learned from previous efforts?

Answer: This is an area that currently is not a focus of our research.

5. Energy-Intensive Industries

Question: How can the United States incorporate new energy technologies and energy efficiency into energy-intensive industries, such as vehicle production, steel production, and defense-related production?

Answer: The private sector in the U.S. does an excellent job of incorporating new technologies into products and services where it is cost effective and makes sense from a performance standpoint to do so. The appropriate role of research and development, particularly government-supported research and development, is to help develop new technologies to the point where they are ready for commercial use. The highly competitive global marketplace in which most U.S. companies operate helps ensure that if a new technology makes sense and provides an advantage over existing technologies, it will be manufactured, marketed and used.

Question: What are some examples of this in the past?

Answer: The increased performance of solar panels and wind turbines over the past several decades has been nothing short of astonishing. While the production tax credit and investment tax credits available for wind and solar production has supported the overall growth in renewables deployment, the technology improvement within these sectors has been what is most impressive, which has helped drive down the cost of these technologies to near parity with fossil fuels in many parts of the country. Similarly, the cost pressure most manufacturers face has led to reductions in energy used to produce each unit of product. Despite continuing economic growth, we are seeing generally flat or declining energy demand across most sectors in the United States. With continued improvements in the energy efficiency of lighting, appliances, vehicles, industrial processes, and more, limited energy demand growth is expected going forward.

6. Water Treatment

Question: How can the United States incorporate new energy technologies and energy efficiency into water treatment and sewage treatment?

Answer: In May 2017, Business Roundtable released a report and recommendations which in part addressed this issue. *Back in Business: A Blueprint for Renewing America's Infrastructure* (available at: https://s3.amazonaws.com/brt.org/staging-qeOOpdhhbbqqq3/BRT-Infrastructurepaper5142017.pdf) In our report, we noted

> [l]ess than 5 percent of federal infrastructure spending supports drinking and wastewater systems and the vast majority of U.S. water systems are owned and operated by municipalities, which lack the resources necessary to make capital-intensive investments in maintaining, replacing and upgrading assets. In fact, there are roughly 56,000 community water systems, 19,000 wastewater pipe systems and 14,000 wastewater treatment facilities across the United States. Within this context, policy changes should prioritize improving the stewardship and management of existing resources, incentivizing market efficiencies, and removing barriers to outside sources of financing. https://s3.amazonaws.com/brt.org/staging-qeOOpdhhbbqqq3/BRT-Infrastructurepaper5142017.pdf, p. 9.

We recommended incentives to consolidate systems in order to help drive efficiency and needed investments. We concluded that:

> Consolidating the thousands of fragmented water management systems across the country would significantly improve system efficiency and performance and should be incentivized according to the following:
> - Expand state revolving fund (SRF) eligibility to include prefeasibility studies. Currently, entities that wish to explore consolidation are ineligible for SRF funds. Providing a financial incentive could prompt more utilities to undertake the data collection and exploration processes necessary to make an informed decision regarding consolidation.
> - Set aside a portion of SRF money to exclusively fund consolidation. Currently, utilities interested in consolidating are forced to compete with every other type of project for funding.
> - Give entities that are out of compliance with environmental laws and regulations the option of choosing to consolidate instead of facing enforcement action. (*Id.*)

We also recommended incentivizing the acceleration of adoption of innovative technologies.

> Local municipalities are understandably risk averse when it comes to adopting new technologies, despite their potential to improve the effectiveness and efficiency of water treatment and management processes. The federal government should incentivize the adoption of these technologies by establishing a "technology test-bed" program to evaluate, demonstrate and approve new approaches. Such a program could be funded by the private sector under federal regulatory oversight, funded by the federal government with participation from the private sector or run as a P3. https://s3.amazonaws.com/brt.org/staging-qeOOpdhhbbqqq3/BRT-Infrastructurepaper5142017.pdf), p. 10.

Question: What can be learned from previous examples of energy changes in water treatment?

Answer: I am not familiar with the lessons learned from previous examples of energy changes in the water treatment industry.

7. Landfill Methane

Question: How can the United States incorporate new energy technologies to address methane leakage from landfills?

Answer: This is not an issue on which Business Roundtable has an opinion.

Question: What should be the role of the Department of Energy for addressing methane leakage from landfills?

Answer: This is not an issue on which Business Roundtable has an opinion.

8. Hydrogen Technologies

Question: What are the potential technology applications and cost-effectiveness of hydrogen technologies?

Answer: My prepared testimony discusses some of the potential technology applications of hydrogen, which promises to have applications across many sectors of our economy. Hydrogen is a very flexible fuel and can be derived from multiple sources.

9. Nuclear Cost Competitiveness

Question: What actions have been taken or can be taken to maintain the cost competitiveness and vitality of the current fleet of nuclear power plants for their life expectancy?

Answer: This is not an area which Business Roundtable is familiar.

10. Compact Plasma Systems

Question: For compact plasma systems, what is your opinion on the ability and timing of deployment?

Question: Where do they sit on the development curve for future energy systems?

Answer: This is not a technology which we currently are investigating or are familiar.

11. Regional Power Differences and Competitiveness

Question: Please elaborate on the key differences in power production facilities in different regions of the country.

Answer: One of the many strengths of the U.S. economy is the abundance and diversity of our energy resources. From hydropower in the Pacific Northwest; excellent wind resources in the Mid-continent and West; abundant solar potential in many states; coal in Appalachia, Montana and Wyoming; to oil and natural gas now being produced offshore and in many states, the U.S. is blessed with a diverse portfolio of energy resources. Not all regions have equal access to these resources but the expansion of organized power markets and increased transmission investment allowing load centers to be connected to resources located further away has resulted in less pronounced regional differences in resource mix.

Question: How does that affect rates for consumers, particularly industrial consumers, in those regions?

Answer: Business Roundtable has no particular expertise or view on this question.

Question: How do electricity rates for consumers affect manufacturing competiveness?

Answer: Energy prices, including the price of electricity, have an impact on manufacturing competitiveness, particularly with respect to energy-intensive, trade-exposed manufacturing. While energy prices may not be the most important factor when deciding where to locate a manufacturing facility, it is certainly an important factor that is taken into consideration by energy intensive industries.

Question: How can regions increase their competitiveness if they do not benefit from lower electricity rates resulting for abundant natural resources like hydropower?

Answer: Business Roundtable has no particular expertise or view on this question. My own personal experience suggests that regions often do well by building on and emphasizing their strengths, rather than trying to make up for an apparent weakness.

12. Geopolitics of European Energy

One example of the geopolitical implications of energy is illustrated in Europe's dependence on Russia for its natural gas supply. Russia accounts for approximately 37% of Europe's imports of natural gas, and Europe is now considering building a new pipeline – Nord Stream 2 – that would increase the amount of natural gas imported from Russia.

Question: What are the geopolitical implications of Europe increasing its dependence on Russia for natural gas supply?

Question: As the United States continues to invest in energy R&D to drive down the costs of alternative energy sources, how can the United States help regions around the world diversify their energy supply to make them less dependent on single countries or single sources of energy?

Question: What else can be done to decrease the Europe's dependence on Russia for the supply of natural gas?

Answer: Please see my answer to Question #13.

13. LNG Exports

The natural gas market has transformed radically in the past ten years. Today, instead of a growing liquefied natural gas (LNG) importation market, the United States is a growing LNG exporter.

Question: What steps can the United States take to create stable LNG markets abroad?

Answer: Each LNG export facility represents billions of dollars of private sector investment, with additional investments required for pipelines and other associated infrastructure. In order to create the right conditions for these investments, predictable, stable regulatory and permitting regimes are necessary, along with long-term off-take contracts. The U.S. can further bolster the growth of the LNG export market by being a trusted, reliable supplier of natural gas to foreign nations needing these energy resources while ensuring predictability and stability in the regulation and siting of the necessary facilities.

Question: How should our future LNG exports be used to further the national interest and create a more stable energy future for our country?

Answer: A growing LNG export market will help Europe and Asia diversify their energy supplies and reduce dependence on any one supplier of energy. Not only will this be advantageous to Asia and Europe but it also will help create jobs and economic activity in the U.S.

Much of the growth in the LNG market comes from the Utica and Marcellus formations, which could be served by a connection to American allies in Europe.

Question: Please comment on the possibility of using the St. Lawrence Seaway, as a fast connection point to Europe for the sale of LNG.

Answer: This is not an issue on which Business Roundtable has a view.

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[i] DOE, "About the Office Of Building Technology", https://www.energy.gov/eere/buildings/about-building-technologies-office

RESPONSES OF DR. JAY E. HAKES

QUESTIONS FOR THE RECORD
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
U.S. HOUSE COMMITTEE ON APPROPRIATIONS

Hearing on Energy Trends and Outlook
Thursday, February 7, 2019

GENERAL

1. Top R&D Priorities

Question: In your opinion, what are the top priorities or most effective areas to invest in energy innovation?

JEH: I believe that the top priority for energy research should be storage (mainly batteries). For both stationary and mobile applications, we need storage that is more compact, cheaper, quicker to recharge, and capable of providing power for longer periods of time. Innovations in storage are needed to help the electric grid ramp up the use of renewable energy to much higher levels while maintaining reliability of delivery. They are also necessary to make all-electric vehicles attractive to more potential buyers. Despite the progress already made, batteries are still an "immature" technology, meaning there is still lots of room for innovation.

Second, I would continue to focus on the cost and efficiency of solar panels. As the use of photovoltaics expands, the space needed for them will become a greater concern. (Solar on roofs will help but not enough.) Lower costs will make solar a more attractive option in areas of the world where energy use has the potential to grow rapidly. It is also a technology with great potential for additional major advances.

I am uncomfortable putting all our electricity eggs in the renewables basket. Thus, I believe that natural gas generation with sequestration and small, modular nuclear plants could play major roles in the providing power with low/no carbon emissions.

An additional priority is the security of the electric grid. As we become even more reliant on electricity, the dangers of natural or malevolent human disruptions increase. Since the capability of U.S. rivals to create havoc will continue to increase, we must maintain a strong and sustained effort to protect ourselves.

Most of my priorities are conventional wisdom. However, not enough attention has been paid to the potential role natural gas generation with carbon sequestration, and long lead times will be needed to make the technology competitive in energy markets.

2. Technology Areas and Research Needs

Question: For areas where you would like to comment, please elaborate on the near- and long-term technology potential, barriers to development, and research needs for any of the following technology areas: renewable energy; energy storage; crude oil and petroleum products; natural gas; nuclear energy; coal; carbon capture, utilization, and storage; energy efficiency; transportation; or cybersecurity.

Funding for research and development will have the greatest impact in areas where there is (or will be) market demand for the technology. For instance, additional investments in natural gas extraction using hydro fracturing could not paid off until the Fuel Use Act banning new natural gas plants was repealed in 1989 and electric companies recognized the advantages of advanced combined cycle gas plants. Another example: investments in big (1,000 megawatt) nuclear plants for the U.S market did not make much sense, when demand was not growing fast enough to justify plants of that size. (The international market is another matter.) Thus, investments in energy technologies are most effective when they are paired with policies that creative incentives for or eliminate barriers to market penetration or recognize limitations that make market penetration unlikely despite continued investment.

3. Stable R&D Funding

We often hear about the necessity of stable and predictable funding for energy research and development.

Question: Can you please elaborate on why that's important for researchers and private sector?

There are significant transaction costs when programs are suddenly started or terminated. At a university or lab for instance, new support means that equipment must be purchased, faculty schedules must be rearranged, and graduate assistants must be hired. Quality research is harder to achieve when resources are not provided on a steady basis.

The goal should be to provide reliable funding that is not overly reactive to political cycles, while making occasional changes to R&D priorities based on strategic considerations and the likelihood of achieving the desired results.

CHAIRWOMAN KAPTUR

4. Energy in Housing

Question: Relating to the future of housing and energy systems, where are path-breaking efforts being made?

Solar roofs and windows are exciting areas of consideration for future homes. It is not clear, however, whether it will be more economic to produce electricity on solar farms or at individual residences.

More attention should be paid to dehumidification strategies. A major waste of energy results from people running their air conditioners to dehumidify when there are better options available. Less expensive whole-house dehumidifiers would help reduce this waste and provide a more comfortable interior environment.

Question: What can be learned from previous efforts?

The nation has achieved great saving from big gains in efficient lighting and appliances. One lesson of this experience is that when advances are made, we should that assume that further advances are often possible at reasonable costs.

5. Energy-Intensive Industries

Question: How can the United States incorporate new energy technologies and energy efficiency into energy-intensive industries, such as vehicle production, steel production, and defense-related production?

This is not an area I have studied very carefully.

Question: What are some examples of this in the past?

6. Water Treatment

Question: How can the United States incorporate new energy technologies and energy efficiency into water treatment and sewage treatment?

This is another area I have not studied very carefully.

Question: What can be learned from previous examples of energy changes in water treatment?

7. Landfill Methane

Question: How can the United States incorporate new energy technologies to address methane leakage from landfills?

This is not an area I have studied very carefully.

Question: What should be the role of the Department of Energy for addressing methane leakage from landfills?

8. Hydrogen Technologies

Question: What are the potential technology applications and cost-effectiveness of hydrogen technologies?

I have a hard time envisioning major role for hydrogen for two major reasons. First, it has low energy density (British Thermal Units per square inch). Second, the major economies already have electric grids in place, which gives the battery infrastructure a head start over fuel cells that probably cannot be overcome.

Research and development can resolve some problems for hydrogen energy systems, which may give the impression they can play a much bigger role in the future. However, other technologies will also be making progress, so the fuel cells of the future will not be competing with the batteries of today. I have not seen convincing scenarios that fuel cells/hydrogen can catch up.

9. Nuclear Cost Competitiveness

Question: What actions have been taken or can be taken to maintain the cost competitiveness and vitality of the current fleet of nuclear power plants for their life expectancy?

Existing U.S. nuclear plants, unlike those in France, were not designed to easily turn on and off, based on the assumption they would provide base load power, whenever they were able. This was a joint decision made by private industry and the U.S. government. One unanticipated consequence of this approach has been a conflict between intermittent wind power and the desirability of keeping nuclear plants running during periods of low demand.

Though some of these challenges can be worked out at the state level, there is a national interest in keeping existing nuclear plants operating through their useful life cycle, and this interest may not be adequately reflected in state-level economics.

In most cases, it is desirable to have nuclear plants rate-based rather than operating in the wholesale market. Second, batteries should be able to assist in managing conflicts between intermittent wind and base load nuclear. New federal legislation may be needed on this subject, possibly as part of a national renewable/no carbon portfolio.

10. Compact Plasma Systems

Question: For compact plasma systems, what is your opinion on the ability and timing of deployment?

I do not have expertise in this technology.

Question: Where do they sit on the development curve for future energy systems?

11. Regional Power Differences and Competitiveness

Question: Please elaborate on the key differences in power production facilities in different regions of the country.

Access to hydropower, ideal wind patterns, abundant sun light, and low-priced natural gas can vary by region. These factors have an impact on rates.

Question: How does that affect rates for consumers, particularly industrial consumers, in those regions?

Energy-intensive industries are strongly motivated to located in regions where they have low energy costs.

Question: How do electricity rates for consumers affect manufacturing competiveness?

Energy prices, labor costs, and taxes are among the factors that affect manufacturing competitiveness.

Question: How can regions increase their competitiveness if they do not benefit from lower electricity rates resulting for abundant natural resources like hydropower?

Many national and international companies are requesting access to solar and wind power when they make decisions on new locations.

12. Geopolitics of European Energy

One example of the geopolitical implications of energy is illustrated in Europe's dependence on Russia for its natural gas supply. Russia accounts for approximately 37% of Europe's imports of natural gas, and Europe is now considering building a new pipeline – Nord Stream 2 – that would increase the amount of natural gas imported from Russia.

Question: What are the geopolitical implications of Europe increasing its dependence on Russia for natural gas supply?

Russia has demonstrated that it is willing to use its position as a supplier of energy to advance its political objectives. In some respects, the threat of withholding gas supplies is more grave than the threat of withholding oil supplies, since the transportation of gas is more constrained than for oil.

Question: As the United States continues to invest in energy R&D to drive down the costs of alternative energy sources, how can the United States help regions around the world diversify their energy supply to make them less dependent on single countries or single sources of energy?

The world trade of Liquefied Natural Gas can bring needed flexibility to energy markets. The United States is able to produce more gas than it consumes, so it is well positioned to participate in this trade. Further reductions in the costs of transportation would be beneficial for the United States, as well as the broader market.

Further advances in wind and solar energy and batteries can bring added flexibility to energy markets around the world.

Question: What else can be done to decrease the Europe's dependence on Russia for the supply of natural gas?

The number of LNG ports needs to expand, so that Europe has greater opportunities to purchase American gas. We have to realize, however, that pipeline gas will almost always be cheaper than gas transported by tankers.

13. LNG Exports

The natural gas market has transformed radically in the past ten years. Today, instead of a growing liquefied natural gas (LNG) importation market, the United States is a growing LNG exporter.

Question: What steps can the United States take to create stable LNG markets abroad?

Unlike the shipping of oil and coal, the trade of LNG is highly sensitive to the costs of transportation. As result, the international movement of natural gas would benefit from further reductions in the costs of shipping.

In addition, diplomatic discussions with Europe on national security issues should include the advantages of vibrant international trade in trade gas and mutual advantages of expanding the number of ports.

The pricing of gas should be left to the private sector.

Question: How should our future LNG exports be used to further the national interest and create a more stable energy future for our country?

The export of LNG contributes to the creation of jobs in the United States and to the reduction of Russian leverage over Europe.

The United States should make clear that it does not intend to use its energy resources for political advantage. Buyers may be willing to pay a premium if they believe that American gas is reliable and deliveries will not be interrupted to bully other nations.

Much of the growth in the LNG market comes from the Utica and Marcellus formations, which could be served by a connection to American allies in Europe.

Question: Please comment on the possibility of using the St. Lawrence Seaway, as a fast connection point to Europe for the sale of LNG.

Transportation costs greatly affect the market access of NG. Thus, a route to Europe through the St. Lawrence Seaway would give gas from the Utica and Marcellus formations a comparative advantage over other sources of LNG and provide the Europeans with more attractive pricing.

QUESTIONS FOR THE RECORD
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
U.S. HOUSE COMMITTEE ON APPROPRIATIONS

Hearing on Energy Trends and Outlook
Thursday, February 7, 2019

GENERAL

1. Top R&D Priorities

Question: In your opinion, what are the top priorities or most effective areas to invest in energy innovation?

Many U.S. states have committed to or shown a strong interest in achieving 100 percent renewable energy targets for their electric grid. Many of the largest American corporations have made similar announcements for their headquarters and manufacturing facilities in the United States. To facilitate 100% renewable energy generation, new technologies will be required to handle intermittency issues, including electricity storage.

While companies are installing successful battery storage facilities to pair with wind and solar in the United States, Australia and other key locations, these systems are able to provide backup in terms of hours or days and are not a full solution to intermittency issues that would arise from seasonal variations in availability of renewable energy sources. To provide a more lasting way to convert renewable energy to a storable carrier, researchers and companies are working on means to convert the electricity generated into hydrogen which can later be used for stationary power or in hydrogen fuel cell vehicles. Hydrogen is considered a top option to facilitate **seasonal storage** for renewable energy. Today, the proven processes to convert electricity to hydrogen are considered too expensive for large scale adoption but R & D on electrolysers and hydrogen storage materials could bring down costs.

2. Technology Areas and Research Needs

Question: For areas where you would like to comment, please elaborate on the near- and long-term technology potential, barriers to development, and research needs for any of the following technology areas: renewable energy; energy storage; crude oil and petroleum products; natural gas; nuclear energy; coal; carbon capture, utilization, and storage; energy efficiency; transportation; or cybersecurity.

3. Stable R&D Funding

We often hear about the necessity of stable and predictable funding for energy research and development.

Question: Can you please elaborate on why that's important for researchers and private sector?

Energy innovation is a vital U.S. national interest. Emerging technologies hold great promise to both promote electricity system resiliency and accelerate the transition to cleaner forms of energy as well as to lower the oil intensity of the U.S. economy. More broadly, energy innovation ensures national security by providing the U.S. military and space program a technological edge over its geopolitical rivals. Leading in energy innovation contributes to U.S. global competitiveness—not only in spurring new markets, industries, and companies but also in producing more cost-effective supply chains, boosting manufacturing productivity, and lowering the economy's energy intensity.

Historically, the United States has been a global leader in energy innovation, but more recently China has made energy innovation the cornerstone of its future industrial strategy. China is already staking out its position to promote and thereby dominate the market, creating a giant industrial complex armed with cheap solar panels, smart grid and distributed energy technologies, and Chinese electrified vehicles. The country's energy pivot is expected to include investments of more than $6 trillion by 2040. China already dominates the global solar panel market and aims to expand to a wider range of oil saving technologies from batteries to electric vehicles to drones to robotics.

Without adequate sustained public funding for innovation in energy and resiliency technology development, the United States will fall behind other nations with focused efforts such as China. U.S. clean energy and technology companies currently have a global edge but without a supportive policy atmosphere to foster markets at home and abroad, the U.S. could inadvertently cede the major global economic and strategic advantages it currently enjoys in the energy, military and technology spheres and inadvertently jeopardize its ability to sustain a premiere role in global economic activity, trade and innovation.

Continued achievement in energy innovation takes sustained, long term effort. Interruptions in funding discourage entry of sustained pipeline of new talented personnel into the energy research field and force existing scientists and inventors to limit activities in favor of other commitments that are receiving funding. Corporate funders have individual applied company interests as their priorities and these do not always match exactly to U.S. national interest.

CHAIRWOMAN KAPTUR

4. Energy in Housing

Question: Relating to the future of housing and energy systems, where are path-breaking efforts being made?
http://www.cleanfleetreport.com/honda-smart-home-integrates-ev-house/

Tesla is now proposing projects to test the convergence potential of storage, rooftop solar, and eventually electric vehicles. In one ambitious project, the company worked with the South Australian government to expand its local storage participation to homeowners with residential Powerwall batteries, and aggregating rooftop solar generation paired with Powerwall storage across Adelaide households in what is hailed as the "world's largest virtual power plant." Any excess energy generated by the system that is not used by the household will be automatically sent to the grid. This released energy will be centrally controlled by South Australian government entities. When grid conditions are stressed, the virtual power plant will provide energy, via an intermediary company, to the grid, much like a conventional power plant does. The difference with a virtual power plant is that anyone with a Powerwall and other distributed energy sources (such as solar panels, electric cars, power stored from the grid), rather than just a utility-scale facility, could feed electricity to the grid.

Question: What can be learned from previous efforts?

Energy efficiency has a huge potential to reduce energy use and related carbon emissions.

5. Energy-Intensive Industries

Question: How can the United States incorporate new energy technologies and energy efficiency into energy-intensive industries, such as vehicle production, steel production, and defense-related production?

Advanced manufacturing technologies can reshape how companies manage their production, with important implications for supply chain management and energy use. For example, 3-D printed engines are being made with fewer components and geographically closer to assembly, thus reducing dependence on volatile supply chains. In contrast, traditional manufacturing relies on complex supply chains that bring together for assembly parts produced in industrial plants across the world. Today's diverse supply chains also require heavy machinery and oil-intensive shipping programs to take final products to market. Advanced manufacturing systems could dramatically change that, both by lessening the number of final parts that need to be transported for assembly and by reducing the distance those parts have to travel. In both cases, oil use would be dramatically lowered. The manufactured engines and equipment would also be lighter, requiring less energy to operate.

Customized parts not only reduce the energy expenditure in supply chains but also improve energy efficiency of the final products. For example, Cessna will soon launch a new plane with a 3-D printed engine. The previous engine for a Cessna aircraft had 855 parts; the new one has only twelve. As a result, the engine is 5 percent lighter and 20 percent more fuel efficient and has 10 percent more operating power. Cessna once took eight to ten years to develop an engine; it can now do it in two.[i] Similarly, 3-D printing could revolutionize automobile manufacturing. Local Motors, in conjunction with Oak Ridge National Laboratory, revealed the first entirely 3-D printed concept car in 2016.[ii] The ability to print cars, or even just parts, could change the current energy-intensive and inflexible manufacturing tooling and platform system. Design-specific tools such as stamping equipment, machinery, assembly equipment, and tooling support only a handful of designs. These tools are capital intensive and involve long amortization periods, so car manufacturers have difficulty innovating within the constraints of existing equipment. Advanced manufacturing could enable the industry to introduce new designs at more affordable prices. These designs could have higher fuel efficiency and lower manufacturing-energy footprints. The digitalization of advanced manufacturing also allows for computer-driven optimization, which can further improve the process. Automated 3-D printing can improve material choice and

structure to create cost-effective, strong, and light products. The automotive manufacturer Divergent 3D, which is pioneering this method, says it can reduce the life-cycle environmental effect of the automobile manufacturing process.[iii]

Question: What are some examples of this in the past?

Our lifetime is not the first time in history that the global energy system has undergone a major technological transformation. In the early 1900s at the time of Thomas Edison and Henry Ford, American oil and mass-produced oil-fueled vehicles helped reposition the United States as a global power, altering the geopolitical landscape in modern history and influencing the premiere role oil has played in global power.

Since the time of Edison, American business innovation and entrepreneurship has given the United States a technological edge over geopolitical rivals and ensured U.S. military supremacy. Ford's mass-produced trucks and cars proved critical in many battles in World War I to overcome Germany's advantageous access to European railroad transport. Over the course of World War II, the United States had manufactured over 70 percent of all allied war material, with Ford Motor Co. alone contributing more than the entire Italian national effort. The U.S. domestic oil industry, dominated by Rockefeller's Standard Oil, constituted two-thirds of world oil production by the 1940s and was a crucial feature closing Britain's fuel deficit compared to Germany and Japan.

During the 1950s, a major U.S. effort to reach space in response to the Sputnik crisis of 1957 led to a period of remarkable American innovation and scientific achievement. Many of the technologies we use today in everyday life like global positioning systems (GPS) found their early roots from technologies developed as part of the space race.

Today, the militarization of space and the race to automation in warfare has stimulated a new technology race. The U.S. Pentagon has recognized this future and began funding American scientists to develop the technology for automated machines and vehicles in 2004 with a grand challenge to produce a robot car that could transverse the Majove desert. Most people missed the fact that the U.S. Congress set a goal to have a third of all ground combat vehicles be autonomous by 2015, a deadline that missed the mark in the timeline of its ambition. China is now promoting its own new internal industrial policy, called China 2025, to address the coming global onslaught of new critical warfare technologies and has made clear its intention to dominate a new energy market, with a high emphasis on its own brand of solar power, smart electric grids, cyber surveillance technologies, and automated vehicles. The United States is responding with export controls on its own critical technologies but has yet to step up to the plate with the kind of massive investment in innovation that is needed to keep pace.

6. Water Treatment

Question: How can the United States incorporate new energy technologies and energy efficiency into water treatment and sewage treatment?

Question: What can be learned from previous examples of energy changes in water treatment?

7. Landfill Methane

Question: How can the United States incorporate new energy technologies to address methane leakage from landfills?

Landfill gas to energy (LGTE) is a method of capturing the naturally occurring methane from the breakdown of waste in a landfill. One solution for dealing with this methane is to simply flare it off breaking it down into less harmful gases. However, due to the potential energy source of this gas, technologies have been developed to capture this gas and convert it into energy. G. Saur and A Millbrandt (2014)[iv] estimate that the U.S. total methane potential in raw biogas is about 16 million tons, but exploitable availability is more limited at 6.2 million tons. The authors breakdown the biogas supply by source with landfill biogas as the largest potential source of 2,455 thousand tonnes per year out of 10,586 total methane potential.

Texas and California providing many of the largest sites (see figure).

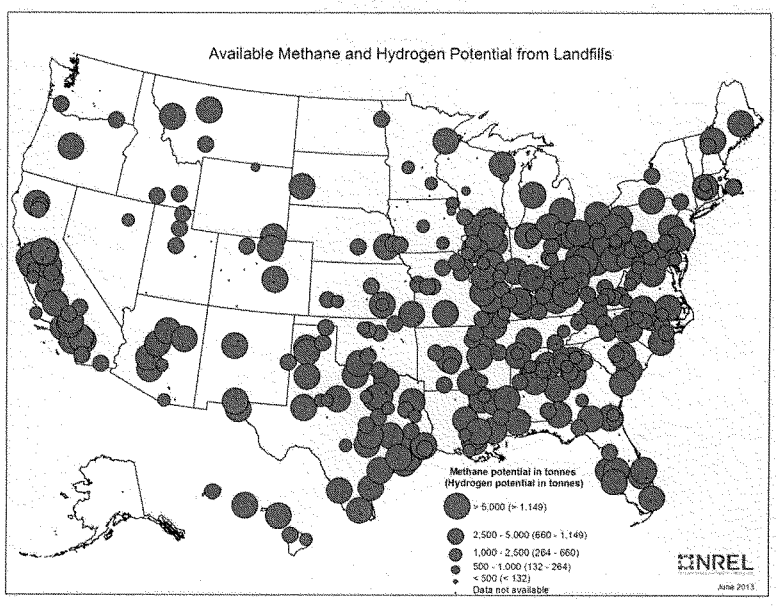


Figure: Landfill Methane and Hydrogen Potential (Tonnes) adopted from G Saur and A Milbrandt (2014)

The U.S. Environmental Protection Agency (EPA) has a voluntary Landfill Methane Outreach program that provides technical assistance to communities, utilities and businesses to overcome barriers to development of projects that reduce methane emissions from landfills through energy production and use either by using the landfill gas to produce electricity or to remove impurities and contaminants to upgrade the gas to pipeline quality gas that can be used by industry or as a transportation fuel. About half of the methane produced in landfills in California

is used to generate electricity. The state is also looking for ways to increase incentives to convert landfill gas to renewable natural gas pipeline injections for use in trucks and the state's gas companies have been asked to complete five pilot projects that demonstrate injection potential to the natural gas pipeline system to complement incentives for the conversion of buses and trucks to low NOx natural gas engines. Electricity production from landfill is constrained by the availability of electricity demand close by to facilities. The high costs for raw biogas to renewable natural gas (biomethane) conversion (clean up) remain a barrier to its injection into pipelines. The latter could be addressed either by providing financial incentives that cover clean-up costs (such as California's transportation carbon credit system that has incentivized shipments of renewable natural gas from Texas) or by supporting research and development of technologies to lower the costs of removing impurities from biogas.

Question: What should be the role of the Department of Energy for addressing methane leakage from landfills?

DOE could support a research and development program on biogas clean up technologies to supplement EPA's Landfill Methane Outreach Program.

8. Hydrogen Technologies

Question: What are the potential technology applications and cost-effectiveness of hydrogen technologies?

The corporate sector continues to invest in hydrogen technologies for a variety of uses ranging from as a means to create seasonal storage for renewable energy (so-called e-gas or green hydrogen). Hydrogen is also still viewed as a viable low-carbon fuel for heavy duty trucks that travel long distances and for highly efficient passenger vehicles in Japan and Germany. The United Kingdom is moving forward with a novel plan to blend small amounts of hydrogen into the country's natural gas system used for household heating to lower its carbon footprint. For the most part, the technologies are still more expensive than competing fuel systems and, unlike electricity, require a full build out of alternative infrastructure.

9. Nuclear Cost Competitiveness

Question: What actions have been taken or can be taken to maintain the cost competitiveness and vitality of the current fleet of nuclear power plants for their life expectancy?

10. Compact Plasma Systems

Question: For compact plasma systems, what is your opinion on the ability and timing of deployment?

Question: Where do they sit on the development curve for future energy systems?

11. Regional Power Differences and Competitiveness

Question: Please elaborate on the key differences in power production facilities in different regions of the country.

Question: How does that affect rates for consumers, particularly industrial consumers, in those regions?

Question: How do electricity rates for consumers affect manufacturing competiveness?

Question: How can regions increase their competitiveness if they do not benefit from lower electricity rates resulting for abundant natural resources like hydropower?

New technologies, such as renewables and storage with grid-balancing capabilities, can save money and optimize grid system performance, but so far, government regulators are not providing effective incentives. Distributed energy systems (DERs) or mini-grids—decentralized, smaller-scale generation facilities (often augmented with battery storage) permanently or temporarily delinked from the larger grid—create value in multiple ways. They can save money by postponing or displacing the construction of more expensive system upgrades such as transmission and distribution lines, substations, capacitor banks, and other grid-balancing equipment. They also relieve location-specific congestion in the distribution network, avoiding high marginal costs for electricity production needed during temporary peaks in demand. Finally, they offer environmental benefits.

New York State's Reforming the Energy Vision (REV) strategy fixes the problem of utility incentives by restructuring who gets the benefit of the financial payouts from DERs and storage. The financial benefits coming from distributed solutions are assigned equally, one-third each, to the local utility Con Edison, the DER provider, and Con Edison customers. In addition, REV has restructured utility rate-making and revenue models to earn returns from the locational value of distributed energy resources. In other words, New York is trying to create a system where deployment of DER is focused where it has the broadest value and thereby creates savings to customers across the system rather than wherever customers prefer clean energy. Typically, today's system of development—based on discrete preferences of individual investors at their location of choice—promotes the development of value only for the DER host customer, often a corporation, and runs the risk of increasing costs across the system.

An example of REV at work is the "request for solutions" for procurement and grid plan implemented by Con Edison in New York City. Rather than building a $1.2 billion substation, Con Edison selected a much cheaper mix of smaller-scale technologies to substitute for the substation. By selecting bids for solar with storage and implementing energy-efficiency projects as well as on-site heat and power systems, Con Edison was able to service rising electricity needs in a particular area of Brooklyn and Queens for 15 percent of the cost of the substation, saving money for all rate payers. Under the REV system, Con Edison shared in savings from avoided costs and received performance-based compensation for system efficiency, and was also able to lower rates to customers.

12. Geopolitics of European Energy

One example of the geopolitical implications of energy is illustrated in Europe's dependence on Russia for its natural gas supply. Russia accounts for approximately 37% of Europe's imports of natural gas, and

Europe is now considering building a new pipeline – Nord Stream 2 – that would increase the amount of natural gas imported from Russia.

Question: What are the geopolitical implications of Europe increasing its dependence on Russia for natural gas supply?

A substantial increase in dependence on Russia natural gas makes key European countries such as Germany more vulnerable to geopolitical pressure from Moscow and gives the Kremlin leverage to try to influence domestic politicians, foreign policy and other national policies.

Question: As the United States continues to invest in energy R&D to drive down the costs of alternative energy sources, how can the United States help regions around the world diversify their energy supply to make them less dependent on single countries or single sources of energy?

It is a win-win for the United States to develop commercially viable energy technologies that help countries diversity their energy supply. Successful R & D not only creates opportunity for American export products but also reduces the leverage that energy suppliers have to try to influence foreign policies of import dependent countries. The rising use of renewable energy has played a major role in reducing overall European demand for Russian natural gas and increased energy price competition. Increased access to liquefied natural gas from the U.S. and other exporters also plays a similar role in diversifying Europe's dependence on Russian energy.

Question: What else can be done to decrease the Europe's dependence on Russia for the supply of natural gas?

Encourage the development of LNG receiving terminals and pipeline projects to allow more supplies to come from diverse sources.

13. LNG Exports

The natural gas market has transformed radically in the past ten years. Today, instead of a growing liquefied natural gas (LNG) importation market, the United States is a growing LNG exporter.

Question: What steps can the United States take to create stable LNG markets abroad?

The United States should work to depoliticize natural gas export markets and take care to let market forces drive sustainable U.S. sales. Trying to couple U.S. LNG exports to larger China trade negotiations has accidentally inhibited U.S. LNG sales, not promoted them.

Question: How should our future LNG exports be used to further the national interest and create a more stable energy future for our country?

Some of the growth in the LNG market comes from the Utica and Marcellus formations, which could be served by a connection to American allies in Europe.

Question: Please comment on the possibility of using the St. Lawrence Seaway, as a fast connection point to Europe for the sale of LNG.

Private industry is not considering this routing at this time.

[i]. Matt Rogers, "Advanced Manufacturing" (PowerPoint presentation, Transition by Design: The Tech-Enabled Future Roundtable, Council on Foreign Relations, New York, NY, October 2017).

[ii]. Local Motors, "World's First 3D-printed Car Takes Inaugural Drive," news release, September 23, 2014, http://localmotors.com /press-release/worlds-first-3d-printed-car-takes-inaugural-drive.

[iii]. Divergent 3D (website), http://divergent3d.com.

[iv] G Saur and A Milbrandt (2014) Renewable Hydrogen Potential from biogas in the United States. National Renewable Energy Laboratory. Technical Report NREL TP-5400-60283. July 2014

QUESTIONS FOR THE RECORD
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
U.S. HOUSE COMMITTEE ON APPROPRIATIONS

Hearing on Energy Trends and Outlook
Thursday, February 7, 2019

GENERAL

1. Top R&D Priorities

Question: In your opinion, what are the top priorities or most effective areas to invest in energy innovation?

Because EIA models energy balances in a larger economic context into the future, our focus is on more established technologies currently being deployed rather than assessing the potential of early stage energy technology investment.

2. Technology Areas and Research Needs

Question: For areas where you would like to comment, please elaborate on the near- and long-term technology potential, barriers to development, and research needs for any of the following technology areas: renewable energy; energy storage; crude oil and petroleum products; natural gas; nuclear energy; coal; carbon capture, utilization, and storage; energy efficiency; transportation; or cybersecurity.

EIA cannot address this question because EIA has not analyzed or collected data on technology potential, analysis of barriers to development and research needs in any of the these areas listed. However, documentation of EIA's cost assessments for electric generating technologies entering service over roughly the next decade as represented in the National Energy Modeling

System used in EIA's Annual Energy Outlook 2019 Reference case can be found at https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf.

3. Stable R&D Funding

We often hear about the necessity of stable and predictable funding for energy research and development.

Question: Can you please elaborate on why that's important for researchers and private sector?

EIA has not conducted any studies related to historical funding for energy research and development or its effects on deployment of energy technologies.

4. Energy in Housing

Question: Relating to the future of housing and energy systems, where are path-breaking efforts being made?

EIA has not conducted an analysis of path-breaking efforts in future housing and energy systems, and is unable to comment.

Question: What can be learned from previous efforts?

EIA has not conducted an analysis of path-breaking efforts in future housing and energy systems, and is unable to comment.

5. Energy-Intensive Industries

Question: How can the United States incorporate new energy technologies and energy efficiency into energy-intensive industries, such as vehicle production, steel production, and defense-related production?

EIA has not conducted an analysis of the role of new technologies in energy-intensive industries, and is unable to comment.

Question: What are some examples of this in the past?

EIA has not conducted an analysis of the role of new technologies in energy-intensive industries, and is unable to comment.

6. Water Treatment

Question: How can the United States incorporate new energy technologies and energy efficiency into water treatment and sewage treatment?

EIA has not conducted an analysis of the role of new technologies and energy efficiency into water and sewage treatment, and is unable to comment.

Question: What can be learned from previous examples of energy changes in water treatment?

EIA has not conducted an analysis of the role of new technologies and energy efficiency into water and sewage treatment, and is unable to comment.

7. Landfill Methane

Question: How can the United States incorporate new energy technologies to address methane leakage from landfills?

EIA has not conducted an analysis of the role of new technologies into methane leakage from landfills, and is unable to comment.

Question: What should be the role of the Department of Energy for addressing methane leakage from landfills?

EIA has not conducted any analysis of the effects of policy on methane leakage from landfills, and is unable to comment.

8. Hydrogen Technologies

Question: What are the potential technology applications and cost-effectiveness of hydrogen technologies?

EIA has not conducted an analysis of the potential technology applications and cost-effectiveness of hydrogen technologies, and is unable to comment.

9. Nuclear Cost Competitiveness

Question: What actions have been taken or can be taken to maintain the cost competitiveness and vitality of the current fleet of nuclear power plants for their life expectancy?

Since 2013, six nuclear power plants retired prior to the expiration of their operating licenses and nine more plants are scheduled to retire by 2025. Four recently-retired nuclear power plants, Kewaunee in Wisconsin (2013), Vermont Yankee in Vermont (2014), Fort Calhoun in Nebraska (2016), and Oyster Creek in New Jersey (2018), cited market conditions as the primary cause for permanent shutdowns. For Oyster Creek, state policy implementation of environmental regulations would have required cooling towers to be built, a large capital investment. Entergy, the owner of the Indian Point nuclear plant in New York, scheduled to close in 2020 and 2021, also cited state policy requiring cooling towers as an expense that would affect the ongoing commercial viability of the plant.

Some nuclear plant owners have sought price support from their state governments. As a result, several states have responded with different forms of support. Specifically, Illinois (in 2016) and New York (in 2017) began providing long-term (over 10-12 years) price support, in the form of Zero Emission Credits (ZECs). After this state-level price support commitment was made, the Quad Cities and Clinton nuclear plants in Illinois, and the Fitzpatrick, R.E. Ginna, and Nine Mile Point nuclear plants in New York reversed their decisions to shut down. Connecticut amended its solicitation process for zero-carbon electricity-generating resources in 2017 to include nuclear capacity as an eligible resource. The 2018 solicitation process resulted in the selection of bids from the Millstone nuclear plant and New Hampshire's Seabrook nuclear plant,

along with other zero-carbon resources, to meet 45% of the state's electricity demand. In 2018, New Jersey enacted a law that includes a ZEC program to provide subsidies for its two operating nuclear plants – Salem and Hope Creek. All of the state ZEC programs require plant owners to demonstrate the need for price support. Nuclear plants in Ohio (Davis-Besse and Perry) and Pennsylvania (Beaver Valley, Limerick, Peach Bottom, Susquehanna, and Three Mile Island) are also claiming that they are impacted by unprofitable market conditions and are currently seeking state support. The owners of Davis-Besse, Perry, Beaver Valley, and Three Mile Island have indicated that without support the retirement of those plants is likely.

The Federal Energy Regulatory Commission (FERC) has open dockets to address the pricing of factors such as resilience and fuel security, but the timing for those decisions is uncertain; and, it is unclear at this point what actions may emerge and the extent to which any such action results in additional revenue support for nuclear generating plants.

There are efforts underway to reduce nuclear plant operating costs. In 2016, the Nuclear Energy Institute and the operators of America's nuclear energy facilities partnered on a multiyear strategy to reduce operating costs. This effort to "Deliver the Nuclear Promise" developed 67 efficiency bulletins that describe plant operations, management, and logistical improvements that are designed to lower costs and improve overall industry performance.1 These bulletins are specific efficiency recommendations to nuclear plant operators. As a result of this initiative, NEI estimates that operating costs have been reduced by 19% since 2012.2

[1] https://www.nei.org/resources/delivering-the-nuclear-promise

[2] https://www.nei.org/resources/delivering-the-nuclear-promise/forward-strategy

Policy questions about preserving the future vitality of the nation's nuclear fleet would be best answered by the Office of Nuclear Energy.

10. Compact Plasma Systems

Question: For compact plasma systems, what is your opinion on the ability and timing of deployment?

EIA has not conducted an analysis of compact plasma systems, and is unable to comment.

Question: Where do they sit on the development curve for future energy systems?

EIA has not conducted an analysis of compact plasma systems, and is unable to comment.

11. Regional Power Differences and Competitiveness

Question: Please elaborate on the key differences in power production facilities in different regions of the country.

The power generation mix can vary widely by region; but, if we look at coal, hydroelectricity, natural gas, nuclear, solar, and wind, we can generalize that:

- Natural gas has the largest share of generation in the New England, South Atlantic, and West South Central Census Divisions.
- Coal has the largest share in the East North Central, West North Central, and Mountain Census Divisions.
- Hydroelectricity has the largest share in the Pacific Contiguous Census Division.
- Natural gas and nuclear share prominence in the Middle Atlantic and East South Central.

Question: How does that affect rates for consumers, particularly industrial consumers, in those regions?

EIA does not observe a strong enough correlation between industrial electricity rates and regional power generation sources to generalize upon how rates are affected by regional power generation mix.

Question: How do electricity rates for consumers affect manufacturing competiveness?

EIA has not conducted an analysis of the effect of electricity rates on manufacturing competitiveness, and s unable to comment.

Question: How can regions increase their competitiveness if they do not benefit from lower electricity rates resulting for abundant natural resources like hydropower?

EIA has not conducted an analysis of the effect of regional differences in electricity rates and their effect on competitiveness, and is unable to comment.

12. Geopolitics of European Energy

One example of the geopolitical implications of energy is illustrated in Europe's dependence on Russia for its natural gas supply. Russia accounts for approximately 37% of Europe's imports of natural gas, and Europe is now considering building a new pipeline – Nord Stream 2 – that would increase the amount of natural gas imported from Russia.

Question: What are the geopolitical implications of Europe increasing its dependence on Russia for natural gas supply?

From EIA's Country Analysis Brief on Russia: In 2016, almost 90% of Russia's 7.5 trillion cubic feet (Tcf) of natural gas exports were delivered to customers in Europe via pipeline, with Germany, Turkey, Italy, Belarus, and the United Kingdom receiving the bulk of these volumes. In 2013, Ukraine was Russia's third-largest importer of natural gas, importing 0.8 Tcf from Russia. In 2016, Ukraine imported a total of 0.4 Tcf of natural gas, none of which was purchased from Russia. Because of a pricing and payments dispute and as part of the wider tensions between the two countries, Ukraine has decreased the volume of natural gas it buys

from Russia and increased the natural gas it buys from its western neighbors. However, Ukraine still acts as a transit country for deliveries of pipeline natural gas from Russia to Western Europe, and much of the natural gas Ukraine buys from Western Europe physically originates in Russia.

Revenues from natural gas exports in 2015 accounted for about 13% of Russia's total export revenues. While not as large as Russia's export earnings from crude oil and other liquids, Russia still depends on Europe as a market for its natural gas. Europe, likewise, is dependent on Russia for its supply of natural gas. In 2015 and 2016, natural gas imports from Russia accounted for about one-third of natural gas consumed in the Organization for Economic Co-operation and Development (OECD) Europe. Additionally, some countries within Europe, especially Finland, the Baltics, and much of Southeast Europe, receive almost all of their natural gas from Russia.

Since the mid-2000s, natural gas consumption in OECD Europe has generally been flat to declining, prompting Russia to look to Asia and liquefied natural gas (LNG) as a means to diversify its natural gas exports. U.S. and European Union (EU) sanctions, implemented in 2014, accelerated Russia's pivot to the east, with Russia signing two pipeline deals with China in 2014 covering exports that could eventually reach 2.4 Tcf per year. (*Country Analysis Brief: Russia*, EIA)

Question: As the United States continues to invest in energy R&D to drive down the costs of alternative energy sources, how can the United States help regions around the world diversify their energy supply to make them less dependent on single countries or single sources of energy?

EIA has not conducted an analysis of the effect of diversification of energy sources, and is unable to comment. This policy-related question is outside of EIA's scope.

Question: What else can be done to decrease the Europe's dependence on Russia for the supply of natural gas?

EIA has not conducted an analysis of Europe's dependence on Russia for the supply of natural gas, and is unable to comment. This policy-related question is outside of EIA's scope.

13. LNG Exports

The natural gas market has transformed radically in the past ten years. Today, instead of a growing liquefied natural gas (LNG) importation market, the United States is a growing LNG exporter.

Question: What steps can the United States take to create stable LNG markets abroad?

EIA has not conducted an analysis of the stability of international LNG markets abroad, and is unable to comment. This policy-related question is outside of EIA's scope.

Question: How should our future LNG exports be used to further the national interest and create a more stable energy future for our country?

EIA forecasts substantial increases in future LNG exports from the United States in its Annual Energy Outlook 2019 under the assumption of no changes to current policy. However, this policy-related question is outside of EIA's scope.

Much of the growth in the LNG market comes from the Utica and Marcellus formations, which could be served by a connection to American allies in Europe.

Question: Please comment on the possibility of using the St. Lawrence Seaway, as a fast connection point to Europe for the sale of LNG.

EIA has not conducted an analysis of the possibility of using the St. Lawrence Seaway as a fast connection point to Europe for the sale of LNG, and is unable to comment.

WEDNESDAY, FEBRUARY 13, 2019.

OVERSIGHT OF DEPARTMENT OF ENERGY'S WEATHERIZATION ASSISTANCE PROGRAM

WITNESSES

ANNAMARIA GARCIA, DIRECTOR, WEATHERIZATION AND INTERGOVERNMENTAL PROGRAMS OFFICE, U.S. DEPARTMENT OF ENERGY

AMY KLUSMEIER, DIRECTOR, WEATHERIZATION ASSISTANCE PROGRAM, NATIONAL ASSOCIATION FOR STATE COMMUNITY SERVICES PROGRAMS

MICHAEL FURZE, ASSISTANT DIRECTOR, ENERGY DIVISION, DEPARTMENT OF COMMERCE, WASHINGTON STATE

TERRY JACOBS, DIRECTOR, HOUSING AND ENERGY, GREAT LAKES COMMUNITY ACTION PARTNERSHIP

Ms. KAPTUR. The committee will come to order. And we want to welcome all of our guests to our second hearing of the new Congress. Thank you all for coming. I want to especially thank all the witnesses here today. We appreciate your understanding and flexibility in rescheduling this hearing due to weather.

Last week, our hearing focused on energy trends and future outlook. It offered a 30,000 foot perspective of our country's past, present, and future relating to our energy needs. And this week, we will do the opposite. We will do a deep dive into one specific program at the Department of Energy to which you have devoted to your lives and you have been hard at work and I am quoting one of my constituents here, B–T–Utifying America for over 4 decades. And I know I will have to spell that for the individual who is taking a record of this meeting.

DOE's weatherization program has a direct, positive impact on the lives and pocketbooks of every day Americans, particularly elderly and low-income Americans spanning all 50 states, U.S. territories, and Native-American tribes.

Just 2 weeks ago, it was colder in the Midwest than on the surface of Mars or throughout the Arctic. We are putting up some headlines from different places in the country now. Tucson, one of my friends called me last year, he goes, Marcy, it is 120 degrees out here.

The data is clear. According to the CDC, weather-related death rates were 2 to 7 times as high in low-income counties as in high income counties. Additionally, poor households rely on alternative temperature regulating devices such as space heaters, which according to the National Fire Protection Association caused about one-third of all winter house fires and 80 percent of all winter fire deaths.

This goes to show how crucial DOE's weatherization dollars are in ensuring low-income energy insecure families can protect themselves, their homes, and mobile homes from the elements.

This program was created after the 1973 oil crisis when the price of oil quadrupled in our country from $3 a barrel to nearly $12, causing severe disruptions from coast to coast.

Low income individuals, particularly in cold weather states who relying on oil to keep warm, suffered greatly. The weatherization program for millions has been a lifesaver, truly. Since its first appropriation in 1977, the weatherization program has made millions of homes energy efficient, resulting in an average of $283 in annual energy cost savings per weatherized unit.

Back then, it was estimated that over a 20-year lifetime the program would save the equivalent of 12 million barrels of oil. Because investments in weatherization pay off, it is a tragedy that this administration continually targets this program for cuts.

For each of the last Fiscal Years, this administration has proposed to zero out this important program. And sadly, I expect the forthcoming budget to, again, likely propose to eliminate this program.

In 1983, the program received the equivalent of $473 million based on 2010 dollars. That was in 1983, Ronald Reagan was president then. Since then, this program has been on a downward curve in terms of funding. This Fiscal Year, look at that, if you had to manage a business that had that kind of according ledger, over time it has had a downward curve in terms of funding, and this Fiscal Year the program received only $266 million which is half as much in real dollars has happened in the 1980s.

Despite these funding challenges, to date, $7.4 million units have been weatherized averaging about 110,000 units per year according to the statistics I have. So, I want to thank all of you here today for devoting a major part of your lives to helping build America forward where it matters most.

We will hear today from Terry Jacobs of the Great Lakes Community Action Partnership in Toledo, Ohio. He can attest to the many benefits to this program across Ohio that I just emerged from or we just emerged from a major ice storm.

We will also hear from Michael Furze from the Washington State Department of Commerce who will speak to the health benefits of weatherizing homes, another example of how this program saves lives.

Annamaria Garcia from the Department of Energy will give us some background in history. In looking at this history, it takes me back to my service in the Carter administration where I worked on housing and neighborhood revitalization efforts.

The weatherization program was still new at that time, but it has become clear that weatherization is a significant energy conservation tool in a toolbox with unrealized potential that can be used to help lift struggling families and neighborhoods out of poverty by a focus on the cost of energy.

As successful as this program has been, there is always room for improvement and innovation. Amy Klusmeier from the National Association for State Community Services Programs actually began her career on a weatherization crew, and Amy will talk about what happens at the ground level, in fact, at all levels, and how the program can be improved and made more impactful.

Finally, we will have upcoming, we think, an infrastructure bill in this Congress and I believe that this program of weatherization should be one essential element as we work together on a Build America Forward agenda.

I want to thank you our witnesses again for their testimony today and we look forward to hearing from you. And I would like now to turn to our ranking member, dutiful member, Mr. Simpson for any opening remarks.

Mr. SIMPSON. Thank you, Chairwoman Kaptur. I would like to join you in welcoming our witnesses here today for today's hearing. We thank you all for being here this morning and especially for being willing to adjust your schedule last week when we had to reschedule our hearing.

I look forward to hearing about your experience with the Department of Energy's Weatherization Assistance Program. The purpose of the Weatherization Assistance Program is to reduce energy cost for low-income households by increasing the energy efficiency of their homes. In addition to the direct benefits to the household's budget, these weatherization improvements often also result in better health and safety for the individuals and families within the household.

These benefits have impacts beyond individual households to broader communities as well as particularly when we look at the program as a whole. So while the Weatherization Assistance Program represents a relatively small portion of the DOE's overall annual budget, it provides important services across the country.

I thank Chairwoman Kaptur for calling this hearing and I look forward to hearing from our witnesses about the successes of the program as well as any continued improvements that can be made in the program, and I have to tell you, at 10:45 I have to step out for just a minute. So when I step out I am just stepping out because I have a conference call I have to do, and then I will be back in, so thank you.

Ms. KAPTUR. Thank you very much. Thank you very much Ranking Member Simpson. We know how dedicated you are, so good luck on that.

We want to thank you and I am very excited for our witnesses joining us today. Let me just tell you a bit of each of them.

First we will have as I mentioned, Ms. Annamaria Garcia, who is the director of the Weatherization in Intergovernmental Program Office at the Department of Energy. Prior to this appointment, Ms. Garcia was the executive director of the Ozone Transport Commission and also served as director of Operations and State Programs for the Center for Energy and Climate Solutions.

Next, we will have Ms. Amy Klusmeier who is the Weatherization Assistance Program director at the National Association of State Community Services Programs. Ms. Klusmeier began her weatherization career as a field worker in south central Wisconsin and later served as the lead weatherization program analyst for the State of Wisconsin, and I know Congressman Pocan will be very interested in your testimony, as will we all.

Following that, we will have Mr. Michael Furze who is the assistant director of the Energy Division at Washington State's Department of Commerce. And prior to this role, Mr. Furze held a variety

of other duties within Washington State's Department of Commerce and also served as a weatherization manager in New Mexico. And I know how strongly Congressman Kilmer advocates for Washington State here. Take my word for it.

And last but not least, we will have Mr. Terry Jacobs, who is the housing and energy director at the Great Lakes Community Action Partnership in Toledo, Ohio. Mr. Jacobs has worked on weatherization at the local level for over 12 years.

Thank you all for taking time to be here today, and without objection, your written statements will be entered into the record, and please feel free to summarize your remarks in about 5 minutes each, starting with Ms. Garcia.

Ms. GARCIA. Chairwoman Kaptur, Ranking Member Simpson and members of the subcommittee, thank you for the opportunity to testify today on behalf of the Department of Energy's Weatherization Assistance Program known as WAP.

As director of the Weatherization and Intergovernmental Programs Office, I oversee DOE's WAP, the nation's largest residential energy efficiency program. The mission of WAP is to increase the energy efficiency of dwellings owned or occupied by low-income persons, reduce their total residential energy expenditures, and improve their health and safety.

WAP residential retrofits reduce the cost of low-income household energy bills. These households are often on fixed incomes or rely on income assistance programs and are most vulnerable to volatile changes in energy markets.

DOE provides core funding to weatherization grantees in all 50 states, the District of Columbia, one Native-American tribe and the five U.S. territories through formula grants.

The program has two parts, allocating the funds, and producing the weatherized homes. Could I have the first slide please? That is not the first slide. This chart, which is a little hard to see, depicts the funding and production of weatherized homes from 2000 to 2018. The colored bars show the number of homes weatherized; blue for homes done with regular annual appropriations and green for homes done with Recovery Act dollars.

DOE WAP Appropriations are shown by the dashed lines ending in the black circles and labeled with the dollar amounts. The $5 billion in 2009 Recovery Act appropriations is not included, so as not to skew the scale.

The other side of the chart lists the average per home expenditure limit that applies to the DOE dollars. Prior to 2009, those limits did not exceed 3,000 per home. A statutory change raised the limit to 6,500 per home adjusted annually by the consumer price index for the preceding 12 months or 3 percent, whichever is less.

In years where you see no change, the applicable CPI was negative or zero. The expenditure limit explains the decreasing production numbers in the blue bars after 2009. The increased limit has allowed greater investment per home and energy efficiency upgrades, incidental repairs, and health and safety measures.

DOE has consistently ensured funds are available for grantees in time for their program cycle, either through partial obligations or the full allocations. In recent years, no grantee has had to stop work due to lack of DOE funding. Thus, grantees have been able

to upgrade homes in accordance with their state plan. Grantees provide funding to approximately 700 local governmental and nonprofit entities known as sub-grantees such as community action agencies and others to deliver services.

Typical energy conservation measures include installing insulation, ceiling ducts, repairing or replacing heating and cooling systems, reducing air infiltration, improving hot water production and use, and reducing electricity consumption. Grantees use both federal and nonfederal funding sources to expand the array of services for each home and increase the number of homes weatherized.

A retrospective evaluation released by the Oak Ridge National Laboratory in 2014 found the average total investment per home in 2008 from all funding sources, not just DOE, was $4,695. Could I have the other slide please?

This next chart illustrates the savings from that investment, $283 in average annual energy cost savings per home, or 12 percent of the average pre-weatherization bill. It also shows the portion of DOE funding grantees use for energy efficiency upgrades and health and safety investment as compared to what they use for administration of their programs and for training and technical assistance.

WAP focuses not only on delivering weatherized homes, but also on ensuring quality work is performed. DOE has supported the grantees through these key improvements, creation and maintenance of the standard work specifications that define how a home should be weatherized. Accreditation and support of 22 weatherization training centers, and development of worker credentialing standards through a consensus process with industry overseen by a private sector entity.

DOE has also initiated deeper dialogue with grantees and subgrantees through the American Customer Satisfaction Index. Specific improvements include a new process to provide grantees with a comprehensive overview of the changes or new requirements from the previous year's application; a simplified budget process through upgrades to the performance and accountability for grants in energy or PAGE data system; and new planning and reporting templates for training and technical assistance and monitoring activities.

Results are evidence in the feedback and the quality that DOE project officers observe through desk and field monitoring. For example, customer service has been improved through providing ongoing support to WAP grantees during their grant application development, instituting a more consistent monitoring process and timeframes for communications.

Improvements have also occurred through 14 DOE-developed WAP trainings provided over the last year and a half to help grantees with tools and processes for running more efficient programs.

In 2019, the program is exploring how to reduce the number of homes that are deferred or not qualified for services due to structural issues and conditions. DOE is also examining concerns with weatherizing homes that have vermiculite insulation in attics and identifying best practices for providing services to these homes.

My office looks forward to continuing to identify areas where we can strengthen our program and provide assurance for the Amer-

ican taxpayer investment. Thank you again for the opportunity to speak to this important program and I would be happy to answer any questions.

[The information follows:]

Testimony of

Annamaria Garcia

Director, Office of Weatherization and Intergovernmental Program
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Before the

House Appropriations Subcommittee on Energy and Water Development
United States House of Representatives

February 12, 2019

Introduction

Chairwoman Kaptur, Ranking Member Simpson and Members of the Subcommittee, thank you for the opportunity to testify today on behalf of the Department of Energy's (DOE) Weatherization Assistance Program (WAP).

As Director of the Office of Weatherization and Intergovernmental Program within the Office of Energy Efficiency and Renewable Energy, I am responsible for overseeing DOE's Weatherization Assistance Program (WAP)—the nation's largest residential energy efficiency program. DOE is focused on ensuring that the WAP is implemented consistent with statute to increase the energy efficiency of dwellings owned or occupied by low-income persons, reduce their total residential energy expenditures, and improve their health and safety.

Through retrofitting residential buildings, WAP activities work to reduce the cost of low-income household energy bills. Low-income households carry a larger burden for energy costs, typically spending 16.3% of their total annual income versus 3.5% for other households (Weatherization Assistance Program Technical Memorandum Background Data and Statistics on Low Income Energy Use and Burdens, Oak Ridge National Laboratory, 2014).[1] Up to 40 million low-income households in the U.S. are eligible for low-income housing energy assistance. These low-income households are often on fixed incomes or rely on income assistance programs and are most vulnerable to the volatile changes in energy markets.

The WAP formula grants provide resources for home retrofits that are intended to result in annual energy and bill savings for low-income households over the 20-year life of the measures installed. This allows eligible low-income families to use retrofit-enabled energy cost savings to purchase other essentials (like food, medicine, etc.). Since 1976, WAP has performed over 7 million upgrades to low-income households.

Overview of the Weatherization Assistance Program

DOE provides core funding to **Weatherization grantees** in all 50 states, the District of Columbia, one Native American Tribe, and the five U.S. territories—American Samoa, Guam, Commonwealth of the Northern Mariana Islands, Puerto Rico and the U.S. Virgin Islands—through formula grants. The fundamental mechanics of the WAP is made up of two parts: allocating the funds and producing weatherized homes. DOE has consistently ensured that funds be available to grantees in time for their program cycle—either through partial obligations at intervals under a Continuing Resolution until full appropriations are made or through full allocations of appropriations as is occurring in 2019. In recent years, no grantee has been forced to stop work due to lack of DOE funding. As a result, grantees have been able to weatherize homes, without interruption, in accordance with their State Plan. DOE recognizes every grantee has a set of unique circumstances within which to work and therefore DOE provides some flexibility to the grantee.

[1] https://weatherization.ornl.gov/wp-content/uploads/pdf/2011_2015/ORNLTM2014_133.pdf

The DOE allocates WAP funds on a statutory formula basis[2] and awards grants to a single agency within each State, Washington, DC, a Native American Tribe and the five U.S. territories. DOE provides flexibility to WAP grantees to start their local programs when it is best for their internal structure, such as aligning with their fiscal year. The majority of states follow a July 1 - June 30 fiscal year, while the U.S. territories follow the federal fiscal year (October 1 - September 30). There are 14 Grantees that have selected April 1 as their Program Year start date; the remainder use July 1. DOE initiates work on the WAP Grant Guidance package in May of the year preceding the next year of appropriations.

For example, work on the WAP guidance to distribute FY 2019 appropriations began in May 2018. When Congress appropriates funding for the program, DOE calculates the formula allocations and finalizes the guidance package. Releasing the guidance in December allows sufficient time for distribution of funds to the earliest (April 1) recipients. This provides the time needed for DOE to review the guidance with the grantees, and for the grantees to prepare their applications, hold public hearings (required in most, if not all, jurisdictions), and to submit them to DOE in time for technical and procurement reviews to be performed, process the awards, and set up the accounts that grantees use to draw down the funding. DOE has consistently delivered funds to WAP grantees by their Program Year start dates, even under a Continuing Resolution (where partial awards are made).

Grantees draw down funding from their accounts as they conduct their programs. Funding is used to increase the energy efficiency of homes occupied by families with household incomes of 200 percent or less of the poverty guidelines updated periodically in the Federal Register by the U.S. Department of Health and Human Services under the authority of 42 U.S.C. 9902(2). These agencies (grantees), in turn, subgrant funding to approximately 700 local governmental and nonprofit agencies (collectively known as subgrantees) such as Community Action Agencies and other entities that secure grantees' contracts through competitive grantee procurement processes. The subgrantees provide jobs and deliver the weatherization services to low-income families in every geographic area of the country. Congressional appropriations from 2015 through 2018 ranged from $188.8 million to $247.5 million, with production of nearly 35,000 weatherized homes on average per year over this period, averaging between $5,400 and $7,000 per home.

Weatherization service providers are expected to choose the best package of efficiency measures for each home based on a comprehensive energy audit. All Energy Conservation Measures (ECMs) must have a Savings to Investment Ratio (SIR) of 1.0 or greater, per 10 CFR 440.21 (d). Professionally trained local weatherization crews use computerized energy audits and advanced diagnostic equipment, such as blower doors, manometers, and infrared cameras to create a comprehensive analysis of the home. This audit determines the most cost-effective weatherization and energy efficiency measures appropriate; and identifies any health and safety concerns, such as carbon monoxide and ensures adequate indoor air quality by testing existing ventilation systems.

[2] Allocations are determined using two different formulas, depending on the amount of the appropriation. If the appropriation is at least $209,724,761, allocations are provided as described in 10 CFR 440.10(b). If the appropriation is below this threshold, allocations are reduced according to the guidance in 10 CFR 440.10(c). Each grantee's allocation is reduced from the amount it would be allocated by the same percentage as the total program allocations for the fiscal year if appropriations fall below $209,724,761.

Once a customized work order is created, the trained crews install the identified energy efficient and health and safety measures. Typical energy conservation measures include installing insulation, sealing ducts, repairing or replacing heating and cooling systems, reducing air infiltration, improving hot water production and use, and reducing electricity consumption. When completed, a certified Quality Control Inspector (QCI) ensures all work was installed correctly and that the home is safe for the occupants.

DOE recognizes the pace for meeting grantee production goals are often subject to local prioritization. Active Federal, regional and state training and technical assistance programs ensure the consistent delivery of quality services. The program uses both Federal and non-Federal funding sources to expand the array of services available for each home and increase the number of homes weatherized. The average total investment per home is $4,695 from the 2008 Retrospective Evaluation (Weatherization Works – Summary of Findings from the Retrospective Evaluation of the U.S. Department of Energy's Weatherization Assistance Program),[3] which is line with the preliminary 2017 average cost of $4,570.[4]

DOE's Weatherization Assistance Program also includes funding for Training and Technical Assistance (T&TA) activities that improve program effectiveness, service delivery, resource accountability, and operational efficiency. DOE WAP T&TA funding provides resources for the development and dissemination of changes that enable continuous improvement of the program's operation across the country. T&TA activities include conducting strategic planning and analysis; defining program performance measurements and facilitating advanced techniques and collaborative approaches through pilot programs, publications, training programs, workshops and peer exchanges.

These funds also allow for the development and execution of research projects to improve the quality of services and enhancement of benefits to low-income WAP recipients through identifying areas of program operation that could be improved through the development of best practices or further investigation. DOE coordinates these efforts with partner federal agencies to ensure that this research is, where possible, applicable to a wide range of programs. Learnings from research and replicable models curated from local network agencies can be delivered more broadly to grantees and local agencies periodically to ensure continuous improvement of DOE's WAP.

Program Impacts

In FY 2015, DOE completed a national evaluation of WAP. The evaluation periods covered included the WAP program year 2008, and the American Recovery and Reinvestment Act of 2009 (http://www.gpo.gov/fdsys/pkg/PLAW-111publ5/pdf/PLAW-111publ5.pdf). An impact analysis, completed by Oak Ridge National Laboratory[5], estimated national energy savings and program cost effectiveness, as well as non-energy benefits (e.g, reduced work absences due to

[3] https://weatherization.ornl.gov/wp-content/uploads/2018/06/WAPNationalEvaluationWxWorksv14blue8515.pdf
[4] Based on 2017 Program Year data from the DOE reporting system, Performance and Accountability for Grants in Energy (PAGE)
[5] https://weatherization.ornl.gov/wap-retrospective/

sickness, fewer hospitalizations for those with chronic health conditions, food assistance reduction, etc.), and a comprehensive process evaluation addressed program characterization, operation, training, and quality assurance. Among the program's publically released results are:

- Single-family home average annual energy cost savings of $283; and
- A program-wide savings-to-investment (SIR) ratio of 1.4.[6]
- Findings show clients were very satisfied with the program service delivery. The weatherization process—conducting audits, delivering weatherization services, and conducting final inspections—can be challenging to schedule and complicated to complete effectively. However, these high grades from the clients (90 percent or above on almost all measures) speak well of the systems that the weatherization network has put in place to deliver these services.[7]

DOE encourages WAP grantees to secure funds from multiple sources and blend those funds with DOE to enhance and expand weatherization services. Based on The National Association of State Community Service Providers (NASCSP) 2016 Funding Survey[8], 48 of 57 WAP grantees receive Low-Income Households Energy Assistance Program (LIHEAP)funds. This federal funding is transferred from LIHEAP grantees to use for weatherization purposes annually. These funding transfers totaled approximately $408 million from all grantees in Program Year (PY) 2016.

Non-federal leveraged funds may include weatherization funding from the States and resources from utilities and universal service funds. According to data provided by WAP Grantees, during Program Year 2016, 27 states utilized an estimated $236 million in leveraged funds for weatherization, in addition to the LIHEAP funding.

The funding available for Program Year 2016 totaled $859 million, including $215 million (25%) in Congressional appropriations for DOE's WAP, the $408 million (47.5%) portion of LIHEAP funds that states put toward weatherization, and the $236 million (27.5%) in other non-federal funding.

To assist in securing leveraged funds, DOE Program regulations (10 CFR 440.14(c)(6)(xiv)) permit grantees to use a percentage of their grant to undertake leveraging activities which may result in their accessing additional funding or other resources to supplement Weatherization or be used to run a parallel program.

Key Program Improvements, Innovations and Best Practices

Integrated into the production is not only the delivery of weatherized units, but ensuring the quality of work being performed on these homes meets the Program's expectations. DOE has worked in the last number of years to support the Grantees through the development and implementation of a variety of tools needed to implement work quality, training accreditation,

[6] The SIR of 1.4 is based on average energy bill savings of $4,196 over the lifetime of the measures (discounted to present value) divided by average spending of $2,846 in DOE funding for efficiency measures in homes in the ORNL Weatherization Retrospective Evaluation (2008), https://weatherization.ornl.gov/wp-content/uploads/pdf/WAPRetroEvalFinalReports/ORNL_TM-2015_13.pdf

[7] https://weatherization.ornl.gov/wp-content/uploads/pdf/WAPRetroEvalFinalReports/ORNL_TM-2014_335.pdf

[8] https://nascsp.org/wp-content/uploads/2018/02/nascsp-2016-wap-funding-survey-final-web-display.pdf

and worker certification, under the WAP Quality Work Plan (QWP). The elements of the QWP include:

- Creation and maintenance of the Standard Work Specifications (SWS) that define how a home is weatherized. The SWS is housed as a component of and online tool for home energy upgrades, serving as the backbone of the WAPs work quality initiatives. The tool allows grantees to develop work quality standards for their crews as well as illustrated field guides, work orders, training plans and checklists. The SWS requires regular review and updating to ensure it is current with codes, technology, and best practice for residential upgrades. The SWS online tool requires ongoing maintenance to respond to user's needs and ensure consistent functionality.
- Development of the home energy professional (HEP) certifications and their underlying resources, such as the job task analyses and certification schemes. All grantees must maintain their HEP quality control inspector certification to retain their American National Standards Institute (ANSI) accreditation. To date over 1,500 Home Energy Professional Quality Control Inspectors have obtained certification, and WAP T&TA funds continue to provide accreditation and support of 22 weatherization training centers.

In addition to the deployment of the Quality Work Plan, advancements to WAP operations include:

- Development of training resources to respond to continually evolving needs in the field, including an enhanced curriculum, updating of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 62.2 curriculum, and updating several modules related to weatherizing multi-family buildings.
- Upgrade of and enhancements to the suite of energy auditing tools for single-family buildings, mobile homes, and multi-family buildings—including moving these tools online.
- Presentation on WAP tools to various industry groups including the Better Buildings network, multifamily stakeholder groups, Federal partners, and utility industry.
- Participation in the Federal Healthy Homes Working Group and dissemination of WAP Healthy Homes training to various industry stakeholders.

WAP supports the largest and one of the most technically advanced networks of residential energy retrofit providers in the country. It plays a leadership role in strengthening the infrastructure of the residential energy retrofit market, through coordination with industry stakeholders; it develops and implements voluntary and comprehensive national certifications and standards in retrofit worker training, energy audits, and weatherization methods. For example, utility programs across the country have recognized and adopted the Home Energy Professional Certification program.

Coincident with the work on field upgrades, DOE has also initiated dialogue with the grantees and sub-grantees through the American Consumer Survey Index (ACSI). By listening to our customers, DOE has been able to improve grant application submission and grant management processes, including:

- Established a process to provide grantees a comprehensive overview of the changes or new requirements from the previous year's application.
- Upgraded the data reporting system—Performance and Accountability for Grants in Energy—to simplify the budget process.
- Created planning and reporting templates for T&TA and monitoring activities.

The results of these improvements are evidenced in the feedback and the quality the DOE Project Officers observe through desk and field monitoring. Specific examples are:

- Improved customer service through providing ongoing support to the WAP grantees during their grant application development, instituting a more consistent monitoring process and timeframes for communications.
- Improved training and resources: From September 2017 through January 2019, DOE developed 14 WAP topical trainings to educate the WAP grantees on tools and processes to help run a more efficient program.

FY 2019 Improvements

DOE is taking a closer look at the frequency and reasons that homes are deferred from receiving weatherization services. In FY 2019 the Program is exploring how to increase the housing stock that DOE can provide weatherization services to and reduce the number of homes that are not qualified for services per the audit of the home due to structural issues and conditions, such as roof deficiencies, moisture and mold contamination, and windows with lead paint. In addition, DOE is examining the issue of weatherizing homes that have vermiculite insulation in attics, to understand what concerns there may be in disturbing this material and identifying and piloting best practices for providing services to these homes.

Conclusion

DOE is focused on ensuring that the Weatherization Assistance Program is implemented consistent with statute to deliver more affordable energy to low income families across the country while also maintaining the highest quality standards of work and performance of measures and materials. I appreciate the opportunity to appear before this Committee to discuss the Program

Weatherization Assistance Program

DOE FY19 Funding $257M

DOE WEATHERIZATION FUNDING

- 10% ADMINISTRATIVE COSTS
- 55% ENERGY EFFICIENCY UPGRADES
- 15% HEALTH & SAFETY INVESTMENT
- 20% TRAINING & TECHNICAL ASSISTANCE COSTS



$4,695
AVERAGE WEATHERIZATION COST PER UNIT (DOE, LIHEAP, other funding)*

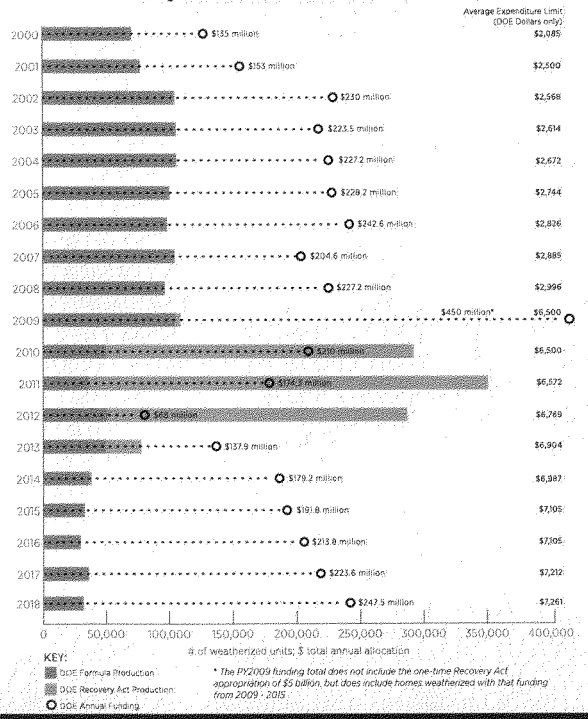
$283
ANNUAL ENERGY COST SAVINGS
(From DOE, LIHEAP, other funding invested)*

18%
ANNUAL HEATING CONSUMPTION SAVINGS

7%
ANNUAL ELECTRIC CONSUMPTION SAVINGS

**Weatherization Works – Summary of Findings from the Retrospective Evaluation of the U.S. Department of Energy's Weatherization Assistance Program.* 2014 study of 2008 program year.

The U.S. Department of Energy's Weatherization Assistance Program: Funding and Production of Weatherized Homes (2000 - 2018)



Ms. KAPTUR. Thank you so very much, Ms. Garcia.

Ms. Klusmeier.

Ms. KLUSMEIER. Good morning. Chairwoman Kaptur, Ranking Member Simpson, and members of the subcommittee, thank you for the opportunity to testify today.

I am here representing the National Association for State Community Services Programs. We are a member association of 57 weatherization grantees, all 50 U.S. states, the District of Columbia, five U.S. territories, and one Native-American tribe.

I started my career in weatherization as a crew worker in southern Wisconsin. Like most weatherization workers I learned on the job how to do the rigorous work of insulating homes and also how to perform diagnostics and use advanced tools and technologies. I later served as the lead WAP program and policy analyst for the State of Wisconsin.

The Department of Energy funding appropriated by Congress provides the foundation of the weatherization program. Each home receives a suite of measures that must have a savings to investment ratio of 1.0 or greater to ensure we are delivering cost-effective services.

With lower energy bills, families can increase their usable income and buy other essentials like food, clothing, and medicine. The energy savings impact is the core of the weatherization program.

Another critical benefit of the weatherization program is its positive effect on health and safety. An evaluation by the Oak Ridge National Laboratory found that residents of weatherized homes experienced fewer asthma, allergy, and cold symptoms, fewer missed days of work and school.

Weatherization can also prevent other life threatening situations such as carbon monoxide poisoning and fires. The State Weatherization Grantee plays a critical role in administering the program and ensuring a successful federal, state, and local partnership.

State WAP offices provide oversight with comprehensive quality assurance programs that include fiscal monitoring, administrative reviews, onsite inspections of field work, and training and technical assistance.

States and local agencies work diligently to cultivate partnerships with utilities and leverage additional funding into the program. In 2017, 29 state offices reported leveraging over $255 million in additional funding from utilities and other nonfederal sources. This funding allows for flexibility and comprehensive services while maximizing the number of households that receive weatherization services.

The State WAP Grantee is also a key driver of innovation and enhancement of the program. I will share 3 examples today. The first is Weatherization Plus Health. Washington who you will hear from in a moment and Vermont are leaders in the adoption of the Weatherization Plus Health Model.

These states are using the weatherization delivery network to incorporate additional healthy homes measures such as duct cleaning, advanced ventilation, mold abatement, accessibility improvements, and client education. Combined with basic weatherization, Weatherization Plus Health can target those with chronic health

conditions that result from in-home factors or environmental factors.

Renewable energy is a second example of innovation and weatherization. Colorado was the first state to gain DOE approval for the use of solar in weatherization. In 2016, Colorado partnered with utilities to leverage solar rebates to expand their solar photo-voltaic, and Colorado predicts that rooftop solar is projected to save clients an additional $400 per year over standard weatherization.

Finally, pre-weatherization programs are an example of using leveraged funds to maximize the number of households receiving weatherization. Occasionally, severe conditions in a home can cause a home to be deferred from receiving weatherization services because those conditions would render the materials unsafe or ineffective. For example, standing water in a basement could affect the appliances in the basement, or old electrical wiring that's covered with insulation could cause a fire hazard. States have taken the lead and designing innovative programs utilizing leveraged funding sources to make homes weatherization-ready.

In closing, I would like to underscore the critical need for continued Department of Energy funding for the Weatherization Assistance Program. NASCSP strongly supports innovation while also maintaining a robust formula allocation to ensure all states have the ability and the capacity needed to continue weatherization's record of success.

Leveraging additional resources is critical to sustaining the weatherization program at its current nationwide scale. However, without the funding, programmatic quality standards and reputation of the Department of Energy, states would have a difficult time attracting and retaining those private partners.

NASCSP supports additional funding for national program evaluation, robust data is needed to inform policy decisions to continue development of savings estimates for health and safety benefits, and to guide innovation in the program.

We look forward to continuing to work with committee members and to continue to deliver cost-effective results that make a difference in the lives of the most vulnerable in our communities. Thank you.

[The information follows:]

Organization: National Association for State Community Services Programs (NASCSP)
Appropriations Subcommittee: Energy and Water Development

Testimony of Amy Klusmeier, WAP Director, National Association for State Community Services Programs (NASCSP)

Opening

As Weatherization Director for the National Association for State Community Services Programs (NASCSP), I am pleased to submit testimony for today's hearing on the Department of Energy's (DOE) Weatherization Assistance Program (WAP). NASCSP is the member organization representing the weatherization grantees in all 50 States, DC, 1 Native American Tribe and 5 US territories on issues related to the WAP. The state offices represented by our organization would like to thank this Committee for its support of the WAP over the years.

I have been working in weatherization for over ten years, starting my career on a weatherization crew in south central Wisconsin. The WAP is a whole-house retrofit program, and as a crew person that meant climbing through every crawl space and attic to air seal and insulate. Like most WAP workers I was trained on-the-job to perform the rigorous work of insulating homes, and also to use advanced tools and technologies to diagnose home performance—WAP field workers are highly skilled building analysts. I later served as the lead WAP Program and Policy Analyst at the State of Wisconsin, working closely with our local Community Action Agencies and service providers to ensure effective and efficient delivery of the program statewide. I have witnessed firsthand the successes and achievements of the WAP, most notably its impact on America's most vulnerable households. The WAP is a proven investment in our communities, not only reducing families' energy costs, but also making homes healthier and safer while supporting job creation, workforce development and small businesses. As we head into Program Year 2019, we see numerous opportunities for continued innovation and to build on the program's record of success.

Department of Energy Funding- The Core of the Program

The Department of Energy funding appropriated by Congress has allowed over 7.4 million homes to be weatherized since the program's inception in 1976. Each home receives a site-specific suite of energy efficiency measures to be installed, such as insulation, air sealing, and high efficiency HVAC systems. DOE requires that the suite of measures installed in each home has a Savings to Investment ratio of 1.0 or greater to ensure the program is delivering cost-effective services to eligible households. By improving the energy efficiency of the home, these long-term investments save families money, month after month, year after year. With lower energy bills, families can increase their usable income and buy other essentials like food, clothing, medicine, and health care. This energy savings impact is the core of the Weatherization Assistance Program mission.

Another critical benefit of the WAP is its positive effect on the health and safety of families. In homes that are cold and drafty, or affected by mold and excess moisture, there is an increased risk of recurring illnesses. What we have learned over the years is that the non-energy benefits of weatherization result in a healthier living environment. An evaluation by the Oak Ridge National Laboratory Evaluation[1] found that residents of weatherized homes experienced fewer asthma, allergy, and cold symptoms, as well as fewer missed days of work and school. Weatherization mitigates factors that can trigger an asthma attack, resulting in fewer emergency room visits and hospitalizations. WAP measures can also prevent other life-threatening events such as carbon monoxide poisoning and fires from unsafe heating sources. These outcomes pay off — every weatherization dollar spent returns $2.78 in non-energy benefits[2]. The Oak Ridge Evaluation found that families reported decreased out of-pocket medical expenses by an average of $514 and the total health and household-related benefits for each unit is estimated to be $14,148.

Additionally, incredible need for residential energy efficiency remains. Our nation's housing stock is aging and inefficient, with at least 50% of homes built before 1970 and a median home age of 37 years[3]. According to the Energy Information Administration[4], 37 million American homes are energy insecure. 25.3 million homes reported reducing or forgoing food or medicine to pay energy costs and 12.8 million homes reported leaving home at unhealthy temperature. 6.1 million homes reported being unable to use heating equipment, 6.9 million reported being unable to use cooling equipment.

State Role- Oversight, Leveraging, and Workforce Development

The State WAP Grantee plays a critical role in administering the program and ensuring a successful federal, state, and local partnership. To ensure timely and appropriate use of tax payer dollars, state WAP offices provide oversight with comprehensive quality assurance programs that include fiscal monitoring, administrative reviews, on-site inspections of field work and training and technical assistance. Certified local agency staff inspect all units weatherized with DOE funds to verify homes receive the highest quality weatherization services. The state grantee monitors at least 5% of these units to provide an additional layer of assurance.

States also work diligently to cultivate partnerships with utilities and leverage additional funding into the program. In 2017, 29 state WAP offices reported leveraging over $255 million in additional funding from utilities and other non-federal sources. This funding allows for greater flexibility and comprehensive services, while maximizing the number of households served by

[1] Oak Ridge National Lab, "Health and Household-Related Benefits Attributable to the Weatherization Assistance Program", 2014. https://weatherization.ornl.gov/Retrospectivepdfs/ORNL_TM-2014_345.pdf

[2] Oak Ridge National Lab, "Weatherization Works - Summary of Findings from the Retrospective Evaluation of the U.S. Department of Energy's Weatherization Assistance Program", 2014. https://weatherization.ornl.gov/Retrospectivepdfs/ORNL_TM-2014_338.pdf

[3] National Association of Home Builders, "Eye on Housing", 2018. http://eyeonhousing.org/2018/08/half-of-us-homes-built-before-1980/

[4] US Energy Information Administration, "Residential Energy Consumption Survey", 2015. https://www.eia.gov/consumption/residential/data/2015/hc/php/hc11.1.php

weatherization. State WAP offices also manage other federal programs such as the Low-Income Home Energy Assistance Program (LIHEAP) and the State Energy Program (SEP), creating numerous opportunities for collaboration and integration. For example, U.S. Department of Health and Human Services (HHS) regulations allow 15% of a state's LIHEAP funds to be transferred to WAP. LIHEAP funds used for weatherization are subject to rules specified by States in their LIHEAP plans approved by HHS allowing states to enhance their weatherization services.

Additionally, each state must create and implement a training and technical assistance plan to build capacity in their state network and maintain a skilled workforce that has the necessary Department of Energy certifications. The WAP provides robust workforce development in the very same communities in which it is delivering energy efficiency services. The energy efficiency work of the WAP supports at least 8,500 jobs in weatherization and thousands more across the supply chain of material suppliers, vendors, and manufacturers. These are good, living wage jobs that provide fulfilling and rewarding careers — something I can personally attest to. Additionally, because of the advanced diagnostics and technology developed in WAP, the program stands as the foundation for the home performance industry (HPI), which employs thousands of contractors who complete energy efficiency retrofits across the entire residential sector, contributing to the overall 2.25 million energy efficiency jobs nationwide[5].

Opportunities for Innovation

The State WAP grantee is also a key driver of innovation and enhancement of the WAP. There are numerous examples of States across the country building on the success of the WAP and maximizing the impact of weatherization.

- **Weatherization Plus Health**
  Washington and Vermont are leaders in the adoption of a "Weatherization plus Health model"[6]. This means that in addition to the inherent health benefits of WAP, these states are using the weatherization delivery network to incorporate additional healthy homes measures such as hard surface flooring, duct cleaning, advanced ventilation, mold abatement, accessibility improvements and more. Local WAP agencies have partnered with community health workers to provide enhanced client education on energy and health. Combined with basic weatherization measures, Weatherization Plus Health can target those with chronic health conditions that result from in-home factors.

[5] E4TheFuture, "Energy Efficiency Jobs in America", 2018. https://e4thefuture.org/2-25-million-energy-efficiency-jobs-in-u-s/

[6] Vermont Department of Health, "Weatherization + Health: Health and Climate Change Co-Benefits of Home Weatherization in Vermont", 2018.
http://www.healthvermont.gov/sites/default/files/documents/pdf/ENV_CH_WxHealthReport.pdf

- **Renewables Integrated with WAP**
  The Department of Energy released WAP Memorandum 024 in January of 2017 which specifies a path for states to incorporate solar into their WAP programs[7]. This was largely a result of the innovation of the Colorado WAP which has been leading the way on integrating solar into their WAP since 2016. Colorado WAP has also partnered with utilities to leverage solar rebates to fund and expand solar work. While there are challenges in the low-income solar space, Colorado has been successful implementing both rooftop solar and community solar. Rooftop PV clients are projected to save an additional $400 per year over standard weatherization.

- **Pre-Weatherization Programs**
  Occasionally, severe conditions in a home can cause a home to be deferred from receiving WAP services because the conditions would render the weatherization measures unsafe or ineffective. For example, standing water in a basement that affects the performance of appliances, old electrical wiring that may cause a fire hazard if covered with insulation, and major structural or roofing deficiencies that do not allow for effective installation of insulation materials. States have taken the lead with innovative "Pre-WAP" programs utilizing leveraged (non-DOE) funding sources to make homes "weatherization- ready". Pre-WAP programs are generally run by the State WAP Office or administered in partnership with another state office.

    Delaware- The program is funded by Regional Greenhouse Gas Initiative (RGGI) and administered by Delaware Sustainable Energy Utility (DESEU) in partnership with State WAP Office. Network of local providers is the same for Pre-WAP and traditional WAP. In PY 2017, Pre-WAP brought 104 deferred WAP homes back into the WAP to receive the full complement of services[8].

    Ohio- The program is funded by Low-Income Home Energy Assistance Program (LIHEAP) funds. US Department of Health and Human Services (HHS) regulations allow 15% of LIHEAP funds to be transferred to WAP (up to 25% with waiver)[9]. LIHEAP funds used for weatherization are subject to rules specified by States in their LIHEAP plans approved by HHS. Some LIHEAP waiver programs are addressing prominent reasons for deferral such as moisture/mold issues, roof damage, overall structural problems, and electrical wiring issues.

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[7] Department of Energy, "WAP Memorandum 024: The Use of Solar PV in the WAP", 2017. https://www.energy.gov/eere/wipo/downloads/wap-memorandum-024-use-solar-pv-wap

[8] Delaware Department of Natural Resources and Environmental Control, "Annual Report- Program Year 2017", 2018. http://www.dnrec.delaware.gov/energy/Documents/Weatherization/2018-wap-annual-report.pdf

[9] U.S. Department of Health and Human Services, "Weatherization Overview." https://liheapch.acf.hhs.gov/wxview.htm

Closing

In closing, I would like to underscore the critical need for continued Department of Energy funding for the Weatherization Assistance Program (WAP). NASCSP strongly supports innovation in the WAP while also maintaining a robust formula allocation to ensure all states have the capacity and resources needed to continue WAP's record of success. NASCSP encourages the committee to build on the recent funding increases provided in FY 2018 and FY 2019. Leveraging additional resources is critical to sustaining the WAP at its current nationwide scale and sustaining the WAP's current impact. However, without the funding, programmatic quality standards and reputation of the Department of Energy, States would have a difficult time attracting and retaining these private partners.

NASCSP applauds DOE's commitment to continuous improvement, especially the efforts to publish the allocations and a redline version of the annual application instructions in a timely manner. NASCSP supports additional funding for national program evaluation. Robust data is needed to inform policy decisions and to continue development of savings estimates on the impacts of non-energy benefits to guide innovation in the program.

We look forward to working with Committee members in the future to ensure the WAP continues to deliver cost effective results that support our economy and make a difference in the lives of the most vulnerable in our communities.

Thank you.

Respectfully submitted,

Amy Klusmeier

WAP Director
National Association for State Community Services Programs (NASCSP)
Contact Information: aklusmeier@nascsp.org, 202-370-3661

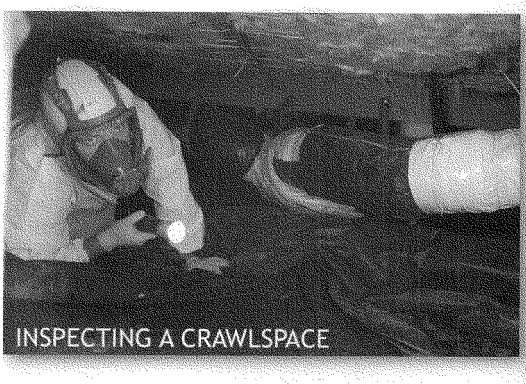
The Weatherization Assistance Program (WAP)



NASCSP

Amy Kiusmeier, Weatherization Assistance Program Director, NASCSP

U.S. House Energy and Water Development Appropriations Subcommittee | February 2019



INSPECTING A CRAWLSPACE

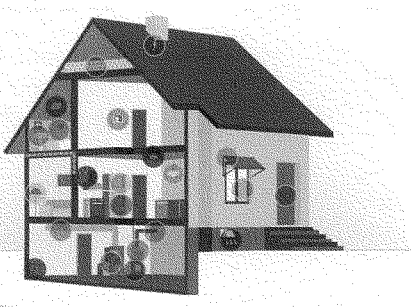


BUILDING DIAGOSTICS

WEATHERIZATION | WHAT WE DO

MECHANICAL MEASURES

- Clean, tune, repair, or replace heating and/or cooling systems.
- Install duct and heating pipe insulation.
- Repair leaks in heating/cooling ducts.
- Install programmable thermostats.
- Repair/replace water heaters.
- Install water heater tank insulation.
- Insulate water heating pipes.



BUILDING SHELL MEASURES

- Install insulation where needed.
- Perform air sealing.
- Repair/replace windows/doors.
- Install window film, awnings and solar screens.
- Repair minor roof and wall leaks prior to attic or wall insulation.

HEALTH & SAFETY MEASURES

- Perform heating system safety testing.
- Perform combustion appliance safety testing.
- Repair/replace vent systems to ensure combustion gas draft safely outside.
- Install mechanical ventilation to ensure adequate indoor air quality.
- Install smoke and carbon monoxide alarms when needed.
- Evaluate mold/moisture hazards.
- Perform incidental safety repairs when needed.

ELECTRIC & WATER MEASURES

- Install efficient light sources.
- Install low-flow showerheads.
- Replace inefficient refrigerators with energy-efficient models.

CLIENT EDUCATION ACTIVITIES

- Educate on potential household hazards such as carbon monoxide, mold & moisture, fire, indoor air pollutants, lead paint and radon.
- Demonstrate the key functions of any new mechanical equipment or appliances.
- Discuss the benefits of using energy-efficient products.

WAP Mission



Department of Energy



Grantees (States, Territories & Tribes)



Local Providers (Sub-grantees)



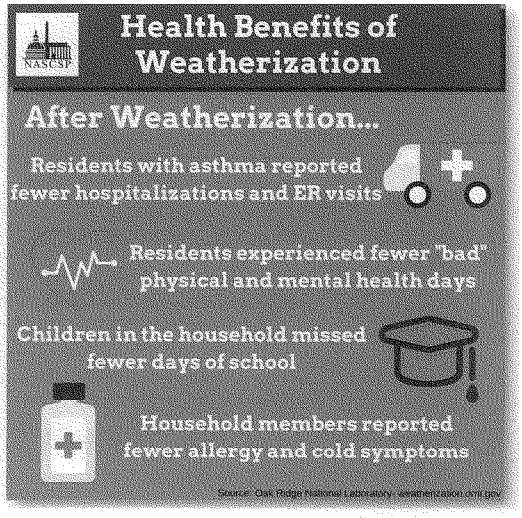
Low Income Households

Mission Statement in WAP Statute: "To reduce energy costs for low-income families, particularly for the elderly, people with disabilities, and children, by improving the energy efficiency of their homes while ensuring their health and safety."

40+ Years of Success

- Operating since 1976
- Largest energy retrofit program in the nation- All 50 states, DC, territories
- Serving up to 200% of poverty level
- Over 7.4 million homes weatherized

- Decreased out-of-pocket medical expenses by an average of $514
- Total health and household-related benefits for each unit is $14,148



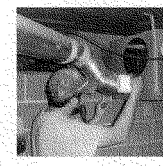
WEATHERIZATION | WORKFORCE DEVELOPMENT

THE U.S. DEPARTMENT OF ENERGY IS INVESTED IN CREATING THE **MOST QUALIFIED ENERGY EFFICIENCY WORKFORCE** IN THE COUNTRY.

100%
OF **WEATHERIZATION ASSISTANCE PROGRAM (WAP) HOME INSPECTIONS** MUST BE COMPLETED BY A **CERTIFIED QUALITY CONTROL INSPECTOR**.

CERTIFIED INSPECTORS RECEIVE TRAINING BY **ACCREDITED TRAINING CENTERS**. THESE CENTERS OFFER TRAININGS TO PRIVATE CONTRACTORS, BUILDING CODE OFFICIALS & HOUSING SPECIALISTS.

USE OF **DOE'S STANDARDIZED WORK SPECIFICATIONS (SWS)** ENSURES THE HIGHEST QUALITY OF WORK IN THE WEATHERIZATION & HOME PERFORMANCE INDUSTRY.





VERMONT
DEPARTMENT OF HEALTH

Weatherization + Health in Vermont

http://www.healthvermont.gov/environment/home

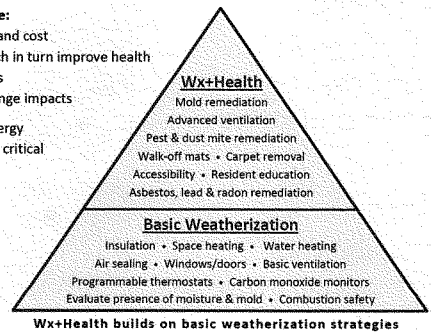
Home weatherization addresses energy, health and environmental problems

Benefits of home weatherization include:

- Reduced household energy usage and cost
- Improved housing conditions, which in turn improve health
- Reduced greenhouse gas emissions
- Increased resilience to climate change impacts

Basic weatherization (Wx) prioritizes energy efficiency improvements but can include critical health and safety improvements.

Weatherization + Health (Wx+Health) prioritizes delivery of health benefits by including specific health and safety improvements in addition to basic Wx strategies, which may be especially helpful for those with chronic health conditions or accessibility challenges.



Wx+Health builds on basic weatherization strategies

COLORADO
Energy Office



https://www.colorado.gov/pacific/energyoffice/low-income-solar

- First state to receive DOE approval to integrate rooftop solar
- Low-income community solar demonstration project



"Pre-WAP" Programs: Making Homes Weatherization Ready

Services Provided:

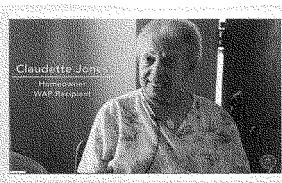
- Mold Remediation
- Moisture Control
- Pest Control
- Electrical Repairs
- Structural Repairs
- Roof Repairs





"The weatherization program was life-changing for me. It inspired me to pay it forward and help others live lives of hope and dignity."

-Kelly, Washington



"I used to use the stove to keep the house warm, it wasn't really comfortable in any way."

-Claudette, Colorado



"You could trust them and we were very impressed with them. By the time they left it felt like we had an extended family"

-Al and Loretta, Indiana

Contact Information



NASCSP provides research, analysis, training and technical assistance to State CSBG and WAP grantees, Community Action Agencies, and State Associations in order to increase their capacity to prevent and reduce poverty and build economic and energy security.

Amy Klusmeier | aklusmeier@nascsp.org | **202-370-3661**

https://nascsp.org/



Efforts to Reduce Deferrals

A "Pre-WAP" program addresses severe conditions in a home that would cause a home to be deferred from the WAP because the conditions would render the weatherization measures unsafe or ineffective. Examples include moisture/standing water, electrical/wiring issues, environmental contaminants, structural/roofing deficiencies, etc. Pre-WAP programs utilize non-DOE funding sources to make a home "weatherization- ready". Pre-WAP programs are generally run by the State WAP Office or administered in partnership with another state office. Below are examples from States with Pre-WAP programs.

Example: Indiana

Indiana's Pre-WAP is funded by mortgage settlement funds and administered by State WAP Office. Measures include mold remediation, moisture control, fixing electrical issues, grading, roof repair, gutters, sump pumps, pest control, and addressing structural issues. During the 2016 program year, Pre-WAP moved 198 homes from permanent deferral to fully weatherized.

Example: Delaware

Delaware's Pre-WAP program is funded by the Regional Greenhouse Gas Initiative (RGGI) and administered by the Delaware Sustainable Energy Utility (DESEU) in partnership with State WAP Office. In 2017, partnership with the DESEU's Pre-WAP brought 104 deferred WAP back into the WAP to receive the full complement of services.

Additionally, some states have found success in coordinating with other programs at the federal, state, and local level to address various reasons for deferrals. Examples from across the network include:

- Federal
  - Department of Housing and Urban Development (HUD) home repair programs such as the Community Development Block Grants (CDBG) and HOME program
  - Department of Agriculture (USDA) home repair programs
  - Home repair programs run by Community Action Agencies and funded by the Community Services Block Grant (CSBG)
- State
  - Programs run by State departments of health or environment to remediate lead, mold, radon, or other environmental contaminants
- Local/Private/Not-Profit
  - Non-profits specializing in working with clutter and hoarding
  - Trusts/foundations that fund remediation of asbestos

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Willie Fobbs, President, *VA*
Beverly Buchanan, Vice President, *AR*
Bill Brand, Past President, *IA*

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Melanie Sanford, Secretary, *MI*
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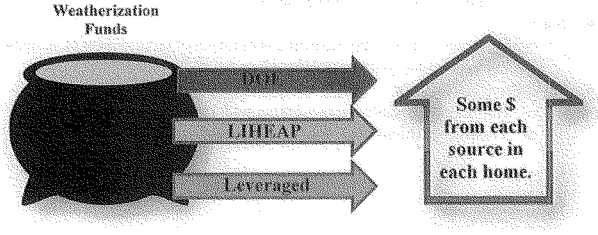
WEBSITES
www.nascsp.org
www.waptac.org
www.wxplushealth.org

State Grantees with Access to Leveraged Funds				
Alaska	Idaho	Minnesota	North Dakota	Vermont
Arizona	Illinois	Missouri	Ohio	Virginia
California	Indiana	Montana	Oregon	Washington
Colorado	Iowa	Nevada	Pennsylvania	West Virginia
Connecticut	Kansas	New Hampshire	Rhode Island	Wisconsin
Delaware	Kentucky	New Jersey	South Carolina	
Dist. Columbia	Maryland	New Mexico	Tennessee	
Florida	Massachusetts	New York	Texas	
Hawaii	Michigan	North Carolina	Utah	

"Braiding" Funding Sources Within Homes

When WAP State grantees have access to multiple funding sources they are able to work within rules of each funding source, "braiding" these funds together within each home in order to maximize the impact of the program. Braiding funds allows for more comprehensive measures in each home, and to stretch dollars further and serve more homes overall. DOE dollars are subject to rules and regulations designed to manage and account for the resources provided and to ensure proper expenditure of taxpayer dollars. Namely, all energy efficiency measures installed with DOE funds must cost justify, ensuring their savings pay for the measure over its lifetime. LIHEAP dollars are more flexible than WAP dollars and are subject to the rules determined by the state in their LIHEAP Plan. Leveraged, non-federal funds are generally considered the most versatile funding source.

The graphic below illustrates all three funding sources braided within one home. In the hypothetical example, DOE dollars could be used for energy conservation measures, LIHEAP funds reserved for health and safety, and then leveraged funding would be used to address something like a roof repair or furnace replacement. In our 2017 funding survey, 37 states reported braiding their DOE funding with LIHEAP and/or other leveraged funds, while 20 Grantees reported keeping their DOE funds separate.



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www.waptac.org
www.wxplushealth.org

Ms. KAPTUR. Thank you Director Klusmeier very much. And I just want everyone to know that the testimony that's being presented along with the slides will be on the Appropriations Committee website.

So, unfortunately, I don't think we have the charts in our materials that were given to us, but we will make sure those are integrated.

Director Furze.

Mr. FURZE. Chairwoman Kaptur, Ranking Member Simpson, members of the Committee, thank you so much for the opportunity to come here today and testify about this important program.

My name is Michael Furze and I am an assistant director at the Washington State Department of Commerce. The team that I lead is the Energy Office, we do work in weatherization and another program at EERE called the State Energy Program.

But I am here today to talk about the critical importance of the Weatherization Assistance Program both in our state and across the country. My agency's core purpose is to strengthen communities and the Weatherization Assistance Program has been a partner for us in doing that since 1978.

I would like to start by telling you about a family that came to one of our Community Action Agencies looking for service, the Finkbonner Family. They had recently purchased a 1,400 square foot home that was built in 1933. They live in the Lummi Reservation in Western Washington.

On days like the one we had here in D.C. yesterday which are pretty common in the Pacific Northwest, it would be cold, and damp, and drafty in their home. The basement was actually wet from moisture and leaks. You could smell wood smoke from an inefficient wood burning stove in the air. And there were 11 people that lived in this multi-generational household, an elderly relative who had COPD and a child with respiratory conditions.

Their electric bill was almost $700 a month when they came to us and they couldn't afford that or to fix their home. Commerce serves thousands of families like that every year and we do it through a network of 28 service providers including 3 tribes. I think on average, we weatherize between 2,500 and 3,000 homes per year and we receive between $20 million and $25 million a year from four sources.

The Department of Energy's Weatherization Program is the core of what we do. We also leverage Health and Human Services LIHEAP funding. We get funding from the Bonneville Power Administration and we are fortunate to receive funding from the Washington State legislature.

Each of these is critically important and we blend those funding sources to make sure that they go further in each home. The funding that has been provided for the last 4 decades has helped weatherize thousands of low-income household families in their homes in Washington State.

Thank you for your support. We appreciate the Congress has rejected calls to cut this program and/or to eliminate it entirely and we thank you for increasing the funding last year. As you know, there is significant unmet need across the country.

In our state, there are roughly 800,000 eligible households, folks that are living at or below 200 percent of the federal poverty level. Like the Finkbonners, their homes need, health, safety, energy upgrades to help the family save money, to stay warm, and live healthier and more stable lives.

When we upgrade these homes, we help keep warm air inside, cold air outside in the winter and we do the opposite in the summertime. After weatherization, the Finkbonners' heat source was much safer, the air was cleaner, the roof, bathroom, and basement were free of leaks. The family told us that they don't get sick as often, so they are able to go to work and go to school and that their electric bills were cut in half.

Simply put, weatherized homes cost less to heat and to cool. And this is really important because low-income families pay a disproportionate share of their income on their energy bills, what we call the energy cost burden. They pay 3 times as much of their income on their energy bills as an average household does. And these folks when they are unable to pay their bills are also struggling to pay housing, food, and medical cost as well.

When we look at the folks that are served by the Washington Weatherization Program, we think that 40 percent of them are also medically vulnerable, meaning they are missing work, school, and spending additional money on their healthcare so they could do things like breathe easier.

There is a growing body of research that links weatherization deposit of health outcomes. I think the overall program pays for itself 1.4 times. When you think about adding the health and safety benefits to the core energy benefits, that ratio goes up to 4 to 1.

And we think by focusing in a targeted way and balanced way on energy and health together, we can get that return on investment to go higher. So we have been innovating in Washington State for the last 10 years trying to find a service delivery model that integrates health with weatherization which is similar to what the Finknbonner household received.

We call that Weatherization Plus Health and it builds on the 40-year-old successful delivery system that the weatherization program provides, but it adds 3 new things. Two of those are new measures. So we add measures that intended to reduce slip, trip, and fall hazards with the aging adult population. We add measures that are intended to reduce asthma triggers like mold, mildew, and dust particularly in homes with children.

And then what is both really interesting innovative and challenging is finding new partnerships, getting the weatherization service providers to work with local community health clinics to make referrals and to provide targeted and customized measures, education, and ongoing support for clients.

It is our state funds that fund this work although we are working with the LIHEAP office to provide additional services, and I believe that this program could serve as the model for the nation if Congress was interested in expanding that type of program more broadly.

I want to thank you again for the opportunity to testify. Federal funding for the weatherization program improves lives by improving homes for families like the Finkbonners and many, many oth-

ers. I would urge Congress to smooth out that curve that Chairwoman Kaptur showed in terms of the funding cycle so that we have a long and sufficiently funded future for this program. I look forward to working with you and answering your questions.

[The information follows:]

Statement of Michael Furze

Assistant Director, State Energy Office, Washington State Department of Commerce

Before Subcommittee on Energy and Water

United States House of Representatives

February 12, 2019

Chair Kaptur, Ranking Member Simpson, Members of the Committee: it is a privilege to be here today. My name is Michael Furze, and I am the assistant director of the State Energy Office at the Washington State Department of Commerce. Today I appear before you to talk about the critical importance of the Low-Income Weatherization Program, both nationally and in our state of Washington.

Our state Department of Commerce's core purpose is to strengthen communities. The department has administered Washington's Weatherization Program since 1978 with an average of 20-25 million federal and state dollars per year from the U.S. Department of Energy, U.S. Department of Health and Human Services, Bonneville Power Administration and Washington state capital budget dollars. We partner with a network of 28 weatherization providers serving every county in Washington, delivering between 2,500 and 3,000 projects each year. Every fund source contributing to this program is critically important to ensure that families impacted by poverty can live in safe, healthy and energy-efficient housing.

Weatherization is a sound investment delivered by a program with a 40-year history of success. The program has a national savings-to-investment ratio of 1.4, meaning the savings resulting from the investment are more than paid back over the lifetime of the measures. Simply put, weatherized homes cost less to heat. They do a better job of keeping warm air inside the homes and cold air out — saving families money, improving their energy efficiency, and enabling them to live healthier and more stable lives.

Low-income households typically bear a disproportionate energy and housing cost burden relative to non-low-income households. Low-income households pay up to three times as much as the average household on their energy bills. A growing body of research emphasizes that this inequity is

a critical public health concern. Families who cannot pay energy bills often struggle to cover other basic needs, such as housing, food, and medication. High-energy bills in the winter can trap people in a "heat or eat" dynamic. One study by the Human Impact Partners found that adults and children in low-income households did what wealthier households did not — reduced their calories by 10 percent during the winter, resulting in lower weight.

This reality makes the Weatherization program all the more important. It also means the overall return-on-investment of Weatherization is even greater. Analyses of the benefits resulting from energy efficiency programs historically have focused only on energy and cost savings. The growing body of research linking Weatherization, and other energy-efficiency upgrades, to positive health impacts also must be considered. When the cost of health and safety benefits are included, the program has a ratio of 4.1 savings to investment.

Federal funding for this program over the last four decades has enabled our state to help thousands of low-income Washingtonians, and we appreciate that Congress has rejected calls to cut or eliminate it. However, there is significant unmet need among families in Washington state and across the country who could be served by additional funding.

In our state, Washington households participating in the state's Low-Income Weatherization Program and Energy Assistance Program represent only a small fraction of the households that are eligible for services, with insufficient funding being our most limiting factor. There are 784,000 households in the state living at or below 200 percent of federal poverty level (FPL) according to the 2017 Energy Affordability Gap. Their income makes them eligible for Weatherization, yet an estimated 300,000 households living in eligible homes have not received services from the state's Weatherization program. These homes are in need of health, safety and energy upgrades to ensure that families can remain in stable housing with affordable living expenses into the future. Those with incomes falling between 125 percent and 200 percent of FPL are of particular concern, as these households do not have sufficient minimum income to meet basic needs, including energy costs, and may stay on a waitlist for years before receiving Weatherization — while those households with a higher energy burden are served with the limited resources that do exist.

Despite limited resources, Washington state has been a national innovator in using funds to deliver integrated services that we refer to as, "Weatherization Plus Health." Weatherization Plus Health

expands the Weatherization Program delivery model to include measures intended to reduce slip, trip and fall hazards for the aging adult population and asthma triggers, such as mold, mildew and dust, in homes with children. We are fortunate to receive support from our state capital budget to do so. Washington state can serve as a model for the nation if Congress has interest in scaling up the model nationally, with additional funding and expanded services.

We are now evaluating additional opportunities to better meet the needs of underserved populations. This work includes distributed energy generation such as community solar projects, seismic retrofits in our earthquake-prone state for those least likely to have earthquake insurance, and providing targeted pilot efforts to previously weatherized homes with technologies, such as ductless heat pumps, that were not market ready at time of weatherization. Washington state is driving toward a future in which all Washingtonians can thrive in a clean, affordable and just energy economy.

Federal funding for the Weatherization program improves lives by improving homes. I urge Congress to ensure a long and sufficiently funded future for this important program. Thank you again for the opportunity to testify, and I look forward to answering your questions.

Ms. KAPTUR. Thank you very much Mr. Furze. And finally, Director Terry Jacobs. Thank you for coming.

Mr. JACOBS. Good morning.

Ms. KAPTUR. Good morning.

Mr. JACOBS. Thank you, Madam Chairwoman, Ranking Member Simpson, and members of the subcommittee. For the last 11 years I have managed the weatherization program for Great Lakes Community Action Partnership formerly WSOS in a 6-county region in Northwest Ohio.

Like every community action agency in the nation, we are going to call it GLCAP is represented by the National Community Action Foundation here in Washington, D.C.

Madam Chairwoman, last fall you responded to an invitation by WSOS or GLCAP attending our weatherization demonstration in Oak Harbor, Ohio. Your positive comments and engaged interaction with the housing energy staff that day and the homeowner proved to us that you understood the importance of the program and that you wanted to keep it going and that meant a lot to us.

GLCAP has received and continues to receive many thank you letters from families like the family in Oak Harbor whom we have provided weatherization assistance to. These letters often touch on how the program has impacted their lives such as lowering heating and electric bills and how the home is much safer and more comfortable to live in.

One of those letters stated, being that my house is 101 years old, it needed the insulation updated and without the help I would never have been able to afford having it done. Because of all the improvements made to my home, not only will my utility bills be more manageable but my family will greatly benefit from the home staying warmer in the winter and cooler in the summer.

The participant then compliments the great work that our people at GLCAP did and stated that she was grateful for exceptional work that was performed on the home. The list of directed impact, the direct benefits that weatherization program provides to the participants is long, as you had mentioned earlier. Many times folks are forced to make difficult choices between paying higher utility bills and medical and food and healthcare. This program helps to reduce the burden of those choices for those folks.

Though the weatherization program has much to offer, like every program, it does have some limitations. One of those limitations involves leaking roofs, structural deficiencies, electrical hazards, some hoarding infestation situations. These sometimes result in what is called an unable to assist or a deferral type situation.

To help combat these situations, we seek outside funds from gas and electric utilities and other home repair programs offered in the state, and we leverage those in combination with the weatherization program, which allows us to take a whole house approach to the home versus the restrictions of the weatherization program.

And in these situations, we have helped 80 percent of the total amount of weatherization units that we complete. So, the 20 percent of the homes that didn't get mentioned typically fall in like a rural situation where it is bulk fuels, propane, fuel oil or municipalities that don't have energy efficiency programs.

If I could direct you to the slides, this is a home we did in Seneca County, one of our six counties and this home is obviously very large and had lead-based paint and had a lead poisoned child that lived there and if we could just continue through, that's a finished product of the home using eight programs that were accessible to us for this person.

Now this is kind of a unique situation. Not all of our clients can get eight programs but in this specific example, we were able to get rid of all the lead and perform weatherization. This is a picture of the attic empty and then the finished attic blown. Otherwise, we wouldn't have been able to do any work with weatherization there or any of the other programs. Each program hinged on the other.

Historically, but more so on recent years, the retention of weatherization field test staff has become one of the top challenges we face at GLCAP. Many times, once these field staff have earned experience, formal training, and certifications that the weatherization program offers, which is awesome at the training center, they become more valuable to the growing market of home retrofits, remodelers and construction companies, which oftentimes can pay higher wages, while working in less desirable work environments such as tight crawl spaces and very hot attics.

So, the works these folks do is highly important. And we need to retain them to deliver the best service possible. Raising the cost ceiling allowing more flexibility and funds would be most helpful to address this growing challenge.

Lastly, we understand and support the idea of making homes healthier and safer by implementing initiatives such addressing indoor air quality, lead, and radon in homes. However, these initiatives need to be funded and production goals adjusted to allow for the additional labor and materials that now have to be installed in every home.

In conclusion, I would like to thank the committee for its continued support of the weatherization program. The increase in funding over the past several years has been much needed and it is very much appreciated.

The program has helped thousands if not millions of families for 40-plus years and the need for the service continues. As our housing stock continues to age, the participant waiting lists grow and so does the need for increase services and funding. I hope my testimony provides you with a unique perspective on the local level. Thank you.

[The information follows:]



Great Lakes
COMMUNITY ACTION
PARTNERSHIP

A trade name of WSOS Community Action Commission

Testimony of
Terry Jacobs, Housing and Energy Director
WSOS/Great Lakes Community Action Partnership

Before the
House Energy and Water Development Appropriations Subcommittee

Oversight Hearing: Department of Energy's Weatherization Assistance Program
February 12, 2019

Testimony of Terry Jacobs
Housing and Energy Director
WSOS/Great Lakes Community Action Partnership
February 12, 2019

Chairwoman Kaptur, Vice-Chairman Visclosky, Ranking Member Simpson, and members of the Subcommittee, thank you for the opportunity to provide testimony regarding the Department of Energy's (DOE) Weatherization Assistance Program (WAP). My testimony will focus on my knowledge and experience administering and implementing a local weatherization program.

My name is Terry Jacobs and I am the Director of the Housing and Energy Department at WSOS/Great Lakes Community Action Partnership (GLCAP). GLCAP is community action organization with over fifty years' experience providing high quality programs and services to low and moderate income families in northwest Ohio and beyond. For the past eleven years, I have managed the weatherization program in a six county rural area of northwest Ohio.

Benefits of DOE WAP

Over the years, I have witnessed firsthand some of the many benefits resulting from families receiving weatherization services. Based on that experience, I believe the weatherization program is still fulfilling its original design and purpose since Congress created it in 1976. As stated in the 10CFR 440.1, the U.S. Department of Energy's Weatherization Assistance Program was created "to increase the energy efficiency of dwellings owned or occupied by low-income persons, reduce their total residential energy expenditures, and improve their health and safety, especially low-income persons who are particularly vulnerable such as the elderly, persons with disabilities, families with children, high residential energy users, and households with high energy burden."

As evidence, GLCAP has received and continues to receive many thank you letters from families to whom we have provided weatherization assistance services. These letters typically state how thankful they are for the services we provided and often list many of the benefits mentioned above in the enabling legislation. The following quote was taken from a letter received from a family that had received weatherization services from our organization. "My family and I just wanted to express our thanks and gratitude for the weatherization of our home....Being that my house is 101 years old it was definitely in dire need of having the insulation updated and without the help that your program gave us I would never have been able to afford having it done. Because of all the improvements made to my home not only will my utility bills be more manageable but my family will be able to greatly benefit from the home staying warmer in the winter and cooler in the summer." The homeowner goes on to state that she is also "grateful for the exceptional work" that was performed on the home. This is just one example of the many letters we receive. Many times folks are forced to make difficult choices between paying high utility bills or purchasing food, needed healthcare services and prescription medications. This program reduces the burden of those choices.

Leveraging other funding resources with DOE WAP

It is our mission to provide our communities and families with the best possible assistance available. Though the weatherization program has much to offer, it does have limitations. In many cases, leaking roofs, structural deficiencies, electrical issues, etc. could result in an "unable to assist" situation, leaving the home ineligible for weatherization services. This is not the most desirable end result. As the housing stock continues to age, the need for additional assistance to address the physical challenges of the homes continues to increase.

To help combat these "not able to assist" situations, GLCAP administers other utility funded energy programs and several other housing rehabilitation/repair initiatives. Funding for these programs originates from the Department of Housing and Urban Development, the State of Ohio and regulated electric and natural gas utility companies. Leveraging these programs in combination with the weatherization program allows us to take a whole house approach to our work and helps alleviate those "not able to assist" situations. Blending leveraged resources creates an opportunity to repair and rehabilitate these deficient homes, making them weatherization ready and resulting in a safe, energy efficient home for the client. GLCAP also makes a concerted effort to administer the weatherization program in combination with available resources offered by other agencies in the area. In PY2017, GLCAP was able to combine at least one or more leveraged resources on over 80% of the total units weatherized. The remaining 20% of the homes tend to be located in more rural areas that depend on bulk fuel utilities such as propane, fuel oil and electricity from municipalities that do not offer energy efficiency programs.

Success story illustrating the benefits of leveraging multiple resources on a home:

GLCAP completed a large project that illustrates the power of leveraging multiple funding streams on one home. The home was very large, built around the turn of the last century, had twelve foot ceilings, a spiral staircase and was in very bad condition. A young family of six lived in the home, with one of the children being under the age of six. Peeling lead based paint inside and out gave concern to the youngest child's health and safety. There was no insulation in the home, major roof issues were evident, and unsafe electrical wiring pushed this home way beyond the financial capabilities of any one program. The family qualified for eight of our housing and energy programs that were offered at the time. Each of the eight programs were dependent on the other to make this a viable project. These include; Home Weatherization Assistance Program, Community Housing Impact and Preservation, Columbia Gas of Ohio WarmChoice Program, Ohio Housing Trust Fund, American Electric Power CAP, Ohio Lead Hazard Control Grant and Lead Safe Families Grant. Any one of the programs could not have been accessed, the home would have become an "unable to assist" situation and the family would not have received assistance of any kind. As a result, the project was a success and all deficiencies were corrected and weatherization services were able to be provided. One year later

we contacted the homeowner to determine the energy savings they had realized. In just one year, the family saved over $800 from reduced gas and electric consumption.

Challenges of administering the DOE WAP:

I am responsible for the budgets for the programs listed above and I need to tell you that I do not have enough money for administration. The big cost in weatherization used to be materials, but savings now is really dependent on highly trained installers and administrative staff. I need to be able to pay people so I can keep them, but I'm also a business – a nonprofit but still a business. An extra 5% would solve a wealth of problems and make sure we weatherize as many units as we can as well as we can.

Program eligibility determination policies and procedures should be aligned for low income programs. Currently, most funders have their own unique way of determining eligibility. Having one common eligibility determination procedure for all programs would not only make it simpler and less frustrating for the families we serve, but for the sub-grantee as well. This is one of the biggest hurdles we face when attempting to leverage multiple funding sources together on a project. If funders could agree on one common application, one common method of calculating income and common poverty income guidelines to follow, the programs and services would be streamlined for the families and the sub-grantees.

Congress has spent a lot of money building a trained national network to deliver WAP, and now a lot of utility and state programs that we coordinate. After Congress criticized WAP for shoddy work during the American Reinvestment and Recovery Act, DOE and the network came up with the Quality Work Plan. It looks a lot like the training and standards we had developed on our own in Ohio. We have had a good training center for over 30 years, and we needed it to meet the new requirements. I can safely say I have some of the best trained people you can find, who care about the families they serve.

Conclusion:

I would like to thank the committee once again and encourage your continued support for the DOE WAP. This program has helped thousands of families for 40+ years and the need for this service continues in our communities and across the nation. As our housing stock continues to age, so does the need for increased WAP services and funding. I hope my testimony provides you with a unique perspective on managing a weatherization program at the local level.

Respectfully submitted,

Terry Jacobs
Housing and Energy Director
WSOS/Great Lakes Community Action Partnership

Weatherization

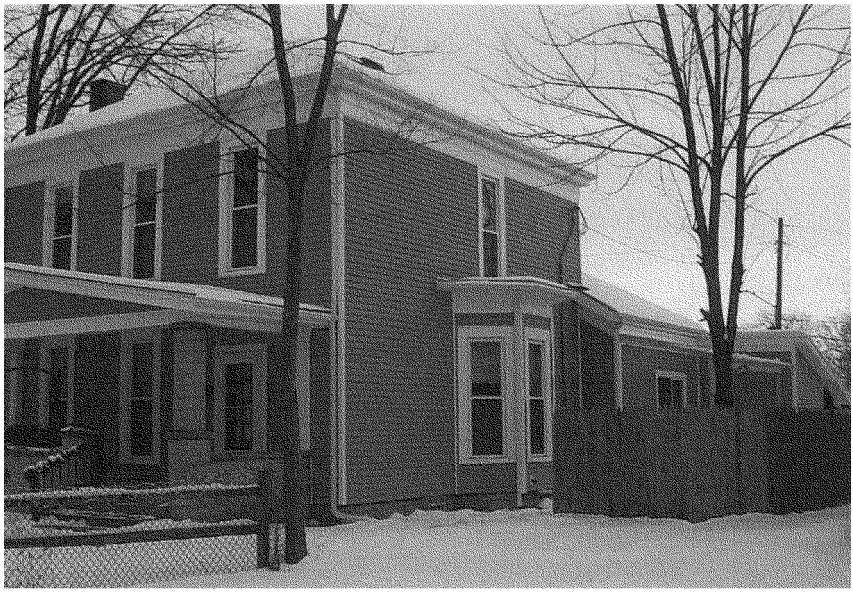
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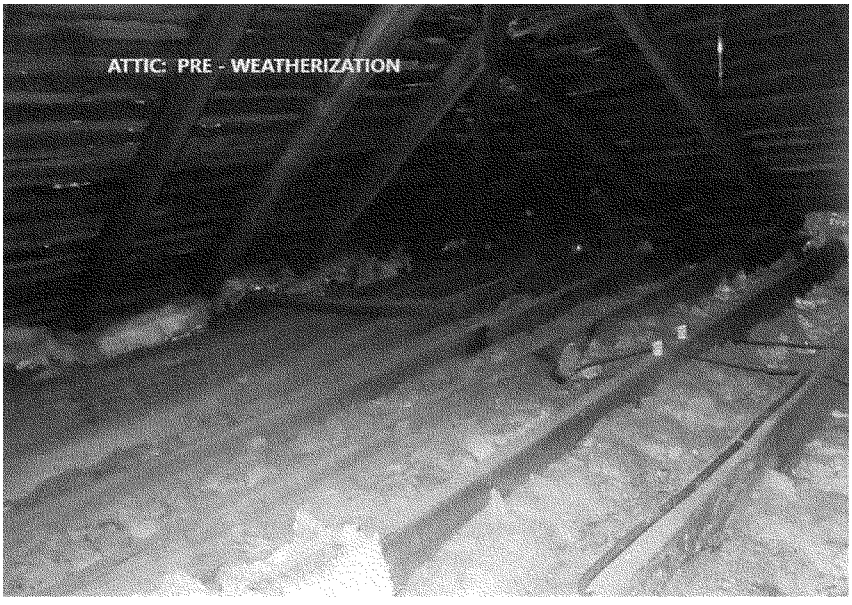
Terry Jacobs

Director, Housing & Energy

Great Lakes Community Action Partnership






ATTIC: PRE - WEATHERIZATION


ATTIC: POST WEATHERIZATION

Ms. KAPTUR. Thank you very much, Director Jacobs. Thank you for travelling, all of you who had to come from out of town, thank you so very much for the effort you put forward.

Several witnesses mentioned the Oak Ridge Labs, Congressman Fleischmann here to my right represents that very important location in our country. And I watched him listening to all of you, so I thank him for being here this morning. He is very responsible member.

Before we begin questions, I would like to again remind members about our hearing rules for this year. First, I intend to begin all hearings on time. We did that. For those members present in the room, when I gavel in the beginning of the hearing, I will recognize you for questions in order of seniority, alternating between majority and minority until all who arrived prior to the gavel have asked questions.

For those who arrive after the hearing had started, I will recognize those members solely in order of arrival, again, alternating between majority and minority. And lastly, I intend to observe or at least try to, the 5-minute rule for questions and answers and we will now begin questioning under our normal rules.

Let me begin by asking Director Garcia. The Energy Independence and Security Act of 2007 authorizes the secretary of Energy to make funding available to local weatherization agencies for renewable technologies.

Furthermore, the department released a memorandum in January of 2017, which specified a path for states to incorporate solar into their Weather Assistance Programs. Can you provide specific examples of how renewable technologies have been incorporated into this program? And how does the department actually decide how to do that, which technologies to include?

Ms. GARCIA. So, that is a very good question and thank you for that, chairwoman. We have a policy outlined in the—further in the memo that you referenced that shows the pathway in terms of a normal procedure for getting a technology that may not be currently on our appendix A, which is the original list of technologies that were associated with weatherization program in the statute.

So, if any technology, including solar is—if a state is looking to get that technology into their program, they follow the same procedure. They need to show us that they—the technology can meet a savings investment ratio of 1 or greater.

They need to include the measure in their plan and they need to demonstrate that it can be incorporated into their audit. The memo that you referred to also asked that we conduct a pilot program with the—particularly with the solar PV. That was such a large technology. There are situations where it might be put on rooftops versus community solar. And DOE wanted to be aware of the kinds of steps that were being taken in terms of integrating that technology on low-income homes, there are issues of maintenance and operations for that technology. We wanted to make sure we were tracking that at least in its early stages of being implemented.

And as was referenced earlier, Colorado has been a leader in integrating solar PV, looking at it both on rooftops as well as community solar applications where it makes sense.

So again, they follow a very standard procedure of applying through DOE that they want to include this new technology. There is provision for up to—I think the level now is just about $3,700 out of the—now, is a little over 7,000 maximum expenditure allowed on the DOE program, under the DOE program for renewables, for renewable applications, for renewable technologies.

We have also been—states have come to us and put solar thermal heating, solar thermal water heaters in. Those kinds of technologies have been integrated in the program for some years now.

Ms. KAPTUR. I wonder if you could provide some of that detail to the record.

Ms. GARCIA. I would be happy to respond to a question for the record on that.

Ms. KAPTUR. All right. I thank you very much for that. I had mentioned to my colleagues that I have gone out to several sites around Ohio and with the crews that are working and I have learned a lot. And we all learn when we go out.

And one thing that really surprised me and maybe you think about your own experience in your districts, this program excludes roofs. So, I have many neighbors, in fact, in the neighborhood I live in, they are senior citizens. They can't afford to put a roof on.

So, I watched this housing deteriorate. And I am thinking what is wrong here. And I realized the Department of Energy does not authorize roofs. And there is this limit on how much you can spend per home.

But I have been thinking about new technologies that we might try to spur the DOE to come forward, if we were to have a rubber roofing with solar chips in it or figure out a way to provide a lot of roofing round the country, working with the industry, whomever we have to work with. Imagine what we could do for thousands and thousands and thousands of people. And so, I have been very interested in that idea of how to integrate this program with others that exist.

You talked about LIHEAP, but maybe that isn't enough. And how we can use innovation to help reduce the cost and serve the people that you are trying to serve. I was actually shocked that roofing wasn't included in the authorizing language, either in—I think LIHEAP now is a 20 percent set aside that some of those dollars can go to the roof.

But it makes it so difficult operationally at the local level. And then also the idea of what kind of roofing could America invent that actually could contribute to the power package. You mentioned solar thermal. We have new homes being built—modular homes where solar thermal is built into the wall.

And I am thinking, what is the most efficient technology we could provide not on a, sort of, test pilot basis in this state or that state, but massively make available to this program. So, I hope you can think with us on that.

In that regard, Ms. Klusmeier, your background shows that you have been actually on the ground, house after house after house after house. One of the experiences I had in visiting sites was I talked to a man who had worked for this program for 25 years.

And I said to him, were you educated? Did you go to community college? Or did you go to a trade union? Did you learn how to be

or were you are a heating, or insulating, specialist? He goes, no, could I have done that? And I said, so, you don't have a path forward. You don't have a journeyman's card or an apprentice card or you are not getting community college credit?

Ms. Klusmeier, could you comment on what could we do in this program to provide a platform for the workers where they would qualify for the professional skills that they develop? Are there examples around the country of where these specialists have accessed credit, either for a degree or to get a journeyman or a journeywoman's card?

Ms. KLUSMEIER. So, that is a great question. And I would love to look into—see if we can find some specific examples for you and provide answers in writing. I would point to my own experience.

I came to the program through a technical college program. I was kind of bouncing around from job to job after I got out of school and learned about a training, a technical program that was geared towards women in the trades to introduce women to various trade careers.

It was offered by one of my local technical colleges. Through that program I got connected to my local weatherization provider and that is how I got my foot in the door there. So, I think looking at the next phase of that is how do we get people who get into the weatherization program and then further their careers from there is a great idea and something that NASCSP would certainly be willing to look into and provide some examples to you.

I would point to the efforts that have been made over the last couple of years, especially since 2015 to certify workers in the weatherization program. So, there was a quality work plan initiative, started in 2015, that required certification of the inspectors that are doing the program.

I personally feel and many of the people in our industry feel that we have some of the best-trained and certified workers in the home performance industry. So, I think anyone working in weatherization with those certifications, especially energy auditors, building inspectors could certainly move on and advance their career in that way.

Ms. KAPTUR. All right. Thank you.

Ms. Garcia, are you aware of any regularized training platform that these individuals access?

Ms. GARCIA. Yes. Within the program, we do have our guidelines for home energy professionals, which Amy was referring to. They include the standard work specifications that I mentioned earlier in my testimony for outlining the work requirements for the different types of crew that are involved in doing weatherization.

There are also certifications for the energy auditor and a new classification of position called the quality control inspector. So the quality control inspector is a person who is charged with looking at every home after the weatherization is completed to make sure that the work is done well and according to the standard work specifications that are part of that. We have accredited training at these training centers around the country, 22 of them. One just opened in Michigan.

And they are not only open to weatherization crews but the weatherization crews can take advantage of the training metrics.

Ms. KAPTUR. And who operates the training centers again? Excuse me.

Ms. GARCIA. They are operated often by universities or other organizations. I can get you a list of them and who manages them as a question for the record.

Ms. KAPTUR. Oh, that will be great to have for the record.

Did either of the gentlemen want to comment?

Mr. Furze.

Mr. FURZE. Madam Chairwoman, I think that what I heard in Terry's testimony speaks to the work that is being done at the Department of Energy level to create a framework for the work to be standardized and for the folks doing that work to get credentials.

And then it is creating a bit of a challenge both in Washington State and I heard it also in Ohio that when folks get these credentials, they are able to step into the building trades more directly, jobs that are potentially higher paying. The housing market in Washington State is white hot. And so, that is part of the challenges that we are having.

We maintain a training center and that is part of how we stay successful so that as we lose folks to higher paying jobs in the trades, we are bringing up the skillset of the folks that come after them. But it is not as direct as I hear you asking the question.

Ms. KAPTUR. All right. I am going to ask one more question, then we will go to the members. I am interested in the idea that weatherization has the ability not just to improve the lives of individual families, but in fact, in entire neighborhoods.

However, the current weatherization program isn't set up to encompass a whole neighborhood approach. So I am interested in any ideas you might have about a path by which neighborhoods could apply for grants, so that everyone in the same community can be uplifted equally if they qualify.

Are there any innovative communities across the country that are thinking about how we can use the power of energy to uplift an entire neighborhood using weatherization as the anchor? Are you aware of offsite energy fields that have been pumping energy into certain communities?

What about, we talked about roofing a little bit earlier, where we are doing mass purchase of materials that would really allow this program to catapult from its 1 by 1 by 1 home weatherization. Are there any innovative ways to think about how we can uplift the entire neighborhoods using weatherization as the main vehicle? Have you ever seen that anywhere?

Ms. GARCIA. I would be glad to start response to that, chairwoman. So what we have seen, I think there is flexibility within the program today for this to occur, depending on what states want to undertake with their local crews.

What we have seen, for example, in Ohio that all of the major utilities hire WAP agencies to deliver the programs funded by the utility rate payers. And then they also obtain home repair funds, much like we were talking about in the GLCAP where you are braiding different types of resources together.

And then Murray City in Ohio weatherized over 75 percent of low income households in a community by doing that and bringing

private donors into the community to do a variety of things. I could get more information on that program if you like.

And then in Connecticut, we have two utilities who have been piloting community efforts for a couple of years now, implementing on a community basis, piggybacking on to the weatherization program with other resources.

So, I would be happy to take that as a question for the record and get you some additional information on those examples. We would very much like to be focused on capturing some of these different types of models that might be going on across the country.

Ms. KAPTUR. It would be really interesting to see you in partnership with Neighbor Works or with Habitat for Humanity or some of our community development corporations that are working. I remember going through one historic neighborhood that was leaking energy all over the place because it couldn't locate in one of our older cities because they couldn't get windows that meet the historic guidelines.

And I was going, oh, my goodness. And they wanted to preserve the neighborhood and the major issue was energy. But somehow at the local level they couldn't integrate it. So, I think your suggestions to us as we try to make this program more impactful would be very, very valuable.

I am going to go to Mr. Simpson now.

Thank you so very much.

Mr. SIMPSON. Thank you. I apologize for leaving for a few minutes. Two of you mentioned during the overview of Weatherization Assistance Program, DOE provides core funding to weatherization grantees in all 50 states, the District of Columbia, the five U.S. territories and one Native American tribe. You mentioned one Native American tribe. Why is that? And what tribe is that?

Ms. GARCIA. Arapaho. The Arapaho Tribe. Tribes can opt in to the program. They can apply directly for funding from the Weatherization Assistance Program and over the years we have had varying number of tribes that do that and take it upon themselves to administer a program.

But oftentimes, the programs are run in conjunction with the state. So the state and the Native American lands that are there are working to put together weatherization for those homes. And others on the panel might want to be able to talk to that.

Ms. KLUSMEIER. Right. So the one tribe is the one that receives direct allocation, otherwise tribes are served, I can speak to how we prioritize in Wisconsin, tribal families were put on the priority list for services just as other families were.

And in Wisconsin there was a governor directive that they could be prioritized with those other service categories as DOE—that are defined by DOE, the elderly, the child, high energy burden households.

Mr. SIMPSON. But as individuals, not as a tribe?

Ms. KLUSMEIER. Right.

Mr. SIMPSON. Any idea why a tribe wouldn't apply for being a separate entity like a state and getting a grant from the weatherization program to apply to their members and stuff, if I am a tribe that is what I am going to do. I have been on a lot of reservations.

And I will tell you that some of the worst poverty in America is on reservations.

Ms. GARCIA. During my time, I think what I have seen is the capacity for the tribe to take on the program and run it as in contrast to working with the state through their already established network.

Mr. FURZE. In Washington State there are a couple of different ways that tribal members are served. I believe that Amy described where weatherization service provider just has folks that are either on tribal land or in the community that can apply for services. And their priority is weighted by that status.

One of the other ways that we provide services is by working with tribal entities to provide services for their territory. And so, there are three tribes that we are working with. We have a really strong program out in Spokane Washington.

And what they do and it speaks to the capacity issue that Annamaria mentioned, their membership, their service territory is relatively rural, and so the formula that we distribute funding by—that they don't get a lot of funding to run the program.

And so, they supplement weatherization program with other tribal funds, including CDBG funding in order to provide services for their members. That is a little bit different in Washington.

Mr. SIMPSON. Just out of curiosity, how are the funds that are appropriated, I suspect that we can appropriate four times as much that we actually do and that could be used. How is it divided among the various entities that we service?

Being from the north, maybe this is just my bias, but we thought weatherization was something that we had in cold weather states, but then there are weatherization issues in warm weather states also. How do we decide how much each entity, state or whatever receives?

Ms. GARCIA. That is a very good question. And we have been getting that a lot lately. So, I will try and explain it very—simply as I can. There is a formula consistent with statute, based in rule that provides for the allocations for each of the grantees.

And there are three main factors, the proportion of low income households in that state versus other states; heating and cooling degree days across the state relative to one another; and then also the energy burden or the amount of residential energy expenditure relative to income. And those comparative factors weigh in on the way the funds are allocated.

Mr. SIMPSON. Okay. Thank you.

Ms. KAPTUR. Congresswoman Wasserman Schultz.

Ms. WASSERMAN SCHULTZ. Thank you, Madam Chair.

It is fitting that Mr. Simpson mentioned that warm weather states also have a need to use the WAP program as well, particularly because we have insulation issues that are associated with keeping homes cooler.

And most of the funding for the program is directed to cold weather states to keep people safe in harsh winters. Florida experienced a significant 22.7 percent increase in WAP funding from 2018 to 2019 because of how the statutory funding formula allocates money over the $209 million threshold.

So, Ms. Garcia, as climate change intensifies, can the WAP funding formula adapt to this trend and help warm weather states that are experiencing increasingly warmer summers and more dangerous heat waves?

And I will ask you both, my part A and part B questions at the same time. When the federal funding allocation is below the statutory threshold, a formula is used that tends to benefit colder states.

When it is above the threshold it can benefit warmer states more. So can you explain exactly why Florida experienced a sizeable increase in funding from 2018 to 2019, and in your opinion is the formula still able to address the weatherization issues that we are experiencing across the nation today without bias for either cold or warm weather states?

Ms. GARCIA. I will do my best to give you an answer to that question. The formula is a little bit complicated. So, the formula prior to 1995 used these same factors, but also had a basis of $100,000 per state, so that basis plus the way these factors would work on a certain amount of funding would produce the formula of allocations for each grantee.

In 1995, they looked to, tried to adjust the formula to provide more funding for warm weather states. And in that rulemaking, the original funding levels at that 200 million level which was I believe the 1993 appropriation was grandfathered in as a base so that there would be no loss of capacity across the states.

And then above that—anything above that $209 million level is simply subject to that formula, to those different factors. Those factors are updated every year as frequently as possible.

There have been some of the factors and I would have to take it for the record to tell you exactly which ones have not updated as quickly as maybe they should have in order to continue to ensure that warm weather states are receiving an equitable treatment under the formula. But those 3 factors alone affect the funding above the $209 million level.

Ms. WASSERMAN SCHULTZ. Given that the administration has repeatedly—this administration has repeatedly targeted this program for elimination essentially or the funding for elimination, is enough attention paid to the program to ensure that the most updated climate conditions happening in states are going to be factored into the formula that is used?

Ms. GARCIA. In keeping with the department's practice over the last several years, if Congress appropriates money, we execute the program as expeditiously as possible. We use the most current information that is available from other resources like NOAA and other references which I will have to get to you as a question for the record, would be happy to do that.

I have not seen that there has been anything that would interfere with continuing to provide a reasonable allocation based on those factors. But I would be happy to research it further and get back to you.

Ms. WASSERMAN SCHULTZ. Yes. And Madam Chair and Mr. Ranking Member, especially since you raised the issue of warm weather, I am concerned that there is an inequity and a lack of predictability or consistency for cold and warm weather states.

It is, trust me; I am from Florida in case no one was aware. It is equally as important to keep my constituents cool as it is to keep a member from a cold weather state's constituents warm.

You can very easily have your health decline and very rapidly from overheating when our temperatures get upwards of 90 and 100 degrees in warm weathers states and much, much warmer inside when your air conditioning is not working properly. So, if you can get that information for the record, that would be very helpful.

Thank you, Madam Chair.

Ms. KAPTUR. Thank you very much Congressman Wasserman Schultz. You remind me that the number of elderly who live not just in your state but we have increasing numbers. Medicare is working. And people are living longer.

There has been a special relationship set up between just one of the national organizations, the AARP and one of my local hospital systems nationally, on the issue of nutrition for seniors because they are so worried about rising levels of diabetes and hypertension and trying to focus in on the diets of those individuals. We haven't had the same kind of relationship among—that I am aware of—among other national elderly organizations and the weatherization program.

But what you are saying is absolutely correct. And whether it is hypothermia or whether it is—I don't know what they call it when you get too hot. There is a medical term for that. But we know how debilitating that can be to people of all ages, but certainly senior citizens.

So that is a set of relationships I think that could really help. And we want to make sure that the formula is properly adjusting to the realities of climate change in this country. And that is one of the reasons we are having this hearing this morning.

So, we thank you for—the turnout is just tremendous by our members today.

I am going to now turn to Congressman Fleischmann.

Mr. FLEISCHMANN. Thank you, Madam Chairman and I want to thank you for your earlier kind words about the Oak Ridge National Laboratory. I do represent that great lab.

And I want to thank each and every one of you all for being here today. These are the kind of hearings that help us as legislators do our job and to gather information. So thank you for being here. It is an honor to have you.

My first question, and I will just open this up to anyone who would like to comment. The Weatherization Innovation Pilot Program was initiated by the Department of Energy in 2010 to accelerate effective innovations in home energy efficiency.

In May 2007, as already has been alluded to, the Oak Ridge National Laboratory issued a report assessing the program's successes and challenges. First question, how would you describe the progress that has been made in innovation since that report? And the second, would be what additional areas should we be thinking about for further innovation?

Ms. GARCIA. I will begin. We did learn a great deal not only from the WIPP projects, but there were also during that same timeframe sustainable energy resources for consumers grants that were more

experimental in terms of looking at new technologies that might be able to be proven to be or demonstrated to be in the program.

So the WIPP focused more on innovative approaches by different deliverers of the program, while the SCRC looked more at the technologies. And so, the combination of those two I think has probably on the one hand led to different approaches in terms of delivery mechanisms and braiding or resources, whereas the SCRC grants have brought some new technologies at least into the fore, very close to being able to be on a cost bases to be in the program, which is also something that the labs contribute to the work.

The labs in getting the costs down of the technologies enable them to be qualifying better for the savings to investment ratio requirement of 1.0. So things like mini-ductless split systems that can be very applicable in some of these homes, tankless water heaters, some of those kinds of technologies have been moved a little bit further along the pathway of getting into the program by the work that was done under these different experiments from that point forward.

And then also, we have tried to improve the tools of the weatherization program, so audits which started out in the program as mostly paper-based are now computer-based. And we are getting ready to put that interface into the web so that they can be utilized, in a real-time basis internet of things, sort of way, and that—that data on what is going to be prescribed in the audit can be accessible to everyone, and then we can collect more data on what is being done and—and have a better—and more real time sense of the performance of the program. So those are some—some things that I would offer that have improved.

Mr. FLEISCHMANN. Thank you, would anyone else care to comment?

Mr. FURZE. In Washington state, we partner with the—the Washington State University Energy Extension Program, and they ran one of those initial WIPP grants a while ago and that helped bring ductless heat pumps and advanced duct sealing into the weatherization program, so there is hopeful partnership there.

With state funding, they continue to do that work and they have taken an approach which is not community based, but is perhaps manufactured home park base. They can go and do a number of jobs simultaneously which leads to referrals to the weatherization program. So that type of innovation, while limited in scope, brings a new technology and creates an opportunity for partnerships.

Mr. FLEISCHMANN. Thank you. As my time is waning, I will ask one last question. In Chattanooga, my hometown, the electric power board fiber optic network is the backbone of its smart grid which enables communications with smart meters, smart switches and other smart grid devices.

A joint study by the Electric Power Board and Oak Ridge National Laboratory found that the smart grid ultimately helped realize incredible savings to the utility and most importantly, the consumer or rate payer. How is the Weatherization Assistance Program ensuring that it is keeping abreast of progress in the grid modernization space and ensuring that homes in the program are able to fully realize the benefits of smart grid technology?

Ms. GARCIA. Thank you for that question. It is certainly a hot topic at the department these days, the grid modernization and the internet of things, and our Buildings Technologies Office along with the Office of Electricity is doing a lot of work in partnership these days. So we are trying to follow those developments closely so that we can understand when and if it will be possible to integrate different aspects of what comes out of that—out of that initiative into the Weatherization Assistance Program.

Right now, I think it is still in a fairly nascent stage.

Mr. FLEISCHMANN. Thank you. I believe my time has expired. Madam Chairman, I yield back.

Ms. KAPTUR. Thank you very much, Mr. Fleischmann. Mr. Kilmer, Congressman, Kilmer.

Mr. KILMER. Thanks, Madam Chair and thanks, everybody for joining us. And Mr. Furze, thanks in particular, I know you had probably to overcome the snow-pocalypse in Washington State to be here, so thank you for that.

I want to ask you to follow-up a little bit on the Weatherization Plus Health idea and just give us a sense more of some of the potential benefits that you see from it, any key lessons you have seen since I know not every state does this, if you have any takeaways? I do not know if that is a disturbance in the force.

[Laughter.]

Mr. KILMER. So any sort of key lessons that you take away? And if you can speak more to potential opportunities you see for the federal government to engage on that?

Mr. FURZE. Thank you for that question, Representative Kilmer. I think at its core, the weatherization program federally understands energy benefits and non-energy benefits and this opportunity that we have in Washington State is to be more specific about the health benefits which bring significant increase to the overall savings to investment ratio of the program.

The approach has been to build out the infrastructure of the weatherization network as it exists and—and to do it in a couple of different ways, we provide traditional weatherization services, when appropriate we compare that with rehab services to do the major upgrades that Chairwoman Kaptur was talking about. We provide both energy and health-related education, and we do a set of kind of basic measures that create cleanable surfaces in the house. We add HEPA filtered vacuum cleaners and educate folks on how to use this.

And that in it of itself provides a significant benefit. There is a family that we work with Snohomish County Washington which sort of was a tale of two pregnancies, one before the Weatherization Plus Health program where she was in the hospital quite a bit, her husband had to take off work after the program. And the key factor for them was just figuring out how to use that high quality vacuum, no hospital visits other than what the appointments she had regularly scheduled.

So those are the types of things that we can do by just adding new measures and additional education. And I think that is pretty achievable both across the State of Washington and with a little bit of education to our training network nationally, we can expand

that as long as there is permission to use some of these new measures.

The harder piece and I think the more beneficial piece is collaboration with community health workers, so these are folks that are on the ground, the know the sickest families in the community and can provide referrals to the weatherization program so that they—they go into the home, they are already looking at the energy benefits, they are starting to look at the—the potential health risks and they can provide targeted services that are directed by a professional. And what we are seeing in the five or six cases that we have in Washington State is that these partnerships are leading to on-going care which is providing additional savings and reductions and hospital visits and emergency room visits out into the future, and we are trying to quantify that which is one of the hardest things to do in addition to creating those partnerships.

Mr. KILMER. So the—in terms of federal action, is the program sufficiently permissive for federal dollars to be used for this right now or would there have to be some change there?

Mr. FURZE. Thanks for that question. I think one of the things that Terry mentioned was just the scope and stature of the program and Anna mentioned Appendix A, right, there is a set of things that we can do easily through the program. And there was lots of discussion back during the Recovery Act, about bringing the Weatherization Plus Health program out of Washington State and across the nation and what we found is that, as Terry said, there wasn't funding to do that new opportunity.

And so my view is that the weatherization program focuses on a course that have helped in safety measures which are really essential to the safety of the occupants. And this is just taking a broader lens. And so some of the things that we do particularly around mold and mist, mold and mildew, walk off mats, vacuum cleaners, that type of stuff is beyond the scope of the weatherization program.

Mr. KILMER. The other thing I wanted to ask and I am not sure who to direct this too was to get a better sense of rental housing and some of the challenges facing rent burdened households. I know that we looked at the—where the money goes. And it looks like, I guess, 63 percent goes to single family homes, 18 percent to manufactured homes, 18 percent to large multi-family units and 5 percent to small multi-family units. I think most renters do not live in single family homes.

And so I would like to just get a sense in the time I have left, you know, how do we make these programs more, yeah, and the resulting energy cost savings and the health benefits and all that more accessible to low-income rent burdened households?

Ms. GARCIA. Please go ahead.

Mr. JACOBS. Thank you for that question, Representative Kilmer. We actually have a lot of experience with weatherizing rental units. The landlord who is the property owner has a lot of that—makes a lot of that decision, if they do not want you on the property, they have that—that right. So there is that stumbling block.

Another hurdle we face is eligibility determination because each—if you go into a large family, multi-family unit of say, 50, you have to virtually knock on every door and get in contact with every

tenant to get their information to determine if they are eligible. There are eligibility limits and percentages on multi-family, but it is a challenging task.

During the Recovery Act, there was an agreement between HUD and DOE and that made it much more simpler and they—actually, if they were a HUD-verified or eligible unit, then they would qualify for a WAP program. Thank you.

Ms. GARCIA. Yes, and I was going to cover some similar information, but the percentage of households in a multi-family building, in order to qualify, would need to be at least, I think is 60 percent, 55 or 60 percent of the households in there need to be low income and then of course there are the challenges of just being able to verify the eligibility.

The other thing that I would say is, depending on the size of the building would be dollars that the state can devote to that can be a limitation.

Ms. KAPTUR. Thank you, Congressman Kilmer, I think your questions lead us to other questions and we welcome the witnesses providing to the record any ideas you have either on gaps in your legislative authority through the Department of Energy or waivers to cooperate with other departments where necessary.

This is a hard program to cobble together because you have got Department of Health and Human Services, one of the largest departments through LIHEAP involved in this, you have got the Department of Energy which, you know, thinks about a lot of other things in addition to this program, and developing those partnerships across the federal establishment is not so easy and then it of course is farmed out to the states and then they have to put it together and whatever.

And sometimes when you have so many different stovepipes, you don't necessarily then easily transfer what you have learned at the local level back up to the top, right? So I think we are very interested in your suggestions after all these years of how we can improve the authorities under which you operate or make it easier to link to other departments. So please, think hard on that one for us as we move forward.

I am going to turn over now to Congressman Newhouse who has been listening intently. Thank you.

Mr. NEWHOUSE. I appreciate that observation, Madam Chair. Well, thanks to everybody in the panel for coming a great distance to be here with us especially Mr. Furze. Not only did you get out of the snow, but good luck to you on getting back. That might even be harder. And thanks to you, Madam Chair for holding this hearing on an important topic. I know many people in my district have had benefited from the work in the weatherization program in the—in a northern climate. That is important for people that can't afford to do these themselves and we realize a lot of benefits in.

One of the things that I have learned is that, you know, you can't make a decision without impacting other things that you want to accomplish as well. So I have a question that relates to some decisions that are being made back in the State of Washington for Mr. Furze. Many of you that well, now nobody else in this room besides us, maybe is from the State of Washington, you may be aware that our governor, your boss, recently released a massive $1.1 billion

plan for the endangered southern resident Orca, the whales that are struggling in Puget Sound. And for those of you that know that can do the math, that would be about $14.8 million for each of the remaining 74 whales.

Part of that, though, and that is what I want to talk to you about that part of that $1.1 billion is included $750,000 for a task force to analyze tearing down four Lower Snake River hydroelectric dams, which are in my district. They provide clean, emission-free, inexpensive, reliable baseload for families all over my district, in Central Washington, but all over the Pacific Northwest.

We work together on a lot of different things, my colleagues here in Washington and our colleagues in the State of Washington, however, as everyone knows, only Congress can authorize the breaching of federal dam, no governor can do that, has the power to tear down a federal program, let alone four of them.

So with that in mind, and sorry, it takes a little background here, but Mr. Furze as your—as a governor's assistant director for energy, my question, and in looking at everything we have heard today with the conversation regarding the Weather Assistance Program which is intended to help lower income families to reduce their energy bills and improve their health and all of those things, I am curious as to your thoughts as to whether or not that 3 quarters of a million dollars could be perhaps put to better use to help people in the State of Washington, the elderly, the disabled, our tribal friends, the low income communities with their energy bills and all of the other issues.

I am told that those folks spend approximately 16 percent of their income on energy cost compared with only 3.5 to 4 percent that other folks spend. So I guess, my question is what kind of impact could we see with an additional $750,000 for this program that, as you talk about, it is underfunded and certainly not meeting the needs of nearly 40 percent of low-income families in our state.

Mr. FURZE. Thank you for that question, Representative Newhouse. Unfortunately, I can't speak to the details of the Orca package and although I am aware of the element that you are referring to regarding the $750,000 to take a look at the Snake River dams, and I appreciate the perspective that you offered about the governor's authority relative to the authority of the Federal government, so thanks for that.

We are fortunate in the State of Washington to have the four funding sources that I mentioned and the—the—one of the largest of those is the state, we call them energy matchmaker dollars which is what allows us to do the Weatherization Plus Health program. The request in the governor's budget was for $25 million for those funds and off the top of my head, I will have to get back to you for the record for the amount of funding, the amount of homes that we will be able to weatherize with that funding, and we can do a comparable comparison for the amount of funding that you mentioned.

I think that it is really important that Washington supports the low energy prices that we have got. That is part of what we do through the grid transformation in the other part of my role here as the assistant director for the energy division is to look at the grid transformation efforts that Representative Fleischmann men-

tioned to figure out how we can combine that activity with the essential activity of the weatherization program to make sure that the most vulnerable receive the benefits that they need. Thank you.

Mr. NEWHOUSE. I appreciate that answer, and Madam Chair, in the few seconds I have remaining, if I could, I would like to submit two letters to the governor opposing this use of taxpayer dollars, they come from dozens of mayors, county officials, PUD commissioners, community leaders in the tri-cities, ports of Clarkston, also Lewiston in the great State of Idaho for Mr. Simpson's area that perhaps that these tax dollars could be put to better use even—maybe even the weatherization program that benefits so many thousands of people and could benefit many, many more in our state.

And thank you for your answers and—and I appreciate your being here. And good luck getting home.

Ms. KAPTUR. We will include that in the record without objection. We will include that in the record without objection. And Congressman Pocan and—you and Ms. Klusmeier share a Badger heritage.

Mr. POCAN. Absolutely, absolutely. Well, thank you, Madam Chair. And first of all my apologies to the—the committee and the guests for being late and having to come in and out. This is a very strange week with various funerals Tuesday and then tomorrow, it just made the calendar very challenging, but I appreciate you being here.

And well, thank you to all of our witnesses, especially, Ms. Klusmeier from my district, I appreciate you being here. In Wisconsin, you talked about bad weather, I know you had an interesting time getting here. Madam Chair, we had over 8 inches of snow yesterday, a couple of weeks before that, we are at minus 20 something, real temperature. So programs like these are especially appreciated in states like Wisconsin. I was sad to see the administration completely cut this program in the last proposed budget as well as the low-income home energy assistance program, both really important in my district. So I appreciate you all being here.

Ms. Klusmeier, I have a question for you, specifically, when we have those huge swings in temperature, we had minus 50 below wind chills, I have to admit, that was the 1 week I was glad to be here and not Wisconsin, because we didn't have that exact weather here, how does that provide, you know, challenges for the program and are there things within the program that we can do to better prepare homes and communities for those really wild temperature swings?

Ms. KLUSMEIER. So I think this is one of the huge benefits that weatherization provides as a resiliency strategy in those situations and those homes that have been weatherized are in a much better situation to keep those—those customer safe.

In Wisconsin, we are fortunate to have the public utilize funds in the program along with LIHEAP as the chairwoman mentioned earlier. Those funds are all blended together in Wisconsin, and part of that money is used to do a crisis assistance program for no heat situations.

So this is a model that is used in other states as well. So in those situations where you have life-threatening conditions where there are situations where people are without heat, the weatherization

network is used as a deployment network to get those people services in—in timeframes under 24 hours in most cases.

So that is a great example of—of the life-saving role that some of these agencies, the local agencies play in the field.

Mr. POCAN. All right, thank you. And then I know we talked just a little bit about things like solar and roofing and I appreciate your comments on that, Madam Chair. I had a question from one of the agencies that deals with this back home, and their question specifically was, in 2017, like almost 3,700 homes were weatherized across the state, specifically their question is what role does the deployment of decentralized renewable energy sources play in weatherization, and can eligible homes receive solar panels for example as a way of ensuring an added layer of energy security and efficiency?

Ms. KLUSMEIER. So as DOE mentioned earlier, there is a process in place at the federal level to incorporate renewables into the program. The average cost limit was also mentioned, so right now there is about a $3,700 average cost limit on renewables and that is a barrier for some states, so it does take some leveraged funding to make that happen.

Mr. POCAN. Can you group that money when you go into like if their—yes.

Ms. KLUSMEIER. So this is one of the best practices that in NASCSP, we get the most questions about right now, it is called blending or braiding funding. So in Wisconsin, yes, they do blend funds. So when that local provider is going into the house, they have the option to use all three of those funding sources on a measured level. Some states do not do that. So some states are keeping the DOE fund separate and we just completed our 2017 funding report at NASCSP that was published last week and we are seeing a majority of funds moving to blending those—those fund sources on a house-by-house level.

Mr. POCAN. Yes.

Ms. GARCIA. I would just add one comment on the leveraging or getting funds available to be braided in. So part of what the weatherization program, DOE weatherization program allows is for some of the budget to be used by the state staff to go out and find those leveraging sources, those leveraging resources that they can bring into the program. And I would just point out that Washington State has a very good track record in this area. They spent, I think it was $91,000 on leveraging activities that brought in $9 million in non-federal funding into the program.

Mr. POCAN. That is great. Congratulations. Yeah, please.

Mr. JACOBS. If I could just add, on the leveraging, so the—the photos that I showed you of the home that we provided eight different leveraging sources on, each and every one of them had a different eligibility criteria. This is more work than the actual work that gets done in the home practically. So if—and we have hit on this in several different questions that we need to figure out a way to bring everyone to the table and be happy with, one, if they are low income, they are low income. And we can provide that, you know, program together.

The coordination of all these leveraging, it is awesome, but the work that it takes to do that coordination is great, so.

Mr. POCAN. Great, thank you.

Ms. KAPTUR. Thank you all for those comments. I wanted to just say that because this program has so many legs, I think over a thousand or more implementing agencies locally, 50 states, territories, several federal departments, sometimes when a program operates that way, even though it has been successful, it is like you see the trees, but not the forest. And what I am asking you today is to glean from your experience and to try to work with this committee and submit to the record as you are able suggestions for what we might do to improve the program.

I have already talked to the authorizers on several of the related committees here and it is also complex congressionally. We have lots of committees or subcommittees involved in some way. And at this point, you must have gleaned from your vast experience ways in which we could improve the program.

I am very open to and we had a tremendous turnout of members this morning. This is only our second hearing and this is not the department's largest program. And this shows you the interest of the members, so you have got an awake group here and we want to help you do a better job to streamline where we can streamline, to take that state experience, to take your implementing experience on the community action agencies and to provide us with a more robust program.

I was going to ask Mr. Klusmeier, given the distribution of this program across the country, can you point to a state or a few states that you believe is doing a great job with weatherization dollars where we might learn how we can inform other states? I don't know if DOE does this or it is done at the state level, state to state, so I am very interested in where you perceive success and good program management and innovation.

Ms. KLUSMEIER. Sure. So, we mentioned Washington, I think they are certainly one of the leaders on the Weatherization Plus Health initiative. We would be happy to put together a brief or a summary for you of state, different state performance metrics if you would be interested in that on the record.

Ms. KAPTUR. Thank you, and—and any recommendations for program improvement.

Ms. KLUSMEIER. Yes.

Ms. KAPTUR. I am also interested if the department or any of you have ideas for a pilot program where we might take the innovation authorities that exist and look at a whole neighborhood. And many of our members talked about mobile home parks today.

I believe some of the most severe poverty in this country and in my district exists in these forgotten places. If you have examples or could conceive of pilot programs that we might try to launch, Ranking Member Simpson talked about Native American mobile home parks and Congressman Kilmer is interested in that as well.

I don't have such parks in my district. However, I do have deep poverty in many mobile home parks that I am seeing. And a lot of these are absentee owned, and I watch these individuals struggle. I was in a mobile home the other day where with the weather being 20 below the man's wall actually somehow expanded. I don't know, it was in the bathroom, the bathtub moved away from the wall and all the cold air was coming into his unit, and very poor

electricity where if he turned a space heater on with his sweeper, all the lights went out. I mean, it is just a disaster waiting to happen. Well actually, it did happen.

So I am interested in what might we do? Are there ways where we can have offsite solar power being produced where we can give a credit and it can go into these parks? How do we manage energy? And we know they are leaking energy, it is not sensible. Maybe there are things we can do.

I wanted to suggest to you also here in the Rayburn Building, many, many times we have organizations that come up here and they have big receptions over in the Rayburn foyer, they bring technologies. Perhaps your association might be interested in working with the subcommittee and we could find a date where we have fine technologies.

You could introduce other members of Congress and their staffs to what the Department of Energy has invented to test walls and to suck the air out of houses and figure out where the leaks are, to show some of the technologies that you view as modern and really up-to-date. Some of our members talked about sensors, and we could bring in some of the trades that you have relationships with and we can show the training programs for people in your program.

Maybe some of the folks on workforce development here in the House would be interested in some of the problems you are having and holding your staff, we need to figure out what to do about that. I don't know what to do about that, it is not technically our jurisdiction, but to help people to find a way to ultimately get credit or to become a journeyman.

I can't forget this one person, it was in Lorain, Ohio and he said to me, oh, I could have gotten an apprenticeship program? What is that? I mean, they didn't even know. I said, oh my gosh, how do we pull all the threads of this together? So I am looking for recommendations. Think about a time when it might be easy for you invite in some of your recipients across the country.

Let me move to Congressman Simpson at this point.

Mr. SIMPSON. Thank you Chairwoman Kaptur. He had to bring me into it. And while this has nothing to do with weatherization rather than the price of electricity. [Laughter.]

Mr. SIMPSON. And while you noted the benefits, I thought I was not going to say this, well you noted all about the benefits of the dams, you didn't mention that they also stopped the migration of salmon back to their breeding ground in Idaho which is my state which is a real problem. What would happen to electricity rates in Washington if BPA goes broke?

Mr. FURZE. Representative Simpson, thank you for that question. I will need to respond in the record that that is not a calculation that I have got in my head.

Mr. SIMPSON. Okay. Because it is a problem right now and some of us are trying solve the problem rather than add to it.

A couple of things, rental property was mentioned, is there a cost share for the individual that is living in the house or that owns a house on this program or anything or there is not any cost share?

Ms. GARCIA. No. There is not cost share, it is handled the same as owner homes.

Mr. SIMPSON. So basically if I had rental property, I am the one that is——

Ms. GARCIA. For the landlord.

Mr. SIMPSON. For the landlord.

Ms. GARCIA. For the landlord there can be. I was thinking about the renter.

Mr. SIMPSON. Okay, yes.

Ms. GARCIA. But for the landlord, yes.

Mr. SIMPSON. For the landlord, there can be a cost share.

Ms. GARCIA. Yes.

Mr. SIMPSON. Because he is the one that is going to get the benefit, it is improving the property that he is renting out and he is renting it out and making profit off of it. So it seems like there ought to be some type of cost share for the landlord.

Ms. GARCIA. The states have different approaches but, yes, there can be a cost share for the landlord.

Mr. SIMPSON. Okay. Were you going to say something?

Mr. JACOBS. In the State of Ohio, on multi-families we have a 50 percent contribution from the landlord on health and safety related measures. And on single families, that has been waived at this point.

Mr. SIMPSON. But it is different across the country. Should that be something that is kind of standardized?

Ms. KLUSMEIER. I think given the different housing stocks and the different climates in each state, each state has the opportunity to define what that policy would be in their annual planning process with the Department of Energy, which is approved by the Department of Energy.

So right now the department provides quite a bit of flexibility for states in that area and I think that is something that we would continue to support.

Mr. SIMPSON. We have heard about the benefits of the program, this committee has obviously limited resources, we all do. And we have to choose what is the biggest bang for the buck and look to the needs and so forth and so on.

Over the years we have, at least since I was Chairman, I know that we have increased the weatherization program not by huge amounts but each year we have increased it somewhat. Are there any ways for us to measure success of the program?

Is it just the number of units that we weatherize or is it just the cost savings? Do societal benefits come into this or anything? Because we have to weigh the benefits of the program versus other things that we are putting money into.

Ms. GARCIA. That is a very good question. And we are looking for as I said ways to get data that help us to understand more quickly what is going on a year-to-year basis in terms of the number of units weatherized, the kinds of savings that are being achieved.

We did do our last retrospective evaluation based on the program year 2008. We are looking at ways of doing smaller, more nimble evaluations on a year-to-year basis depending on appropriations within the resources that we have.

I would mention that there are a number of states across the country that do their own evaluations of the program and those are

often very helpful in looking at program impacts in between other kinds of work that the department does.

Mr. SIMPSON. What share of the total cost of the program goes to the administrative cost versus——

Ms. GARCIA. The limit is 10 percent. That is 5 percent for the state and 5 percent for the local agencies.

Mr. SIMPSON. Is that statutory or——

Ms. GARCIA. It's consistent with statute, yes.

Mr. SIMPSON. Okay. Are there improvements that could be made in the administrative portion of this that we spend fewer and fewer dollars on? I mean because all our desire is to get as much money out into the program actually as possible.

Ms. GARCIA. I think I would defer to my state and local colleagues on the administrative piece.

Mr. FURZE. What I would say about that is that it takes investment in infrastructure to be able to administer a high quality program. And so that is sort of the balancing.

I think the issues with grid modernization that Representative Fleischmann brought up in the questions of innovation that Chairwoman Kaptur brought up, that is where some of that work will happen. And so being able to have the capacity to think through linkages with existing programs, how to bring things on in grid transition require potentially additional resources either through SEP or through a weatherization program.

Mr. SIMPSON. Okay. I am a contractor in Southeast Idaho. Not really, but just theoretical, hypothetical. And I want to get into upgrading houses and stuff, because I can see this is kind of a lucrative business or at least one way to keep my people working. How do I qualify?

Ms. GARCIA. I believe the states set up their procurement processes for the agencies that deliver the programs, so.

Mr. JACOBS. In the State of Ohio, a contractor must have the same certifications as an installer. So they have to attend the training center to receive a long list of actual certifications. So it is quite intense in Ohio. So that adds to the difficulty of getting weatherization contractors.

Same for the, like, HVAC contractors as well, they have to have different certifications, but they have to have certain certifications to do work in weatherization program.

Ms. KLUSMEIER. So anecdotally, what we hear from both our local agencies and our member states is that they would love to have more contractors in this program.

And NASCSP did a survey in the fall of 2017 that showed 61 percent of the states did consider themselves contractor-based, opposed to 39 percent that considered themselves crew-based. So it varies widely from state-to-state and even local-to-local on whether or not those agencies are using contractors to do work or using in-house employees.

Mr. SIMPSON. So some states do have in-house people to go in and do the weatherization, people that they employ.

Ms. KLUSMEIER. The local agencies do.

Mr. SIMPSON. Yes.

Ms. KLUSMEIER. Right.

Mr. JACOBS. GLCAP is crew-based, so we have our own staff that do the work in the homes. In the northwest Ohio, the agencies are crew-based. There are no weatherization contractors in northwest Ohio that have all the certifications to do weatherization.

And during the last few years, I have had trouble finding staff. I contracted with a company out of Akron to come in to Northwest Ohio which is quite a drive, a couple hours. So the reasoning is because of the certifications that they need.

Mr. SIMPSON. I suspect this is different across different states, but are we having trouble getting people to do the work now? Because I mean, in some areas you cannot find people to do home improvements there. You know, if you want to do an addition to your house or something, having a hard time finding contractors.

So they are so busy now with the economy kind of growing in a lot of areas. Are we having trouble getting people to come in and do the work?

Mr. JACOBS. Yes. Great question because that is my number one problem with boots on the ground getting the work done as both contractors and installers.

The installers, would start there, it is not the best work in the world, they are crawling in attics that are 120 degrees, they are in crawl spaces that haven't seen the light of day in years and things are living in there and so on. I could provide you pictures for the record. [Laughter.]

Mr. SIMPSON. No thank you.

Mr. JACOBS. However, the contractors, it is the same problem. The economy is doing well, so they are going to that work versus this work because they don't have to jump any hoops, they can just do the work and get paid and not meet all the certifications and criteria that we need work in our program. We see that on both—run a CHIP program with HUD and we see it on both sides. And it is our number one challenge right now.

Ms. KLUSMEIER. So, I do agree that it depends on how the economy is working. So when the economy is doing well, contractors tend to move around more and they are more busy.

I do want to add that the federal rules of the program do allow our training and technical assistance funds to be used to train contactors. So many states are using that money with a retention agreement, usually that the contractor signs to agree to work in the program for a certain amount of time. They can get those certifications and trainings paid for by the program.

Mr. SIMPSON. Thank you all. Thanks for being here today and thanks for the work that you do. Appreciate it.

Ms. KAPTUR. I want to thank Ranking Member Simpson for his leadership and Congressman Fleischmann for staying for the entire hearing.

Let me ask, since the program is so distributed across the country. Does that preclude bulk buying of materials or technologies that you have found to be very important and high performing?

Ms. KLUSMEIER. So, by bulk purchasing I interpret that to mean like buying truckloads of cellulose——

Ms. KAPTUR. Furnaces.

Ms. KLUSMEIER. Furnaces. Okay.

Ms. KAPTUR. Sensors, windows——

Ms. KLUSMEIER. Sure.

Ms. KAPTUR. Et cetera. Are we losing something in terms of cost per unit because the program is so decentralized in terms of delivery?

Ms. KLUSMEIER. So the Federal rules do require a cost assessment to be done with every procurement action. So I can speak to it. In Wisconsin that is done at the local level, so each local agency would purchase their own materials and supplies and do a cost assessment at that point.

I am aware of some states that look at doing that at the state level as well, so they purchase all the materials to try to get a bulk discount essentially is what it sounds like.

Ms. KAPTUR. Right. That is what I wondered because the program is so locally-driven and state-driven, because DOE just has the funding that goes to the states. But then you sort of look and think to yourself, hmm, what could we do nationally that would benefit?

Like I say, a furnace is an expensive item, a water heater is an expensive item, is there anything we can do to, think about this in your reply to the record, in talking to one another, is there anything we can do to increase efficiency in procurement? And that would be something that would have to be led nationally by the Department of Energy, and I honestly don't know Director Garcia, if you have sufficient staff to even do all of this, to really do the kind of granular analysis across the country. Do you need additional staff in your area of expertise at DOE?

Ms. GARCIA. I will confer with the NASCSP folks and we have worked together on questions like this in the past and we would take this on together.

Ms. KAPTUR. All right. Before long, we will be benefited by the directors of our national labs coming in here, the Department of Energy operates 17 labs across the country.

And as I look at some of the photos you put up there this morning, I just kept thinking, new materials. New materials. What can we do to help to make this program just even be more effective? And so I am going to ask you a hard question and make recommendations to me when the directors of the lab say to us, well what can we do beyond what we are doing now?

And I would like to say, well, I want you to look at the weatherization program. And we know that the Oak Ridge Labs do a lot of work related to this program, and tell me what I should ask them. Should I ask them for solar siding? Should I ask them for a roof that produces energy? What do I ask them for? To cut the cost of water heaters by half and connect it to the roof? I don't know. Give me some thoughts about what to ask the national labs.

Mr. FURZE. Chairwoman——

Ms. KAPTUR. Yes, Mr. Furze.

Mr. FURZE. What I would ask you to think about is to leverage the idea that you put forward around neighborhoods and communities. I am most familiar with the work of Pacific Northwest National Lab, they are the hub for grid modernization efforts certainly in the Northwest, in the grid modernization consortium.

And if we are thinking about a neighborhood scale systems approach to energy efficiency, through a lot of electric vehicles, smart

water heaters, IOT, how might those things be integrated so that low-income folks can benefit, is a question that I ask myself.

Ms. KAPTUR. I appreciate that comment. Because I think there is enough experience in this program now earned by hard effort in so many places. I think we can now distill something and take it to the next step, but I have been in houses but I haven't crawled through those spaces with the critters.

But I know how our homes leak energy, I had a developer come in the other day, a new patent holder talking to me about these modular homes that they are going to be building in the west and it was so fascinating. They are going to cut the energy bills by well over a third. And solar thermal is built right into the wall.

And they actually use a technology, whether it works or not, I don't know, but it was, I want to say, a Styrofoam product that had cement on both sides and a steel beam construction. It was just fascinating to think about what is being done. And then you look at existing stock and say, okay, so how do you really retool this? What are the magic ways in which we do that? And you have such experience in that.

Some of the devices that I saw individuals using in the homes that we visited were actually invented by the Department of Energy but several years ago. So I am asking myself, so now what? What now do we want to ask them to invent? So could you talk among yourselves and make recommendations to the record on it? Yes, Ms. Garcia?

Ms. GARCIA. I would just add I am certainly happy to take this question for the record. There is work going on between the labs and the Building Technologies Office on low temperature heat pumps which could have great application and we are watching that. And so that might be something to ask them about, what the current state of that technology is.

Ms. KAPTUR. All right. Very good. Yes, Mr. Jacobs, any final comments?

Mr. JACOBS. Yes. On that specific question, I love the idea of innovation. And we love innovative products such as 2-part foam. Two-part foam versus doing it a different way in the home is a lot faster, however, it is more expensive.

So we have at the local level have to balance measures. We input them into a program from DOE and it basically tells us whether or not it cost justifies to be used or not. So though I am 100 percent for all that, it is just on a practical level it has to meet the SIR of 1 or greater to be used in the home.

It does speed up the production of getting that work done. So it is a really good idea and I would like to explore that further.

Ms. KAPTUR. Thank you. Ms. Garcia, could you estimate this Fiscal Year or 2019, approximately how many homes would you assume would be weatherized across our country based on past experience?

Ms. GARCIA. Given the average cost limit per house, we are estimating it is on the order of about 38,000 homes.

Ms. KAPTUR. Thirty eight thousand. See, imagine if you could bulk purchase some of that. I don't know if practically that can actually happen, but if we could reduce share price by nationally helping to procure, wouldn't that be something?

Mr. JACOBS. If I could comment to that, on just for an example of cellulose. So we buy cellulose bulk from a company in Bucyrus we get it a lot cheaper that way than versus buying it from, you know, a big box store like Lowe's or Home Depot.

Savings per bag is upwards of $3 or $4 a bag, so we get a semi-trailer truck full of about a thousand bags which saves us a lot of money on each purchase. If that could be done by state or on a national level, I don't know what that number to be.

Ms. KAPTUR. Right. And what would you say is your most expensive purchase annually? Would it be the furnace, the water heaters, of you look at where you spend the most money. Mr. Jacobs.

Mr. JACOBS. Labor would definitely be number one. That is our number one expense. And then I could get that information for you for the record but I would say cellulose is very cheap.

So what you saw on the picture, the cellulose blown in the attic, that stuff is $5.50 a bag, you know, to $6 a bag. But 2-part foam is like $300 a box which only goes a little ways. But I could get you that information if you need more.

Ms. KAPTUR. This is a very interesting discussion. Wouldn't you say Mr. Ranking Member? Bulk purchase somehow to drive this. I don't know how to do it exactly, but if we say things publicly, sometimes things magically happen. [Laughter.]

Ms. KAPTUR. And we can get very progressive states like Washington to help be a voice for this and the National Association for State Community Services Programs.

All right. Well everyone has been very generous in coming here this morning. I want to thank you for participating, I want to thank all the members who took time this morning to meet their obligation and they all did. And I want to thank our ranking member for his participation. And this hearing will come to a close. It is adjourned.

QUESTIONS FOR THE RECORD

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
HOUSE COMMITTEE ON APPROPRIATIONS

Hearing on the Weatherization Assistance Program
Wednesday, February 13, 2019

Chairwoman Kaptur

1. Innovation

Ms. Garcia, in an answer to my question regarding innovation, you mentioned that states have introduced solar thermal water heaters.

Question: Can you detail how this new technology was introduced to the weatherization program? What steps did the states take in order for solar thermal water heaters to be used in weatherization?

Weatherization Assistance Program (WAP) Grantees that choose to implement solar thermal water heaters (SHW) must receive Department of Energy (DOE) approval as part of the energy audit approval process. SHW are proven technologies and can be approved by DOE if the Grantee shows that the measure is cost effective (i.e., meets a savings-to-investment ration (SIR) of 1.0 or greater) and the Grantee's network has the technical capability to provide and install systems that perform effectively over their life span.

SHW can be cost effective in mild climates and have been installed by WAP Grantees in Hawaii, Puerto Rico, and the Virgin Islands as part of the normal program since 2011. In the case of Puerto Rico, a special exemption was needed because the units manufactured in Puerto Rico did not have backup heating capability, which is a standard requirement[1] in the United States. Puerto Rico was able to demonstrate that backup heating is not necessary in its climate.

In 2010, DOE used American Recovery and Reinvestment Act of 2009 (ARRA) funds to implement a Sustainable Energy Resources for Consumers (SERC) grant program that facilitated installations of SHW by some WAP Grantees. The SERC grant program is authorized under the Energy Independence and Security Act of 2007 (EISA) Pub. L. 110-140, Section 411(b). Under this program, DOE is allowed to allocate up to 2% of WAP funds to SERC grants if the national WAP budget exceeds $275 million in a single fiscal year. The ARRA budget for WAP in 2009 was $5 billion, thus exceeding the $275 million threshold and prompting 2% to be reserved for SERC grants. The SERC grant program awarded a total of $90 million in 27 states to WAP Grantees. SERC projects are not required to meet a

[1] The standard requirement in the US is that a solar water heater SWH must receive the Solar Rating and Certification Corporation's (SRCC's) OG-300 certification. Puerto Rico's waiver requires that the SWH only receives the SRCC OG-100 certification.

savings-to-investment ratio (SIR) of 1.0 or greater in order to explore pathways for bringing new technologies into the program and potentially find efficiencies and other ways to reduce costs of these new technologies that factor into the SIR. As a result, the SERC grant program provided WAP the opportunity to employ alternative measures in the residential sector that might have otherwise been deemed lower priorities as a result of low cost-effectiveness (i.e., SIR), or that may have been considered unallowable under current WAP standards because of the inherent risks involved with innovation.

The Oak Ridge National Laboratory (ORNL) performed an assessment of the Department's SERC Grant program.[2] Seventeen Grantees[3] out of the 27 SERC recipients included SHW as one of the innovative measures to include under their SERC grant. According to the ORNL assessment, a total of 2,026 solar hot water heaters were installed with SERC funding, primarily in single family homes and mobile homes, but also in a few multi-family buildings. To date, DOE has not seen any of these grantees request SHW as a measure in their normal WAP programs, likely due to SIR or other challenges/barriers to its installation. In the SERC assessment, ORNL found the estimated cost of SHW technology to range from $9,200 to $10,000 per unit, and that it had a very low estimated SIR, from 0.17 to

[2] https://weatherization.ornl.gov/wp-content/uploads/2018/03/ORNLTM2017703SERC.pdf
[3] Arizona, Idaho, Indiana, Massachusetts, Maine, Michigan, Missouri, Montana, North Dakota, New Hampshire, Nevada, New York, Oklahoma, Oregon, Virginia, Vermont and Washington

0.25, significantly short of the 1.0 SIR to qualify for installation under DOE WAP rules.

2. Training Centers

Ms. Garcia, in an answer to my question regarding worker training, you mentioned that there were about 22 universities and other organizations involved in training weatherization crews.

Question: Can you provide a list of the 22 universities or other organizations that operate training centers that members of weatherization crews can take advantage of?

As of February 8, 2019, the WAP training network includes **21 accredited training centers**[4].

Among them, these centers offer a combined **65 accredited training programs** (e.g., accredited Quality Control Inspector training program).

Training providers often travel to provide training outside their states, but they are listed below by the state that the physical center is based in. **Underlined and bolded centers** are associated with universities, colleges, or community colleges.

- Arizona - FSL Southwest Building Science Training Center
- Georgia - Southface Energy Institute
- **Illinois - Indoor Climate Research & Training, University of Illinois**
- Indiana - Indiana Community Action Association
- Kentucky - Residential Energy Efficiency – Training Initiatives

[4] https://irecusa.org/credentialing/credential-holders/

- Massachusetts - SMOC / Green Jobs Academy
- **Montana - Montana Weatherization Training Center, Montana State University**
- Nebraska - Contractors-Laborers Training Fund
- **New Mexico - Santa Fe Community College**
- New York - Association for Energy Affordability (AEA)
- New York - New York State Weatherization Directors Association (NYSWDA)
- North Carolina - Everblue
- Ohio - COAD Ohio Weatherization Training Center
- Oklahoma - Oklahoma Weatherization Training Center
- Oregon - Oregon Training Institute
- **Pennsylvania - National Sustainable Structures Center, Pennsylvania College of Technology**
- Pennsylvania - Energy Coordinating Agency of Philadelphia, Inc.
- Utah - State of Utah
- Virginia - CHP Energy Solutions, LLC
- Washington - Building Performance Center
- Wisconsin - Wisconsin Energy Conservation Corporation (soon to be called SlipStream)

3. Neighborhood Approach

Ms. Garcia, in an answer to my question regarding a holistic neighborhood approach to weatherization, you mentioned Murray City, Ohio and the state of Connecticut's efforts.

Question: Can you provide more information about Murray City, Ohio and how they were able to weatherize over 75 percent of low income households using weatherization funds and bringing in private donors?

The Murray City, Ohio, community-based project serves as an innovative example of how to organize and deliver weatherization assistance and other energy efficiency programs. The innovation comes from marshalling resources from multiple sources beyond the traditional leveraging of utility program funding with Weatherization Assistance Program (WAP) resources in order to serve all households in a neighborhood.

Murray City is a small town located in Hocking County, Ohio, deep within southeastern Ohio's coal country. Eighty percent of Murray City's 200 households qualify for low-income weatherization assistance. Most of the homes are over 100 years old, and are single-story structures with no insulation, failing HVAC systems, outdated and inefficient appliances, poor ventilation, and other problems.

The Corporation for Ohio Appalachian Development (COAD) is a private non-profit consortium of 17 community action agencies that serve 30 counties in southeastern Ohio. During the American Recovery and Reinvestment Act (ARRA),

COAD launched a long-term goal to weatherize an entire community. With WAP ARRA funding of approximately $1M dollars for this project and approval from the state weatherization office to waive priority list requirements[5], COAD moved forward to launch the Murray City project. As part of its role, COAD segmented the community into two groups, one comprising households eligible for low-income programs, including DOE-funded WAP, and the other comprising non-low-income households that would be able to participate in other programs.

Low-Income or WAP Eligible Homes

WAP funding was used for low-income-eligible homes to receive the energy efficiency retrofits. COAD conducted energy audits for the WAP income-eligible homes. The local COAD delegate agency serving Murray City, Hocking Athens Perry Community Action Agency (HAPCAP), had established a relationship with the mayor and city council, which increased public awareness for the project with Murray City residents. HAPCAP received the energy audits for the low-income weatherization program completed by COAD and managed trained weatherization crews within the city. Using the WAP ARRA funds in combination with utility programs of Columbia Gas of Ohio and AEP, the agency was able to offer a variety

[5] Priority list requirements refers to priority of service to households with elderly, disabled, households with children, high-energy burden or high energy users, as required by 10 CFR 440.16(b).

of low-income programs and leveraged funding for this unique community-wide approach.

Non-WAP Eligible Homes

COAD, by building on existing and new relationships with local contractors and entities such as CLEAResult® (formerly Conservation Services Group, CSG), was able to develop the project in a way to be able to offer a weatherization/energy efficiency program to all income levels. COAD referred non-low-income households to CLEAResult® to conduct the energy audits for homes above the income eligibility guidelines for WAP. CLEAResult® also worked with private sector contractors through the Home Performance with Energy Star Program (HPwES). Rebates and other resources for the project were provided by American Electric Power (AEP) and Columbia Gas of Ohio.

Question: Can you provide more information about the two utilities in Connecticut that have been piloting community efforts for the last couple of years?

In addition to United Illuminating Company and Connecticut Light and Power Company (Eversource), Connecticut Natural Gas and Southern Connecticut Gas have also been involved in piloting or implementing neighborhood/community based weatherization programs. These utilities have implemented neighborhood low-income programs in addition to the DOE weatherization program, using a variety of community providers. Connecticut utilities' programs are often

implemented by the same local non-profits (including local community action agencies) that provide DOE-funded weatherization services. The utility-funded low-income weatherization program is called Home Energy Solutions – Income-Eligible (HES-IE) and is funded through Eversource, United Illuminating, Connecticut Natural Gas, and Southern Connecticut Gas. The utilities streamline eligibility with the federal Weatherization Assistance Program (WAP) and Low-Income Home Energy Assistance Program (LIHEAP) requirements, as well as the Connecticut Green Bank application. This means that one application can be used for HES-IE, WAP, and LIHEAP. The program is supported by Energize Connecticut, and utilities partner with community action agencies to cost share for WAP-funded projects.

The HES-IE program is available to qualified low-income residential customers in both single and multifamily buildings and provides no-cost weatherization measures and low-cost energy efficiency upgrades. Like DOE WAP, the HES-IE energy conservation measures can include air sealing, duct sealing, lighting fixtures, water efficiency measures, and insulation. Energy-efficient upgrades include appliance replacements, water heaters, HVAC systems, and windows. The program also includes funds to address health and safety issues. The marshalling of resources from HES-IE, DOE, and LIHEAP allows for different funding sources to be used within the same home for energy efficiency upgrades.

Although the HES-IE program has a different approach than the Ohio examples, whole towns can utilize the HES-IE services model. For example, United Illuminating partnered with Park City Communities on a multi-family project in Bridgeport, Connecticut,[6] and the Town of Greenwich[7] has also launched an HES project with Eversource.

[6] https://nerej.com/ui-and-parkcitycommunities-turn-to-cmcenergyservices
[7] https://www.greenwichsentinel.com/2017/04/11/greenwich-eversource-announce-town-wide-energy-efficiency-efforts/

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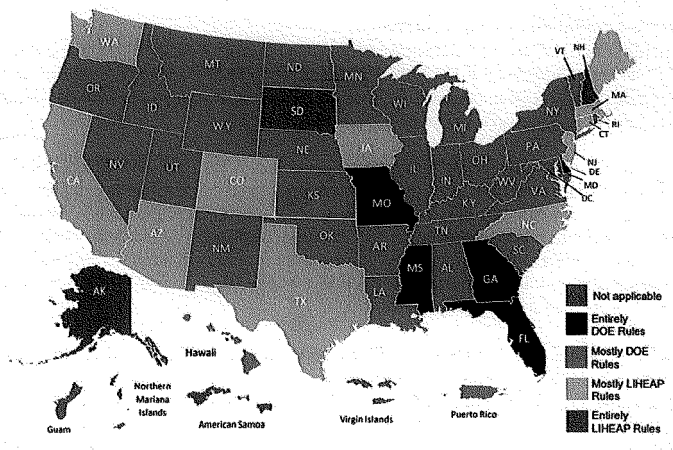
Questions for the Record
Hearing on Weatherization Assistance Program
Wednesday, February 13, 2019

Ms. Klusmeier, in my questioning, I asked about best practices among states. Question: Can you provide a summary of state by state performance metrics?

As the member association for the State Directors of the Weatherization Assistance Program (WAP), NASCSP is uniquely positioned to identify and disseminate best practices that enhance the performance of WAP across the country. Below we have highlighted best practices that present that represent trends in the management and execution of the weatherization program, based in part from data collected annually for the Weatherization Assistance Program Funding Report. The full version of the report, including state-by-state data, can be found on the NASCSP website: https://nascsp.org/wap/weatherization-publications/wap-annual-funding-surveys/

Coordination with LIHEAP

The annual Department of Energy (DOE) appropriations from Congress provide the core funding for the WAP. However, a strategic partnership with the Low-Income Home Energy Assistance Program (LIHEAP) within the Department of Health and Human Services (HHS) provides additional critical funding for the program. HHS allows states to transfer up to 15% of their LIHEAP allocation to WAP and up to 25% with an approved good-cause waiver. According to HHS, 47 States and the District of Columbia transferred LIHEAP funds to their WAP in 2017. LIHEAP funds transferred to WAP are subject to the rules laid out in the state LIHEAP Plan, a document which is reviewed and approved by HHS. In their plans, states can choose whether to have those LIHEAP funds follow entirely DOE rules, entirely LIHEAP rules, or a hybrid



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between the two.

A best practice identified across the network is to adopt at least some LIHEAP rules. This gives States flexibility to provide more comprehensive services than with DOE funds alone. For example, in order to ensure that the majority of DOE dollars go towards energy conservation measures that provide savings to low-income clients, program rules limit the amount of DOE funds that may be used for health and safety measures. Selecting to follow LIHEAP rules and structuring LIHEAP plans to maximize flexibility in program rules allows states to expand the services provided and offer additional health and safety measures to households eligible for weatherization. In some cases, LIHEAP funds are instrumental in ensuring a home is not deferred from the WAP due to health and safety issues.

> *Example: Pennsylvania*
> In Pennsylvania, LIHEAP and WAP are administered by the Department of Community and Economic Development. The department conducted a survey to identify predominant reasons for deferral from the WAP program. These included moisture/mold issues, roof damage, overall structural problems, and knob and tube wiring. Pennsylvania is targeting LIHEAP funds to address these issues in order to reduce deferrals and enable weatherization services.

> *Example: Ohio*
> In 2018, the Ohio state legislature required the state to increase their LIHEAP transfer from 15% to 20%. The state directed the additional 5% to help address four major issues identified through surveys and listening sessions: furnace repair/replacement, replacement of knob-and-tube wiring, ventilation measures, and roof repair.

Leveraging Additional Funding Sources
Core funding from DOE, as well as the reputation and expertise of DOE, allow States and local agencies to leverage additional funds from non-federal sources that enhance the program and make it robust and effective nationwide. Without DOE investment, it would be difficult for States and local agencies to draw other funders to the table.

Leveraged funds can be broken into two major categories: Utility funds and State Funds. Utility Funds are any funds that utilities collect from ratepayers and either transfer to a public benefit fund, to a WAP state agency, or to programs run directly by contracting with WAP local agencies. Utility funds make up the majority of leveraged funding in the network. State funds come from state-collected revenues such as fees or tax revenues like funds from energy production royalties paid to the state. Additionally, a very limited number of states appropriate additional to WAP in the state budget.

In our 2017 funding survey, a total of 29 States reported utilizing leveraged funds in 2017, up from 28 states in 2016. Additionally, in some cases local agencies leverage funds from utilities directly. These direct partnerships exist in an additional 12 states.

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THURSDAY, MARCH 7, 2019.

ENERGY WORKFORCE OPPORTUNITIES AND CHALLENGES

WITNESSES

MORGAN SMITH, CHIEF EXECUTIVE OFFICER, CONSOLIDATED NUCLEAR SECURITY, LLC

DONNIE COLSTON, DIRECTOR OF UTILITY DEPARTMENT, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS

SLOANE EVANS, CENTER FOR ENERGY WORKFORCE DEVELOPMENT AND SENIOR VICE PRESIDENT FOR HUMAN RESOURCES, GEORGIA POWER & SOUTHERN COMPANY

NOËL BAKHTIAN, DIRECTOR, CENTER FOR ADVANCED ENERGY STUDIES

Ms. KAPTUR. This is our third hearing. And let me especially thank the witnesses who are with us today, thank members on both sides of the aisle for their faithful attendance. And on the very important subject today of energy workforce development opportunities.

Today our subcommittee will discuss future energy jobs and the need to ensure that our Nation has a ready, capable workforce, both for today and the next generation, to meet our Nation's growing energy demands.

Developing clean, cutting edge energy technologies and safeguarding our national nuclear security requires our concerted attention.

The Department of Energy itself is responsible for addressing energy, environmental, and nuclear security challenges, relying on approximately 100,000 Federal employees and contractors to fulfill these duties. We look forward to hearing from our expert panel about workforce development opportunities and challenges in nuclear security and the broader energy sector, with a particular focus on the vital role of industry, organized labor and its training academies, science, technology, engineering, and academia.

In particular, questions I hope we discuss today include what are we doing to improve the diversity and readiness of America's workforce to meet future energy and nuclear security needs, and is it enough. And what should the United States be doing and thinking about to create more skilled worker pipelines and training collaborations in the nuclear security and energy workforce.

We can learn a lot from you.

As we start, I wanted to highlight a few key points with respect to today's energy workforce that represents both the opportunities and the challenges facing us. We are putting up some headlines. They're from newspapers around the country about the unmet energy talent that we need from coast to coast and that information summarizes the fact that roughly 12 percent of today's energy in-

dustry workforce is eligible to retire. That translates into about 800,000 jobs that would need to be filled if everybody retired today.

Also, 76 percent of energy industry employers have reported hiring difficulties—76 percent; three-quarters. According to the Energy and Employment Report for this year, which was just released yesterday, the U.S. energy sector employs about 6.7 million of our fellow citizens. This job sector is projected to grow by an additional 1.5 million by 2030. This does not include the 42,000 men and women in the national nuclear security complex.

These challenges underscore the need to invest in our energy workforce, the steel and iron workers, nuclear operators, electricians, plumbers and pipe fitters, engineers, scientists, physicists, and how critical those investments are for a ready, capable workforce.

With respect to nuclear security, the Department of Energy is in the midst of a scope of work it hasn't seen since the Cold War to sustain the nuclear deterrent. There are many risks and challenges in this mission and thus the DoE requires the necessary workforce to accomplish its mission in a safe, security, and cost effective manner.

And as the energy sector evolves to include more sustainable forms of energy, as our nuclear security needs have also grown, and as more Americans retire, it is paramount that today's energy workforce transitions meet new opportunities and that we build the workforce of tomorrow.

In my view, energy workforce development is about collaboration and establishing closer partnerships between labor, our STEM objectives, the national laboratories, industry, and academia. Collaboration is, for example, creating new opportunities for workers in coal country as our energy mix changes. Collaboration can ensure the next generation is ready to be nuclear welders or nuclear physicists. And collaboration means reaching more people in more places, including those with diverse backgrounds and skill sets or those with little familiarity with this employment sector.

And that is why you are here today, so that we can elevate what you say to a much broader audience beyond these walls.

I want to again thank our witnesses for their testimony today and I look forward to our discussion.

And I would now like to turn to our amiable and talented ranking member, Mr. Simpson, for any remarks he might have.

Mr. SIMPSON. Thank you, Chairwoman Kaptur. I would like to join you in welcoming our witnesses to today's hearing. We always appreciate when experts such as yourselves are willing to take the time out of your schedules to come and talk with us about what you do and how the Federal Government can help you succeed in that effort.

I would also like to extend a particular welcome to Dr. Noël Bakhtian, the director for the Center for Advanced Studies in Idaho. While I am certainly familiar with the workforce development collaboration being advanced through CAES, I am pleased that today my colleagues will have the opportunity to hear about it as well.

Part of the reason we hold oversight hearings is so success stories can be shared with a wider audience, perhaps leading to im-

provements in more locations. So, Dr. Bakhtian, thank you for making the trek across the country from that warm state of Idaho where the snow starting to melt a little bit, to this warm location here in Washington.

The Department of Energy's programs impact a broad spectrum of national security and national economic security issues. The workforce needs are equally as broad and diverse, from the researchers and engineers advancing our understanding of the sciences and developing new technologies for defense and energy production purposes, to the skilled trades people building and operating Federal facilities and safely remediating sites contaminated by previous Federal activities, to the project management experts ensuring Federal taxpayer dollars are being spent effectively. It is no simple task to project and meet future workforce needs in any case. The significant changes in the energy world make it particularly challenging.

On the national security side, we need to reestablish many important capabilities we previously let fade away thinking they wouldn't be necessary moving forward. On the energy sector side, the transformations of the energy related to new technologies and emerging concerns, like cybersecurity, are demanding a quickly and ever evolving set of new skills and tools.

The Department of Energy does not have primary responsibility for ensuring all of these workforce development needs are met. But where the Federal Government has a vested interest for national security or economic security reasons, the Department can and does play an important role in workforce development.

I look forward to hearing from our witnesses about the challenges and successes and ideas for improvements in this area.

I thank the Chairwoman for calling this hearing and look forward to it.

Ms. KAPTUR. Thank you very much, Mr. Simpson. And I am very grateful to the witnesses who have traveled here today, many long distances. And we are very excited by you being with us today.

First, we will have Mr. Morgan Smith who is chief executive officer of Consolidated Nuclear Security LLC. Mr. Smith is responsible for managing the National Nuclear Security Administration's Y–12 and Pantex facilities. He has over 35 years of experience managing nuclear programs and facilities and has held senior leadership roles at the Knolls and Bettis Atomic Laboratories.

Next, we will have Mr. Donnie Colston with the International Brotherhood of Electrical Workers, Department of Utilities. Mr. Colston has been with the IBEW for almost 40 years and is responsible for representing the interests of over 240,000 utility workers who perform some of the most difficult jobs in the country from coast to coast.

Following that we will turn to Ms. Sloan Evans, who is testifying on behalf of the Center for Energy Workforce Development. Ms. Evans is the Senior Vice President of Human Resources at Georgia Power and Southern Company where she manages leadership, employee development, and staffing programs.

And last, but not least, we will have Dr. Noël Bakhtian, who serves as the Director for the Center on Advanced Energy Studies. Dr. Bakhtian is a mechanical engineer and has held positions at

the White House and the Department of Energy's Office of International Affairs.

Thank you all for taking the time to be here today. Without objection, your written statements will be entered into the record. Please feel free to summarize your remarks in about 5 minutes if you can, starting with Mr. Smith.

Mr. SMITH. Chairwoman Kaptur, thank you. Ranking Member, Mr. Simpson, thank you. Members of the subcommittee, thank you again for having us.

It is a pleasure to talk to you about some of our strategy and some of the opportunity and challenge that we have in maintaining a robust workforce at our Pantex Plant, Amarillo, Texas and in Oak Ridge at the Y–12 National Security Complex.

I would also like to thank the subcommittee for your investment in our sites. We have had heavy investment in improving the site infrastructure, which is important both to enable us to fulfill our future missions, as well as give our workers and future workers a good place to work. So thank you for that.

Today we employ approximately 300 employees, 3,400 at the Pantex site, about 4,900 in Oak Ridge. Both locations have a proud legacy of very hard work and patriotism serving our Nation and these sites have been in existence since the Manhattan Project and World War II doing that service. Many of our employees are generational there, from one generation to the next. And so we intend to maintain that proud tradition while certainly having a priority on identifying the next generation of workers.

On the average, our workers are 48 years of age, 13 years of experience on our sites, they possess a vast array of skills, such as the construction workers, the various building trades that are building the new uranium processing facility in the Oak Ridge area, and those same types of workers maintain our aged plants to keep us in production. Engineers, scientists, production technicians, machinists, chemical operators, all produce the product that ultimately we provide for the Nation. Then our security police officers, our business professionals, cyber specialists, administrative professionals, all support this work as some examples of the type of workforce we have.

Nearly half of our workers, about 4,000, are represented by 9 labor organizations. And I want to tell you that labor leadership at our sites are true partners in accomplishing the nuclear deterrent work that we do.

And I want to recognize one of those labor leaders here today, Mike Thompson, who I think is in the second row. He is actually the president of our largest group at Y–12, the Atomic Trades and Labor Council, representing over 1,200 employees. And Mike and his team really champion a number of the things that you discussed, Chairwoman, relative to really championing, engaging people in the trades, convincing them that STEM is important and bringing them along to join our workforce.

Building the workforce of the future requires a broad spectrum of recruiting, development, engagement, and retention strategies. Part of our strategy is to build academic alliances with colleges and universities and other schools. It is very, very important that we do that because out of that we can have research collaborations, we

can have skill development and training programs, and we clearly obtain hiring pipelines.

A unique example was something that we had done with Roane State in Oak Ridge. We partnered with the college there to develop a curriculum that trains chemical operators. The students meet at night where tuition is paid for the by the State. This is very important to us and the work that we do at Y–12, and we hope that this program will continue to develop. Today we have approximately 10 people in that program, but very important for the future.

We also partner with other educational institutions to promote interest in science, technology, engineering, math, and manufacturing skills. And then as well to provide job opportunity awareness of what we have at Pantex and Y–12. We engage middle school students all the way through graduate students in doing that. And we also make them aware of the unique character and behavioral expectations that it takes to do work in the nuclear field.

A recent example is in Texas we work with the Canyon Independent School District in the Texas panhandle to establish a trade curriculum where we are taking high schoolers and preparing them to be production technicians or certified welders, such that they can pass the qualification exams. And then we also work closely with labor leadership to establish apprenticeship programs. Right now we have just obtained agreement to go through with about 45 a year for the next 3 years between Texas and the Oak Ridge area to cover areas like steam plant operators, utility operators, machinists, electricians, iron workers, pipe fitters. Very important to us to build that workforce for the future.

The programs that focused on further developing and retaining our existing workforce are also very necessary. We have a number or examples that we work with the University of Tennessee on, various graduate engineering programs that have graduated more than 60 of our employees. And right now we have 25 more enrolled, including now distance learning out of Pantex in Texas. We think that type of program has the opportunity to be extended to other areas of the nuclear security enterprise. And I can tell you that the administrator of NNSA, Lisa Gordon-Hagerty, has a tremendous vision for workforce development and recruitment for the future. Outstanding work by her doing that.

And so it is through all these avenues that we have to continually grow our future workforce. It will take a strategic, varied, and fully engaged approach to enable us to accomplish the important mission work in entrusted to us. And the fact is, the skilled workers are what are so essential, and our future national success will depend on our ability to attract, develop, and retain that workforce. It is paramount that we succeed.

And I am very appreciative of the interest of this subcommittee in that future.

Thank you for the opportunity to give you these remarks.

[The information follows:]

Statement of Morgan Smith, President and CEO

Consolidated Nuclear Security, LLC

on

"Energy Workforce Development: Opportunities and Challenges"

Before the

Subcommittee on Energy and Water Development

House Committee on Appropriations

March 7, 2019

Chairwoman Kaptur, Ranking Member Simpson, members of the subcommittee, thank you for the opportunity to submit this statement on the strategies and challenges involved in maintaining a robust workforce at the Pantex Plant in Amarillo, Texas, and the Y-12 National Security Complex in Oak Ridge, Tennessee. Consolidated Nuclear Security, LLC (CNS) is very appreciative of the continued support the House Appropriations Committee, and the Energy and Water Development Subcommittee in particular, has provided for the sites over the years and we are especially appreciative of the opportunity to discuss a topic that involves our most important asset: our people.

CNS is the management and operating contractor for the National Nuclear Security Administration's (NNSA) two primary nuclear production sites: the Pantex Plant and the Y-12 National Security Complex. CNS assumed the management and operating responsibility for the sites on July 1, 2014. Pantex is our nation's only nuclear weapons assembly/disassembly facility. Y-12 is our nation's only nuclear weapons secondary facility. Without the essential work performed at Pantex and Y-12, our Nation would be unable to maintain the nuclear deterrent so essential to the defense of our country. The essential, but quiet, work performed in these two facilities is an important element to the security of our nation and our allies. It is a privilege to work alongside the patriots that comprise the federal and contractor workforces in support of this vital mission. It is also a privilege to engage with our host communities as we work together to improve both the sites and the surrounding areas.

Both sites have long and storied histories of contributing to the nation's nuclear deterrent. The Pantex Plant produced conventional bombs and artillery shells when it was established during World War II, but was recast in the 1950s as a main hub for the assembly of thousands of nuclear warheads during the Cold War. Since 1975, Pantex has been the nation's primary assembly, disassembly, retrofit, surveillance, and modification center for nuclear weapons. Pantex also produces the chemical high explosives used in nuclear weapons and serves as the interim storage location for plutonium components that have been removed from dismantled nuclear weapons.

Y-12 was established as one of three Manhattan Project sites and produced the enriched uranium that fueled the Little Boy atomic bomb that contributed to the rapid conclusion of World War II. As the Cold War progressed, Y-12 served as a key cog in the nation's nuclear deterrent, and today it remains an essential component in the nuclear security enterprise. Its missions include manufacturing, dismantlement and surveillance of highly enriched uranium components, production of other highly specialized parts and material, and serving as the country's primary safe and secure storehouse of highly

enriched uranium. Y-12 also supplies the enriched uranium feedstock that is fabricated into fuel for Naval Nuclear Propulsion use. With our vast uranium expertise we play a major role in nuclear nonproliferation efforts to secure vulnerable nuclear material around the world and curb nuclear trafficking and smuggling.

The missions at both sites have evolved over time as have the threats facing our nation, and we are currently undergoing a vast effort to modernize our infrastructure. However, our dedicated people have been the constant through our long and rich history—and our most valuable resource in maintaining the nation's nuclear deterrent.

At Y-12, the hundreds of "Calutron girls" that helped tune and monitor the dials on the calutrons—the mass spectrometers that separated uranium isotopes at Y-12 during World War II—are best remembered of the many thousands of Americans from all walks of life who helped produce the enriched uranium that was used in the first atomic bomb. In the Texas Panhandle, it was the thousands of patriots that first helped establish the Pantex Ordinance Plant to build conventional munitions for the Army during World War II, and then helped the plant transition to its current nuclear weapons mission in 1951.

Today, approximately 8,300 employees work at Pantex and Y-12 – about 3,400 in Amarillo and 4,900 in Oak Ridge, and that number is only expected to grow as the scope of our work increases. No matter the location, the legacy of hard work and patriotism has been passed down, sometimes through generations in the same families, and it is our top priority to preserve that legacy and ensure that we are building our workforce for the future to continue to ensure the capability of the nation's nuclear deterrent.

On average, our employees are 48 years old, have been at the sites for 13 years, and encompass a vast array of skills; examples include skilled craft workers, like the construction workers building the state-of-the-art Uranium Processing Facility and who maintain our aged sites, security police officers that protect the sites, engineers, scientists, chemical operators, janitors, administrative professionals, production technicians, and business specialists. Forty percent are represented by labor unions (like much of our skilled craft and guards) and a quarter of our workforce is eligible to retire today; that number is expected to increase to 38 percent in five years.

Building the workforce of the future requires a broad spectrum of recruiting, development, engagement, and retention tools that we cannot, and do not, take lightly. Our mission and importance to national security is exciting, urgent, and satisfying. Through their daily effort on the job, our employees team together to maintain the nation's nuclear deterrent. Each of them has a role in maintaining and enhancing global security on a daily basis. But due to the nature of our work and the requisite protection of information and materials, most Americans do not understand or identify with our mission, leading to a significant gap in name recognition outside of the Nuclear Security Enterprise.

In addition, in order to work at our sites, employees must pass rigorous background checks and in most cases, an even more rigorous process to earn security clearances. These elements, combined with needed electronic security requirements that prohibit many employees from access to personal electronic devices such as cell phones, create significant challenges in attracting and recruiting prospective employees. The NNSA is working to address these issues broadly through its Nuclear Security Enterprise Workforce Development Strategy team, and we are building off the work of that group. This team is spearheading joint recruiting efforts, particularly for degreed employees, and

developing focused marketing and branding to increase visibility and create a consistent message of the opportunities across our enterprise.

At CNS, our strategy to overcome these challenges and build our workforce is broad. CNS's strategic academic alliances with regional and national universities, colleges, and schools allow both Pantex and Y-12 to develop strong research and development collaborations, training programs, and hiring pipelines. CNS partners with area educational institutions to promote interest in science, technology, engineering, math, and manufacturing skills and to provide awareness of job opportunities at Pantex and Y-12. Our programs engage students from middle schools through graduate-level college institutions, including outreach designed to provide awareness about the hurdles and expectations involved in working in the national security field.

Our vision is that these partnerships will positively impact every stage of the employment cycle, starting with building students' interest in critical fields at a young age, and then working with community colleges and universities to offer courses that align with future employment needs. We can then offer internships as an additional recruiting tool to expose students to our mission and processes and, finally, recruit new hires from degree and certification programs we have helped establish and support. After hire, we offer continuing education, training, and research opportunities through these academic alliances to maintain a diverse and knowledgeable workforce for our enduring mission.

In the following sections, I will detail our recruiting, training and education, research and development, community, and diversity partnerships.

Recruiting

A key aspect of setting up a robust recruiting pipeline involves building strategic partnerships with educational institutions. For example, in critical skill areas such as Nuclear Criticality Safety, CNS subject matter experts worked with Texas A&M University to create two-semester-long criticality safety courses within the Nuclear Engineering department. Similar discussions are ongoing with the University of Tennessee (UT) to adapt their criticality safety courses to align with CNS criticality safety content. Because of these partnerships, an increasing portion of CNS's nuclear engineering staff are being recruited from these two schools. Beyond this hiring pipeline, the strategic partnerships resulted in custom training courses designed specifically for CNS to further develop systems engineering, lean manufacturing, and statistical process control expertise.

Over the past five years, CNS has provided internship opportunities to students representing over 40 colleges and universities, including many from Historically Black Colleges and Universities (HBCUs) and Hispanic-Serving Institutions (HSIs). Through their personal relationships, these student interns help promote CNS's mission to a broader audience, in turn developing a robust hiring pipeline. After their internship, many students continue to support CNS projects as part of their graduate work. CNS staff participate as advisors and sit on graduate committees for these students, which in turn develops relationships between CNS staff and university faculty members.

Over the last three years, CNS has sponsored over 30 graduate students in our Graduate Assistantship Program and has authorized 10 Joint Assignment Agreements with key professors in support of our mission. Academic disciplines include business analytics; supply chain management; electrical

engineering; materials science; information science; nuclear engineering; mechanical engineering; industrial engineering; business administration; and law.

CNS Mission Engineering staff supports Fire Protection Programs and staffing plans by working with Oklahoma State University and the University of Maryland. Through these relationships, we promote CNS's special mission to the Fire Protection Engineering (FPE) audience for numerous career opportunities and internships. In addition to providing immediate help to both Pantex and Y-12, these internships help maintain a pipeline of new fire protection engineers. CNS is in the process of establishing a relationship with Eastern Kentucky University's FPE program. This small but growing program will be another university partnership to help ensure the critical FPE hiring pipeline remains a diverse, interdisciplinary group. CNS will also be working with the University of North Carolina at Charlotte and the University of New Haven as they work to establish their FPE programs and we helped establish a FPE graduate certificate program at the University of Tennessee.

Training and Education

Amarillo College and Pantex successfully collaborated in 2015 to secure a five-year, $750,000 DOE grant that supports safety training classes for DOE workers, primarily those employed at Pantex. This alliance is expanding its scope to include area industries, and employees from throughout the region may now enroll in asbestos training, and hazardous-material handling and transportation courses previously offered exclusively to Pantex workers. Local employers can realize sizable savings, paying only for tuition, not for travel and other expenses if their employees had to travel outside the area for this training.

Pantex is working with Canyon Independent School District, in Randall County of the Texas Panhandle, to establish a trades curriculum so high school students can be trained and pass the CNS qualification test to be a production technician and/or certified welder upon graduation. Courses taught through the academy are designed to equip potential job candidates with technical knowledge, leadership, and communication skills as well as an understanding of professional and safety standards.

A partnership with Texas A&M University will establish a college class at the Pantex site so workers can earn their degree in on-site facilities. They would attend their class and then go back to work to finish required work time. Similar partnerships are being established with West Texas A&M University and Texas Tech University.

A member of the CNS Mission Engineering staff supports West Texas A&M University as a board member of the engineering industry advisory council. This council provides industry needs insight, as well as feedback to support Accreditation Board for Engineering and Technology accreditation. Recent milestones include the development of an electrical engineering degree plan, which supports a growing critical need for electrical engineers at CNS and for the nation.

A partnership between Y-12 and the Atomic Trades and Labor Council, with classwork provided by Pellissippi State Community College, has graduated 97 Y-12 employees from its apprenticeship program since the program was reinstituted in 2008. In May 2018, eight machinists completed the four-year program. A similar program at Pantex is being developed, and NNSA is supporting a program that will recruit up to 45 apprentices a year (25 at Y-12 and 20 at Pantex) over the next three years to work as

steam plant operators, electricians, pipefitters, machinists, iron workers and riggers, utility operators, and air conditioning/refrigeration technicians, as well as other crafts.

The University of Tennessee has provided CNS with multiple workforce development programs and initiatives in support of CNS and its mission. These initiatives include master degree cohort programs in Engineering Management and Systems Engineering, of which CNS has more than 60 graduates and over 25 current students participating. The program is hosted in Oak Ridge, but it includes CNS participants that engage remotely from Amarillo, and there is the potential for other sites in the Nuclear Security Enterprise to participate in the future. These types of programs will serve as powerful recruiting and retention tools while also helping us develop our workers.

UT has also provided professional development programs for Y-12 employees in project management, fire protection engineering, business analytics, industrial systems engineering, and leadership/executive management. We also developed cohort-style master's degree programs in systems engineering with both UT and TAMU; CNS funds students' participation in the two-year degree program and works with both institutions to format the schedule to best fit CNS employee schedules.

Collaboration, Research, and Development

Since 2016, CNS and the University of Tennessee have collaborated on over 15 unique research and development projects. These projects range from supporting CNS and Oak Ridge National Laboratory additive manufacturing initiatives to investigating process parameters in support of the production of spherical powder particles by gas atomization. UT has supported CNS's maintenance efforts and assisted with efforts to enhance cybersecurity capabilities and platforms.

Texas A&M University (TAMU) now has leased office space in Pantex's new John C. Drummond Center to collaborate on engineering, high explosives, and emergency management projects. This will in the long term enable future employee development opportunities around the natural progression of technologies.

Community Involvement and Outreach

Y-12 is engaged with Roane State Community College in an innovative program called "Dream it. Do it.," which pairs local eighth-grade teams with area industries. The students create videos of their partner manufacturing businesses, which are then voted on by the public online. The goal of the program is to promote awareness among young people of the jobs and career opportunities available in our industry.

Morgan County's Career Technical Center took part in National Manufacturing Day on October 2, 2018. Through a program created at Y-12, the students were able to engage with our employees in a panel discussion and learn about career pathways from our workforce in the crafts and trades industry.

Oak Ridge Schools teachers were invited to sit in with our Atomic Trades and Labor Commission trades and crafts leaders during a teacher in-service day to discuss how best to engage with them about job opportunities and career pathways for their students, and ATLC leaders regularly visit area schools to expose students to opportunities in the trades.

Pantex is participating in the Canyon Independent School District Interview Week. During Interview Week, seniors will be interviewed by business professionals from the community to receive constructive and purposeful feedback. The opportunity to "Practice without Penalty" in an interview setting is

intended to give students the competitive edge needed to succeed when they step into an interview for a highly desired job.

A number of Pantex and Y-12 employees engage with local schools to support FIRST (For Inspiration and Recognition of Science and Technology) Robotics Competitions, and we sponsor science bowls for middle schoolers and high schoolers in Amarillo and Oak Ridge. At the events last month at Pantex, 290 students participated in the High School Science Bowl and another 290 participated in the Middle School Science Bowl, while the High School Science Bowl in Oak Ridge drew 59 teams and approximately 250 students.

Diversity

CNS participates in the NNSA-funded Minority Serving Institutions Partnership Program (MSIPP), which offers research and internship opportunities to students at Historically Black Colleges and Universities (HBCUs) and Hispanic-Serving Institutions (HSIs). Over the past five years, CNS has built strong relationships with 13 HCBUs and four HSIs across the southeast. The MSIPP created multiple research partnerships including joint-funded projects, peer-reviewed research publications, patents, and, most importantly, a diverse hiring pipeline.

The CNS manager of Physical Sciences has attended Florida A&M University's STEM Day each of the past three years and provided a relevant technology demonstration. The event now brings together almost 800 middle and high school minority students in the Tallahassee area.

Each year, Consolidated Nuclear Security hosts an event known as Introduce a Girl to Engineering where employees across the site come together to provide female middle- and high school students in Amarillo and Oak Ridge a chance to interact with women and men working in the engineering and STEM fields. The goal of this event is to ignite an interest for STEM careers. Several booths with hands on activities and speaking engagements are designed to expose the students to the various ways STEM related fields can have an impact on the world that we live in. We had more than 600 students participate in Introduce a Girl to Engineering at both sites last month (approximately 300 at Pantex and 330 at Y-12)—a number that would have been much larger had school not been cancelled in one East Tennessee county because of a flu outbreak.

Summary

It is through all of these avenues that we must continue to grow our future workforce. Just as the history of Pantex and Y-12 is rich and varied, so must be our approaches to recruiting, development, engagement, and retention. A strategic, broad, varied, and complementary approach is necessary to help preserve our capability to perform the important mission work entrusted to us and will help keep Pantex and Y-12 on track to provide a safe, secure and effective nuclear deterrent into the future.

Thank you for the opportunity to speak to you today.

Ms. KAPTUR. Thank you very much, Mr. Smith.

Mr. Colston.

Mr. COLSTON. Chairman Kaptur, Ranking Member Simpson, and members of the House Appropriations on Energy and Water Development, thank you for inviting me to today's hearing.

My name is Donnie Colston. I am the director of the International Brotherhood of Electric Workers, Utility Department. I have been asked by president Stephenson to speak on behalf of the IBEW. This hearing's topic is vital to the economic health of our country.

Based on recent data, the electric power generation sector employs over 875,000 Americans in 2018. The jobs multiplier for the utility industry is the highest of all measured industries, with over 950 indirect jobs impacted by every 100 direct jobs lost or gained in the industry itself. The IBEW is the largest energy union in the world. We represent more than 775,000 members in the United States, U.S. Territories and Canada who work in a variety of related fields, including utilities and construction, telecommunications, broadcasting, manufacturing, railroads, and of course government.

The hallmarks of the IBEW are professionalism, skills, and training, which are embedded in our code of excellence. This is a commitment from our leadership, members, to our contractors and our customers to consistently provide the best value for the product. For more than 10 years the code of excellence has allowed the IBEW to meet or exceed our customers' needs. The code has played a part in the creation of employment opportunities for the IBEW members because of the improved relationships with our customers and our employers. Among the IBEW's partnerships with employers nationwide is between IBEW Local 245 and Toledo Edison, the Chairwoman's northwest Ohio district.

The code of excellence is another example of the IBEW's commitment to working with our employer partners to provide on the job excellence every working day.

The IBEW represents public employees at electric cooperatives and municipality power providers, workers at the Tennessee Valley Authority, the U.S. Army Corps of Engineers, private sector employees, and most investor owned utilities. In nuclear generation alone, we represent more than 15,000 workers.

Occupations within the power plants range from plant operators to instrument and control technicians to maintenance electricians to security guards. Over 500,000 of our members are responsible for making sure electricity makes it from the point of generation all the way to the electric or gas meter.

Not only does the utility industry support hundreds of thousands of jobs, salaries are higher. The average of an IBEW member employed in the utility operations is $46.24 an hour, which is already double the U.S. average without including pensions and healthcare.

Energy generation, transmission, and delivery is our Nation's most vital infrastructure. Utilities, construction, manufacturing are all three significant industrial sectors in energy efficiency, transmission, distribution, and storage, adding over 36,000 new jobs just in 2018. It is therefore critical for the safety of our member and the community needs that the workers charged with constructing

and operating and maintaining energy infrastructure are highly and extensively trained. My written testimony tells a broader story. I am going to use my time to quickly tell you about our partnerships in the utility industry.

The Center for Education Workforce Development is one of our most significant utility industry partnerships. The CEWD's mission is to develop solutions to the industry's workforce shortage.

Applicants who have basic proficiency in STEM disciplines had the necessary foundation for success in most utility apprenticeships and training programs. For too long, a four year degree has been promoted as the only path to a high wage career.

In fact, there are many jobs, particularly in utilities that provide solid middle class incomes with little to no debt. These occupations are America's best kept secret.

Too often, young people perceive that these jobs are low or middle skill because no college is required. IBEWs actively engaged in efforts to attract young people, women and veterans into high paying utility occupations.

Another example of training partnerships in the utility industry is the strong relationship between the IDEW, Alabama Power and the Southern Company and the National Utility Industrial Training Fund recently upgraded Varnon Training Center is the most modern facility of its type in the country.

The IBEW contributed to the curriculum development and provides seasonal craftsman to deliver hands on classroom training at this facility.

New IDEW members and experienced members who seek knowledge upgrades now receive training in a facility that provides them with the opportunity to become the highest skilled workers in the utility industry.

In conclusion, I would leave you with one final thought. The model inscribed on the wall at the Varnon's training center and Alabama Power says with hands on practice, knowledge becomes a skill.

With time and dedication, skills become a craft and a laborer becomes a craftsman. Thank you for the opportunity to testify today and the IDEW looks forward to answering any of your questions.

[The information follows:]

Testimony of Donnie Colston
Director, Utility Department
International Brotherhood of Electrical Workers

Before the Subcommittee on Energy and Water Development, and Related Agencies
House Committee on Appropriations
U.S. House of Representatives
March 7, 2019

Chairwoman Kaptur, Ranking Member Simpson, and Members of the House Appropriations Subcommittee on Energy and Water Development, thank you for inviting me to participate in today's hearing.

Background

My name is Donnie Colston. I am the Director of the International Brotherhood of Electrical Workers' (IBEW) Utility Department. I have been asked by our International President, Lonnie Stephenson, to speak on behalf of the IBEW. President Stephenson sends his apologies, he is unable to be here today due to a scheduling conflict.

The topic of this hearing is vitally important to the economic health of our country and is of special interest to the IBEW. Based on data recently published in the 2019 U.S. Energy & Employment Report (USEER), the electric power generation sector employed over 875,000 Americans in 2018. The construction industry covers 33 percent of the electric power generation workforce while utility workers form 21 percent. According to the Economic Policy Institute, the jobs multiplier for the utility industry is the highest of all measured industries, with

almost 958 indirect jobs lost or gained with every 100 direct jobs lost or gained in the industry.

The IBEW, as the largest energy union in the world represents over 775,000 active members and retirees in the United States, United States' territories, and Canada, who work in a wide variety of energy related fields including utilities, construction, telecommunications, broadcasting, manufacturing, railroads, and government. To break those industries down, I want to give you a few non-exhaustive examples of employers, workplaces, occupations, and tasks within those occupations.

The IBEW represents workers employed in the manufacturing industry. These individuals manufacture electrical components like transformers at Delta Star in Virginia and nuclear fuel tubing at Westinghouse Electric Company in Pennsylvania.

The IBEW represents hundreds of thousands of workers employed in the private and public-private construction industry. These individuals wire office buildings, homes, hospitals, and construct large-scale electrical transmission lines spanning thousands of miles, across states and borders that take power from where it is generated to where it is needed.

As the Director of the IBEW Utility Department, I am most familiar with the public employees at municipal power providers, the Tennessee Valley Authority, the U.S. Army Corp of Engineers, and private-sector employees at the vast majority of investor-owned utility companies, like Southern Company, where we represent thousands of workers under at least 12 collective bargaining agreements. Our members day-to-day duties vary by task, location, and generation source. Occupations within power plants range from plant operators, instrument and controls technicians, maintenance electricians, to security guards. Duties include

constant monitoring of voltage and adjustment of controls regulating power and moving fuel within the plant to performing janitorial services.

Over 500,000 of our members are directly responsible for making sure electricity makes it from the point of generation all the way to your light switch. To reiterate, I am most familiar with our membership in the utility industry and their job duties, but, because President Stephenson could not be here today, my remarks are going to address IBEW workforce training initiatives in the construction and manufacturing industries as well as partnerships and programs the IBEW has instituted across all industries.

Training Partnerships

Members of the IBEW are involved in every facet of energy and seek training partnerships with employers in all corners of the industry. The IBEW has always focused on education as the means to better our members, our union, and our industries. Energy generation, transmission, and delivery is our nation's most vital infrastructure. According to the same USEER data referenced above, utilities, construction, and manufacturing are three significant industrial sectors in energy efficiency, transmission, distribution, and storage, adding over 36,000 new jobs in 2018 with growth expected to continue. It is therefore critical for the safety of our members and communities that the workers charged with constructing, operating, and maintaining our energy systems have a deep understanding of applicable processes and technology. A carefully balanced system of education, training, and experience is the only method for achieving the highest level of craftsmanship. The IBEW has and always will be focused on this principle as its core. Skill, and the development of it, is the highest value we provide to our members, our employers, and our customers.

Utility Industry

The Center for Energy Workforce Development (CEWD) is one of our most significant utility industry partnerships. IBEW President Lonnie Stephenson is a proud member of the board of directors, and the IBEW is an active participant in promoting the mission of CEWD. We see clear results when our members have the opportunities use CEWD curriculum. It has become a utility industry best practice.

Applicants who have basic proficiency in STEM disciplines – a necessary foundation for success in most utility apprenticeship or training programs - do not just appear. Countless scholarly articles and hours of congressional testimony underscore this fact. This is why CEWD formed the National Energy Education Network and has launched the Get Into Energy online resource center.

For too long, a four-year degree has been promoted as the only path to a high wage career. In fact, there are many jobs, particularly in utilities, that provide solid middle-class incomes with little to no debt. These occupations are America's best kept secret. Too often, young people perceive these jobs as low or middle skill because no college is required. CEWD is making huge strides to ensure it does not stay a secret. Programs like Get Into Energy and Get Into STEM, including a Pathways Model, focus on bringing young people into high-paying utilities occupations. The IBEW and our partners are focused on helping find jobs for veterans though Troops to Energy Jobs, and diversifying the workforce though Women in Sustainable Employment (WISE).

Another excellent example of training partnerships in the utility industry is the strong relationship between IBEW System Council U-19, Alabama Power/Southern Company, and the National Utility Industry Training Fund (NUITF). The recently upgraded Varnons Training Center is the most modern, specialized facility of its type in the United States. The IBEW, at the invitation of

Alabama Power, heavily contributed to curriculum development and provides skilled and seasoned craftsmen to deliver hands-on and classroom instruction. New IBEW members, and already experienced members who seek knowledge and skill upgrades now receive training in a facility that provides them with the opportunity to become the highest skilled workers in the utility industry.

Construction Industry

IBEW members in the construction industry also complete extensive training. Our members employed in the construction industry complete up to 10,000 hours of on-the-job and classroom training in privately funded, nationwide apprenticeship programs - earning while they learn. These programs are sponsored by the electrical training ALLIANCE, a joint effort between the National Electrical Contractors Association (NECA) and the IBEW and are designated as Registered Apprenticeships through the United States Department of Labor. The electrical training ALLIANCE program is the largest apprenticeship of its kind. Two hundred million dollars is invested annually to equip students with the skills necessary to meet market demands. The knowledge and skills obtained through this world-class training gives IBEW members the ability to perform at the highest level for our NECA contractor partners to satisfy the needs of customers on each and every project. The IBEW is proud to have the highest standards for energy workforce training in the industry.

An inside journeyman, who focuses on commercial and industrial electrical work, is required to complete 1,000 hours of classroom education and 8,000 hours of on-the-job training, taking five years in total. An outside journeyman, who will work on electrical transmission and distribution, is required to receive 450 hours of classroom education and have 7,000 hours of on-the-job training, normally taking three-and-a-half years to complete.

I encourage each of you to visit one of our training centers in your Congressional District. There are over 300 facilities located across the United States. It is important to note that the continuation of this successful training partnership is dependent upon opportunities for continuous employment from the private and public sectors alike. Our training programs guarantee a steady stream of skilled electrical workers. We take pride in our market analysis and the fact that we do not waste funding or applicants' time by training apprentices for jobs that do not exist. We thrive off stability and market predictability just like any other industry.

Manufacturing Industry

In the modern advanced manufacturing economy, most production workers, need more than the basic skills that were required in previous decades. To meet demand for quality and safety in a workforce where experienced employees are aging out and new talent is hard to find, employers need to attract and train skilled workers who will grow this critical sector of the U.S. economy – particularly in the energy supply chain.

The Industrial Manufacturing Technician (IMT) Apprenticeship meets these needs by helping employers and unions fulfill the growing need for skilled advanced manufacturing production workers. The IMT is a nationally-recognized apprenticeship registered with the U.S. Department of Labor that trains manufacturing production workers in skills manufacturers look for.

The AFL-CIO Working for America Institute (WAI), in partnership with the Wisconsin Regional Training Partnership/BIG STEP and Jobs for the Future developed the IMT Apprenticeship with grant funds from a U.S. Department of Labor, Employment and Training Administration. A second Labor Department grant through the American Apprenticeship Initiative supports the expansion of the IMT apprenticeship to employers and unions in eight states.

A broad coalition of labor unions and manufacturing employers specified the job tasks, skills, performance standards, and helped to design supporting curriculum. Related instruction for the IMT apprenticeship is based upon the Manufacturing Skills Standards Council (MSSC) Certified Production Technician national industry standards.

The Code of Excellence (COE)

The COE is a commitment from our leadership, members, and contractors to customers that the IBEW will consistently provide the best value product. The COE began over 10 years ago and has allowed the IBEW to meet or exceed our customers' needs by ensuring the highest quality of work as a return on the customers' investment. This program began as a construction industry initiative and has now been instituted across all IBEW-represented industries. The COE has played a part in creation of employment opportunities for IBEW members because of improved relationships with customers and employers alike. The concepts embodied by the COE have led to other labor unions implementing COE partnerships of their own. The IBEW has many successful COE partnerships with employers nationwide. One that is often highlighted is between IBEW Local 245 and Toledo Edison in Northwest Ohio. The IBEW's COE program is an example of the IBEW's full commitment to working with our employer partners to provide on-the-job excellence every working day.

Conclusion

I will leave you with one final thought. The motto inscribed on the wall at the Varnons Training Center is: *"With hands-on practice, knowledge becomes a skill. With time and dedication, skill becomes a craft, and a laborer becomes a craftsman."*

Thank you for your interest in this important topic and the opportunity to testify today. The IBEW looks forward to answering your questions.

Ms. KAPTUR. Thank you so very much, Mr. Colston. Ms. Evans.

Ms. EVANS. I want to thank member Simpson and members of the subcommittee, thank you for inviting me to testify. My name is Sloane Evans and I am the Senior Vice President of Human Resources for Georgia Power and Southern Company.

Southern Company is a leading US electric utility with more than 27,000 employees serving 9 million customers across the United States and I am testifying today on behalf of the center of energy workforce development.

The Center for Energy Workforce Development or CEWD is a partnership of electric, natural gas, and nuclear utilities and their industry associations, contractors, unions, that is focused on building a skilled workforce pipeline to address the anticipated workforce shortage in the utility industry. Southern Company and more than 100 other US utilities are members of CEWD.

The industry—the energy industry plays a vital role in our nation and contributes approximately 5 percent to our nation's GDP.

Our industry supports more than 7 million jobs across the country, about 1 out of every 20 and not only is it critical to today's economy, we expect that it will be even more critical to the future as we transition to cleaner energy resources, build smarter energy infrastructure, support greater transportation electrification and deliver energy solutions that our customers want and need. We offer quality jobs that pay well and on average, employees work in our industry for more than 15 years, which symbolizes that we are an industry of careers, not just jobs.

The energy industry is experiencing transformational change. We see the potential shifts in size for the skills, knowledge requirements about the current and the future energy workforce.

Examples include infrastructure monetization, the evolution of our generationed fleets, change in customer expectations, physical cybersecurity concerns, a transitioning workforce and emerging technologies.

All of these changes can impact a company's ability to create and maintain a talented pipeline of qualified and skilled employees.

Through CEWD, the industry has come together on a routine basis to address workforce challenges through a collaborative process with the simple strategy that has been successful for the past 13 years.

Industry strategies local solutions. For example, I would like to highlight our state energy workforce consortiums.

Today, nearly 30 states are represented, each of them led by a CEWD industry member. The purpose of these consortiums is to identify and develop solutions to meet the current and future workforce needs specific to those states. Southern Company helped to create two of the original state consortia in Florida and George and as a result, we have established energy pathways in Georgia and Florida secondary and post-secondary education systems.

These pathways create awareness around the careers and deliver fundamental skills around STEM.

Another example of CEWD creating industry strategies with local solutions is their work to attract students to the industry, leveraging those strategies, the best practices and the support of CEWD, southern company has successfully sponsored first robotics

competitions that inspire young people to be interested in participating in science and technology.

These innovative programs motivate students to better education and career opportunities in STEM while building self-confidence, life skills and knowledge. It's helping us identify, engage, and attract our future workforce.

The on scale development and awareness efforts, the utility industry recognized a strong talent existed among our veterans and transitioning service members. In collaboration with our utility trade associations, Federal associations such as the DOD and the DOL and labor groups like the IBEWD, we Formed Veterans in Energy which provides outreach, networking and mentoring to veterans in our industry.

These partnerships have removed barriers in finding, hiring, and retaining veterans.

The industry must continue to develop a workforce that meets the needs of today and tomorrow and as an energy industry, we are focused on career awareness, developing education strategies, recruitment and retaining efforts.

We believe we can accomplish more together than we can separately.

On behalf of the center for energy workforce development, its 100 member utilities associations, contractors and unions, I want to commend this subcommittee for examining energy workforce development issues. Thank you very much.

[The information follows:]

Testimony for the House Energy and Water Appropriations Subcommittee
Energy Workforce Development Opportunities and Challenges
March 7, 2019

Sloane N. Evans
Senior Vice President, Human Resources
Southern Company
On behalf of the Center for Energy Workforce Development (CEWD)

Introduction

Chairwoman Kaptur, Ranking Member Simpson, and Members of the Subcommittee, thank you for inviting me to testify. My name is Sloane Evans, and I am Senior Vice President of Human Resources for Southern Company. I am testifying today on behalf of the Center for Energy Workforce Development (CEWD).

Economic Business Case:

The energy industry is the foundation of our economy and covers a broad diversity of generation and delivery. The electric power industry alone contributes about 5 percent of our nation's GDP, and we like to think of it as the first 5 percent because electricity helps power our entire economy. Our industry supports more than 7 million jobs across the country—about 1 out of every 20 jobs. Our industry not only is critical to today's economy, we expect it will be even more critical to the future as we transition to cleaner energy resources, build smarter energy infrastructure, support greater transportation electrification, and deliver innovative energy solutions that our customers want. We offer quality jobs that provide individuals security and serve as anchors in communities. Our jobs pay well – 2 times the national median wage at $73,000 per year.

Industry and Workforce Landscape:

Our industry is experiencing transformational change, and we see the potential for significant shifts in size, skills and knowledge requirements of the current and future energy workforce. All of these changes can impact a company's ability to create and maintain a talent pipeline of qualified and diverse workers and to deliver on the company's business plan. Industry changes include:

- Infrastructure Modernization
- Energy Generation Transformation
- Regulation / Policy Changes
- Physical / Cyber Security
- Customer Expectations
- Enabling Technologies
- Transitioning Workforce
- Business Restructuring

- Affordability / Cost Containment

The industry changes indicate a shift to an industry that is more rapidly transforming, with technology playing an increasingly important role. The energy workforce is also changing with a younger and more diverse workforce that is increasingly digitally literate. This transitioning workforce, along with advances in education technology, can position the industry to meet the challenges of the future.

The industry must continue to develop a workforce with skills for traditional energy production and delivery as well as developing capabilities for the future. As an industry, we are focused on career awareness, developing education strategies, recruitment, and retention efforts. We believe we can accomplish more together than we can separately.

I want to commend this Subcommittee for examining energy workforce development issues. As the energy industry undergoes a transformation in our country's energy mix, maintaining a skilled workforce is vitally important for the entire industry.

Center for Energy Workforce Development – Industry Consortium

CEWD is a non-profit national organization that brings together the energy industry, energy associations, contractors, labor, educators, government, and communities to build the alliances, processes, and tools to develop a diverse, qualified workforce for the energy industry. Originally formed in 2006 to address concerns about an aging skilled workforce, CEWD members today include more than 100 electric and natural gas companies, six trade associations (Edison Electric Institute, American Gas Association, Nuclear Energy Institute, National Rural Electric Cooperative Association, American Public Power Association, and Distribution Contractors Association), large supplemental labor contractors, and unions (the International Brotherhood of Electrical Workers and Utility Workers Union of America). CEWD focuses on delivering proven workforce development solutions, curriculum, tools, and data that improve the rate and quality of hiring into industry jobs.

CEWD Goals:

- Identify critical workforce needs and measure the success of workforce development solutions.
- Build awareness of high skilled, well-paying jobs in the energy industry
- Partner with members to implement education solutions to build a pipeline of skilled workers
- Serve our member and share best practices

CEWD Focus Areas

Career Awareness—In a series of CEWD surveys with member companies and state consortia in 2018, career awareness continued to be one of the most important priorities in building a diverse,

qualified energy workforce. CEWD launched its national career awareness brand, Get Into Energy (GIE), in 2006 and has since launched a family of brands and career awareness resources.

CEWD and its members engage in a wide variety of career awareness activities. Career awareness activities are aimed at five key demographics: youth, low-income young adults, women, veterans, and transitioning workers. The overall intent of these activities is to make it easier for students and jobseekers to find us, understand our jobs, and understand what education pathways will lead to an energy job.

The Get Into Energy website (getintoenergy.com) was created to raise awareness of jobs in the energy industry. Energy jobs offer competitive pay and benefits, are widely available and generally immune from outsourcing, and provide a valuable service to the community.

CEWD energy career websites are targeted to key demographic populations:

- **Get Into Energy:** CEWD's national website, getintoenergy.com, provides resources for each key demographic to understand the pathways for critical jobs, where to find training, and a jobs site that lists all jobs currently posted by CEWD members.
- **Get Into Energy/Get Into STEM** was launched at stem.getintoenergy.com. The web site positions all energy careers as STEM careers and has a teacher's section as well as pages with energy and STEM-related competitions and contests and scholarships.
- **Troops to Energy Jobs:** The veteran-focused site for Troops to Energy Jobs, troopstoenergyjobs.com, includes a roadmap for veterans seeking jobs in the industry, a unique-to-CEWD military occupation code translator that ties military jobs more specifically to energy jobs, a registration site that allows veterans to enter basic information about themselves (such as military occupation, field of expertise, resumes, and geographical area they would like to work in) and see information about companies located in their region. Veterans now make up 11 percent of our workforce, and in Nuclear Operations that number is 22.5 percent. Companies from across the industry are reaching out to veterans for their training, leadership, and service mentality to fill these critical positions.

National Energy Education Network—Over the past several years, CEWD has worked to create the National Energy Education Network (NEEN), a national consortium of educational institutions sponsored by CEWD industry members. Members of NEEN include community colleges and other educational institutions that have active partnerships with CEWD member companies, have relevant programs of study for our four critical job categories (lineworkers, technicians, operators, and engineers), and are producing quality candidates who are being hired into industry jobs. These partnerships and programs provide the baseline for documenting what works, sharing curriculum and best practices, and identifying the potential supply of candidates from high schools, technical and community colleges, and universities. NEEN partnerships currently include over 200 educational institutions representing more than 350 energy programs.

Energy Competency Model—CEWD, in partnership with the U.S. Department of Labor, developed the Energy Competency Model that defines basic competencies, industry fundamentals, industry technical competencies, and job-specific competencies in eight separate tiers. The Energy Competency Model is designed to provide a consistent definition of the competencies required to work in the industry. The CEWD Energy Competency Model has proven to be a valuable tool for educators, workforce investment professionals, and businesses to articulate the skills required to perform successfully in various jobs in the energy industry.

Energy Career Clusters—Career Clusters are groupings of occupations/career specialties used as an organizing tool for curriculum design and instruction. Career Clusters identify pathways from secondary school to two- and four-year colleges, graduate school, and the workplace. But there is not a national Career Cluster for energy education that links to industry jobs. Since 2006, CEWD has encouraged states to develop an Energy Career Cluster and Energy Pathways in the secondary and post-secondary education systems to build awareness of how energy careers fit within this system, and to give industry an opportunity to provide input into curriculum and provide context to what students are learning. Several states now have state Energy Career Clusters.

State Energy Workforce Consortia—Each state differs in its education systems, as do the energy companies operating in a state. That means that the workforce development solutions must be tailored to the individual needs of the companies and the demographics of the talent pool available.

Today, nearly 30 states are represented by State Energy Workforce Consortia, each of which is led by CEWD industry members. The purpose of each state consortium is to identify and develop programmatic solutions that consortium members use to meet the current and future workforce needs of the energy industry in their state. Each consortium is encouraged and supported in developing a strategic workforce plan that takes into account specific challenges of the industry in the state. CEWD provides assistance in organizing and starting a consortium and has a state consortium page on the CEWD Members Implementation Wizard with resources and tools for starting and maintaining a state consortium.

CEWD Communities of Practice—These communities have grown in number and importance over the past two years and have evolved into true "think tanks" for CEWD and its members. The communities encompass areas such as Diversity and Inclusion, State Energy Workforce Consortia, Troops to Energy Jobs Employers, Contractors, High School implementation and others.

Partnership with Organized Labor—Energy companies have a long history of partnering with organized labor as evidenced by the National and Regional LAMPAC (labor / management) meetings held each year. As an industry, we have also employed the apprenticeship model for decades to train many of our skilled technical positions. Many of the apprenticeships have been built in partnership with organized labor.

Southern Company Overview

Southern Company is a leading U.S. energy company with more than 29,000 employees, serving 9 million customers through electric operating companies in three states, natural gas distribution companies in four states, a competitive generation company serving wholesale customers across the nation, a leading distributed generation infrastructure company, a fibers optics network and telecommunications services.

Southern Company Workforce Challenges

- Increase representation of minorities and females across all jobs.
- Identify talent with the aptitude and capabilities to work in our industry with a focus on STEM; specifically, math, reading comprehension and mechanical concepts for skilled labor positions.
- Increase the awareness and knowledge of current and future workforce needs with a keen sense of innovative and progressive techniques across our industry and careers.

Southern Company's Response

- Partnering with the Center for Energy Workforce Development, which is a national organization that plays a key leadership role in addressing utility work force issues. *Founding Member Company
- Participation with other national organizations that help build a cohesive strategy and partnership opportunities for the energy industry at the national level - Edison Electric Institute, Nuclear Energy Institute, American Gas Association, National Building Trades and others.
- A Southern Company enterprise-wide Workforce Development Council that coordinates our approach across our system to increase awareness of energy careers, build talent pipelines and leverage strategic partnerships.
- Workforce development professionals are engaged in local, regional, and national organizations in the energy industry, government, and education in addressing utility work force issues (e.g., State Energy Consortiums, Workforce Boards, Technical College System Boards, Department of Education, School Boards and government appointed committees).
- Business Units have implemented workforce planning and development committees that focus on their local and specific workforce challenges. Many have established workforce planning tools that predict and identify key retirements and attrition and then build recruiting plans to address the needs.
- Southern Company partners with organized labor (IBEW) and our contractors in executing workforce development activities for construction skilled trades. To address the skilled labor shortage in construction, these partners invest in training programs and career awareness activities.

Southern Company's Workforce Development Strategy

Our Workforce Development strategy is made up of three major components coordinated by our Talent Acquisition Function:

- Workforce Planning – forecasting the future workforce needs
- Career Awareness – building awareness of the careers that are available in energy
- Workforce Development – partnering to build sustainable pipeline programs that address the needs

- **Comprehensive Talent Acquisition Function.** Southern Company has a best-in-class Talent Acquisition structure that encompasses field recruiting teams, campus recruiting teams, military recruiting teams, diversity recruiting, skills testing services teams, and relocation program management.
- **Co-op and Intern programs.** Our Co-op program is designed to give hands-on experience to talented undergraduates in the areas of Engineering, Business, Finance, and Computer Science. This is an excellent opportunity to put classroom theory into actual practice. Our program provides students with an opportunity to build on their experiences through increased responsibility each returning semester. Our goal through this program is to train students to become a full-time employee with Southern Company. Unlike other employers, we offer internships positions throughout the year to better accommodate student schedules. Our goal is to provide students with exposure to our company and challenge them with exciting work assignments.
- **Military Hiring**. From all branches of the service, 11% of our hires in 2018 have military experience. Southern Company has been recognized nationally as a military friendly employer (named top military friendly employer by GI Jobs and ranked #3 on the Diversity Inc. Top 10 Companies for Veterans). Southern Company continues to partner with military installations in recruiting transitioning service members into roles across all subsidiaries. Also, Southern Company recently joined industry partners with the Department of Energy Joining Forces initiative. We made a commitment to support the hiring and education of veterans and military families. Southern is also an inaugural partner with Troops to Energy Jobs and Veterans in Energy.
- **Skilled-Craft Labor**. Southern is continuing the development of talent pipelines with high schools and technical colleges that will serve as recruiting pools for key jobs. We partner with technical colleges to prepare apprentice line workers and with technical colleges that offer an associate degree and other certification programs to prepare a highly skilled technical workforce.

Examples of System Wide Workforce Development Programs:

Programs at Southern Company that focus on education and workforce development span from Pre-K literacy initiatives to very targeted associate degrees programs. We believe that to develop the next generation of workforce we must have a very proactive and holistic approach.

Georgia Power – FIRST Robotics

- *FIRST (***F**or **I**nspiration and **R**ecognition of **S**cience and **T**echnology) was founded in 1989 to inspire young people's interest and participation in science and technology. These innovative programs motivate young people to pursue education and career opportunities in science, technology, engineering, and math, while building self-confidence, knowledge, and life skills.

Georgia Power – Electrical Lineworker Apprentice Certificate

- The Electrical Lineworker Apprentice Certificate is an educational partnership between Georgia Power and North Georgia Technical College, South Georgia Technical College, Coastal Pines Technical College, and Georgia Piedmont Technical College, focused on the attraction and preparation for a career in the electrical lineworker field.
- The Certificate is an eight to ten-week certificate program (classroom instruction and hands-on training) that prepares students for success in the trade across the state of Georgia. The program focuses on electrical theory, mathematics, and construction concepts, as well as the technical skills required such as climbing poles, safety requirements, electrical assembly, etc.
- Upon successful completion of the program, students are prepared for apprentice level employment in the lineworker trades.

Generation - Instrumentation and Controls (I&C) Academy

- The Instrumentation & Controls Academy is an educational partnership between Southern Company and Georgia Northwestern Technical College (GNTC), Central Georgia Technical College (CGTC) and Mississippi Gulf Coast Community College (MGCCC).
- The Academy is a two-year associate degree program (classroom instruction and lab experience) that prepares students for success in the industry with a foundation to perform I&C maintenance functions including: troubleshooting, repair, installation and maintenance of instruments, control devices, and electronic equipment. Upon successful completion of the program, students are prepared for entry-level employment as an Instrumentation and Control Technician/Specialist.

Alabama Power - iCan Boosts Middle School Girls into High School Engineering Programs

- Middle-school girls who feed into the region's engineering academies take part in four hands-on projects per year, an annual field trip, and an annual Girls Engineering Conference, designed to expose them to the different types of engineering as well as the high-paying careers that could be available to them in this field.
- Each activity is led by a female engineer from Alabama Power in one of four disciplines: civil, electrical, mechanical, and chemical engineering.
- At the annual Girls Engineering Conference, the women engineers hold parent workshops—condensed versions of their hands-on classroom activities—and teach parents, students, and teachers about engineering job opportunities.
- Members of a pool of more than 100 Alabama Power and Southern Company volunteers—all of them women in STEM—lead the iCan activities.

Southern Nuclear - College Nuclear Uniform Curriculum Programs

- Southern Nuclear is partnering with Augusta Technical College for an Associate degree in Nuclear Engineering Technology.
- The program aligns to the nuclear industry's training requirements from INPO's Uniform Curriculum Guide for Nuclear Power Plant Technician, Maintenance, and Non-licensed Operations Personnel Associate Degree Programs.
- Representatives from Southern Nuclear worked with the college president and vice president of academic affairs along with deans and instructors to evaluate the current

course offering and ensure that the learning objectives from the INPO Uniform Curriculum were addressed and continue to support the program in many areas.
- Southern Nuclear and Augusta Tech's collaboration with the NET program is a part of a larger, national Uniform Curriculum Project supported by NEI and INPO.
- With more than 100 graduates from the Augusta GA program in the last six years, close to 90% are working in the nuclear industry.

Southern Company Gas - Summer Internship Program
- Interns representing every major functional area and geographic location of Southern Company Gas showcased their talents during the summer by engaging in meaningful work assignments within their respective departments.
- The summer program kicked off with an orientation that provided the students with foundational knowledge of the Southern Company Gas, Southern Company, and the energy industry.
- The interns also participated in a group project centered around the business imperative of attracting and retaining millennial talent, which was presented to the executive leadership team at the end of the summer semester.
- As a fundamental element of Southern Company Gas' overall workforce development strategy, the intern program is designed to promote our careers by providing interns energy industry exposure and, more importantly, exposure into the natural gas industry with the goal of making Southern Company Gas and its' subsidiaries an employer of choice.

Mississippi Power - Energy Exploration Summer Camp
- Each year, Mississippi Power hosts an Energy Exploration Summer Camp with Mississippi Gulf Coast Community College.
- This camp is for rising fifth and sixth graders to introduce them to energy and STEM activities.
- The campers learn about energy careers along with understanding the concepts of energy and enjoy a plant tour.

LAMPAC Partnerships
- Alabama Power has a long history of partnering with organized labor as evidenced by the National and Regional LAMPAC (labor / management) meetings held each year.
- Through a training partnership with National Utility Industry Training Fund, IBEW and Alabama Power, we have established an industry training standard with a best practice learning curriculum and built a regional state-of-the-art training facility.

Conclusion

Again, I want to thank this Subcommittee for its interest in energy workforce development issues. I look forward to answering any questions you may have.

Ms. KAPTUR. Thank you so very very much. Dr. Bakhtian.

Ms. BAKHTIAN. Chairwoman Kaptur, ranking member Simpson, members of the subcommittee, thank you for the opportunity to address you today.

My name is Noël Bakhtian and I am the Director for the Center for Advanced Energy Studies. CAES is a research education and innovation consortium that brings together the Department of Energy's Idaho National Laboratory, INL, with the four public research universities of Idaho and Wyoming, namely Boise State, Idaho State, University of Idaho and University of Wyoming.

At CAES we are committed to conducting cutting age research, to educating the next generation of scientists and engineers and to partnering with industry to advance competitiveness all by harnessing the diverse capabilities, resources and expertise of these five entities all for the benefit of the region, the nation, and the world.

Let me start today with the need. The US energy market is undergoing significant evolution with shifts to low cost natural gas and clean energy sources compounded with a shrinking US workforce that sometimes is referred to as the silver tsunami. Experts are actually citing the energy sector as one of the most at risk of not meeting the need on qualified workers.

Broadly speaking, our evolving energy future is dependent now more than ever on a highly qualified workforce capable of designing, constructing, operating and protecting our nation's critical energy systems.

In fact, one of the reasons that I came to INL and CAES was to advance educational opportunities in support of accelerating our nation's energy transformation.

Having worked at NASA, Congress, the Department of Energy, the White House and now at Idaho National Laboratory, I fully recognize the power of partnership and what I want to do today is share how the CAES collaborations are helping to fill these energy workforce gaps through the lens of the three strategic pillars at CAES, research, education and innovation.

First research, a robust university research portfolio is necessary to produce a skilled workforce pipeline. At CAES, graduate students pursuing Master's and Doctoral degrees in energy have the opportunity, through mechanisms like, student internships and graduate fellowships to gain the hands on experience working at a state of the art national laboratory, working alongside world class INL researchers.

They are also capable of working back at their home institutions or even in a joint CAES collaborative laboratory under the mentorship of INL researchers or other faculty who can help mentor them.

This enables students to work at the very cutting edge of research in the national interest, thereby strengthening their learning experience, accelerating the impact they are having on R and D but also most importantly inspiring them to perhaps take on their next job in energy. Our second strategic pillar is education.

By bridging academic offerings and the need, CAES helps connect higher education to the workforces at the national laboratory

and regional industry in order to create a diverse workforce that has the appropriate training and education needed for success.

For example, working with the Idaho National Laboratory, Boise State has developed and just established a new doctoral degree in computing with an emphasis on security which will augment the workforce that's working every day to secure our nation's electrical grid.

At CAES, we are also working to develop the first ever joint educational offering between the CAES universities. And our third pillar is innovation.

CAES's strategic focus on its innovation systems and innovation ecosystem center on entrepreneurial opportunities, partnership with industry and tech to market impact.

We are looking forward to building out this brand new pillar this year and in coming years but I would like to highlight two existing programs that already exist in this space.

The first is the CAES technical assistance program, CTAP, which works to bring together regional companies that have a technical challenge with the CAES capabilities and expertise needed to help them succeed.

The second is the CAES energy efficiency research institute, SIRI, which is supported by DOE and provides hands on experiences for engineering students as they go out and they perform assessments and help reduce the energy usage at regional industrial facilities.

As you can see, since opening our doors in 2009, we at CAES have worked very hard to fulfill the Department of Energy's vision for CAES as a collaborative research education and innovation hub aimed at training the next generation energy workforce.

But before I close, I do have an ask. The seventeen DOE national laboratories are absolutely the country's crown jewels in terms of research, education and innovation and they need your continued support to continue pushing those boundaries on science and technology.

They also need continued funding for student internship programs and graduate fellowships as these are really the primary mechanisms by which students enter in to the national laboratory system.

In closing, I'd like to thank the Wyoming and the Idaho delegations including representative Mike Simpson, who has long been a strong advocate for both CAES and INL.

I'd also like to thank Dr. Kathy Arujo who is the director for the CAES energy policy institute for joining me here today and former CAES staffer Ethan Huffman for his support.

And with that, Chairwoman Kaptur, ranking member Simpson and members of the subcommittee, it's been an absolute privilege to be able to address you here today. I look forward to your questions, thank you.

[The information follows:]

STATEMENT OF NOËL BAKHTIAN, PH.D.
DIRECTOR, CENTER FOR ADVANCED ENERGY STUDIES

before the

UNITED STATES HOUSE OF REPRESENTATIVES
COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT, AND RELATED AGENCIES

concerning

"ENERGY WORKFORCE DEVELOPMENT OPPORTUNITIES AND CHALLENGES"

MARCH 7, 2019

Introduction

Chairwoman Kaptur, Ranking Member Simpson, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the important issue of energy workforce development. My name is Noël Bakhtian, and I'm the Director of the Center for Advanced Energy Studies (CAES). Our center, headquartered in Idaho Falls, Idaho, is a research, education, and innovation consortium that brings together the U.S. Department of Energy's Idaho National Laboratory (INL) with the four public research universities of Idaho and Wyoming: Boise State University (BSU), Idaho State University (ISU), the University of Idaho (UI), and the University of Wyoming (UWy). The center is committed to conducting cutting-edge energy research, educating the next generation of scientists and engineers, and partnering

with industry to advance competitiveness. CAES harnesses the shared capabilities, expertise, and resources of its five member organizations to provide academic, national lab, and private industry collaborators with cross-cutting opportunities to address complex energy challenges. It does so through transformative research as well as education and entrepreneurial initiatives that benefit the region, nation, and the world. Today, I would like to discuss the shifting energy workforce playing field, tell you how the Center for Advanced Energy Studies has been working to meet the nation's energy workforce needs, and ask for your support in a few critical areas.

Testimony

The generation, distribution, and utilization of energy is fundamental to human life. Whether we consider how energy contributes to basic necessities, such as food production and access to clean water, or priorities such as economic development, quality of life, and national security, it is clear that energy is a key ingredient to our growth and prosperity. According to U.S. Energy Information Administration (EIA) data for 2017, world energy consumption is projected to grow by 28 percent between 2015 and 2040, based on both population and economic growth around the globe. Moreover, in the U.S., the energy market is undergoing significant evolution.[1] The energy playing field has experienced considerable shifts toward low-cost natural gas and low-carbon sources. In line with such change, the accelerating addition of intermittent renewable energy sources to the grid is spurring research and development in transformative and integrated energy system technologies, including storage, advanced nuclear, and smart systems.

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1 National Association of State Energy Officials (NASEO), (May 2018), *U.S. Energy and Employment Report*, https://static1.squarespace.com/static/5a98cf80ec4eb7c5cd928c61/t/5afb0ce4575d1f3cdf9ebe36/1526402279839/2018+U.S.+Energy+and+Employment+Report.pdf

This evolving energy future necessitates a robust and dynamic energy workforce. At the same time, the U.S. workforce is shrinking, with the Baby-Boomer generation reaching retirement age[2] and birth rates in decline.[3] In fact, many experts cite the energy and manufacturing sectors as most at risk of running out of qualified workers, sometimes referring to the current predicament as the "Silver Tsunami." For instance, in 2013, the National Academies of Sciences, Engineering, and Medicine identified a supply shortage in qualified power engineers, electrical engineers, and cybersecurity experts that are necessary for operating the electric power grid.[4] More recently in 2017, the growth in new energy areas is apparent with new jobs added: [5]

- Wind energy jobs increased by 107,000,
- Energy efficiency added 67,000 net new jobs,
- Battery storage added 6,000 jobs, and
- Motor vehicles, including component parts, added 29,000 jobs. [6]

While thes are signs of growth, more can certainly be done. Broadly, our energy future is dependent on the development of a robust, highly qualified, educated workforce that will design, construct, operate, protect, repair, and replace the vast energy systems and technologies necessary to keep our country running effectively.

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2 National Commission on Energy Policy, (2009), *The National Commission on Energy Policy's Task Force on America's Future Energy Jobs*, October 1, 2009.

3 Caitlin Cheadle, (2016), "Dropping fertility rates are a threat to the global economy," *Business Insider*, November 28, 2016. https://www.businessinsider.com/dropping-fertility-rates-will-affect-the-economy-2016-11

4 National Academies of Sciences, Engineering, and Medicine, (2013), *Emerging Workforce Trends in the U.S. Energy and Mining Industries: A Call to Action*, Chapter 4, "The Electric Grid," see especially Table 4.3, p. 185.

5 NASEO, previously cited. The numbers cited here refer to direct jobs rather than indirect or induced.

6 NASEO, previously cited. Motor vehicles were included as a group because of the role that the industry plays in energy use.

Nuclear Energy Considerations

Although I am here today representing CAES, I am also on the Senior Leadership Team of Idaho National Laboratory. And because INL is the nation's leading center for nuclear energy research and development, I would be remiss if I didn't address the workforce needs specific to the nuclear energy industry.

According to a soon-to-be-published report by Oxford Economics, the U.S. nuclear energy industry has helped to produce electricity for millions of people and has supported thousands of jobs for more than 50 years.[7] The current nuclear power industry produces 20 percent of the electricity needs in the U.S.[8] and accounts for 56 percent of low-carbon electricity.[9] Nuclear power is uniquely situated in the power-generation industry as a highly efficient, yet complex source of electricity; thus, workers employed in this sector must be highly educated and skilled in order to safely operate nuclear plants. In fact, while the total electric-power-generation industry employed approximately 190,000 people in 2017, earning an average salary of $118,000, the subset of the commercial nuclear power industry employed roughly 50,000 workers, earning an average salary of $136,700 during the same year. This average salary premium is indicative of the high-caliber education that workers need to utilize, manage, and develop the technologies required in the nuclear energy industry.[10] Further, there is ample evidence that, at this occupational level, certain training, skills, and educational attainment are necessary for employment. While not every job in the nuclear energy sector requires

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7 Oxford Economics, (2019), Nuclear *Power Pays: Assessing the Trends in Electric Power Generation Employment and Wages*. March 2019, pg. 4. Report to be published on March 25, 2019. See www.nei.org.]

8 National Energy Institute (NEI), (2018) *Nuclear by the Numbers*. April 2018, p. 9. https://www.nei.org/CorporateSite/media/filefolder/resources/fact-sheets/nuclear-by-the-numbers-20180412.pdf

9 NEI, previously cited, p. 5.

10 NEI, previously cited, p. 6

postsecondary education, nearly 35 percent of those employed in the occupation have a bachelor's degree or higher. Of note, these statistics only relate to the commercial nuclear power industry. In nuclear research occupations, required educational attainment can be even higher.[11] When the figures above, describing the workforce that supports operating commercial nuclear reactors, are added to employment figures for nuclear research and development and the supply and service sector, total nuclear energy employment across the U.S. approaches 100,000 people.[12]

Meanwhile, the U.S. Bureau of Labor Statistics projects employment of nuclear engineers to grow by four percent from 2016 to 2026.[13] This comes at a time when the nuclear workforce is aging. In fact, the Nuclear Energy Institute estimates that 39 percent of the nuclear workforce is currently eligible for retirement[14] and that 23,000 jobs will be added in the next 5 years.[15] While employment in the nuclear energy sector is growing at a smaller rate than other energy sectors, the Bureau of Labor Statistics' reporting suggests the largest area of nuclear engineering growth will come in the research and development, management, scientific, and technical consulting-service fields. The modern nuclear workforce will also require new sets of skills to support new and upgraded plants, including digital instrumentation and controls and data collection, analysis,

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[11] Bureau of Labor Statistics, U.S. Department of Labor, "Occupational Outlook Handbook, Architecture and Engineering," Nuclear Engineers, https://www.bls.gov/ooh/architecture-and-engineering/nuclear-engineers.htm#tab-4.

[12] NEI, "Jobs: A single nuclear power plant creates more jobs than any other type of energy generation facility," https://www.nei.org/advantages/jobs

[13] Bureau of Labor Statistics, U.S. Department of Labor, "Occupational Outlook Handbook, Architecture and Engineering," Nuclear Engineers, https://www.bls.gov/ooh/architecture-and-engineering/nuclear-engineers.htm#tab-6

[14] NEI, "Jobs: A single nuclear power plant creates more jobs than any other type of energy generation facility," https://www.nei.org/advantages/jobs

[15] NEI, (2018), *Nuclear Industry Jobs*, August 2018, https://www.nei.org/resources/fact-sheets/nuclear-industry-jobs

and other advanced systems. Additionally, developments in nuclear medicine, diagnostic imaging, and cancer treatment will also drive demand for nuclear engineers. Taken together, these data suggest a strong need for emphasis on energy workforce development.

Finally, let me provide you with data points from Idaho National Laboratory. INL is one of the state of Idaho's largest employers, and its impact contributes significantly to the region's economy through laboratory programs, business partnerships, community engagement, and workforce income. In fact, INL currently employs 4,548 people with an average salary approaching $100,000 annually.[16] Yet, the need for workforce development is apparent even at the lab, where 43 percent of employees will be eligible for retirement in the next five years, resulting in over a thousand new jobs to fill. With strong requirements for postsecondary and advanced education necessary to fill most commercial and government nuclear energy positions, and as INL and the rest of the nuclear sector vie with other high-tech industries for employees, collaborative workforce development and training initiatives like those offered at CAES will increasingly become more relevant and necessary.

Advancing educational opportunities in support of accelerating energy-sector transformation is one of the reasons I came to work at the Center for Advanced Energy Studies, which is a shining example of an intentional partnership between a national laboratory and regional universities and the many benefits that grow from such cooperation, including addressing this workforce challenge. Having spent time working at NASA, Congress, the Department of Energy, and the White House, I have come to recognize the power of partnership. I would like to tell you about

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[16] INL, (2019). *FY18 Economic Summary: Research and Development*, https://public.inl.gov/public/FY18EconomicSummary/index.aspx?page=1

how the CAES collaboration is helping to strengthen capabilities and fill workforce gaps, as we continue to innovate.

The Center for Advanced Energy Studies

More than a decade ago, the U.S. Department of Energy and the state of Idaho envisioned the development of a centralized research campus near Idaho National Laboratory. Closely integrating the state's public research universities with a national laboratory would allow critical energy challenges to be solved through collaborative research while encouraging economic development and workforce training opportunities to support communities across the region. Although originally envisioned as a consortium between Idaho National Laboratory and the state of Idaho's three public research universities, CAES was proud to welcome the addition of the University of Wyoming in 2014, bringing new expertise and capabilities to the mix. Today, CAES fulfills the Department of Energy's vision for a regional research, education, and innovation hub that brings together a diversity of people, perspectives, and experiences needed to address complex global energy challenges **through the power of collaboration**.

CAES' strength lies in leveraging partnerships to solve challenges in energy. Several CAES institutions, working together, can provide value in a way that none can do alone. We benefit from a proud tradition, a dedicated leadership team, broad community support, and research wins in the form of joint federal projects awarded, collaborative publications, joint appointments, student graduates, and a series of new and advanced facilities. In a consortium bringing together a national laboratory and four universities, our stakeholders and thus the people we work with every day are the university students, faculty, national lab researchers, and the energy industries in the region. Our center works to pair university students with national laboratory researchers to receive hands-on experience and mentorship leading to valuable future career opportunities, through mechanisms such as internships, fellowships, and post-doctoral opportunities. We bring

together university and national laboratory experts to teach specialized courses unique to the energy field. We provide the teaming, tools, training, and facility access that enable laboratory researchers and faculty to compete for and win major federal-research hubs such as Energy Frontier Research Centers and Industry-University Cooperative Research Centers. And we are beginning to build a regional innovation ecosystem, supporting existing and incoming private-sector partners or even the next big energy startup.

At the end of 2017, as CAES was approaching its 10-year anniversary, we recognized the value of looking forward with a new strategic plan that builds upon past successes while simultaneously setting a course for further engagement and impact. We determined that energy, environmental, and national security challenges continue to loom large, and we must do more to address these challenges. Our recently released strategic plan aims to create a better energy future through collaboration that inspires energy leadership, ignites technology innovation, and catalyzes global impact. Based on feedback from our stakeholders, we organized our strategy around three major pillars: Research, Education, and Innovation. We also considered the energy areas where CAES collaboration could make a difference in addressing regional, national, and global grand challenges, and we downselected to five major focus areas—nuclear energy, advanced manufacturing, cybersecurity, energy-water nexus, and innovative energy systems—with two cross-cutting focus areas: energy policy and computing, data, and visualization. Based on collaboration, our strategy aims to create win-win opportunities that make our member organizations stronger together than the sum of the parts. In this sense, CAES is a force multiplier created to spur collaboration for the greater good.

How CAES Supports Tomorrow's Energy Workforce

At its core, CAES exists to strengthen the connections, exchanges, and resources of our member organizations and the people who pass through our doors. The diverse capabilities, expertise,

facilities, exposure, and perspectives that come together through the consortium develop more than new energy technologies and solutions. Together, we aim to inspire and develop the energy workforce of the future as we stimulate exploration in basic and applied science and bring industry together with researchers, students, and faculty. In the process, we build the relationships that lead to personal and professional development and evolving career opportunities. I'll frame CAES' contributions to energy workforce development through the lens of our three strategic pillars: research, education, and innovation.

Research

CAES's collaborative research broadens teams and brings together world-class capabilities, facilities, and expertise. Together, these teams develop viable new technologies, effective policy recommendations, and networks of subject-matter experts. We grow by cultivating and aggregating capabilities around our focus areas to develop world-class research collaboration, establish research hubs, and connect facilities—both physically and virtually—to accelerate productivity and the impact of advanced energy research.

In a university setting, education and research are inextricably connected, and a robust university research portfolio is necessary to produce a skilled workforce pipeline. Due to the complex and ever-evolving energy portfolio in the U.S., tomorrow's workforce will need a diverse mix of educational opportunities, including classroom instruction, mentorships, and hands-on training. This is where CAES excels because at the heart of our success is the many student lives we have touched through experiences with the national laboratory. Pairing of university research programs with national labs' human and facility resources gives many students an opportunity to contribute to meeting society's greatest challenges that they would not have had otherwise. In short, this collaboration puts students at the cutting edge of research for the national interest; this is of great value to them, and also to the country.

For example, graduate students pursuing an energy-related master's or doctoral degree at the CAES universities have the opportunity, through mechanisms like internships or fellowships, to complete their research in an INL facility alongside nationally recognized research experts, at a joint CAES lab, or even at their home institutions being mentored by INL researchers. I, myself, had a similar Ph.D. research experience through a collaboration between Stanford University and NASA Ames Research Center, and I can't speak highly enough of the impact that experience at NASA had in enabling my research via access to world-class capabilities and experts, providing my mentors with a preview of my abilities during their hiring decisions, accelerating my research impact, and inspiring my passion to continue working on areas of national interest. Let me highlight a few specific examples illustrating the impact of CAES's Research pillar to workforce development:

- In 2017, Idaho National Laboratory began a new nationally-competitive program—the INL Graduate Fellowship—designed to identify exceptional talent in research areas aligned with INL's strategic agenda to enable the current and future mission of DOE and INL. The program provides mentoring and financial support for outstanding students who plan to enroll in graduate degree programs. This is a triad relationship between the student, the university thesis advisor, and an INL technical advisor to provide meaningful research and mentorship throughout the entire graduate program. During the first year of the program, five of the eleven selected fellows came from CAES member universities. During the program's second year, four additional recipients from CAES members universities were awarded this prestigious fellowship.
- In 2018, we launched a new initiative called the CAES Summer Visiting Faculty program. This initiative provides summer funding for selected faculty members from

the CAES consortium to work jointly with an Idaho National Laboratory researcher on a joint proposal for external funding. The program is highly beneficial for both the faculty member and the laboratory researcher. Faculty members are exposed to the inner workings of a national laboratory, learn about national laboratory capabilities and expertise, and build lasting networks while laboratory researchers build new academic connections, are exposed to diversified funding opportunities, and have the potential to work with and connect with students supporting the faculty member. In 2018, six faculty members from CAES member universities participated in the pilot program. In 2019, we will be able to support almost 20 participants. Creating robust connections between university faculty and INL researchers allows for an easier integration of university students into joint research programs. The program's impacts don't end there; faculty members often take the lessons they've learned working alongside national laboratory researchers and weave these experiences into classroom instruction that benefits their future students as well.

- The Microscopy and Characterization Suite (MaCS) is a state-of-the-art materials characterization laboratory that provides broad material-analysis capabilities at CAES. MaCS was established at CAES to provide a world-class characterization facility in order to attract more students into science and engineering careers, to improve science and engineering education at the undergraduate and graduate levels, and to foster leading research and interaction with local industry. A true collaboration, the user facility is managed by a technical lead from BSU, a laboratory lead from UI, a safety officer from ISU, and equipment investments from INL. MaCS staff provide one-on-one mentorship and training on specialized equipment that can be helpful in developing skills that individuals, whether students or other researchers, can draw on in future

materials-characterization, nuclear energy, and advanced-manufacturing projects and employment. MaCS operates as a user facility, meaning students, faculty, researchers, and private industry from across the U.S. and around the world have access to this state-of-the-art laboratory. Many students, faculty, and researchers access MaCS through its partnership with the Department of Energy's Nuclear Science User Facilities (NSUF), which offsets some of the management and operations costs of MaCS and its associated microscopes and high-end imaging equipment. Private industry can also use the MaCS laboratory and receive the same training from our skilled technicians by paying a market-value rate. Some private organizations that have taken advantage of the capabilities at CAES' MaCS include the NanoSteel Company, J.R. Simplot Company, Micron, TORtec Group Corporation, and Sentient Science Incorporated.

- The integrative research that is characteristic of the CAES Energy Policy Institute (EPI), led by Dr. Kathy Araújo at BSU, also adds timely and relevant value to CAES' research endeavors. By fostering new channels of connectivity between industry, the public sector, and the CAES entities, EPI brings an important focus to CAES on the challenges and opportunities that are inherent in energy-systems change. Moreover, areas of EPI research, including work underway on energy job adaptation in regional innovation systems, could inform the way that new workforce needs are met by channeling or repurposing expertise from one technology or sector to another.

Education

CAES's collaborative education strengthens the personalized learning experiences of students in the region through unique experiences afforded by the national laboratory. By complementing and bridging academic offerings, CAES connects higher education to the workforces at the

laboratory, in regional industry, and across the universities to build a diversified future workforce with the experiences and relationships needed for success. We also strengthen the curricula offered by each university, not by offering degrees and certificates directly through CAES, but by combining and expanding upon the academic offerings in ways not possible with any one university. We encourage qualified researchers to bring their expertise into the classroom, and we support faculty in devoting more time and effort to specialized energy research. Through different forms of training, we encourage continuing education at all levels across the region and maintenance of skills and abilities needed for success in all aspects of energy industry and energy research and development, enabling a workforce more prepared to secure and succeed in the energy workforce of the future.

- An example of the information flow between INL and the universities leading to optimized course offerings is the development of cybersecurity programs offered at Boise State University (BSU). Based on significant feedback from INL and private industry, BSU has established a new doctoral degree in computing, with a security emphasis that aims to design secure and privacy-preserving protocols for computers, networks, programs, and data. This program will add to the workforce currently working to secure the nation's power grid, water supply, and other critical infrastructures. Additionally, this new Ph.D. is being offered to INL employees through synchronous online courses.
- Beyond graduate coursework, BSU established an undergraduate Cyber-Physical Systems Security certificate, the focus of which includes software, hardware, firmware, power systems, and industrial processes. This certificate is of interest to a wide variety of majors, including math, physics, economics,

computer science, electrical engineering, and mechanical engineering. This effort was initiated with seed funding provided by CAES to design the Introduction to Security in Cyber-Physical Systems course, with faculty at BSU collaborating with INL personnel when designing this introductory course.

- In 2018, CAES began a new initiative exploring the creation of a Nuclear Safeguards and Security joint-certificate program using the shared resources of our five member organizations. As envisioned, this joint effort would allow a student to take a series of four 4-credit courses, each taught by a different CAES member university. Following completion of the online course work, students would participate in a field exercise at Idaho National Laboratory, receiving world-class hands-on training in the field of nuclear nonproliferation and nuclear cybersecurity. Students completing the 16-credit course would be awarded an accredited certificate from the institution in which they initially enrolled. More importantly, the student would gain valuable education and practical experience in a specialized field of study not commonly taught at U.S. universities but with current workforce needs. If piloted successfully, this model could become the foundation for joint educational offerings expanded into other relevant energy areas, attracting enrollment to the CAES universities from all over the region and beyond.
- Beyond the traditional student matriculating through the university system, collaborations between INL and the universities support development of the current workforce at INL. Training and coursework for current INL employees is provided by some CAES universities, allowing for follow-on and specialized educational needs identified by the national laboratory. CAES universities—Idaho State University and

the University of Idaho—have established the University Place campus proximate to the national laboratory to better support the educational needs of the laboratory. With faculty and graduate students at the campus next door to INL, CAES research, education, and innovation connections are numerous and even more streamlined.

- Educational collaboration crosses over into regional colleges as well. Per the Nuclear Regulatory Commission, one important requirement of the nuclear industry is to educate all employees regardless of job duties on Nuclear Quality Assurance (NQA-1) requirements from the American Society of Mechanical Engineers (ASME). Meeting this mandate is a struggle for many companies in the supply chain for the Idaho National Lab. With funding support from the state of Idaho, the College of Eastern Idaho, in partnership with Idaho State University and INL's NQA-1 subject-matter experts, is developing a course that will be made available to all Idaho colleges to help meet the broad need for regional NQA-1 training. This class will support the state's several-hundred nuclear industry employers and support industry partners and students who want to work in the nuclear industry. For INL in particular, anticipated enrollment to such a program is around 200 people among current employees, new hires, interns, and subcontractors.
- In 2017, Idaho's Leadership in Nuclear Energy (LINE) 3.0 Commission, of which CAES is a member, championed a change in state law to increase the retention of out-of-state university students wishing to pursue an advanced degree in Idaho. The legislation, which became law on July 1, 2018, waives out-of-state tuition fees for any student who is a graduate of an accredited secondary school in the State of Idaho. This means a student from out of state who attends and graduates with an undergraduate

degree from an Idaho university and enrolls in a graduate program within 36 months of graduation at an Idaho university will pay in-state tuition for graduate school.

- CAES member, Idaho State University (ISU), is developing an interdisciplinary community of scholars who will build and sustain educational and research excellence in technology and its energy applications. This effort is central to a polytechnic initiative funded by the state of Idaho and ISU, in partnership with INL and other key industry and educational partners in Eastern Idaho. ISU is in the process of hiring seven faculty members whose proven capabilities complement INL's research emphasis on the generation, distribution, and security of electric power. This "Polytechnic Center of Excellence" will provide educational pathways relevant to the growth of an energy workforce in Eastern Idaho and around the United States. ISU students studying at the Polytechnic will receive an interdisciplinary education as they work closely with CAES and INL researchers. Students will complete undergraduate and graduate degrees in nuclear and electrical engineering, data analytics, and cybersecurity, and as the Polytechnic grows, additional opportunities will be added.
- In 2015 and 2016, the University of Idaho (UI) and the University of Wyoming (UWy) created a CAES graduate assistantship program to catalyze interdisciplinary, cooperative energy research and academic programs, promote workforce development, and engage industry partners in transformational energy programs. The program also promoted enhanced faculty–to-faculty inter-institutional collaboration, requiring students in the program to work on a project that involves participation from at least two CAES member institutions. In 2015, UI funded two graduate students through the program. One student worked on a project to integrate algal biomass into a broad-based dairy-manure resource-recovery technology, and the other worked on novel

heterogeneous catalysts for synthetic fuels. In 2016, the UWy supported seven graduate students through the program, working on a spectrum of energy-research topics, ranging from the development of a web-based, searchable Western Energy Corridor resources map to the study of chemistry and mineralogy of the Woodford Shale in Oklahoma.

- The K-12 science, technology, engineering, and math (STEM) pipeline is of critical significance to the energy workforce pipeline as well. INL and the regional universities focus on professional development for regional teachers, student diversity and access to STEM, matching career STEM pathways to industry needs, and targeting under-represented populations. INL in particular, strategically aligned with the DOE's STEM Rising Initiative, has awarded almost $5M in grants over the last decade to innovative STEM projects through the CAES universities, community colleges, Idaho schools, and informal STEM educators such as museums. Additionally, INL-hosted programs have included My Amazing Future, an annual event at the national laboratory for more than 10 years which brings in the region's 8th grade female students for a day of exploration and science, and INL Team STEMazing, an employee volunteer program which takes STEM learning out into schools and communities in order to spark a class' interest in pursuing STEM careers.

Innovation

CAES' new strategic focus on its innovation ecosystem centers on entrepreneurial opportunities, industry partnerships, and tech-to-market impact. By moving in a direction that fosters regional startup companies and facilitates work with industry partners, CAES aims to be a critical player in transitioning research and development to impactful utilization. We are working to pair key regional industries with researchers, faculty, and students to deliver solutions and new business

)pportunities. Likewise, we are leveraging intellectual property created at INL and the ıniversities to bring research and development to market and, in turn, benefit our broader :ommunities and businesses. We contribute to a skilled and capable workforce, and we support ob creation and economic development as we begin to foster a regional accelerator-like :cosystem that spins off new industry, in the vein of Breakthrough Energy's recent report.[17]

- An example of our current collaborative ecosystem with industry can be seen in a project led by researchers from the University of Idaho, with support from Boise State University and Idaho National Laboratory, alongside technical aluminum casting experts from Tokyo, Japan's Sakae Casting, prototype assembly by Idaho's Premier Technology, and team members from the College of Eastern Idaho and Table Rock, LLC. This CAES research team was awarded a grant from the state of Idaho in 2018 to model heat-transfer properties for a new spent-nuclear-fuel storage cask that aims to reduce the amount of time irradiated nuclear fuel stays in water-cooled fuel pools. Using computer-aided design software, researchers designed models of aluminum plates infused with boron, a material particularly suited for neutron absorption, capable of fitting inside a newly designed spent-nuclear-fuel cask. If successful, the plate-and-cask design will work together to provide additional layers of neutron and gamma-ray shielding while also cooling spent-nuclear-fuel assemblies. This means spent nuclear fuel could be moved out of water pools and into dry storage faster than with the current cool-and-wait method.

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[17] Breakthrough Energy, (2019) *Advancing the Landscape of Clean Energy Innovation.* February 2019, p. 194. http://www.b-t.energy/reports/advancing-the-landscape

- CAES, Food Northwest, and the University of Idaho have begun discussing ways to reduce energy and water consumption at food-manufacturing plants and facilities and are considering the development of a new CAES research center to provide the regional food industry with transformative technologies, research, and workforce educational programs to sustain the food-processing industry. As one of the largest trade associations representing the food manufacturing industry, Food Northwest would help support the center by encouraging its members to join the industry-funded endeavor. As envisioned, the center will pool the resources, capabilities, and expertise of the CAES entities together to develop technology and training programs aimed at reducing energy and water consumption at food-processing and manufacturing facilities in Idaho, Oregon, and Washington. Like many industries, the food manufacturing sector faces a workforce shortage, so a key aspect of this center will be workforce training. The center plans to develop coursework and training opportunities to support the current workforce and provide them with an energy- and water-efficiency skill set that can be widely applied. Once fully operational, the center will be headquartered at CAES and managed by the University of Idaho.
- The CAES Technical Assistance Program (C-TAP), headquartered at Boise State University, engages the expertise of faculty and students to solve technical challenges that face Idaho industry. In short, if a company has a challenge, it can reach out to C-TAP, which pairs the company with expertise and capabilities—faculty and students associated with a university lab—to resolve the issue. By employing students wherever possible, C-TAP allows young professionals to gain relevant work experience and industry connections that ready them for the workforce after graduation. In some cases, a student's experience serves as a springboard to positions in industry. In addition,

participation in C-TAP projects helps university faculty understand the needs and processes of Idaho industry. Since its inception less than 5 years ago, C-TAP has engaged in 178 projects for 91 clients and provided work experiences to roughly 20 students.

- Another example of CAES industry partnering is the Industrial Assessment Center (IAC), part of the CAES Energy Efficiency Research Institute (CEERI) based at Boise State University and supported by the Department of Energy. The IAC brings together BSU with UI to train engineering students with the hands-on experience in assessing the energy usage at small-to-medium-sized regional industrial facilities. Over the period of operation, nearly 100 engineering students have participated. According to DOE statistics, the IAC is responsible for cumulative savings of $7.2M and over 1.1 TBTU of energy saved. To put that in perspective, the amount roughly equates to constant savings of 5MW of electric power for companies in the region.

Students at all levels are the key to an energy future built on the best in research, education, and innovation. From early outreach and engagement through higher education and beyond, CAES offers experiences and opportunities for early career talent that are simply not possible for member institutions acting alone, or in other parts of the country and the world. Our students can see and experience the amazing things happening in energy and technology, sparking curiosity and lifting go-on rates. The connections we bring across research, academia, and industry build relationships and opportunities that draw undergraduate and graduate students to the area, lifting enrollments and growing our universities. These connections also strengthen employment and retention rates across the region through new opportunities, thriving industries, a growing innovation economy, vibrant communities, and a blossoming next-generation of future energy leaders.

CAES' Value and Major Milestones

Since opening its doors in 2009, CAES has made a concerted effort to demonstrate value to its stakeholders. We work hard every day to support the Department of Energy's vision for CAES as a regional, collaborative research, education, and innovation hub aimed at training the next-generation energy workforce. Our efforts support mandates from the states of Idaho and Wyoming to increase educational attainment, to supply an educated workforce capable of supporting high-technology industries, and to attract and retain new industries by supplying them with a qualified workforce. Our efforts also support our national laboratory and university stakeholders' needs by providing students with hands-on learning experiences through internships, postdocs, fellowships, job opportunities, and mentorship. Similarly, through CAES, faculty members have a mechanism to transfer laboratory and industry knowledge into the classroom; they can both shape coursework based on shared experiences and have increased potential for receiving a joint appointment or grants leading to tenure. The national lab benefits directly by molding and recruiting the nation's next-generation energy workforce and from accelerated research and development through teaming. In short, CAES provides win-wins for everyone associated with our center. Our members jointly leverage shared strengths—resources, capabilities, facilities, equipment, and expertise—leading to new funding opportunities, major proposals, and research hubs, while elevating the stature and expertise of the five CAES institutions and their associated researchers, faculty, and students.

Since 2009, CAES has achieved several significant milestones for our members including:

- Awarded more than $100 million dollars in competitive grants, including
  - More than $26 million from DOE's Nuclear Energy University Program and
  - Nearly $10 million from INL's Laboratory Directed Research and Development.

- Received more than $25 million in state of Idaho funding to support faculty and students,
- Published more than 1,700 journal articles, conference proceedings, and technical reports, and
- Hosted more than 15,000 visitors, including many university student groups.

In the last five years, CAES members have collaborated on personnel exchanges, with:

- 226 interns working at INL from CAES member universities,
- Seven INL graduate fellows from CAES member universities (through a program started in 2018),
- Seven INL postdoctoral researchers from CAES member universities,
- 25 CAES Summer Visiting Faculty (a program started in 2018), and
- 35 joint appointees between INL and CAES member universities (i.e., 29 faculty at INL and 6 INL researchers at a university).

And related to direct support of INL's specific workforce development and pipeline needs:

- 36 former student interns or post-docs were subsequently hired by INL.
- In fiscal year 2018, former INL interns and postdoctoral students accounted for 37 percent of the laboratory's overall hiring. Many of these interns and postdoctoral students came from CAES member universities.
- 485 INL employees returned to a CAES university for postsecondary education through the laboratory's employee education program.
- 27% of INL employees have one or multiple degrees from a CAES university; over the years, CAES universities have awarded 1,546 degrees to current INL employees.

Individual Success Stories

Although hundreds of students and faculty members have passed through, been impacted by, or received funding from CAES, I would like to highlight three individual success stories.

Kelley Verner

Kelley is a native of Idaho Falls, Idaho and attended the University of Idaho in Moscow, where she received a bachelor's degree in biological and agricultural engineering. As Kelley turned to graduate school, CAES helped her continue her education through the study of advanced hybrid-energy systems. Now a Ph.D. student, Kelley has been able to take advantage of CAES' connection to INL through internships with the Nuclear Science User Facilities and subcontract work with the INL's Materials and Fuels Complex. The Ph.D. work she is performing would not have been an option without the space and proximity to INL that CAES provides to students. As a result of CAES opportunities afforded to her, Kelley will be participating in the nationally competitive Dr. G. Robert Keepin Nonproliferation Science Summer Program this year at Los Alamos National Laboratory.

Michael Shaltry

Michael was the very first university student to receive authorization to conduct student research in the CAES facility when it opened in 2009. At the time, he was an undergraduate student at Idaho State University, pursuing a bachelor's degree in physics. While conducting his student research, he worked under the direction of University of Idaho's Dr. Supathorn Phongikaroon at CAES, performing chemical and electrochemical research associated with nuclear molten-salt systems. With his bachelor's degree complete, and having had excellent mentorship at CAES, Michael decided to pursue a master's degree in nuclear engineering from the University of Idaho. While completing his thesis, he continued to work at CAES, moving up the staff ranks to become a laboratory lead, overseeing CAES' Radiochemistry Laboratory and providing

mentorship to new generations of students. Today, Michael works for Idaho National Laboratory as a nuclear engineer.

Olu Omotowa

Olu joined and performed research out of the CAES facility between 2009 and 2013 while he pursued his doctoral degree in nuclear engineering at the University of Idaho under the supervision of Dr. Akira Tokuhiro at CAES. With previous degrees in chemical engineering and environmental and energy engineering, Olu saw CAES as a unique collaborative environment with peers, national laboratory experts, and academics who would enable him to perform advanced research, utilize the user facilities, develop methods, and create sustainable energy solutions. During his time at CAES, Olu worked on several DOE-funded projects, using research tools and testing facilities within CAES to provide solutions to technical challenges facing existing fleet and advanced nuclear reactors. That collective experience prepared him for the nuclear engineering workforce. Today, he utilizes the skills acquired and applies the knowledge gained while at CAES in his current role as a senior engineer at TerraPower, a nuclear innovation company.

These success stories are just a few from dozens of similar stories we hear regularly from former students, faculty members, and laboratory researchers who have been affiliated with CAES during its first decade. While some CAES students become employees at Idaho National Laboratory, others have pursued teaching opportunities or accepted positions in private industry. We are aware of CAES alumni who have gone on to work for the Department of Energy, NASA, Boeing, TerraPower, the Nuclear Regulatory Commission, Los Alamos National Laboratory, the National Renewable Energy Laboratory, Argonne National Laboratory, Oregon State University, the University of Utah, the University of Florida, Boise State University, and the University of Idaho, to name just a few organizations, agencies, or universities that have hired former CAES

faculty and students. As the importance of an educated energy workforce continues to grow, we need further support from the U.S. Congress to meet these workforce demands.

Opportunities for Congressional Support for Energy Workforce Development

Here are three ways the U.S. Congress can aid the development of a thriving energy workforce:

Robust Research Portfolio

A robust energy workforce pipeline is supported by a similarly robust research portfolio: strong research and development catalyzes the science enterprise, and educators and broader industries mobilize around strategic priorities. A robust research portfolio would include increased and targeted investment by the public and private sectors on energy innovation, seamlessly spanning gaps between fundamental research and commercial application. This approach, especially when combined with an all-of-the above strategy for energy solutions, builds on the core principles of Vannevar Bush's vision for the U.S. scientific enterprise that centers on the importance of scientific research for national security and economic well-being.[18]

But it goes further. We have an opportunity to catalyze all areas of the energy innovation system by recognizing that science and technology can mutually inspire.[19] Here, combining science and applied energy R&D portfolios can encourage performance with cross-cutting innovation.

National Laboratory Support

The country's 17 U.S. Department of Energy national laboratories are crown jewels of research, education, and innovation that deserve continued commitment and support from the U.S. Congress. Each day, thousands of researchers go to work at one of these laboratories where they conduct work in a range of scientific and engineering disciplines. The laboratories have

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18 V. Bush, Science: The Endless Frontier, Report to the President by Vannevar Bush, Director of the Office of Scientific Research and Development, July 1945, https://nsf.gov/od/lpa/nsf50/vbush1945.htm.

19 D. Stokes, (1997). Pasteur's Quadrant: Basic Science and Technological Innovation. Brookings Institution Press: Washington DC.

historically developed intellectual property, inventions, and breakthrough technology that have changed and will continue to alter the course of history. They need your continued support to push the boundaries of science and technology. They also need your support for continued funding for student intern programs, graduate student fellowships, and post-doctoral opportunities, as these are the primary mechanisms by which students enter the lab system. Finally, given the strengths we've discussed in leveraging combined laboratory and university expertise and capabilities, we also recommend that more federal agency calls for research allow opportunity for more collaborative and integrated engagement between universities, national labs, and other federal research centers across the agency complex. Perhaps these are areas where CAES could serve as a model for additional lab-university partnerships.

Advancing Energy Education

Education remains a cornerstone to solving the workforce shortage in the energy sector. We ask the U.S. Congress to continue to provide support and funding for academic scholarships and grants, especially those enabling graduate research studies. We would welcome your encouragement with universities to deepen and broaden degree programs in the energy field. Additionally, fellowships like the American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellowship and the ASME Congressional Fellowship changed my own development path and led to public service and a career in energy. Support for such fellowships, at the federal, regional, or state level, can help develop future government energy workforce. Federal-state partnerships could be beneficial in areas such as Department of Labor and Department of Education initiatives and grant programs as well.

Furthermore, partnerships with high schools, technical colleges, and community colleges must be incentivized, as energy workforce needs span a broad spectrum of talent from technicians to Ph.D.'s. The successes stemming from INL's connections with the College of Eastern Idaho and

regional universities can't be overemphasized. Such collaborations could strengthen regional innovation ecosystems and the workforce pipeline at national labs across the country. Of course, energy workforce pipeline considerations start with K-12 awareness and education. Support of efforts within national labs and at universities, such as those described herein, is critical. Inspired in part by the Peace Corps, a national junior energy league could also be supported, connecting high school and undergraduate students with national lab and industry mentors to tackle community energy challenges.[20] Finally, your support of technical certifications, skilled trades, and apprenticeships for energy industries will strengthen our country's technology leadership and resilience as we adapt with the changing energy playing field.

Conclusion

Chairwoman Kaptur, Ranking Member Simpson, and Members of the Subcommittee, it has been a privilege to address you this afternoon on the very important topic of energy workforce development. I look forward to any questions or recommendations you have on ways we can improve and advance today's energy workforce while simultaneously preparing tomorrow's students for careers in the energy sector. I am honored to be the director of an organization that, between its five members, collectively represents more than 8,000 researchers, 63,000 students, 1,100 degrees and certificates, nearly 100 engineering facilities, and approximately $1.8 billion dollars in annual research and development funding. As we continue to leverage these resources for the benefit of all, it's hard to refute that our future looks bright. I would be remiss if I didn't thank several individuals who have helped elevate CAES from a figurative concept into a collaborative institution that aspires to our organization's vision: to

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[20] This could complement the Energy I-Corps which connects researchers with industry (see https://www.energy.gov/eere/technology-to-market/energy-i-corps) and work collaboratively with groups, like Energy Corps, https://www.energycorps.org/.

create a better energy future through collaboration that inspires energy leadership, ignites technology innovation, and catalyzes global impact.

First and foremost, I would like to thank the Idaho Congressional Delegation, including Representative Mike Simpson who has long been an advocate for CAES and Idaho National Laboratory. I would also like to thank former Idaho Congressman and former Idaho Governor C.L. "Butch" Otter who was instrumental in ensuring CAES received appropriate financial considerations for the construction of our state-of-the-art headquarters facility and continued operational funding every year since 2009. During his tenure, former Governor Otter was supported by Idaho's current Governor, Brad Little, another strong advocate of CAES to whom we are indebted. In 2014, former Wyoming Governor Matt Mead also strongly advocated for the University of Wyoming's association with CAES, enabling new tracks of research and collaboration for the benefit of the region.

I would also like to thank the CAES Steering Committee members: Dr. Marianne Walck from Idaho National Laboratory, Dr. Harold Blackman from Boise State University, Dr. Scott Snyder from Idaho State University, Dr. Janet Nelson from the University of Idaho, Dr. Edmund Synakowski from the University of Wyoming, and all those who have come before, who provided steady guidance and strategic direction to CAES. We are grateful for the University Partnerships team at INL, led by Michelle Bingham, that works side by side with CAES and enables not only our CAES successes, but many others with universities around the country. I would also like to express my sincere thanks to the director of Idaho National Laboratory, Dr. Mark Peters, for his commitment to CAES and his support for our vision and mission. And lastly, I would like to thank the CAES leadership team and the many faculty members, students, laboratory researchers, and staff who believe in and support our mission and who come to work each and every day hoping to make the world a better place, together.

Ms. KAPTUR. Thank you, Dr. Bakhtian. Thank you all; this is such a fine panel. Again, thank you for making the time to be with us. I'll just ask one question, then we'll rotate back and forth so members can get in at least one question.

Let me begin with the following: in order to sustain the nuclear deterrent, you rely, Dr. Smith, on skilled labor for manufacturing, for construction, operations and maintenance of the nation's most critical nuclear security facilities.

As you see with the commercial nuclear energy industry contract, are there opportunities for you to leverage the skills and expertise of that workforce to meet some of your growing needs for additional qualified workers for the nuclear security enterprise and what can you suggest the Department of Energy might do to accelerate that transition?

Mr. SMITH. I think those that would be coming out of the commercial nuclear industry would be excellent candidates to work in a nuclear security enterprise.

By virtue of working in the nuclear reactor industry, they already have a strong appreciation for rigorous and disciplined conduct of operations.

They know the expectations around doing nuclear work. They understand that verbatim compliance is essential in the work you do.

So my suggestion would be to open that up, is as we know that we are about to exit out of site because of a shutdown or whatever is taking place, we try to put together career fairs or whatever name you want to put to it where would come in with both labor leadership and with management out of the nuclear security enterprise and we talk to workers about the opportunities that we would have because one of the things facing us, I think in the statistics that you shared at the beginning, you said about 12 percent of the nuclear industry is ready to retire?

Our number right now is 25 percent is already retirement eligible on our sites and we'll go to 40 percent within the next five years so finding qualified workers that know the expectations to work on a nuclear site would be a real advantageous situation for us.

Ms. KAPTUR. All right, and you were suggesting that the Department of Energy and its leadership on the nuclear side is heavily into this transition issue?

Mr. SMITH. Absolutely. I think we are always sensitive to moving in and pulling from an area where there is still active work so I think it has to be commensurate, with, for instance, sort of the shutdown of a site to not, again, start moving the workers around in a way that's detrimental to one place to the advantage of the other, that's why—and I think Mr. Colston really hit it so well.

We need to continually introduce more workers into the field because right now we tend to be taking from one area to meet the need in another area but then the area that they just exited is left wanting so I think there's a tremendous opportunity as we are prepared to shut down sites to offer opportunities for those workers.

Ms. KAPTUR. Well I am interested in your suggestions on any role that the Department of Energy might have in that transition to be a little more—some of what you may have suggested to them

in hopes that it might come out in the final recommendations so you can provide that to the record if you wish or you might comment later in the hearing.

Mr. SMITH. All right, I would certainly make that recommendation and I do believe that at least within the sector that I work, the Master Nuclear Security administration, there is a lot of interest in doing things jointly to accomplish just that.

Ms. KAPTUR. Thank you so much, I'd like to rotate now to Congressman Simpson.

Mr. SIMPSON. Thank you. That is an interesting topic on itself and its challenge with DOE, especially when you have EM sites and the goal of an EM site is to clean it up and move on and then you're left with all these employees that have been working there for 20 years and what do you do. It has been my experience, contractors that we've worked with have been pretty good at letting that workforce know what's happening and that the end is going to come at some point and time and helping transition them to other jobs because cleanup around this country is going to go on for quite a time in different areas. Before we move on to everyone else so that they get a chance to ask questions, let me ask Dr. Bakhtian.

I read your written testimony last night and several of the innovative programs you're rolling out this year. Can you tell us more about those and some of the successes you've had since you opened the doors 10 years ago to CAES?

Ms. BAKHTIAN. Absolutely. Thank you for the question, Representative Simpson. I'll highlight maybe two programs that we've started rolling out last year that we're excited about. One is called the CAES Summer Visiting Faculty Program and I consider it a real win-win which is always what we are looking for at CAES, wins for the Universities and the Idaho National Laboratory.

What this program does is it brings a faculty member—lots of faculty members into the national lab for a week to get to know one specific expertise area and the researchers that work there and then over the Summer, they write a proposal together for external funding and this can also involve students as well.

And so the faculty members get the opportunity to learn about INL's capabilities and build lasting networks while the INL researchers are exposed to diversified funding opportunities and really have the potential to connect the students. The pilot last year, we had only six faculty members to try it out. This year we have nineteen so we are really excited about growing that.

Actually, we've had other universities really excited about this and they are interested in getting in the mix too. The second program maybe I'll highlight is a pretty interesting educational offering that we are trying out. We don't know if it is going to work but we are going to try it out. Again, it's a win-win.

Universities sometimes don't have the resources to provide a very specialized offering but guess what? Altogether, the four CAES Universities possibly could.

So what we are exploring is a certificate program whereby each of the CAES universities would only have to offer up one course but altogether, those courses with the hands on and world class

training opportunity at the lab would provide for a whole certificate that each of the Universities could offer to their enrollees.

We are exploring this first with nuclear safeguards and security certificates but again, we'd be able to create a whole host of very specialized certificates that people would want to come all over the world to our area to do.

Your second question was maybe about metrics and I wanted to—I have a list of a few stats I'd love to share about our successes to date.

CAESers have been awarded more than $100 million in competitive grants since we have opened our doors. We've published almost 2,000 journal articles, conference proceedings, et cetera.

We've hosted over 15,000 visitors to our headquarters building but let's talk about people because that's really what it's all about.

In the last five years, we've had 240 interns, fellows and postdocs, 36 of whom were then subsequently hired by the Idaho National Laboratory.

We've had 35 joint appointees and I like this stat, we've had 485 INL employees that were turning to a CAES University for a postgraduate education which is showing that win-win again.

Also, last year, a third of the new hires at INL actually came out of former INL interns and post-docs, some of which were CAES.

And when we talk about the people, so I thought I would share one quick student story. We had the first ever student who was allowed to come in and start working at the case facility in 2009. His name was Michael Sultry. It is now Dr. Michael Sultry. But when he was doing the undergraduate experience he was actually mentored in the case facility by a faculty member from a different university in nuclear energy, and he enjoyed this so much that he decided to pursue a Master's.

And then he kept moving up the pipeline and he ended up becoming a laboratory lead in our case building for radiochemistry which is a big deal. And therefore, he turned into a mentor for other students. So you can see how the pipeline works. Eventually, he was actually hired by Idaho National Laboratory. So those are the kinds of students' success that we see all the time at KAYS.

Finally, I will just close by saying, Representative Simpson, you're very well aware of this. INL is about to open up the doors on two wonderful new collaborative centers, Cybercore and C3 this year. There are also research education initiatives that are state supported, and what I really love is the fact that, I heard, it was before my time. That when these buildings were being discussed in the State Legislature it was actually the shining example of KAYS that was shown off as, look, this is what we could do with the collaboration between the universities and Idaho National Laboratory.

So I see that as a success of what KAYS has done in the past and kind of the torch that we're passing on to other centers. I think that is it.

Ms. KAPTUR. Thank you very much. We'd now like to turn to Congressman Kilmer.

Mr. KILMER. Thanks, Madam Chair, and thanks everybody for being with us. I wanted to start maybe with Dr. Bakhtian, and if others want to chime in on this I would welcome that.

I am particularly excited about some of the DOE STEM programs. We have seen the success of that in Congressman Newhouse and my state. The Pacific Northwest National Lab Office of STEM Education is working on computer science education, training teachers through partnerships with Washington State University and the University of Washington. In my necks of the woods in Sequim, Washington at the Marine Sciences Lab there is a group of scientist that are participating in the lab STEM Ambassadors Program to connect scientific experts with classrooms and to help inspire that next generation of students.

I want to get your sense. How do we scale this up? How do we scale up these programs and other DOE initiatives at our national labs to train future STEM workforce? And I also wanted to just get your sense how we build some deeper connections between the national labs and our local communities, and particularly some of the under representative groups. In my neck of the woods we have tribal communities and others who I know our local lab is trying to make those connections, but if you have advise in that regard it would be helpful.

Ms. BAKHTIAN. Absolutely. Thank you for the question. First, I just want to iterate the importance of these kinds of STEM program. Obviously, KAYS is focused on universities, but the pipeline starts a lot earlier than that. K–12, for example, and working also with community colleges, technical colleges, et cetera.

You know, maybe I will highlight some of the Idaho National Laboratory programs which I am not an expert on, but I will give you some ideas of what is going on. We have a program called My Amazing Future, for example, where this has been going on for I think 10 years. Where we bring in every single year all of the regional eight grade women in the area and they come for a whole day at Idaho National Laboratory, and we have folks from all over the lab. Obviously, a lot of the women researchers, but others who are really excited to be able to share what they are doing. So I think having strong programs and then continuing them year after year it just becomes kind of like a tradition, an institutional tradition.

You also asked about how do you scale this up. I think that is an interesting question. Obviously, part of that is funding. Funding is always going to be the limit, kind of, to what we can do. You know, the national labs work closely together and have committees altogether where they are sharing best practices. That is always something great to do, but I think maybe we can be doing a little bit better about sharing the importance and the statistics that would drive these kinds of actions so people can see how important they are.

Mr. KILMER. Thank you. Does anyone else want to weigh in?

Mr. SMITH. Yes, I would be happy. I am sorry. Are you going to go? I would be happy to chime in a little. I think part of it, too, is, for instance, we just ran at both of our sites and introduce a girl to engineering type approach, but a lot of times these programs tend to be in the STEM outreach a little bit too much of a one and done for a while and then you come back. I think it takes a sustained effort. I think you have to be in the schools. You have to encourage it.

And you have to think, especially, like, in the underrepresented areas try to paint that vision and get people to maybe think about STEM as something different than the way they think about it today. You need STEM to be an electrician. You need STEM to be a machinist, a welder, a chemical operator, and you can go on and on. And so therefore, gaining that vision that gets someone to start into a trade, and it may lead later on to they decide to go back to school.

I was a mill right helper and then eventually I completed an engineering degree. And so I think it is important to get the vision there, but it takes a sustained effort, and I agree with the doctor it takes funding then or the allowance to go in and spend your employees' times to build those relationship. But I think it's a national investment that would be essential for the future.

Mr. KILMER. With the time I have left I wanted to ask about investment in building a workforce to deal with the electrical grid and sort of smart grid technology. We are seeing as we try to, sort of, de-carbonize and depend more on renewables having a smart grid to manage the supply and demand side is increasingly important and, often, I imagine, requires a new and different set of skills. Maybe Mr. Colston or others if you have a reaction to that. What are you seeing in terms of new skills that are required? In terms of the, kind of, electric grid workforce of the future? Any thoughts on what we need to do to train students up both today and down the road here for the future grid.

Mr. COLSTON. So the skills that the future holds, and as most of us see the grid is changing and the skills need to change with the grid itself. So the jobs within the utilities themselves, those are very blue collar high paying jobs and very high-skilled jobs. So as you take generation off you have to put more transmission in. So therefore, that creates other opportunities on the transmission side. When you talk about grid modernization the lineman of yesterday that where you set poles and pull wire is not the lineman of tomorrow. The lineman of tomorrow has to be digitally experienced enough to know that the sensors that we are putting on the line to communicate with the system dispatch is allowing the utility to understand what is happening with the electricity. So as they come through the door of the utility itself as reaching out as you talked about STEM earlier. STEM gets them through the door for there. What it does not do is get them a skilled trade once they get through the door.

What happens from that point in conjunction with the utility we teach them the skills they are going to need to be successful in their career. So that is where we look at to say that we have to teach them, one, what does grid modernization mean? Is it meaning that we are going to put lines underground? Is it meaning we are going to increase the transmission lines? We are putting sensors all through the distribution and transmission system to be able to communicate back of how we can effectively keep a 24/7 electricity running when that customer wants it.

Mr. KILMER. Thank you. Thanks, Madam Chair.

Ms. KAPTUR. Thank you very much, Congressman Kilmer. Congressman Fleischmann.

Mr. FLEISCHMANN. Thank you, Madam Chairman. I want to thank this distinguished panel today for being here. Workforce development is an American issue. It is really wonderful to see not only bipartisan support with this great subcommittee and our full committee, but really earlier today I just left the Department of Energy that did an Atomic Wings luncheon. DOE is working in this direction in the like. It is really outstanding so thank you.

I would like to extend a special thanks to Morgan Smith and also Mr. Thompson. I want everyone to note, this is very important, CNS is a wonderful group. It is a Bechtel litis consortium that does a great job at Y–12 and is building the uranium processing facility. But the fact that Mr. Thompson is here as a labor leader speaks volumes, and I thank you for being here today. The workers in Oakridge work with business leaders, work with community leaders and we get it done, and I think that is so critically important as we move forward on workforce development that everyone has a seat at the table. And special thanks again, Morgan, for the job that you do with CNS.

I have a question. We often talk about the progress that is being made on the construction of the uranium processing facility. That is the UPF and it really has been truly amazing what you have done. However, it is also important that the workforce be prepared to continue operations despite transitioning from Manhattan project area facility to a state of the art 21st Century facility. How are you ensuring, sir, that the current workforce is prepared to continue operations in the UPF?

Mr. SMITH. Thank you, Congressman, for the remarks. And one of the things that we are working very hard with in that example that I gave earlier in my opening remarks relative to the Roane State chemical operator preparation program that we are working which I think will benefit not only us but other chemical industry jobs along the way, but we recognize that we must develop a strong cadre of future chemical operators as we move into the new facility. Because at the same time we are moving we are also going to be closing down the old facility. So a big part of it is preparing the workforce of the future, having sufficient chemical operators to do that work, gaining familiarization with all the trades and crafts that we have relative to the new facility.

There will be new systems in there. Again, similar to what Mr. Colson said. Where we are today is not where we are going to be in the future, and so we have to learn those new systems and be prepared and bring individuals along. We are going to have to have the right kind of start-up teams in the 2022–2023 range of a coalition of workers that are really learning the new facility and experiencing that, and we have all that in our plans. We believe it is funded, and so we are marching forward to that end.

Mr. FLEISCHMANN. Thank you, sir. Also in my district we have a facility, a DOE Oakridge Institute for Science Education managed by ORAU. It is a tremendous resource for students, teachers, researchers, and individuals looking to work with numerous national laboratories and government agencies. On average each year ORISE places approximately 8 to 9 thousand participants in research programs at 22 different Federal agencies.

As time is moving tight, I just will ask you these questions and I open this up for whomever would like to answer. Thinking across the spectrum of opportunity, from students to experienced professionals, are you aware of opportunities for public/private partnership that the government is not currently pursuing? And I open that to anybody.

Mr. SMITH. Well, I will give it a start. I think the opportunity there is to make sure that we are intentionally encouraging the right people to get in these program, probably to look harder at internship programs, as the doctor has spoken of, and make sure that they are greatly aligned. And then make sure that as we articulate it facing in here to Washington that as we work harder to develop these programs we also make that we are representing what funding is needed. Be that in people head count, dollars for the educational aspects.

And so I think we have more work to do there to really shape it and be more intentional, and I think that is the big opportunity is to get a lot more intentional about it. Because, again, as I said in my opening remarks I think we have a national issue here that we have to prepare and be ready for the future.

Mr. FLEISCHMANN. Thank you, sir. I believe my time is up. Madam Chairman, thank you for calling this critically important hearing. It has been a privilege. Yield back.

Ms. KAPTUR. Thank you for participating. Congressman Newhouse.

Mr. NEWHOUSE. Thank you, Madam. Madam Chair, appreciate all of you being here and having this important conversation as it relates to the future of our labor force in a critical field for our country. Many people here on the panel know, but maybe you do not, but I represent the Hanford Nuclear site in Tri-Cities, Washington so you probably know thousands of my constituents are really at the front line of the challenging work that is done there, challenging, important, and dangerous work, I should add.

Partly from this, from the highly trained workforce that we have and has been assembled for the technical needs at Hanford, but as well as we also have a national laboratory, Pacific Northwest National Lab just down the road a piece. Tri-Cities truly has become, I guess you could say it is a hub for many of the science and technology, the research, the innovation, the development for many of the things that we have been talking about today.

A key component of that, though, has been really, I think, the cutting edge partnership that have been developed with some of the industry partners, labor community, certainly state colleges, universities, as I mentioned, the National Laboratory. I would like to point out a couple of those just to brag a little bit on them.

For instance, Battelle, which is the manager and operator of PNNL for the Department of Energy has contributed to the development of the Bachelor's program in cyber security at Columbia Basin College. CBC's cyber security center has subsequently been certified as a national center for academic excellence by the National Security Agency and the U.S. Department of Homeland Security or the Washington River Protection Solution.

The operations contractor responsible for the 56 million gallons of nuclear waste that are stored in temporary underground tanks

at Hanford. They have recently funded a major effort being developed by a professor and his research team at Washington State's University's Tri-Cities' campus to engineer a high-performance grout that will potentially be used to encapsulate solid secondary waste at Hanford.

Or one other example is a partnership with Department of Energy and Bechtel International which is the prime contractor responsible for the construction of the waste treatment plant, and CBC, Columbia Basin College. They have developed an analytical methods laboratory to provide chemists and laboratory specialists' ability to plot out process and procedures that will be used at the plant to classify radioactive waste from the Hanford site.

So I could go on and on and on. The list is long. There is a lot of collaboration already taking place. I am sure we could use more, and I guess kind of a softball question, but very important I think as we move forward, Dr. Bakhtian, I would like to expand a little bit, if you could, as to why you think that collaboration between the universities, industry, certainly the national laboratories, and more importantly, here, the Federal government, why it is so critical to this future question?

Ms. BAKHTIAN. Absolutely. Thank you for the question. Since you did mention Battelle I just wanted to share that Battelle is also the mothership for the Idaho National Laboratory as well which is operated by BEA, Battelle Energy Associates.

So your question, why is collaboration so important? I think that comes just down to the science and the crux of collaboration itself. There are actually scientific studies that show that when you have diverse opinions in the room, at the table, when you are working across the aisle and with others you actually come up with more innovative solutions. And so that is one of the reasons that we find collaboration so fun.

You know, just bringing together, talking about public/private partnerships, bringing together the needs of the industry, and you can include Idaho National Laboratory in that a little bit, as far as workforce development with the source of that which is education, whether it's universities or community colleges or K–12. That partnership and being more intentional about it actually provides for a better end result which is a stronger workforce at the end of the day and the workforce that you want. So I think collaboration is crucial. And, honestly, collaboration is what we do at KAYS. That's our keyword.

Mr. NEWHOUSE. Good, good. Thank you very much and I have got some other thoughts and ideas, but maybe we will have time for a second round, but thank you all for being here today. I appreciate it very much. Thank you, Madam Chair. I yield back.

Ms. KAPTUR. Thank you. Congressman Calvert.

Mr. CALVERT. Thank you, Madam Chairman. I think we are talking about the challenge of our time. I work with the Department of Defense on a number of issues and getting young people involved in science is a difficult problem. There are studies out there that show about eighth or ninth graders make a determination of where they are going to go in their careers in high school and college, and many of them, obviously, are not choosing the hard sciences. They are not choosing to go into the STEM fields.

And so other countries, India, China, Russia have much better outcomes than we do in the United States. So the challenge is we need another, I guess, Sputnik moment. I remember when that happened, everybody was running around with their HP calculators going to their physics class and taking calculus in high school. Now they do not even have calculus in high school. Most school districts have stripped calculus 1 and 2 out of the high school curriculum and you have to go to a community college.

It is not just your industry, but it is all industries. Like I said, it is a challenge of our times so maybe it is a panel question, but, Doctor, do you want to start with that?

Ms. BAKHTIAN. Absolutely. Thank you for that question; so important. I think to me, this is my personal opinion, that the excitement comes when the students have the hands-on experience and see the application. Because sitting in a math classroom or a science classroom, sometimes you don't see the big picture of how you can make an impact in the world. I certainly didn't, and so there are some ways that you can help with this, especially centers like CAES and national labs and others of our—and industry.

So, one of the examples is I was actually a part of the NASA Speakers Bureau when I was working at NASA. As researchers, we would go out to local schools who requested it or we would tell them what we do and they would request us to come out and give talks at the very lowest level, from kindergarten to 12, right, and it would actually get students excited. You would see their eyes light up. And so something that we have been thinking about at CAES is actually creating a CAES Ambassadors Program or a CAES Speakers Bureau where any of the five entities, whether they be students or faculty or researchers at the lab, we would be able to reach out to them and send them out to the schools that need speakers.

And, again, I see this as a win-win because as a speaker myself, just talking to students and hearing their questions and seeing their excitement reminded me about why I loved what I did so much. So, that is an example if that helps.

Mr. CALVERT. Thank you. Anyone else? Mr. Smith. Ms. Evans.

Ms. EVANS. So one of the things that I think that CEWD helps the energy industry do so well is really to start very early. And so we are, even in kindergarten, talking about and getting kids interested and excited about STEM, and doing that through things like you just described. FIRST Robotics, it is where they go and they build robots and they have competitions and they are learning about STEM without thinking about the fact that it is engineering.

The other thing to do to really help to focus and to get students interested is around focusing on diversity and inclusion and letting folks see that there are people who look like them in these type of roles, and doing that through spending time in schools by building programs in areas where there might not be that type of representation. You can do what you see, and helping students understand very early that energy is an exciting career and one that is very applicable to them, is one that we have seen that has helped really drive interest starting with very, very young students.

Mr. CALVERT. Great.

Mr. SMITH. I would sort of add that I think it has been captured well by the first two speakers there, it is relevance and vision. I am of the age where I identify with what you spoke about. We all wanted to be scientists or engineers in the sixties because of what NASA was doing. We didn't actually need a STEM program. We had NASA. So, talking about things at a national level, making it relevant and real to students, bringing it down, starting early as been said, having the diversity and inclusion to bring everyone in, and have them see the ability to have a real contribution in where we are going as a Nation and as mankind, I just think it can be made exciting. We just are not making it exciting and so we have to engage in a greater way in industry, as labor, with the classrooms and make it real.

Mr. CALVERT. Thank you. Thank you, Madam Chair.

Ms. KAPTUR. Thank you, Mr. Calvert. Congresswoman Wasserman Schultz.

Ms. WASSERMAN SCHULTZ. Thank you, Madam Chair. Climate change, I think, can be acknowledged as a central crisis of our time, no matter what you think the origin is. And it is something that we really have to meet head-on. The American energy industry's work is really critical, not only for our future, but for our Nation's future and the future of our planet as well.

The development of the renewable energy sector over the past few years has been really extremely encouraging and it continues to grow and create more good paying jobs. I mean, for example, we have about 800,000 people that are employed by the petroleum industry, but the clean energy industry now employs 611,000, approximately.

So this is no longer a fledgling industry. This is no longer, you know, fly-by-night or cross our fingers and hope it works out. This is really a sea change.

According to projections from the Bureau of Labor Statistics, solar panel installer is the fastest growing job in eight different states, including my home state of Florida.

So, Ms. Evans, my first question is what would you say is driving this rapid job growth in clean energy and how—what steps can we take to sustain it? And what challenges still exist that may be hindering job growth in the clean energy sector? And I will tell you, in my state, you know, we have a number of different power companies. NextEra and FPL are mine and they have really been leaders in the clean energy, renewable energy effort, despite criticism that all the power companies might get and so, you know, we have a few of the good guys, but we always can do better.

Ms. EVANS. So one of the things that we just talked about, about getting people interested and excitement, is around technology. And so what you are seeing with new technology, especially advancements around green and new type of ways to distribute energy, is that it is interesting and it is different. And so one of the things that we continue to focus on is building that foundation with STEM because you really need to make sure that people understand that, but you add in and think about competencies. Right, and so when you think about battery storage that is becoming closer and closer and you think about solar panels and you think about distributed generation, it is thinking about the workforce we have

today and up-scaling them and making sure that they have the skills and abilities to continue to compete for those roles as well as attract and encourage new people to come in. So, I think it is an excitement and it is new and it is something that people can get very excited about.

Thirty percent of our workforce is made up of millennials. Technology is something that is not a—it is a necessary thing. It is just as important to them as air and so finding ways to link that with what we do in the energy sector is what started to do that growth.

And, again, I just wanted to go back to when you think of the STEM and it being the foundation and helping to make sure that we not only build upon that, we partner with our technical schools, and the reason why is because that is a great and easy way to talk about things like how do you up-scale talent and how do you put a certificate program in very quickly to get people the skills they need to be successful, so.

Ms. WASSERMAN SCHULTZ. Exactly, and actually that really is the perfect segue into my second question which deals with women and minorities because they comprise a relatively small portion of the nuclear security and energy workforce, which is mostly older white men. No offense to the older white men in the room. There might be—I know, I am sorry. Sorry, not sorry. According to—we love our older white men, I promise.

According to a report prepared for the American Petroleum Institute, women make up around only one-fifth of the workforce in the oil and gas industry and comprise an even smaller portion of the executive level positions. And the report also found that African Americans make up 6.7 percent of the oil, gas, and petrochemical industries while they make up about 12 percent of the population, you know, our population.

So, Ms. Evans, can you discuss ways to foster employment and leadership opportunities for women and minority communities in the nuclear security and energy workforce? Would you say that the energy industry is behind other industries in diversity and inclusion efforts? I am just going to ask you all my questions and then I will let you go.

Ms. EVANS. Okay.

Ms. WASSERMAN SCHULTZ. Is the renewable energy sector bucking this trend in recruiting more women and diverse candidates? And I really applaud your get into energy and get into STEM initiatives. My youngest daughter is in 10th grade. She is a very science- and math-oriented young lady. I can't imagine where she got that from because it certainly wasn't from me, but what opportunities and partnerships should we be looking at to ensure more diversity in the STEM workforce and how can Congress help?

Ms. EVANS. Great. So thank you very much for that question and I am going to kind of start at the very beginning. When you look at the energy industry and diversity and the types of jobs, we have a very tenured, very stable workforce. We do not have a lot of turnover and churn, and so when you think about folks leaving the organization and people coming in the organization, that tends to be very slow.

And so when it comes to D&I, we have to very intentional about thinking about where do we go to recruit. We have to look at dif-

ferent and diverse pipelines. The military and veterans is one that is exceptionally strong. Folks who have served our country understand what it is like to work in an organization such as ours, where it is safety, where it is procedural-based. It is something that takes a long time for people to get skilled and understand that have a commitment. But there is lots of great diversity among women and minorities in our veterans and so leveraging that workforce, but it has to be intentional. And as you think about people transitioning out, you think about how do you find pipelines to pull people in. It goes back to starting very early. People think about what they will do based on the people that they see that are doing that work.

And, if I can have a moment, I was a recruiter very early in my career and went to a career fair at an elementary school and was talking about the power company and I had a little girl start crying because for her it wasn't a positive situation. It was somebody that came and turned off her power. And so very much it was talking about, no, this is a career path for you and this is what we do and this is why it is exciting for you and so spending time to be intentional about pipelines, thinking about the programs that we already have and we leverage, not creating special programs just for minorities or females because, again, you want to leverage what you already have and so how do we be intentional to make sure that we get diversity into those pipelines and we leverage it.

Ms. WASSERMAN SCHULTZ. That term "intentional," Madam Chair, has sort of become a buzzy-word, but it is so important when it comes to making sure that we have diverse opportunities for more people who wouldn't traditionally form that pathway, which is why I have intentionally directed my youngest daughter that she should be an engineer when she chooses her major in college. And so, anyone who wants to help me assist her and other young women move in that direction, all advice welcome, as her mom. Thank you.

Ms. KAPTUR. Thank you very much, Congresswoman Wasserman Schultz. I wanted to ask the panel, we have been talking a little bit about what the private sector can do, what educational institutions can do, what skilled labor can do. I wanted to ask you, what do you think the Department of Energy should do and its labs in terms of fostering workforce training? Congressman Calvert's statement that many high schools don't offer calculus was a shocking statement to me. I don't know if that is true across the country.

Mr. CALVERT. I never used calculus, so.

Ms. KAPTUR. But, wow, this is not the education committee, however, we have a responsibility to the country to do our job to be world leaders in energy. And so my question really goes to if you could advise the Department of Energy on how to be more effective in fostering the pipeline we have been talking about, and I am going to call on you, Ms. Evans, first because you were the panel member that identified the earliest age group, children. What can we advise the Department of Energy or suggest so that they can be partners in fostering workforce training in the very skills that they so desperately need, including our lab directors? So, I am really interested in your suggestions.

And while each of the panelists is thinking about answering that, I am also going to ask if you have materials that we could put up on our website. Several of you have talked about STEM. Well, are there standardized STEM advice or materials we can post on our website that teachers across this country can access? Are there materials in your possession?

You know, we only have 17 labs and we have 50 states and not every state has a lab and so not every place in America has lab connectivity, especially those that are in the bottom rung of median income per household. So, what do we do on the website of our committee to help you do your work? What materials can you provide us? What models can you provide us for the 20 states, evidently, that don't have any such training relationship with the energy industry? What might we put up on our website to help?

And I was thinking about this. Someone talked about distance learning. What could we do to promote some type of distance learning or access to information that could be pulled down from the poorest school district in the country to the wealthiest, that would help us deal with the STEM education issue more effectively? I think everyone in this society has a responsibility, including this subcommittee. So, what would you advise the Department of Energy on the training front, Ms. Evans?

Ms. EVANS. One of the things that would be extremely helpful is continue focusing awareness on the opportunities that exist for students. There is a 4-year career path or a college track that people can go into and that is what we spend most time talking about, but there is a hugely lucrative and incredibly amazing career path that comes through technical and career colleges, and it is called now the "new collar," and so it is career-ready, where people can go to school for a relatively shorter period of time and go right into a career versus potentially going into a college, so helping to take away a little bit of what really is a stigmatism in going into something that isn't a 4-year. We have—we want our children to go and do things better than we did, and sometimes that means directing them away from some of the jobs that we need the most, electricians, mechanics, some of those very skilled trades. That would be one.

The other is support and funding around what we call wraparound services. We can attract and get people into technical training programs and get them into technical colleges, but having the support for them to stay, and it is things as little as tuition assistance, it is transportation, it is career counseling, it is helping students identify early that they might be better suited for a 2-year technical program than a 4-year. Right now career counselors in high schools have 3- to 400 students. They can't spend the time and energy to help them think about what that means for them. So those would be the types of things that the DOE could really help do that would add to immediate results.

We have a great infrastructure. We have great programs. Help us focus and strengthen what we have versus creating something new.

Ms. KAPTUR. While you were talking, we put back up on the board there the energy sector age distribution. And Dr. Bakhtian, you talked about the term a "silver tsunami." Well, it is pretty

clear what is happening there and I keep saying how do we move the bubble to the left? How do we more quickly accelerate movement into these fields? And those who are in the audience, those who are listening elsewhere, the committee will accept relevant information and post it on our website to help America understand a little bit better the challenge that we face in this really vital industry to our country.

Would anyone else on the panel wish to comment on what you might advise the Department of Energy in order to be more effective in meeting this national goal?

Ms. BAKHTIAN. Chairwoman Kaptur, if I may. I want to focus more on what you mentioned about the website and what is information that you could be providing that can be accessed from anywhere, not just next door to a national lab or somewhere near in D.C., and I want to just give a brief example of something that we have done in Idaho.

So there is a commission called the Leadership in Nuclear Energy Commission started by former Governor Butch Otter and it is now led by current Governor Brad Little, and the LINE Commission, which I sit on, and many of my colleagues at the lab do as well, something that we have done within the Education and Workforce Subcommittee is we have created an online, kind of innovative PowerPoint. It is not a regular PowerPoint. It is something that can sit on a website. And what it does is it provides students, K through 12, even those in community college, with an idea of very visually aesthetically pleasing, what are the jobs—this one is nuclear focused—what are the jobs in nuclear that someone might want to go into, whether it is material scientist or an operator or a nuclear engineer. And as soon as they click on it, it tells them what is an average salary, it tells them how many are actually in need in the state and in the region, and it also tells them exactly which degrees they would need from a regional college or university.

So it just gives them all of the information they might need that sometimes that is the hurdle that they need to go off and try something new. So that is something that we can absolutely provide to you and maybe that is something the Department of Energy or the national labs can be working on, creating for all the other energy sectors as well.

Ms. KAPTUR. Thank you very much. We will accept your offer. Yes, Mr. Smith.

Mr. SMITH. I guess one thought would be we would need to provide more resource to go, I think, get into the schools and mentor young people. You know, part of what was discussed by the representative that now has left whose daughter was thinking about engineering.

Part of the parental journey is many of our children hit an age where we are not all that relevant but somebody else is more relevant to listen to. And I think we have, for instance we refer to them as affinity groups.

I have early career people, early career engineering groups, National Society Black Engineers, Women in Nuclear. There is a lot of affinity groups typically on Department of Energy sites but we are very limited in the amount of time we can devote to allowing

those employees to spend time in the school systems to really be those mentors and make that kind of impact. And so there would be an opportunity there, but it would take resources to be able to do that because when they're doing that, they're not doing their day job if you will.

But I really believe that at some level, and then when you talk about underrepresented groups and that sort of thing, you know, the ability to put them together with somebody that can create a vision of what's possible and where you might be able to go with your life and a career is something that I think is very important. Because when you go home, you don't necessarily have that vision instilled in you.

And so I think there is a lot of opportunity but it would take the ability to use that resource and really impact at least in the areas. But when I look across the Department of Energy, we are in a lot of locations. So if you at least multiple there as a starting point, its pretty significant.

And then as has been discussed by Ms. Evans, you know, the robotics programs, all that takes funding as well. But when you get around those young people that participate in that, there is more energy than you can imagine and it's just fun and building this, the, you know, the cell cars and science bowls and all these things, but it all takes resources to accomplish it.

Ms. KAPTUR. I would very much appreciate to put on our website if you have this ability in the organizations that you represent, personal testimonials from people working on your sites and to talking—talk about their job and what they do.

And I will tell you in the region I come from, plumbers and pipefitters in elections twice saved our necks in a nuclear power plant. Not a one of them got any TV time and they got hardly any recognition and I feel people like that who really make America run deserve more attention.

And so if you have such materials in possession of your organization, think about who are the best spokesmen and women in those organizations and give us the video clips and we will try to put them up in some reasonable order, talking about why what they do is important.

They can talk about their salaries if they want to, annually what they and their colleague might earn but also why they love their job and why they are so good at their job. And I think America needs to hear their voices.

I wanted to—I had a couple other questions here. I wanted to ask for the record and what would be one of the toughest jobs, the most challenging jobs in each of these sectors that you represent? Mr. Carlson, I am going to start with you. Colston, I'm going to start with you.

Mr. COLSTON. So you know we represent a wide range of jobs within the utilities themselves and you can go from, you know, from operators to mechanics to maintenance people to lineman. Linemen are highly technical jobs but I would say a nuclear operator is probably one of the most highly technical jobs that you have.

By the time you pass the NRC regulations that's going to allow you to operate this multi-million dollar piece of equipment, that is

a—and they're tested regularly on that not only that, the pumps, the equipment, the NRC regulations. It's a continuous education for a nuclear operator to maintain their ability to operate that unit.

And that's the same person that came in through the door that we talked about being aware of blue collar jobs that did not have a college education, but came through the door with the ability to come in that the company and the unions worked with to say we can build you a craft. We can build you a skill level that is marketable and you're going to operate a million dollar piece of equipment.

And that's where those apprentices programs take place as in telling them these are good blue collar jobs with highly skilled workers at them.

Ms. KAPTUR. I know in our region it was those very workers who attempted and succeeded in turning off various valves and switches in the bowels of the operation when the control room made mistakes, whether it was mistakes that were made or some piece of equipment malfunctioned in the control room it was the operators that went down and saved our community. Twice.

That is one of the reasons I am on this committee. Because I have such respect for what they did and I would like to elevate their contributions to this country. I am hoping each of you can help me in some way. Congressman Simpson.

Mr. SIMPSON. Thank you. This has been an interesting discussion and an important discussion but I am going to go off the rails for just a little bit. As I sometimes have a tendency to do. We hear about STEM all the time. It is STEM this, STEM that, we have to do more STEM, all that kind of stuff.

My fear is that we forget about that rest of the person. We forget about the rest of their education. The arts are important. History is important in becoming a complete individual. And I worry that we are going to be so focused on STEM that we are going to forget about the rest of the part of the person. And that is important as they are going to school.

But it has been interesting that you have talked about, Ms. Evans, about the collaboration with young people, getting them excited about knowing that these types of opportunities are out there for them.

And you have talked about, Mr. Smith, about the transition as labs transition or workforce develops in other areas and the challenges that that brings.

And, Noel, you talked about the important collaboration between individuals in college, wanting to have the hands on experience with real live researchers doing real research, and how that transfers into them getting into the field and stuff.

Mr. Colston, I agree completely with your testimony. It was when I went to college, back when William and Mary's first graduating class occurred in 1796 or something like that. Not really. I mean, it was a while ago. But the thought at the time was okay, you can go to college and you can make a bunch of money or whatever, but if you want to have a good living, you have to go to college. If not, you go to community colleges or you go to trade schools or something like that. And if you graduate from college—just from high school you are done. I mean, that was kind of the theory.

That is not true anymore. In that there are opportunities that require all sorts of different skill levels. Sometimes it is community and technical schools. Sometimes its apprenticeship programs. Sometimes there are some jobs skills that require not only college but post graduate degrees.

I have always worried that we are encouraging when we measure people's success or a state's success or something about how many of your students go to college? I don't think that is the measure anymore. The measure should be, and I don't know how you would do this, but the measure is are you happy with what you do? And what are you unable to do that you would like to do because of a lack of skills? And is there something we can do to help you gain those skills so that you can accomplish the life that you want to achieve?

When I graduated from college, I didn't know what I wanted to be but I can tell you one thing. Well, I do know what I wanted to be. I wanted to be a water color artist. And I could have done that, but I would be a lot thinner. Because I couldn't have made a living at it.

But part of what I wanted to do was okay, what do I—what is something that I can enjoy doing that I think I have some skills in that I can make a living at at a living standard I want to live at.

Why is the government now involved or why should we be involved in trying to fill that gap where we have a need for—we can look and say we are going to need all these engineers or workforce and the energy sector. If I'm going to college then I'm going to say—I'm going to look there and say hey look, jobs are available in the energy sector. That is, you know, that is maybe where I want to go. Maybe I don't want to become an artist because there are no jobs available there.

Why isn't that enough to help move the workforce in the direction where the jobs are available? And the reason I ask this is because when I—back when I went to William and Mary, no, I actually didn't go to William and Mary. But I can remember the Federal Government at the time said or a few years before I went, we need more engineers. We have to have more engineers. We are running out of engineers in this country. And they pushed everybody into the engineering programs whether it was chemical engineering or electrical engineering or structural engineering or whatever.

I went to college and some of my best friends were guys with PhDs in engineering that couldn't get a job because we had pushed everybody into that, in to fill those needs. The government is not really good at this. What it is good at is trying to identify kind of what are the needs going to be in the future and how can we tell the workforce of those available opportunities? And if you're looking for a long term job, maybe this is where you ought to look.

I guess that's kind of a question. Any comment on that off the rails comment?

Ms. BAKHTIAN. Ranking Member Simpson, if I may, first a stat that I found interesting that I just learned. In the nuclear energy sector, the—there is a stat that says that nearly 35 percent of those employed in the occupation have a bachelor's degree or higher.

And while that does suggest that there is some university and post grad education is necessary, that there are jobs that don't require that, just as you stated. So I think, it has been mentioned before that knowing what you want to do and what level of education or skills, not even education, just skills or training you need to get there is very important. And so what we have been thinking about actually at the Energy Policy Institute is taking the jobs report, the energy jobs report that just got released yesterday and doing kind of a second analysis, a more deep dive analysis on okay, so what are exactly the needs and what's the road map that we need to get there? So I think it's a really important question for right now. Thank you.

Ms. EVANS. We have to look at the partnership in companies partnering with the government to understand supply and demand. I mean, a key component of workforce development is having the right supply to meet the demand and not one over the other. And so having companies come and organizations come and talk about what that demand looks like and where, and then partnering with us to figure out how do we get the best supply is how we will make sure that we do that in a way at the end of the day people have those jobs to do what they want to do and be successful.

Mr. COLSTON. I think the government plays a major role in building partnerships. Partnerships that lead to pipelines that feed people to come up through whether it be the high schools, the trade schools, the apprenticeship programs, is the government can say that look, in the place of this, we need to partner with our industry. We need to partner with labor. We need to partner with our school system to say these are the jobs that are available. What can we do?

And I think Center for Energy and Workforce Development, that is the main focus of that whole institute is just say how can we build those partnerships of making aware of what are the jobs? Most people there's a lot of kids that are in high school and or two year colleges that would do a whole lot better on earning a living and an education at the same time.

Mr. SIMPSON. You know, that is what is very——

Mr. COLSTON. That's very important.

Mr. SIMPSON. That is what community colleges are so good at is when an industry or business wants to move into the community and they need some people and some skills, you will find that those community colleges have the flexibility to develop the classes to train those people. And they are going to become more and more important in the future I think.

Mr. SMITH. You covered pretty large water. With that set of comments. It's interesting, one of the areas of work is the naval reactors facility in your area that you represent. And I recently read some of the writings of Admiral Rick over again, reread them and he talked about the need for all of us even if we are in a technical field to have that broad spectrum of the humanities, the arts, because that would foster the greatest I think contribution of citizens in the country and as well probably stimulate greater creativity.

But, I think, you know, I struggle too with what is the Federal Government's role in all of this. Because I still think it comes down to in each community, teachers, parents, industry, helping people

get a vision. And the ideal world is to go pursue something that you love not because you are told to do it, but because you really enjoy doing it. And then as well really exposing people to that broader set of opportunities.

Because I still think we are living in a path exactly what Mr. Colston just said, where there is a lot of encouragement to go to a university but people come out with degrees that there's nothing you can do with them, in reality. And education has gone somewhat to selling education. And we need to help channel people into something that they would enjoy, something they can make a living with, and something that they can contribute to our society with. The degree to which the Federal Government can help establish that vision I think is what we need to wrestle with.

Mr. SIMPSON. Well, I appreciate that. And I am not one who is denying that the Federal Government has a role in all this kind of stuff. But what I do is struggle with what it is. You know, and so I appreciate all of your testimony today. It is a fascinating subject. It really is. Thank you.

Ms. KAPTUR. Thank you, Congressman Simpson. Let me just say that I can attest to a fine water color artist you really are. And also say that in my part of the country, we respect STEM very much but we put an A right in the middle. STEAM.

So we get both the left and the right side of the brain engaged and so we need STEM and we need STEAM in this country. And that leads me to my final comment which is creative and innovation.

Oh, Mr. Fleischmann. Oh, I am sorry. I will wait on my question. I will yield the floor to Congressman Fleischmann.

Mr. FLEISCHMANN. Thank you, Madame Chairman. I will be very brief. In my opening remarks, and I am so glad that you alluded to this. The Department of Energy is actually engaged in work force development. Just today I participated in an event with them. But last night I spoke with Secretary Perry and perhaps we can help them because the Department of Nuclear Energy has these things called Millennial Nuclear Caucuses where they get millennials in and give members of Congress such as myself and other members, both appropriators and authorizers to go in and talk with them about careers in nuclear across the board.

And I commended the secretary because this is done under NE but something that we need to be aware of, this is a temporary program. It has been successful so perhaps, Madame Chairman, as we go through the appropriations process, either with the report language or something, we could work to get them to make this permanent because what I found was there was tremendous diversity there.

But the interesting thing about it is everybody there was young except me. And so there was that—I was a child of the 80's and I just really believed you just went out and you worked 7 days a week and practiced law and made a lot of money and that was great.

SPEAKER. If you practiced law, that's true.

Mr. FLEISCHMANN. Yes, there you go. Yes, or dentistry. But I was an LES history type. But the interesting thing about it I found was some of the values of the millennials were different in terms of and

I am not saying better or worse, but in terms of the work ethic or the view of that. So introducing the millennials—so DOE is doing that, but perhaps we can help them not only with the funding but to work towards making that maybe a more permanent system.

The last thing I will say is the caucus system that we have up here. I am chairman of the National Labs Caucus, it is a wonderful bipartisan caucus, Ben Ray Luján, my dear friend on the other side of the aisle and Representative Foster who has a couple labs. And we work together and we are going to have an event and we are going to be talking about the same things. So there are a lot of different venues but again I appreciate what you all are doing here today very much. But that might be something we can work with DOE and with that I will yield back.

Ms. KAPTUR. Thank you very much, Congressman Fleischmann, for these comments. My last reference after complimenting Congressman Simpson on his artistry and talking about STEAM is as you look across the energy field, in terms of innovation, what is something that you have seen that maybe the rest of America doesn't know about and maybe we don't know about that you have found that you just—it stops you dead in your tracks. I thought that is the future. Or it is some element of the future.

Is there something in your work, that you have observed that you would like to share with the rest of the country? What might that be in the field of energy? Dr. Bakhtian, you are shaking your head, so looks like you have seen something.

Ms. BAKHTIAN. Yes. Well, I am relatively new with the Idaho National Laboratory, I have almost been there two years now. And when I started learning about the great ideas that the lab researches have on micro actors I was just blown away. And I said wow, that's the wave of the future. Advance reactors, micro reactors that don't cost billions of dollars maybe to put in place and that could help support the grid of the future as well, being very resilient. Being safe. So I'm excited to be a part of that team right now.

Ms. KAPTUR. Thank you so very much for sharing that. Anyone else wish to comment? Mr. Smith.

Mr. SMITH. I'll come at it two ways. I agree with micro reactors. I think that is really phenomenal. I would maybe take it and broaden it just a little bit more. So I go back to the slide rule days——

Ms. KAPTUR. So do I.

Mr. SMITH [continuing]. When I started college.

Mr. SIMPSON. I had to show one of these to my staff.

Mr. SMITH. You had to show one to your staff. So I have taken a pretty long journey. And to me there are so many exciting things but the one that really still strikes me is additive manufacturing. That whole approach. It would have sounded like a fairy tale to me when I was in college that we would do that.

The fact that we can model materials on high performance computers to the atomistic level and design them there as opposed to trial and error, all these things are just a phenomenal new era and a phenomenal new wave of capability and interesting things. And when you look back, just how far we have come in such a short pe-

riod of time and you think about where that may go, it's really capturing those visions.

I constantly tell our leadership that I think there are skill sets that we should be trying to figure out what they are and who they are to recruit now. Because we can't even explain what they are but we are going to need them 5 and 10 years from now. And I think really continuing to focus on that and come up with that.

And a lot of that is going to be in energy because when you look at the grid and everything that we have to do to really power this Nation and you look at the renewable opportunities, the sky is the limit. It's really an exciting time.

Ms. KAPTUR. Mr. Colston, would you like to contribute to the conversation before we close, or Ms. Evans?

Mr. COLSTON. I think that, you know, from my perspective and—I'm sorry. From my perspective, and looking at the system itself and what—how do you maintain the liability and resiliency of the system per our members, is advanced nuclear technology. As in how do we move forward with the new technology that is going to be smaller but yet still maintain reliability and resiliency of the system.

So I think that that is what catches my attention as in what's the next technology that is going to maintain that reliability and resiliency of the grid.

Ms. KAPTUR. Thank you. Ms. Evans.

Ms. EVANS. And with the increase of all the technology so smart meters and distributive generation, there is just so much data that we have access to that we have not had the ability to access before and it's allowing us to predict and think about customer needs and anticipate them in a way that we have never done.

And when you think about the way that we interact from Amazon, from other organizations that you spend time with, people want us to think about and anticipate their needs and be ahead of them. And so that I think is just very exciting.

The ability to use data to get ahead of what our customers need around energy is just going to be amazing. And I couldn't even begin to understand all that that would be today because it is changing so quickly.

Ms. KAPTUR. I don't know if the ranking member wants to make a comment, but I think one of the most astounding inventions I've ever seen, and I don't think that it is completed yet, but it was a very thin filament that floated in a nitrogen bath. And from point of generation to point of use it was 100 percent efficient. That was remarkable. And I don't know, Congressman Simpson?

Mr. SIMPSON. I will just say that when you talk about additive manufacturing and stuff, what is fascinating is what they are doing in medicine with that. The $6 million man is not that far away. Now the $6 million dollar brain, that is a lot further away.

But I think that one of the best answers I ever saw was they were asking a bunch of kids what they wanted to be when they grew up and they were like 5th and 6th graders. And they got the typical answers. I want to be a nurse, I want to be a doctor, I want to be a policeman, I want to be a fireman, you know, all that kind of stuff. They asked one kid and he says I don't know, I don't think it has been invented yet. Hire that kid.

Ms. KAPTUR. Yes. I did not see Congressman Fleischmann sitting behind your shoulder. Did you have a final comment on any? You are fine.

Mr. FLEISCHMANN. Thank you.

Ms. KAPTUR. All right, thank you very much. Thank you for participating. This concludes this afternoon's hearing. Again, I would like to thank each of our witnesses for joining us today on behalf of the country.

I ask the witnesses to please ensure for the hearing record that questions for the record and any supporting information requested by the subcommittee are delivered in final form to us no later than three weeks from the time you receive them. And members who have additional questions for the record will have three business days to provide them to the subcommittee office.

Again, thank you very much. This hearing is adjourned.

TUESDAY, APRIL 2, 2019.

DEPARTMENT OF ENERGY—NATIONAL NUCLEAR SECURITY ADMINISTRATION

WITNESSES

LISA GORDON-HAGERTY, UNDER SECRETARY FOR NATIONAL SECURITY AND ADMINISTRATOR FOR NATIONAL NUCLEAR SECURITY ADMINISTRATION

CHARLE VERDON, DEPUTY ADMINISTRATOR FOR DEFENSE PROGRAMS, NATIONAL NUCLEAR SECURITY ADMINISTRATION

BRENT PARK, DEPUTY ADMINISTRATOR FOR DEFENSE NUCLEAR NONPROLIFERATION, NATIONAL NUCLEAR SECURITY ADMINISTRATION

ADMIRAL JAMES CALDWELL, DEPUTY ADMINISTRATOR FOR OFFICE OF NAVAL REACTORS, NATIONAL NUCLEAR SECURITY ADMINISTRATION

Ms. KAPTUR. The subcommittee will come to order. Administrative Gordon-Hagerty, I want to thank you and your team for being here today.

We continue our budget hearings with the Department of Energy's National Nuclear Security Administration fiscal year 2020 Request.

The National Nuclear Security Administration and its workforce are responsible for the consequential mission of ensuring the safety, security, and effectiveness of our Nation's nuclear deterrent. This includes nonproliferation activities and powering the Navy's nuclear ships and submarines. I want to underscore the enormity of this mission while recognizing your service and contributions to our Nation.

I know that each of you here today feel that awesome responsibility. Thank you, on behalf of the country.

The Nuclear Deterrent and the Science-Based Stockpile Stewardship Program that underpin it are national priorities.

With a credible deterrent we can deter conflict, pursue diplomacy, and advance the interest of the United States and our allies.

And I must pause here to note that diplomatic engagement is a critical part of deterrence, which is something I am not sure everyone in this particular administration understands.

Successfully maintaining a credible deterrent requires a balanced and cost-effective strategy that includes prudent program, project, and risk management from NNSA.

Congress, and this subcommittee in particular, must balance the need to maintain our nuclear weapons stockpile with the importance of reducing both domestic and global vulnerabilities through nonproliferation efforts.

Unfortunately, the budget request before us today does not achieve that balance. The administration seeks a 12 percent in-

crease for weapons activities alone, 1.3 billion above the 2019 request.

As I said at this very hearing last year, these increases are simply not realistic given other constraints on the Federal budget, and unsustainable year over year.

The reality is that we have two more years of sequestration ahead of us if a budget deal is not reached. Even with a budget deal we will face difficult choices in allocating limited resources. And I look forward to hearing NNSA's plan to appropriately prioritize and cost-effectively manage the nuclear enterprise.

In turning to nonproliferation, these programs play an indispensable role in our national security by securing nuclear material globally and providing important insights into foreign nuclear programs.

While the top line number in this request appears positive at a glance, I am concerned that the administration is taking its foot off the gas pedal with respect to nonproliferation programs.

For example, a $64 million reduction is proposed for the Global Material Security Program, which helps prevent nuclear and radiological terrorism and trafficking. This program protects people and communities from serious threats, and these cuts leave vulnerable the United States and our allies worldwide.

I remain mindful of the national security imperative of the nuclear deterrent along with a strong nonproliferation program. The NNSA makes up sizeable portions of this subcommittee's budget and bill, and as such we must ensure that precious resources are provided as part of a balanced, coherent strategy.

Again, thank you for your service to our Nation, and for being here today.

With that, I will close my opening remarks. And I will turn to our ranking member, Mr. Simpson, for his opening remarks.

Mr. SIMPSON. Thank you, Chairwoman Kaptur. I would like to join you in welcoming our witnesses to this morning's hearing.

We have had good discussions with Administrator Gordon-Hagerty and Admiral Caldwell at previous hearings, while we have the pleasure of having Dr. Verdon and Dr. Park join us for the first time today. Thank you all for being here.

I look forward to hearing from you on the fiscal year 2020 budget request for the National Nuclear Security Administration.

The President's budget request for the Department of Energy shows the strong commitment to enhancing the U.S. national security. The request for the NNSA is just under $16.5 billion, an increase of $1.26 billion, or 8 percent above last year.

This funding will advance the modernization of nuclear weapons stockpile and its support infrastructure, prevent, counter and respond to nuclear proliferation and terrorist threats, and support the Navy's nuclear propulsion needs.

The budget request supports the reestablishment of many critical capabilities and continuous efforts to make an advancement through science and technology. Many of these programs are, by necessity, ambitious and will require sustained attention to good program and program management, as well as a full and capable workforce.

It will be a challenge to deliver these programs on time and on budget, but I believe the NNSA leadership assembled here with us today is up to that task.

I look forward to today's discussion on the importance of your work, and how the budget request will strengthen our national security.

I thank the chairwoman for calling this hearing. And I yield back.

Ms. KAPTUR. Thank you, Mr. Simpson. Again, I am pleased to welcome the witnesses here today.

We will hear from the Honorable Lisa E. Gordon-Hagerty, who is the Under Secretary for Nuclear Security and Administrator for NNSA. Administrator Gordon-Hagerty is responsible for the Nation's nuclear security enterprise, and she has more than 30 years of experience in national security. She has served in private industry and has held positions on the White House National Security Council and the House Committee on Energy and Commerce.

Next we will hear from Dr. Charles P. Verdon, the Deputy Administrator for Defense Programs for NNSA. Dr. Verdon is responsible for directing, managing, and overseeing the national security laboratories for nuclear weapons production facilities. He previously served as the Principal Associate Director for Weapons Integration at Lawrence Livermore National Laboratory. Thank you, Doctor, for your patriotism and for the years you have dedicated to the security of this country.

Following that we will hear from Dr. Brent K. Park, the Deputy Administrator for Defense Nuclear and Nonproliferation for NNSA. Dr. Park leads and coordinates NNSA's efforts to prevent nuclear weapons proliferation. And prior to joining NNSA Dr. Park served as Associate Laboratory Director at Oak Ridge. We hear about that frequently here on the committee, Oak Ridge National Laboratory. So, Congressman Fleischmann is doing his job.

And finally, we will have Admiral James F. Caldwell, Jr., who is the Deputy Administrator for the Office of Naval Reactors. Admiral Caldwell is responsible for managing NNSA's Nuclear Propulsion Program. And what a program that is. Admiral Caldwell's sea tours include surface in both the Atlantic and Pacific fleets and multiple operational assignments. Thank you very much, General, for being here—Admiral, excuse me, for being here today, and for your lifetime of service to this country.

Thank you all for being here. Without objection, your written statements will be entered into the record. Please feel free to summarize your remarks. You have approximately 5 minutes.

Ms. Gordon-Hagerty, you are first.

Ms. GORDON-HAGERTY. Chairwoman Kaptur, Ranking Member Simpson, distinguished members of the subcommittee, thank you for the opportunity to present the President's fiscal year 2020 Budget Request for the Department of Energy's National Nuclear Security Administration.

It is an honor to appear before you today, with members of my leadership team representing a truly extraordinary team at the NNSA, a team that is indispensable for national security. A written statement has been provided to the subcommittee, and I respectfully request that it be submitted for the record. Thank you.

Since I last testified before the——

Ms. KAPTUR. Without objection.

Ms. GORDON-HAGERTY. Thank you. Since I last testified before the subcommittee, NNSA has been diligently executing our three enduring missions: One, ensuring the safety, security, and effectiveness of the U.S. nuclear weapons stockpile. Two, reducing the threat of nuclear proliferation and nuclear terrorism around the world. And three, providing nuclear propulsion for the U.S. Navy's fleet of aircraft carriers and submarines.

The President's fiscal year 2020 budget request for NNSA is an investment in these missions, in our infrastructure, and our people. My priorities with this crucial funding are to revitalize the United States' defense plutonium capabilities and other essential infrastructure, to keep our stockpile life extension programs on schedule and on budget, and to recruit the workforce of the future.

The 2018 Nuclear Posture Review provided a realistic view of the world with an evolving and uncertain geopolitical landscape. The NPR states that there is no margin for further delay in recapitalizing the nuclear security enterprise, an enterprise that is comprised of eight laboratories, plants, and sites, and a dedicated workforce of almost 44,000 employees.

NNSA's 16.5 budget request is a necessary investment when you consider the stakes. Russia and China are pursuing entirely new nuclear capabilities. North Korea's intentions remain unclear, and we face the most complex and demanding global security environment since the end of the Cold War.

Accordingly, the fiscal year 2020 budget request represents the largest increase in our nonproliferation, counter-proliferation, and counterterrorism programs in the last 5 years. After all, the U.S. nuclear deterrent is much more than bombs and weapons, and the 2018 NPR reaffirms the need for effective arms control measures and treaty verification.

With this funding, NNSA will continue to apply its technical expertise to reduce nuclear threats around the world. Now is the time to provide the dedicated stewards of the U.S. nuclear deterrent with a modern and safe infrastructure, and the critical tools needed to maintain it.

My focus is setting the conditions today for a resilient, responsive nuclear security enterprise for the next 50 years and beyond.

During my nomination hearing last year, I stated that my highest priority was plutonium pit manufacturing. That has not changed. For the next several decades NNSA will rely on a combination of newly manufactured pits and judicious reuse of existing pits to modernize our existing nuclear weapons stockpile.

A modest pit manufacturing capability is necessary to ensure the safety and security of refurbished warheads while maintaining high confidence in stockpile effectiveness. The deliberate, methodical replacement of pits is the most prudent way to mitigate the uncertainty of plutonium aging and its impact on weapons performance.

Consistent with the NPR, NNSA is committed to producing no fewer than 80 pits per year by 2030 to meet military requirements.

Last May, the Nuclear Weapons Council endorsed NNSA's path forward to recapitalize on this vital mission, and a production capa-

bility that was shuttered in the early 1990s. Our two-side approach calls for plutonium pit production at both Los Alamos National Laboratory in New Mexico, and at the Savannah River Site in South Carolina.

This is an important step in bolstering the enterprise's responsiveness and resiliency, and is necessary to counter future threats.

NNSA is not only investing in plutonium pit mission, and thanks to the strong support of Congress we are making significant progress in the modernization across the enterprise.

We started construction on the main buildings at the uranium processing facility at Y–12 National Security Complex. And I am proud to report, this vital undertaking remains on budget and on schedule by the end of 2025 for not more than $6.5 billion.

And in New Mexico, we have broken ground on the Albuquerque complex, which will provide modern and safe infrastructure and workspace for approximately 1,200 dedicated personnel.

All of our NNSA enduring missions are underpinned by state-of-the-art scientific capabilities. As these capabilities become more important during this time of renewed great power competition, NNSA is working to stay ahead of the technology curve.

A future gap in high-performance computing is being addressed through a joint effort with DOE's Office of Science. Our contribution to that effort will be undertaken at Lawrence Livermore National Laboratory, and we will deliver exascale computing to the enterprise by 2023. From the earliest days of the Manhattan Project, the dedicated men and women of the nuclear security enterprise has answered our Nation's call.

What we are accomplishing today is remarkable. We have completed the 76–1 Life Extension Program under budget and ahead of schedule.

We have five warhead modernization programs ongoing that are currently on schedule and on budget.

We have helped 33 countries plus Taiwan to become free of highly enriched uranium. Nigeria is the latest country thanks to an NNSA-led reactor conversion program in 2018.

We routinely deploy nuclear security experts around the United States to events such as the Super Bowl to keep the public safe from a radiological threat.

And we are lending unparalleled expertise to the U.S. nuclear Navy's new Columbia-class Program to ensure sea-based deterrent capabilities for decades to come.

Finally, I want to emphasize that regardless of the investments we make in modernization of our infrastructure, the United States must continue its investment in a world-class workforce, and as requested by the President's fiscal year 2020 budget.

We face stiff competition from the private sector for the top 10 in our highly technical fields. With an aging workforce, NNSA has launched an integrated effort to recruit the next generation of scientists, engineers, and technicians, so that we can continue to answer the Nation's call and meet tomorrow's challenges.

No other government or civilian agency can accomplish the unique missions of the American people, and I couldn't be prouder to represent NNSA today.

Thank you for your strong and continued support, and the opportunity to testify before you today. And I look forward to answering your questions.

[The information follows:]

Testimony Statement of
The Honorable Lisa E. Gordon-Hagerty
Under Secretary for Nuclear Security
and Administrator of the
National Nuclear Security Administration
U.S. Department of Energy
Before the
Subcommittee on Energy and Water Development
House Committee on Appropriations

April 2, 2019

Chairwoman Kaptur, Ranking Member Simpson, and Members of the Subcommittee, thank you for the opportunity to present the President's Fiscal Year (FY) 2020 budget request for the Department of Energy's (DOE) National Nuclear Security Administration (NNSA). NNSA appreciates the Committee's strong support for our nuclear security mission and for the workforce and organizations that are responsible for executing it every day.

NNSA's enduring missions are to protect our Nation by maintaining a safe, secure, and effective nuclear weapons stockpile, reducing global nuclear threats, and providing the United States (U.S.) Navy's submarines and aircraft carriers with militarily effective nuclear propulsion. NNSA has numerous strategic partners that enable, contribute to, and benefit from our efforts, yet no other government or civilian organization can accomplish our unique mission on behalf of the American people.

The U.S. nuclear deterrent has been the cornerstone of our national security and global stability for more than 70 years, and its credibility serves as the ultimate insurance policy against a nuclear attack. While the ultimate goal of eliminating nuclear weapons has been an aspiration for generations, we must recognize the reality that foreign nuclear threats are growing. It is imperative that we modernize the U.S. nuclear deterrent and enterprise; our credibility assures our friends and allies and deters those who wish us harm.

Thanks to continued strong support from this Administration and Congress, NNSA is transforming the nuclear security enterprise to be more responsive and resilient. The following highlights: (1) NNSA's accomplishments in calendar year 2018; (2) the budget request for NNSA; (3) Weapons Activities Appropriation; (4) Defense Nuclear Nonproliferation Appropriation; (5) Naval Reactors Appropriation; and (6) NNSA Federal Salaries and Expenses Appropriation.

NNSA's Accomplishments in Calendar Year 2018

Plutonium Pit Production: The highest NNSA infrastructure priority is re-establishing a plutonium pit production and fabrication capability to meet the Department of Defense's (DoD) military requirements. Our national requirement, supported by numerous studies and analyses, requires no fewer than 80 war-reserve pits per year by 2030. Last May, the Nuclear Weapons Council (NWC) endorsed NNSA's recommended alternative calling for plutonium pit production

at Los Alamos National Laboratory (LANL) and the Savannah River Site (SRS). This two-site approach bolsters the nuclear security enterprise's responsiveness and resiliency.

NNSA's Life Extension Programs (LEPs), Modifications, and Alteration: In January 2019, NNSA completed the program of record for the W76-1 LEP, extending the warhead's service life from 20 years to 60 years. The B61-12 LEP, W80-4 LEP, W88 Alteration 370, W87-1 Modification, and the W76-2 Modification continue to remain on budget and schedule. These achievements are a testament to NNSA's ability to deliver on our commitments we have made to DoD and Congress.

Infrastructure Investments: NNSA commenced construction of the main buildings of the Uranium Processing Facility (UPF) at the Y-12 National Security Complex (Y-12). UPF remains on budget and on schedule for delivery by the end of 2025 for no more than $6.5 billion. NNSA also broke ground on the new Albuquerque Complex, which will house 1,200 employees when complete.

Highly Enriched Uranium (HEU): Working with the International Atomic Energy Agency (IAEA), China, and Nigeria, NNSA was instrumental in the conversion of a Nigerian research reactor from HEU to low-enriched uranium (LEU) fuel. This marks NNSA's 74th research reactor or isotope production facility conversion, which was followed by repatriation of the HEU fuel to China, making Nigeria the 33rd country plus Taiwan to become HEU free.

Nuclear Material Removal: NNSA removed or confirmed disposition of more than 280 kilograms of HEU from four countries, enough material for more than 11 nuclear weapons.

Counterterrorism: NNSA's technical experts were deployed to numerous widely attended public events such as the Super Bowl and the Boston Marathon to provide radiation detection, identification, and technical advice, helping to protect the public from acts of nuclear and radiological terrorism. This level of support requires NNSA's response assets to maintain full operational readiness at all times.

Naval Nuclear Propulsion: NNSA's Office of Naval Reactors continued its record of safe and reliable nuclear propulsion and nuclear fleet support, while contributing expertise to the U.S. Navy's new Columbia-Class program. This next generation nuclear-powered submarine will ensure required sea-based deterrence capabilities for decades to come.

Supercomputing: Lawrence Livermore National Laboratory (LLNL) unveiled the Sierra supercomputer, ranked the second-fastest in the world according to the Top 500 list.

For more than 70 years, from the early days of the Manhattan Project to the height of the Cold War, the dedicated men and women of the nuclear security enterprise have overcome every obstacle in their way, all while accomplishing a complex and enduring national security mission. With Congress' continued support, NNSA will similarly overcome the nuclear security threats that face us today and into the future.

NNSA's FY 2020 Budget Request

The 2018 Nuclear Posture Review (2018 NPR) calls for the United States to have modern, flexible, and resilient nuclear capabilities that are safe and secure until such a time as nuclear weapons can prudently be eliminated from the world. All previous NPRs highlighted the need to maintain a modern nuclear weapons infrastructure, yet the United States has fallen behind in sustaining a modern infrastructure that is resilient and has the capacity to respond to unforeseen threats. Additionally, the 2018 NPR reiterates the United States' commitment to effective nonproliferation and arms control measures, both of which are equally important as having a credible deterrent.

For the Nation to retain a credible deterrent and prevent, counter, and respond to global nuclear security threats, NNSA will require significant and sustained investments in its nuclear security mission. In pursuit of these goals, the President's FY 2020 budget request for NNSA is $16.5 billion. This is an increase of $1.3 billion, or 8.3 percent, over the FY 2019 enacted level.[1]

Weapons Activities Appropriation

The FY 2020 budget request for the *Weapons Activities* account is $12.4 billion, an increase of $1.3 billion, or 12 percent, over FY 2019 request levels. The programs funded in this account support the Nation's current and future defense posture and the associated nationwide infrastructure of science, technology, engineering, cybersecurity, and production capabilities.

The majority of weapons in today's stockpile have surpassed their intended design life, thereby accumulating increasing risk. The United States has reduced its stockpile by 25 percent since 2010, while potential adversaries have increased their numbers of nuclear weapons and significantly modernized their nuclear capabilities.

Maintaining the Stockpile

In FY 2019, the science-based Stockpile Stewardship Program supported certifying to the President for the 23rd consecutive year that the U.S. nuclear weapons stockpile remains safe, secure, and reliable without the need for nuclear explosive testing. This remarkable scientific achievement is made possible through the work accomplished by NNSA's world-class scientists, engineers, and technicians, and through investments in state-of-the-art diagnostic tools, high performance computing platforms, and modern facilities.

For *Directed Stockpile Work (DSW)*, the FY 2020 budget request is $5.4 billion, an increase of $768 million, or 16.5 percent, over the FY 2019 enacted level. Included within this request is funding to support the LEPs, modifications, and a major alteration. These modernization efforts are aligned with the needs outlined in the 2018 NPR and approved by the NWC.

W76-1 LEP: The W76-1 LEP, which directly supports the sea-based leg of the nuclear triad, completed its production run in December 2018. Close-out activities in FY 2020 include

[1] Amounts do not reflect the transfer of funds from Naval Reactors to the Office of Nuclear Energy for maintenance and operation of the Advanced Test Reactor in FY 2019.

archiving production tooling and program records, and completing component overbuilds to support hardware provisioning for the life of the warhead system.

W76-2 Modification Program: The W76-2 is currently on schedule and on budget. The First Production Unit (FPU) was completed in February 2019. By providing the U.S. an assured ability to respond in kind to a low-yield nuclear attack, the W76-2 discourages an adversary from pursuing such an attack and therefore strengthens deterrence. Having credible response options to a nuclear attack of any magnitude ensures no adversary mistakenly believes the U.S. would be deterred from responding to a low-level nuclear attack for fear of escalation.

B61-12 LEP: The B61-12 LEP will consolidate four variants of the B61 gravity bomb and improve the safety and security of the weapon. Currently in Phase 6.4, Production Engineering, this LEP has demonstrated system performance in over 60 integrated ground and flight tests, including eight joint flight test drops. The B61-12 LEP will enter Phase 6.5, First Production, in the fourth quarter of FY 2019, following completion of system qualification and Pantex Plant production readiness activities.

W88 Alteration 370: The FPU is on track for completion by December 2019. This program, which also supports the sea-based leg of the nuclear triad, is currently in Phase 6.4, Production Engineering, and will enter Phase 6.5, First Production, in September 2019.

W80-4 LEP: In February 2019, the NWC approved the W80-4 LEP to transition into Phase 6.3, Development Engineering. The FY 2020 request for $899 million will allow the W80-4 LEP to remain on track to achieve FPU completion in FY 2025 in support of the Air Force's Long-Range Stand-Off (LRSO) cruise missile.

W87-1 Modification Program: The W87-1 program will replace the aging W78 warhead, with planned first production in 2030 to support fielding on the U.S. Air Force's Ground Based Strategic Deterrent (GBSD) missile system. In September 2018, the NWC authorized restart of Phase 6.2, Program Feasibility Study, activities on the W78 replacement warhead and renamed it the W87-1. The W87-1 Modification Program will improve the warhead's safety and security, addressing design, material obsolescence, performance, and survivability considerations.

Within DSW, the FY 2020 budget request includes $636 million for *Stockpile Systems*, an increase of $36 million, or 6.1 percent above the FY 2019 enacted level. This program sustains the stockpile in accordance with the Nuclear Weapon Stockpile Plan by producing and replacing limited-life components such as neutron generators and gas transfer systems; conducting maintenance, surveillance, and evaluations to assess weapon reliability; detecting and anticipating potential weapon issues; and compiling and analyzing information during the annual assessment process.

The DSW request also includes $1.1 billion for *Stockpile Services*, an increase of $76 million, or 7.2 percent, above the FY 2019 enacted level, to support the modernization of capabilities to improve efficiency of manufacturing operations to meet future requirements. This request supports all DSW operations by funding programmatic and infrastructure management, and

maintaining the core competencies and technologies essential for reliable and operable stewardship capabilities.

The FY 2020 budget for *Strategic Materials* is necessary to maintain NNSA's ability to produce nuclear and other strategic materials associated with its weapons programs, as well as refurbish and manufacture components made from these materials. This includes uranium, plutonium, tritium, and lithium.

Strategic Materials Sustainment: The request of $257 million, an increase of $41 million, or 18.8 percent, above the FY 2019 enacted level, will develop and implement strategies to maintain the technical base for strategic materials in support of NNSA's nuclear weapons, nonproliferation, and naval nuclear propulsion activities at NNSA's eight sites.

Uranium Program: The FY 2020 budget request of $909 million for the Uranium Program is comprised of Uranium Sustainment ($94 million), Process Technology Development ($70 million), and the UPF project ($745 million).[2] Uranium Sustainment supports the program to maintain existing enriched uranium capabilities through enhanced equipment maintenance while preparing to phase out mission dependency on Building 9212, a Manhattan Project-era production facility at Y-12. The funding request will enable NNSA to sustain uranium manufacturing capabilities while accelerating planning and execution of the Building 9212 exit strategy to reduce risks associated with transitioning enriched uranium capabilities to the UPF. Process Technology Development supports key capability transitions out of Building 9212, including chip processing, purified metal production, and recovery of low equity material, into enduring nuclear facilities. Funding for UPF will support peak construction activities in FY 2020 and FY 2021. UPF will provide uranium casting, special oxide production, and salvage and accountability capabilities for the enterprise.

Plutonium Sustainment: The FY 2020 budget request of $712 million, an increase of $351 million, or 97.2 percent, above the FY 2019 enacted level, supports continued progress to meet pit production requirements. The requested funding would support efforts to begin the long-term plan to develop a capability to produce no fewer than 80 war-reserve pits per year by 2030, as directed in the 2018 NPR.

The time to move forward is now. Repurposing the Mixed Oxide (MOX) Fuel Fabrication Facility and producing plutonium pits at SRS and LANL is the preferred path to achieve the critical DoD requirement of 80 pits per year by 2030. Even though this approach will require NNSA to fund activities at two sites, any interruption or delay to pit production in the future due to the lack of resiliency will have huge cost increases across the entire nuclear security enterprise. NNSA is investing in the Savannah River Plutonium Processing Facility. The agency is executing conceptual design activities for the repurposed MOX Fuel Fabrication Facility and moving forward with National Environmental Policy Act activities.

NNSA is also investing at LANL to provide all the tools necessary for the enterprise to successfully support an enduring plutonium pit production mission to produce 30 pits per year by

[2] Process Technology Development is funded under the Advanced Manufacturing Development program, and the UPF project is funded under Infrastructure and Operations.

2026. NNSA anticipates $3 billion in total funding over the next five years to enable this, and LANL is actively installing pit production equipment and has begun hiring to meet future work scope. As the Nation's plutonium center of excellence for research and development, LANL plays a critical role in early design efforts for pit production.

In addition, NNSA's budget request includes funding for the Chemistry and Metallurgy Research Replacement project at LANL, which supports our plan to cease operations in buildings dating back to the Manhattan Project, in the height of the Cold War, and transition to modern facilities.

Tritium Program: The FY 2020 budget request of $269 million, a decrease of $21 million, or 7.3 percent, below the FY 2019 enacted level, will provide the tritium necessary for national security requirements. Tritium must be replenished regularly because it radioactively decays at 5.5 percent per year. Tritium availability is dependent on both the production of new tritium and the recovery and recycling of tritium from returned warhead components. Mission requirements necessitate that tritium production double by the mid-2020s. NNSA's tritium strategy focuses on increasing tritium production in Tennessee Valley Authority reactors and modernizing infrastructure at SRS to support the tritium supply chain.

Lithium Program: The FY 2020 budget request of $29 million, a decrease of $335,000, or 1.1 percent below the FY 2019 enacted level, supports a lithium bridging strategy to maintain the production of lithium. The FY 2020 budget request includes $32 million for the Lithium Processing Facility (LPF), which will replace 1940s infrastructure at Y-12 and house lithium processing capabilities by 2030. NNSA completed an Analysis of Alternatives (AoA) for the LPF and is preparing for Critical Decision 1, establishing the preferred alternative design and estimated budget.

Domestic Uranium Enrichment (DUE): The FY 2020 budget request of $140 million, an increase of $90 million, or 180 percent above the FY 2019 enacted level, will continue efforts to make available, when needed, the necessary supplies of enriched uranium for a variety of national security needs. The DUE program schedule is driven by the nearest-term defense need—unobligated low enriched uranium for tritium production. Other Departmental needs for enriched uranium (e.g., research reactors, naval fuel) are supported by this effort as well.

For *Research, Development, Test, and Evaluation* (RDT&E), the FY 2020 budget request is $2.3 billion, an increase of $264 million, or 13.1 percent above the FY 2019 enacted levels.

Increases to the *Science Program* ($587 million) provide additional funding to support subcritical experiments for pit reuse and advanced diagnostics for subcritical hydrodynamic integrated weapons experiments that produce data for stockpile certifications.

The *Engineering Program* ($234 million) sustains NNSA's capability for creating and maturing advanced toolsets and technologies to improve weapon surety and support annual stockpile assessments.

In FY 2020, the *Inertial Confinement Fusion Ignition and High Yield Program* ($481 million) will continue to maintain essential experimental capabilities and expertise in high energy density

stockpile science. These efforts continue to provide data to reduce uncertainty in calculations of nuclear weapons performance and improve the predictive capability of science and engineering models in high-pressure, high-energy, high-density regimes.

The FY 2020 request includes $840 million for the *Advanced Simulation and Computing* (ASC) Program, which continues NNSA's close collaboration with DOE's Office of Science to implement the Exascale Computing Initiative. The ASC Program supports stockpile stewardship by developing and delivering predictive simulation capabilities for nuclear weapons systems in addition to deploying increasingly more powerful supercomputers at Sandia, Los Alamos, and Lawrence Livermore National Laboratories.

The *Secure Transportation Asset* (STA) program provides safe, secure movement of nuclear weapons, special nuclear material, and weapon components to meet projected DOE, DoD, and other customer requirements. The Office of Secure Transportation has an elite security workforce that performs sensitive and demanding work; our agents are among the most highly trained and dedicated national security personnel operating within the United States. The FY 2020 budget request is $317 million, of which $80 million continues our efforts to modernize and replace the existing fleet of transporters with the Mobile Guardian Transporter (MGT). The MGT will be used for the containment and transport of nuclear weapons, weapons components, and/or special nuclear materials.

Improving Safety, Operations, and Infrastructure

An effective, responsive, and resilient nuclear weapons infrastructure is essential to the U.S. capacity to adapt flexibly to shifting requirements. Such an infrastructure offers tangible evidence to both allies and potential adversaries of U.S. nuclear weapons capabilities and can help to deter, assure, hedge against adverse developments, and discourage adversary interest in arms competition.

More than half of NNSA's facilities are over 40 years old, and roughly 30 percent date back to the Manhattan Project. It will take sustained, significant resources to modernize NNSA's nuclear weapons infrastructure.

Thanks to the support of the Administration and Congress, NNSA is making progress in repairing, replacing, and modernizing NNSA's facilities and stabilizing deferred maintenance; yet much more remains to be done. The FY 2020 budget request for *Infrastructure and Operations* is $3.2 billion, an increase of $121 million, or 3.9 percent above the FY 2019 enacted level. It includes $1.1 billion for line item construction and over $580 million for minor construction and equipment recapitalization needs. Delivering these projects on budget and schedule is contingent upon stable and predictable funding profiles, and support for the President's budget request.

Many of NNSA's excess process-contaminated facilities will ultimately be transferred to DOE's Office of Environmental Management (EM) for disposition. For example, EM commenced efforts to remove Building 280 Pool Type Reactor and ancillary facilities at Lawrence Livermore

National Laboratory. NNSA identified five (including Building 280) of the top ten highest risk excess facilities at Lawrence Livermore National Laboratory.

In the interim, NNSA is focusing on reducing risks where possible. NNSA has made critical investments to stabilize high-risk process-contaminated facilities until ultimate disposition, including at Y-12's Alpha 5 and Beta 4 facilities. In FY 2020, NNSA is using the authority Congress provided in the FY 2018 National Defense Authorization Act (NDAA) to pursue disposition of several high-risk process-contaminated excess facilities with a project cost of less than $50 million. NNSA also remains committed to reducing the risk of non-process contaminated facilities by dispositioning facilities where possible. For example, NNSA completed the Pantex Drummond Office Building (formerly known as the Administrative Support Complex) at the Pantex Plant outside of Amarillo, Texas in 2018. This building provides 1,000 employees with modern, energy efficient workspace. As a result, NNSA is now disposing of dilapidated, 1950s-era buildings and eliminating approximately $20 million in deferred maintenance. In FY 2020, NNSA plans to fund the disposition of 24 additional facilities totaling 75,000 gross square feet.

Defense Nuclear Security's FY 2020 budget request is $778 million, an increase of $88 million, or 12.7 percent, over the FY 2019 enacted amount. To execute its enterprise security program, DNS provides funding to the sites for: protective forces; physical security systems; information security and technical security; personnel security; nuclear material control and accountability; and security program operations and planning. While NNSA faces challenges replacing and refreshing aging physical security infrastructure, we are making key investments in recapitalizing this infrastructure through the Security Infrastructure Revitalization Program (SIRP). SIRP projects address aging high-priority security systems and related security infrastructure and equipment needs at all NNSA sites. NNSA will continue to execute ongoing line-item security projects as well, including the effort to reduce the Y-12 Protected Area and use security resources more efficiently. In addition, NNSA will sustain counter unmanned aircraft systems implementation and operation at sites possessing Category 0/I quantities of special nuclear material.

Information Technology and Cybersecurity enable every element of NNSA's missions. The FY 2020 budget request is $309 million, an increase of $88 million, or 40 percent over the FY 2019 request. This increase will continue cybersecurity enhancements, bolster cybersecurity capabilities, and support the continuation of IT modernization efforts. NNSA is making steady progress in enhancing and upgrading the components of the Enterprise Secure Computing environment to ensure that nuclear security enterprise missions can be completed without disruption. As NNSA mission requirements expand in scope, the IT and cyber programs require modernization, expansion, and innovation in a commensurate fashion. Cybersecurity is a defense and deterrence mechanism and a powerful tool. In the current threat environment, NNSA cannot afford to neglect its cybersecurity capabilities, which serve as frontline assets that protect the information, systems, and networks NNSA depends on to execute our mission.

Defense Nuclear Nonproliferation Appropriation

The FY 2020 budget request for the Defense Nuclear Nonproliferation account is $2 billion, an increase of $63 million, or 3.3 percent, above the FY 2019 request. Defense Nuclear

Nonproliferation account activities address the entire nuclear threat spectrum by helping to prevent the proliferation of nuclear weapons, counter the threat of nuclear terrorism, and respond to nuclear and radiological incidents around the world. The FY 2020 budget request funds two program mission areas under this account: the Defense Nuclear Nonproliferation (DNN) Program and the Nuclear Counterterrorism and Incident Response (NCTIR) Program.

Nonproliferation Efforts

The Office of Defense Nuclear Nonproliferation works to: remove or eliminate vulnerable nuclear material; improve global nuclear security through multilateral and bilateral technical exchanges and training workshops; help prevent the illicit trafficking of nuclear and radioactive materials; secure domestic and international civilian buildings containing high-priority radioactive material; provide technical reviews of U.S. export license applications; conduct export control training sessions for U.S. enforcement agencies and international partners; strengthen the IAEA's ability to detect and deter nuclear proliferation; advance U.S. capabilities to monitor arms control treaties and detect foreign nuclear programs; and maintain organizational readiness to respond to and mitigate radiological or nuclear incidents worldwide.

The *Material Management and Minimization (M3)* program provides an integrated approach to addressing the risk posed by nuclear materials. The FY 2020 budget request is $334 million, an increase of $40 million, or 13.5, percent above the FY 2019 enacted level. The request supports the conversion or shut-down of research reactors and isotope production facilities that use HEU and the acceleration of developing new, non HEU-based molybdenum-99 production technologies in the United States. Additionally, the request for M3 supports the removal and disposal of weapons-usable nuclear material, with priority on expediting the removal of surplus plutonium from the State of South Carolina and continuing the transition to the dilute and dispose strategy for surplus plutonium disposition.

The *Global Material Security* program works with partner nations to increase the security of vulnerable nuclear and radioactive materials and improve the ability to deter, detect, and investigate illicit trafficking of these materials. The FY 2020 budget request of $342 million, a decrease of $65 million, or 15.9 percent, below the FY 2019 enacted level and includes efforts to secure the most at-risk radioactive material in U.S. high-threat urban areas by the end of FY 2020.

The *Nonproliferation and Arms Control* program develops and implements programs to: strengthen international nuclear safeguards; control the proliferation of nuclear and dual-use material, equipment, technology and expertise; verify nuclear reductions and compliance with nonproliferation and arms control treaties and agreements; and address enduring and emerging proliferation challenges requiring the development of innovative policies and approaches. The FY 2020 budget request for this program is $137 million, an increase of $6 million, or 5.8 percent, above the FY 2019 enacted level. This increase serves to advance and complete development of the new Export Compliance Assistance Program to deploy export control training across DOE and NNSA facilities, implement new 10 CFR Part 810 civil penalty authority pursuant to the FY 2019 NDAA, and establish and maintain a nonproliferation

enrichment testing and training platform in cooperation with the IAEA and select foreign partners.

The *Defense Nuclear Nonproliferation Research and Development* program supports innovative unilateral and multilateral technical capabilities to detect, identify, and characterize foreign nuclear weapons programs, illicit diversion of special nuclear material, and nuclear detonations worldwide. The FY 2020 budget request for this program is $495 million, a decrease of $80 million, or 13.9 percent, below the FY 2019 enacted level. This decrease is due to shifting the HEU Reactor Conversion program to M3, as it is no longer in the research and development phase.

Nonproliferation Construction consolidates construction costs for DNN projects. The FY 2020 budget request is $299 million, an increase of $79 million, or 35.9 percent, above the FY 2019 enacted level. Last year, NNSA terminated activities for the MOX Fuel Fabrication Facility project to pursue the dilute and dispose option to fulfill the U.S. commitment to dispose of 34 metric tons of plutonium. The $220 million for the MOX Fuel Fabrication Facility will be used to continue termination activities. The request also includes $79 million for the Surplus Plutonium Disposition project, which supports the dilute and dispose strategy.

Nuclear Counterterrorism and Incident Response (NCTIR)

The Office of Counterterrorism and Counterproliferation (CTCP) provides effective capabilities to respond to any nuclear or radiological incident in the United States or abroad by applying the unique technical expertise found in NNSA's nuclear security enterprise. Highly trained personnel with specialized technical equipment maintain readiness to support lead federal agencies to find and render safe potential nuclear and radiological threat devices, to effectively manage the consequences of nuclear or radiological emergencies, and to support enhanced security operations for National Security Special Events (NSSE).

NNSA's Aerial Measuring System (AMS) provides airborne remote sensing in the event of a nuclear or radiological accident or incident within the continental United States, as well as in support of regularly scheduled NSSE. The AMS fleet consists of three Beechcraft B200 fixed-wing aircraft with an average age of 33 years and two Bell 412 helicopters with an average age of 24 years. The age of the current aircraft leads to unscheduled downtime resulting in reduced mission availability. A 2017 AoA on the AMS aircraft determined that recapitalization of the aging aircraft fleet is necessary to continue to provide Federal, State, and local officials with rapid radiological information following an accident or incident. In FY 2019, the fixed-wing aircraft will be replaced, and the rotary-wing aircraft will be replaced in FY 2020. The FY 2020 budget request for AMS recapitalization is $35.5 million.

NNSA, in conjunction with the Federal Bureau of Investigation (FBI), supports render safe teams at FBI field offices in 11 major American cities that are specially trained and equipped to identify and mitigate the function of a nuclear or radiological device (i.e, "stabilization"). CTCP will conduct stabilization training and operations and begin transitioning to the Capability Forward initiative, under which lifesaving responses to a nuclear threat device will be accelerated. Under this initiative, NNSA will provide additional training, equipment, and

technical support to the current 11 stabilization cities – eventually growing to 14 U.S. cities by FY 2022 – to allow FBI teams to execute render safe operations more rapidly. CTCP will also improve and expand NNSA training facilities to accommodate the increased training requirements associated with regional render safe capabilities.

The Nation's nuclear incident response teams require the ability to communicate classified technical assessments in deployed, and often austere, environments using highly secure means. Information requirements encompass both nuclear device design information and intelligence assessments. The equipment used by NNSA's nuclear incident response teams is aging, resulting in increasing maintenance costs and heightened risks to the emergency response mission. This budget includes funding for recapitalization of incident response equipment consistent with lifecycle planning to maintain operational readiness. The budget also includes funding for state-of-the-art, secure, deployable communications systems that are interoperable with FBI and DoD mission partners that will help provide decision makers with real-time technical recommendations to mitigate nuclear terrorist threats.

CTCP maintains an operational nuclear forensics capability in three distinct areas: (1) pre-detonation device disassembly and examination; (2) post-detonation assessment; and (3) analysis and characterization of nuclear materials. The program maintains readiness to deploy device disposition and device assessment teams, conduct laboratory operations in support of analysis of bulk actinide forensics, and deploy subject matter expertise and operational capabilities in support of ground sample collections that support attribution of a nuclear detonation.

The *Emergency Operations* program's FY 2020 budget request includes $35.5 million under NCTIR to support NNSA's Office of Emergency Operations. This funding will support NNSA's all-hazard emergency response capabilities that positively impact the Department's emergency management continuity and devolution programs, enhance the ability of the Department to respond to, and recover from, catastrophic emergencies or other man-made hazards or natural disasters.

Naval Reactors Appropriation

Advancing Naval Nuclear Propulsion

Nuclear propulsion for the U.S. Navy's fleet of submarines and aircraft carriers is critical to the security of the United States and its allies as well as the security of global sea lanes. The Office of Naval Reactors remains at the forefront of technological developments in naval nuclear propulsion by advancing new technologies and improvements in naval reactor performance. This preeminence provides the U.S. Navy with a commanding edge in naval warfighting capabilities.

The *Naval Reactors* FY 2020 budget request is $1.65 billion, a decrease of $140 million or approximately 8 percent, below the FY 2019 enacted level. This request reflects reductions to planned funding levels following additional funding enacted in FY 2018 for the S8G Prototype Refueling Overhaul and Spent Fuel Handling Recapitalization Project. In addition to supporting today's operational fleet, the requested funding is the foundation for Naval Reactors to deliver

tomorrow's fleet and recruit and retain a highly-skilled workforce. One of Naval Reactors' three national priority projects, continuing design and development of the reactor plant for the Columbia-Class submarine, featuring a life-of-ship core and electric drive, will replace the current Ohio-Class fleet and provide required deterrence capabilities for decades. The project to refuel a research and training reactor in New York will enable 20 more years of research, development, and training for fleet operators. Funding will also be used to support construction of a new spent fuel handling facility in Idaho that will facilitate long term, reliable processing and packaging of spent nuclear fuel from aircraft carriers and submarines.

Naval Reactors has requested funding in FY 2020 to support these projects and fund necessary reactor technology development, equipment, construction, maintenance, and modernization of critical infrastructure and facilities. By employing a small but high-performing technical base, the teams at Bettis Atomic Power Laboratory in Pittsburgh, Pennsylvania; Knolls Atomic Power Laboratory and Kesselring Site in New York; and the spent nuclear fuel facilities in Idaho can perform the research and development, analysis, engineering, and testing needed to support today's fleet at sea and develop future nuclear-powered warships. These laboratories also perform the technical evaluations that enable Naval Reactors to thoroughly assess emergent issues and deliver timely responses to provide nuclear safety and maximize operational flexibility.

NNSA Federal Salaries and Expenses Appropriation

The FY 2020 budget request for *Federal Salaries and Expenses* is $435 million, an increase of $25 million, or 6.0 percent, over the FY 2019 enacted level. NNSA's workforce is critical to the success of the Nation's nuclear security enterprise. NNSA must have a sufficient workforce, with the right capabilities, to ensure it can modernize the nuclear deterrent, recapitalize an aging infrastructure, and continue to meet the requirements of our nonproliferation and counterterrorism programs. The 2018 NPR highlighted the need to properly support civilian personnel who protect the United States against nuclear threats. Effective deterrence would be impossible without the vital contributions our personnel make to the United States' nuclear capabilities and deterrence.

If NNSA is to be successful, funding alone will not be enough. NNSA will need to have the necessary human resource authorities to attract and retain the best and brightest workforce from around the country, fostering interest through internships or skilled trade programs, and clearing them for classified work as quickly as possible. This includes jobs not just in science, technology, and engineering but also manufacturing, maintenance, project and program management, and construction.

Meeting NNSA's growing mission requirements, as described in the 2018 NPR will require an aggressive hiring strategy for the next two years. Since 2010, NNSA's program funding has increased 50 percent, while staffing has decreased 10 percent. The FY 2020 request increases NNSA staffing to 1,753 full-time equivalents (FTEs), an increase of 95 FTEs from the current on-board level of 1,658 Federal employees. NNSA would benefit from the elimination of the overall cap on FTEs and excepted service personnel.

Last year, two independent studies identified NNSA's unmet critical staffing needs. The Office of Personnel Management (OPM) and NNSA's Office of Cost Estimating and Program Evaluation (CEPE) found that NNSA was understaffed across all functions. The number of additional staff recommended in both studies would exceed the statutory cap on NNSA's full-time equivalent employees. In March 2019, the Government Accountability Office (GAO) endorsed both OPM and CEPE's staffing analyses' conclusions of critical staff shortfalls and needs across multiple NNSA functions. GAO's endorsement supports NNSA's request for additional hiring authorities that would eliminate personnel caps, which would allow us to put significant resources behind our mission priorities. NNSA is focusing on developing a concrete strategic staffing plan based on the information provided by the two independent studies and GAO's report.

Management and Performance

Since 2011, NNSA has delivered approximately $2 billion in projects, a significant portion of NNSA's total project portfolio, under budget. We are committed to encouraging competition and increasing the universe of qualified contractors by streamlining major acquisition processes. NNSA will continue to focus on delivering timely, best-value acquisition solutions for all programs and projects, by using a tailored approach to contract structures and incentives that are appropriate for the special missions and risks at each site. NNSA's Office of Acquisition and Project Management continues to: lead improvements in contract and project management practices; provide clear lines of authority and accountability for program and project managers; improve cost and schedule performance; and ensure that Federal Project Directors and Contracting Officers possess the appropriate skill mix and professional certifications to manage NNSA's work.

Conclusion

NNSA's diverse missions are critical to the national security of the United States: maintaining the safety, security, reliability, and effectiveness of the nuclear weapons stockpile; reducing the threat of nuclear proliferation and nuclear terrorism around the world; and providing naval nuclear propulsion to the U.S. Navy's fleet of aircraft carriers and submarines. NNSA is mindful of its obligation to improve acquisition, safety, and security practices continually, and to use in a responsible manner, the resources entrusted to it by Congress and the American people. By investing in our nuclear security enterprise and continuing our efforts to modernize our scientific, technical, and engineering capabilities and infrastructure, NNSA will continue to deliver on its nuclear security mission.

Ms. KAPTUR. Thank you very much, Madam Administrator. If I were to ask you to do a press release to the public of the positions that are needed at NNSA, do you have the ability to do that?

Ms. GORDON-HAGERTY. Absolutely.

Ms. KAPTUR. I would love to see that, for the record. Let me proceed to the first question. The committee is often faced with significant constraints when writing appropriation bills, and the administration has requested 12 percent in increase, $1.3 billion, in weapons activities for fiscal year 2020.

As I said to Secretary Perry last week, sustaining a credible nuclear deterrent is a national priority, but it must be done in a balanced, cost-effective manner.

This year will not be any different, and I don't see enough evidence in your testimony of the prioritization necessary to assist Congress in making difficult choices in allocating limited resources.

So I heard what you said. We heard what you said about plutonium pit modernization. But what are your essential priorities for NNSA, essential priorities?

Ms. GORDON-HAGERTY. Thank you, Chairwoman Kaptur. Our essential priorities are to maintain the five current modernization programs that we have on board for our defense program's activities, those were the five weapons programs.

We have two life extension programs, two modernization programs—and modification programs, and one major alteration. We must keep those on schedule and on budget to meet the military requirements of STATCOM in the Department of Defense.

Secondly, and equally important is the underpinning of our scientific technical expertise. So, the science-based stockpile stewardship also supports the nonproliferation and counter-proliferation and counterterrorism programs. They are underpinned by the technical expertise resident throughout our entire workforce across the entire nuclear security enterprise.

With that, Dr. Park's program on nonproliferation has brought to me a prioritization of how we can look strategically into nonproliferation efforts across the board. In fact, I have tasked the entire enterprise to give me a strategic vision of where do we want to ensure nonproliferation, counter-proliferation, counterterrorism programs globally. And where are we looking to, whether we are committing to the Horn of Africa or Eastern Europe. But we are looking across the entire globe to see where we can ensure we can continue to provide counter-proliferation support, nonproliferation, and counterterrorism support.

Third, and equally important of course, is maintaining one of the three legs of our triad, which is, of course, nuclear Naval propulsion in our submarine force, but that is also to provide the Naval nuclear propulsion for both our aircraft carriers and our submarines.

So, they are all equally important, and perhaps though budgets may not be equal, a third each, if you will, they are all equally important, and we are keeping our eye on all three of those critical missions that underpin the responsibilities of the NNSA.

Ms. KAPTUR. If I were to ask you, on nuclear Naval propulsion, a scientific hurdle that you have to surmount, could you or the admiral pinpoint a particular technological barrier?

Ms. GORDON-HAGERTY. I would ask Admiral Caldwell if he would like to respond. Thank you.

Admiral CALDWELL. Sure, ma'am. Thanks for the question. It is an honor to be here today. And I would like to thank the subcommittee for their strong support.

But how do we provide the Navy the greater capability that they need? The CNO has talked a lot about the needs of the Navy, a Navy that is more agile, a Navy that is more sustainable, a Navy that is ready to fight at the high end of warfare.

So my job at Naval Reactors is to think about those future investments to enable that. How do we increase the power density in the core? How do we make manufacturing more easy? How do we make it more affordable? How do we make parts and components that last even longer? How do we make our ships even quieter?

So to that end, we are investing in future technologies to figure out what those possibilities are that can unleash and exploit the advantage that we enjoy because of our nuclear propulsion.

So I don't have a specific technology that we have to, you know, overcome. There are a variety of things that we are working on to help us gain, to improve our advantage in nuclear propulsion throughout the Navy.

[The information follows:]

Statement of Admiral James F. Caldwell
Deputy Administrator for Naval Reactors
National Nuclear Security Administration
U.S. Department of Energy
on the
Fiscal Year 2020 President's Budget Request
Before the
House Committee on Appropriations
Subcommittee on Energy and Water Development

April 2, 2019

Chairwoman Kaptur, Ranking Member Simpson, and distinguished members of the subcommittee, thank you for the opportunity to appear before you today and present the President's Fiscal Year (FY) 2020 budget request for Naval Reactors. Your strong support for the work we do ensures our nuclear Navy has the power and propulsion to carry out missions around the world.

This past year marks the 70th anniversary of the founding of the Naval Nuclear Propulsion Program under the leadership of Admiral Hyman Rickover. In 1955, just seven years after the creation of our program, the first nuclear-powered warship, USS NAUTILUS (SSN 571) reported "*Underway on nuclear power*". Since NAUTILUS, follow-on classes of ever more capable nuclear-powered submarines and aircraft carriers have ensured our warfighting edge over potential adversaries. Reactor core lives have increased from just under two years to over 40 years. Our ballistic missile submarines have provided the most survivable leg of our nuclear triad for nearly six decades and are essential to our ability to deter major warfare and assure our allies. Our fast attack submarines operate virtually undetected, safeguard vital commercial sea-lanes, and stand ready to protect American interests. And, our aircraft carriers – 4.5 acres of sovereign territory – provide our nation unparalleled mobility and the sustained ability to project combat power, deter conflict, and protect our interests.

Today's security environment is dynamic and challenging, best characterized as a return to great power competition. In the maritime domain, nuclear propulsion enables the Navy to conduct missions vital to national security by providing unmatched mobility, flexibility, responsiveness, and endurance. These key attributes ensure our nuclear fleet can meet the demands of forward presence and crisis response world-wide. Today, nearly 45 percent of the Navy's major combatants are nuclear-powered (11 aircraft carriers, 14 ballistic missile submarines, 50 attack submarines, and four guided missile submarines).

Last year, with Naval Reactors support, the Navy deployed 22 submarines and conducted 36 strategic deterrent patrols. At any given time, there were at least 47 submarines deployed or ready to deploy within days. Our carriers, USS CARL VINSON (CVN 70), USS THEODORE ROOSEVELT (CVN 71), USS JOHN C STENNIS (CVN 74), USS HARRY S TRUMAN (CVN 75), and USS RONALD REAGAN (CVN 76) deployed during 2018. This past December, USS HARRY S TRUMAN (CVN 75) successfully concluded a historic, two-part deployment as part

of the implementation of the Dynamic Force Employment plan, demonstrating our Navy's ability to be more agile and operationally unpredictable to potential adversaries.

In submarine shipbuilding, the Navy recently saw the keel laid for the attack submarines Pre-Commissioning Units (PCU) MONTANA (SSN 794) and HYMAN G. RICKOVER (SSN 795), and the commissioning of USS COLORADO (SSN 788), USS INDIANA (SSN 789), and USS SOUTH DAKOTA (SSN 790). This totals 17 VIRGINIA-Class submarines.

In aircraft carrier shipbuilding, USS GERALD R FORD completed her initial at sea operations and began her Post-Shakedown Availability in July. Construction of the JOHN F. KENNEDY (CVN 79) is nearing completion, and she is scheduled to be christened later this year. The third carrier of the FORD-Class, ENTERPRISE (CVN 80), began construction activities this past year and will proceed as part of a two-carrier buy of CVN 80 and CVN 81, which is anticipated to generate substantial savings for the Navy. As these aircraft carriers join the fleet, they will bring unmatched capabilities to our Navy. The propulsion plant for the FORD-Class represents the first newly designed aircraft carrier propulsion plant in 40 years. These ships not only match the high speed of our NIMITZ-Class aircraft carriers but provide 25 percent more energy and three times the electrical generating capacity. Additionally, the propulsion plant design reduces maintenance by 30 percent and manpower by 50 percent. These advances in propulsion plant design are a direct result of the dedicated and sustained effort by Naval Reactors and its field activities, our Department of Energy (DOE) laboratories, nuclear industrial base suppliers, the Navy design team, and the nuclear shipbuilders.

This committee's support has enabled the safe operation of the nuclear fleet, substantial progress on our key projects, and our continued oversight and regulation of all areas across the Naval Nuclear Propulsion Program. Naval Reactors' budget request for FY 2020 is $1.65 billion, a reduction of $140.2 million, or 7.8%, from our FY 2019 request. The budget request fully supports the requirements for our three major projects – COLUMBIA-Class propulsion plant development, the refueling overhaul of a research and training reactor in New York, and the construction of the Naval Spent Fuel Handling Facility in Idaho. The budget request also ensures Naval Reactors can support the operational nuclear fleet, continue research and development efforts for the next generation of nuclear powered warships, and make progress on both the recapitalization of our laboratory facilities and the environmental remediation of our legacy responsibilities.

Major Projects

COLUMBIA-Class Propulsion Plant

The COLUMBIA-Class ballistic missile submarine is the Navy's number one acquisition priority. Naval Reactors is on track to support the start of ship construction in FY 2021 and is committed to delivering the life-of-ship reactor core and the electric drive propulsion system necessary for the COLUMBIA-Class program. FY 2020 funding of $75.5 million will continue supporting procurement of the lead ship propulsion plant components. The Navy began procuring long-lead material for the propulsion plant this year, and also will begin manufacturing the life-of-ship reactor core.

S8G Prototype Refueling Overhaul

The FY 2020 budget request includes $155 million to support the refueling overhaul of one of the New York land-based prototypes, which will enable an additional 20 years of Naval Reactors' commitment to research, development, and training. As part of this refueling project, we will insert recently manufactured COLUMBIA-Class type fuel modules in the prototype reactor as part of testing and demonstrating the manufacturability necessary for production and delivery of the COLUMBIA-Class reactor core. The prototype refueling overhaul is scheduled to complete in FY 2021, with a return to training operations shortly thereafter.

Spent Fuel Handling Recapitalization Project

The FY 2020 budget request includes $238 million to continue construction of the Naval Spent Fuel Handling Facility, which broke ground in 2017. Full support from Congress has enabled us to keep this project on track. The cost and schedule baselines were approved in September of 2018. Design and site preparation for this facility continues, and it is on track to receive spent nuclear fuel from aircraft carriers in FY 2024 and be fully operational by FY 2025.

Technical Base Funding

In addition to our three priority projects, Naval Reactors maintains a high-performing technical base to: 1) execute nuclear reactor technology research and development that supports today's fleet and ensures our Navy maintains its technological advantage over adversaries and, 2) provide the necessary equipment, construction, maintenance, and modernization of critical infrastructure and facilities. The funding required for this base also supports the lean federal workforce that provides the oversight necessary to carry out this important technical work safely and efficiently. These activities are vital to our ability to provide 24-7 support to the nuclear-powered Navy.

Research and Development

By employing an effective technical base, the teams of talented and dedicated people at Program sites – the Bettis Atomic Power Laboratory in Pittsburgh, the Knolls Atomic Power Laboratory and Kesselring Site in greater Albany, the Naval Reactors Facility in Idaho, and our Washington, DC headquarters – can perform the research and development, analysis, engineering, and testing needed to support today's fleet at sea and develop more capable nuclear-powered warships for tomorrow's fleet. Advanced nuclear technologies such as those employed in the COLUMBIA reactor require extensive development and prototyping, spanning a decade or more to mature the technology to a point where it is ready to incorporate in a ship design. Technology development will receive increased emphasis in the coming years as we complete our major projects and increase our focus on the development of tomorrow's fleet.

Our labs perform the technical evaluations that enable Naval Reactors to thoroughly assess approximately 4,000 emergent issues annually and deliver timely responses that ensure nuclear safety and maximize operational flexibility. Our research and development efforts must continue

so that we can provide the Navy more capable propulsion plants in the future. The performance of our reactors is key to maintaining advantages over our potential adversaries. The technological advances that go in our propulsion plants today are a direct result of research and development investments that began decades ago. Continued investment now is vital to the generations of scientists and engineers who will design the propulsion plants of the future.

Facilities and Infrastructure

Our laboratory facilities and infrastructure are critical in carrying out Naval Reactors' mission. The budget request supports recapitalizing our Naval Nuclear Laboratory facilities and infrastructure systems, many of which have supported the Program since its inception 70 years ago. Without this recapitalization we will be unable to effectively support nuclear fleet operations and advanced research and development efforts at the level required by this complex technology. Our budget request this year also reflects the increase in our efforts in decontaminating and decommissioning (D&D) older facilities that have been in existence since the start of the Program in the early 1950s. We have approximately $8 billion in environmental liabilities requiring D&D efforts - about one-third of these facilities are no longer in use. We are increasing our emphasis on retirement of theses liabilities in an environmentally responsible and cost-effective manner to support best use of our funding.

I want to assure the committee that the planning efforts we execute in budgeting for current and future projects are done with extreme rigor. We conduct comprehensive reviews of our budget to ensure we are making the right investments and tradeoffs. Our budget profile is consistent with projections in earlier Future Years Nuclear Security Plan submissions. Investments we make today in research and development efforts not only advance capabilities, but will also result in cost savings far into the future. We provide unmatched value to our Nation's defense and have a history of cost-effectively meeting our obligations. I understand the difficult budget environment in which Congress must craft legislation, and I respectfully urge your support for aligning allocations with the FY 2020 Budget Request.

Ms. KAPTUR. Thank you very much. I am now going to turn to Mr. Simpson.

Mr. SIMPSON. Thank you, Chairwoman. This is a question that is perhaps for the administrator and for Admiral Caldwell that can answer it together. Nuclear modernization demands a substantial and sustained amount of funding through the NNSA. Same thing with the recapitalization project for the nuclear Navy and their research into the future.

What happens if we fall below that substantial or that sustained level of investment in the remodernization of our labs that have been there for how long that need upgrades and so forth?

Could you explain that to us and what happens with the nuclear Navy if they fall behind on their budget proposals?

Ms. GORDON-HAGERTY. Yes. Thank you, Representative Simpson. This is a very important issue because more than 50 percent of the facilities and the infrastructure throughout the NNSA enterprise are more than 40 years old. And one-third of them were constructed during the Manhattan Project.

Those are untenable conditions under which we are operating and we are basically—we have basically fallen behind in recapitalizing our infrastructure.

So with the support of Congress, we have undertaken a sustained program to invest in and recapitalize our entire infrastructure. For example, the UPF facility. I use the example about the Albuquerque complex. Currently, our employees in Albuquerque are being housed in 1950s barracks where windows are normally—are routinely broken and it costs—one, the cost of maintaining that infrastructure can be untenable. But two, we need to put our—I think our workforce deserves no less than having modern infrastructure and modern places in which to work and to be able to conduct our critically important missions in the nuclear security enterprise.

So without the support of—continued support to sustain this effort we are catching up now for decades of noninvestment, if you will, or lack of investment in the infrastructure. And now is the time to recapitalize that. And it is not a 1- or 2- or 3-year investment. It is a decades long investment in our future enterprise.

Because if we don't do it now, we are only going to be falling—we are going to fall behind our adversaries and we need to maintain our critical deterrent. And I would ask Admiral Caldwell if he would like to comment on the other programs and perhaps at Idaho as well.

Admiral CALDWELL. Yes, ma'am—or yes, sir. The facilities that we have that support the Navy Nuclear Propulsion Program include the four Department of Energy facilities that—where our technical base is, does their work. The scientists, the technologists, and the engineers that allow us to meet the needs of today's fleet as well as prepare for the future fleet. If we don't have those facilities, then we can't do the things that we need to do to solve current fleet problems and to develop the technology for the future. So our priorities always in our facilities are to make sure that they are safe, that they protect the environment and our people. Second, that we meet our mission responsibilities.

And so we are focused on recapitalization of 60-year-old facilities, many that came about many decades ago. And also to do the decontamination and decommissioning of those facilities.

So without those, the laboratories where we do our work, the facilities where our engineers do their great calculations and do their great engineering, we would not be able to support the nuclear Navy.

So accordingly, we are increasing our investment in Naval operations and infrastructure to support the ends of the Navy today and in the future. And I appreciate his subcommittee's support in that endeavor.

Mr. SIMPSON. Thank you. Madame Administrator, you have shaped the NNSA's nonproliferation mission since you took office. What countries is NNSA engaging with that is in your vision for nonproliferation?

We have had debates here within this committee and with the Senate committee over how much to spend on nonproliferation. I think we all want to spend whatever is necessary, but a lot of those things take engagement with foreign countries to do nonproliferation work.

I have seen in the past that we have had a carryover on the nonproliferation budget and an appropriate, as we discussed the other day, appropriate carryover level is appropriate for non pro. Do you know what that level is and how are we engaging with these other countries now?

Ms. GORDON-HAGERTY. Yes. With regard to—let me address the issue of carryover. While it seems that there might be carryover in the nonproliferation, obviously the, as you have rightly stated, interactions with foreign nation—foreign countries is a diplomatic—it takes part diplomacy, part technical. And these negotiations and execution of programs don't necessarily take place in any particular fiscal year.

So for example, the Nigeria reactor conversion to which I alluded in my opening statement took several years in order to accomplish. So while we were funded for it several years ago, several fiscal years ago, we weren't able to execute until this last year.

So it does take a bit of time in order to execute. So while you might see carryover funding, it is for a good cause and we actually have it dedicated to certain programs.

With regard to the other, we are interacting with tens of countries around the world and I would like to turn to Dr. Park, if it is appropriate, and have him explain to you some of the current and ongoing efforts that we have.

Mr. PARK. So as it turns out, we engage with literally dozens of countries. Allow me to give you just quick two examples. On risk security, in fact, we have deployed our fixed portal detectors in over 60 countries. Recently the administrator and I participated in the Insider Threat Mitigation Symposium with our international partners and close to 60 countries participated.

So as the congresswoman pointed out, international engagement is key to our success when it comes to the non pro. Depending upon how you count, I can count literally over 100 countries that we engage with and that leaves another 100 or so that we need to engage

with. But again, we actually have the robust engagement plan, but it does take time.

In terms of a carryover, we have controlled it to a point where it is less than 15 percent or so. Historically, it used to be much higher, but, again, we are doing our job very carefully to monitor how we engage with the international partners. But overall, things have improved substantially over the last few years.

Mr. SIMPSON. Thank you.

Ms. KAPTUR. Ms. Frankel.

Ms. FRANKEL. Thank you. Thank you all for being here. In February this year, the Trump administration unilaterally withdrew the United States from the INF Treaty. I would like to have you please just comment on how—if and how it affects your work and what efforts you believe should be made to bring Russia back into compliance and what are we doing about that?

Ms. GORDON-HAGERTY. Good morning, Representative Frankel. First of all, with regard to the INF Treaty and the fact that the administration has pulled out of the treaty, the—since 2013, the United States has interacted with Russia on this matter more than 30 times.

We have continued to try to make progress with them, but in order to maintain arms control treaties, you need two willing, at least two willing partners and we don't feel that we have that right now.

How it affects our work is that we will continue to provide and we provide the underpinning, if you will, of the technical expertise for arms control and verification and treaties and the like. It is not affecting our work. We will continue to do so whether it is in this particular arms control measure or others or whether it is New START or other engagements because we provide the technical expertise to State Department and to others in these matters.

Ms. FRANKEL. And it has come to my attention through the committee that the Secretary of Energy authorized the export and transit of seven unclassified civil nuclear technologies to Saudi Arabia.

And just a question whether you will be able to provide response—we are going to submit some questions to you I think at a later date and we will just be looking forward to your responses.

Now I have another question, just to follow up on the chair's first question on your priority. I wrote down you said to maintain five modernization programs. Could you tell me just a little bit what are those programs? What is the purpose of those programs?

Ms. GORDON-HAGERTY. Sure. Thank you. Those are five modernization programs of our current nuclear weapons stockpile. The United States is not undertaking new nuclear weapons development. We are maintaining and extending the life of the U.S. nuclear weapons stockpile.

We have two life extension programs, two modification programs, and one major alteration. And I would like to, if I may, turn to Dr. Verdon and let him describe them since they fall under his jurisdiction.

Ms. FRANKEL. Just so I understand it because this is my first time on this committee. These particular programs are aimed at our ability or efficacy in terms of delivering a nuclear device or?

Mr. VERDON. They are aimed at assuring that the nuclear weapons still remain safe——

Ms. FRANKEL. Okay.

Mr. VERDON [continuing]. Secure, and effective.

Ms. FRANKEL. Okay. So it would be offensive on our part?

Mr. VERDON. It is the deterrent. It is basically—you know, it acts as a deterrent whether it is offensive, defensive, but it is the deterrent.

Ms. FRANKEL. Okay. I got it.

Mr. VERDON. But it is just——

Ms. FRANKEL. I mean, it is sort of ironic it is defensive. On the other hand, if we have to use it, it is probably the end of the Earth. Right?

Mr. VERDON. Well, that is yes, God forbid.

Ms. FRANKEL. Okay, anyway, let me—you can answer your question.

Mr. VERDON. Well, no, they are just—they are done to—they are basically built by man so they undergo aging and eventually parts wear out. Their original life expectancy was 10 to 15 years. We have had them now on almost the average of 30 years.

So eventually parts have to be replaced and that is what the life extension programs do. They literally replace the parts, but, as the administrator said, offering no new military capabilities, not requiring underground testing to accomplish that means. So it is just ensuring that the deterrents still remain safe and secure and effective.

Ms. FRANKEL. Okay. Just a couple more questions. How would you—who are considered or what countries do you consider our greatest nuclear threats? And number two is, what does a nonproliferation program look like?

Mr. VERDON. So I would say our peer competitors would be Russia and China. And then for the nonproliferation——

Mr. PARK. So as it turns out, we have a great system, a network of countries working together. In fact, nonproliferation is one of those rarity, if you would.

For example NPT, Nuclear Non-Proliferation Treaty, actually has over 180 member countries.

This is actually one of the most well organized treaty to the extent that we enjoy a greater support, even from China believe it or not. And they actually helped us with the HE, highly enriched, uranium removal from Nigeria, for example.

So there are some challenging situations mainly because of lack of consideration or support on the safeguards. This is how we protect the nuclear controls and so on and so forth. We like to actually impose the strictest control everywhere in the world and we leave that effort, and depending upon which country you are talking about, their requirement is not as strong as what we like to see.

So it is actually a very challenging condition, even under the condition that every country in principle support the nonproliferation. If that makes sense to you.

Ms. FRANKEL. I asked for an example. So you tried to give me a general overview, but could you give me an example of a nonproliferation?

Mr. PARK. Oh, absolutely. As it turns out, as Madam Chair talked about, the international engagement, we actually trained a lot of countries to better protect the materials that they have. These are the materials that could be a potential use for nuclear devices or what we call RDD, radiological dispersal device. So by training them to protect their materials, I think the world is safer.

But we would like to actually better control the nuclear technologies so that they don't fall in the wrong hands, the terrorists and so on and so forth.

Ms. FRANKEL. I see.

Mr. PARK. And so there are many examples that I can provide. But again, those are some of the examples that I will share with you right now.

Ms. KAPTUR. Thank you. Congressman Fleischman.

Mr. FLEISCHMANN. Thank you, Madam Chairman. And to the distinguished panel today, I know each and every one of you all. Let me say this. Since I have been serving in the House since 2011 and privileged to be on this subcommittee and an appropriator, I know of no other agency that can compete with the NNSA.

You all are tremendous, do a tremendous job. Your patriotism, your competence, your vigilance is truly outstanding. This is a mission that we cannot fail on and I am astounded every time I look at what you do.

And, Admiral, thank you for the job you do and your service to our country, and please tell Admiral Richardson I said hello. Madam Secretary, gosh, Secretary Perry has been before us. The administration is doing a good job. This is an area I think where Republicans and Democrats and our friends in the Senate can and must cooperate. So I thank you again.

As has been noted on the record, I represent a wonderful city, Oak Ridge. Brent, I met you there first at Oak Ridge. I remember those days very well.

I live in Chattanooga, but Oak Ridge is the city that really I have drilled down and become well that is my avocation for the Department of Energy across the complex and it is truly outstanding.

The Y–12 facility is antiquated. It is part of the Manhattan era Project, part of the Cold War era. And the uranium processing facility, I want our colleagues to know that this is money well spent. And I want to thank the administration for asking to increase its budget here. We need the uranium processing facility.

Ladies and gentlemen, this was a facility that was originally not going to be designated, they had some cost about $20 million—I am sorry, $20 billion and because of the hard work and effort, and I have to thank the contractor. CNS has just done an outstanding job working with the NNSA to make sure that they are going to build this for $6.5 billion and open by 2025 and the men and women who work there.

Our workforce are tremendous our contractors and the men and women who work in our labor forces, labor unions. I mean, they cooperate with the contractors in Oak Ridge at no other place like I have seen in the country.

So again, we are doing a good job and want the members to know that. And I tell the American people that whenever I have an opportunity.

I do have a question. At Y–12, NNSA continues to make excellent progress on the uranium production facility. How does funding fit in this year's project or the timeline, and how can Congress make sure that it stays on track?

Ms. GORDON-HAGERTY. Well, Congressman Fleischman, I couldn't agree more about our—all of our workforce throughout our entire complex in the national nuclear security enterprise. We have tremendous workforce and I couldn't be prouder to represent them. And that also goes for our team at Y–12 national security complex.

With regard to the funding, as I mentioned, we have spent—we have expended $2.5 billion to date on the UPF operation. And we are currently constructing this year for the request, the resources that we have requested for 2019 and received, we are now under construction with the main processing facility at the Y–12 UPF.

And so we are on budget, we are on target. We will complete by the end of 2025 and as long as we can—and to Representative Simpson's point, as long as we continue—due to remain on schedule and on budget, it will be based on Congress' decision whether or not to provide that sustained funding that we so urgently desire.

Otherwise, we can't guarantee that we will be on—continue to be on schedule. So we do require the sustained investments for the infrastructure improvements and the recapitalization across our entire nuclear security enterprise.

And that also goes for the lithium processing facility and other facilities of the Y–12 national security complex. You have been through the lithium facility. And we have just expanded another failure of some material falling off of one of the ceilings in one of the workspaces. And that is just an unacceptable condition in which we ask our workforce to work around.

So we thank Congress for your continued sustained support for our capital infrastructure, our infrastructure improvements, but without that, you know, we are making—we are not making investments in our future for our nuclear deterrent.

Mr. FLEISCHMANN. Thank you, Madam Secretary. I will be very brief. On lithium, by the way, it is a nonradiological component, but thank you for agreeing to build it on site. I think that was the right move at the right time. The new lithium processing facility will make significant strides towards maintaining state-of-the-art nuclear stockpile. What key benefits and capacities will LPC provide and how can we get—how can we get the committee to provide—how can we get the committee to provide for support for construction?

Ms. GORDON-HAGERTY. Again, this is part of that sustained investment in our infrastructure modernization. As I mentioned, literally some of the ceiling components fell down earlier this week and we—and that is not the first time that that has happened in the facility. So it is imperative that we modernize that part of our infrastructure.

We do everything we possibly can to reuse our lithium, but we also need lithium for the future. So I can turn to Dr. Verdon and he can give you the specifics on what our anticipated challenges are there.

Mr. VERDON. So, yes. So lithium, as mentioned, is key and so this year you asked, this year we are continuing on with the prepara-

tion and the preliminary design development in support of critical decision one, to move forward on the project. So that is the importance of this year's request is to keep that design work on the building moving forward.

And so that this is one of those, again, where it is leading back to some initial questions where we time phase some of our requirements. We recognize that the pits and the uranium UPF were number one priority, so they got their funding and we are pushing those hard.

Lithium is right behind it as a need, but also, as mentioned, worker safety also drives requirements. And so now that is why that is the next one coming up, that we are bringing up to kind of, you know, the critical decision one to move forward on.

Mr. FLEISCHMANN. Thank you. Madam chair, I yield back.

Ms. KAPTUR. Mr. Newhouse.

Mr. NEWHOUSE. Thank you, Chairman Kaptur. My welcome to all of you here this morning, too, I appreciate you coming. I just want to associate myself with the remarks of Mr. Fleischmann that the work you do here for our country is—can't be overstated as to its importance and I want to thank you very much for your diligence in making sure that our nuclear arsenal continues to be a strong deterrent and that our Naval capacity meets the needs of the future as well. Besides the INL and Oak Ridge, there is another laboratory represented on this panel. I wanted to make sure people were aware of that, but last but not least how is that.

Certainly the Pacific Northwest National Laboratory, which just happens to be in my district, continues to be a major contributor to the defense nuclear nonproliferation, that is easy for you guys to say, strategy initiatives aimed at addressing the most difficult contemporary nonproliferation issues.

So thank you for supporting their work, certainly at home, but also around the globe to make sure our Nation remains secure. Being a multiprogram lab, you know, every time I go there I am so proud to see how they are able to bring advances really from all sorts of sciences to bear on national security challenges. It is truly an amazing thing.

In particular, though, I understand they are working hand in hand with the NNSA to leverage advances in modern data science to enhance early detection of proliferation.

So as much as you can, could you talk about how your budget request will help to drive these efforts and what outcomes that you hope to see in the next year or two on these investments?

Ms. GORDON-HAGERTY. And thank you very much for acknowledging PNNL. While it is an Office of Science laboratory, it is certainly—we certainly continue significant investments into Pacific Northwest National Laboratory and they do contribute significantly to our defense nuclear nonproliferation as well as to our defense programs' activities because they do produce the tritium, what we call the TP bars for tritium. So they do—they are supporting our weapons activities as well.

I would like to ask Dr. Park to comment on it, but I will tell you, I have been extremely impressed with the work I have seen at PNNL. I look forward to traveling there in the very near future

and getting a broader perspective of all of the different works, work that PNNL offers to our national security enterprise.

But most importantly, the work they do in our mid-career—in our training for our workforce, they support that. And they also support international programs supporting IAEA in training expertise around the world.

So I would like to ask Dr. Park to give one or two specific examples about what PNNL is doing and how the budget can support continued activities at PNNL.

Mr. NEWHOUSE. Thank you. And you can repeat all those good things about the lab so the chairwoman can hear them.

Mr. PARK. So you would be happy to know, and I will probably get myself in trouble, PNNL gets more funding from DNN than any other labs. But they do actually more than just one thing. They do all of DNN work from global material security to R&D to medialization work and supporting the arms control policy work that we perform on behalf of interagency partners, namely State Department. Specifically on the data, we are actually in the process of maturing what we call data analytics and there is a fancy name, but it is too long for me to remember what it is.

Mr. NEWHOUSE. Could you repeat that?

Mr. PARK. It is a data analytics.

Mr. NEWHOUSE. Analytics.

Mr. PARK. It is called an—and it has got a much longer title, but essentially what it is is exactly the way you described. Can we actually collect enough quality data to actually know what is being done at certain parts of the world? So early detection is the name of the game when it comes to nonproliferation work and PNNL does provide leadership in that along with Oak Ridge, along with I could actually name all the other labs.

But again, it is mainly composed of five, six big labs that we have. And PNNL does provide a strong support for what we call short physics experiment with the detectors and so on out of Nevada national security site.

And again, PNNL actually has a prominent role in the DNN mission space. Thank you for your support.

Mr. NEWHOUSE. Yes, yes. Thank you. Again, thank you very much for being here this morning. Look forward to continuing to work with you. Thank you, Madam Chair.

Ms. KAPTUR. Thank you, Mr. Newhouse. Obviously, the American people, at least some of them, will get to see what we are discussing this morning.

So Dr. Park, I wanted to ask you if you could give a brief summary of recent accomplishments on the nonproliferation front in terms of the number of nations that you deal with. And also looking forward, where do you see the next horizon in order to make progress in nonproliferation?

Mr. PARK. Again, thank you for your continued support. And we actually have made a tremendous progress by the way. As you all know, nonproliferation is not one year in and out, it is enduring mission. As such, the building relationships as you pointed out takes a long time and there are many great examples. Let me just focus on a few.

For example, on the international rad security, or what we call NSDD, nuclear smuggling detection work, we were able to deploy additional radiation portals so that the countries can actually monitor radiological material movements.

And again, I am happy to report to you that as I used that example earlier, we have over 66 countries actually having those detector systems and trained by us. Even better news is that almost 95 percent of the nations would actually own and operate using their own funds. So this is really great news and obviously we need to take a step up to improve the detectors and so on and so forth, and that is in our article. But again, many of our partnering countries actually do take ownership of all these radiation portals so they can actually do their own operations, which is great news.

What we have actually been focusing on it is building relationships more, as you pointed out. Yes, we spent a lot of time providing them training and then new detector systems and knowing they will take ownership of all that eventually. But again, we are more into building relationships than ever before and providing them support.

And again, the training is not just how to use the detectors, by the way. So they can actually think for themselves and defend for their own countries and be a productive member of the international community.

And yet another example is that the—with the, you know, countries like UK, Canada, and many other countries, France included, we actually have robust engagement on the SNT side, which is not something that we talk about much.

But we actually have a group of countries that we work closely with and we actually share our science and technology work map, so to speak. And yes, we actually invest more than any other countries, but, again, we actually have partners throughout the world that we engage with. And in terms—sure.

Ms. KAPTUR. May I interrupt and ask of your best partners that offer their own resources and cooperate with you, who would you place on that list?

Mr. PARK. So——

Ms. KAPTUR. Which countries?

Mr. PARK. So obviously, I would have to start with the United Kingdom. And there are many countries, by the way. I would actually have to say Japan, by the way. They have stepped up quite a bit when it comes to actually sharing the safeguards, the standards throughout the world. And the same thing is true for Canada wants to step up more, so there are many countries.

And the—but again, I could give you all kinds of examples. And quickly, on the material minimization work, as the administrator pointed out, that Nigeria, the HU removal actually is number 103. Over the last 40 years, we have been removing HU from all these places and the high-performance reactor conversion work is really making a big difference. And the R&D we work closely with the DOD, the intel community, and so on, which I am more than happy to discuss at a later point.

Ms. KAPTUR. Could you repeat a number you gave earlier in reply? You said how many countries engage with you and how many do not.

Mr. PARK. So there are different ways of accounting the numbers because certain areas, for example, when it comes to radiation portal detectors, we actually work with 66 countries. That single project alone we actually engage with—this is not a 1-year exercise. We have been actually working with these countries on and off for many, many years. And the—so in other fronts, by the way, there is a different group of countries that we work with so to depending upon how I count, there could be up to 100 or so.

Ms. KAPTUR. All right.

Mr. PARK. And there are many countries——

Ms. KAPTUR. Are any of those—Doctor, I am going to interrupt you. Are any of those that are not on that list, are they problematic?

Mr. PARK. So——

Ms. KAPTUR. The ones that aren't participating?

Mr. PARK. So I need to be cautious about naming certain countries in an open setting, but yes, we could actually see more cooperation from certain countries that we have been engaged with.

But overall, it has been working out relatively well, but it is not something that we can back off. I mean, it requires a continuous engagement. And so, but I am more than happy to give you at a—in a different setting some of the countries that we can be——

Ms. KAPTUR. That would be very interesting. I wanted to ask you in terms of nuclear threat reduction playing a central role in our security with what we see happening with a very predatory Russia, could you talk a little bit about the Green Border Initiative in central Europe?

Mr. PARK. Right. As it turns—thank you for that, this opportunity to talk about that. As it turns out, that the fixed portals are placed at the port of entry and—but in between, these ports we actually have virtually no coverage. And by providing mobile systems, our partnering countries can actually provide the better coverage to detect a smuggling or elicit behaviors. And they are seeing some positive signs and we would like to actually enhance that even more in the coming years.

But that is actually one of the latest initiatives that we have. Not that it is new, but again, we see more of a need, especially in the areas that you are quite familiar with, FSU zone.

One country in particular comes to my mind that we spent a lot of time and energy is Ukraine. And, in fact, we actually are adding more detectors and portals and so on to make sure we can actually detect the movements, if there are any.

Ms. KAPTUR. Well, in a different setting some of our members might be interested in more detail on that. And I wanted to ask, you are proposing to cut funding for the Global Material Security Account. Why?

Mr. PARK. So the—first of all, the—one could look at it as a budget cut. In reality, when we prepare multiyear budget like a 5-year budget cycle, what we look for is a steady, stable funding that becomes our baseline. Not necessarily what you might call baseline, but again, what we need more is a stable, steady funding than anything else. Because it actually supports our lab scientists, engineers, and technicians and support personnel.

And it is through that exercise we build a baseline budget request and when you look at the historical budget request numbers, it is actually not down but up. It is down compared to the last—this year's enacted, the—so the requested budget does cover a core mission space. And what we cannot do is there are some things we have to kind of postpone in terms of, you know, installing the sensors and radiation detectors for new facilities and so on.

But again, this is not really core priority. If we are given an opportunity we will do more so, but the way we look at it is we actually use the stable, steady budget as a baseline for our building the budget, the information.

So we are more than happy to execute should the opportunity arise as we have done the last year. But again, I think we have adequate funding that we are requesting to cover the core mission space programs.

Ms. KAPTUR. Thank you very much. Congressman Simpson.

Mr. SIMPSON. Thank you. And I would be remiss if I didn't mention that the National Nuclear Security Administration works well with the lead nuclear lab in the country, which is the Idaho National Laboratory. As you can tell, we represent three different labs, but to tell you—and we jab each other all the time.

But the reality is, is that we all care very deeply about the complex and what goes on in the different labs. I support Oak Ridge just as much as Mr. Fleischmann does. He supports the Idaho National Lab. Same thing with PNNL in Hanford, as Congressman Newhouse does. So we work together on this.

But it is interesting the discussion, I have got a couple other questions, but it is continuing on the line of this nonproliferation. After the Soviet Union came down, we went over and visited the Soviet Union and what we were doing in nonproliferation activities with the Soviet Union. And what we were trying to do is to secure their nuclear material from being spread all over the world.

And it was fascinating some of the work that our people at NNSA was doing then. We also went to some of the ports where we have radiation detectors to make sure that the—these crates don't come into the United States. And our theory is if we are going to detect a radiation threat from in one of these cargo crates that comes, is shipped all over the world, we would rather detect them in a foreign port than we would when they come into New York.

And so the work that you do is very important, but let me ask, in your budget request for the NNSA for nonproliferation, is it for current non pro activities or does it include funding for anticipated non pro activities that may become available if we have agreements with foreign countries? Do you understand what I am asking?

Mr. PARK. So the—yes and no. As it turns out, from the nonproliferation arms control policy office that I operate, there are some modest increase of roughly $6 million to anticipate future requirements. So from that sense, yes.

Mr. SIMPSON. Okay.

Mr. PARK. And there is a capacity-building exercise throughout the DNN offices. There are four major program offices. And there is a bit of anticipation, a leaning forward, a projecting forward built in, but at the level where we can actually handle something like a TPRK, for example.

And but again, we are accustomed to adjusting along the way depending upon the world events.

Mr. SIMPSON. Yes.

Mr. PARK. And it is there not as much as you might think, but again we have been doing this for a long time so we actually have built in a little bit here and there to anticipate some of the challenges.

Mr. SIMPSON. Okay. And I suspect if there was need to, there is reprogramming abilities and those types of things as things become available.

Admiral Caldwell, the budget requests for the Naval reactors overall is down significantly from 2019. The Naval reactors development line, however, sees a small increase in fiscal year 2020 and larger increases over the next 4 fiscal years. Now I understand we have talked about the recapitalization project in Idaho, and apparently we have the number that is necessary to keep it on schedule to be done by 2025.

Can you please explain what activities are supported under the Naval reactors development line and what the future year increases will support?

Admiral CALDWELL. Yes, sir. Thank you. And to your comment about the support for the spent fuel handling facility, we have the budget request supports exactly what I need to continue that project on schedule to start operations in that facility in 2024.

Now, regarding the Naval reactors development budget line, that supports the development of technology that not only supports today's fleet, but enables future capability in the fleet. And over the last 5-plus years, we have been focused on these three major projects that are DOE funded, which include the design of the Columbia-class reactor plant, the spent fuel handling facility, and the refueling of the SAG prototype in New York. As those funding lines come down, it is time for us to invest in the future capabilities to support the Navy.

As I talked about it, the CNO is requiring a Naval force that is more agile, sustainable, and can be prepared for the high-end fight. So the investment in the Naval reactors development includes the investment in our technologies that would enable the Nuclear Propulsion Program to deliver for the U.S. Navy. And I talked about that briefly before, things like increasing the energy that we could load into the core, making the reactor plants for our submarines quieter, making construction easier, making the parts and components that we build more reliable and have longer lives, and also to make fabrication easier as I said.

The reactor development line of effort has done things in the past, like enable the increased lifetime of the core. For example, if you go back to *Nautilus* days, we refueled that submarine initially at the 18-month to 2-year point and now we are developing a *Columbia*-class core that will last over 40 years. That reactor development line allows us to handle challenges that occur in the fleet. We respond to some 4,000 requests every year, and so that line will allow us to continue to do that.

It also allows us to sustain our efforts to avoid obsolesces of instrumentation and control equipment; we have a tremendous record in that. And, in fact, in the past we have saved up to $500

million in the cost and development of reactor instrumentation and control systems. And, as well, it also allows us to invest in the technologies and the computing capability to extend the lives of our ships. And if you look at the fleet today, we have extended the lives of the *Trident*-class submarines out to 42 years; we have extended the life of the *Nimitz*-class carriers out to 50 years; we are extending the lives of 688 class submarines and will refuel five to seven of those and we will get another operating cycle out of those submarines; and we have also extended the lives of our training platforms.

So, all of these things in reactor development enable us to do those kinds of activities, not only today, but to pave the way for the future. And, as I said, we took a close look at our budget to see how we could do this within our Naval reactors topline and as we go forward, we will continue to focus on this and keep your staff informed. I would like to thank the subcommittee for their support of this budget request.

Mr. SIMPSON. Thank you.

Ms. KAPTUR. Mr. Fleischmann.

Mr. FLEISCHMANN. Thank you again, Madam Chairwoman, and I would like to thank the panel and you, as well, for a very substantive hearing; this is great, thank you.

We all understand that the risk of nuclear radiological material falling in the hands of bad actors is unacceptable. Reducing that risk is what the experts in the Office of Defense Nuclear Nonproliferation handle on a daily basis. However, DNN's role in national security is broader than that and includes a role in ensuring the supply of radiological materials that by and large are used for nonmilitary purposes.

Radioisotopes, some of which are produced at Oak Ridge National Laboratory, help to save the lives of people every day in a host of medical applications. However, there is currently no domestic supply of moly-99, which is used by approximately 50,000 patients every day. We are, therefore, for lack of a better phrase, being held hostage to foreign suppliers who may or not have our best interests at heart.

With that in mind, what is the Office of Defense Nuclear Nonproliferation doing to support the creation of a domestic supply chain of moly-99, and how is that reflected in this year's budget? Thank you.

Ms. GORDON-HAGERTY. Representative Fleischmann, you are exactly right. There hasn't been for more than three decades a domestic supply of moly-99, which we use for very important medical applications and they are approximately between 40- and 50,000 per day here, just in the United States.

I am heartened to say that the Department of Energy, NNSA, has worked closely with a number of private entities, private companies, and we are now for the first time in more than 30 years, developing moly-99 source supplies here in the United States for domestic production. I would like to ask Dr. Park to talk about the great grant program that we have with these companies and what we are looking for in the future in terms of the amount of curie content, the amount of material, gram content, that we are actually providing for moly-99.

Mr. PARK. So happy to report that one of the companies actually starting to produce moly-99, one of the companies that we are in negotiation with toward contracts over the next few months is Northstar. In fact, it was the first time ever that we actually—it is a minute quantity, but again, the fact that we have reconstituted at least a small bit of capability to start producing for our own use.

The Secretary and the Administrator actually provided the information to the public recently on the progress we are making, that we went through the propulsion review process. An independent group of experts picked the four companies for us to go into negotiations with.

So we are actively pursuing the contracts, if you would, so that over the next 2 years we can start producing moly-99 within the United States. So, if I could add actually one more, we also work with the national labs so they can actually develop capability to show to any company that comes along. So, in fact, that is actually part of the request from what we call N–Cubed Program Office. So we are not relaxing our posture, we are not taking any chances in addition to four companies that are picked to start producing over the next couple of years. We are also engaged with the national labs to make sure we can further enhance the likelihood of actually producing moly-99 in this country. So we are hopeful the progress is on track with all of your support. I appreciate it, thank you.

Mr. FLEISCHMANN. Thank you and I am so pleased to hear about the progress in that regard. And Madam Chair, I yield back, thank you.

Ms. KAPTUR. Thank you very much. Madam Administrator, NNSA is running at an operational tempo that is really much faster than in prior decades and to do your multiple weapons refurbishment, establishing key strategic materials capabilities, and working to address infrastructure challenges. But GAO has indicated that several of the programs and projects at NNSA are at high risk, including contracting management and large projects over $750 million.

What is NNSA doing to improve risk management and Federal oversight to safely deliver NNSA's core mission on time and on budget? And are you considering efforts to embed mission support staff, such as project management and human resource expertise, within NNSA's core defense programs and nonproliferation programs?

Ms. GORDON-HAGERTY. In 2011, as I understand it, NNSA actually took on the responsibility to address these issues associated with the high-risk category, if you will, of facilities. And I am happy to say that our Office of Acquisition and Project Management has undertaken a robust program to work towards getting us off of the high risk list. In fact, GAO's recent report stated just that, that NNSA has made significant progress in our major capitalization projects.

In terms of what APM is doing, they are contributing to by putting Federal project managers on programs, on major capitalization and modernization programs, such as the UPF plan. We actually have a dedicated person at Y–12 overseeing that Federal project and we continue to do so.

We are actually undertaking a project right now, the recapitalization, if you will, or the repurposing of the former facility at Savannah River, the MOX facility, which we are repurposing for plutonium pit production and capability at Savannah River. And we are looking to see how we can possibly ensure that the lessons learned, the good lessons learned, that we have had as we undertake Y–12 UPF program, that we are actually applying those lessons learned as we go forward and repurpose the facility at the Savannah River plant.

So, yes, we have some work to go, but we have made great progress through our APM program. We have put fidelity and resiliency in the program to make sure that we do everything we can to minimize risk in these major capitalization projects when we are talking in excess of $750 million per project.

Ms. KAPTUR. In my experience on different committees, I have never seen an agency that managed to overspend at the level of the Department of Energy, or to build facilities that then were never used. It has actually been shocking to me. So I think that that rigor is really important and maybe you can be part of a change in practice at the Department of Energy.

Ms. GORDON-HAGERTY. We are doing our best, but I will say, we have had some major improvements and, in fact, GAO just called us out in their recent study, so I am pleased to report that.

Ms. KAPTUR. All right, I am going to ask a question about the W87 Life Extension, but I wanted to have each of you think about this and if you don't want to comment, you don't have to, but knowing—no one could know more about the nuclear enterprise than you do in this country, and yet we have this massive problem of spent fuel and where to place it.

If you have any opinions about Yucca Mountain, and if it doesn't happen, what options do we have as a country to deal with spent fuel?

I would be very interested in your observations if you are able to give them, but let me ask a question, the administration has requested $112 million to study the design and feasibility options for the W87 Life Extension Program. The initial cost estimate of the program is 15 billion, but the actual cost will largely depend on what technology and safety options NNSA selects. How will NNSA consider cost as a factor for the refurbishment of this system and what opportunities are there to reuse previously designed components and technologies from other weapons refurbishments to reduce cost?

Ms. GORDON-HAGERTY. The W87 is formerly known as the W78 Replacement, and I would ask Dr. Verdon to talk specifically about the replacement parts and what we are doing to modernize the 78 Replacement known as 87–1.

Mr. VERDON. Yes, to your point, we are looking at all those options that—the $15 billion number is an option that really has everything in it. And so we purposefully went for what the high level would be and then from there we are working to look at, and working with our military partners, what options, you know, what features does it really need, which ones are we willing to take risks against and eliminate. And the same with your question about reusing existing parts that have been made for other warheads, we

are heavily looking at that also as a way of controlling the cost while still meeting the requirements of the warhead.

So, all of those options are indeed on the table and we are exploring that. And that is part of the phase that it is in right now is to look at those exact details that you mentioned. So that is actively ongoing right now.

Ms. KAPTUR. Anybody want to comment on Yucca? Anybody brave enough for the sake of the country to venture an opinion?

Mr. SIMPSON. I will comment.

Ms. KAPTUR. Mr. Chairman, you are next, you are next. Yes, I mean, look at the country. We look ridiculous; billions of dollars unused and a political standoff that I don't think is going to end. So, what do we do? You know more about spent waste than any other people, that I am aware of, living in this country. If you were in our position, what would you do?

Admiral CALDWELL. Ma'am, I don't want to comment specifically on Yucca Mountain, but I will comment on the need for a long-term geological repository. Since the 1990s, Naval reactors have been packaging our spent fuel for long-term storage in such a repository. We have done that effectively and safely, and we have to date over 65 percent of our spent nuclear fuel is packaged and ready to go in such a facility, and would be among the first to go into such a facility.

Accordingly, we have agreements with the State of Idaho that require me to remove my spent fuel from Idaho by the year 2035. So, without a long-term storage facility, that is going to be a challenge for us and we are going to have to work with Idaho and DOE counterparts and our Federal counterparts on how we are going to come through that.

So, what I have learned is that packaging can be done safely, securely, and reliably, and we would love to take you out there and show you how we do that work.

Ms. KAPTUR. Thank you very much, Admiral. Yes Administrator?

Ms. GORDON-HAGERTY. So Chairwoman Kaptur, I believe that—I agree with you that we need to come to a decision and I think the Secretary does, too. And regardless of the politics behind it, I think the Secretary is actually undertaking, at least having the conversation, about how to move forward since over the last 6 or 7 years or so the Yucca Mountain program has basically been put on hold, so he is having the conversations.

Again, as you rightly state, this is all about politics and we need to find a long-term solution for what is right now interim aboveground storage of the spent nuclear fuel from the commercial reactors around the Nation. And I think our citizens deserve as much and I believe the Secretary is trying to undertake at least having that conversation, which is a good start. Thank you.

Ms. KAPTUR. Thank you. Anything you can do to further the Secretary in those efforts would be very much appreciated. I am a practical person. I like to make decisions and get things done for the country.

Ms. GORDON-HAGERTY. Yes.

Ms. KAPTUR. I think Congressman Simpson is the same type of person and it seems to me that this is a priority that we can't ig-

nore, and interim solutions, different visions, are all welcome here. And we thank you very, very much for being here today.

And Congressman Simpson, did you wish to ask any other questions?

Mr. SIMPSON. Yes, I have a few here if I could.

Ms. KAPTUR. All right.

Mr. SIMPSON. First of all, I don't know much, but what I do know is the law of the land, and the law of the land is Yucca Mountain. And politically, we have been unable to come to an agreement on that. All of us in support of Yucca Mountain also support interim storage. I think interim storage becomes much more difficult if it becomes de facto permanent storage because you don't have a plan for a geological repository.

At some point in time we are going to have to bite the bullet and get on with this. And I think the Secretary has done a good job in requesting the money for funding both in the Department of Energy and in the NRC to advance the Yucca Mountain project. I hope we can come to an agreement this year. Senator Alexander and I have had this discussion for 3 or 4 or 5 years, and every year it is next year we are going to get this done. Hopefully this will be the year that we will move ahead with this.

But a couple of quick questions. One, 44,000 employees, how many of those are near retirement?

Ms. GORDON-HAGERTY. Forty percent will be eligible for retirement in the next 5 years.

Mr. SIMPSON. Forty percent.

Ms. GORDON-HAGERTY. Yes.

Mr. SIMPSON. Okay. With you and Dr. Verdon, I guess you guys are responsible for directing the Secretary who has to certify to the President that our nuclear stockpile is safe, reliable, and secure. Do you do that annually?

Ms. GORDON-HAGERTY. Correct.

Mr. SIMPSON. Okay. One other question I have is that, Madam Administrator, the 2018 Nuclear Posture Review called for the enduring capability and capacity to produce plutonium pits at the rate of no fewer than 80 pits per year by 2030, as you said in your opening statement. The NNSA then analyzed alternatives and decided to pursue a two-site plan for the production—sorry, that is my dog calling again—a plan to have production capacity of at least 30 pits per year at Los Alamos and no fewer than 50 pits per year at the Savannah River site.

Now, some people have said that the reason we chose a two-site plan was, for lack of a better term, paying off Savannah River for closing MOX and so forth and so on. Nevada obviously would like all of the pit production in Nevada——

Ms. KAPTUR. That is a dog.

Mr. SIMPSON. Jeez, he is crazy. He must have heard my voice. Could you dispel the myth that this was a—that this decision was a payoff, I hate using that term, but to South Carolina and that a two-site production facility makes sense?

Ms. GORDON-HAGERTY. Yes, and there could be nothing further than the truth that this was a payoff. The NNSA must have a responsive and resilient infrastructure. As I mentioned in my opening statement, the United States has not had a plutonium pit man-

ufacturing and production capability since the early 1990s when we shuttered Rocky Flats Plant. The two nuclear weapon design laboratories, Lawrence Livermore National Laboratory and Los Alamos National Laboratory, are exactly that, they are design laboratories. They were never intended to be production laboratories.

When the requirements were set from STRATCOM, from the Department of Defense, and approved by the Nuclear Weapons Council, it was so that we would make the not less than 80 pits—produce 80 pits per year by 2030. It is going to be a challenge.

First of all, all of that work is being done currently at Los Alamos National Laboratory. They are doing the chemistry and the actinide science behind plutonium, the work that we need for our pit production capabilities to maintain the nuclear deterrent and it is going to be a challenge for them to even get to the 30 pits per year by 2026, which is their challenge. They have acknowledged that they have realized that.

To the extent that I can dispel the issue about having the work all done in New Mexico, we conducted two independent analyses of alternatives which said that a two-pronged approach would be appropriate, and looked at the different options. But more so, then we conducted an engineering assessment and an enterprise, a workforce enterprise study that stated the best way to get to the 80 pits per year, the only we would be successful is to go with a two-pronged site approach.

It so happened that the MOX facility was going to be terminated. The Secretary had planned that, we had worked on that, we had followed, we had worked with Congress on that matter, and it happened to be that that facility could be repurposed for exactly this.

Savannah River is known for the last 70 years as part of the production complex in the NNSA and our predecessor agencies, so it would make extreme sense to do it there. Los Alamos, the challenge we would have to do all the work at one place is that it would only be at one place. And as the MPR pointed out, we have to have a resilient and flexible workforce and the enterprise in order to conduct it.

And if we are looking to do this work for the next 50 to 70 years, I don't believe that it makes sense to rely on one single location. So our two-pronged approach is the most effective way to get to the not less than 80 pits per year.

Mr. SIMPSON. Redundancy?

Ms. GORDON-HAGERTY. Yes.

Mr. SIMPSON. Thank you. Thank you all for being here. Some of the work that—all of the work that you do is some of the most important work that we do in this government, and I appreciate the job you are all doing.

I apologize for Charlie, my dog. You have both met Charlie, and maybe he was watching the hearing and he recognized you two and said, hey, I know that voice. Anyway, thank you for being here today.

Ms. KAPTUR. Congressman Fleischmann.

Mr. FLEISCHMANN. Madam Chair, I just want to close by saying thank you again for an outstanding hearing. And again, to reconfirm what I have known and what the American people need to do,

that you and your employees are truly outstanding Americans. Thank you.

Ms. KAPTUR. Thank you. I have two final questions, Madam Administrator. NNSA is seeking a significant increase in its budget to hire an additional 63 Federal employees. Please explain the programs or activities for which you are seeking additional Federal staff, and whether these are the programs and activities for which workload is increasing or that are high risk.

Ms. GORDON-HAGERTY. The NNSA has actually undertaken an aggressive approach to what we need for our strategic hiring needs. As Representative Simpson pointed out, our workforce is on a downslope. We have what we call the bathtub curve where in the next 5 years, 40 percent of our employees are eligible for retirement. And with the significant workload that we are undertaking now, we need to plan strategically for the workforce of now and in the future.

Ms. KAPTUR. Excuse me, I am going to interrupt you and say, okay, 40 percent, what does that translate into in terms of new hires?

Ms. GORDON-HAGERTY. In terms of new hires.

Ms. KAPTUR. Approximately.

Ms. GORDON-HAGERTY. Well, what we are doing is we are looking—we are taking a strategic approach. I have passed all of my senior leadership at headquarters and the field offices to look and tell me, based on the workload of the future, what does our staffing strategy look like. Because the staffing strategy we have today will not be acceptable for the workload we will see even in the next 5 years.

So we need to be strategic in our thinking in terms of what kind of hiring requirements do we have. And unfortunately, we are under a cap right now imposed on us by the NDAA of 1,690 in our FTEs. We are close to that right now, so I would ask for your assistance in lifting that cap so we can hire the appropriate number of people for our critical skill sets in science and engineering, in project management and oversight. And right now I have given Dr. Verdon the top priority in terms of hiring the personnel to support the five modernization programs most importantly in that and strategic materials in Defense programs activities. So we are focused on this absolutely about how to hire strategically for our workforce of the future.

And let me also say we are also trying to think out of the box in terms of our hiring opportunities. On January 31st, we actually undertook an enterprise-wide hiring event here in Crystal City, and we had over 1,700 applicants in that 1-day hiring event. And so we are trying to find different ways of challenging our HR directors across our entire enterprise to find new ways to hire those critical skill sets.

As I also mentioned, we are in, obviously, constant competition with the private sector. So what we are trying to do is explain that it is a great opportunity for people to come to work for our national security enterprise and working in our very critical areas of nonproliferation and weapons programs and Naval reactors. So we are trying to find different ways of hiring for the future.

Just this last Monday we were at Georgia Tech and we did a hiring event, and we brought all of our labs, plants, and sites and field offices to work with students that are possibly coming out, so early career, coming out and working across our entire workforce. We have also provided grants at different colleges and universities. In fact, it pains me to say this, but at Ohio State University we are—as a Michigan alumni, I have to say that—that we are providing resources, in fact, to the State of Ohio by doing some nonproliferation work at Ohio State University and other places across the Nation.

Ms. KAPTUR. I would like to invite you to Northern Ohio.

Ms. GORDON-HAGERTY. Absolutely.

Ms. KAPTUR. Can you provide a list of these strategic materials that you are seeking?

Ms. GORDON-HAGERTY. Absolutely. And I can rattle them off right now: uranium, plutonian, tritium, lithium. So lithium, tritium, plutonian, and uranium.

Ms. KAPTUR. Thank you. What management and oversight functions will be improved with additional Federal staff?

Ms. GORDON-HAGERTY. Most notably the infrastructure modernization and the recapitalization of the programs is really where we need to focus our efforts to make sure that our contractor support staff is absolutely keeping on target, on schedule, and on budget with our major recapitalization programs.

In addition, it will also provide the effective oversight for the modernization programs of our stockpile.

Ms. KAPTUR. Okay. One of the requests I would have of you, the hiring event that you held in Crystal City, any materials that are available relative to that, I would be very interested in looking at to understand how you go about recruiting and where you go about recruiting.

It is interesting, we all represent different congressional districts. Congressman Simpson obviously is in Idaho. Now he won't accept this, but to me Idaho is like remote. The region of Ohio that I represent is a heavy manufacturing platform, as you well know, but not always connected to the government of the United States. We don't have a lab in my area. And out of 435 congressional districts in terms of median income per household, my district ranks 407. So people are working hard and sometimes they—and we have universities, obviously, but they are not connected to the Federal establishment. And I often feel that we are bypassed. It is like there is this overpass that goes over us and it goes somewhere else.

So I am really interested in how you connect to places that don't have a heavy Federal presence. And I am interested in offering some of our expertise, if I can find a way to get it to you. That is not so easy.

And Columbus is a capital city, like so many other capital cities, including the one we are sitting in. A lot of the Nation's assets over the last 25 years or so have moved to those places. But it is the other places that are struggling where people are eking out a living and trying to move forward. And I am just someone who is trying to, if there are Federal opportunities, I am working hard to try to let people know about those. And it is not so easy from my standpoint.

So I just put that on the table.

And so as you think about recruitment you might look at the bottom third of congressional districts in this country. And it is sort of easy to go to other places just because there is a relationship. But maybe there are some other. If one looks at the recruitment to the U.S. military in regions like my own, it is huge. We have a very patriotic population. And we even have a nuclear sub named after Toledo, so we are pretty proud of that. And so I am just—it is endemic across the Federal establishment, it is just more comfortable to be in the capital complex. But the rest of America is out there, too. And so I make a plea for them.

Let me ask a final question and we will conclude. Former NNSA Administrator Lieutenant General Frank Klotz noted before his departure in early 2018 that the NNSA complex was at full capacity on multiple fronts, people, materials, facilities, and GAO has echoed similar concerns.

At a little over a year later, with additional recommendations from the 2018 Nuclear Posture Review, what is your view on NNSA's capacity issues, and has the Kansas City plant and the Y–12 facility become choke points?

Ms. GORDON-HAGERTY. General Klotz was correct in saying that we had some challenges. We continue to have challenges, and as I mentioned, we are busier than we have been since the Cold War. But we are meeting those challenges. And I can confidently say that with the great leadership under Dr. Verdon, we are managing those complex programs, those five modernization programs. And as with any slippage in possible areas like Kansas City National Security Complex and at Y–12, we have risks associated with them, but we believe we are balancing those risks with a great workforce and a great Federal oversight.

So while I recognize we do have challenges, we are managing those challenges. And I make my commitment to you, as we find those challenges we are not going to inform Congress of those challenges at the last minute. We will inform you and keep you apprised of how we are doing with the five modernization programs.

Ms. KAPTUR. Thank you. Mr. Simpson, do you have further comments or questions? All right.

Thank you all very, very much. This concludes this morning's hearing. I would like to thank all of our witnesses for their service to our country and to our people.

I ask the witnesses to please ensure for the hearing record that questions for the record and any supporting information requested by the subcommittee are delivered in final form to us no later than 3 weeks from the time that you will receive them. Members who have additional questions for the record will have until the close of business this Friday to provide them to the subcommittee office.

This hearing is adjourned. Thank you.

QUESTION FROM THE HOUSE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

Plutonium Pit Production

Q1. NNSA has proposed a strategy to produce plutonium pits at both Los Alamos National Laboratory in New Mexico and the Savannah River Site in South Carolina. For this strategy to be successful, it requires more than funding, but rather a highly integrated approach for risk management, infrastructure, operations, and workforce training.

Is the NNSA working on an implementation plan and what is the anticipated completion date?

A1. NNSA developed the Preliminary Pit Production Implementation Framework, which is an internal document identifying early actions associated with NNSA's plans to produce no fewer than 80 pits per year by 2030. The framework was designed to address specific risks, including technical and operations risks, safety and security risks, and risks associated with building the necessary skilled production and support workforce required to meet the military requirement. Pursuant to the *John S. McCain National Defense Authorization Act for Fiscal Year 2019 (P.L. 115-232)*, NNSA will provide a briefing to the congressional defense committees detailing the findings of the Preliminary Pit Production Implementation Framework. The Office of Defense Programs will consolidate the preliminary framework's contents into an integrated program schedule incorporating planning activities at Los Alamos National Laboratory (LANL), Savannah River Site (SRS), and other sites.

QUESTION FROM THE HOUSE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

Uranium Processing Facility

Q2a. NNSA is in the process of constructing the Uranium Processing Facility (UPF) and has committed to delivering the project in 2025 with a total project cost of $6.5 billion.

What is the status of the project, what are the primary risks, and has NNSA encountered (realized) any of those risks? Has any scope been removed from the project to keep within the $6.5 billion cost target?

A2a. UPF supports decreasing mission dependency on Building 9212 at Y-12, a 70-year-old enriched uranium operations facility, and will also provide capability for casting, special oxides, and salvage of uranium. The UPF project was baselined in March 2018 for $6.5 billion, with a project completion date of December 2025. The project remains on budget and on schedule.

UPF project risks include hiring sufficient craft personnel and start-up and transitioning to operations in the new facility. Given market dynamics in the southeast, the project has to compete to attract sufficient craft personnel to support a major ramp up in construction over the next year. To mitigate this risk we have planned incentives to recruit individuals with the necessary skills and expertise and meet established hiring goals. There are anticipated risks associated with transitioning major nuclear operations to a new facility such as hiring and training operators on new specialized equipment. Mitigation strategies have been developed and will be initiated if these risks begin to be realized.

Q2b. Is there a schedule for a supplemental environmental impact statement that addresses the major changes of the UPF design from the "big box" approach?

A2b. The Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex (SEIS) was completed in 2011 and analyzed the potential environmental impacts of five alternatives for ongoing and foreseeable future operations and activities at Y-12, including the original 'big box' approach envisioned for UPF. In 2014, NNSA revised its strategy and pursued a hybrid approach of upgrading existing facilities and building new UPF facilities. While there was no change in Y-12's mission, a Supplemental Analysis (SA) that focused on the new approach was conducted in 2016. The SA found "no significant new circumstances or information relevant to environmental concerns that warrant preparation of a supplemental or new EIS," and that no further NEPA document was required to execute the current strategy. In 2018, in response to concerns raised by new information brought to NNSA's attention by local activist groups, Y-12 completed an additional SA for the SEIS examining this new information. After examining this new information, the SA found that the new information did not change the conclusions made in the 2016 SA. Construction on the new UPF facility and the upgrading of legacy facilities continues.

QUESTION FROM THE HOUSE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

Kansas City Plant

Q3. The 1,000,000 square foot Kansas City Plant (KCP) stands in marked contrast to many NNSA facilities in that it is modern, having been constructed in 2012. It is the Committee's understanding, however, that it is also too small and that NNSA is looking to lease an additional 500,000 square feet of office and warehouse space to accommodate the projected workload and ensure KCP is not a choke-point for modernization efforts.

How does the budget request support obtaining additional space for KCP and what analysis has NNSA completed to be certain that leasing is the best option?

A3. The FY 2020 President's Budget Request includes funding for short-term leases and tenant improvements, but it does not include a request for additional space at Kansas City.

NNSA is taking an integrated look at Kansas City's role in weapons modernization to validate the infrastructure requirements identified by our Management and Operating contractors. NNSA is currently leading a Strategic Infrastructure for Non-nuclear Components Planning study to identify and analyze strategies for meeting the long-term infrastructure requirements at Kansas City to support the weapons mission.

To meet immediate mission infrastructure requirements, Kansas City requires additional space starting in Fiscal Year (FY) 2019. While the long-term study is being conducted, NNSA has identified two short-term, additional leases to meet immediate workload and mission demand. Building 22 is an 80,000 square foot office facility with a three–year, firm-term lease with three one-year options. This lease was signed in FY 2019. Building

23 is an approximately 250,000-300,000 square foot light manufacturing facility and the lease is expected to be signed in the near future.

While NNSA has determined a short-term lease is an economical interim solution to meet the current increased demands, the long-term infrastructure strategy at Kansas City is still being studied. The study will evaluate cost, schedule, and risk and identify strategies that maximize permanent investments to meet the long term needs for each strategy. A determination will then be made on the best value to the Government.

QUESTION FROM THE HOUSE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

Naval Reactors

Q4. The budget request for development of the reactor for the Columbia-Class ballistic missile submarine is $75.5 million, which decreases from 2019 according to the project's funding profile.

With the Navy preparing to start construction of the first Columbia submarine, can you provide an update on the status of the reactor system and if you will remain on schedule and budget for all milestones?

A4. Naval Reactors is supporting construction of the first COLUMBIA-Class submarine by developing a reactor plant with a life-of-ship core that will be in service for more than 40 years.

Earlier this year, Naval Reactors placed the reactor plant long-lead procurement contract with Navy funding (Shipbuilding and Conversion, Navy (SCN)), including the reactor core to support the shipyard's build plan. The contract was placed on time, following design efforts that began in 2010, and we expect to remain on schedule and on budget in support of COLUMBIA construction beginning in FY 2021 and delivery in FY 2028.

Naval Reactors' FY 2020 Department of Energy budget request provides the necessary engineering, testing, and analysis to ensure the lead reactor plant supports the construction and test plan. The funding will continue to support oversight and evaluation of component designs and fabrication efforts, as well as operational safety analysis efforts.

QUESTION FROM THE HOUSE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

Medical Isotopes Production

Q5a. NNSA has a program to help establish domestic production for the medical isotope Moly-99 without the use of highly-enriched uranium, as directed in the American Medical Isotopes Production Act. These efforts are critical for reducing our reliance on foreign sources for Moly-99.

NNSA has funded a handful of projects to date, one of which has supplied some Moly-99 to the market. NNSA is currently in negotiations to add two new projects. What are the metrics for success for both existing and new projects?

A5a. NNSA's metric for success is a reliable supply of Moly-99 in the United States produced without the use of Highly Enriched Uranium that includes sufficient reserve capacity to cover any unexpected outages.

Q5b. What is the cost estimate to complete the projects and what is NNSA's plan to ensure success?

A5b. The total project costs to bring the four new cooperative agreement technologies to market is currently estimated to be $849 million, most of which the cooperative agreement partners will provide.

NNSA will conduct regular project reviews to ensure adequate progress is being made in accordance with terms and conditions in the cooperative agreements and will evaluate project needs on an annual basis.

Q5c. The fiscal year 2020 budget request includes $10 million for the national laboratories to provide technical support, but no funding for cooperative agreements themselves. Does NNSA believe the laboratory support alone will ensure establishment of domestic production?

A5c. Ensuring the establishment of a reliable domestic supply of Mo-99 will require a combination of cooperative agreement funding, laboratory technical assistance funding, and significant private investment. Until the cooperative agreements are awarded and work scopes established, it is premature for NNSA to have a basis to request additional funds for the new cooperative agreements. NNSA will continue to monitor cooperative agreement progress and take that into consideration during the annual budgeting process.

QUESTION FROM REPRESENTATIVE KAPTUR

Site Governance

Q1a. It is the Committee's understanding that NNSA's Office of Safety, Infrastructure, and Operations is working to formalize the coordination required to take place between line management, functional elements, and field offices on matters concerning risk management, site activities, and operations.

What is the objective in formalizing required coordination?

A1a. NNSA is revising SD 226.1B, *NNSA Site Governance*. One key feature of the revision will be guidance to communicate potential mission risk impacts resulting from emergent safety, security, or operational events. This improved communication between field offices, functional managers, and program managers will help ensure all elements of NNSA management are operationally aware and facilitate making risk-informed decisions in response to such events.

Q1b. When does NA-50 anticipate completing the process to formalize this?

A1b. NNSA anticipates publishing the revision to SD 226.1B by October 30, 2019. NNSA expects to complete a formal review process by the end of the fiscal year. The review and subsequent approval process will ensure that all elements are fully aware of the proposed revision and can immediately implement it upon final approval.

Q1c. How will formalizing coordination help improve program-informed risk management, transparency, and communication across the enterprise?

A1c. NNSA expects the enhancements in the supplemental directive regarding communication of potentially significant issues to foster better coordination within the federal team and drive operational excellence in the mission. This approach will improve situational awareness, keep the leadership informed, and support the decision making process.

QUESTION FROM REPRESENTATIVE KAPTUR

Human Capital Management

Q2a. NNSA seeks funding to onboard an additional 63 Full Time Equivalents (FTEs) within a relatively short period of time to address additional work-scope. However, based on information provided to the Committee, the average time (in days) it takes to onboard a federal employee 5 years ago was 133 days compared to today when it takes 127 days.

Question: What specific steps is NNSA taking to appreciably reduce the amount of time it takes to onboard federal employees and streamline human capital processes?

A2a. NNSA is maximizing the use of Excepted Service hiring authorities to reduce the amount of time to onboard employees. In January and July 2019, recruiting events were held in which Human Resources expedited the hiring process by accepting resumes, conducting interviews, checking references, performing required drug tests, initiating fitness for duty and security clearances and extending fifty-three job offers in a single day. This resulted in NNSA surpassing the target hiring goal of 1,690 personnel.

Q2b. What programs will receive the additional 63 FTEs that NNSA is requesting and is it based on risk and workload?

A2b. Defense Programs will receive the additional 63 FTEs based on mission growth and risk determination. This includes increases in their offices of Life Extension Programs, Strategic Materials, Stockpile Sustainment, and Research, Development, Test, and Evaluation. In FY 2018, two independent studies concluded that the NNSA had unmet critical staffing needs. The Office of Personnel Management (OPM) and NNSA's Office of Cost Estimating and Program Evaluation (CEPE) separately arrived at the conclusion that the NNSA is currently understaffed. Both studies recommended that the NNSA should hire additional staff and exceed its current statutory cap of 1,690 full-time

equivalent (FTE) employees. In March 2019, the Government Accountability Office (GAO) also endorsed OPM and CEPE's conclusion that there are critical staffing shortfalls across multiple NNSA functions. NNSA will authorize an additional 63 FTEs in Defense Programs in FY 2020 based on the Weapons Activities account mission growth and risk assessment.

Q2c. Is NNSA considering the use of a "matrix-management" approach that includes human capital, acquisition, and project management expertise to program offices in order to improve performance and transparency?

A2c. Through a Staffing Plan Review process, NNSA is identifying opportunities to streamline operations and make full use of matrix management, to include human resources, the planning, programming, budgeting, and evaluation process, learning and development, acquisition, and project management to improve performance, eliminate redundancy, and streamline resources.

QUESTION FROM REPRESENTATIVE KAPTUR

Production Planning and Execution

Q3. NNSA's operational tempo has and continues to grow due to additional requirements. The nuclear security enterprise—its infrastructure, workforce, and operations—will be challenged to meet production, schedule, and cost commitments.

How is NNSA improving coordination and transparency within the enterprise to meet the strategic direction of NNSA's weapons and nonproliferation programs in a cost-effective, timely, and safe manner?

A3. On May 6, 2019 NNSA released its Strategic Vision, Governance & Management Framework, and Strategic Integrated Roadmap to guide efforts across the nuclear security enterprise.

NNSA's Strategic Vision ("Vision") identifies mission priorities and goals to ensure the agency is responsive to the Nation's nuclear security and strategic defense needs. It also outlines key expectations for the governance and management of the nuclear security enterprise along with a set of core values and behaviors that will help NNSA meet its missions on budget and on schedule.

NNSA's Governance and Management Framework ("Framework") focuses on the "One NNSA" team approach to mission integration and strategic planning and establishes clear roles and responsibilities across the enterprise. The Framework encompasses the federal headquarters and field office staff, as well as the Management and Operating contractors at NNSA's eight laboratories, plants, and sites. Its goal is to show how the NNSA will deliver its mission in a resilient, agile, and responsive manner.

Finally, NNSA's Strategic Integrated Road Map illustrates the path to achieving goals now and into the future. NNSA's mission priorities include maintaining the stockpile; countering and reducing proliferation threats; providing the Navy with safe, militarily-effective naval nuclear propulsion plants; applying world-class scientific and technological discoveries to real-world problems; and modernizing the infrastructure of the enterprise.

The release of these three documents along with the planned communications and outreach on these documents is intended to improve coordination and transparency across the nuclear security enterprise. Additionally, improved mission integration and transparency are key themes in both the Framework and the Vision. These documents are intended to demonstrate collectively what the mission priorities are and how NNSA will work together as one team to ensure NNSA will meet its missions safely, on time, and on budget.

QUESTION FROM REPRESENTATIVE KAPTUR

Partnerships and Collaboration

Q4a. NNSA has highlighted the importance of establishing training and development pipelines for manufacturing and capabilities such as precision machining, flexible circuitry, advanced manufacturing, engineering expertise, and skilled labor expertise (i.e. welding, nuclear operators, boilermakers, etc.).

While NNSA has fostered important and necessary pipelines and collaborative initiatives with local communities and institutions located nearest to its sites and laboratories, what opportunities exist to leverage engineering and skilled labor expertise outside the immediate surrounding regions of NNSA's labs and plants?

A4a. Over the past several months, NNSA has broadened the aperture of recruitment and retention outreach across the NNSA nuclear security enterprise (NNSA NSE – comprised of NNSA, as well as the Management & Operations (M&O) contractors, who run the laboratories, sites, and plants). A formal NNSA NSE recruitment strategic framework was developed. The NNSA NSE recruiting events we held in the last four months included all of the M&Os as well as the NNSA federal hiring authorities. By appearing together, as an enterprise, at Georgia Tech, Texas A&M, Purdue University, and University of California at Merced, we shared resources and helped each other find the talented employees we need. Our upcoming NNSA NSE day recruiting event in Ohio this fall will include a special focus on community colleges and vocational schools. Efforts have concentrated on academic institutions with renowned Science, Technology, Engineering, and Mathematics (STEM) focus as well as, Minority Servicing Institutions (MSIs - Historically Black Colleges and Universities, Hispanic Servicing Institutions, and Tribal Colleges and Universities). NNSA's Minority Servicing Institution Partnership Program (a partnership with about 50 MSIs across the Nation) and NNSA's Graduate Fellowship Program (outreach with over 150 academic institutions worldwide) are two

programs that facilitate NNSA's work in this area. In addition, NNSA is embarking on efforts to foster robust partnerships with trade schools and other skilled labor forums to leverage those crucial talents needed to sustain the mission.

Q4b. Is there value in assessing the potential of establishing a cooperative education pilot-program focusing on key capabilities including, but not limited to, manufacturing, materials science, engineering, tooling, and machining?

A4b. NNSA is a full partner in the Federal Government's STEM Education strategic plan, signed by the White House in December 2018. Ongoing initiatives that NNSA will continue to expand include internships and fellowships, which provide students with immersive work addressing real-world projects and challenges. Within the Minority Servicing Institution Partnership Program, for example, programs focus on advanced manufacturing, cyber security, high energy density science, and engineering. NNSA's increased focus on nuclear security enterprise-wide academic affiliations (including trade schools and community colleges) will enable the continued exploration and advancement of cooperative education pilot programs.

QUESTION FROM REPRESENTATIVE SIMPSON

NNSA and DoD are looking at collaborating to develop a "full spectrum" test and training range to improve training for emergency responders and the diverse set of capabilities at INL is being evaluated.

Q1. Deputy Administrator Park, preparing our Nation's emergency responders is an important responsibility for NNSA, one that it is uniquely able to perform utilizing the DOE national laboratories. I understand there is a need for exercising the full scope of tactics, techniques, and procedures to achieve the highest level of preparedness (train the way you fight). This requires capabilities not found many places (large open spaces, nuclear and radiological materials, classified operations, use of destructive tools). What is NNSA doing to advance the preparedness of our emergency responders and how can INL help?

A1. DOE fully agrees that there is a need to exercise the full scope of DOE's and our federal partners' tactics, techniques, and procedures to continually improve our effectiveness in realistic environments and operational conditions. The NNSA Office of Counterterrorism and Counterproliferation is responsible for targeted nuclear and radiological incident response training both domestically and internationally.

DOE's sites, including the Idaho National Laboratory, are harnessed to exercise and evaluate our domestic and international incident response capabilities. DOE/NNSA stands ready to support our interagency partners to continue preparing first responders.

QUESTION FROM REPRESENTATIVE SIMPSON

Naval Reactor Research

Q2. Admiral Caldwell, as you look to recapitalize your programs research and development capabilities, to what extent will you look at assets at our national labs to leverage existing and future investments and reduce shipping costs in some cases?

A2. Naval Reactors' research and development efforts support today's fleet and ensure our Navy maintains its technological advantage over adversaries. These activities are critical as the Navy analyzes requirements for future classes of ships. Investments today in research and development efforts advance capabilities and build cost savings into future work efforts.

Naval Reactors continues to place a strong emphasis on maintaining and recapitalizing our research and development capabilities. As we have done throughout the history of the program, we will assess existing and planned capabilities across the national laboratories and leverage them, when appropriate, to support Naval Reactors research needs and reduce lifecycle costs. For example, Naval Reactors collaborates with the Department of Energy's Office of Nuclear Energy to utilize the Materials and Fuels Complex on the Idaho National Laboratory in lieu of developing these capabilities in-house.

QUESTION FROM REPRESENTATIVE VISCLOSKY

Rising Costs and Competing Priorities

Q1a. There remain serious concerns regarding the long-term fiscal viability of the current nuclear-modernization program as well as NNSA's ability to assess cost tradeoffs among competing priorities. A recent report by the Congressional Budget Office (CBO) projected that U.S. nuclear forces would cost $494 billion over the 2019–2028 period. This estimate is $94 billion more than a CBO estimate published in 2017, and a substantial portion of this increase is related to new modernization programs proposed by the Administration in its 2018 Nuclear Posture Review (NPR). Meanwhile, the annual budget request for Defense Nuclear Nonproliferation (DNN) programs has declined in three out of the last four fiscal years.

What steps is NNSA taking to ensure the overall affordability and executability of the nuclear-modernization program proposed in the 2018 NPR?

A1a. NNSA evaluates affordability as part of a portfolio management approach, in line with the level of uncertainty affecting the estimates for out-years beyond the President's Budget Request. This is analyzed by comparing an aggregate portfolio of cost estimates to a reasonably projected topline budget. Variances are managed as the out-years estimates move into the Future Years Nuclear Security Program (FYNSP) window, and greater scrutiny and prioritization are applied as part of the programming and budgeting processes.

Q1b. How does NNSA assess cost tradeoffs among competing priorities, including nuclear modernization, stockpile stewardship, nuclear nonproliferation, and infrastructure recapitalization?

A1b. A fiscal year funding request is the result of a year-long, documented planning, programming, budgeting, and evaluation process underpinned with validated requirements. Tradeoffs carefully consider national security policy and ongoing programmatic deliverables designated by the Administration, proposed funding growth

between fiscal years, complex-wide strategic plans, and executability informed by science-based metrics such as mission risk reduction, life cycle spend plans, site allocations, and the evaluation of current year performance against planned milestones.

Q1c. Are there instances in which spending on any aspect of the nuclear-modernization program has resulted in fewer funds requested for stockpile-stewardship or nuclear-nonproliferation programs? If so, what are some specific examples?

A1c. NNSA seeks to balance investments across its portfolio of activities each year in alignment with national security goals, NNSA's strategic vision, and deliverables. Our spending on nuclear modernization has not negatively impacted our spending requests for stockpile stewardship or nuclear nonproliferation programs.

In cases where funding requests for stockpile stewardship or nonproliferation activities in a given fiscal year have been reduced, these changes were made based on the anticipated ability of program resources to execute. This might be because program goals have concluded or a lack of success or opportunity on speculative initiatives. For example, the FY2020 Budget Request for some stockpile-stewardship and nuclear-nonproliferation programs reflected reductions in recent years due to increased uncosted balances. As these balances are expended, appropriate amounts of budget authority will be requested in following years.

QUESTION FROM REPRESENTATIVE VISCLOSKY

W76-2 Warhead

Q2a. In discussing the low-yield warhead for submarine-launched ballistic missiles and other "non-strategic" capabilities, the 2018 NPR states that Russia "believes that the United States is unwilling to respond to Russian employment of tactical nuclear weapons with strategic nuclear weapons" and that it "mistakenly assesses that the threat of nuclear escalation or actual first use of nuclear weapons would serve to 'de-escalate' a conflict on terms favorable to Russia." Yet, experts have disputed Russian interest in limited nuclear first use and raised concerns about escalation dangers inherent in low-yield capabilities.

What publicly available sources support the 2018 NPR's assertions regarding Russian nuclear doctrine?

A2a. The Department of Energy defers to the lead agencies, the Department of Defense and Department of State, on the policy analysis and national security requirements identified in the 2018 Nuclear Posture Review.

Q2b. Do treaty allies in Europe concur with the 2018 NPR's assessment regarding Russian nuclear doctrine?

A2a. The Department of Energy defers to the lead agencies, the Department of Defense and the Department of State, on the policy analysis and national security requirements identified in the 2018 Nuclear Posture Review.

Q2c. Prior to detonation, how would Russia discriminate between a high- and low-yield warhead launched on a Trident-II missile from an Ohio-class submarine, and why would Russia wait to find out whether it was being targeted with a high- or low-yield warhead before priming its strategic nuclear forces for use?

A2a. The Department of Energy defers to the lead agency, the Department of Defense, on issues related to foreign state military capabilities and calculus.

QUESTION FROM REPRESENTATIVE VISCLOSKY

Low-Yield SLCM

Q3a. The 2018 NPR states that "Expanding flexible U.S. nuclear options now, to include low-yield options, is important for the preservation of credible deterrence against regional aggression." The pursuit of additional "low-yield options" is questionable, both from the perspectives of cost and strategy. Nevertheless, the Administration's budget request for FY 2020 persists in this pursuit by including $7 million to study the development of a low-yield SLCM. The CBO's most recent estimate of the 10-year costs of U.S. nuclear forces found that this new capability would be far more expensive than this initial request suggests. According to the CBO's estimate, the low-yield SLCM's development could cost taxpayers $9 billion over the next ten years.

What is the military requirement for the low-yield SLCM that cannot be fulfilled by a low-yield warhead in the current U.S. nuclear arsenal or planned capabilities, including the B-21 Raider or the Long-Range Stand-Off (LRSO) weapon?

A3a. The Department of Energy defers to the lead agency, the Department of Defense, on military requirements.

Q3b. Recognizing the rising costs of the nuclear-modernization program, would the low-yield SLCM utilize the design of the LRSO, as the CBO suggests, and would it use an existing warhead, a modified warhead, or a new warhead?

A3b. The U.S. Navy is developing an Analysis of Alternatives for the Sea Launched Cruise Missile (SLCM) system. DOE/NNSA and the Department of Defense (DoD) will not make any decisions on a SLCM warhead until the study is completed and the requirements are validated by the Nuclear Weapons Council (NWC). When the NWC authorizes NNSA to begin consideration of a new warhead, all options will be considered to meet DoD requirements.

Q3c. Do treaty allies in Europe support the development and deployment of the low-yield SLCM to deal with contingencies in their region?

A3c. The Department of Energy defers to the lead agencies, the Department of Defense and Department of State, on the policy analysis and international engagement related to treaty ally support of the proposed development and deployment of weapons.

QUESTION FROM REPRESENTATIVE VISCLOSKY

Sexual Assault

Q4a. On January 25, 2019, the New York Times published a troubling account of a female security guard's experience of sexual harassment at the Nevada National Security Site. The security guard, Jennifer Glover, also claims to have been the victim of a sexual assault in November 2017. According to news reports, DOE security contractors dismissed Ms. Glover's allegations, and even retaliated against her for reporting them. It is critical that DOE ensure the entire nuclear-security enterprise is free of sexual harassment and assault. Such behavior is deleterious to victims, DOE recruitment and retention efforts, and, ultimately, the ability of the United States to maintain a safe, secure, and effective nuclear deterrent.

What activities, including management and oversight practices, does DOE undertake to ensure that security contractors foster workplaces free of sexual harassment and assault?

A4a. Our Nation depends on us to accomplish national security missions each and every day, so it is imperative that all employees feel safe on the job. At every one of the Department's sites, there are resources available to a victim of any type of misconduct. Supervisors and managers routinely encourage employees to immediately seek help in the event of assault, harassment, or reprisal. Contractor employees are provided avenues to bring concerns directly to the Department if they choose to do so. Additionally, contractors are required to address allegations of inappropriate behavior with a timely, thorough investigation and hold each employee accountable as necessary.

Contractors are required to adhere to their contract terms and award terms, respectively, along with all applicable law. DOE/NNSA requires employers to take all necessary steps to prevent sexual harassment from occurring, informing employees of their rights, and developing methods to sensitize all concerned (29 C.F.R. 1604.11(f)). Also, E.O. 11246 and its regulations at 41 CFR chapter 60 contain legally mandated requirements for

contractor employers related to sexual harassment. Specific protections include, EO 11246, Section 202(1); 41 CFR 60-1.4(a)(1): "The contractor will not discriminate against any employee or applicant for employment because of … sex [and]… will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their … sex…."

41 CFR 60-1.32: "The contractor… shall not harass, intimidate, threaten, coerce, or discriminate against any individual because the individual has engaged in [protected activities]. The contractor… shall ensure that all persons under its control do not engage in such harassment, intimidation, threats, coercion or discrimination."

41 CFR 60-20.8(a): "Harassment on the basis of sex is a violation of Executive Order 11246, as amended." The rest of this subsection goes on to describe specific actions that are unlawful.

For contractors working on-site, they must have an approved Worker Safety and Health Program, that outlines processes and procedures for employees related to safety. Additionally, all Department of Energy federal employees are required to participate in a minimum of 3 hours of training on the prevention of sexual harassment on a biennial basis per DOE Order 311.1B.

For any contract administration issue, the contractor is responsible for taking corrective action, if deemed necessary. Failure to correct could result in a Cure Notice (proscribed

in FAR 52.249-8, included in all DOE contracts) being issued to the contractor and possible termination.

Q4b. Are there mechanisms for security-contractor employees to report incidents of sexual harassment or assault to DOE, and for DOE to hold contractors accountable should they fail to take appropriate remedial action?

A4b. Contractor employees are able to report observed or experienced sexual harassment or assault through the Department of Energy (DOE) Employee Concerns Program (ECP). DOE's ECP ensures employee concerns related to such issues as the environment, safety, health, and management of DOE and the National Nuclear Security Administration (NNSA) programs and facilities are addressed through:

- Prompt identification, reporting, and resolution of employee concerns regarding DOE facilities or operations in a manner that provides the highest degree of safe operations;
- Free and open expression of employee concerns that results in an independent, objective evaluation; and
- Supplementation of existing processes with an independent avenue for reporting concerns.

In addition to the ECP managers providing assistance in the evaluation and resolution of employee concerns, they will also transfer concerns to other programs or processes if the concern is deemed to be outside the scope of the ECP (such as Equal Employment Opportunity) along with documenting that an individual, office, or organization has

accepted responsibility for minimizing, correcting, and preventing recurrence of concerns that have been substantiated through the ECP process.

Additionally, the Office of Inspector General (OIG) maintains a hotline to facilitate the reporting of allegations of fraud, waste, abuse, or mismanagement in U.S. Department of Energy (DOE) programs or operations. This includes violations of federal laws and regulations.

For any contract administration issue, the contractor is responsible for taking corrective action, if deemed necessary. Failure to correct could result in a Cure Notice being issued to the contractor and possible termination.

Q4c. Does DOE collect data on reported incidents of sexual harassment and assault among its security contractors?

A4c. There are numerous reporting requirements for the contractor in the event of alleged violence, discrimination, or other criminal activities, such as NNS-H-1017 VIOLENCE IN THE WORKPLACE (NOV 2009), a contract clause which states Contractor supervisors or management representatives shall report any incident or threat of aggression, harassment, hostility, intimidation, or violence to the Contracting Officer or the COR.

In the event of the contractor's non-compliance with the nondiscrimination clauses of this contract, or with any such rules, regulations, or orders, this contract may be canceled,

terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts.

QUESTION FROM REPRESENTATIVE POCAN

Medical Isotopes Production

Q1. Pursuant to the American Medical Isotopes Production Act (Section 3174), the Department of Energy, by January 1, 2020, is required to notify Congress whether exports of HEU for fabricating Moly-99 will be permitted after January 1, 2020. As you know, one of the principle purposes of AMIPA is to curb the export of HEU because of its nuclear proliferation implications and dangers.

Could you describe for the Committee what process the Department will use to make this determination? Has a process been established and if so, what is it, or if has not been established, what is the Department's plan to establish it? This question is not what the Department's decision will be, but solely a question about the process for coming to a decision.

A1. Per American Medical Isotopes Production Act, DOE/NNSA, in conjunction with Health and Human Services (HHS), is reviewing the global market supply to certify that there is either a sufficient or insufficient supply of Moly-99 and other medical isotopes produced without the use of highly enriched uranium available to satisfy the domestic United States market. DOE/NNSA will take into consideration any impacts its decision might have on disrupting global supplies of medical isotopes. Based on this review, the Secretaries of DOE and HHS will make the appropriate certifications.

TUESDAY, APRIL 9, 2019.

MEMBERS' DAY HEARING

Ms. KAPTUR. Good morning to everyone. I see there is good mood here in our subcommittee this morning as we begin our Member Day Hearing.

Thank you to our colleagues so many who have come before us today, and others who have submitted requests to the report, we appreciate the time and the effort that you have taken to be here with us this morning.

The purpose of today's hearing is to take testimony from members on the fiscal 2020 budget. And we look forward to hearing from our attendees about your priorities including Federal programs of importance to your districts, and I know you have talked to us privately many times on them.

There are many members who couldn't be here with us today who have submitted testimony for the record. There are actually numbers into the thousands of requests.

Today we will hear from our colleagues in 10-minute blocks with two members scheduled for each time block. Each member will have approximately 5 minutes to testify.

And with that, we will get started in order of appearance here before the subcommittee, beginning with Congressman Mast. Welcome this morning.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. BRIAN J. MAST, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF FLORIDA

Mr. MAST. Thank you, Chairwoman Kaptur. Thank you, Ranking Member Simpson, and other members of the subcommittee on Energy and Water Development.

I am here to advocate specifically for fully funding Everglades Restoration and Water Quality Infrastructure projects, specifically 200 million for the U.S. Army Corps of Engineers' Construction Account for Environmental Restoration or Compliance, where South Florida Everglades Restoration projects can be completed or can receive additional funding for those projects.

Now, the Everglades for Florida, is the drinking water source for one in three Floridians, a very big deal. Restoring America's Everglades, it is really not a choice between fiscal responsibility and environmental protection it has to be both of those. This is the problem with the entire system.

It was created many decades ago, before any of us were in place, the U.S. Army Corps of Engineers, and we are now tasked to fix

some of their issues that they created, or else it will destroy Florida's ecology, and all that relies upon good ecology in Florida to include drinking water supply. This is what is on the line there. How did they destroy it?

So, early in the 1900s——

Ms. KAPTUR. Excuse me. Will the gentleman, suspend.

Mr. MAST. Yes, ma'am.

Ms. KAPTUR. You have got some excellent footage up there, and make sure that you reference that as you go through your testimony.

Mr. MAST. Absolutely. What you are looking at are toxic algal blooms that we receive in our saltwater coastal estuaries in the State of Florida. They are not naturally recurring in our saltwater estuaries, they occur because we get so much fresh water dumped on us. I will get a little bit into the fresh water issue, but that is the result of it. It is really quite a tragedy for our ecosystem there.

So, going back to the history of how this problem was created, 1900s the Corps of Engineers dug a canal from Lake Okeechobee to the coastal estuary that you are looking at here, oftentimes dumping up to 7 million gallons a minute of fresh water into an area that needs zero of that fresh water. So it is very harmful, even if it is perfectly clean it is very harmful, unfortunately it is often very dirty laden with far too many nutrients that feed those algal blooms.

In the 1930s the Corps of Engineers dammed up Lake Okeechobee, essentially bringing an end or the beginning of what would bring an end to the River of Grass, the water flowing from the Kissimmee River into Lake Okeechobee, down into the Florida Everglades, out into Florida Bay, that damming it up was the beginning of the end of that.

In the 1960s the Corps of Engineers took a river that fed Lake Okeechobee, the Kissimmee River, and it looked like most rivers, like a river that wound around like a snake, and they straightened it out into a channel, precipitation that that lake fill far too fast for what could be drained out, which is what brings about these freshwater discharges, or the need for these freshwater discharges, into our coastal estuaries.

So, what is this problem that it created? The Federal Government, really in the last century, they dammed the Herbert Hoover Dike, they created artificial canals intended to bring water to where it wasn't wanted, and now we don't get the water where it is needed, into the Florida Everglades that work to provide all of that drinking water supply. This is the issue that is at stake here.

Now, Congress committed itself to a solution to this problem back in 2000 when it authorized the Comprehensive Everglades Restoration Plan, CERP, this was the framework for restoring this water system.

CERP has dozens of components and the only hope for correcting the Federal Government's engineering mistakes of the 20th Century, is to bring these components to completion.

This is what we are advocating for today. This is why we are out here saying that we committed to a 50/50 partnership between the State of Florida, and the Federal Government.

The State of Florida is about $1 billion ahead of the Federal Government in terms of funding these problems.

The Federal Government, in our opinion, needs to step up to the plate, honor its commitment under CERP, match the State of Florida in funding these Everglades Restoration projects.

In 2016 the state legislature in Florida committed 200 million in annual state funding for the next 20 years, for planning, design and engineering of these projects. We are looking for that same $200 million commitment from the Federal Government to help correct these problems again, created before all of our time by the U.S. Army Corps of Engineers.

This is what is at stake. This is what we are working for. This is my ask today. I thank you all on this subcommittee for hearing us out on this request.

And with that, I am happy to answer any questions that you all may have for me.

Ms. KAPTUR. Thank you, Congressman Mast. I will just say for the record that the Trump administration's budget request cuts the Corps Construction funding by approximately 43 percent over last year, compared to last year. So, we as a subcommittee know what we have to do. We thank you very much for being here this morning.

Congressman Simpson, do you have any questions?

Mr. SIMPSON. No.

Ms. KAPTUR. All right.

Mr. MAST. Thank you.

Ms. KAPTUR. Thank you very, very much. And your full statement will be included in the record.

[The information follows:]

Congressman Brian Mast
Florida -18th District

Chairwoman Kaptur, Ranking Member Simpson, and members of the Subcommittee on Energy and Water Development, I'm here to advocate for fully funding Everglades restoration and water quality infrastructure projects, and specifically for $200 million for the U.S. Army Corps of Engineers' Construction Account for Environmental Restoration or Compliance where South Florida Everglades Restoration can compete for additional funding.

The Everglades is the drinking water source for one in three Floridians and a source of jobs and economic livelihood for hundreds of thousands more. Restoring America's Everglades is not a choice between fiscal responsibility and environmental protection. In fact, it is both.

In my Florida Congressional District which spans St. Lucie, Martin, and Palm Beach Counties, the most pressing issue for folks is the massive, harmful and unnatural discharges – sometimes up to 7 million gallons of freshwater per minute – out of Lake Okeechobee and into the heart of our coastal community. This massive infusion of freshwater loaded with nutrients turns the St. Lucie River and our nation's most species-diverse saltwater estuary – the Indian River Lagoon – into an algae-infested toxic waterway that surrounds hundreds of thousands of residents. The resulting algal blooms kill beloved wildlife like manatees and dolphins. The toxins released by the blooms creates a public health crisis that hurts people through the water and air – children can't go swimming or play near the water, and elderly residents must stay locked in their homes. These blooms also destroy our economy because you can't sell a house that sits next to toxic water, and no one wants to vacation near, or boat or fish on, a giant stew of algae.

This problem was created by the Federal government in the last century when it created the Herbert Hoover Dike and artificial canals to send water where nature never intended and

away from where it is desperately needed; the result being that my community is being inundated with water we don't want while the Everglades are dying from a lack of water.

Congress committed itself to a solution to this problem in 2000 when it authorized the Comprehensive Everglades Restoration Plan (CERP) as a framework for restoring, protecting, and preserving the Everglades. CERP's dozens of components are essential to correcting the Federal government's engineering mistakes of the 20th century. Such components include (a) the C-44 Reservoir, a CERP project that will attenuate the freshwater flow and improve the water quality flowing into the St. Lucie Estuary, (b) the Restoration of the Kissimmee River that will return flow to 44 miles of the river's historic channel and restore about 40 square miles of river/floodplain ecosystem, and (c) the Everglades Agricultural Area (EAA) Reservoir, a key component that will help the water from Lake Okeechobee to be treated as it flows south to replenish the dying Everglades instead of flowing to the west and east to devastate our coastal communities with harmful algal blooms.

While I appreciate everything that this Subcommittee has done for Everglades restoration, the Federal government needs to do more to match the financial commitment from the State of Florida. The Comprehensive Everglades Restoration Plan was envisioned as a 50-50 partnership with the State of Florida; however, Florida's funding commitment has far outpaced the federal government's in the two decades since the plan was approved – and the gap is getting wider. The federal government's inability to match Florida's financial commitment has led to massive delays to the components of the CERP plan resulting in the prolonged erosion of the Everglades ecosystem and my community's ongoing exposure to harmful algal blooms.

The Federal government needs to step up to the plate, honor its commitment under CERP, and match the State of Florida in funding the Everglades restoration initiative. In 2016,

the Florida State Legislature committed $200 million in annual state funding over 20 years for planning, design, engineering and construction of Everglades restoration project components. The Integrated Delivery Schedule—which provides the sequencing strategy for CERP's individual components—is based upon the assumption that both the state and Federal governments will appropriate $200 million for the plan each year. For these reasons, I am advocating for $200 million for the U.S. Army Corps of Engineers' Construction Account for Environmental Restoration or Compliance. Florida has demonstrated their commitment to tackle this enormous problem, the Federal government needs to honor its commitment and meet my state halfway.

I also must ask that we not delay any of the components of the Comprehensive Everglades Restoration Plan. This Subcommittee was put in a difficult spot when the earmark ban went into effect and had to get creative to invent a system to direct funding to individual Army Corps projects that does not violate this ban. However, the "New Start" procedures have become a self-inflicted wound that is needlessly delaying projects around the nation from advancing to the next phase of completion. Moreover, the "New Start" standard should never have been applied to the Comprehensive Everglades Restoration Plan, which was authorized almost two decades ago. Completion of this authorized project should not – and must not—be delayed by this Subcommittee unilaterally determining that a "New Start" is needed for each of the 68 components of CERP. Components of CERP—like the EAA Reservoir, the Kissimmee River Restoration, and the C-44 Reservoir—must be allowed to advance to the next phase based solely on completion of a viable study, engineering realities on the ground, and availability of funding.

Again, I thank you for everything this Subcommittee has done to help the people of South Florida, and for the opportunity to testify before you today.

Congressman O'Halleran, thank you for coming today.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. TOM O'HALLERAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ARIZONA

Mr. O'HALLERAN. Thank you, Madam Chairwoman Kaptur, and Ranking Member Simpson, and members. Thank you for hosing this Member Day, and providing the opportunity for members to speak about the importance of the Army Corps of Engineers' projects and policies.

I strongly support the work that Army Corps does to project communities across our nation from catastrophic flooding. This work requires that Investigations and Constructions accounts be funded sufficiently.

Specifically, I ask that the Army Corps general Investigations Account receive at least $125 million in funding, and the Construction Account receives at least $2.183 billion. In addition to those funding changes, I ask that the committee consider removing language that has been included in the Energy and Water Appropriations Bill for the last six years that prevents the Army Corps from implementing new principles, requirements and guidelines which has lowered the priority of rural projects.

This policy has the effect of lowering the competitiveness of rural projects by keeping their BCR scores lower than those of urban projects.

For example, Winslow, Arizona, is a rural community in my district, which has a population of just under 10,000 people, is disadvantaged in the current system.

A major flood would devastate the downtown area, and the homes of nearly 700 Native Americans who are forcibly relocated by government under Public Law 93–531, allowing an update of the PR&Ss would provide parity for rural communities like Winslow across the country.

Providing the construction account funding of at least $2.183 billion would allow for the completion of many projects which are nearly finished, and in which the Federal Government has already made significant investments.

I would say that the Winslow location, a flood there could take out I–40 and the major East-West railroad for the Burlington Northern Santa Fe.

For example, for the last 30 years the City of Flagstaff's top priority has been to mitigate potential flood damage caused by the Rio de Flag. Since fiscal year 2002 the Rio de Flag Flood Control Project has received more than 26 million in Federal appropriations for various phases of the project.

With these resources the USACE has conducted the reconnaissance and feasibility studies, completed the preconstruction engineering and design, and begun the construction phase.

Slowing this project would result in huge losses of property and increase the risk of the loss of life, as well as create significant public health and safety issues. A robust construction amount with

at least the $2.1 billion in funding would allow projects like this to proceed. The community in Flagstaff has also increased their tax base in order to contribute to this project.

Providing at least 125 million is dedicated to the general Investigations Account, will allow the Army Corps to continue their work on projects that have already begun, and are important to protecting many growing communities in rural Arizona; for example, the Lower Santa Cruz River Watershed Project is critical to residents of Pinal County, Arizona, one of the fastest-growing counties in the United States.

Last year the project received a little over a million dollars in general investigations work plan funds that will help complete the feasibility portion of their project.

Completing feasibility studies will allow the Army Corps to move on to other projects, and ensure that other communities receive the attention they need.

Thank you for hosting this Member Day and providing an opportunity for members to speak about the importance of Army Corps of Engineers' projects and policies.

I would like to reiterate my support for the work that the Army Corps does to project communities across our nation. And to emphasize my support for funding the General Investigations Account with at least $125 million, and the Construction Account for at least $2.1 billion.

Additionally, I would like to reiterate the importance of removing language that prevents the Army Corps from implementing new PR&Gs, so that rural communities have parity in the process. And I yield.

Ms. KAPTUR. Thank you very much, Congressman O'Halleran. I wanted to ask you. Did you bring any map to place up on the video, to the screen?

Mr. O'HALLERAN. We did not.

Ms. KAPTUR. You did not. Okay. Could you take one extra minute and talk to us about the challenges. You mentioned one rural community in particular and the eligibility of rural communities for attention from the Corps, could you talk a little bit more, generally, about some of the Corps-related work? Your district is huge. As I look at the map that is part of the record. It looks like it covers how much of Arizona?

Mr. O'HALLERAN. Sixty percent.

Ms. KAPTUR. Sixty percent, all right. So, one of the difficulties of dealing with the Corps is that we tend to get burrowed into individual projects, but what we lose is the spatial sense of what it is a part.

You talked about watersheds in your testimony, and then I am going to ask Congressman Mast the same question, you went into a little more detail about the Florida rivers, we would very much appreciate your generalizing from the specific. Could you do that for your district?

Mr. O'HALLERAN. Sure. I have tremendous amount of different watersheds in the district. The Flagstaff one both serves the—flows into the Colorado River and the Verde River system. The Winslow, Lower Colorado aquifer flows into, and the surface waters flow into the Colorado River, and the Santa Cruz River flows into Mexico.

And so these are fairly significant areas of water for Arizona, and for the 40 million people in the Colorado River. We also have a spring that feeds the Colorado River, about 182,000 acre-feet of water a year.

The significance is, each and every one of these locations has nearby major construction, East-West Corridors for commerce. And it is critical that we provide some level of assurance that those corridors are kept open. They feed the Port of Los Angeles, and all the Eastern United States with what comes out of that port.

And additionally, the Flagstaff area, the downtown area also includes the Northern Arizona University. And the Northern Arizona University is the major university in North Arizona, and has about 30,000 students.

So, we have a complex process throughout rural Arizona, but these are the three major projects, and I have another five watersheds within the area, and some of these have overflow into those watersheds.

Ms. KAPTUR. Looking ahead 50 years, if you had to advise the Corps for your district, what would you say?

Mr. O'HALLERAN. Well, first of all, we have been lucky enough to have the Corps out there on each of these projects, I have been there with them multiple times.

I would advise that these are growing areas. Arizona is one of the fastest-growing areas in the country, and if we are to provide the necessary flood capability, stopping floods now and into the future, the sooner we get this done the more availability we will have for funding down the line for other projects. And these are critical projects.

Ms. KAPTUR. Do you anticipated water shortages?

Mr. O'HALLERAN. Pardon me?

Ms. KAPTUR. Do you anticipate water shortages in the future in your specific district?

Mr. O'HALLERAN. Well, damage to water but water shortages are something that Arizona is going to have to live with. And we are going to have ground water shortages, and surface water shortages, if we don't address the issue of how we manage our water, whether it is water that flows through during flood stages, or water from underground. But that is also supplied by the amount of water that we can keep in the basin.

Ms. KAPTUR. Thank you very much. Congressman Simpson.

Mr. SIMPSON. I would just say, if you have not been, Madam Chairwoman, down to the Everglades and taken a tour of it, it would be very helpful. This is the largest environmental restoration program that has ever been attempted. And the Federal Government has been up and down, and up and down in their funding, and what they need is some consistent funding, is what I learned. But they will take you on a helicopter and take you around and show you what they are doing.

It is an amazing restoration project, and as you saw last year from the red tides, and other things that happened, this is devastating to the residents of Florida, but also to restoring the Everglades to what it used to be.

And so I support what you are doing. And look forward to working with you and see what we can do. We all know that the Army

Corps of Engineers' budget is, what was proposed is proposed. Every administration does it. And then we have to fill in the gaps. And we will do that I suspect, because there are so many members; and when I look at the list of members that are testifying, a whole of the Army Corps of Engineers stuff. So, appreciate your being here today.

Ms. KAPTUR. Thank you very much. Congressman Newhouse, we went a little over on this panel, you are lucky, because we had a cancellation of one of our witnesses on this panel. But we are going to proceed now. And any additional information you wish to provide to the record. I heard what the Ranking Member said about the Everglades, several people have invited us down to the Everglades.

I guess I ask myself the question, looking at the 20th Century, and then looking at the proposal for what is being done, my final question really is, do you think that we can restore the Everglades to their natural state? Or are these engineered systems simply not meeting the reality of what is happening in the ecosystem?

Mr. MAST. It will never be exactly the same as its natural state. As much of what used to be the Everglades is now developed area. That is the nature of development, that is the nature of literally hundreds of thousands of people moving into the State of Florida every single year, but it still needs to be repaired so that it can function in the same way that it used to, allowing water to flow through the watersheds, coming all the way down from Orlando, through Lake Okeechobee into the Florida Everglades and out into the Florida Bay.

This type of kidney system needs to operate that way for the State of Florida otherwise it messes up everything in between. So, while it may not look exactly the same, it needs to go back to functioning in the way God intended it.

Mr. SIMPSON. If I could, Madam Chairwoman? What is the State of Florida doing on the nutrient loading? It has been a challenge.

Mr. MAST. We divide the problems up in the State of Florida to, one, are you sending fresh water where it needs to go, versus where it doesn't need to go? But beyond that, when you are sending fresh water to different places, it doesn't have too many nutrients in it, and how can we prevent it from being dirty fresh water?

Those are two separate problems that we deal with. Best management practices are something that are constantly going into place, building reservoirs to go out there and store the water, clean the water, and then send the water into the appropriate directions, because those are drinking water supplies, and there are requirements for parts-per-billion in these different waterways, such as the Everglades, such as other areas that provide municipal drinking water, like a place called Grassy Waters.

There are parts-per-billion standards to send that water into those places, so the State has gone and put in places to clean these waters, stormwater treatment areas, things like that, to bring them up to the water quality standard that they need to be, but it can't keep up with the amount of rainfall and flow that Florida gets when all of that water rushes from North down to South. The system can't keep up with it, with the dammed up lake, and with limited canals to send the water out to tide, which, as I said, when

you are wasting 7 millions a minute, often, that is just in 1 direction out to tide, that is a tremendous waste when just a little bit downstream, the water is needed.

Ms. KAPTUR. Thank you very much. Thank you very much, any additional material you wish to provide to the record for our members would be very much appreciated. We have three or four competing hearings this morning, so our members are running in every direction. And I wanted to share with you the Algal Bloom problem up in the Great Lakes. It is very interesting what you said today about fresh water versus salt water and the impact of fresh water on Algal Blooms. That was most interesting to me. We share that common condition and I thank you for your leadership. Thank you gentlemen both for being here this morning.

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TOM O'HALLERAN
1ST DISTRICT, ARIZONA

The Honorable Marcy Kaptur
Chairwoman
House Appropriations Subcommittee on Energy and Water
2362-B Rayburn House Office Building
Washington, DC 20515

The Honorable Mike Simpson
Ranking Member, Energy and Water Appropriations Subcommittee
U.S. House of Representatives Washington, DC 20515

Dear Chairwoman Kaptur and Ranking Member Simpson:

Thank you for hosting this Member Day and providing an opportunity for Members to speak about the importance of Army Corps of Engineers projects and policies.

I strongly support the work that the Army Corps does to protect communities across our nation from catastrophic flooding. This work requires that Investigations and constructions accounts be funded sufficiently. Specifically, I ask that the Army Corps General Investigations account receive at least $125 million in funding and the Construction account receives at least $2.183 billion.

In addition to these funding changes, I ask that the committee consider removing language that has been included in the Energy & Water Appropriations bill for the last six years that prevents the Army Corps from implementing new Principles, Requirements, and Guidelines (PR&Gs), which has lowered the priority of rural projects.

This policy has the effect of lowering the competitiveness of rural projects by keeping their BCR scores lower than those of urban projects. For example, Winslow, Arizona is a rural community in my district, which, at a population of just under 10,000 people, is disadvantaged in the current system. A major flood would devastate the downtown area and the homes of nearly 700 Native Americans who were forcibly relocated by the government under Public Law 93-531. Allowing an update of the PR&Ss would provide parity for rural communities, like Winslow, across the country

Providing the Construction account funding of at least $2.183 billion would allow for the completion of many projects which are nearly finished, and in which the federal government has already made significant investments.

For example, for the last 30 years, the City of Flagstaff's top priority has been to mitigate potential flood damage caused by the Rio de Flag. Since fiscal year (FY) 2002, the Rio de Flag flood control project has received more than $26 million in federal appropriations for various phases of the project. With these resources, the USACE has conducted the reconnaissance and feasibility studies, completed the pre-construction engineering and design (PED), and begun the construction phase. Slowing this project could result in huge losses of property and increase the risk of the loss of life, as well as create significant public health and safety issues. A robust construction account with at least $2.183 billion in funding would allow projects like this to proceed nationwide.

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Providing at least $125 million is dedicated to the General Investigations account will allow the Army Corps to continue their work on projects that have already begun and are important to protecting many growing communities in rural Arizona.

For example, the Lower Santa Cruz River watershed project is critical for residents of Pinal County, Arizona--one of the fastest growing counties in the U.S. Last year, the project received $1.070 million in General Investigations work plan funds that will help complete the feasibility portion of the project.

Completing feasibility studies will allow the Army Corps to move on to other projects and ensure that other communities receive the attention that they need.

Thank you for hosting this Member Day and providing an opportunity for Members to speak about the importance of Army Corps of Engineers projects and policies.

I would like to reiterate my support for the work that the Army Corps does to protect communities across our nation and to emphasize my support for funding the General Investigations account with at least $125 million and the Construction account with at least $2.183 billion. Additionally, I would like to reiterate the importance of removing language that prevents the Army Corps from implementing new PR&Gs, so that rural communities have parity in the process.

Sincerely,

TOM O'HALLERAN
Member of Congress

Ms. KAPTUR. We appreciate your attendance. Yes, we would now like to call Congressman Robert Wittman of Virginia and Representative Dina Titus of Nevada. Congressman Wittman, thank you for appearing before us this morning.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. ROBERT J. WITTMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF VIRGINIA

Mr. WITTMAN. Madam Chairwoman, thank you.

Ms. KAPTUR. Please proceed.

Mr. WITTMAN. Very good. Chairwoman Kaptur, Ranking Member Simpson, thank you so much for the opportunity to testify today and as a representative from Virginia, home to the Port of Virginia, one of the largest and busiest ports in the Eastern Seaboard, adequately funding the Army Corps of Engineers Civil Works Program in directing at least one construction new start designation for navigation are essential to maintaining and advancing the work done by the Port of Virginia to expand and improve its operations. Since 2014, that is what is calling the Port of Virginia—calling on the Port of Virginia to have nearly doubled in size from 8,000, 20-foot equivalent units, which is how they measure containers that go on ships that are known as TEUs to 14,400 TEUs. And based on this growth, the Port is preparing for 16 to 18,000 TEU ultra-large container vessels in the near future. At its current depth and width, the Port is experiencing an urgent need to deepen and expand its channels. In January, 2018, the U.S. Army Corps of Engineers called for additional deepening and widening of the Port's Thimble Shoal Channel and in February of 2018, the Corps recommended to Congress additional widening to 1,400 feet in the Thimble Shoal Channel at the Port. The deepening to 55 feet and widening to 1,400 feet as recommended by the Corps of the Thimble Shoal Channel received full authorization when President Trump signed into law the Water Resources Development Act, better known as WRDA of 2018. Currently, the Port of Virginia is the fifth largest container Port complex in the United States. It manages cargo ranging from containers, vehicles and non-containerized cargos and commodities ranging from forest products, minerals and grains to auto parts and retail merchandise. It is a national gateway for waterborne commerce supporting businesses in all 48 contiguous states with 35 percent of its cargo moving by rail. The Port of Virginia leads the East Coast and Gulf Coast in percentage of rail serve cargo. So, it is a critical part of a multi-modal transportation effort underway in the nation. Cargo moving through the Port operations help support 5,000, excuse me, 530,000 jobs across Virginia, which is about one out of every nine residents in the state and it generates $88.4 billion in annual economic impact to Virginia. The frequency of ultra-large container vessels calling on the Port of Virginia has increased dramatically, displacing smaller vessels in leading to one-way traffic through its harbor and channels. These ultra-large contained vessels are better known as Panamax vessels because they are the ones that can now traverse the Pan-

ama Canal with the deepening and widening of the Panama Canal, so that opens up a lot of opportunities obviously here in the ports. Curtain navigation of one-way traffic is not sustainable and creates uncertainty and inefficiency for businesses and their supply chains as well as customers. Additionally, one-way traffic has led to interruptions of vessels at Norfolk Naval Station, presenting possible national security concerns. The canal, even with its initial widening could not allow for the transactioning of two vessels, the Naval vessel and one of these ultra-large container commercial vessels.

Ms. KAPTUR. Excuse me, Congressman, did you provide a visual that we could display with your testimony?

Mr. WITTMAN. I do not, but I can get one to you and show you where the widening would take place where these ships can go through. Essentially, what they have at the Port there is a station that is actually suspended over the water with people there that are kind of like the air traffic controllers of the Port. So, they direct ships going back and forth. With these areas where you can widen the 1,400 feet, would essential allow passing lanes, so they could direct traffic, slow it down and speed it up, so that when these ships got to these areas, they could transact.

Ms. KAPTUR. Thank you.

Mr. WITTMAN. So, we will do that. In the widening the 1,400 feet will make way for safe and efficient two-way passage between larger commercial vessels and the other operations in the harbor and channels, including the Navy. As larger vessels continue to call on the Port of Virginia, increasing the depth of the channels at the Port is becoming progressively more important. By deepening the 55 feet, the port is positioned to allow larger ships visiting the ships to arrive and depart fully loaded and will make for safer and more timely passage through the channels. Public and private nonfederal interests have invested billions of dollars on landsite infrastructure to prepare for the future and are prepared to provide additional investments to complete these crucial navigation projects. Between the Port's two major terminal improvement projects, the Port and the State of Virginia have invested a combined $670 million that will improve and expand the Port's operations. Additionally, the State has made an additional investment of $350 million for navigation improvement to complement federal investments in the Norfolk Harbor and Channel Project. With the benefit-to-cost ratio, a more than $5 return for every $1 invested in construction, the Norfolk Harbor deepening and widening presents a huge return on investment for the nation. It will allow American business from across the country to further benefit from the Port of Virginia as an integral part of their supply chain. To continue the momentum exhibited by 2018 and the $2.5 million included in the President's fiscal year 2020 budget for preconstruction engineering and design for the Thimble Shoal's Channel widening and deepening, I have submitted the following document to the subcommittee. $2.6 billion in total funding for the U.S. Army Corps of Engineers construction account; $50 million in total funding for the U.S. Army Corps of Engineers operations and maintenance account; donor and energy transfer program; and $1.59 billion in total funding for the Harbor Maintenance Trust Fund; and at least one construction or new

start designation for navigation. Madam Chairwoman, I want to thank you and Ranking Member Simpson for your interest and time to come before you today to testify to relay to you the importance of this project, not only to Virginia, but all 48 contiguous states here in the continental United States. The business that goes out of there, the multi-level transportation connections, all of those elements are critically important for the nation and our economy. And as I said, the return on investment for $5 for every $1 invested by the Federal Government, I think is a very good return on investment.

Ms. KAPTUR. Thank you, Congressman.

Mr. WITTMAN. Thank you.

[The information follows:]

Representative Robert J. Wittman, VA-01

Intro:

Chairwoman Kaptur and Ranking Member Simpson,

As a representative of Virginia, home to the Port of Virginia – one of the largest and busiest ports on the eastern seaboard – adequately funding the Army Corps of Engineers Civil Works Program and directing at least one construction new start designation for navigation are essential to maintaining and advancing the work being done by the Port of Virginia to improve and expand its operations.

Since 2014, vessels calling on the Port of Virginia have nearly doubled in size from 8,000 Twenty-Foot Equivalent Unit (TEUs) to 14,400 TEUs. Based on this growth the Port is preparing for 16,000 and 18,000 TEU ultra-large container vessels in the near future. At its current depth and width, the Port is experiencing an urgent need to deepen and expand its channels.

In January 2018, the U.S. Army Corps of Engineers (USACE) called for additional deepening and widening of the Port's Thimble Shoals Channel and in February of 2018, the Corps recommended to Congress additional widening to 1400 feet in the Thimble Shoals Channel at the Port. The deepening to 55 feet and widening to 1400 feet as recommended by the Corps of the Thimble Shoals Channel received full authorization when President Trump signed into law, the Water Resources Development Act (WRDA) of 2018.

Currently, The Port of Virginia is the fifth largest container port complex in the U.S. It manages cargo ranging from containers, vehicles and non-containerized cargoes, and

commodities ranging from forest products, minerals, and grains to auto parts and retail merchandise.

It is a national gateway for waterborne commerce, supporting businesses in all 48 contiguous states. With 35% of its cargo moving by rail, The Port of Virginia leads the East and Gulf Coasts in percentage rail-served cargo. Cargo moving through the Port operations helps support 530,000 jobs across Virginia, which is about one out of every nine residents in the state. It generates $88.4 billion in annual economic impact in Virginia.

The frequency of ultra-large container vessels calling on the Port has increased dramatically, displacing smaller vessels and leading to one-way traffic through its Harbor and Channels. Current navigation of one-way traffic is not sustainable and creates uncertainty and inefficiency for businesses and their supply chains as well as customers. Additionally, one-way traffic has led to interruptions with operations of vessels at Naval Station Norfolk presenting possible national security concerns. Widening to 1,400 ft. will make way for safe and efficient two-way passage between larger commercial vessels and other operators in the Harbor and Channels including the Navy.

As larger vessels continue to call on the Port of Virginia, increasing the depth of the channels at the Port is becoming progressively important. By deepening to 55 feet, the Port is positioned to allow larger ships visiting the Port to arrive and depart fully loaded and will make for safer and more timely passage through the channels.

Public and private non-federal interests have invested billions of dollars on land-side infrastructure to prepare for the future and are prepared to provide additional investments to complete these crucial navigation projects. Between the Port's two major terminal improvement projects, the Port and Virginia have invested a combined $670 million that will improve and expand the Port's operations. Additionally, the State has made an additional investment of $350 million for navigation improvement to compliment federal investments in the Norfolk Harbor and Channel Project.

With a Benefit-Cost-Ratio of more than $5 returned for $1 invested in construction, the Norfolk Harbor deepening and widening presents a huge return on investment for the nation. It will allow American businesses from across the country to further benefit from The Port of Virginia as an integral part of their supply chain.

To continue momentum exhibited by WRDA 2018 and the $2.5 million included in the President's FY20 Budget for Pre-Construction Engineering and Design for the Thimble Shoals Channel widening and Deepening, I have submitted the following requests to the Subcommittee:

1. **$2.6 billion in total funding for USACE Construction Account**
2. **$50 million in total funding for the USACE Operations and Maintenance Account, Donor & Energy Transfer Program**
3. **$1.59 billion in total funding for the Harbor Maintenance Trust Fund**
4. **At least one construction start OR "New Start" designation for navigation**

Conclusion:

I want to thank Chairwoman Marcy Kaptur, Ranking Member Mike Simpson, and Members of the Energy and Water Development Subcommittee for this opportunity to testify today on these important matters which are vital to my state of Virginia and what I believe are also important to the nation.

Ms. KAPTUR. Congresswoman Titus, welcome.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. DINA TITUS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEVADA

Ms. TITUS. Thank you very much, Madam Chairwoman, Ranking Member, other members of the Committee. Unlike most of the people that are before you today asking for money, I am here asking you not to spend money. The relationship between the Department of Energy agencies and the State of Nevada has been a long and difficult one. For 3 decades, DOE has tried to force Nevada to become the dumping ground for the nation's waste. A proposal we fought since the Scrutiny of Atta Act was signed into law in 1987. We do not use nuclear energy; we do not produce nuclear waste; and we should not be forced to store it. In 2009, President Obama rightfully announced that the Administration would not seek funding for this misguided project. In 2012, then, the Blue Ribbon Commission on America's nuclear future advocated for consent-based siting of nuclear repositories. That sentiment was echoed by the recent reset of America's Nuclear Waste Management Strategy and Policies Report that was led by a panel of exports including former Nuclear Regulatory Commission members. This is what most nuclear nations around the world have done or are doing to address nuclear waste. Yet, the Administration, along with some of their friends here on the Hill are continuing to pursue this failed strategy. Accordingly, the budget submitted by the President includes $116 million to restart the Yucca Mountain licensing process. This figure actually hides the real costs of continuing down this path. In 2008, DOE estimated that without major interruptions and at the nearly 400 contentions raised by the state of Nevada are somehow adjudicated and dismissed, it would still take $1.66 billion just to complete the licensing process and if that were to happen according to an estimate by the State of Nevada, based on cost studies prepared by DOE, construction to complete the Yucca Mountain repository would cost an additional $96 billion, $96 billion. That figure does not even take in account the cost of transportation of this highly nuclear active waste that would go through 44 states and the District of Columbia, including 330 Congressional Districts. It would ride on nearly 100,000 trucks, which is an average of 4 to 6 trucks every day for 50 years. Congress has already wasted $15 billion on this doomed project that is now just a hole in the ground and we should not waste a penny more. The process that has gotten us this far was driven by bad politics, not good science. There is serious concerns about seismic hazards near Yucca Mountain; the project would border on the largest air and ground military training space in the United States, that is the Nevada Test and Training Range, which has caused the Secretary of the Air Force to express concerns about Yucca Mountain. So, until we recognize here in Congress that without the consent of the state, the affected local governments and tribal communities, there is just not going to be a reasonable solution to storing this waste. I think we need

to look for a solution. We do not want to just say no, but this is not it. Second, I would like to bring to your attention another issue of concern with the DOE. Last year, the State of California sued the Department over its failure to complete the mixed oxide fuel or Mox facility. That facility, as you know, is to be built to process weapons grade plutonium, but the Department failed to take into account the ballooning costs associated for the facility and the Trump Administration killed the project. That is when South Carolina sued. A Federal judge directed the Department then to remove the plutonium that was being stored in South Carolina and put it somewhere else. Following the ruling, the DOE proposal identified two sites, one of which was the Nevada National Security Site located 70 miles from Las Vegas as one of the two recipients. The State of Nevada then filed suit arguing that the state, I mean, the DOE had not adequately studied the potential dangers of moving this plutonium to an area that is subject to flash floods and earthquakes. That is a claim that has since been reinforced by a recent report by the Defense Nuclear Facilities Safety Board. Now, the real disturbing part was during oral arguments of this lawsuit, last January, the DOE failed to disclose to a Federal judge, or to anybody in Nevada that the plutonium had already been shipped to Nevada and it was sitting at the test site. They are required to move an additional 5 metric tons out of South Carolina in the coming years. After all the flap occurred, the Department now says it is not going to send any more to Nevada, but considering their actions and their untrustworthiness to this point, Congress should prohibit any more funds from being use to insure that DOE keeps its word. So, I am asking you, please do not spend any more money on licensing of Yucca Mountain and please do not give DOE any money to ship those extra 5 metric tons of plutonium to Nevada. With that, I thank you, Madam Chairman.

Ms. KAPTUR. Thank you very much. Congressman Simpson, do you have any questions?

Mr. SIMPSON. No. We could have a big discussion that would go on a long time about pros and cons. They talk about consent based. I know of no community that will become a permanent repository for nuclear waste based on consent. Now, some will take interim storage. I am not sure how willing they are going to be to do that if we close down the only possible permanent geological repository that we have been working on for 30 years. So, it is a challenge. I understand where you are coming from. I understand Nevada does not have any nuclear facilities, except at that site, or use nuclear power. Idaho actually does not have, if you can believe it, we do not have any ships of the nuclear Navy that sail in Idaho. Yet, we take all the waste from the nuclear Navy. So, it is a challenging issue. It has to be resolved. Anyway, thank you for being here today. I noticed that Rob, you are smiling today. Does it have anything to do with anything beyond your testimony?

Mr. WITTMAN. Well, there is a pretty spectacular basketball game that was on last night and we were very happy with the results. Much to the chagrin of our colleagues in Texas.

Mr. SIMPSON. Congratulations.

Mr. WITTMAN. Thank you.

Ms. TITUS. Madam, may I respond to that just briefly.

Ms. KAPTUR. Please.

Ms. TITUS. And I understand that we do not need to get into an argument, but I would think that you could equate taking the Navy's waste to what Nevada has done for the Nevada Test Site and testing of weapons. Those two things are up for national security. This is commercial waste we are talking about, Yucca Mountain and that is a whole different kind of story. Second——

Mr. SIMPSON. Not all commercial waste.

Ms. TITUS. I am sorry.

Mr. SIMPSON. Not all commercial waste. The waste from the Nuclear Navy is destined for Yucca Mountain if it ever opens. That is Defense waste.

Ms. TITUS. Well, that will be news to us, so that is another way we need to get more information from DOE. I would just point out that you are right. To allow and consent for interim seems to me and not allowing it for permanent, totally irrational if you are going to allow it for interim, why would you not allow it for permanent and I have sat right before the Rules Committee where Former Member Sessions said Texas would like to have it. So, maybe there are some communities if they are involved in the decision-making would not be as opposed to it as we are because it has just been rammed down our throat and in Europe, that is the way they do it and it has worked very effectively. So, you are right, it is an argument, but there are points on both sides that can be made.

Mr. SIMPSON. Yeah and I would just say, I do not know anyplace in Europe that has a permanent geological repository. It is all temporary. And so we are just pushing the can down the road and have been doing it for 30 or 40 years and we need to come to some conclusion on this. Thank you.

Ms. KAPTUR. I wanted to ask the Congresswoman if there are any materials you could make available to the Committee to augment the record regarding the seismic information that has been coming forward. We would be grateful for that. I think the average member really does not know the size of this facility and if you have any graphic material that you could provide us, that would be helpful. You are a very effective spokeswoman for the State of Nevada. I thank you for testifying.

Ms. TITUS. Thank you, Chairwoman.

[The information follows:]

Testimony of Representative Dina Titus (NV-01) to the Energy and Water, and Related Agencies Appropriations Subcommittee

Chairwoman Kaptur, Ranking Member Simpson, Members of the Committee, thank you for the opportunity to testify today. The relationship between the Department of Energy agencies and the State of Nevada has long been a difficult and painful one. For three decades, the Department of Energy has tried to force Nevada to become the dumping ground for the nation's nuclear waste – a proposal we have fought since the Screw Nevada Act was signed into law in 1987. We don't use nuclear energy, we don't produce nuclear waste, and we shouldn't be forced to store it.

In 2009, President Obama rightfully announced that his Administration would not seek funding for this misguided project. In 2012, the Blue Ribbon Commission on America's Nuclear Future advocated for a consent-based siting of nuclear repositories, a sentiment echoed by the recent Reset of America's Nuclear Waste Management Strategy and Policies report led by a panel of experts including former Nuclear Regulatory Commission members. This is what most nuclear nations have done, or are doing, to address nuclear waste. Yet President Trump and Secretary Perry, along with their allies in the nuclear industry and friends here on Capitol Hill, are pursuing a failed strategy. Accordingly, the budget submitted by the President includes $116 million dollars to restart the Yucca Mountain licensing process. Even so, this request hides the real costs of continuing down this path.

In 2008 the Department of Energy estimated that without major interruptions, and if the nearly four hundred contentions raised by the State of Nevada are somehow adjudicated and dismissed, it would still take $1.66 billion just to complete the multi-year NRC licensing process to receive a construction authorization. If that were to happen, according to an estimate by the State of Nevada based on cost studies prepared by the U.S. D.O.E., construction to complete Yucca Mountain would cost $96 billion dollars. That figure does not even consider the costs of transporting this highly-radioactive nuclear waste through 44 States and the District of Columbia, including 330 Congressional Districts, on nearly 100,000 trucks. That's an average of 4-6 trucks per day, every day, for 50 years. Congress has already wasted $15 billion dollars on this doomed project. We shouldn't waste a penny more.

The process that got us to this point was driven by bad politics, not sound science. There are serious concerns about seismic hazards near Yucca Mountain. The project would also border the largest air and ground military training space in the contiguous United States, the Nevada Test and Training Range, causing the Secretary of the Air Force to express concerns about storing nuclear waste at Yucca. Until, we as a Congress recognize that without consent of the state, affected local governments, and tribal communities, there will never be a solution to this problem, any attempt to appropriate further funds towards Yucca Mountain is simply wasting precious resources.

Second, I want to bring to your attention another issue of concern with the Department of Energy. Last year, the State of South Carolina sued the Department over its failure to complete the Mixed Oxide Fuel or MOX Facility. That facility, as you know, was to be built to process

weapons grade plutonium, but the Department failed to account for the ballooning costs associated with the facility, and the Trump Administration killed the project.

A federal judge directed the Department to move one metric ton of plutonium from the State of South Carolina. Following the ruling, a DOE proposal identified the Nevada National Security Site located 70 miles from Las Vegas, Nevada, as one of two recipients of this material. The State of Nevada filed suit, arguing the Department failed to adequately study the potential dangers of moving the material to an area that is subject to flash floods and earthquakes – a claim that has since been reinforced by a recent report by the Defense Nuclear Facilities Safety Board which noted the safety risks to workers at the site due to the high seismic hazards. Disturbingly, during oral arguments this past January the DOE failed to disclose to a federal judge that the plutonium had already been secretly shipped to the NNSS.

It is inexcusable that the Department withhold this information from a federal judge, let alone from the State of Nevada, the Congressional Delegation, and other stakeholders. DOE is required to move an additional five metric tons out of South Carolina in the coming years. The Department now claims that it does not plan to move any more plutonium to the Nevada, but considering the actions taken by DOE to date, Congress should prohibit any more funds being used for such actions to ensure DOE keep its word.

Madam Chair, I appreciate the invitation to be here today and speak of these important issues affecting Southern Nevada.

Ms. KAPTUR. And I wanted to say, as I said to the prior panel, there are many members in our subcommittee that are faithful attendees, but we have 3 or 4 concurrent subcommittee meetings going on, on appropriations, so they all could not be here with us. Congressman Wittman, I wanted to ask you as this panel departs, could you describe any changes in the ecosystem that you see occurring in the Virginia area. I have heard about rising sea levels that are affecting rail lines in Virginia for example. Could you kind of orient us a little bit from an ecosystem standpoint as to some of the environmental challenges, your region, as you attempt to invest in the Port complex, what are some of the changing environmental conditions that you have experienced in Virginia?

Mr. WITTMAN. Sure, well, there has been some new construction on the Port facility down there and a heightening of the tunnels where the rail line goes through, so now they can double stack containers, but all the rail lines that come into the new areas there are not impacted by any of the storm events that are in the area there. The additional sediment that would come from this project would go to a place called Craney Island which is a place that is slated to become an expanded facility for container ships to come to. Obviously, with this, what they would do is use that sediment to elevate that so it would be a more resilient and we have done a number of things with coastal resiliency in the area there concerning the ports, the port facilities, the connectors, the road connectors, the rail connectors to make sure it is resilient to the impacts of storm events. So, I think it——

Ms. KAPTUR. You see rising sea levels or more feared storm events?

Mr. WITTMAN. Yes, all of those in the same category. The impact that we are seeing from the storm events, from sea level conditions, all those elements are either factored into some of the construction projects that have recently happened with the advancement of the rail lines there, but the newest port facility that was built over on the other side of the Elizabeth River in Portsmouth, was built at a higher elevation to be able to mitigate, or excuse me, to adapt to these conditions. The new facility that is being privately built to Craney Island will be built at a high elevation using the sediment that comes out of the dredging projects and higher bulkheads, so it will be resilient based upon the current conditions there and anything projected out into the future.

Ms. KAPTUR. Thank you both very much for appearing.

Mr. WITTMAN. Thank you.

Ms. KAPTUR. We will seriously consider what you have recommended.

Mr. WITTMAN. Thank you. Thank you Chairman Kaptur.

Ms. KAPTUR. Congressman Jim Hagedorn of Minnesota and Representative Fred Upton of Michigan. Come forward Great Lakes. And I think Hagedorn was first, was he not? Okay. We will take the witnesses in order of appearance. Congressman Hagedorn. Thank you very much for joining us today.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. JIM HAGEDORN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MINNESOTA

Mr. HAGEDORN. Thank you, Chairwoman Kaptur and Ranking Member Simpson, pleasure to be here. I am here on behalf of the constituents of Southern Minnesota. My district is one of those rural districts that goes all the way from South Dakota to Wisconsin and then Iowa up about 80 miles. So there is some areas with the Mississippi River that we border with Wisconsin that are very important to us and our way of life.

The first district of Minnesota is one of the top 10 agricultural producing districts in all the Nation. And of course our farmers and agri-businesses rely quite a bit on being able to transport their goods. And a lot of that goes right down the Mississippi River.

So I wanted to be here today to talk about what's going on there. And I ask for appropriations to make sure that we can maintain the locks and dams, our infrastructure, can continue to do the maintenance to make sure we have efficient, effective ways of delivering our goods and preserving our way of life. And frankly, it is a national security issue. Where would we be if we couldn't have a vibrant agricultural base and we ended up having to import our food and things of that nature. We would be in big trouble.

So it is evident that keeping our Nation's waterways transportation system modernized and maintained is essential to our economy and our way of life. And I am before you today to ask and encourage two funding requests with regard to our Nation's waterway systems. This system carries about 600 million tons of cargo to and from 38 States, including a significant portion of our Nation's agricultural products.

However, much of the physical infrastructure of our inland waterway system is aging and in critical need of maintenance. Commercial navigational locks have a design life of about 50 years, and yet over half of the existing locks on our Nation's waterways are more than 60 years old.

I have met with the mayor of Winona, I have met with the city administrator there, the county officials, people in Houston County, and they can tell you, along with the Army Corps of Engineers, I met with them, and Farm Bureau and others, that it is really, really critical that we continue to maintain the locks and dams and we have our shipping in good shape.

At first I respectfully request the subcommittee to appropriate an Army Corps of Engineers operating and maintenance account funding level of at least 3.74 billion for fiscal year 2020 and for the operation and maintenance of activities of the Corps, including those affecting inland and coastal navigation throughout the Nation.

This appropriation request is the same level signed in the law in the fiscal year 2019, the Energy and Water Appropriations Bill. And it is my belief that investing in the maintenance of our infrastructure today will benefit taxpayers in the future.

Second, I would ask and encourage the subcommittee to provide 10 million in fiscal year 2020 for the investigations account of the Corps of Engineers to continue pre-construction engineering and

design for the navigation and eco sustainability program, upper Mississippi River and Illinois Waterway System as authorized in Title VIII of the Water Resources Development Act of 2007. This funding will support continued pre-construction engineering and design funding for already authorized projects at Lock and Dam 25 on the Mississippi River in Missouri, and at the LaGrange Lock and Dam on the Illinois Waterway in Illinois.

Both projects have been identified as priority authorized projects in the Inland Marine Transportation Systems Capital Projects Business Model, the Joint U.S. Corps of Engineers Industry Capital Development Plan. And that's all from April 13, 2010.

In closing, I would like to emphasize again the vital role inland waterways play in transporting our Nation's commodities in a cost-effective manner. Hard-working Southern Minnesota farmers abundantly produce some of the finest agricultural products in all the world, a maintained inland waterway system is critical to their ability to distribute these products to the Nation and the world efficiently and effectively. And I encourage my colleagues to appropriately fund those needed moneys.

So with that, Madam Chair, thank you for your time, and Ranking Member, happy to answer any questions you might have. And I yield back.

Ms. KAPTUR. Thank you very much, Congressman Hagedorn. And if you have any visuals that you want to submit, we would greatly appreciate those, particularly because you represent a piece of a very long corridor.

And I will just say when the Corps testified earlier this year, they said that between the Rocky Mountains and the Appalachians, that whole basin has about 42 percent of the Nation's rainfall that fell this past year. Eventually comes down the Mississippi, down to New Orleans, and it was 125 year high. And we see Members from that corridor struggling with their districts and different issues, levees broke, lot of things happened.

As I said on prior panels, individual members come here, they talk about the project in their district. I think it would be really valuable if a leader like yourself could work on a bipartisan basis with members along that corridor, and once we finish our formal hearings, could come together to talk about what's happening in the entire corridor. Because I think over the next 50 to 100 years the country is going to have to do some additional things in terms of Corps planning for this vast region where we have so much water fall. And, yes, we are repairing damage and we can't really sustain the President's cuts that he has recommended in this budget. That would be really backward looking for the Nation. So we appreciate your appearance today.

But I think Members need to understand what is happening in that corridor. I think you can help in that. You are very savvy, you are paying attention to what's happening in your region, and rather than just having someone come from the Northern part, the Red River, let's say, Valley, or down from New Orleans, it would be really nice to have the representatives from the Mississippi River and Missouri come together here and just have a discussion. I look forward to that once the formal hearings are over. So I just mention it to you.

Mr. HAGEDORN. It's a very good idea, something that I would like to do and work with Members on a bipartisan basis. And you notice today I mentioned a couple of projects that are far south of the particular district. So we are in this together and I understand how important it is for the entire river to maintain.

[The information follows:]

Sub-committee on Energy and Water Development

Member Day Testimony

Tuesday, April 9, 2019

Congressman Jim Hagedorn (MN-01)

Madam Chair (Marcy Kaptur) and Ranking Member (Mike Simpson),

Thank you for giving me the opportunity to testify before you this morning. The topics I wish to highlight during this hearing are vital to constituents in my District.

Minnesota's 1st District is one of the top 10 agricultural districts in the country. Having a vibrant agricultural economy is vital to the economic well-being of southern Minnesota in general and the rural areas of our District in particular. An efficient and reliable transportation system is critical to a healthy agricultural economy, and inland waterways are a key component of that system.

The Mississippi River, which begins its journey in Minnesota, is the nation's most important waterway when it comes to the transportation of commodities. Fifty-seven percent of the cargo on the Mississippi is agricultural products. It is estimated that over half of the U.S.'s corn exports and over a third of the soybean exports originate in states bordering the upper Mississippi and Illinois Rivers and move via these transport arteries to lower Mississippi River ports. This is not surprising considering waterway transport costs are about half of ground transport costs.

It's evident that keeping our nations waterway transportation system modernized and maintained is essential to our nation's economic health.

I am before you today to ask for and encourage two funding requests with regards to our nation's waterways system. This system carries almost 600 million tons of cargo to and from 38 states including a significant portion of our nation's agricultural products. However, much of the physical infrastructure of our inland waterways system is aging and critically in need of maintenance. Commercial navigation locks have a design life of 50 years and yet over half of the existing locks on our nation's waterways are more than 60 years old.

Therefore, first I respectfully request this Sub-committee to appropriate an Army Corps of Engineers Operating & Maintenance account funding level of at least $3,740,000,000 for FY 2020 for the operation and maintenance activities of the Corps including those affecting inland and coastal navigation throughout the nation. This appropriation request is the same level signed into law in the final FY 2019 Energy & Water Appropriations bill. It is my belief that investing in the maintenance of our infrastructure today will benefit taxpayers in the future.

Second, I would ask and encourage this Sub-committee provide $10,000,000 in FY 2020 from the Investigations account of the Corp of Engineers to continue pre-construction engineering and design for the Navigation & Ecosystem Sustainability Program – Upper Mississippi River & Illinois Water-Way System as authorized in title VIII of the Later Resources Development Act Of 2007. This funding will support continued PED funding for already authorized projects at Lock & Dam 25 on the Mississippi River in Missouri and at the LaGrange Lock and Dam on the Illinois Waterway in Illinois. Both projects

have been identified as priority authorized projects in the Inland Marine Transportation Systems Capital Projects Business Model, the joint U.S. Corp of Engineers-Industry Capital Development Plan from April 13, 2010.

In closing, I would like to emphasize again the vital role inland waterways play in transporting our nation's commodities in a cost-effective manner. Hard-working southern Minnesotan farmers abundantly produce some of the finest agricultural products in the world. A well-maintained inland waterways system is critical to their ability to distribute those products to the nation and the world efficiently and effectively. I encourage my colleagues to fully fund these appropriation requests as submitted.

Thank you, Madam Chair and Ranking Member, for the opportunity to speak with you today and I yield back.

Ms. KAPTUR. There are so many choke points. Thank you. Your colleague from the Wolverine State, Congressman Fred Upton, thank you so very much for taking time from your own responsibilities to be here today.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. FRED UPTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr. UPTON. Well thank you, Madam Chair, and my friend, Mr. Simpson, as well. It is a delight to be here, and I am here to express my strong support for the President's request. It is a pleasure to be here. Thank you my two friends, and colleague.

I am here to urge this subcommittee to act favorably to the President's request. And in fact if he doubled it it would even be better. To restart Federal efforts to complete the licensing process for a nuclear waste repository.

We need to complete the licensing process. This has been a bipartisan issue for decades. We need to complete the licensing because it is absolutely critical to opening the path to meeting the Nation's legal and moral obligations to dispose of the used nuclear fuel and other high level waste currently stranded at 121 sites in 39 states around the country.

I would note that Michigan has three active nuclear energy reactors and one closed one. In fact that closed one has been closed for nearly 40 years. It is time to get it off sensitive environmental areas and into one safe place.

This Congress has worked, we have worked as a Congress for many years on a bipartisan basis. Thanks to Mr. Shimkus' lead in the last Congress we had 49 votes, as I recall, in the Energy and Commerce Committee. Traditionally we have well over 300 votes on the House floor when this issue is brought up. And it is time to actually deliver. And we have got a President who will sign this, it is in his budget, we need to take action so that we can restart this process.

I would recognize that the failure to take timely action will continue to strand waste in our states, and certainly in the Great Lakes, where rate payers have paid some $40 billion towards the permanent repository. We are looking at nearly a billion dollars a year in delays. It needs to happen.

And as I have you, I would also urge that we have strong funding for the Army Corps of Engineers navigation and maintenance and operation activities.

Again in the Great Lakes we have a good number of commercial and recreational harbors. But in particular I would note funds for section 216 of the Rivers and Harbors Act of 1970 which enables the Corps to review operations of completed projects, the physical, economic, or environmental conditions and a final report is made to Congress on advisability for modifying the structure for operations.

I have one small community, the city of New Buffalo, which is just north of the State line in Mr. Visclosky's district where we

have had severe erosion. It has damaged private property, it could potentially threaten the water supply as the pump house is located in the area being eroded. This is a project that is eligible to compete for section 216 funding, but obviously we have to have adequate resources there, and I would urge you to continue to work in a bipartisan basis so that we Members not on the subcommittee and Appropriations can continue to support your good efforts.

Ms. KAPTUR. Thank you so very much. As you know, both the Ranking Member and myself are uncomfortable, I think it is fair to say that, with the administration slashing the Corps accounts, the investigations accounts, so many of the accounts that we have a responsibility to care for the Nation through passage of this bill.

So we are very grateful for your testimony today. If Congressman Simpson has any questions or comments he wishes to make at this point?

Mr. SIMPSON. I appreciate both of you being here. Obviously we agree on Yucca Mountain. We have taken, I don't know, a gazillion votes on the Floor since I have been here on Yucca Mountain, and as you said, it always gets 300 or so votes. It is bipartisan. Politics has stopped us from solving this problem. And we need to just move on and get it done.

So I agree with what you said, Jim. Is Redwood Falls in your district?

Mr. HAGEDORN. No, it's not.

Mr. SIMPSON. Okay. I was just wondering because I had my Legislative Director here and then my Staff Director out in the district, his father was from Redwood Falls and on the City Council, that's where he is from and he brought a lot of Minnesotan to our——

Mr. HAGEDORN. That's like 30 miles north of where our district is.

Mr. SIMPSON. Yeah. Anyway, I agree with you that—the President's budget is always a little bit concerning, they never spend down the Inland Waterway Trust Fund, the anticipated revenue. This year I think it is around half of what we anticipate in revenue. If you are going to tax somebody for a purpose, and for a need, and you still have that need, why not spend that money on that need? But yet it makes it easier for them to put together a budget where they slash the heck out of the Army Corps of Engineers.

So that's something that the Chairwoman and I are concerned about, obviously, with the President's request on the Army Corps. I don't suspect it is going to stay where it is. We need to continue having this fight.

I'm sorry, I was going to ask you a question. I will wait for Congressman Shimkus' testimony because he is the author of the legislation that we passed last year in the House.

So anyway, thank you all for being here.

Ms. KAPTUR. Congressman Fleischmann, do you have any questions or comments?

Mr. FLEISCHMANN. Thank you, Madam Chairman. I, too, will be waiting for Mr. Shimkus' testimony, but Congressman Upton and Hagedorn, thank you so much.

Yucca, to reiterate these sentiments, needs to be done. It has been funded, it has been largely constructed, it is ready to go. And

the American people need this done. We are going to have a nuclear renaissance in this country and we need that final repository.

But kudos do go to my dear, dear friend from Illinois, Mr. Shimkus, on the authorizing side. He has been the hero of this since I have been in Congress. And as an appropriator, gentlemen, I give you my word that we are going to continue to do everything to get this funded. Thank you.

Mr. UPTON. Madam Chair, if I might just again compliment Mr. Shimkus for a moment. It does appear that we are on the cusp of actually getting something through. But we have to take the initiative here in the House. But it appears as though the Senate, with the Members that are there, particularly Senator Alexander and McConnell, are ready to have a vote on this issue. But that is why it is important that we show our stuff here in the House. Because if we are unable to do that, I am not sure that that would happen.

So this is the opportunity for us to really embark on early in the year, get it done in the first year so we can get it done and this stuff off the shores of Lake Michigan and other environmental sensitive areas, and really make a move forward. Long overdue. Thank you. Yield back.

[The information follows:]

FRED UPTON
MEMBER DAY TESTIMONY
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

Chairwoman Kaptur and Ranking Member Simpson,

I am here today to express to you my strong support for and request that you make sure the E&W appropriations bill includes the President's requested funding to restart federal efforts to complete the licensing process for a nuclear waste repository.

Completing the licensing process will provide the authoritative answers about the safety of the nuclear waste repository. And this funding should cover both the civilian spent fuel and the defense waste, from our nuclear navy and from cleanup sites, such as at Hanford, in Washington State.

Completing the licensing is critical to opening the path to meeting the nation's legal and moral obligations to dispose of the used nuclear fuel and other high-level waste currently stranded at 121 sites in 39 states around the nation—including in my home state of Michigan.

I and many of my colleagues on both sides of the aisle, as you know, believe action this year is important. The current Administration supports resuming the nuclear waste program. We in the U.S. House of Representatives have demonstrated strong bi-partisan support for resolving the decade-old political impasse. Let's take action this year, so we can restart the process.

We must recognize that failure to take timely action will continue to strand waste in our states, including on the Great Lakes in my district, while ratepayers have paid some $40 billion towards a permanent repository. Failure will continue to cost American taxpayers, who are already on the hook for more than $34 billion in damages, which grows by nearly $1 billion for each year of delay.

Ms. KAPTUR. Thank you very much. And Congressman Upton, I want to thank you for your leadership on many Great Lakes issues. They are sorely needed and they are effective. You are held in such high esteem.

And, Congressman Hagedorn, we thank you very much for being here this morning. I would ask both of you, if you have visual material that we can incorporate in the record on the specific projects you talked about, that would be most useful to the Membership.

Mr. HAGEDORN. Okay. I will get to work on it.

Mr. SIMPSON. If you would like, we used to have a great big picture in here of Yucca Mountain.

Ms. KAPTUR. I was referring to the Corps project.

Mr. UPTON. At one time we were ready to name if Marky Mountain because it was opposition. What is it we can do to get you to support this thing?

Mr. SIMPSON. They didn't take that down, I took it down, out of the room.

Ms. KAPTUR. Actually it is a good idea though. We should probably have some type of geographic footprint of that facility so Members can contemplate their positions.

Thank you both for being here this morning. We have many Members waiting.

We would like to invite Congressman John Shimkus of Illinois to the table, and Congressman Rick Allen of Georgia. Thank you for joining us this morning. Congressman Shimkus, we are going to begin with you. Thank you for your dogged efforts on trying to reach a reasonable solution for our country on spent nuclear fuels. And we welcome your testimony this morning.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. JOHN SHIMKUS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. SHIMKUS. Thank you, Madam Chairman. It is really great to be here, and I am going to try to use my time effectively and efficiently.

That the simple task is is to support the President's request of $116 million for DOE and $38.5 million for the Nuclear Regulatory Commission.

In addition to my prepared testimony submitted to the Committee, I placed state appropriate folders at your desk. So I would like to go through what's in those files, or in the folder.

First there is a copy of the bipartisan letter signed by colleagues to support this appropriation request, bipartisan. A chart and table that is showing the request and an enacted appropriations since 1997. That's the year I entered Congress, that is why I went back to 97. We also have a sheet explaining the 30 billion and growing cost of inaction. And I want to focus on this a little bit because these blue bars are non-appropriated money. It is out of the Judgment Fund. So it is spending that we have to do that we don't account for. And it is going to grow, and, unfortunately, I think it is $2 million a day that we are spending to do nothing.

You also will see a picture of the country that has all the 31 States, 120 locations where there is spent fuel or defense waste throughout. Then you should have, and I have mine, a fact sheet from your State in there, where your spent fuel or your defense waste is.

And everyone on this subcommittee has some in their State, with the exception of Mr. Visclosky. The State of Indiana has no defense waste or no nuclear power plants. So I wanted to make sure I highlighted those issues.

The Nuclear Waste Fund has around $40 billion currently on the books to finish licensing, construction, and operation of a geological repository for high level waste. Now this is what rate payers have paid into a fund to solve this problem.

Over the past 30 years, $15 billion has been spent to provide us with these two stacks of science that I brought before you right now, on this dolly right here. I think there are 16 volumes. Sixteen volumes, which accounts for billions of dollars in research by our national labs. It is all national labs research done on Yucca Mountain.

It demonstrates that DOE can safely build—through this report, DOE says it can safely build and operate the repository in compliance with the Nuclear Regulatory Commission.

Now on the desk here, so it went from DOE to the Nuclear Regulatory Commission. Now the Nuclear Regulatory Commission is an independent agency, so it is independent. So they took those 16 volumes and they created five volumes of their analysis of the science. So we have had two Federal Government smart people groups look at the science behind this.

This is the NRC staff's detailed and comprehensive review of DOE's application. As I said, it is five volumes, and the final volume was published in January, 2015. This was reviewed by experts in geochemistry, hydrology, climatology, structural geology, volcanology, seismology, and health physics, as well as chemical, civil, mechanical, and nuclear mining materials and geological engineering. So that's who looked at that to come up this conclusion.

The law gives the State of Nevada the right to make their case against these two pieces of science against the DOE analysis and the NRC evaluations before the Atomic Safety Licensing Board panel. This panel is composed of administrative judges who are lawyers, engineers and scientists, so pretty smart folks. The folders contain background document from the NRC explaining the entire licensing process and that's also in the folder I just gave you. On the left side is the NRC analysis.

From the NRC Background document, it says this. If the adjudication were to resume, one or more boards would hear evidence and issue decisions on approximately 300 admitted issues contesting the DOE's application and the NRC staffs decision to adopt the DOE environmental impact statement. Nevada may appeal the Board's decision to the Nuclear Regulatory Commission. The commission's final decision may also be appealed by the U.S. Court of Appeals.

What is the bottom line? The money that we are asking for does not turn one shovel of dirt. That is unfortunate because we need to move forward. What it does, it gives a state a say in the science

which is something if you've read the recent press sometimes that they want. They want a chance to argue the science.

So this money request is a simple request, let's get a final decision on the science and then decide how we want to move forward. If through this process this licensing board says it's not safe, per the law we are done. But to keep the rate payers and the states and the communities held hostage because we are unwilling to have the final debate on the science, I just don't think it is good public policy. And with that I went over my time I thank you and I yield back.

[The information follows:]

Testimony of the Hon. John Shimkus, Illinois-15

Thank you, Madame Chair, and Members of the Energy and Water Subcommittee for allowing me the opportunity to testify before you today.

As you know, I am here in support of funding levels in the President's Budget request for nuclear waste disposal. This request includes $116 million for nuclear waste disposal, and specifically $38.5 million in the Nuclear Regulatory Commission's Nuclear Materials and Waste Safety Program for related activities at Yucca Mountain.

Starting with the Manhattan Project and the creation of our nation's nuclear energy defense and civilian programs, long-lived nuclear waste has been generated which must be permanently disposed of. Since the National Academy of Sciences (NAS) issued their first report in 1957 on nuclear waste disposal options, the international scientific community has consistently concluded that permanent disposal in a deep underground repository is the best approach to dispose of nuclear waste.

In 1954, Congress passed the Atomic Energy Act, authorizing civilian, commercial use of nuclear power. In doing so, the Federal government permitted private entities to generate spent nuclear fuel (SNF). In so doing, the Federal government recognized its obligations to develop a solution to permanently dispose of the material.

From 1964-1971, the Atomic Energy Commission (AEC) – which oversaw all aspects of generation, regulation, and licensing of civilian nuclear facilities – began pursuing a disposal site in a salt formation located in Lyons, Kansas. After subsequent scientific analysis, the site was found to be unworkable. Additionally, the State government lost trust in the AEC and chose to

discontinue their work on a nuclear waste disposal site in Kansas. After this, the AEC formally terminated the project in 1971.

Then, from 1971-1982, the Federal government, through the AEC and subsequently the Energy Research and Development Administration (ERDA), considered a wide variety of options relating to nuclear waste management, including the "Retrievable Surface Storage Facility" (RSSF), to serve as a consolidated interim storage site, and the "Nuclear Waste Terminal Storage Program" (NWTSP) to site a permanent repository.

In 1974, ERDA terminated the RSSF program primarily due to objections raised by the Environmental Protection Agency (EPA). EPA opposed the program out of concern that it would ultimately become a de facto repository due to cost considerations and distract ERDA from the development of a permanent disposal facility.

The NWTSP attempted to site a permanent repository through a process of identifying technically suitable sites and then working through the respective State governments. In 1976, NWTSP notified 36 States of site consideration and requested to work with those Governors to conduct site characterization activities for a repository. Ultimately, no Governors agreed to participate in the program.

During this time, ERDA and DOE conducted extensive scientific and technical evaluation of the viability of the Nevada Test Site. This included a demonstration research project, in which SNF was emplaced at the site, gathering information to help prove SNF could be disposed of in the geologic conditions that are present at the Yucca Mountain site.

After concerns over the AEC's effectiveness in light of the loss of public trust relating to the failed Lyon's Kansas disposal program, Congress passed the Energy Reorganization Act in 1974, which abolished the AEC. The regulatory functions for nuclear material were then assigned to the newly established Nuclear Regulatory Commission (NRC) and policy initiatives were assigned to ERDA. In 1978, Congress finally established the DOE and transferred the legacy responsibilities for nuclear waste from ERDA.

In 1982, Congress enacted the Nuclear Waste Policy Act (NWPA), which established the Office of Civilian Radioactive Waste Management within the Department of Energy (DOE), and entrusted them with the responsibility of developing a deep geologic repository for disposing of spent nuclear fuel and high-level radioactive waste. Additionally, the NWPA also included a fee for service funding model, under which ratepayers who received electricity generated by nuclear power paid into a fund to provide for the disposal of spent nuclear fuel. The NWPA also established requirements for State participation in the process, including a formal disapproval mechanism with ability for Congress to override the State.

Then, in 1985 pursuant to Section 8 of the NWPA, President Reagan made the determination that high-level radioactive waste from defense activities should be "co-mingled with commercial SNF for permanent disposal. Congress then began appropriating funding from the national defense budget accounts to pay for the portion of the Yucca Mountain costs attributable to defense waste. Through 2016, taxpayers have paid $3.6 billion from the defense budget accounts for the Yucca Mountain project.

From 1983-1987 DOE conducted multiple analyses to evaluate the site characteristics at different locations, and Yucca Mountain was consistently rated as the best technically suited site among those studied sites. In 1987, out of concerns about the costs and time delay associated with continuing to study multiple locations, Congress enacted the Nuclear Waste Policy Amendments Act, which redirected DOE's nuclear waste management activities to focus solely on the Yucca Mountain site.

Over the next 15 years extensive scientific research was conducted on the Yucca Mountain site, led by DOE National Laboratories. During this time, the EPA updated regulatory requirements for Yucca Mountain to set potential release limits for up to one million years. In February of 2002, the DOE finally released their Environmental Impact Statement (EIS).

Following a formal recommendation submitted by the Secretary of Energy, President Bush formally recommended the Yucca Mountain site to host a repository. Nevada Governor Guinn submitted the State's disapproval to the Federal government and Congress subsequently followed the process established by Section 115 of the NWPA to approve of the Yucca Mountain site. The House of Representatives voted 306-117 to approve the Yucca Mountain site, and the Senate passed the resolution by voice vote.

In June of 2008, following decades of work on the Yucca Mountain site, DOE submitted the Yucca Mountain License Application to the NRC for review. Then President Barack Obama named Gregory Jaczko, a former staffer of Senate Majority Leader Harry Reid, to head the NRC. This fulfilled a promise President Obama made to Senator Reid, that he would shut down the

Yucca Mountain project, and the NRC stopped its analysis of the pending application and DOE closed the site.

In 2013, the D.C. Circuit Court of Appeals issued a rare writ of mandamus to the NRC directing work on the Yucca Mountain License Application continue in the "In re: Aiken County" decision. The Court found the NRC violated the law governing the Yucca Mountain licensing process. The NRC's Atomic Safety and Licensing Board (ASLB) also determined that DOE did not have the authority to withdraw the license and denied the motion to withdraw. Later that year the Court also found that DOE could not continue to collect the nuclear waste fee in the absence of a credible cost estimate for nuclear waste disposal following the termination of the Yucca Mountain program. Following that decision, DOE halted collection of the fee in May of 2014.

Between October 2014 and January 2015 NRC issued their five-volume scientific and technical analysis of DOE's Yucca Mountain Licensing Application, known as the Safety Evaluation Report (SER). This independent NRC evaluation determined that Yucca Mountain would remain safe for one million years, as required by federal regulations.

Today, with the funding this subcommittee has the ability to provide, the state of Nevada will have an opportunity to challenge the conclusions of that report, and the American people can finally get a yes or no answer on whether Yucca Mountain will become the national repository they were promised. I again urge you to support this critical funding and move the licensing process forward.

Thank you.

Ms. KAPTUR. Well, Congressman Shimkus, you are the only witness that has appeared before us that was respectful of the time limit. Thank you so very, very much. And we will hold the question for the moment. We would like to hear from Congressman Allen.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. RICK W. ALLEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF GEORGIA

Mr. ALLEN. Thank you, Madam Chairman. I want to thank the committee for allowing me to provide this testimony and highlight issues that are critical to the 12th Congressional District of Georgia.

My district is home to many constituents that work at the Savannah River Site, a Department of Energy Environmental Management site right across the river in South Carolina.

The Savannah River Site is home to many critical missions, including H-Canyon, the Nation's only hardened nuclear chemical separations facility, the Tritium Extraction Facility, tank closure, and the Savannah River National Lab, to mention a few.

The President's budget request includes full funding for the Radioactive Liquid Tank Waste Stabilization and Disposition account, and I urge the committee to do the same.

To ensure that the Risk Management Operations can proceed uninterrupted, especially H-Canyon's mission of safely processing highly radioactive materials, I request that the subcommittee fund this account at a total of $597,405,000 for fiscal year 2020, an additional $50 million above the President's budget request.

Additionally, the Nuclear National Security Administration, NNSA, has recommended the Savannah River Site as the most viable location for the proposed two site solution for plutonium pit production.

I support this decision, and ask the committee to fully fund the Directed Stockpile Work account, which would support the design of the Savannah River Plutonium Process Facility Project. The President included this recommendation and full funding in his budget request.

The Savannah River Site has repeatedly answered the call to safeguard our National security, and we must ensure we meet the Department of Defense requirements for plutonium pit production and an aggressive timeline for a modernized nuclear inventory.

Georgia's 12th Congressional District is also home to two nuclear power plants, Plant Vogtle and Plant Hatch. In fact, the 12th District of Georgia has about—will have about 80 percent of the nuclear generating capacity of the Southern Company.

The first two nuclear reactors to be built in 30 years are currently under construction at Plant Vogtle. We have thousands of spent fuel rods being held in spent fuel pools and dry cask storage containers on site, and with the next two reactors set to come online, the amount of spent fuel will increase.

We must have a permanent geological site, the Yucca Mountain, to manage our nuclear waste. I urge the committee to support the President's budget request for FY 2020 for nuclear waste disposal.

Finally, just south of my district is Savannah, Georgia, home of the fastest growing port in the United States, the Port of Savannah. The Port of Savannah is in the midst of a multiyear deepening project. One that will add approximately $282 million in annual economic benefits when completed.

The President's budget for FY 2020 recommends full funding for the Savannah Harbor Expansion Project at $130 million. And I urge the subcommittee to support and allocate that amount in their FY 2020 Energy and Water bill.

All of the issues I have highlighted today have strong, bipartisan support. I want to thank the House Appropriations Committee for their work, and I look forward to working with them to provide the funds necessary for these projects. And I appreciate this opportunity to provide testimony before you today. Thank you very much and I yield back.

Ms. KAPTUR. Again, thank you both for coming. Congressman Shimkus we know of your leadership on many issues including championing Yucca Mountain and trying to reach a scientific decision.

Congressman Allen, thank you so very much for providing us with visual materials also about your district and about the needs of the Port of Savannah and other energy related projects in your region.

And we thank you both for your appearance today. Let's turn it over to the ranking member. Do you have any questions or comments, Congressman Simpson?

Mr. SIMPSON. Sure. Thank you, Rick, for being here today. I have been both to Savannah River, the DOE site there, three or four times over the years and I have also been out to the port, this was years ago when Hobson was chairman of this committee. We went down and took a look at it. So I am familiar with your issues there but thanks for being here today.

John, as you know this has been a struggle over the last several years. What happens if we don't continue funding for Yucca Mountain and we go to conference with the Senate and they adopt their language for interim storage, which I view as inadequate? That's always been the debate we have been having.

Now you have passed a bill. They've never actually brought a bill to the floor and passed it.

Mr. SHIMKUS. Thank you. I think what—no one really knows what will happen. First of all, I think there is going to be a lot more opposition than people think because de facto interim could be de facto long term. The NRC does a short term evaluation for interim 40 to 60 years.

So then what happens in 40, 60 years? You picked it up and move it again? Or that the scientific consensus of the world and we see this going on in other places is long term geological storage. Which would require then that you all, and us, to start looking for another site of a long term geological repository.

And my guess it would take another 30 years and another $15 billion to come back with this type of information on another state in the union.

Now, you know, the importance of this is that the DOE and our labs have done the scientific analysis and more ologists than I even knew existed from volcanologists to hydrologists and all this other stuff. And then the independent Nuclear Regulatory Commission did this.

So they have evaluated the science. I think the other thing to mention and for those of us who have traveled out to Yucca Mountain, I would encourage Madam Chairman to take your subcommittee out there. It's very instructive.

Because that's where we had the nuclear test explosions, you have Yucca Flats there, the Federal Government land mass is the size of the state of Connecticut. So it's really not, we are not taking private property. We are not taking, this is government land that's been used for our Nation's security.

We would have to look elsewhere and when this process started, there were 10 states that they started going down the path. Nevada was always that top of each evaluation list.

But you think we are not going to revisit this in 30 years? If—again, the financial request is just, is really simple. It's not to build. It's to have a debate on the science. And the sooner we get that done, the sooner we decide we can move in or we have to start looking for another place.

Mr. SIMPSON. Thank you.

Ms. KAPTUR. All right. If either of you wish to provide additional visual material that we can include with your testimony, please do. And we will share it with the entire membership.

We thank you both for your—oh, did you have a question, Mr. Fleischmann? I'm sorry.

Mr. FLEISCHMANN. Madam Chairman, thank you. I just have a brief comment to Congressman Allen. Thank you for your avocation for environmental cleanup.

Our distinguished ranking member from Idaho has a DOE reservation. I have Oak Ridge but the Savannah River site is a great site so the cleanup issues are critically important. We have a very strong bipartisan Nuclear Cleanup Caucus and National Labs Caucus where Republicans and Democrats work very well together. So I thank you for being here.

Again, I just have to reiterate what and affirm what Congressman Shimkus has said and done. Yucca needs to go forward. The interim storage options are too burdensome, too costly and that is the site that was chosen, that is the site that was legally funded and the science is sound. And that will be proven out.

The reality is unfortunately the politics has gotten involved and the politics of Nevada and there is equal blame. At one point in time it was the Republicans and now it is the Democrats. And one point in time it was the Senate and let's hope and pray it's not the House.

So that the American people know, we had a very strong overwhelming vote in the House led by Mr. Shimkus's bill but this needs to go forward. There are other states that are looking at long

term storage, like our friends in Texas, and we know that but that will be 30-plus years, decades away.

So the American people need to have this done on the appropriations side. I am so pleased that the administration has put this in its budget but its long overdue and we need to move forward.

Mr. SHIMKUS. Madam Chairman, can I just say one more thing? Previous Congresses have already done the tough decision. They have already cast the votes for where the law is today and for us to at least finish this.

So, I mean, and this is people who were here, maybe when you were around, Madam Chairman, but not when—since I have been around.

I mean they have already struggled with this debate. All we are trying to do is at least finish the scientific debate on that site and that's why I appropriate your comments.

Mr. ALLEN. Let me add one quick note here.

Ms. KAPTUR. Very quick.

Mr. ALLEN. The state of South Carolina has an agreement with the Federal Government to store that waste. The Federal Government has not complied with that agreement. And in fact, the state of South Carolina is now in a lawsuit with the Federal Government which is going to cost the tax payers more money.

So we need to make a decision because we are just going to see more, I mean, it is unconscionable to have this waste in 130 something locations around the country. So I think with haste we need to move forward with a decision on this. Thank you very much.

[The information follows:]

Energy and Water Subcommittee Testimony

Rep Rick W. Allen (GA-12)

I want to thank the committee for allowing me to provide this testimony and highlight issues that are critical to the 12th Congressional District of Georgia. My district is home to many constituents that work at the Savannah River Site, a Department of Energy Environmental Management site right across the river in South Carolina. The Savannah River Site is home to many critical missions, including H-Canyon, the nation's only hardened nuclear chemical separations facility, the Tritium Extraction Facility, tank closure, and the Savannah River National Lab, to mention a few. The President's budget request includes full funding for the Radioactive Liquid Tank Waste Stabilization and Disposition account, and I urge the committee to do the same. To ensure that the Site Risk Management Operations can proceed uninterrupted, especially H-Canyon's mission of safely processing highly radioactive materials, I request that the subcommittee fund this account at a total of $597,405,000 for Fiscal Year 2020, an additional $50 million above the President's budget request.

Additionally, the Nuclear National Security Administration (NNSA), has recommended the Savannah River Site as the most viable location for the proposed two-site solution for plutonium pit production. I support this decision, and ask the committee to fully fund the Directed Stockpile Work account, which would support the design of the Savannah River Plutonium Processing Facility Project. The President included this recommendation and full funding in his budget request. The Savannah River Site has repeatedly answered the call to safeguard our national security, and we must ensure we meet the Department of Defense's

requirements for plutonium pit production and aggressive timeline for a modernized nuclear inventory.

Georgia's 12th Congressional District is also home to two nuclear power plants, Plant Vogtle and Plant Hatch, and the first two nuclear reactors to be built in thirty years are currently under construction at Plant Vogtle. We have thousands of spent fuel rods being held in spent fuel pools and dry cask storage containers on site—and with the next two reactors set to come online, the amount of spent fuel will increase. We must have a permanent geological site, like Yucca Mountain, to manage our nuclear waste. I urge the committee to support the President's budget request for FY2020 for nuclear waste disposal.

Finally, just south of my district is Savannah, Georgia, home to the fastest growing port in the United States-- the Port of Savannah. The Port of Savannah is in the midst of a multi-year deepening project—one that will add approximately $282 million in annual economic benefits when completed. The President's budget for FY2020 recommends full funding for the Savannah Harbor Expansion Project at $130 million, and I urge the subcommittee to support and allocate that amount in their FY2020 Energy and Water bill.

All of the issues I have highlighted today have strong, bipartisan support. I want to thank the House Appropriations Committee for their work, and I look forward to working with them to provide the funds necessary for these projects. I appreciate the opportunity to submit my input.

Ms. KAPTUR. Thank you both very much. I think we are aware of your complete dedication to this issue and the necessity for our country to move forward. Thank you both for being here this morning.

We have several other members waiting. We would like to ask ranking member of the full committee, Kay Granger to come to the witness table and Rodney, Congressman Rodney Davis of Illinois.

We are honored to have the ranking member of the full committee before us today. Congresswoman Kay Granger of Texas, we welcome you and we will hear from you first and then we will turn to Congressman Rodney Davis of Illinois. Thank you both for being here.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. KAY GRANGER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Ms. GRANGER. Thank you very much, Chairwoman Kaptur and Ranking Member Simpson, and Members of the subcommittee. Good morning, and thank you for allowing me to testify before you today on my priorities for the fiscal year 2020 Energy and Water Development and Related Agencies Appropriations bill.

I have two priorities I'd like to bring to your attention, both with a history of strong bipartisan support.

First, I request that you support, at a minimum, the President's budget request for nuclear waste disposal for the Department of Energy and the Nuclear Regulatory Commission. This funding will allow the two agencies to resume regulatory activities concerning Yucca Mountain.

Currently, spent nuclear fuel and high-level radioactive waste is temporarily stored at 121 locations across 39 states. While those locations provide safe storage, they were never intended to be permanent. This material needs to be relocated to a more secure, safe, and reliable facility. By law, Yucca Mountain is that facility.

We must provide the Department of Energy and the Nuclear Regulatory Commission with the resources necessary to continue and complete the licensing process. This process will provide the answers the public needs on long-term safety of the site.

My second priority for the fiscal year 2020 Energy and Water bill is robust funding for the U.S. Army Corps of Engineers civil works program, specifically the Construction account.

The civil works program supports our economy, protects public health and safety, and improves the environment.

Of paramount importance to my constituents is the future of my hometown of Fort Worth is a Corps project called by the Corps Central City. The federally authorized project known locally as the Trinity River Vision and Panther Island Flood Control Project, will reestablish essential levels of flood protection in the Corps built Fort Worth Floodway.

This effort is vital to protecting over 2,400 acres of existing neighborhoods valued at over $2 billion. This ongoing construction project enjoys widespread support in the Fort Worth community, as

evidenced by the recent and overwhelming passage of a $250 million bond issue to reinforce the local funding for the project.

At this subcommittee's hearing on the Corps budget request 2 weeks ago, in response to questions Ranking Member Simpson asked on my behalf, and I thank him for that, Assistant Secretary James reaffirmed his support for the project and Lieutenant General Semonite agreed that the Corps has an obligation to complete a project once it has begun. Unfortunately, the budget request is woefully inadequate to address our Nation's water resources infrastructure needs. Therefore, I ask the subcommittee to once again prioritize robust funding for the Corps of Engineers as you develop the fiscal year 2020 bill.

I thank you for the opportunity to testify today on my priorities for the fiscal year 2020 Energy and Water Appropriations bill.

[The information follows:]

Testimony of Congresswoman Kay Granger (Texas-12)

Ranking Member of the Committee on Appropriations

Before the Subcommittee on Energy and Water Development and Related Agencies

Member Day Hearing

April 9, 2019

Chairwoman Kaptur, Ranking Member Simpson, and Members of the Subcommittee – good morning, and thank you for allowing me to testify before you today on my priorities for the fiscal year 2020 Energy and Water Development and Related Agencies Appropriations bill. I have two priorities I'd like to bring to your attention, both with a history of strong bipartisan support.

First, I request that you support, at a minimum, the President's budget request for nuclear waste disposal for the Department of Energy and the Nuclear Regulatory Commission. This funding will allow the two agencies to resume regulatory activities concerning Yucca Mountain.

Currently, spent nuclear fuel and high-level radioactive waste is temporarily stored at 121 locations across 39 states. While these locations provide safe storage, they were never intended to be permanent. This material needs to be relocated to a more secure, safe, and reliable facility. By law, Yucca Mountain is that facility.

We must provide the Department of Energy and the Nuclear Regulatory Commission with the resources needed to continue and complete the licensing process. This process will provide the answers the public needs on long-term safety of the site.

My second priority for the fiscal year 2020 Energy and Water bill is robust funding for the U.S. Army Corps of Engineers civil works program, specifically the Construction account. The civil works program supports our economy, protects public health and safety, and improves the environment.

Of paramount importance to my constituents and to the future of my hometown of Fort Worth is a Corps project called Central City. The federally-authorized project – known locally as the Trinity River Vision/Panther Island Flood Control Project – will reestablish essential levels of flood protection in the Corps-built Fort Worth Floodway. This effort is vital to protecting over 2,400 acres of existing neighborhoods valued at over $2 billion. This ongoing construction project enjoys widespread support in the Fort Worth community, as evidenced by the recent – and overwhelming – passage of a $250 million bond issue to reinforce local funding for the project.

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Unfortunately, the budget request is woefully inadequate to address our nation's water resources infrastructure needs. Therefore, I ask the subcommittee to once again prioritize robust funding for the Corps of Engineers as you develop the fiscal year 2020 bill.

Thank you for the opportunity to testify today on my priorities for the fiscal year 2020 Energy and Water Appropriations bill.

Ms. KAPTUR. Thank you very much, Congresswoman. We will hold questions just for a moment until we hear from Mr. Davis. Welcome.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. RODNEY DAVIS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. DAVIS. Well, thank you, Madam Chair, and thank you Mr. Ranking Member Simpson and my good colleague and fellow baseball player, Mr. Fleischmann. I truly appreciate the opportunity to testify before you today.

As you may know, I am here in support of funding levels in the President's budget request for nuclear waste disposal. I represent the 13th district of Illinois which is home to the Clinton Power Station, one of 11 nuclear reactors in Illinois. The most of any State in the Nation.

These reactors generate approximately 53 percent of our States electricity, and 89 percent of the state's emissions—89 percent of the State's emissions free electricity. Roughly 5,900 people are employed as a result.

These sites are also home to over 10,000 metric tons of spent nuclear fuel, which is also the most of any other State in the Nation. This is why this issue is very important to me.

Over the past 36 years, rate payers have paid over $40 billion into a fund set up by the Federal Government to create a national nuclear waste depository.

Despite the Act requiring DOE to begin moving spent nuclear fuel by January 31, 1998, it has yet to be moved. The DOE's failure to take custody of commercially spent nuclear fuel at the 1998 deadline, has resulted in the Federal Government paying the industry over $8 billion in damages. Projected future liabilities are estimated at roughly $30 billion more tax payer dollars.

This should not be a partisan issue, and if you look at the numerous votes we have taken in the House over the years it has not been. In the previous Congress we voted 340–72, to advance the Nuclear Waste Policy Amendments Act of 2018, which was introduced by my good friend, my former boss and now our colleague, Congressman John Shimkus of Illinois, if enacted this legislation would have moved forward with both permanent and interim storage and fulfill the promise Congress made to our communities over 30 years ago.

Currently there is over 70,000 metric tons of spent nuclear fuels stored at 121 locations across 39 states. Roughly a quarter of this waste is stored in dry casks, and the rest sits in wet pools, like at Japans Fukushima site.

It sits in Republican districts and Democrat districts. Unless we finally act to restart the project at Yucca Mountain, the issue will remain there indefinitely.

I urge you to support the funding levels in the President's budget request for $116 million for nuclear waste disposal, and $38.5 mil-

lion to restart the licensing process with the Nuclear Regulatory Commission.

And while I am here and have a couple of extra minutes, I do want to also reiterate the importance of the Lock and Dam systems along the Illinois and Mississippi waterways. It is crucial to districts like mine, and I certainly hope that this committee will consider funding levels at appropriate levels for the Corps of Engineers.

Thank you. And I yield back the balance of my time.

Ms. KAPTUR. Thank you very much, Congressman Davis. And we heard what you said about the Mississippi River Corridor. A prior panel I talked about, after our formal hearings are over, all way from the Red River, all the way down to the Port of New Orleans, having members come in on a bipartisan basis and talk about what is happening in that major bowl of our country in terms of water flows, and maybe we can get the Corps to join us for that, so we get a systemic understanding of what is actually going to be required over the next several decades——

Mr. DAVIS. We would love to be back for that, Madam Chairwoman.

Ms. KAPTUR. Thank you. Congressman Simpson, any comments, or questions?

Mr. SIMPSON. I don't have any questions. I think I just received my marching orders.

Ms. KAPTUR. Congressman Fleischmann.

Mr. FLEISCHMANN. I think the chairman and ranking member are absolutely correct. We are hearing a consistent theme on Yucca, and we have heard that. And Congressman Davis, thank you for your avocation, represents the University of Illinois, and Champaign-Urbana, one of my alma maters. So, thank you, sir.

And to Ranking Member Granger, thank you for your service, as ranking member on the full committee, it is the first time I think in our history, that the full committee chair, and the ranking member are both women, and I think that just speaks great volumes to where we have come in this country. So, thank you.

Mr. DAVIS. Thank you.

Ms. KAPTUR. Thank you for noticing that, Congressman Fleischmann. When I first arrived in Congress there were only two women on the Appropriations Committee, no clerk was a female. It was a very different era, and so we have actually lived the history, and transformed the history for the sake of the country. And it will be a good thing. History will attest to that.

Congressman Davis, I wondered if you have, on the issue of the Mississippi, do you have any additional visual materials you could provide to the record on how your district is connected to the entire chain, the spine of the flow.

Mr. DAVIS. Absolutely, I will. And I came here specifically to talk about Yucca Mountain because of the efforts of my colleague, and again, my former boss for 16 years, Congressman John Shimkus, I would be glad to provide you with some updates of our requests for funding for the NESP Program.

I am very happy that the administration has allowed dollars to flow into the La Grange Lock and Dam on the Illinois River, to begin major rehab that will start the process of rehab in the Locks

and Dams up along the Illinois, Mississippi Rivers that are so crucial to our farmers and to our manufacturers.

But I will get you documentation, and I appreciate the offer, Madam Chairwoman.

Ms. KAPTUR. It is a piece of a bigger puzzle.

Mr. DAVIS. Absolutely it is. And I look forward to working with the subcommittee and this committee on getting that puzzle put together.

Ms. KAPTUR. Thank you very much. I also appreciate in your testimony, you talk about Illinois having the most nuclear reactors and the most spent fuel in the country. I take it there is no depository in Illinois that could take that.

Mr. DAVIS. There is not, and I don't think geologically, we could do that, but they are all sitting there right now, which is obviously in my opinion, a national security threat in our own backyard.

[The information follows:]

Rep. Rodney Davis Yucca Testimony

Thank you, Madam Chair, and Members of the Energy and Water Subcommittee for allowing me the opportunity to testify before you today. As you may know, I am here in support of funding levels in the President's Budget request for nuclear waste disposal. This request includes $116 million for nuclear waste disposal. Specifically $38.5 million in the Nuclear Regulatory Commission's Nuclear Materials and Waste Safety Program for related activities at Yucca Mountain.

I represent the 13th Congressional District of Illinois, which is home to the Clinton Power Station, one of eleven nuclear reactors in Illinois – the most in any state. These reactors generate approximately 53 percent of our states electricity, and 89 percent of the state's emissions free electricity. Roughly 5,900 people are employed as a result. These sites are also home to over 10,000 metric tons of spent nuclear fuel, which is also the most in any state. That is why this issue is important to me.

In 1982, Congress enacted the Nuclear Waste Policy Act (NWPA), which established the Office of Civilian Radioactive Waste Management within the Department of Energy. This entrusted them with the responsibility of developing a deep

geologic repository for disposing spent nuclear fuel and high-level radioactive waste. The Act also included a funding mechanism where ratepayers who received electricity generated by nuclear power paid into a fund for the disposal of spent nuclear fuel.

Over the past 36 years, ratepayers have paid over $40 billion into this fund. Despite the Act requiring DOE to begin moving spent nuclear fuel by January 31st, 1998, it has yet to be moved. DOE's failure to take custody of commercially spent nuclear fuel at the 1998 deadline has resulted in the federal government paying the industry over $8 billion in damages. Projected future liabilities are estimated at roughly $30 billion.

In 1987, the Act was amended to restrict DOE's repository studies to Yucca Mountain in Nevada. DOE confirmed the science behind this decision in 1994, and in 2002 Congress and then President George W. Bush approved Yucca Mountain as the nation's designated nuclear repository once again. In 2008 DOE filed their licensing application for Yucca Mountain with the Nuclear Regulatory Commission, however the Obama administration later stopped the application process and DOE

closed the site to fulfill a campaign promise to then Senate Majority Leader Harry Reid.

This should not be a partisan issue. If you look at the numerous votes we have taken in the House over the years it is not. In the previous Congress we voted 340-72, to advance the Nuclear Waste Policy Amendments Act of 2018, which was introduced by my good friend and colleague Congressman John Shimkus of Illinois. If enacted, this legislation would have moved forward with both permanent and interim storage, and fulfilled the promise Congress made to our communities over 30 years ago.

Currently there is over 70,000 metric tons of spent nuclear fuel stored at 121 locations across 39 states. Roughly a quarter of this waste is stored in dry casks, and the rest sits in wet pools, like at Japan's Fukushima site. It sits in Republican districts and Democrat districts. Unless we finally act to restart the project at Yucca Mountain, the issue will remain there indefinitely. I urge you to support the funding levels in the President's budget request for $116 million for nuclear waste disposal, and $38.5

million to restart the licensing process with the Nuclear Regulatory Commission.

Ms. KAPTUR. All right. And I wanted to move to the ranking member of the full committee, Congresswoman Granger. When you talked about Fort Worth and what is happening with the Central City Project. Could you describe to us, and for those that don't know that project in detail, what actually is happening in the ecosystem at Fort Worth?

Ms. GRANGER. It is a flood control issue, because the Corps of Engineers came in 40 years ago in Fort Worth there was a massive flood. And went to the third storey of most of the buildings there, and they came in and did some wonderful work with levees, but now that we have outgrown that, because there is such enormous growth in Fort Worth, so we have a project to widen and deepen that river, and take care of that flood control.

It has been authorized for the Congress, it has been authorized by two Presidents, and it has been funded up until the last 2 years. And we will make sure there is enough to finish that project. It is a half—it is 50 percent paid by the city and the State, and 50 percent by the Federal Government.

Ms. KAPTUR. As the rains come, do you have increasing rainfall?

Ms. GRANGER. Absolutely.

Ms. KAPTUR. All right. So, there is no—it would be great if you would provide some mapping material for our members to review on exactly with population growth, what is happening with demographics and water, water runoff.

Ms. GRANGER. All right.

Ms. KAPTUR. Some of us have heard rumors, you know, that the communities in Texas don't have zoning. Maybe that was only Houston, I don't know. But I think it is important for us to understand some of the scope of what is happening around the country, as we meet with the Corps and work with them on ideas for handling water runoff in a more sophisticated manner.

I am not disagreeing with your project. I am just saying it would be great to have a greater understanding of what is happening in Fort Worth, if you can provide it.

Ms. GRANGER. When I was at Fort Worth it had at 370,000 people, and it now has 800,000 people.

Ms. KAPTUR. Thank you, both, so very much for appearing today.

Ms. GRANGER. Thank you.

Ms. KAPTUR. Okay. The next panel, we will call Congressman Jeff Duncan of South Carolina, and Congressman Joe Wilson of South California.

Mr. WILSON. I was here. I am looking forward to being with both of you.

Ms. KAPTUR. We thank you so very much for appearing this morning. We have several members who wish to testify, and we are asking members if they could stay within the 5-minute rule, we would greatly appreciate that.

Congressman Duncan was here first, so we are going to call on him, and then Congressman Wilson, you will be second on this panel. Thank you so very much for coming today. Congressman Duncan.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. JEFF DUNCAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF SOUTH CAROLINA

Mr. DUNCAN. Thank you, Madam Chairwoman. I am here today to speak in support of the funding levels in President Trump's budget request for nuclear waste disposal. As you begin to work on the Fiscal 2020 Energy and Water Development Appropriations Bill, I urge you to support the President's budget request of $116 million for nuclear waste disposal, specifically the $38.5 million in the Nuclear Regulatory Commission's Nuclear Materials and Waste Safety Program for related activities at Yucca Mountain.

I am, and I will continue to be an advocate for nuclear energy. When we generate electricity from nuclear power, we also create waste. Not only do we need a national solution to this problem, we have one, a permanent geologic repository in Nevada known as Yucca Mountain.

Congress has already established a comprehensive nuclear waste management strategy over 35 years ago when we enacted the Nuclear Waste Policy Act. This assigned the responsibility of permanently disposing spent nuclear fuel to the Department of Energy. It also established a fee-for-service funding model in which fees assessed for electricity generated by nuclear power are paid to the federal government to finance a disposal program.

Because the Department of Energy and the Federal Government have defaulted on their contractual obligation, ratepayers across the United States, notice I said, ratepayers across the United States, have paid around $40 billion in fees for the construction, and operation of a permanent nuclear waste repository.

Federal law required the Department of Energy to begin disposing of nuclear waste by 1998. Clearly the Federal Government has aggressively failed to meet this contractual deadline by over 20 years, unnecessarily costing Americans billions of dollars.

In addition to what ratepayers have paid, taxpayers have paid nearly $7 billion in legal damages. In fiscal year 2017 alone, taxpayers paid nearly $732 million, which breaks down to about $2 million a day in damages.

And for what? Given our rising $22 trillion debt, it is important to remain cognizant of what else this money could be funding. Despite the billions of American ratepayers have paid, American taxpayers are liable for nearly $30 billion in payments to manage the spent nuclear fuel that sits in 121 communities across 39 states.

Appropriating funding to restart the program is the first step towards reducing and ultimately eliminating these escalating costs. It is time the Federal Government stop kicking the can down the road. Doing this for 40 years has resulted in about 80,000 tons of commercial and non-defense spent nuclear fuel, and 14,000 tons of defense waste currently scattered in temporary storage sites in over 100 different sites.

Most of these commercial spent nuclear fuel storage sites are near large population centers and large bodies of water. Over 161 million Americans live within 75 miles of these facilities.

The issue of nuclear waste is one of particular interest to my constituents and South Carolina as a whole. Nuclear energy generates over 58 percent of our state's electricity. South Carolina is home to 7 nuclear reactors at 4 locations. These sites in South Carolina store 4,798 metric tons of used nuclear fuel as of 2017.

In addition, just outside my district, the Department of Energy's Savannah River Site site stores approximately 8,000 tons of vitrified nuclear waste, along with 35 million gallons of high-level liquid waste.

There are over 4,000 canisters filled with vitrified glass waste sitting at the Savannah River Site ready to ship to Yucca Mountain.

They started this mission over 20 years ago and have since been waiting for us to license a permanent repository. Until Yucca Mountain is licensed, the Savannah River Site will continue to be the custodians of the waste, which was never the intended purpose of the site.

In addition to the waste still sitting in my state, through September of 2016, South Carolina ratepayers have contributed, including interest, approximately $3.1 billion to the Department of Energy's Nuclear Waste Fund, to permanently dispose of this used nuclear fuel at Yucca Mountain. This is the third most of any state.

I would also like to take a moment to express my strong support for the Department of Energy's funding request at the Savannah River Site, specifically funding for both the H–Canyon facility and the proposed Savannah River Plutonium Processing Facility.

H–Canyon is the Nation's only remaining production scale facility capable of processing nuclear materials for reuse or proper disposition.

In the interest of time, I will skip down and say I was extremely supportive of the President's 2017 initial step, to request funding to restart the Yucca Mountain Project, and it has been overwhelmingly proven that Yucca Mountain will protect the people and the environment for thousands of generations.

The natural features of the mountain, geology, climate, distance above water table, and isolation, make it a perfect place for the repository. I have been there myself. I have seen first-hand how suitable the site is. It is a geologically perfect location. We need to restart this.

And I urge the committee to support the President's request. And with that, I yield back.

[The information follows:]

House Committee on Appropriations
Subcommittee on Energy and Water
FY2020- **Rep. Jeff Duncan (SC-03)**
Testimony for the Record

Mr. Chairman, I am here today to speak in support of the funding levels in President Trump's budget request for nuclear waste disposal. As you begin to work on the Fiscal Year 2020 Energy and Water Development Appropriations bill, I urge you to support the President's budget request of $116 million for nuclear waste disposal, specifically the $38.5 million in the Nuclear Regulatory Commission's Nuclear Materials and Waste Safety Program for related activities at Yucca Mountain.

I am and will continue to be an advocate for nuclear energy. When we generate electricity from nuclear power, we also create waste. Not only do we need a national solution to this problem, we have one – a permanent geologic repository in Nevada: Yucca Mountain. Congress has already established a comprehensive nuclear waste management strategy over 35 years ago when we enacted the Nuclear Waste Policy Act (NWPA). This assigned the responsibility of permanently disposing spent nuclear fuel (SNF) to the Department of Energy (DOE). It also established a "fee-for-service" funding model in which fees assessed for electricity generated by nuclear power are paid to the federal government to finance a disposal program.

Because the Department of Energy (DOE) and the federal government have defaulted on their contractual obligation, ratepayers across the United States have paid around $40 billion in fees for the construction and operation of a permanent nuclear waste repository. Federal law required the Department of Energy (DOE) to begin disposing of nuclear waste by 1998. Clearly the federal government has aggressively failed to meet this contractual deadline by over 20 years, unnecessarily costing Americans billions of dollars. In addition to what ratepayers have paid, taxpayers have paid nearly $7 billion in legal damages. In Fiscal Year 2017 alone, taxpayers paid nearly $732 million, which breaks down to about $2 million per day in damages.

And for what? Given our rising $22 trillion dollar debt, it is important to remain cognizant of what else this money could be funding.

Despite the billions American ratepayers have paid, American taxpayers are liable for nearly $30 billion in payments to manage the spent nuclear fuel in 121 communities across 39 states. Appropriating funding to restart the program is the first step towards reducing and ultimately eliminating these escalating costs. It is time the federal government stop kicking the can down the road. Doing this for 40 years has resulted in about 80,000 tons of commercial spent nuclear fuel and 14,000 tons of defense waste currently scattered in temporary storage over 100 sites. Most of these commercial spent nuclear fuel storage sites are near large population centers and large bodies of water. Over 161 million Americans live within 75 miles of these facilities.

The issue of nuclear waste is one of particular interest to my constituents and South Carolina as a whole. Nuclear energy generates over 58 percent of our state's electricity. South Carolina is home to 7 nuclear reactors at 4 locations. These sites in South Carolina store 4,798 metric tons of used nuclear fuel as of 2017. In addition, just outside my district, the Department of Energy's Savannah River Site (SRS) stores approximately 8,000 tons of vitrified nuclear waste, along with 35 million gallons of high-level liquid waste. There are over 4,000 canisters filled with vitrified glass waste sitting at the Savannah River Site ready to ship to Yucca Mountain. They started this mission over 20 years ago and have since been waiting for us to license a permanent repository. Until Yucca Mountain is licensed, the Savannah River Site will continue to be the custodians of the waste, which was never the intended purpose of the site. In addition to the waste still sitting in my state, through September of 2016, South Carolina ratepayers have contributed, including interest, approximately $3.1 billion dollars to the

Department of Energy's Nuclear Waste Fund to permanently dispose of this used nuclear fuel at Yucca Mountain. This is the third most of any state.

I would also like to take a moment to express my strong support for the Department of Energy's funding request for the Savannah River Site – and specifically funding for both the H-Canyon facility and the proposed Savannah River Plutonium Processing Facility. H-Canyon is the nation's only remaining production scale facility capable of processing nuclear materials for reuse or proper disposition. Additional funding for H-Canyon will allow the facility to continue to reduce the proliferation risks of nuclear materials in storage throughout the world. H-Canyon also supports environmental cleanup and nonproliferation efforts needed for a more secure and less expensive nuclear weapons complex. I also ask the Committee to support the Department of Energy's funding request for the proposed Savannah River Plutonium Processing Facility. For more than 60 years, Savannah River has helped build and maintain the US nuclear stockpile, including ongoing tritium operations at the site. I believe the Savannah River Site has the workforce, the technical capability, and the experience needed to re-build an enduring plutonium pit manufacturing capability.

I was extremely supportive in 2017 when President Trump took the initial step to request funding to resume the Yucca Mountain project. It has been overwhelmingly proved that Yucca Mountain will protect the people and the environment for thousands of generations. The natural features of the mountain (*geology, climate, distance above water table, and isolation)* make it the perfect place for the repository. I have been there myself and I have seen firsthand how suitable the site is; it is a perfect geologically location. The license application has resulted from more than two decades of expert scientific research and engineering by the Department of Energy and

its contractors, their national laboratories, the U, S. Geological Survey, and many colleges and universities. Storing spent nuclear fuel at Yucca is overwhelmingly safer than having it scattered across communities in the United States.

It is truly astounding we have allowed billions of dollars to go to the operation and construction of this site without a single ton of nuclear waste transferred there. It is time we hold the federal government accountable to the law of the land. Congress in a bipartisan fashion has funded the Yucca Mountain project for a generation and I have worked with numerous colleagues on the other side of the aisle to get this done. I urge the committee to support the President's proposed budget for nuclear waste disposal at Yucca Mountain. It is long overdue that we reform our nation's nuclear waste policy and utilize Yucca Mountain for its intended purpose: a permanent geologic repository.

Ms. KAPTUR. Thank you very much, Congressman Duncan. Congressman Wilson.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. JOE WILSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF SOUTH CAROLINA

Mr. WILSON. And thank you, Madam Chairwoman. And thank you, Ranking Member Simpson. We appreciate your leadership on the subcommittee. I am here today representing the Second District of South Carolina, the home of the Savannah River Site.

The Savanna River Site was constructed in the early 1950s to support our national defense programs during the Cold War. The site maintains that responsibility 70 years later with victory in the Cold War.

According to the Nuclear Posture Review, it is critical that the United States produces 80 pits per year by 2030 to ensure defense readiness. Since the cancellation of the Mixed Oxide Fuel Fabrication facility last October, the NNSA has recommended repurposing the MOX facility for pit production to satisfy 80 pits per year goal.

With the facility already being 70 percent complete, the site is the most viable option for a two-site solution and I request the committee support full funding of critical weapons activities.

With the closure of MOX, South Carolina was left with the storage of weapons grade plutonium that was originally going to be processed through the MOX facility for commercial fuel use.

I support the request of the President for $79 million for the Surplus Plutonium Disposition Project to support the dilute and dispose strategy to remove the plutonium from the site.

Additionally, I support the President's budget request for Yucca Mountain to ensure the country has a safe and permanent repository for management of nuclear waste.

The site is also home to H–Canyon, the only hardened nuclear chemical separations plant still in operation in the United States. Unfortunately, H–Canyon has been under-funded both this year and in previous years, with approximately 240 metric tons of LEU yet to be processed through H–Canyon, I am requesting an additional $50 million to the President's budget request to accelerate the operations of this vital asset.

I also support the President's budget request for the full funding of the Radioactive Liquid Tank Waste Stabilization and Disposition Account and urge the committee to do the same.

With the site spanning over 300 square miles, it is important that the community is adequately served by the Federal Government.

In the President's budget the payment in lieu of taxes was removed from receiving funding under community and regulatory support. And I ask that the committee reinstate the $6.5 million, to ensure the local schools and emergency services are adequately served.

While it may be interpreted that the site is getting a significant increase in funding, a large portion is due to an increase in pension

payments. It is projected that pensions will require an additional $28.6 million from FY 19 and up to an approximate $98 million over the next 5 years, with the pensions only being funded at about 80 percent. Lack of appropriate funding for pension payments will result in discontinuity in operations and potential layoffs due to funding being sourced from the Risk Management Operations Account.

A final community-related area of importance is the Advanced Manufacturing Collaborative facility. The AMC will be an innovation hub that will not only allow experts in emerging technologies to collaborate with industry, academia, and government to improve manufacturing, but also assist the DOE complex by accelerating technology development for the cleanup mission.

I am grateful that the President requested funding for the design and construction of this facility, and I encourage the committee to support this private-public partnership, specifically for location at the USC Aiken Campus.

Additionally, I strongly support the President's full funding request of over $138 million for the completion of the Charleston Harbor Deepening Project.

In 2017, the South Carolina Ports Authority signed a Project Partnership Agreement with the Army Corps of Engineers, which allows for the use of advanced funds from the SC Ports Authority for the federal share in addition to the non-federal share of the construction costs.

Responsible, collaborative infrastructure investments like the Port of Charleston are in the best interest of American taxpayers, creating jobs. The Port of Charleston contributes $53 billion in annual economic impact to the state of South Carolina, and is a key economic driver for the region.

In direct testament to the competitiveness of this project, the U.S. Corps of Engineers recently found the recalculated cost-benefit ratio of the project to be over 6 to 1.

I urge you to provide the full funding in the Army Corps of Engineers Civil Works construction funding for the Charleston Harbor Deepening Project.

And I am grateful to speak with you in support of this positive infrastructure investment. Thank you both for your time.

[The information follows:]

Energy and Water Subcommittee Testimony

Rep. Joe Wilson (SC-02)

Chairwoman Marcy Kaptur and Ranking Member Mike Simpson:

Thank you for your leadership on the subcommittee. I am here today representing the Second District of South Carolina, the home of the Savannah River Site.

The Savannah River Site was constructed during the early 1950s to support our national defense programs during the Cold War. The site maintains that responsibility almost 70 years later.

According to the Nuclear Posture Review, it is critical that the United States produces 80 pits per year by 2030 to ensure defense readiness. Since the cancellation of the Mixed Oxide Fuel Fabrication facility (MOX) last October, the NNSA has recommended repurposing the MOX facility for pit production to satisfy the 80 pits per year goal. With the facility already being 70 percent complete, the site is the most viable option for a two-site solution and I request the committee support full funding of critical weapons activities.

With the closure of MOX, South Carolina was left with the storage of weapons grade plutonium that was originally going to be processed through the MOX facility for commercial fuel use. I support the request of the President for $79 million for the Surplus Plutonium Disposition project to support the dilute and dispose strategy to remove the plutonium from the site. Additionally, I support the President's budget request for Yucca Mountain to ensure the country has a safe and permanent repository for management of nuclear waste.

The site is also home to H-Canyon, the only hardened nuclear chemical separations plant still in operation in the United States. Unfortunately, H-Canyon has been underfunded both this year

and in previous years. With approximately 240 metric tons of LEU yet to be processed through the H-Canyon, I am requesting an additional $50 million to the President's budget request to accelerate the operations of this vital asset. I also support the President's budget request for the full funding of the Radioactive Liquid Tank Waste Stabilization and Disposition account and urge the committee to do the same.

With the site spanning over 300 square miles, it is important that the community is adequately served by the federal government. In the President's budget the payment in lieu of taxes was removed from receiving funding under community and regulatory support and I ask that the committee reinstate the $6.5 million to ensure the local schools and emergency services are adequately served.

While it may be interpreted that the site is getting a significant increase in funding, a large portion is due to an increase in pension payments. It is projected that pensions will require an additional $28.6 million from FY19 and up to an approximate $98 million increase over the next 5 years, with the pensions only being funded at or around 80 percent. Lack of appropriate funding for pension payments will result in discontinuity in operations and potential layoffs due to funding being sourced from the Risk Management Operations account.

A final community-related area of importance is the Advanced Manufacturing Collaborative (AMC) facility. The AMC will be an innovation hub that will not only allow experts in emerging technologies to collaborate with industry, academia, and government to improve manufacturing, but also assist the DoE complex by accelerating technology development for the cleanup mission. I am grateful that the President requested funding for the design and construction of this facility and I encourage the committee to support this private-public partnership, specifically for location at the USC Aiken campus.

Additionally, I strongly support the President's full funding request of over $138 million for the completion of the Charleston Harbor Deepening Project. In 2017, the South Carolina Ports Authority signed a Project Partnership Agreement with the Army Corps of Engineers, which allows for the use of advanced funds from the SC Ports Authority for the federal share in addition to the non-federal share of the construction costs. Responsible, collaborative infrastructure investments like the Port of Charleston are in the best interest of American taxpayers and our growing economy. The Port of Charleston contributes $53 billion in annual economic impact to the state of South Carolina and is a key economic driver for the region. In direct testament to the competitiveness of this project, the U.S. Army Corps of Engineers recently found the recalculated Benefit-Cost Ratio of the project to be over 6:1. I urge you to provide the full funding in the Army Corps of Engineers Civil Works construction funding for the Charleston Harbor Deepening Project and I am grateful to speak with you in support of this positive infrastructure investment.

Thank you for your time.

Ms. KAPTUR. Thank you both for appearing this morning. Quickly, could I ask you, Congressman Wilson, and both of you represent really important elements of our Nation's security, and economic activity.

Mr. WILSON. Yes.

Ms. KAPTUR. Based on the regions you represent, the districts you represent, have you seen any changes in the ecosystem that impact either your port, in this future, or any of the energy sites that you referenced? South Carolina has taken a battering at least on the coast, but I am just curious, over the last several years, the changes you see. I take it you are both Native South Carolinians. Right?

Mr. WILSON. Yes. Yes.

Ms. KAPTUR. What changes do you see occurring there that we might need to know about as a subcommittee?

Mr. WILSON. We are both inland districts, and so other changes that may be occurring on the Coast would not impact substantially. And we have recurring droughts, recurring high levels of rain, and we have had significant rainfall to the point of a thousand-year flood, so this all is of concern to everyone.

Ms. KAPTUR. But not entirely——

Mr. DUNCAN. Joe hit on the environmental impacts of El Nino, and just in the natural cycle, but if we focus on the idea of climate change, one thing that we can lower our carbon footprint as a nation, is use more nuclear power. But the downside of that is as we create more nuclear waste when we do that.

And there are two reactors in two different plants in your home state of Ohio that currently have 1,387 metric tons of spent waste sitting on the shores of Lake Erie.

In my district we have it sitting on the shores of Lake Keowee, it is a man-made reservoir. We also have it sitting on the Broad River in South Carolina.

So, it concerns me that we are not doing enough—and chosen, and selected, and is the law of the land as a repository for both defense and non-defense waste. And so as we try to balance our efforts on climate change, we also should try to balance a long-term repository for the waste that sits in your State and 121 different sites around the country.

Ms. KAPTUR. Thank you very much. Congressman Simpson.

Mr. SIMPSON. Don't have any questions. Thank you for being here, appreciate your testimony. And you didn't mention that the Savannah River site is where the location of the first cloverleaf on an interstate was built. It is an historical thing.

Mr. DUNCAN. We have somebody that knows that.

Ms. KAPTUR. How did you know that?

Mr. SIMPSON. Because I went there.

Mr. DUNCAN. And we appreciate you visiting. And South Carolina is very grateful for many positive firsts.

Ms. KAPTUR. Congressman Fleischmann.

Mr. FLEISCHMANN. I just wish to thank both my distinguished colleagues and friends from South Carolina. I support your initiatives, and I thank you for appearing before us today.

Ms. KAPTUR. Thank you both very much. I am going to call now Congressman Buddy Carter of Georgia and Congressman Jerry

McNerney of California. Thank you gentlemen for waiting. Oh, I'm sorry, they are here. Calling Congressman Mike Johnson of Louisiana. We are trying to call in order of appearance. Congressman Carter, why don't we begin with you on this panel, you appeared first. And then Congressman Johnson.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. EARL L. "BUDDY" CARTER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF GEORGIA

Mr. CARTER. Well thank you, Madam Chair. And thank all of the Members for entertaining us today, we appreciate the opportunity to speak before you.

And I want to share my concerns. I have the honor and privilege of representing the First Congressional District of Georgia. The First Congressional District of Georgia includes the entire coast of Georgia, over 100 miles of coastline. Starts up in the State line of South Carolina and goes all the way down to Florida. We have a lot of natural resources, as you can imagine, and a lot of history in our district as well.

One of the things that we are most proud of is that we are home to two major seaports. The Port of Savannah, the second largest container port on the Atlantic Seaboard, the fourth busiest in the United States. And, I might add, one of the fastest growing ports in the world. Only two ports in China are growing faster than the Port of Savannah.

Also we have the Port of Brunswick. The Port of Brunswick is the No. 2 roll-on/roll-off port in the country. They have really found their niche there with cars and trucks that are going in and out of that port.

Currently we are expanding our, I should say deepening the Savannah Harbor. The Savannah Harbor Expansion Project carries us from 42 feet depth to 47 foot depth. And it allows us to accommodate the post-Panamax ships that are now calling on these ports. It is extremely important. This project has received $130 million this year in the fiscal year, from the President. This will help us in finishing this project. We need one more year. If we can get one more year after this then we should be able to finish this project in 2020 or 2021 at the latest.

I would ask for your help and your approval of that funding request by the President of $130 million this year. That will keep us on schedule with that.

The economic benefit, I might add, of that project is one of the highest in ratio of any project in the country, with a return for every dollar that we spend, we get a return of $7.50. Who wouldn't take that kind of input?

Also I would be remiss if I didn't mention the Harbor Maintenance Trust Fund. As you can imagine, with two major ports it is very important that we maintain those ports and that we keep the United States competitive in a global stage. Without the Harbor Maintenance Trust Fund and without it being funded, we are defi-

nitely going to be in trouble. So that is extremely important, I would ask for that as well.

Also on the coast we have weather-related impacts on our district, as you can imagine. We had two major hurricanes in an 11-month period, which really impacted our district. And this is very important that the Corps of Engineers be funded properly so that they can help us in mitigating this.

I have submitted a language request that appropriate levels of funding be allocated within the dredging operation environmental research account to help maintain the progress that we have made.

Also in Georgia nuclear power plays a large role in our Nation's power portfolio, but especially in Georgia. Currently we are the only State and the only place where we have two major nuclear reactors under construction at Plant Vogtle. This is extremely important. And because of that we need to find a safe long-term solution for the storage of nuclear waste. That's why I submitted a request that will help us to move one step further to the construction and use of Yucca Mountain. That's very important.

Finally, I have submitted a request for both inland waterways and short protection accounts. As you can imagine, a district with over 100 miles of coastline and an ample stretch of intercostal waterway, it is imperative that we pay attention to these areas in the country, such as the Barrier Islands of Georgia. They are very, very important. Funding for those efforts will help ensure storm resistant and weather resistant communities of the future, and that is extremely important.

Again, Madam Chair and Members, I want to thank you for giving me the opportunity to testify today and thank you for your work in this area. It is extremely important, particularly to us on the coast.

[The information follows:]

Members' Day Testimony (E&W) - Rep. Earl L. 'Buddy' Carter (1st District of Georgia)

Thank you for this opportunity to share my concerns and priorities for the First Congressional District of Georgia. It's an honor to represent a district rich in history and so many natural resources. As the representative for the entire coast of Georgia, I am able to travel from South Carolina to Florida to see how the needs of our communities intersect with the issues of the Energy & Water Subcommittee.

One of the focal points of our district and region's growth is centered on the Ports of Savannah and Brunswick. Whether it's container units out of Savannah or roll-on/roll-off cargo out of Brunswick, our region has benefited from the continued development of those ports and the accompanying infrastructure developments. The Port of Savannah us currently undergoing one of the largest deepening projects in the nation. This deepening, which is also one of the most exhaustively studied projects in the country, will allow for the largest ships in the world to call on the port with more cargo, creating efficiencies and leading to higher amounts of growth and revenue. Once that project is completed, it will yield nearly $232M in annual economic benefits. As an example of its importance, the entire Georgia delegation once again came together this year to support the President's budget request of $130M, the most significant request to date. That is

why I ask this committee to support that funding request and to help keep this vital project on track and on time.

In a similar vein, I joined a number of my colleagues in supporting robust funding for the Harbor Maintenance Trust Fund. As the fund dedicated to keep our harbors and ports maintained, it is critical that this program be able to allocate ample amounts of funds to the ports that need it. With two major ports, I know all too well the importance of keeping those maintained and how that keeps the United States competitive in a global stage. For that reason, I request support for those funds.

As we look to options to address weather-related impacts on our districts, the Corps of Engineers is already deeply engaged in nature-based alternatives. They are working on innovative projects around the country that utilized natural sources for infrastructure that helps our communities, especially coastal ones such as those found in my district. For that reason, I have submitted a language request that appropriate levels of funding be allocated within the Dredging Operation Environmental Research account to help maintain that progress and to help our nation search for affordable and reliable solutions.

Nuclear power plays a large role in our nation's power portfolio, but especially in Georgia with the only two units under construction in the country.

With the recent milestones at Plant Voglte, it's clear that nuclear energy should be a source in which we heavily utilize. However, we need to find a safe, long-term solution for the storage of nuclear waste. That is why I submitted a request that will help us to move one step further to the construction and use of Yucca Mountain.

Finally, I have submitted requests for both inland waterways and shore protection accounts. As a district that has over 100 miles of coastline and an ample stretch of the Intracoastal Waterway, it is imperative that proper attention be paid to areas of the country, such as the barrier islands of Georgia. Funding for those efforts will help ensure storm-resistant and weather-resistant communities of the future, ensuring long-term cost savings.

I thank the committee for their work on these issues and for the opportunity to testify today. Thank you for your attention to these matters and please don't hesitate to reach out to my office with any questions.

Ms. KAPTUR. Thank you very much, Congressman Carter. We will move to Congressman Johnson. I just want to say we will not have questions in this period in deference to Congressman Scalise who has a drop dead deadline here very shortly. So please proceed.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. MIKE JOHNSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF LOUISIANA

Mr. JOHNSON. I do my best to give deference to my colleague from Louisiana, Whip Scalise. I'll speak quickly and I'll make it brief.

Chairwoman Kaptur, Ranking Member Simpson, all of our colleagues on the Subcommittee, greatly appreciate the opportunity to testify before you today.

I am here to express to you just simply the importance of developing and maintaining the Nation's water infrastructure needs, particularly as they relate to my district in Northwest Louisiana.

As such I respectfully request the Committee prioritize funding for the Army Corps of Engineers Civil Works Division for operations in maintenance and for their general construction needs.

Our inland waterways provide tremendous flood management and navigation benefits. And they provide critical jobs to support our Nation's maritime economy. Some of the biggest challenges and opportunities in my district revolve around port infrastructure and further development of the navigation of our rivers.

My district is home to four shallow draft port authorities that serve 485 miles of navigable waterways and shallow draft river miles. The J. Bennett Johnston Waterway is a commercially navigable portion of the Red River. It is by far the most robust waterway in our district. And it supports economic development through both recreation and shipping.

The last time I testified before you I discussed our experience with the catastrophic flooding event that we experienced on the Red River in 2015. Homes, businesses, agricultural lands, critical infrastructure were severely damaged and destroyed. Four years later we are still coping with finding resources to repair our navigation structures. And a lack of investment in the waterway poses threats to the maintenance to the channel.

Interestingly, recent severe flood threats from the Red River have been triggered by relatively lower volumes of water flooding through the channels. In essence, we are experiencing worse flooding from less water.

The Army Corps has initiated a sedimentation study to determine the reasons for this discrepancy, and a preliminary report is expected this summer. The Army Corps hasn't yet released their findings, but we believe, many experts believe, that sediment buildup is the primary driver of the increase in the severity of our flood events.

To fight this problem we need robust funding under the Army Corps Operations and Maintenance Account to perform dredging of the channel. This will preserve the River's navigability and it will

provide an additional buffer for flood relief as the channel will be capable of holding higher volumes of water. Of course that is a cost savings to the Federal Government, the State, and everyone involved.

Additionally, operations and maintenance funding will help restore dykes and revetments that have deteriorated from the floods we have experienced in 2015, 2016, and 2018. These are historic events.

Second, I respectfully request that the Committee appropriate robust funding for the Army Corps General Construction Account. The construction features at the J. Bennett Johnston Waterway, those features are only 93 percent complete at present, and the funds are needed to acquire mitigation lands so the Army Corps can bring the waterway up to the standards that were originally intended.

My understanding is that stakeholders have identified willing sellers of the required mitigation lands, and the Army Corps just needs funding to complete the transaction and move the project forward.

Ultimately this funding will create a more resilient waterway for our constituents and allow us to expand the economy of Northwest Louisiana and the broader region. Once the Army Corps is able to dredge the River and complete the construction features of the J. Bennett Johnston Waterway, we will be able to explore further developments, future developments that will have a greater regional impact, and will extend all the way to Texas and Arkansas.

In sum, I strongly urge the subcommittee to prioritize investments in our ports and waterways as you work your way through the fiscal year 20 appropriations process. And I stand ready to work with each of you in the administration to develop solutions that will enhance our water infrastructure system, and I am certainly grateful for the opportunity to testify before you on these issues. Thank you so much.

Ms. KAPTUR. You both have done a fine job in your testimony, and you have a Subcommittee that will grapple with your recommendations as we try to repair the budget for 2020 that was sent to us from the administration. We thank you for your appearance today.

Mr. JOHNSON. Thank you.

[The information follows:]

Testimony of Congressman Mike Johnson (LA-04)
Submitted to the Appropriations Subcommittee on Energy and Water Development
April 9, 2019

Thank you, Chairwoman Kaptur and Ranking Member Simpson and my colleagues on the subcommittee for the opportunity to testify before you today. I am here to express to you the importance of developing and maintaining the nation's water infrastructure needs, particularly as they relate to my district in Northwest Louisiana.

As such, I respectfully request the committee prioritize funding for the Army Corps of Engineers Civil Works Division for operations and maintenance and general construction. Our inland waterways provide tremendous flood management and navigation benefits, and they provide critical jobs to support our nation's maritime economy. Some of the biggest challenges and opportunities in my district revolve around port infrastructure and further development of the navigation of our rivers. My district is home to four shallow draft port authorities that service 485 miles of navigable waterways and shallow draft river miles.

The J. Bennett Johnston Waterway is a commercially navigable portion of the Red River, and it's by far the most robust waterway in my district. It supports economic development through both recreation and shipping.

The last time I testified before you, I discussed our experience with the catastrophic flooding from the Red River in 2015. Homes, businesses, agricultural lands, and critical infrastructure were severely damaged and destroyed. Four years later, we're still coping with finding resources to repair our navigation structures, and a lack of investment in the waterway poses threats to the maintenance of the channel.

Interestingly, recent severe flood threats from the river have been triggered by relatively lower volumes of water flowing through the channels. In essence, we're experiencing worse flooding from less water. The Army Corps has initiated a sedimentation study to determine the reasons for this discrepancy, and a preliminary report is expected this summer. While the Army Corps hasn't yet released their findings, many experts believe that sediment buildup is the primary driver of the increase in severity of our floods.

To fight this problem, we need robust funding under the Army Corps' operations and maintenance account to perform dredging of the channel. This will preserve the river's navigability and provide an additional buffer for flood relief, as the channel will be capable of holding higher volumes of water. Additionally, operations and maintenance funding will help restore dikes and revetments that have deteriorated from the floods we experienced in 2015, 2016, and 2018.

Second, I respectfully request that the committee appropriate robust funding for the Army Corps' general construction account. The construction features of the J. Bennett Johnston Waterway are only 93% complete, and funds are needed to acquire mitigation lands so that the Army Corps can bring the waterway up to the standards that were originally intended. My understanding is that stakeholders have identified willing sellers of the required mitigation lands, and the Army Corps just needs funding to complete the transaction and move the project forward.

Ultimately, this funding will create a more resilient waterway for my constituents and allow us to expand the economy of Northwest Louisiana. Once the Army Corps is able to dredge the river and complete the construction features of the J. Bennett Johnston Waterway,

we'll be able to explore future developments that will have a greater regional impact that will extend to Texas and Arkansas.

In sum, I strongly urge the Subcommittee to prioritize investments in our ports and waterways as you work your way through the FY20 appropriations process. I stand ready to work with each of you and the Administration to develop solutions that will enhance our water infrastructure system, and I am grateful for the opportunity to testify before you on these issues.

Ms. KAPTUR. Congressman Steve Scalise of Louisiana, and Congressman Pete Olson of Texas, please. Let us begin with Congressman Scalise. Thank you so very much, knowing your responsibilities for appearing before our subcommittee today.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. STEVE SCALISE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF LOUISIANA

Mr. SCALISE. Well thank you, Chairwoman Kaptur, and Ranking Member Simpson, for the opportunity to testify before the subcommittee on the importance of investing in Corps of Engineers projects and feasibility studies that primarily focus on protecting our communities from natural disasters, and strengthening our Nation's waterways.

Specifically I am here to talk about a few projects that are both in my district but also have a very large impact on America's national security and energy security infrastructure. This includes deepening the Mississippi River from 45 to 50 feet, as well as the St. Tammany Feasibility Study and the Morganza to the Gulf Hurricane and Storm Surge Protection Project.

Lastly, I am also here to express my support to the Subcommittee on investing in the safety and security of our nuclear waste repository, I know a few other Members have talked about, the importance of Yucca Mountain.

Louisiana is one of the top five energy producing states in the country and is home to the mouth of the Mississippi River. My district serves as a critical gateway to the world, moving 500 million tons of cargo in international trade. I am asking this subcommittee to consider providing necessary funding that gives the Corps of Engineers flexibility they need to invest in deepening the Lower Mississippi River from 45 to 50 feet. As you can imagine, when we saw the widening of the Panama Canal, it created a lot of opportunities to move larger vessels. The Corps was able to, through this Committee's work and the authorizing committee's work, to authorize an expansion from 45 to 50 feet of dredging. And by making that investment it would allow the larger vessels that are moving through the Panama Canal to be able to get access to our inland waterways. And of course with the mouth of the Mississippi River.

We knew back when Thomas Jefferson made that $15 million investment in 1803 to double the Nation's size, it was to get access to the Port of New Orleans through the Mississippi River. And that Port and that waterway, the Mississippi, is still the gateway to so many of our Nation's producers of a lot of our agricultural products and so many other products, that we are able to export. We could take even further advantage of the deepening of the Panama Canal by deepening to 50 feet on the Mississippi River.

Additionally, it provides dual benefit of rebuilding Louisiana's vanishing coastline. Because we have finally entered into a contract, both Louisiana and the Corps of Engineers now have an agreement that as they are dredging the Mississippi River in the past, that sediment used to be just dumped into the Gulf of Mexico

where you don't get any beneficial use. We are now able to use that sediment from dredging to rebuild Louisiana's vanishing coastline. So we lose about a football field of land every single hour in Louisiana. It is a major national crisis. In our State we have dedicated things like drilling, deep water drilling revenues to restoring our coast. The State's also put up large amounts of money. We dedicated what would probably amount to well over a billion dollars of the BP settlement from the Deep Water Horizon disaster. That money will go to rebuilding the coastland that has been eroding.

But the dredging of the Mississippi River also allows us the ability to take that sediment and use it to rebuild land and coastline, which also helps defend against future storms.

In recent years Louisiana has managed to secure long-awaited Corps project authorization that were held up due to bureaucratic red tape. But as Members of this Subcommittee, you all know that authorization is only the beginning of turning studies into reality.

In 2016 Congress authorized a new start feasibility study for St. Tammany Parish which would examine the need for hurricane, surge, flood, and shoreline protection projects in a vulnerable area of my district. While the Southern and Western Portions of Lake Pontchartrain have received funding for related projects, the North Shore of Lake Pontchartrain, which during Katrina saw storm surges ranging from 7 to 16 feet, destroyed thousands of homes and small businesses. And yet they have not seen a single Federal dollar dedicated to flood protection.

I ask this subcommittee to consider including necessary funds for new start studies so projects like the St. Tammany Parish Project can move forward.

In 2014, Congress reauthorized Morganza to the Gulf, our hurricane and storm protection reduction project located within my district of Terrebonne and La Farge Parishes. Unfortunately, this reauthorization came after nearly 20 years of studies that spent more than $70 million, all without the Corps of Engineers putting a single shovel in the ground. Any funding provided to this project should strengthen our community in Southeast Louisiana as well as the billions of dollars in economic activity that provide valuable energy resources to fuel this country.

It is also important to note that while this project has yet to receive any Federal funding, local and State funds have allowed $400 million to be invested in this project. So that's all local money that they have put up to help advance more gains in the Gulf.

I ask this subcommittee to consider providing the Corps of Engineers additional resources for construction projects like Morganza and the Gulf to be completed.

And lastly, I want to express my strong support for including robust funding for the Department of Energy and the Nuclear Regulatory Commission that gives them the ability to complete the licensing process for the Yucca Mountain Nuclear Waste Repository. I am glad that President Trump has included $116 million for the Department of Energy and $38.5 million for the NRC for this purpose. I urge this subcommittee to seriously consider and support this request. These funds would ensure that the State of Nevada and other stakeholders have an opportunity to participate in the licensing process and have their views heard. Our decades-long fail-

ure to move this project along costs the American taxpayers nearly $2 million a day. Reports show we have already spent $8 billion in taxpayer money because of needless delays and our inability to meet our legal obligations to the Nation's electric utilities. Failure to provide funding that secures spent nuclear fuel will only cause further financial hardship on the American taxpayer and uncertainty for rate payers, who in many parts of the country rely on nuclear energy, one of our most reliable sources of electric generation.

So in closing, I again want to thank the Subcommittee for the important work you are doing. And I know you are considering a lot of requests, and especially when you look at the Corps of Engineers and the role that they play all across this country in strengthening and securing our infrastructure needs. I appreciate the work that you do, and I would be happy to take any questions.

[The information follows:]

Congressman Steve Scalise (LA-1)
Member Day Testimony
House Committee on Appropriations
Subcommittee on Energy and Water Development

Thank you, Chairwoman Kaptur and Ranking Member Simpson, for allowing me to address this subcommittee on the importance of investing in Corps of Engineers projects and feasibility studies that primarily focus on protecting our communities from natural disasters and strengthening our nation's waterways. Specifically, I am here to advocate for projects that are primarily in my district but have a national impact on our economy and energy security. This includes: deepening the Mississippi River from 45-feet to 50-feet, the St. Tammany Parish feasibility study, and Morganza to the Gulf of Mexico hurricane and storm surge protection project. Lastly, I am here to express my support to this subcommittee on investing in the safety and security of our nuclear waste repository.

Louisiana is one of the top five energy producing states in the country and, as home to the mouth of the Mississippi River, my district serves as a critical gateway to the world moving 500 million tons of cargo in international trade. I am asking this subcommittee to consider providing necessary funding that gives the Corps of Engineers flexibility they need to invest in deepening the lower Mississippi River from 45-feet to 50-feet. Getting the Mississippi River to 50-feet ensures our country's ports and trading capacity remain competitive on the international market.

Additionally, deepening the Mississippi River provides a dual benefit of rebuilding Louisiana's vanishing coastline by using the disposed dredged material to create approximately 1,500 acres of new marsh land. It is more urgent than ever to ensure any investments in Louisiana help

protect and rebuild our wetlands, which provide a natural hurricane surge barrier from fierce storms.

In recent years, Louisiana has managed to secure long-awaited Corps project authorizations that were held-up due to bureaucratic red-tape. But as members of this subcommittee, you all know that authorization is only the beginning of turning studies into reality. In 2016, Congress authorized a new start feasibility study for St. Tammany Parish, which would examine the need for hurricane surge, flood, and shoreline protection projects in a vulnerable area of my district. While the southern and western portions of Lake Pontchartrain have received funding for related projects, the northshore of Lake Pontchartrain – which during Katrina saw storm surges ranging from seven to sixteen feet destroy thousands of homes and small businesses – has yet to see a single federal dollar dedicated to flood protection. I ask this subcommittee to consider including necessary funds for new start studies, so projects like these in St. Tammany Parish can move forward.

In the 2014 WRDA bill, Congress reauthorized Morganza to the Gulf, a hurricane and storm damage reduction project located within my district of Terrebonne and Lafourche Parishes. Unfortunately, this reauthorization came after nearly 20 years of studies and spending more than $70 million…all without the Corps of Engineers putting a single shovel in the ground. Any funding provided to this project would strengthen our community in southeast Louisiana as well as the billions of dollars in economic activity that provide valuable energy resources to fuel our country. It is also important to note that while this project has yet to receive any federal funding, local taxes and bonds have allowed $400 million to be invested in the project. I ask this

subcommittee to consider providing the Corps of Engineers additional resources for construction projects, like Morganza to the Gulf, to be completed.

Lastly, I want to express my strong support for including robust funding for the Department of Energy and the Nuclear Regulatory Commission (NRC) that gives them the ability to complete the licensing process for the Yucca Mountain nuclear waste repository. I'm glad President Trump included $116 million for the Department of Energy and $38.5 million for the NRC for this purpose. I urge this subcommittee seriously consider and support this request. These funds would ensure that the State of Nevada, and other stakeholders, have an opportunity to participate in the licensing process and have their views heard. Our decades-long failure to move this project along costs the American taxpayer nearly $2 million a day. Reports show we've already spent eight billion in taxpayer dollars because of needless delays and our inability to meet our legal obligations to the nation's electric utilities. Failure to provide funding that secures spent nuclear fuel will only cause further financial hardship on the American taxpayer and uncertainty for ratepayers, who in many parts of the country rely on nuclear energy, one of our most reliable sources of electricity generation.

In closing, I want to thank you all for considering these important priorities and for allowing me to come before your subcommittee to discuss issues that impact Louisiana's First Congressional District and our nation's economy.

Ms. KAPTUR. Thank you very much. Congressman Olson. Welcome.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. PETE OLSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. OLSON. Chairman Kaptur, GOP Leader Simpson, my de facto Congressman from Idaho. My wife and I own a place at Bays River Run right there on Wood River, haven't been there for about two years. That's the wife, that's the wife's side of the family.

Thank you so much for the chance to remind you how important the Houston Ship Channel is to all America, including Ohio, Idaho, and Texas 22.

The Houston Ship Channel is 52 miles long, from the buoy to the turn basin. Includes the Port of Galveston, the Port of Texas City, the Port of Houston, has two huge container ports, one at Barbour's Cut and one at Bayport. It has been two way traffic that provides access from the largest petro chemical complex in the world to America's allies and trading partners.

The Port of Houston has been the number one exporting port in America for over the last decade. And right now we are getting busier because of this Committee's efforts, all of our efforts to repeal the ban on crude oil exports. They're going crazy in the Port of Houston, going overseas. Also LNG exports, which are destroying the sway of OPEC and Russia on the global market.

All the Members here may recall what happened to gasoline prices in August of 2017, September of that year. In some parts of our country the prices spiked up about 25 cents per gallon. That's because Hurricane Harvey hit that large petrochemical complex with all our refineries on the target there. It was shut down for a few days.

We lost three feet of water depth. We had to go one way for about eight miles of parts of the ship channel. That's still in effect. That means we risk collisions and spills that didn't exist before Harvey.

I ask this Subcommittee to fully fund the Harbor Maintenance Trust Fund and put the highest priority on projects which have the biggest impact on our U.S. economy. We cannot afford to spend these precious tax dollars on lower priority projects.

Harvey hit Southeast Texas hard. August 25th. Two days later it turned around from San Antonio and hit us again. The whole world learned how the ordinary Texans did extraordinary things to recover from Hurricane Harvey. We were and are Houston Strong. We need to be Houston Stronger. Since Harvey came ashore, we have been working with the Corps of Engineers on measures to prevent future floods from hurricanes. We have made small progress, small amounts of money. We have got studies going on. We need your help. Our recovery has been way too slow. Harvey hit us almost two years ago, and right now, as I speak, we are 21 days away from the hurricane season of 2019 starting. These pleas

help to break through legal and obligatory walls hitting our building to stop flooding from another Harvey.

I would also like to talk about what happened during Hurricane Harvey, and how important it is to have a diversified energy policy. A coal plant had four plants go down during Hurricane Harvey. They were knocked offline. Also, right on site, four natural gas plants kept up and running, but the biggest power source through Hurricane Harvey was the South Texas Nuclear Project, in Bay City, Texas. She was hit directly by the bad side of Harvey, the northeast quadrant; not a blip, not a flicker throughout that terrible storm. That nuclear plant kept our community online and saved countless lives.

Nuclear power is critical to our power grid and an important part of our energy future. We have companies working on small modular reactors to build the next generation of nuclear plants. They are safe, reliable, and very clean, but their future is uncertain. I hope this Subcommittee will put emphasis on small modular reactors.

Years ago, great payers agreed to pay for nuclear power if the Federal government created a place to put the spent nuclear fuel, to store it. That place is Yucca Mountain, Nevada. We have had a law for all our hazardous waste, the radioactive waste, to be stored at Yucca Mountain. It has been the law of the nation for over 20 years. We have spent over $15 billion on Yucca Mountain to date, and, yet, no waste from these reactors has been stored at Yucca Mountain.

I ask this Subcommittee to fully fund Yucca Mountain in this appropriations bill. We have failed to deliver our promises for too long. Thank you for your time and commitment to our ports and our diversified power sources; happy to answer any questions.

[The information follows:]

Rep. Pete Olson | TX-22

Mr. Chairman, I'm here today to advocate for my bosses, the great people of TX-22.

The ports and waterways in the greater Houston region are not just for Texas, but all of America. They are the gateway for American Liquid Freedom exports and economic advancement for the entire country.

In order to keep our national economy strong, I request full funding from the Harbor Maintenance Trust Fund to dredge our ports. These critical funds are needed to ensure our ports and waterways remain second to none.

Second, as y'all know, Hurricane Harvey devastated our region in 2017. Our communities were destroyed and our strength was tested, but we proved we are Houston Strong.

We're working hard with agencies like the Army Corps to make our communities more resilient and better prepared for future storms. Right now multiple studies and investigations are happening to determine the most effective storm preparation projects.

We need to get those projects completed, but we also need a strong operations and maintenance budget to make sure we are dredging the projects that ARE complete.

Lastly, the energy sector in Texas is BOOMING. We are blessed with a diverse and vibrant electrical grid. Its diversity provides reliability, that is sorely needed to avoid blackouts.

During Harvey, a coal plant in my district was knocked off line. Over the next few days, power from the South Texas Project nuclear plant kept our community online and saved countless lives from flooding by keeping the water pumps running.

Nuclear power is critical to our power grid and an important part of our energy future. We have companies working on Small Modular Reactors to build the next generation of nuclear plants. They are safe, reliable and clean, but their future is uncertain.

Ratepayers agreed to pay for nuclear power IF the federal government created a path for the spent fuel. We have a plan and we have the Yucca Mountain site. Opponents have reviewed the law around this site several times seeking a way out. Each time the result is the same – the law requires that we move forward.

We have failed to deliver on our promise for too long. Something has to give so we can get this project off the ground and follow the law WE passed. I am asking the Committee to *please* fund the Yucca Mountain project in the NRC's budget.

Thank you for your time.

Ms. KAPTUR. Thank you, both, for your excellent testimony. Congressman Scalise, as we attempt to help you, on the Mississippi River and other projects in your region, I would like to ask your help, as a member from the Great Lakes, where we face a real threat from something called the Asian Bighead Carp, that got its start down in the Mississippi-Louisiana area and it moved its way all the way up the Mississippi River, almost to Chicago now. So, I want to make you aware of a serious invasive species that could destroy our entire fishery in the Great Lakes. So, I just—let you know.

Mr. SCALISE. I have heard of that. Yeah, I have heard of that issue and would be happy to help because Asian Carp invasion has been a—has been a growing threat, and whatever we can do to help.

Ms. KAPTUR. And we hope to bring together members all along the Mississippi River Corridor. Your statement about the amount of dredge material you have, and so forth, will be of interest to those who come from the Red River Valley, of all places, and Illinois, Minnesota; we have had them before the Committee this morning. We want to look at systemic solutions and, maybe, have the Corps present, with several members, as we look at what the—what we can do to help make the future more livable in our country. So, we thank you very much for your appearance today.

Mr. SCALISE. Thank you.

Ms. KAPTUR. Congressman Olson, thank you very much. Thanks for mentioning LNG and the importance that your port plays, the Port of Houston plays, in the global security challenges that we attempt to surmount with—through those energy exports. So, thank you so very much. I know we are running a little bit over. Congressman Simpson, do you want to ask anything?

Mr. SIMPSON. I would just say thank you for being here, today, and your testimony; Harbor Maintenance Trust Fund, very important. You know, there is a target that we have to meet, or are supposed to meet, that was passed. We have exceeded that target in the last two years. The way the fund works, now, is that, if we exceed the target, the target does not go down to what it would have been next year. It goes to what it was last year, plus 103%, I mean 103% of what it was. So, that is always a challenge, but I am one that believes if you, as I have said earlier on the Inland Waterway Trust Fund, if you tax people for a purpose and that need still exists, then you ought to be able to spend the money on that need. It just makes sense. So, thank you for being here today.

Mr. SCALISE. Thank you, Mr. Simpson.

Ms. KAPTUR. Thank you.

Mr. SCALISE. Thank you, Chairwoman Kaptur.

Ms. KAPTUR. We would now like to call Congresswoman Debbie Mucarsel-Powell, from Florida, and Congressman Jerry McNerney, of the great state of California. All right. Congresswoman Mucarsel-Powell, you will be first, and then we will move to Congressman McNerney. Welcome.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. DEBBIE MUCARSEL-POWELL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF FLORIDA

Ms. MUCARSEL-POWELL. Thank you so much, Chairman Kaptur and Ranking Chair Simpson, for giving us the opportunity to come forth today to talk about our priorities. One of my top priorities in Congress was, when I got elected, is to make significant progress in the effort to restore the Everglades. Congress authorized the Comprehensive Everglades Restoration Plan, known as CERP, in 2000, which is now the largest ecological restoration project in the world.

Although the plan was originally expected to take many years, given its immensity, it has moved along unpredictably slow. Unfortunately, almost two decades later, we have made very little progress. This has to change, and that means we need to properly fund it. I, along with many of our Florida colleagues on a—in a bipartisan manner, have urged your Committee to provide the maximum funding possible for CERP. We have also called for a significant increase in the Army Corps construction account, for additional funding for environmental restoration or compliance, from $50 million to $200 million. This increase of $150 million will make available more funds, for which Everglades restoration projects can compete, and once the appropriations bill is signed to law, you can be certain that I will be pressuring the Army Corps to include full funding for Everglades restoration projects in their workplan.

Healthy Everglades are essential to a healthy economy in South Florida. The 1.5-million-acre wetland is a source of jobs and economic livelihood for hundreds of thousands of people. They attract visitors from across the country and around the world, contributing immensely to the tourism industry. The Everglades adds billions of dollars to the South Florida economy annually. Yet, with each year that passes without significant restoration, our economy is put at risk. More importantly, a thriving Everglades ecosystem is crucial to our health and the wellbeing of the families that live in Florida. We have already experienced consequences of our current system.

This past year, we suffered through disastrous algae blooms that are not only toxic to marine life and our fishing and tourism industry, but are harmful to human health, and I just want to remind everyone, and I brought some pictures of the images that we saw in Florida.

Ms. KAPTUR. Thank you for bringing this. Thank you.

Ms. MUCARSEL-POWELL. The overgrowth of algae causes respiratory issues and eye irritation, so much so that some people are unable to go outside over the duration of the bloom. We have also had countless fish wash ashore; thousands and thousands of tons of fish that are washing ashore our coasts, in Florida.

These naturally occurring events are significantly exasperated by our polluted and damaged Everglades ecosystems. The Everglades also provide drinking water for more than one-third of Floridians. That is over eight million people who rely on the ecosystem for their most basic needs. Furthermore, the Everglades are natural

barriers to floodwaters. They act as sponges during floods and storm surges. With rising sea levels and stronger and more frequent storms, due to climate change, the natural infrastructure provided by the Everglades is even more vital to the existence of our South Florida environment.

I think of the Everglades as our circulatory system. They are the arteries that provide life to all of us, in South Florida. They are a certified nationwide treasure. This is a bipartisan issue with support at the Federal level, state level, and local level. This has to be a national priority. I strongly urge you to provide the highest funding possible for Army Corps accounts, so that we can propel Everglades restoration projects ahead, for the sake of our economy, our health, and the beautiful landscape and biodiversity of South Florida.

I just want to finish by quoting one of my favorite authors. As Marjory Stoneman Douglas said, in her book, The Everglades: River of Grass, "There are no other Everglades in the world. They are, they have, always been one of the unique regions of the Earth, remote, never wholly known. Nothing anywhere else is like them.", which is—I urge the Committee to protect them. Thank you.

[The information follows:]

Rep. Debbie Mucarsel-Powell
Testimony before Energy and Water Appropriations Subcommittee
April 9, 2019

Thank you, Chairwoman Kaptur and Ranking Member Simpson, for the opportunity to appear before you today. One of my top priorities in Congress is to make significant progress in the effort to restore the Everglades. Congress authorized the Comprehensive Everglades Restoration Plan (CERP) in 2000, which is now the largest ecological restoration project in the world. Although the plan was originally expected to take many years given its immensity, it has moved along unpredictably slow. Unfortunately, almost two decades later, we have made very little progress. This must change – and that means we need to properly fund it.

I, along with my many of our colleagues, have urged your committee to provide the maximum funding possible for CERP. We have also called for a significant increase in the Army Corps Construction account for Additional Funding for Environmental Restoration or Compliance, from $50 million to $200 million. This increase of $150 million will make available more funds for which Everglades restoration projects can compete. And once the appropriations bill is signed into law, you can be certain I will be pressuring the Army Corps to include full funding for Everglades restoration projects in their Work Plan.

Healthy Everglades are essential to a healthy economy in South Florida. The 1.5-million-acre wetland is a source of jobs and economic livelihood for hundreds of thousands of people. They attract visitors from across the country and around the world, contributing immensely to the tourism industry. The Everglades adds billions of dollars to the South Florida economy annually. Yet with each year that passes without significant restoration, our economy is put at risk.

A thriving Everglades ecosystem is crucial to our health, as well. We have already experienced consequences of our current system. This past year, we suffered through disastrous algal blooms that are not only toxic to marine life and our fishing and tourism industry but are harmful to human health. The overgrowth of algae causes respiratory and eye irritation – so much so that some people are unable to go outside over the duration of the bloom.

The Everglades also provide drinking water for more than one third of Floridians – that's over 8 million people who rely on the ecosystem for their most basic needs.

Furthermore, the Everglades are natural barriers to flood waters. They act as sponges during floods and storm surges. With rising sea levels and stronger, more frequent storms due to climate change, the natural infrastructure provided by the Everglades is even more vital to the existence of our South Florida environment.

The Everglades are like our circulatory system – they are the arteries that provide life to South Florida. They are a certified nationwide treasure. This is a bipartisan issue, with support at the federal level, state level, and local level. **This must be a national priority.**

I strongly urge you to provide the highest funding possible for Army Corps accounts so that we can propel Everglades Restoration projects ahead for the sake of our economy, our health, and the beautiful landscape and biodiversity of South Florida.

As Marjory Stoneman Douglas said in her book *The Everglades: River of Grass*, "There are no other Everglades in the world. They are, they have always been, one of the unique regions of the earth, remote, never wholly known. Nothing anywhere else is like them..."

Ms. KAPTUR. Thank you for being the effective spokesman for your region—spokeswoman for your region. Congressman McNerney.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. JERRY MCNERNEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. MCNERNEY. Chairman Kaptur and Ranking Member Simpson, thanks for the opportunity to testify today. This is my first time to testify before this subcommittee. So, I wore pink to show you my softer side, this morning. Fundamentally, we must act aggressively on climate change. I spent over 20 years in the wind industry business, and I am determined on this issue. We can create good jobs, provide clean energy, and mitigate the damage from climate change through strong, immediate action.

I would like to use my time today to talk about three of my priorities for this year's appropriations bill. First, fund cutting edge research for renewable energy, energy storage, and climate intervention technologies. Second, start the process for a nuclear waste repository or restart the process for a nuclear waste repository; and three, adapt adaptation measures to make our communities more resilient to the effects of climate change.

As vice chair of the Energy Subcommittee on the Energy and Commerce Committee, I urge the subcommittee to find our—to fund our clean energy priorities. Importantly, this includes the Energy Department's Office of Energy Efficiency and Renewable Energy, as well as the Office of Electricity and Delivery, and the new cyber office within it, the Office of Science—Sciences Basic Research Mission. Cyber is a very critical issue, and it is growing in its importance.

I have also co-chaired the Grid Innovation Caucus for many years, and we must transform our grid into a bidirectional, fluid, and resilient backbone of our electricity infrastructure. We must fund technology, research, and development programs to create an energy system that adapts the changing distributed resources, climate, and cost. The DOE's programs across the spectrum, from the Energy Efficiency and Renewable Energy, or EERE, to RPE, to the Office of Science, including our national labs, are central to this effort. I must add that climate adaptation, mitigation, and intervention strategies, across the board, should be on the table. We must also work together to find a permanent solution to nuclear waste. While we have not had a major accident yet, there are tens of thousands of tons of high-level nuclear waste sitting in relatively exposed conditions. This is a tragedy waiting to happen. I was a graduate student in mathematics at the University of New Mexico, and studied at the Waste Isolation Pilot Project, near Carlsbad. Nuclear waste has engineering solutions. This is a political problem. A successful nuclear storage project will need transparency with the community, and while there will always be some amount of opposition, Congress must work with the community for a local buy-in.

This is why we must work towards an interim storage solution that ties to a permanent repository. The one requires the other.

Finally, I urge the Committee to fund adaptation and mitigation efforts through the Army Corps of Engineers. Specifically, the operations, and maintenance, and construction accounts are important to flood control and resilience efforts. Two projects in my district are a part of the Army Corps' workplan, and I encourage full funding for these accounts, and before I close, I will just say I have the California Delta in my region, which is similar, in some ways, to the Florida Everglades. We need to protect those vital resources because they are sources of economic growth and the health of the community. With that, I yield.

[The information follows:}

Rep. Jerry McNerney (CA-09)

Testimony to Energy & Water Subcommittee

Tuesday, April 9, 2019

Chairman and Ranking Member,

Thank you for the opportunity to testify to the Subcommittee about my priorities in this year's Energy and Water appropriations bill.

Fundamentally, we must act aggressively on climate change. As someone that spent over twenty years in the wind energy business, I am determined on this issue that we can create good jobs, provide clean energy, and mitigate the damage from climate change through strong, immediate action.

I would like to use my time today to talk about three of my priorities for this year's appropriations bill: (1) fund cutting edge research for renewable, energy storage, and climate intervention technologies; (2) restart the process for a repository for nuclear waste; and (3), adaption measures to make our communities more resilient to the effects of climate change.

As Vice Chair of the Energy Subcommittee on the Energy & Commerce Committee, I urge the subcommittee to fund our clean energy priorities. Importantly, this includes the Energy Department's Offices of Energy Efficiency and Renewable Energy as well as the Office of Electricity and Delivery and the new cyber office within it, and the Office of Science's basic research mission.

I have co-chaired the Grid Innovation Caucus for many years and we must transform our grid to a bi-directional, fluid, and resilient backbone of our electric infrastructure. We must fund technology, research, and development programs to create an energy system that adapts to changing distributed resources, climate, and costs. DOE's programs across the spectrum, from EERE to ARPA-E to the Office of Science, including our national labs, are central to this effort. I must add that climate adaption, mitigation, and intervention strategies across the board should be on the table.

We must also work together to find a permanent solution to nuclear waste. While we have not had a major accident yet, there are tens of thousands of tons of high-level nuclear waste sitting in relatively exposed conditions. This is a tragedy waiting to happen.

I was a graduate student in mathematics in New Mexico and studied the Waste Isolation Pilot Project near Carlsbad. Nuclear waste has engineering solutions. This is a political problem.

A successful nuclear waste storage project will need transparency with the community, and while there will always be some amount of opposition, Congress must work with the community for local buy-in. This is why we must work towards an interim storage solution that is tied to a permanent repository—one requires the other.

Finally, I urge the Committee to fund adaption and mitigation efforts through the Army Corps of Engineers. Specifically, the Operations & Maintenance and Construction accounts are important to flood control and resilience efforts. Two projects in my district are a part of the Army Corp's work plan and I encourage full funding of these accounts.

I thank the Committee for this opportunity.

Ms. KAPTUR. I would like to thank both witnesses for testifying. They have been most articulate, and you have mentioned issues that others have not. I thank you, both. If you have visual materials that you wish to append to the record, we will receive those materials. We try to put them up on our website, so that we can help the public, and our own members, understand how an individual project in one place might be part of a much larger, systemic set of issues that change as the environment around us adapts, and so I think those are very important. I want to thank Congressman McNerney for your leadership on so many—and, both personally and as a representative from California, on the new energy systems that we have to develop across this country, and for your suggestions on how we move forward on a serious question, such as interim storage as a first step toward permanent storage and—in the future. We need ideas there because, obviously, there is a lot of disagreement and, for the sake of the country, we have to find a positive step forward. So, thank you so very much for being with us today. There are others waiting, so. Congressman Simpson, did you have—notice I did not call you Shimkus this time?

Mr. SIMPSON. Yeah. You did not call me Shimkus this time. Yeah, well. As the leading Republican on this Committee, I will not tell you that I disagree with anything either of you said. I have been a huge supporter of the Everglades, continue to be, spent a couple days down there. If you could, do something to get rid of those pythons. That would be really important to me.

Ms. MUCARSEL-POWELL. Do you want to see an image of the largest female python that was just caught, I think, last week——

Mr. SIMPSON. I do not want to see that. They scare the hell out of me, but, anyway, thank you for being here. I look forward to working with you. Energy grid resilience and security is a huge issue. So, thank you for being here today.

Ms. KAPTUR. Thank you, both. Thank you. Our next panel—let us call Congressman Conor Lamb, of Pennsylvania, and also Jenniffer González-Colón, from Puerto Rico. Thank you, both, for appearing today. We will take Congressman Lamb first. We are calling in the order of appearance.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. CONOR LAMB, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF PENNSYLVANIA

Mr. LAMB. Thank you, Madam Chairwoman and Ranking Member Simpson, for allowing me to be here today. I am Conor Lamb, proudly representing the people of Western Pennsylvania's 17th district. Madam Chairwoman, if I told you that I had a policy in mind that would definitely reduce the amount of carbon in our atmosphere, create jobs, make it cheaper for small businesses to move their goods, create jobs, and cut traffic on our roadways, as well as creating jobs. Most people would agree that those are pretty good bipartisan objectives. Thankfully, that is something that we can do, and we can do it by supporting our inland waterway system, specifically, our rivers.

Pittsburgh is known as the City of Three Rivers. We have three beautiful rivers, the Allegheny, the Monongahela, and the Ohio, that come together in downtown Pittsburgh, and we built an infrastructure to make it possible for us to move cargo, to supply our municipal drinking water systems, to engage in recreation to protect the environment, but this infrastructure is aging, and it is aging fast.

Specifically, we have three locks on the upper Ohio River, which are in my district, that are included in what is called the Upper Ohio Navigation Project, and these locks are called the Emsworth, Dashields, and Montgomery locks. They are the oldest in the entire Ohio River system. They are all over 70 years old. If I asked you which is older, between a Slinky and the locks on the upper Ohio River, unfortunately, the answer would be the locks on the upper Ohio, and they are expected to do a lot more work every day than the Slinky is.

I brought some pictures with me, today, to show the state of degradation that these locks are in. This is just an overall view of the Montgomery lock, to give you a sense of what it looks like, but if we go to the next picture, that is a giant crack in the outside of a structure that is meant to manage and hold tons and tons of river water. Moving to the next one, this is a Lieutenant General, from the Army Corps of Engineers, pointing out a crack in the middle wall gallery at the Montgomery lock. So, this is actually a wall that separates two different chambers of the locks. We have a large chamber, which is capable of holding lots of barges at once and carrying huge construction cargo, and we have a smaller chamber, which is, obviously, much smaller. There is a concrete wall in between them that holds the whole thing together, and there are cracks on both the inside and outside of it. One more shot is a crack in what you can see is, kind of, a ceiling structure. Again, that is just holding massive amounts of river water. The reason we have these cracks, Madam Chairwoman and Mr. Ranking Member, is because, over the years, we have not fully funded the reconstruction of these locks and dams. We have done it piecemeal. It does not help our business owners. It does not help the structures, themselves, but, most importantly, it does not help the taxpayer. When we pay for these things piecemeal, they become more expensive over time. We are just due to finish another lock and dam project, in Western Pennsylvania, that was initially authorized in 1994, and it is going to end up costing the taxpayers three-four times what it originally should have because we never paid for and finished all the work at once.

One of the problems we have with this particular lock, which is why I have highlighted it as that, it sits very close to one of the largest construction sites in the United States, right now, which is the Shell Corporation building, a petrochemical plant, in my district. There are—by this summer, it will be 6,000 people working, on site, to build it. It will create thousands and thousands of jobs in downstream manufacturing because of the plastic that is being created. They are all coming from the natural gas in Western Pennsylvania.

Well, the project is so large that there are certain pieces of construction equipment that they have to bring up the river, that can

only fit in the large chamber of the lock that I mentioned. It will be closed for large parts of this summer because of this piecemeal reconstruction that has to be done. They, literally, have to put pieces of steel rebar in where those cracks are, every so often, to keep the entire thing from falling apart. So, Shell is busy trying to schedule the delivery of some of this construction equipment. Construction workers and their families are waiting on the jobs that have been created there, but no one will get paid, and this project will not advance if we cannot improve this situation. Shell's going to be able to figure it out. They are a large company, but the small, downstream business owners will never have that kind of advantage.

It is only 2 cents a ton to ship their goods on the river, versus close to 10 cents on the road, at this point. So, if you are a business owner, which are you going to choose, but you need certainty and predictability to get to your customers. So, this is the issue. What I ask, for your consideration, is to fully fund the investigations account, so that this project can compete for funding in the future, and that we also make sure we fully fund the construction part of the Waterways Trust Fund Account. We also ask you to consider providing and FY–20 O&M funding level at, or above, the level provided for in the Energy & Water Development Appropriations Act of 2019.

This is a bipartisan cause. We have several members, Congressman Johnson, Congressman McKinley, Congressman Reschenthaler, from the Republican Party, and myself, and Congressman Doyle, from the Democratic Party. We can do better than this, I believe, and I really thank you for hearing me out today.

[The information follows:]

Congressman Conor Lamb (PA-17)

Chairwoman Kaptur, Ranking Member Simpson, and Members of the House Appropriations Subcommittee on Energy and Water Development, I appreciate the opportunity to speak to you today in support of funding for the United States Army Corps of Engineers, especially funding for the Civil Works Program, Investigations Account, where the Upper Ohio Navigation Project could compete for funding.

As the easternmost gateway of the Inland Waterways System, the Port of Pittsburgh has a strategic location in moving freight to and from the Northeastern and Middle Atlantic regions. The three locks on the Upper Ohio River that are included in the Upper Ohio Navigation Project, the Emsworth, Dashields, and Montgomery Locks, are the oldest of the entire Ohio River system. They are all more than 70 years old. The current condition of these locks is a state of critical structural and operational degradation. They are increasingly at risk of structural or operational failure that could halt navigation for a year or longer. This type of a major failure would effectively close the entire Port of Pittsburgh and would greatly impact the steel and energy industries that are essential to our national security and our regional economies in Western Pennsylvania, the Great Lakes Region, and beyond. In addition to impacting commercial freight, pool loss from a failure would affect municipal and industrial water intakes, recreation, and wildlife habitats in my own and many other districts. I have brought these pictures to further illustrate how dire the situation is back home.

The long-term solution, is to ensure the highest possible funding for the United States Army Corps of Engineers, Civil Works Program, Investigations Account, so that the Upper Ohio Navigation Project can compete for funding and undergo the desperately needed overhaul that

would allow for the construction of new lock chambers along the three locks on the Upper Ohio River, including the Montgomery Lock that you see here.

In addition to these funds, I ask for your consideration for other important funding levels within the Corps' Civil Works Program that are vital to our shared interests in making certain that we have safe and reliable infrastructure. This includes $330 million for the Inland Waterways Trust Fund construction account, which will maintain the same level of funding for projects that Congress provided in FY19. I also urge you to provide a FY20 Operations & Maintenance funding level at or above the $3.740 billion level provided in the Energy and Water Development Appropriations Act, 2019.

I was pleased to lead a bipartisan appropriations letter with members from across the Northeastern and Middle Atlantic regions, whose districts directly benefit from the Upper Ohio Navigation Project, including Congressman Doyle, Congressman McKinley, Congressman Johnson, and Congressman Reschenthaler. Thank you again for the chance to share my perspective and the importance of the Upper Ohio Navigation Project before the Committee today. I greatly appreciate your consideration of funding for these important programs.

Ms. KAPTUR. Thank you very much Congressman Lamb, for appearing. Representative González-Colón.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. JENNIFFER GONZÁLEZ-COLÓN, A REPRESENTATIVE IN CONGRESS FROM PUERTO RICO

Miss GONZÁLEZ-COLÓN. Thank you, Chairwoman Kaptur and Ranking Member Simpson, for holding this important hearing and having me here today. The U.S. Army Corps of Engineers projects are instrumental for restoring critical infrastructure and maintaining financial stability. In the case of Puerto Rico, the Army Corps oversee multiple projects in several municipalities on the island, and, as you are probably aware, reconstruction and recovery efforts remain underway on the island, and my constituents continue to face challenges tied to the devastation of the 2017 hurricane season. One of the Corps projects that remain a priority in Puerto Rico is the Cano Martin Pena Echo System Restoration Project, located in San Juan Metropolitan Area. The Cano Martin Pena Community is located alongside a 3.75-mile-long tidal channel, and is home to over 26,000 residents, making it one of the most densely populated areas on the island. For decades, the community has struggled with frequent flooding, resulting from debris and waste water accumulation in the channel. Flooding also negatively impacts all the neighboring communities San Juan and the International Airport.

To make matters worse, the hurricane season of 2017 exacerbated flooding problems, by increasing the amount of debris that already clogged the channel, and, therefore, increased the level of pollution and health concerns that existed prior to the storms. As all of you already know, my district was not only—the only one effected by natural disasters during the last two years. Several older states and territories were impacted and, most likely, share similar hardships. This is partly due to projects like this, that secure improper funding for the Corps—for the Corps is essential. As an effort to achieve this goal, I submitted a request to maintain the inactive level of funding, of $2.18 billion for the Army Corps construction account, to the fiscal year 2020. Additionally, I respectfully request these funds to be used to authorize no less than five new construction projects, to be used or start—for new starts, and no less than two of the five new starts to be on ecosystem restoration projects. According to the Army Corps, restoring ecosystems to their normal, self-regulated function remains a priority. Therefore, they shall have the resources available to undertake this important task.

Lastly, I request inclusion of the—of report language about the Cano Martin Pena Ecosystem Restoration Project that recognize the importance of this project that has been working since the 1970s, and including this, its lock protection benefits, and encourage the Corps to work with a—with a non-Federal sponsor to continue the next phase at the earliest practicable opportunity. In closing, the Government of Puerto Rico has already invested over $100 million in this project. It is currently on track to finalize the pre-

construction phase, and design, by the end of the current fiscal year. I would like to acknowledge the leadership of my colleagues in the House, and in the Senate, for providing funds during the last two years. It was because of you that this project has continued to happen, and so many visits from different representatives in the House and in the Senate, in a bipartisan way, that this community and several NGOs are working together, and that is the reason I am here today, not just to say thank you, but to continue and encourage you to continue support in this community. I will like, also, to continue the Cano Martin Pena, to fulfill their goal. I would like also to recognize the diligent and dedicated work of ENLACE, the non-Federal sponsor, and I am confident that their hard work and commitment will remain as an example for similar projects on the island. I will continue to propel the project forward. With that, I yield back.

[The information follows:]

TESTIMONY OF THE HONORABLE JENNIFFER GONZALEZ-COLON
REPRESENTATIVE OF PUERTO RICO. AT- LARGE
HOUSE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
MEMBER DAY HEARING. TUESDAY APRIL 9, 2019

Chairwoman Kaptur, Ranking Member Simpson and members of the Subcommittee, thank you for holding this important hearing and allowing me to testify regarding my requests for the FY20 appropriations bill and accompanying report.

U.S. Army Corps projects are instrumental for restoring critical infrastructure and maintaining financial stability. In the case of Puerto Rico, the Army Corps oversees multiple projects in several municipalities on the island. Also, as you are probably aware, reconstruction and recovery efforts remain underway, and my constituents continue to face challenges tied to the devastation of the 2017 hurricane season.

One of the Corps projects that remains a priority is the Caño Martín Peña Ecosystem Restoration Project, located in the San Juan metropolitan area. The Caño Martín Peña community is located alongside a 3.75-mile-long tidal channel and is home to over 26 thousand residents, making it one of the most densely populated areas on the island. For decades, the community has struggled with frequent flooding resulting from debris and wastewater accumulation in the channel. Flooding also negatively impacts other neighboring communities in San Juan and the Luis Muñóz Marín International Airport.

To make matters worse, the hurricanes in 2017 exacerbated flooding problems by increasing the amount of debris that already clogged the channel and therefore increased the levels of pollution and health concerns that existed prior to the storms.

As you know, my district was not the only one affected by natural disasters in 2017 and 2018. Several other states and territories were impacted and most likely share similar hardships. It is partly due to projects like this that securing proper funds for the Corps is essential. As an effort to achieve this goal, I submitted a request to maintain the enacted level of funding of $2.18 billion for the Corps construction account in Fiscal Year 2020. Additionally, I respectfully requested these funds be used to authorize no less than five new construction starts, or New Starts, and that no less than two of the five New Starts be an ecosystem restoration project.

According to the US Army Corps of Engineers, restoring ecosystem to their normal, self-regulated function remains a priority. Therefore, they should have the resources available to undertake this important task.

Lastly, I requested the inclusion of report language about the Caño Martín Peña Ecosystem Restoration project that recognizes the importance of the project, including its flood protection benefits, and encourages the Corps to work with the non-Federal sponsor to continue to the next phase at the earliest practicable opportunity.

In closing, the Government of Puerto Rico has already invested over $100 million dollars in this project. It is currently on track to finalize the Preconstruction, Engineering and Design phase by

the end of the current fiscal year. I would like to acknowledge the leadership of my colleagues on the House and Senate with this issue, which has helped get the Caño Martín Peña Project to this stage. I would also like to recognize the diligent and dedicated work of ENLACE, the non-federal sponsor. I am confident their hard work and commitment will remain as an example for similar projects on the island and will continue to propel the project forward.

Thank you.

Ms. KAPTUR. Thank you, both, very much. We have members waiting, so I will be very quick, but Congressman Lamb, thank you so very much for your excellent testimony, and visual illustrations of the real infrastructure challenge we face with the Corps. We cannot agree with the President's cutting back on the Corps construction accounts, their operations and maintenance accounts. I mean, that is simply dangerous for the nation. I, actually, think that, if anyone is listening over in the Trump Administration, that we should move the Corps Budget forward, not cut it by a third, but move it as our first step to infrastructure for this country. If we cannot have a T&I Bill that emerges, to fully fund the Corps accounts, they could get the job done across this country. We would make a significant difference, and I think we could pass it. So, that is just a personal opinion, but we thank you for your testimony today, for your true leadership, and, Congresswoman Colón, thank you very much for your dutiful representation during a very difficult time. I am proud of what the Corps was able to do in Puerto Rico, and continues to do, and we look for ways to be constructive as we move forward. Congressman Simpson.

Mr. SIMPSON. Don't really have any questions. I have been up on the Mon—I cannot pronounce the name of the river. How do you say it?

Mr. LAMB. The Monongahela.

Mr. SIMPSON. Yeah. I always screw it up. So, I just say the Mon, but I went up there. The Army Corps took me up there, and I was stunned at the locks and dams along there, and the repair that is needed, and what I was really stunned about is, one of those goes down, what it does to commerce in the area. It shuts it down. So, it is very important that we do this. In fact, you might be interested that they were showing us how they brought a barge in one time, and it was a little too wide for the lock, but they said, "Just go ahead. It will give." What? It will give? Well, it is wooden posts, and you can shove this thing about a foot either way, you know? It is kind of spooky. So, it is certainly something that needs to get done; appreciate you both being here.

Mr. LAMB. Thank you, Congressman.

Ms. KAPTUR. Thank you, both. If you would have any augmented material you wish to submit to the record, we will be—happily accept it.

Miss GONZÁLEZ-COLÓN. I want to submit a letter for more details, under project. Thank you.

Ms. KAPTUR. Thank you. Thank you, both. Our next panel, Congressman Raul Ruiz, of California, and Congressman T.J. Cox, of California. Welcome, gentlemen. We will begin with Congressman Ruiz. Sorry to keep you waiting a few minutes.

TUESDAY, APRIL 9, 2019

WITNESS

HON. RAUL RUIZ, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. RUIZ. Thank you, Chairwoman Kaptur and Ranking Member Simpson. Thank you for inviting me here, today, to testify—Thank

you, Chairwoman Kaptur and Ranking Member Simpson. Thank you for inviting me here, today, to testify about an issue that is of incredible importance to my district in Southern California. The Salton Sea is California's largest inland body of water, stretching more than 30 miles across Imperial and Riverside Counties, in Southern California. It is also a rapidly unfolding environmental disaster. The Salton Sea is shrinking, and that presents a massive public health crisis, as the shoreline recedes and the playa becomes exposed, salty, chemically, laden dust becomes airborne and blows across the region that my constituents call home. This dust is made up of fine microparticles that, when breathed, can get into the blood stream and cause asthma and other respiratory ailments.

It is also—it has pesticides, heavy metals, and other toxins. The Salton Sea is also critical to the economy of my region. Tourism is in the top three industries. You might have heard of Palm Springs and The Coachella Valley, California. So, you can recognize that it is—tourism is important. National parks, like Joshua Tree, desert habitat, and gorgeous landscapes, that cannot be found anywhere else in the country, are part of the draw to our region. So, tourism, property values, and more are all threatened by the potential contaminated dust bowl. In fact, a 2014 study by The Pacific Institute, put the cost of inaction at more than $70 billion. Finally, the Salton Sea is an important natural habitat for fish and wildlife. More than 400 species of birds can be found stopping at the sea, as part of the Pacific Flyway. However, as the sea shrinks and the salinity increases, this habitat is at risk of vanishing. Already, most fish species have died, and even the tilapia, which can withstand salty water, are succumbing to the pollution. In 2016, I helped facilitate a memorandum of understanding between the state of California and The Department of Interior to work together on the management of the Salton Sea. This MOU was a great step forward. It still needs to be funded by Congress, and I intend to see it through. This Appropriations Committee, in fact, has recognized the importance of that MOU and has included report language supporting it. I would encourage the Committee to not only once again include this critical language, but also expand the language to include the cooperation from the Army Corps, the Environmental Protection Agency, and Department of Agriculture, to further the objectives outlined in the 2016 MOU. The 2016 MOU included a commitment for $30 million for both operation and maintenance of Habitat Restoration and Dust Suppression Projects, and additional projects associated with California's Salton Sea Management Plan. I strongly urge the Committee to follow through on the commitments made to the residents of Southern California.

The success of the mitigation of the Salton Sea hinges on the cooperation of all government partners, and it should be noted that Department of Interior is the largest land owner at the Salton Sea. In addition, I am requesting that your Committee include vital reporting, which under the Army Corps of Engineer section of the report, encouraging the Corps to prioritize permitting for this Salton Sea Management Plan. Expediting these projects is critical. Each day that shovel-ready projects sit idle is detrimental to health of residents in Southern California. Finally, I would like to address the impacts of the Drought Contingency Plan. As you may know,

the DCP is a critical plan between seven Western Basin states to conserve water and to keep the Colorado River operational. During the course of DCP negations, my constituents, including Senator Boxer, expressed concerns that the authority granted to the Bureau of Reclamation could result in decreased inflow, or wading environmental protections for the Salton Sea. I would strongly encourage the committee to draft report language that reiterates Congress' commitment to both the Salton Sea and the DCP, and make it clear that any actions taken with regard to the DCP should be done only in a way that does not exacerbate the unfolding public health crisis at the Salton Sea. The Salton Sea is a public health environmental and economic crisis that is unfolding rapidly and will affect residents far beyond the receding shoreline. Thank you for inviting me to testify, and I hope the committee will include these important requests in the fiscal year 2020 Energy and Water Appropriations Bill.

[The information follows:]

Chairwoman Kaptur and Ranking Member Simpson, thank you for inviting me here today to testify on an issue that is of incredible importance to not only my district, but Southern California at large. The Salton Sea is California's largest inland body of water, stretching more than 30 miles across Imperial and Riverside Counties in Southern California. It is also a rapidly unfolding environmental disaster.

The Salton Sea is shrinking and that presents a massive public health crisis for those who call Southern California their home. As the shoreline recedes and the playa becomes exposed, salty, chemical-laden dust becomes airborne and blows across the region of my constituents' communities. This dust is made up of fine microparticles that when inhaled can enter the bloodstream and cause asthma and other respiratory ailments.

The Salton Sea is also critical to the economy of my region. National parks like Joshua Tree, desert habitats, and gorgeous landscapes that can't be found anywhere else in the country draw visitors to our region. All of this is threated by the disappearance of the Sea. In fact, a 2014 study by the Pacific Institute put the cost of inaction at more than $70 billion.

Finally, the Salton Sea is an important natural habitat for fish and wildlife. More than 400 species of birds can be found stopping at the Sea as part of the Pacific flyway. However, as the Sea shrinks and the salinity increases, this habitat is at risk of vanishing. Already, most fish species have died and even the tilapia – which can withstand salty water – are succumbing to the pollution.

In 2016, I helped facilitate a Memorandum of Understanding between the State of California and the Department of Interior to work together on the management of the Salton Sea. The MOU was a great step forward that I intend to see through, but it still needs to be funded by Congress.

This Committee has recognized the importance of that MOU and has included report language supporting it. I would encourage the Committee to not only once again include this critical language, but also expand the language to include cooperation from the Army Corps of Engineers, Environmental Protection Agency, and Department of Agriculture to further the objectives outlined in the 2016 MOU.

The MOU included a commitment for $30 million for both operation and maintenance of habitat restoration and dust suppression projects, and additional projects associated with California's Salton Sea Management Plan. I strongly urge the Committee to follow through on the commitments made to the residents of Southern California.

The success of the mitigation of the Salton Sea's decline hinges on the cooperation of all government partners, and it should be noted that the Department of the Interior is the largest landholder at the Salton Sea.

In addition, our counterparts in the Senate have included vital report language under the Army Corps of Engineers' section of the report encouraging the Corps to prioritize permitting for the Salton Sea Management Plan. Expediting these projects is critical. Each day that shovel-ready projects sit idle is detrimental to the health of residents of Southern California.

Finally, I would like to address the impacts of the Drought Contingency Plan (DCP). As you may know, the DCP is a critical plan between seven western basin states to conserve water and keep the Colorado River operational. During the course of DCP negotiations, my constituents expressed concern that the authority granted to the Bureau of Reclamation could result in decreased inflows to the Salton Sea.

I would strongly encourage the Committee to draft report language that reiterates Congress' commitment to both the Salton Sea and the DCP and makes it clear that any actions taken with regard to the DCP should be done so only in a way that does not exacerbate the unfolding public health crisis at the Salton Sea.

The Salton Sea may only cross two Congressional districts, but the public health, environmental, and economic crisis that is unfolding will affect residents far beyond the receding shoreline. Thank you for inviting me to testify, and I hope the Committee will include these important requests in the FY20 Energy and Water Appropriations Bill.

Ms. KAPTUR. Thank you, Dr. Ruiz. We thank you so much for your testimony, today. Congressman Cox.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. TJ COX, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. COX. Thank you, Chairwoman Kaptur and Ranking Member Simpson, for this opportunity to testify, as you develop the Appropriations Act for fiscal year 2020. As a proud representative of California's 21st Congressional District, I'm here on behalf of the farmers, the ranchers, and, most importantly, the communities of California's San Joaquin Valley. As you know, my congressional district is stressed by a lack of water supply reliability, and the work done by this subcommittee is of critical importance to the future of the San Joaquin Valley. As such, I'll be advocating for a number of different topics that would increase water supply reliability, and, today, I would like to highlight three of critical importance. One, I urge the Subcommittee to fully fund the administration's water infrastructure improvement for the Nation, when act—request of $134 million, and two, the Bureau of Reclamation's full request for the Safety of Dams Program, which will advance critical safety work for improving the seismic stability of the B.F. Sisk Dam; and three, the U.S. Army Corps of Engineers Water Operations Technical Support, the WOTS program, in the amount of five and a half million.

Our 21st Congressional District has some of the most severe water needs in the country, and faces unique challenges, in terms of addressing imbalanced groundwater use, resulting from decreased surface water supplies from the Delta. It is unacceptable that, even today, 2 years after the worst drought in California's history, there are families in my district that cannot drink the water out of their taps, due to water quality issues. As the number one agriculturally productive district in California, the top agricultural state, access to a clean and reliable water supply is the driving force behind our community, and critical to the health and well-being of our communities.

I am here, today, to urge the subcommittee to include sufficient funding to maintain and upgrade California's water storage and conveyance systems. This is imperative, not only for today, but to also prepare for future droughts, which we know are coming, due to our changing climate. In regard to wind, I recently signed onto a bipartisan letter, urging funding for projects across 17 western reclamation States. With increasing erratic winter storms, uncertain snowpack, and prolonged drought, we need to be able to capture and store more water during wet years for use during dry years.

One way we can easily mitigate the detrimental impacts of climate change on the hardworking families of my district is by adapting our water systems, such that we build resilient water supplies and related infrastructures to meet future needs.

In regard to the U.S. Army Corps of Engineers WOTS program, within operations, maintenance, FUD risk management account, I recently signed onto a bipartisan letter, sponsored by Representatives Costa and LaMalfa, to accelerate development of, and improved decision-making tools at Western Reservoirs. Recent scientific advancements have allowed us to increase the forecast accuracy of atmospheric rivers, which deliver us much of California's water supply on an annual basis. This increased accuracy of the—the increased accuracy of these forecasts should inform the operations of our reservoir systems to stretch our water supplies as far as possible, without increasing flood risk. The WOTS program is critical to the effort.

As established by sections 4007 and 4009 of Public Law 114–322, resilient water supply is not only a purpose for Federal expenditures, but is, in fact, required without further congressional approval, and it is in this capacity that I testify before you today. To date, Congress has enacted funding for storage projects under sections 4007 and 4009 of the WIN Act within the Bureau of Reclamation's water and related resources account. The WIN Act established a process for Federal funding to be allocated, based on Administration, Administrative recommendations, and the letter was provided to this committee, recommending WIN Act funding allocations on February 13, 2019.

In conclusion, I request that the Committee fund, one, the WIN Act, in the amount of $134 million; two, Reclamations' Dam Safety Program; and three, the U.S. Army Corps of Engineers WOTS program, in the amount of $5.5 million. The Congress and the Administration should fully support the use of the funds that accrue to the Reclamation fund, for their intended purpose of supporting Western Water Development, including water infrastructure projects that continue conservation to meet our future community, energy, and infrastructure needs. Thank you.

[The information follows:]

Testimony of Rep. TJ Cox before the House Subcommittee on Energy and Water Development Appropriations

April 9, 2019
10:00 am

I want to thank the House Subcommittee on Energy & Water Development, and Related Agencies for this opportunity to testify as you develop the Energy & Water Development and Related Agencies Appropriations Act for fiscal year 2020. As the Representative of California's 21st Congressional District, I am here on behalf of the farmers, ranchers, and communities of California's San Joaquin Valley. As you know, my Congressional district is stressed by a lack of water supply reliability, and the work done by this Subcommittee is of critical importance to the future of the San Joaquin Valley. As such, I'll be advocating for a number of different topics that would increase water supply reliability, but I'd like to highlight three of critical importance: (1) I urge the Subcommittee to fully fund the Administration's Water Infrastructure Improvements for the Nation (WIIN) Act request of $134 million, and (2) Reclamation's full request for the Safety of Dams program, which will advance critical safety work for improving the seismic stability of B.F. Sisk Dam, and (3) the US Army Corps of Engineers' WOTS program, in the amount of $5.5 million.

CA-21 has some of the most severe water needs in the country and faces unique challenges in terms of addressing imbalanced groundwater use resulting from decreased surface water supplies from the Delta. Even today, two years after the worst drought in California's history, there are families in my district that cannot drink the water out of their taps due to water quality issues. As the number one agriculturally productive district in the United States,–access to a clean and reliable water supply is the driving force behind our economy, and I am here today to urge the Subcommittee to include sufficient funding to upgrade California's water storage and conveyance system, which will build resilience to the droughts we know will come in our changing climate.

In regard to WIIN, I recently signed on to a bipartisan letter urging funding for projects across the 17 western "Reclamation" states. With increasingly erratic winter storms, uncertain snowpack, and prolonged drought, we need to be able to capture and store more water during wet years for use during dry years. One way we can easily mitigate the detrimental impacts of climate change on the constituents of California's 21st District is by adapting our water systems such that we build resilient water supplies and related infrastructure to meet future needs.

In regard to the US Army Corps of Engineers' WOTS program within Operations and Maintenance, Flood Risk Management account, I recently signed on to a bipartisan letter sponsored by Reps. Costa and Lamalfa to accelerate development of and improve decision-making tools at western reservoirs. Recent scientific advancements have allowed us to increase the forecast accuracy of atmospheric rivers, which delivers much of California's water supply on an annual basis. The increased accuracy of these forecasts should inform the operations of our reservoir system to stretch our water supplies as far as possible without increasing flood risk. The WOTS program helps with that effort.

As established by Sections 4007 and 4009 of Public Law 114-322, resilient water supply is not only a purpose for federal expenditures, but is in fact required without further Congressional approval, and it is in this capacity that I testify before you today.

To date, Congress has enacted funding for storage projects under sections 4007 and 4009 of the WIIN Act within the Bureau of Reclamation's Water and Related Resources account. The WIIN Act established a process for federal funding to be allocated based on Administration recommendations, and a letter was provided to this Committee recommending WIIN Act funding allocations on February 13, 2019

In conclusion, I request the Committee fund (1) the WIIN Act, in the amount of $134 million, (2) Reclamation's Dam Safety program, and (3) the US Army Corps of Engineers' WOTS program, in the amount of $5.5 million. The Congress and the Administration should fully support the use of the funds that accrue to the Reclamation Fund for their intended purpose of supporting western water development, including water infrastructure projects that continue conservation to meet our future water, energy and infrastructure needs.

Ms. KAPTUR. Thank you, both, for testifying. I consider the two districts you represent extremely predictive, as to how we are going to live in this new century, and so I am very grateful for your testimony today. If you have other materials you wish to submit to the record, your districts do not live in isolation, they relate to a larger ecosystem, and any way you can help us understand, more specifically, what is happening in your areas, throughout California. Today, we had a great deal of testimony about regions that are flooding around the country, and how we handle water runoff and, obviously, you do not have to be a genius to sit up here and figure out, well, you know, what do we do? How do we better store the water that is showering down on us? How do we move it to places that need it? How do we better manage the assets we have in this new century? So, I think what you know and what you have lived, in your regions, is important for the country to know. Any way you can help us better explain it, through our website, through materials you provide, photos you provide. I just think we have a hurdle to overcome in public education of what is going on around this country, including the desertification of the West, and how we meet the challenge. So, I am really grateful for your appearance today.

I wanted to move to Congressman Simpson, if he has anything he would like to say.

Mr. SIMPSON. I would just say, thank you both for your testimony. I have spent time in your district. I have never been to the Salton Sea. It would be interesting to go see. That is my impression that has been created over time.

I have to get out and drive around and see the West. And one of these days I might call you up and we would be driving, I mean, California is just like next door.

Mr. RUIZ. We can arrange that.

Mr. SIMPSON. Thank you.

Mr. RUIZ. Thank you.

Ms. KAPTUR. I think the relationship between food, land, water and people in places such as you represent, needs to be more fully fleshed out. The Salton Sea, obviously, is experiencing a serious condition because of runoff that happened over the years, and a lot of the materials that I am sure are being airborne now, because of the drought that you have had to endure is related to a, I don't want to say a mismatch, between food, land, water and people, but somehow we have got to put the equation together in a smarter way for the country in each congressional district, and we are not there yet.

Mr. RUIZ. That would be an example of how we can prevent dust exposure with pesticides, arsenic, heavy metals and other toxins from getting into the blood of human beings.

That, as a doctor, is my priority, and we have a plan, it is the California Salton Sea Management Plan, we have some funding in this, but the Federal Government has to do its part in cooperation with the state and other local actors in order to prevent this from happening, and to potentially save many, many lives.

So, I appreciate your interest, and I will take you up on that suggestion, and I will invite the both of you for a wonderful trip to the Coachella Valley during the winter months when you are all cov-

ered with snow. And I will give you tour of the Salton Sea. Thank you.

Ms. KAPTUR. As we are facing in the Great Lakes, a monumental challenge of additional rainfall that is washing over our watersheds at a much higher rate and taking with it a lot of nutrients. And with warming soils, conditions, science doesn't fully understand. I am sure you all saw the stories internationally about the new type of fungus that has infected people for which there is no antibiotic.

Mr. RUIZ. Yes.

Ms. KAPTUR. And with the warming earth, there is a soil science that is not completely understood either. So it is incumbent on all of us to put the pieces together, try to figure out new ways of moving forward, and I am, again, most grateful for your testimony today. I know what responsible members you are. So, thank you for being here.

Mr. RUIZ. Thank you.

Ms. KAPTUR. We would like to call our next panel. Is this our last panel?

We may have one more? Okay. Thank everyone, for their patience. Scott Peters of California, and Morgan Griffith of Virginia. Thank you, Congressmen, so much for waiting today, and for being with us. And we will begin with Congressman Peters.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. SCOTT PETERS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. PETERS. Thank you, Chairwoman Kaptur, Ranking Member Simpson. Thank you for hosting Member Day, for your colleagues like me who have important requests for the Energy and Water Appropriations Bills.

I know you are talking about a lot of things. I want to just give a nod to similarly important priorities for me, Energy Efficient Building Grants, Carbon Capture Utilization and Sequestration incentives, water power innovations and more. All high on my list and all connected to environmental stewardship in the San Diego in particular. You have no—that received the appropriations letters we have written to support those programs.

But today I wanted to highlight one particular topic where the issue of where Americans can safely store spent nuclear fuel. As you may know, the San Diego Region is home to the San Onofre Nuclear Generating Station, or SONGS, which is being decommissioned. As part of that decommissioning spent nuclear fuel is being relocated to on site, dry cask storage.

Now this cannot be the final resting for this material. It is located on a Military Base, and Camp Pendleton, about 100 feet from the Pacific Ocean, and the corrosive ocean air, miles from massive fault lines, and most alarmingly, close enough to communities to severely affect millions of Southern Californians.

The Nuclear Regulatory Commission has certified the storage process is safe, but that doesn't change the fact that it is in the wrong place. While San Diego bears unique risks with onsite stor-

age, many other communities have spent nuclear fuel near their homes, schools and offices, and shouldn't. We need a safer storage location.

In fact, we have one planned, but due to the lack of political will, Congress has not advanced on this planned solution, and I suggest that that needs to change.

The Department of Energy needs to continue its path, both toward interim storage options, and permanent storage at Yucca Mountain in Nevada. That is why a bipartisan letter with Congressman Jeff Duncan, in support of the administration's budget request for funding.

The request includes $116 million to the Department of Energy, the split between $90 million for the Nuclear Waste Disposal Account, $26 million for the Defense Nuclear Waste Disposal Account, and $38.5 million in the Nuclear Regulatory Commission's Nuclear Materials and Waste Safety Program. Basically the funding for three accounts will be used to take the next steps on licensing and design activities at Yucca Mountain, which includes the judicatory hearings. All this is to make sure that we work with Nevada, and we make sure that the storage is safe there as well.

Last year the House passed legislation for these solutions, and my colleagues and I strongly urge you to support this request. It is really beyond time to get something done to secure the spent fuel that threatens communities.

And I want to thank you for your time and consideration.

[The information follows:]

Appropriations Energy and Water Subcommittee

Member Day

April 9, 2019

Remarks for Rep. Scott Peters:

Chairwoman Kaptur and Ranking Member Simpson:

Thank you for hosting "Member Day" for your colleagues like me who have important requests for the Energy and Water appropriations bill.

While you debate where to place much-needed funding, I want you to know that many programs, including ARPA-e grants, energy efficient buildings grants, carbon capture utilization and sequestration incentives, waterpower innovations, and more, are all high on my priority list, closely connected to San Diego, or both.

You no doubt have received the appropriations letters I have written and signed onto that support these programs.

During this time, however, I'd like to highlight one very important topic – where Americans can safely store spent nuclear fuel.

As you may know, the San Diego region is home to the San Onofre Nuclear Generating Station, which is being decommissioned.

As part of that decommissioning, spent nuclear fuel is being relocated to on-site, dry cask storage.

This cannot be the final resting place for this material.

It's located on a military base, about 100 feet from the Pacific Ocean and the corrosive ocean air, miles from massive fault lines, and most alarmingly, close enough to communities to severely impact millions of Southern Californians.

The Nuclear Regulatory Commission has certified the storage process as safe, but that doesn't change the fact that it's in the wrong place.

San Diego is unique with its risks to the on-site storage, but many other communities have spent nuclear fuel near their homes, schools, and offices-- and shouldn't.

We need a safer storage location. In fact, we have one, but due to the lack of political will, Congress has not advanced on this solution.

That must change.

The Department of Energy needs to continue its path toward both interim storage options, and permanent storage at Yucca Mountain in Nevada.

That is why I led a bipartisan letter, with Congressman Jeff Duncan, in support of the administration's budget request for funding.

This request includes $116 million through the Department of Energy, split between $90 million for the Nuclear Waste disposal account, $26

million for the Defense Nuclear Waste disposal account, and $38.5 million in the Nuclear Regulatory Commission's Nuclear Materials and Waste Safety Program.

Last year, the House passed legislation for these solutions.

There is still support and the appropriations committee should fund it.

My colleagues and I strongly urge you to support this request.

It's beyond time to get something done to securely store the spent fuel

Thank you for your time and consideration.

Ms. KAPTUR. Thank you so much for appearing, Congressman Peters. Congressman Griffith.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. MORGAN GRIFFITH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF VIRGINIA

Mr. GRIFFITH. Let me just say that John Shimkus is very happy you said that. And I know they heard from him earlier today, and I would echo those comments, not for the reasons, but just because we, as a Nation, have to figure it out.

As you all know, I don't come from an area that has nuclear waste in the southwest section of the Commonwealth of Virginia. That is not one of our issues. We have lots of issues and I do appreciate the opportunity to highlight some of the matters that are of great importance to my district, and to the country as we move forward in this process.

And I would like to address the importance of research and development funding at the Department of Energy, in general, and specifically at the Office of Fossil Energy.

As this Congress continues to examine our global climate, it is imperative that an effective plan to counter climate change include our Nation's vast supply of natural resources, and our talent for technological innovation.

Far more room exists for exploration and innovation in the energy space, and DOE plays an important role in this research and development.

During a recent district work period, I visited Virginia Tech where a team of experts is focusing on developing processes to extract rare earth elements from coal. But as often happens with research, sometimes you are working on one thing, and you actually solve a different problem. Now they are still working on getting the rare elements from coal, because it appears that Appalachia has a rich segment of where the coal meets the rock, we have a lot of rare earth. It is still rare, but not as rare.

And so a consortium of universities including Virginia Tech, won a $2-million grant from DOE for a pilot project to test a hydrophobic, hydrophilic, don't ask me what all that means, separation process to produce clean coal and especially carbon products from discarded, or for discarded coal wastes.

As a result of this research, they have also found a way to improve the quality of coal burn at steel plants. So, what they are able to do, is they are able to take a poor quality coal, get the higher quality carbon ready for use, and then it can be used for making steel, even if it is a low quality coal.

As a result of that research two steel facilities in India are now licensing their technology, not because they are looking for rare earth, but because they are looking—India wants to have cleaner processes, but their main fuel source is coal, and it is not very good coal.

So they are going to use our technology that we did the research on to get a higher burn from their coal, for their steel plants, which

lowers their carbon footprint. So, when we talk about doing research on coal, what so many people don't realize is, the rest of the world is going to continue to burn coal.

India wants to have a clean environment, I am not saying they don't, but if all they have got between themselves and their people having good jobs, or better jobs, and having a better lifestyle, is to be able to use their coal as it currently is, a dirtier form of coal, they are going to use it.

But if we can use our research and development and come up with better ways to use the coal, or to make it cleaner, then we can export that technology to the world, because if we could do everything in this country to lower our carbon footprint, and if the rest of the world, particularly the large emerging economies, don't follow suit, and they won't if it means impoverishment of their people, then we haven't really done a whole lot.

And this is one of those exciting technologies where we were looking for one thing, but because we were working on clean coal, we found another. This is just one example of how DOE and research and development funding can be used in conjunction with our national labs and research universities to get projects like this off the ground.

I would love to see overall increases in research, but at the minimum parity between the amount of money appropriated for fossil energy research, and other DOE research accounts, particularly with the Office of Energy, Efficiency and Renewable Energy, would be greatly appreciated.

A comprehensive of all of the above energy policies must include robust funding for R&D at the Federal level. These funds will continue to shorten the timeline that it take, ready to make clean energy technologies available, not just for us, but for the world.

I would also like to share my support for work done by the Appalachian Regulations Commission, particularly on the Appalachian Highway projects, HEART funding can be used for a variety of projects that directly benefit economic development in the Appalachian Region through grants and contracts.

This money has gone towards important issues in the Appalachian communities including expansion of broadband services, community planning and roads. The projects this money funds are important for the success of Southwest Virginia, and really for all of Appalachia.

I understand that the funding of the Appalachian Highway Program isn't under this committee's jurisdiction, but HEART plays a critical role in administering the Appalachian Development Highway System. These highway projects serve as economic lifelines to small communities throughout Central Appalachia, bringing in tourism, jobs, et cetera.

I urge you to work with the Transportation Subcommittee, and with the Appalachian Regional Commission to ensure that they have the resources needed to expand and improve highway access in Central Appalachian.

And that being said, I appreciate you all, time here today, I know you have heard a lot. But thank you so much for doing it, it is important to us to be able to come in and look you in the eye and say, this stuff is important. Thank you.

[The information follows:]

March 26, 2019

The Honorable Marcy Kaptur
Chairwoman
Energy and Water Development
Appropriations Subcommittee
2362-B Rayburn House Office Building
Washington, DC 20515

The Honorable Mike Simpson
Chairman
Energy and Water Development
Appropriations Subcommittee
2362-B Rayburn House Office Building
Washington, DC 20515

Dear Chairwoman Kaptur and Ranking Member Simpson:

Thank you for providing me with the opportunity to highlight matters of great importance to my district and the country as you move forward in the appropriations process. I'd like to address the importance of research and development (R&D) funding at the Department of Energy (DOE) in general, and specifically at the Office of Fossil Energy (FE).

As this Congress continues to examine our global climate, it is imperative that any effective plan to counter climate change include our nation's vast supply of natural resources and our talent for technological innovation. Far more room exists for exploration and innovation in the energy space, and DOE plays an important role in this R&D.

During a recent district work period, I visited Virginia Tech where a team of experts is focusing on developing processes to extract rare earth elements from coal byproducts. A consortium of universities including Virginia Tech won a $2 million grant from DOE last fall for a pilot project to test a hydrophobic-hydrophilic separation process to produce clean coal and specialty carbon products for discarded coal wastes. As a result of this research, they have also found a way to improve the quality of coal burned at steel plants. They are licensing this technology to Indian steel mills which will reduce their carbon footprint. This serves as just one example of how DOE R&D funding can be used in conjunction with our national labs and research universities to get projects like this off the ground.

I would love to see overall increases, but at the minimum parity between the amount of money appropriated for fossil energy research and other DOE research accounts– particularly with the Office of Energy Efficiency and Renewable Energy.

A comprehensive "all of the above" energy policy must include robust funding for R&D at the federal level. These funds will continue to shorten the timeline it takes to ready many clean energy technologies for commercial use.

I would also like to share my support for work done by the Appalachian Regional Commission (ARC), particularly on Appalachian highways programs.

ARC funding can be used for a variety of projects that directly benefit economic development in the Appalachian region through grants and contracts. This money has gone towards important initiatives in Appalachian communities, including expansion of broadband services, community planning, and roads. The projects this money funds are important to the success of Southwest Virginia.

While I understand that funding for Appalachian highways programs, particularly the Appalachian Development Highway System (ADHS), is funded under the Transportation, Housing, and Urban Development Appropriations bill, ARC plays a critical role in administering the ADHS program. These highway projects serve as economic lifelines to towns throughout Central Appalachia, bringing in commerce, tourism, and jobs. I urge you to work with the Transportation Subcommittee and with ARC to ensure they have the resources needed to expand and improve highway access in Central Appalachia.

I appreciate your consideration of this request.

Sincerely,

H. MORGAN GRIFFITH
Member of Congress

Ms. KAPTUR. Thank you so very much for representing your districts, but also the larger needs of the country, embracing all energy forms in trying to help our nation transition where we must.

I think you have both been very upfront about that. Thank you for helping us to produce a more balanced bill, as this committee is known to do, and for the sake of the country.

I heard, Congressman Peters, what you have recommended regarding nuclear spent fuel storage. We have had several witnesses testify today. It is a very prickly issue, as you well know, but I think all of us want to see a momentum on that.

And Congressman Griffith, I think you are the—we had two witnesses from Virginia today. So, thank you for representing the Western portion, so that we gain an understanding of the coal corridor that ends up passing through Ohio as well, the southern part of our state, in West Virginia, and so forth, the very place in America that cannot be ignored.

And we have to find answers, and science is our friend on this. Although she seems to be very slow. I have been voting for clean coal since I got here many years ago, and we don't seem to be there yet. But we have learned a lot about the ecosystem in which we must jointly exist. So, thank you for testifying today.

Congressman Simpson.

Mr. SIMPSON. I would just say, thank you for your testimony, for being here. We will take it, obviously, under consideration, when we put this bill together. Congressman Whitman was the other Congressman from Virginia, and I noticed that he had a smile on his face, just like yours, so there must be something that happened that——

Mr. GRIFFITH. Yes. We had some good things happen last night in Virginia over the weekend, and last week.

Mr. SIMPSON. Congratulations.

Ms. KAPTUR. And if either of you wish to submit additional material to the record, including visual material, or broader ecosystem data that you think would be important for our own information, please do so.

Mr. SIMPSON. Thanks very much to both of you.

Ms. KAPTUR. Thank you so very much. And finally, I think our last witness of today will be Garret, Congressman Garret Graves from Louisiana. We have had quite a contingent from Louisiana today. So we warmly welcome you.

TUESDAY, APRIL 9, 2019.

WITNESS

HON. GARRET GRAVES, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF LOUISIANA

Mr. GRAVES. It must be kind of important.

Ms. KAPTUR. Must be pretty important.

Mr. GRAVES. Thank you, Chairwoman, Ranking Member Simpson. Thank you very much for the opportunity to be here. I do very much appreciate your patience. I know that sitting here though testimony from all these members from problems, energy, water,

across the issues is challenging, and I do very much appreciate you opening the doors, and your patience being here today.

So you have had other people from Louisiana who have come, and so I am sure that they have said everything, I just want to say it better. Now, so seriously.

Madam Chair, a little bit of background. Louisiana, is at the bottom of one of the largest watersheds in the world, and we drain Canada, we drain Montana, we drain New York, and everything in between.

As all of these areas develop, including your state, more water is put into this river system, it comes to us. And so we have this challenge of our spillway systems, our emergency relief valves have been opened on average once every 10 years. We have had to open them, 3 of the past 4 years, 3 of the past 4 years, we have had to open them, breaking this once per decade sort of theme, or average that we have seen over the last several decades. Showing again, more water is coming to us and it does make us more vulnerable.

At the same time on the ecological side, we have lost 2,000 square miles of our coast, 2,000 square miles. Jurisdiction of wetlands, we had the EPA and the Corps of Engineers that regulate the wetlands, yet, their own actions. This is largely attributable to the Corps of Engineers actions, have caused us to lose 2,000 square miles of our coast, once again, making us more vulnerable, and it is a very challenging situation to be in.

This area is nationally significant, one of the top energy producers, one of the top refiners, five of the top 15 tonnage ports in the United States, one of two places in the Nation has all six class one rail lines, top commercial seafood production in the Continental United States.

I mean, these are nationally significant areas, assets, resources that we have. And so these vulnerabilities affect not just Louisiana, they affect the entire Nation.

We are talking a lot about the National Flood Insurance Program lately, that is the defense, you are the offense, and you have a $100 billion backlog in project with the Corps of Engineers, $100 billion.

We can appropriate the amount of money that the administration, whether it is Trump, Obama, Clinton, Bush, have asked for, we will not have these projects for over 100 years. We obviously know it doesn't make sense. We are exacerbating the problem through a few things we are doing here.

Number one, some of the barriers in place that are preventing in some cases pre-disaster mitigation, hazard mitigation, community development disaster recovery funds from being used on Corps of Engineer projects.

There is no project process as arduous as the Corps of Engineers. None. We should actually be incentivizing other funds when they are eligible to be put towards these types of projects. Not prohibiting it. Helping to address our backlog, and more importantly helping to make our community more resilient.

Helping to bring down the liability of the Flood Insurance Program. Helping to reduce the flood insurance cost. And most importantly, helping to reduce the trillions of dollars in disaster cost that we have spent over the last few decades. This is deficit spending.

I think that we need to look, and I know this gets into authorization, I think we need to look very seriously about whether the Department of Defense is the right agency to house this mission.

I know a decade, excuse me, a hundred years ago it was, I am not sure today that it still is the appropriate place for it to be. Should it be an infrastructure agency? Should we set up an administrative account to where the Corps is not billing individual projects accounting, instead, have an administrative account to bill the Corps of Engineers to where we can put money toward projects, and not allow them to keep living off of these projects, where they are siphoning off millions and millions of dollars each year to pay for agency costs, including our Colonel in Louisiana that had a fleet of vehicles driving around places.

And I want to give a shout out to our Colonel Clancy who now drives himself. But I am just not sure that there is a pressure for efficiency there. We have a project in Louisiana that has been in the study phase since 1993. We spent over $80 million studying it, and they haven't put a shovel in the ground.

That is not doing justice to anyone. An authorization should mean something to someone, it should mean something to our residence, not the actual death sentence, or mean that nothing is going to happen, and you can't use other funds to progress the project.

And a few other things, very quickly. We have, as I mentioned, 5 of the top 15 ports in the United States, yet we don't have the ability to handle post-Panamax ships. We have had a deepening project on the Mississippi River that has been authorized now for decades. We have done some additional perfection to the authorization language.

This isn't just an opportunity for us to meet new shipping trends, it is an opportunity for us to take the sediment that we dredge, and use it for restoring our coastal wetlands, which also have billions of dollars in federally authorized projects there. It is an opportunity for us to have symbiotic relationship.

Again, I want to mention the Morganza and the Gulf Project which is hurricane protection for Terrebonne and Lafourche Parishes that dates back to 1993. We have had over a billion dollars in FEMA claims in this region without any work on this project.

It saves money, we are working right now to help to refine the projects, because I think the Corps' estimated cost is outrageous. It was in excess of $10 billion. I wouldn't fund it either if it was that high. So we think it was gold-plated out of hand so we are working to reduce those costs.

And lastly Madam Chair, we have a programmatic project called the Louisiana Coastal Area, LCA, it's about 100 percent about restoring our coastal wetlands.

It's about ecological productivity, helping to address sea rise challenges and vulnerabilities, and coastal Louisiana projects have been authorized since 2007. This is comparable. The Chesapeake Bay Everglades, Great Lakes, except that it is even more important.

And I would urge that you continue working to help improve efficiency, and providing funding for these important national projects.

Ms. KAPTUR. Thank you so very much Congressman Graves. Congressman Scalise testified a little bit earlier, and I said to him

that when our formal hearings are over, I really want to create a sort of Mississippi River Corridor discussion, all the way from the Red River Valley up in Minnesota, all the way down to you in Louisiana, and have the Corps present, so we can get our arms around what the future requires of us today.

And I am completely in agreement with you that the infrastructure needs of the Corps budget are so huge, and we have not been able to fund what is necessary around the country. We patch a lot, and projects take a long time, because there are a lot of projects and there is not enough money.

So, if you could have any influence over the Trump administration that has proposed a budget that cut the Corps by a third, and several other accounts that are very important to us in the Department of Energy.

I mean, we really need more vision, and I believe that the President should move an infrastructure bill starting with this account. The Army Corps of Engineers Account. We have our arms around the backlog, we know where it exists, and let us be the base hit. Maybe we are not the homerun, but we could do so much from coast to coast, but we can't do it if we have only one leg.

And right now, we are limping around because we don't have sufficient funding to meet all of the Corps' requirements around the country, including in Louisiana.

So, I just put that on the table. I don't know what some of those people think over there. We generally get an administration in place that doesn't give us enough money for the Corps knowing how vital this is to people's districts that we will restore it.

Well, that doesn't show very much leadership. But I just think somebody ought to, some group of people, maybe Congressman Scalise could have an influence over there, but why fight about some other infrastructure bill that will involve several other committees. Our subcommittee could move a bill very quickly, and all the projects are outline, including those that are needed in your area. So I just put that on the table.

Congressman Simpson.

Mr. SIMPSON. I would say all we need is a big 302(b) allocation. That has always been the challenge, and it is not just from this administration. As I have said many times during hearings, unfortunately their budget has to abide by the law, and the law right now is sequestration. So, until we fix that, we have got a problem.

I don't suspect that sequestration is going to be where appropriation bills end. So we will come to an agreement, and we will put funding in for those things. But a $100-billion backlog in the Army Corps of Engineers, and $750-billion backlog at the EPA in clean water and sewage systems, and so forth. An $11-billion backlog in our national parks. A huge problem.

Mr. GRAVES. Yeah. It is. It is. And if I can just respond very briefly. Madam Chair, Ranking Member, in regard to the White House, and as Ranking Member Simpson noted, this has been a problem under consecutive administrations. I think one of the challenges that everybody has is people look at the Corps of Engineers and say, this isn't a good investment, they are not fast enough.

And so it is kind of a chicken and an egg thing. I think we have got some work to do on the authorization side as well as to help

improve the efficiency of this project in development and the delivery process to where you all look at it, and the White House looks at it like a good investment.

Ms. KAPTUR. Thank you so much. And we will accept your written testimony for the record, and any visual materials that you wish to provide along with it.

Mr. GRAVES. Thank you very much. I appreciate that.

Ms. KAPTUR. We will post them on our website. Thank you so very much.

Mr. GRAVES. Thanks, again, for opening up the committee. I appreciate it.

[The information follows:]

Congressman Garret Graves, Louisiana's 6th Congressional District
Member Day Testimony
House Committee on Appropriations
Subcommittee on Energy and Water Development

Chair Kaptur and Ranking Member Simpson, Members of the Subcommittee, thank you for the opportunity to discuss the importance of prioritizing investment in our nation's infrastructure.

We have a fundamental problem in the water resources space: The Army Corps of Engineers is our primary resilience agency, but the Corps has a backlog in congressionally authorized projects that would take 100 years to complete if we continue to appropriate funding for authorized projects at the current rate. There is plenty of blame to go around for this backlog, and I want to start by pointing out some questions which need to be addressed by authorizing committees:

- Should we continue to allow the Corps to bill individual projects for their administrative costs?
- Is the mission of the Army Corps' Civil Works division compatible with the mission of the Department of Defense? – This organizational structure is fundamental to the Corps' dysfunction and should be reallocated to an agency that ensures that the civil works mission is the national priority it should be. I want to lend my support to the administration's reorganization of the federal government in this area, as well as recent efforts to centralize and ensure non-duplicative permitting processes.
- Lastly, why do Corps of Engineers projects routinely cost two to three times the cost of state and local estimates, and how can we leverage local capabilities to get all of these projects completed as soon as possible?

While there is much work to be done, there are also changes that need to be made in the appropriations process to ensure the efficiency of federal investment.

In an effort to ensure non-duplication of support, the Appropriations Committee has placed restrictions that prevent some funding streams from being allocated to authorized Army Corps of Engineers Projects. This provision has been included in several supplemental appropriations bills and actually makes it *more* of a liability for an infrastructure project to receive congressional authorization. I want to urge the committee to reverse their course in this effort: we should be *eliminating* obstacles and disincentives to using other federal funds to implement Corps projects — such as FEMA's PDMP and

HMGP, HUD's CDBG-DR and others. The fact of the matter is that there is no project in the federal government that goes through the technical, environmental and economic scrutiny of Corps projects and we should be pushing other federal program funds to these projects, not prohibiting them. These funding sources only compliment the hard work of our state and local governments. In my state, Non-Federal sponsors of Corps projects invest billions of dollars in ecological restoration and flood mitigation projects. We need to encourage all stakeholders in these projects to work together for the common goal of getting these projects over the finish line.

Many of you have heard me say this in the past, but the waters that flow through the Mississippi River in my district is drainage from two Canadian provinces, water from every state between Montana and New York, and is the largest watershed in the United States and *one* of the largest in the world. As you know, right now the 3rd highest volume of water on the river in recorded history is heading for my district and the outlet of the river into the Gulf of Mexico. I say this to underscore that investment in water infrastructure generally, as well as in the region I represent, is crucial to our nation.

However, there is a stereotype that supporting Army Corps of Engineers projects equates to pork-barrel spending. Without transparency, that can be true. However, there are many projects that would actually provide a substantial savings to federal taxpayers. You may be surprised to hear that many of these opportunities are in Louisiana:

- Louisiana is home to five of the top 15 tonnage ports in the United States. Using our ports and waterways to move cargo gets it off our roads, reduces energy consumption, has lower emissions and has lower costs as compared to other options. Our state has been working with the Corps on Mississippi River deepening for not years, but decades. This project has been authorized and needs to be funded. Unfortunately, the budget request does not include funding for this important project. Our waterways handle near one-quarter of the maritime commerce in the United States. We access 31 states through our waterways and load nearly 65% of the grains in the midwest. We are decades behind investment. Funding this project and managing the implementation in the right way can help to address two problems: 1) deepening the river to meet shipping trends, 2) use the dredge material to advance the Louisiana Coastal Project to restore a portion of the 2000 square miles of Louisiana coastal wetlands.

- The Morganza to the Gulf project has a history dating back to the 1980s. The project or project components have been authorized by Congress at least three times and approximately

$80,000,000 without a single dollar in CG funds being invested in construction of the project. As we have waited these decades, over $1,000,000,000 in federal funds have been spent on FEMA claims in the area. We are working with the Corps, Terrebonne Levee and Conservation District, the South Lafourche Levee District and others to right-size this project and to reevaluate the engineering standards. Efforts so far have identified substantial cost savings and value for taxpayers.

- Old River Control Structure diverts approximately a 70/30 split of flow on the Mississippi and Atchafalaya Rivers. The management of freshwater and sediment in the vicinity of this structure is dangerous. This river system is one of the largest in the world. Historically, we opened the Bonnet Carre Spillway once per decade, we have been forced to open this "pressure relief value" three of the last four years. The riverbed has not been properly managed. Spillway operations are primarily based upon flow or volume. With the sediment build up above and below the structure, the same flow of water today may be several feet higher on the levees than it was a few decades ago. This is dangerous and not consistent with levee designs. The Committee must work with the Corps to address this urgent situation.

- Lastly, the Louisiana Coastal Area (LCA) is a program not unlike the Everglades restoration project, restoring 2,000 square miles of wetlands under the jurisdiction of the Corps. The degradation of this ecosystem has occurred because of mismanagement by the federal government. The State of Louisiana's Coastal Masterplan provides the map for restoring much of this habitat and ensuring its future resilience and I want to urge federal support of the state's work in this area.

Members of the Committee, I'd like to end by noting that many Army Corps projects in my district received funding in recent supplemental appropriations packages. I want to deeply thank the committee for providing these resources, but I do want to note that had these congressionally authorized projects received the funding they needed before our 2016 flood, there may not have been a need for supplemental appropriation. Countless studies have shown that delaying investment in water infrastructure results in the devastation of communities, loss of lives, disruption of the economy, degradation of our environment, and a much higher price tag to our taxpayers in disaster response costs. My experience with our flood bears this out, and I want to urge the committee to protect our nation from these kind of disasters by prioritizing proactive investment.

Thank you again for providing me the opportunity to speak to you on these important priorities for Louisiana's 6th Congressional District and please let me know if you have additional questions regarding these priorities.

Ms. KAPTUR. All right. And I want to thank the Ranking Member for his dutiful participation. And all the members who have attended this morning. All of our witnesses.

The committee is adjourned.

[Additional material submitted for inclusion in the record follows:]

REP GILBERT R. CISNEROS, JR.
(CA-39)

Subcommittee on Energy and Water Development, and Related Agencies
FY 2020 Member Day Testimony

Chairwoman Kaptur, Ranking Member Simpson, and members of the House Energy and Water Development, and Related Agencies, thank you for allowing me this opportunity to provide input on the FY 2020 Appropriations process on behalf of the residents of California's 39th Congressional District.

Since being sworn into office, I have met with local leaders across my district to discuss their regional priorities. In virtually every meeting, the U.S. Army Corps of Engineers figured prominently. Whether it was processing development plans or design approvals, constructing infrastructure upgrades, or cleaning up Army Corps of Engineers controlled property, city leaders across my district rely on a responsive Army Corps as their partner in maintaining the quality of life for our shared constituents.

While my office is still working to best resolve the concerns raised by community leaders, it is apparent to me that the issues they raised are not the result of a lack of interest on the part of the Corps, but rather a lack of sufficient resources. I strongly encourage continued robust funding for the Army Corps of Engineers Civil Works activities, particularly for the Construction and Operation and Maintenance accounts, as this Subcommittee has championed on a bipartisan basis in the past.

In the City of Brea, we have faced unique challenges with maintaining Army Corps land in coordination with local officials. Through no fault of their own, homeless individuals establish encampments in the flood control channels above the Brea Dam. City officials have an obligation to ensure the safety of their residents but cleaning up these homeless encampments can often take months to complete. We have been assured that the Army Corps attempts to be as responsive as possible, and the city maintains good and open communication with the Army Corps. However, funding shortfalls impede timely maintenance and ongoing security. I would urge the Committee to ensure the Army Corps has the funding and flexibility to improve their ability to conduct cleanup of their property.

I would also urge the Committee to provide robust funding for the Continuing Authorities Program (CAP). CAP is a useful tool for the Army Corps to undertake localized projects. In my district, this constructive funding line will help initiate the design phase of a Project Management Plan with the Orange County Water District in the Prado Basin.

I urge you to do what you can to ensure the Corps has sufficient funds to negotiate with local partners to advance projects in a timely manner. The City of Chino Hills and its neighboring City of Chino engaged in long and complex negotiations with the Army Corps for more than a

decade to approve designs for improvements to Pine Avenue and road infrastructure in the surrounding area. While the City has indicated to me that the discussions were ultimately productive and that they enjoy a close working relationship with the Army Corps, sufficient funds are needed to ensure decade long delays like this are not replicated in other areas.

For instance, San Bernardino County will soon open negotiations with the Army Corps to replace a leasehold with an easement that the County will fund by state park bond funds. This will require complex negotiations with the Army Corps and necessitates the Corps being adequately staffed. Additionally, in the City of Fullerton, the Brea Dam has drainage tunnels and culverts and roadways that require attention due to recent storms. I encourage the Committee to provide all adequate funding for the Army Corp of Engineers Maintenance and Operations budget, which would allow the Army Corps to continue to be a good partner with our local governments.

Finally, the Santa Ana River Mainstem Project has two components currently underway that impact my district – the Prado Dam and reservoir and improvements to the Lower River in Orange County. The Santa Ana River Mainstem Project is designed for a 190-year flood event and is a cooperative effort between the Army Corps and the Counties of Orange, Riverside and San Bernardino. Full funding of the Project will allow this critical project to be completed to protect thousands of families in Southern California from major flooding.

Thank you again for your time and consideration. I know the Committee is balancing several urgent needs, and I hope that my testimony has provided you a better understanding of how important the Army Corps of Engineers and their work is to my district.

Member Day Hearing Testimony by Congressman Emanuel Cleaver, II (MO-5)
House Committee on Appropriations, Subcommittee on Energy & Water Development
Tuesday, April 9, 2019

Thank you, Chairwoman Kaptur and Ranking Member Simpson, for holding this hearing and giving Members the opportunity to share our priorities with the Subcommittee. As you may know, recent Missouri River flooding has devastated Nebraska, Iowa, and Northwest Missouri. The March runoff in the upper Missouri River Basin above Sioux City, Iowa, was a record 11.0 million-acre feet, surpassing the previous record of 7.3 MAF set in 1952. The March runoff for Gavins Point to Sioux City was more than a typical year's worth.

Though the full scope of the damage is still being assessed for Missouri and Kansas, the total likely exceeds $3 billion, just for Iowa and Nebraska. According to the Missouri Department of Transportation, 120 roads were closed due to flooding, and 168,000 acres are under water in Atchison and Holt Counties in northwest Missouri. The U.S. Army Corps KC District estimates 64 breaches occurred among the 13 impacted PL84-99 Program levee systems (two levee systems overtopped, and 11 levee systems overtopped and breached).

My congressional district – Missouri's Fifth – did not experience the level of devastation that occurred in northwest Missouri. However, make no mistake, farmers and residents in Ray, Lafayette and Saline Counties were impacted. Levee sponsors in my district are seeing a lot of seep water behind levees and clogged drainage pipes, which will delay planting. Many levees – though they did not overtop or breach – experienced erosion and side wash from the high, rapid river levels. Levees are saturated and weakened from the March flood and the grass covers will have to be re-seeded. Further snow-melt or heavy rains locally could place the region in another perilous situation.

I urge your committee to consider supplemental disaster assistance for these Midwest states impacted by the Missouri River flooding, and particularly funding for levee rehabilitation assistance through Public Law 84-99 for both federal and non-federal flood control projects damaged by the flood.

I am certain that my colleagues from Missouri, Nebraska and Iowa would concur that timely help is essential - our farmers are already dealing with challenges on multiple fronts: low commodity prices, higher equipment costs, tariffs and market uncertainty, and rising farm debt. NOAA predicts that nearly two-thirds of the lower 48 states have an elevated risk of flooding through May, placing further risk on the lower Missouri River basin. If levees are not repaired by next year farmers along the Missouri River or tributaries may not be able to purchase crop insurance. I urge your subcommittee to act swiftly to provide supplemental disaster assistance and kickstart the recovery process for the Midwest. Thank you for your consideration.

Statement of Congressman James Comer
April 9, 2019
Energy and Water Development and Relate Agencies Subcommittee Member Day

Chairwoman Kaptur and Ranking Member Simpson, thank you for the opportunity to testify on the 1st Congressional District of Kentucky's priorities in the Fiscal Year 2020 Energy and Water Development and Related Agencies Appropriations bill.

Paducah, Kentucky, is home to the Paducah Department of Energy Cleanup site. From 1952 to 2013 the Paducah Gaseous Diffusion Plant enriched uranium in support of America's nuclear weapons program and provided fuel for commercial nuclear power plants. The work that was done there was critical to both the defense and energy security of our nation. However, this important work left behind significant soil and water contamination. Deactivation and cleanup work has been underway since 2014, but there is still decades of work to be done to fully remediate the site.

In FY 2014, approximately $320 million was appropriated for cleanup activities, unfortunately that funding has dropped to about $270 million in subsequent fiscal years. Increased funding of $300 million would expedite the cleanup activities, including:

- Removal of 8.5 million pounds of R-114 refrigerant from the site. This is the world's largest concentration of the chemical, as well as one of DOE's largest environmental risks.
- Removal of motors, compressors and convertors from buildings prior to demolition, reducing future surveillance and maintenance costs for these structures.
- Complete the demolition of various dilapidated buildings on the site, reducing DOE's environmental liability for future years.

The 1st Congressional District of Kentucky is also home to the barge industry, which according to recent estimates, transports more than 600 million tons of cargo on our inland waters every year. Unfortunately, more than half of the locks in the system are more than 50 years old and far past their design life. Failures of this aging infrastructure lead to bottlenecks of river traffic delaying shipments and costing American shippers hundreds of millions of dollars.

It is crucial that we continue to provide funding to upgrade our river infrastructure. That is why I ask the committee to provide adequate appropriated construction funding to match the full potential of the Inland Waterways Trust Fund. Of that funding, at least $330 million should be specifically provided for the three priority projects identified by the Corps of Engineers, including $66.1 million for the Kentucky Lock Expansion. I also ask the committee to continue to support the Corps of Engineers' work to clear its backlog of operations and maintenance projects by providing O&M funding equal to or even greater than the $3.74 billion provided in FY19. Finally, I ask the committee to provide $10 million from the Corps of Engineers Investigations account to continue pre-construction and design for the Navigation and Ecosystem

Sustainability Program (NESP). NESP serves purposes we can all support of both upgrading our locks and dams while restoring or preserving more than 100,000 acres of wildlife habitats at the same time.

Again, thank you for the opportunity to testify. I look forward to working with you to fund these priorities that will help not only my district but reduce the overall liabilities of DOE and improve the efficiency of our entire inland waterways system.

Statement of Hon. Neal Dunn

Thank you Chairwoman Kaptur and Ranking Member Simpson,

I am here before you today to advocate for robust funding for critical infrastructure and environmental projects of great importance to my district and our nation as a whole.

Like many across the country, Florida's Second Congressional District has constant water infrastructure needs, whether this be beach re-nourishment in Gulf County, maintenance on the Suwannee River or harbor expansion in Panama City. I'm pleased that this year, finally, the Port of Panama City was included in the Army Corps FY19 workplan. A $4 million investment from the federal government will be an economic boon for the Florida panhandle, especially as it looks to recover from Hurricane Michael.

I support, and urge this committee to support, robust water infrastructure funding this year. However, as we move through the appropriations process, I'd like to leave you with my thoughts on some of the issues we face, and where we could do better.

Although Congress has the power of the purse, we ultimately have very little say over when or how we fund water infrastructure projects. Like many members, I spend hours during the last 6 months of the year pestering the Army Corps of Engineers and the Office of Management and Budget – trying to make them understand why a project in my district is in the best interest of the country. This process is frustratingly convoluted and opaque. While projects are typically ranked based on a cost benefit ratio (BCR) number – the Corps and OMB often disagree as to what that value is, or simply use different numbers entirely. Most of the time, a community is better off hiring a good lobbyist in Washington rather than looking to make their project more competitive. This process needs to be more clear and transparent.

Furthermore, we have severe challenges in getting water projects done in a cost efficient and timely manner in the United States. Depending on what side of the sea turtle season we are on, the U.S. dredging industry is either significantly over or significantly under capacity. Furthermore, a large, $100 million or more dredging contract may only receive two bids – if we are going to spend that much money on something, we need a more competitive marketplace. I'd like for us to look at ways to strengthen the U.S. dredging industry, both by providing more opportunity at home and abroad. When projects in my district wait for years for just a few million dollars – or less – of federal funding, shaving just a few percentage points off the cost of a large project would go a long way. I believe that a larger and more competitive domestic industry would accomplish this.

Finally, I'd like to shift gears towards what has been for the last 60 years, and remains to be, our most pressing national environmental crisis – nuclear waste. Currently, Nuclear waste is stored in over 121 locations across 39 states, with over 3000 metric tons in my home state of Florida alone. Despite decades of research and the fact that ratepayers have contributed $40 Billion towards its construction, Yucca Mountain remains stalled. I support the President's request to revive the project, and finally proceed with a solution to the nuclear waste problem. I urge this committee to do the same. Thank you.

Representative Bill Huizenga
Michigan – 2nd District

Energy and Water Development Appropriations Member Day Hearing

Rep. Bill Huizenga Remarks - April 9, 2019

- Thank you, Chairwoman Kaptur, Ranking Member Simpson, and members of the Energy and Water Development Subcommittee, for allowing members to share their priorities and the needs of their district at this member day hearing.

- I am here today to discuss two issues that are critical to West Michigan and to the whole Great Lakes Region: The upkeep of our Harbors and the fight against invasive species

- Harbors and navigation channels are a vital part of our nation's transportation infrastructure and a reduction in their capacity can have significant impacts on local communities, from the coasts to the Great Lakes.

- I am grateful for your efforts to increase U.S. Army Corps of Engineers harbor maintenance funding in recent Energy and Water Development appropriations bills.

- The Consolidated Appropriations Act for 2019 allocated $1.54 billion for harbor maintenance, exceeding the target Congress overwhelmingly supported from the Water Resources Reform and Development Act of 2014.

- While this is another strong step in the right direction, there is still work which remains

- Full use of the Harbor Maintenance Trust Fund is urgently needed to support critical maritime economic activity.

- Through a glide path established in WRDA, Congress committed to achieve full use of the Harbor Maintenance Trust Fund through incremental increases over a ten-year period.

- We are ahead of this schedule and it is with this spirit that I urge the House Appropriations Committee to stay on the path to full utilization of the trust fund and allocate $1.59 billion for harbor maintenance in fiscal year 2020.

- During my first year in Congress, our ports and navigation channels were maintained with just 47% of the revenue collected into the Harbor Maintenance Trust Fund. Last year we were near 95% - showing just how far we have come.

- Thanks in large part to the efforts of this committee, we have stopped adding to the maintenance dredging backlog.

- U.S. ports serve as a critical link to connect U.S. manufacturers, farmers, and businesses with markets around the world and are indispensable to making the exports of U.S. goods cost-competitive.

Representative Bill Huizenga
Michigan – 2nd District

- The inefficiencies resulting from poorly maintained harbors drive up the cost of U.S. exports and imports, which threatens U.S. economic growth. We can't sell more Made-in-America products if they can't leave our harbors!

- Enough Harbor Maintenance trust fund revenue is collected each year to meet the nation's annual authorized harbor maintenance needs for harbors of all sizes in all regions of our country - from the Pacific Northwest to the Gulf Coast and from the Port of Long Beach to Pentwater, Michigan.

- Thank you for the efforts we have made thus far and I urge you to continue on our path of incremental funding increases that will soon unlock all of our navigation channels for the free flow of commerce.

- Additionally - I would also like to take this opportunity to urge your support of our efforts in the fight to prevent the full scale, irreversible inundation of Asian carp into the Great Lakes region.

- Asian carp have huge appetites, can grow to weigh 100 pounds and four feet long, and quickly expand their habitats. They have decimated native fish populations throughout the Mississippi River Basin.

- The importance of protecting our vulnerable Great Lakes freshwater system from this disastrous invasive species cannot be overstated. In fact - the introduction of non-native species to the Great Lakes is currently one of the greatest economic and environmental threats to our region.

- The preventative measures we currently have in place are only temporary obstacles, as Asian carp have been found only a few miles from Lake Michigan.

- However – the Brandon Road Lock and Dam in Joliet, Illinois has been identified as the key choke point in safeguarding our Great Lakes ecosystem and economy

- The timely completion of the work at Brandon Road is an essential next step in the process to safeguard the Great Lakes region – which provides drinking water to over 30 million people and supports a $7 billion fishing and $16 billion boating industry.

- The Army Corp of Engineers must act with urgency to complete and release the Chief's Report for the Brandon Road Recommend Plan to prevent the upstream transfer of invasive species into the Great Lakes.

- Furthermore – it is also critical that the Corp prioritizes critical projects, such as the Brandon Road Lock and Dam, to prevent the irreversible spread of invasive species.

- In West Michigan – our identity is directly tied to the health of the Great Lakes. This highly destructive invasive species is a direct threat to our way life and we must take the necessary steps to protect our region.

Representative Bill Huizenga
Michigan – 2nd District

- Chairwoman Kaptur, Ranking Member Simpson , and members of the Subcommittee – Thank you again for working with us to maintain our nation's ports and harbors and for your efforts to safeguard one of our nation's greatest natural resources.

CONGRESSWOMAN SHEILA JACKSON LEE (TX-18)

STATEMENT BEFORE THE
COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY, WATER, AND RELATED AGENCIES

MEMBER DAY HEARING ON
ENERGY, WATER, AND RELATED AGENCIES APPROPRIATIONS ACT FOR FY2020
WEDNESDAY, APRIL 9, 2019
2362-B RAYBURN
10:00 A.M.

Chairwoman Kaptur, Ranking Member Simpson and distinguished Members of the Subcommittee:

- As a senior member of the Committees on the Judiciary and on Homeland Security, let me offer my appreciation and thanks to Chairwoman Kaptur and Ranking Member Simpson for the difficult work and choices that must be made to produce a truly bipartisan Energy and Water spending bill, for their commitment to producing a bill that fairly reflects the interests and priorities of the American people, and for their cooperation in working with me to ensure that the victims of Hurricane Harvey received the assistance and resources needed to recover from one of the greatest water catastrophes in recent memory.
- Madam Chair, I understand that my entire statement will be made part of the record so I will keep my remarks brief.
- In the few minutes allotted I wish to highlight the energy, water, and U.S. Army Corps of Engineer programs which warrant the Committee's continuing attention and support.

ENERGY AND WATER PROGRAMS

I support $1.59 billion for Harbor Maintenance Trust Fund

The Harbor Maintenance Trust Fund (HMTF) is collected to ensure reliable maintenance and operation of our nation's ports. I strongly support full utilization of the Harbor Maintenance Trust Fund, and urge the Committee to fund harbor maintenance activities at the highest possible level.

I support $270 million for Weatherization Assistance Program

WAP helps low-income families, seniors, veterans, and individuals with disabilities improve the energy efficiency of their homes, freeing up limited resources for other essentials like food and medicine

I support $6.0 million for U.S.-Israel Energy Cooperation Program
This funding will be utilized to further implement Section 917 of the Energy Independence and Security Act, P.L. 110-140, and the May 2008 agreement between the U.S. and Israel on energy cooperation. The funding will provide for ongoing collaborative U.S. and Israeli research and development efforts in the fields of energy technologies and increased energy efficiency.

I support $120 million for DOE's Wind Energy Program
The Wind Energy Program improves our nation's renewable energy goals by furthering advancements in wind energy research and technologies, including wind energy project design, optimization, and testing. The program also conducts important research to increase capacity for distributed wind, which has the ability to harness the full potential of rural America to play a major role to lower the costs for consumers.

I support $2.6 billion for Energy Efficiency and Renewable Energy
The DOE Office of Energy Efficiency and Renewable Energy (EERE) and its critical programs partner the federal government with industry, academia, and research facilities to secure America's energy future.

I support $7.0 billion for DOE Office of Science
This request provides funding to operate the scientific user facilities at optimal levels in support of more than 31,000 researchers from universities, national laboratories, industry, and international partners. The request funds activities that, in close coordination with the NIH and the Presidential BRAIN Initiative, will develop next-generation tools and technologies to support research into the brain.

I support $70 million for State Energy Program
This funding will allow states to take on energy efficiency and renewable energy projects and grid modernization projects, including: starting rebate programs to encourage purchasing energy-saving appliances; efficiency improvements of hospitals and school; working with utilities and energy service companies to install wind, solar and energy efficiency projects and to improve resilience and modernize the grid.

U.S. ARMY CORPS OF ENGINEERS
I support $175 million for Army Corps of Engineers Investigations
The Army Corps of Engineers does vital work that requires cooperation with other agencies. This appropriation funds studies to determine the need, engineering

feasibility, and economic and environmental return to the Nation of potential solutions to water and related land resource problems; preconstruction engineering and design; and related data collection, interagency coordination, and research.

I support $73 million for Continuing Authorities Program

This request would provide funding for USACE Civil Works Program in the following amounts: Section 14, Emergency Streambank Protection, $8 million; Section 103, Hurricane and Storm Damage Reduction, $4 million; Section 107, Small Navigation Improvements, $8 million; Section 111, Shoreline Damage Attributable to a Federal Navigation Project, $8 million; Section 204, Beneficial Uses of Dredged Materials, $10 million; Section 205, Flood Control Project, $15 million; Section 206, Aquatic Ecosystem Restoration, $12 million; Section 1135, Project Modifications for Improvement of the Environment, $8 million.

I support $5.5 million for U.S. Army Corps of Engineers' Water Operations Technical Support (WOTS) program

These reservoirs provide invaluable flood control, water supply, recreation, and stream flow regulation. Recent droughts, including the devastating drought impacting California, highlight the need for the Corps to access the latest weather and seasonal forecasting observations, which may offer the opportunity for improved operations increasing water supply while maintaining critical flood control.

I support $7.5 million for Coastal and Ocean Data System (CODS)

CODS provides high-resolution observations and models of coastal ocean waves and shoreline change. Through a network of over 50 wave buoys, CODS measures, models, forecasts and publicly disseminates real-time coastal wave information in 14 states and island territories. Without these data, life and property would be at risk.

CONCLUSION

Madam Chairwoman, I thank you and the Ranking Member for your leadership and for extending me this opportunity to share my major priorities with the Subcommittee.

Congressman Francis Rooney (FL-19)

House Appropriations Subcommittee on Energy and Water Development Testimony

Chairwoman Kaptur and Ranking Member Simpson, thank you for the opportunity to testify on the Everglades. The Army Corps of Engineers is responsible for the construction and management of projects around Lake Okeechobee and the Everglades. I appreciate the Energy and Water Development Appropriations Subcommittee's attention to this critical issue and look forward to working with the Chairwoman and Ranking Member.

The Everglades and Lake Okeechobee Watershed include 16 counties and 164 cities. It has a $2 trillion economic impact on the state and supports 55% ($1.3 trillion) of the real estate value in Florida. For every dollar invested in the Everglades/Okeechobee Watershed, $4 of economic benefit are produced.

Due to a century of human development, the greater Everglades ecosystem is now less than half of its original size and Lake Okeechobee fills up 6 times faster than it can be drained, resulting in massive discharges into the adjacent rivers and coastal areas. These discharges are untreated and impact the delicate balance of fresh water and salt water in the coastal ecosystems. The Comprehensive Everglades Restoration Plan, or CERP, seeks to restore balance to these delicate ecosystems, ultimately reducing harmful discharges to the Caloosahatchee and St. Lucie estuaries and sending clean water south to the marshes of the Everglades and Florida Bay.

CERP was created by Congress and the State of Florida in 2000. It includes 68 projects that will create (1) storage, treatment and flow of water southward into the marshes of the Everglades and Florida Bay; (2) storage and treatment of water entering Lake Okeechobee from the north; and (3) balancing of flows to control salinity levels between wet and dry years. CERP was set up to share costs between the state and the federal government 50/50. As of December 2018, the state had made expenditures of $2.25 billion and the federal government had contributed $1.37 billion – these figures translate to a 62/38 split overall. So, we have a lot of catching up to do on the federal end of the agreement.

In fact, three projects authorized by the 2007 WRRDA are still incomplete: (1) Site 1 Impoundment next to the Loxahatchee Wildlife Refuge; (2) the Picayune Strand project in Collier County; and (3) the Indian River Lagoon-South, or C-44, along the St. Lucie Canal.

Additionally, four projects from the 2014 WRRDA have not been completed: (1) C-43 West Storage Basin in LaBelle; (2) C-111 Spreader Canal on the east side of Everglades National Park just west of Miami – there is no reason to clean up the Everglades if pollution can creep in from the east; (3) the Broward County Water Preserve Area; and (4) the Biscayne Bay Coastal Wetlands project. Each of these projects play an essential role in the overall CERP and must be completed. The cost to complete these projects is $1.7 billion but Florida will pay for the remaining $800 million to complete C-43.

In 2016, the Water Infrastructure Improvements for the Nation Act, or WRRDA 2016, was signed in to law with two new CERP authorizations. The Central Everglades Planning Project (CEPP) combined 6 projects from the CERP. This critical $1.9 billion project will construct a series of features to allow the redirection of up to 210,000 acre-feet of Lake Okeechobee regulatory discharges southward for storage, treatment and delivery to the Water Conservation Areas and Everglades National Park. This project will also help reduce damaging freshwater releases from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries. CEPP includes several features, including backfilling of canals, removal of levees and roads that impede the flow of water south and construction of another 15,000-acre Flow Equalization Basin (FEB), A-2, just west of the A-1 FEB that was built by Florida under its restoration strategies program, successfully bringing the park in to EPA 10ppb compliance.

The second WRRDA 2016 authorization was for completion of the last $133 million of the Picayune Strand Restoration Project at a total cost of $626 million. This will restore over 55,000 acres of over-drained wetlands in Collier County and help to improve the quality, timing and distribution of freshwater flows to the Ten Thousand Island National Wildlife Refuge. As of FY2019, the Picayune Strand is expected to complete its final pump installation and other components, potentially providing us with the first component completion of CERP in this fiscal year.

In 2017, the State of Florida pledged more than $1 billion to expand the water storage component of the CEPP. Located south of the lake in the Everglades

Agriculture Area (EAA), this reservoir will hold 240,000 acre-feet of water, helping to reduce harmful discharges from Lake Okeechobee and ultimately conveying clean water south and in to the Everglades. The state's committeemen required a Post Authorization Change Report (PACR) for the CEPP. This critical report required additional approval from Congress. This approval was included in the 2018 WRDA bill that was signed in to law and the planning process has started for this significant project.

Table: Corps and DOI Funding for Everglades Restoration, FY2010-FY2017
(in thousands of dollars)

	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020 Proposed
DOI								
CERP	*7,883*	*8,376*	*8,408*	*7,934*	*8,000*	*7,600*	*7,600*	*7,800*
Corps								
CERP	*76,212*	*38,499*	*61,001*	*69,970*	*75,000*	*75,300*	*67,500*	*63,255*
Total	**84,095**	**46,875**	**69,409**	**77,904**	**83,000**	**82,900**	**75,100**	**71,055**

Source: Congressional Budget Justifications for the U.S. Department of the Interior and the U.S. Army Corps of Engineers, South Florida Ecosystem Restoration Crosscut Budget Report for FY2015.

Despite the authorization of new projects, Corps funding for CERP has dipped since 2017 as indicated in the chart above. The authorization of CEPP is one of the most ambitious and critical projects to date and must begin as soon as possible. I strongly urge the Committee to provide strong funding for Corps construction to support the continued work on older CERP projects.

I appreciate the Committee's time today. I continue to encourage the Committee to provide robust funding for the Corps to carry out its crucial Everglades

restoration duties. I look forward to working with the Chairwoman and Ranking Member to restore the Everglades for future generations.

Representative Filemon Vela – Texas-34

FY 2020 - Subcommittee on Energy and Water Development

Good morning and thank you for your time today. I represent the Lower Rio Grande Valley, a diverse coastal district separated from Mexico by the Rio Grande river. It has a rich history of land and water rights and enjoys a unique ecosystem that provides habitat to one of the most diverse bird populations in the country. We have seen unprecedented growth in the valley, but still have one of the poorest populations. We support and encourage local involvement in managing that ecosystem but cannot do this without the help of the federal government. The Army Corps of Engineers (ACE) is critical to the livelihood and economic prosperity of my district. With that in mind, there are a few program areas that I encourage your support in the FY20 appropriations process.

First, I ask for support and funding of the ACE Investigations Account. Funds in this account are critical to continue the important progress made in restoring the Resaca system of Brownsville, Texas, and to develop a regional watershed management plan for one of the fastest growing regional water planning areas in the nation. I greatly appreciate the assistance over the past several years in funding for both the Investigations and Continuing Authorities Program (CAP) accounts. This has enabled the ACE and the Brownsville Public Utilities Board (BPUB) to advance the Brownsville Resacas Restoration program. The program's most significant achievement was securing a project authorization in America's Water Infrastructure Act of 2018, Section 1401, (5).

It is my understanding is that the Army Corps Galveston district could utilize $2,000,000 for work on this project with BPUB in FY20 for preconstruction engineering and design (PED) and expects to complete a Project Partnership Agreement (PPA) in 2020 with BPUB. If the Corps and BPUB complete the PPA as planned, the Brownsville Resacas Ecosystem Restoration project should be positioned for consideration as a new start construction project for FY21. The resacas in Brownsville are the last remaining ones along the Rio Grande, so restoring them is vital to preserving this important ecosystem.

In addition to the Resaca projects, ACE Galveston District is collaborating with BPUB to produce a regional watershed assessment to identify possible opportunities to develop a watershed management plan for the Lower Rio Grande Valley region. Support of the ACE Investigations Account is critical to assist communities like mine to address ecosystem restoration and flooding problems.

Next, I would also encourage support for funding of the ACE Section 205 CAP account. Sec. 205 CAP funds would assist the Army Corps in addressing flooding issues in my district, particularly in communities prone to such occurrences like Weslaco. Over the past several decades, communities in my district have experienced severe and recurring flooding. According to the city of Weslaco, recent storms damaged 20 percent of structures, including buildings critical for first responders. My understanding is that the Army Corps Galveston could utilize $125,000 in FY20 to assist in development of a watershed assessment of the area to begin to address these problems. Continued support

for the Sec. 205 CAP account would help provide the resources to move projects like this forward.

Finally, almost twenty years ago, Congress recognized the need to conserve and enhance the water supplies for ten counties in southwest Texas by passing the Lower Rio Grande Valley Water Resources Conservation and Improvement Act. With water shortages continuing due to ongoing drought conditions, high population growth, and recurring non-compliance by Mexico of the 1944 Treaty between the United States and Mexico, the need to continue this initiative is more important than ever. To date, nineteen projects have been approved for the program, which still need appropriations. These projects reduce and recover water losses due to seepage and evaporation, allow for efficient operation of the water delivery system and save individual irrigation districts thousands of dollars each year in water and energy costs. For Fiscal Year 2020, I encourage $2,000,000 in appropriations for the continuation of the program. This is a modest investment that will ensure the region's economy remains viable for many years to come.

I thank you for your time and consideration of these requests.

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