

**THE ECONOMIC IMPORTANCE OF MODERN,
RELIABLE ENERGY INFRASTRUCTURE TO
WEST VIRGINIA AND THE UNITED STATES**

FIELD HEARING
BEFORE THE
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
ONE HUNDRED FOURTEENTH CONGRESS
SECOND SESSION

AUGUST 29, 2016



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**THE ECONOMIC IMPORTANCE OF MODERN,
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WEST VIRGINIA AND THE UNITED STATES**

MONDAY, AUGUST 29, 2016

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Morgantown, West Virginia.

The Committee met, pursuant to notice, at 2:04 p.m. in Courtroom 1 of the Monongalia County Justice Center, Morgantown, West Virginia, Hon. Shelley Capito presiding.

**OPENING STATEMENT OF HON. SHELLEY CAPITO,
U.S. SENATOR FROM WEST VIRGINIA**

Senator CAPITO. I am feeling very all-powerful up here.

I want to thank everybody for coming and our witnesses for coming. Senator Manchin and I are really pleased to be talking about something that we have much agreement on, probably all agreement on, and it is extremely important to our state.

I would like to extend the fact that we invited Congressman McKinley to join us today, but he was unable to be here. I know he is as passionate about this subject as we are as well.

I would just like to say that a field hearing in my view is like we are right in Washington in our committee room giving the testimony. This will be part of the permanent record of the U.S. Senate, and I believe it is going to be online in the next 24 hours or so. If you do not catch something you wanted to catch, you can listen to it. For the general public, I think that is important.

The way this goes is I am going to make an opening statement, Senator Manchin is going to make an opening statement, and then we are going to have each person testify. If they have a longer statement, they will give a five-minute overview of their statement, and then we will begin the questioning. I do not want to make it real formal, but that is kind of how we are going to roll here.

Again, thank you all very much for coming. I am going to gavel us in.

I want to start by thanking the Monongalia County Justice Center for hosting us, and I would like to thank Judge Clawges—I hope I said his name correctly—Robin Bailey and the other justice court officers for going above and beyond. They greeted me and got me in perfectly fine, and I know it is a disruption to their day so I appreciate that.

Again, I want to welcome our witnesses to talk about the economic importance of energy infrastructure in the State of West Virginia.

We are now at a point, I think, where the United States is becoming one of the most dominant players in energy production in the world, which makes this hearing incredibly well-timed and important. There is arguably no other state where the discussion on energy infrastructure is more critical than in West Virginia.

In 2013, the United States surpassed Russia and Saudi Arabia as the leading oil and gas producer in the world, and yet we are still woefully ill-equipped to handle this boom in production.

The good news, however, is that building modern infrastructure will do exponentially more than just deliver cheap, reliable energy. New infrastructure creates jobs—and that is what we wanted to focus on today, boosts communities, adds billions of dollars to the economy, improves the safety and reliability of our grids and contributes to less emissions.

West Virginia has always been one of the blocks in the foundation of our country's energy production, but our economy in many of our communities has been devastated due to the downturn in the coal industry. We continue to rank 10th in production of all energy, 10th in the production of natural gas, second in the production of coal, and West Virginia has proven time and again that we have the perfect storm in a good way of natural resources and skilled work force that make investment in energy infrastructure so valuable.

Advanced drilling techniques have made our natural gas wells some of the most productive in the country. The Marcellus and Utica Shales have accounted for 85 percent of the growth in the industry. In 2014, one EQT well in Wetzel County just below Marshall County, home of my birth, alone provided enough gas to provide the power for 77,000 homes for an entire year.

This rate of production, coupled with the fact that the gas demand for power generation alone in the lower 48 is expected to increase by almost 75 percent between now and 2025, means that there is a crucial need for this transmission infrastructure.

The shale gas revolution has made it possible to produce enough gas to meet both our domestic demand and increase our footprint around the world in the global oil and gas markets. The ability to export liquefied natural gas, which I have been a supporter of, means more job opportunities here at home as well as abroad.

The export project at Cove Point is almost online, and Dominion right now has 2,000 workers—they are probably not all Dominion workers but contractors and all—that are working on that job right now. It will export gas to countries like Japan and India, friendly countries to us, and will considerably lessen our reliance and their reliance on hostile countries that threaten the global security.

Additionally, due to the exponential increase in natural gas reserves, we will see that exports do more than just provide trade revenue. So the need for pipelines to transport our abundance of natural gas is crucial. That is why I included language in the Energy Policy Modernization Act of 2016, which is actually in conference right now, which is the most comprehensive energy legislation we have done in years and very bipartisan. I know Senator

Manchin and I both voted for that coming out of the committee and on the Floor, and, speaking for myself, I hope we get the chance to vote for that conference committee.

My bill would help to streamline the permitting process for pipelines. We have learned the permitting process can be so broken apart and convoluted that we can streamline it, not doing away with any of the environmental regulations at all because those are extremely important, but just have it make more common sense.

Pipeline infrastructure is critical for job creation. It is estimated that for every mile of natural gas transmission line pipeline, a total of 58 jobs are created. Because of our upstream capacity, West Virginia can have a more robust chemistry sector that accounts for nearly 40 percent of our state's manufacturing jobs and is the second-largest exporting industry in the state.

Using ethane from natural gas as a feedstock means chemical companies can choose to operate in West Virginia due to the enormous benefits of being right on top of the resource. That is why, again, I included language in the energy bill that would require the Departments of Energy and Commerce to conduct a study to look at the feasibility of an ethane storage and distribution hub here in Appalachia, in West Virginia, or in the region.

Congress' role in improving infrastructure is only a piece of what needs to be done. Innovation and private investment is extremely important to building safe, efficient energy infrastructure. Innovation, we are doing it here on the campus of West Virginia University and also at the National Energy Technology Lab, is extremely key. Senator Heitkamp and I have worked on a bipartisan group that focuses on carbon capture technology, which we are going to talk about later. We need to foster an environment where risks associated with infrastructure are vastly outweighed by the incentives to move forward.

One of the greatest contributions to our energy infrastructure is the diversity and ingenuity of our work force, and we are going to talk about that today, and West Virginia, as an energy-exporting state, I think is a prime example of this.

I hope we can accomplish a lot in the hearing today. I hope that this will give us some impetus as we move back to Washington, DC, after Labor Day, to move that conference committee bill and the energy bill. It has a lot to do with what we are going to be talking about today, and I want to again thank the witnesses.

Before we move to the panel, I would like to ask Senator Manchin for an opening statement.

STATEMENT OF HON. JOE MANCHIN III, U.S. SENATOR FROM WEST VIRGINIA

Senator MANCHIN. Well, thank you, Madam Chairman. I thank you for holding this hearing today.

We both serve on the Energy and Natural Resources Committee which is very important to our state and very important to this country.

I just want to thank all the witnesses. I know everyone is concerned about this right now. We are hitting some tough times, and it is going to be all of us pulling together to figure this one out and working together, and we cannot let politics get in between. I think

you will see that Senator Capito and I will work across party lines and try to show a pathway forward in Washington that we should be doing what is best for our country and our state that we respectfully represent. That is what I think we will do here today, and we will continue to do that.

I want to thank all of you again. Dr. Deskins, thank you and I appreciate it; Dr. Anderson, Mr. Earl, and Steve Hedrick, who we have worked with very closely over the years, and Mr. Keffer, I appreciate you all being here and, Delegate Poling, thank you as always for being involved.

I also want to make a little announcement right now—Senator Capito and I have been working very hard trying to get Secretary Moniz to come to West Virginia. We finally got it confirmed, and he is going to be coming September the 12th. He will be visiting NETL. We are going to take him out to Longview, and we are going to show him what West Virginia does for this country and how well we do it.

So we are pleased to announce today that he will be coming. We have worked on this long and hard. Secretary Moniz would have visited earlier, but the Iran nuclear discussion took him away from us for a while. We have got him scheduled, and we are happy for that.

It is no secret that West Virginia has been economically challenged recently. Our economy is suffering largely due to a transition away from coal. We continue to experience persistently high unemployment rates. In fact, in some counties those numbers are over two times the national average.

In our southern counties, traditionally our largest coal-producing region, we are consistently posting unemployment numbers in the double digits: Mingo County, 11.7 percent; McDowell, 12.5; Logan, 10 percent; Wyoming, 9.1; Boone, 8.3.

Workforce West Virginia reports that between July 2015 and July 2016 we lost 4,800 mining and logging jobs; 700 manufacturing jobs; and 1,700 trade, transportation, and utility jobs. The slowdown of natural gas exploration and production in Marcellus and Utica has dampened new hiring, as well as state tax revenue, as we all know. To complicate matters, we just experienced a once-in-a-century flood that took West Virginia lives, homes and businesses, a tragic event from which we will be recovering for years.

More than ever, it is critical that we go the extra mile to examine the opportunities for jobs creation and economic development while ensuring we remain an energy leader for our nation.

Historically, West Virginia has been an energy exporter. Our home state sits on abundant reserves of coal and natural gas which Senator Capito has just pointed out. We are the fourth-largest state of proven reserves of natural gas behind only Texas, Pennsylvania, and Oklahoma.

In the 2016 Annual Energy Outlook, the Energy Information Administration (EIA) projected that, even under a Clean Power Plan scenario, coal and natural gas will make up approximately half of our electric generation mix in 2040.

We talk about deniers. You know, there are those who deny there is climate change going on, and there are those who deny we are going to be needing fossil fuel for the next two, three, or four dec-

ades. Both of these groups are severely handicapping us from the standpoint of doing the job that we need to be doing, and I would hope that all those on either side would look at the facts. They are entitled to their own opinions, just not entitled to their own facts. So these are the facts as we bring them forth.

Coal and natural gas are going to continue to be a critical part of our energy mix in our economy for decades to come. It is important for us, very important for us, to support the policies that ensure West Virginia continues to be a significant and sustainable participant in the energy future of this nation.

Two pieces of these policies, simply put, are technology and infrastructure. Technology must further develop and commercialize carbon capture utilization and sequestration in order to secure a future for reliable, affordable coal energy both here at home and abroad. In addition, we must put the necessary infrastructure in place to take advantage of the robust opportunities that come from our abundant natural resources while ensuring the reliability of our electric grid.

I would mention one thing. I have spoken to a lot of our state legislators, and I said we have got to start thinking in terms of a regional energy hub, a mid-Atlantic energy region, such as the Southwest. We should be looking at Pennsylvania in the highest part of this region, not the borders that separate us but basically the ability that we have to work together to build these pipelines that basically keep some of this product in this market area. They say, "Build it and they will come." I truly believe if you have it, they will come, but you have to have access to it.

Transportation of energy has always been a key part of the energy economy and will be a key in its future. When developed responsibly in harmony with local stakeholders these pipeline projects offer our state economic benefits. The Interstate Natural Gas Association of America Foundation released a study earlier this year which noted that new investments in midstream pipeline infrastructure will range from \$183 billion to \$282 billion over the next two decades.

It is no secret that pipeline development in West Virginia is growing particularly because our region is blessed with vast amounts of gas and natural gas liquids. We need to ensure these high-value West Virginia products can reach new markets—and this is what we are looking at—as well as attract long-term investment in our state and our work force.

Expanding pipeline infrastructure will allow consumers and businesses access to more affordable energy and attract new investments and lead to job creation. West Virginia's workers and businesses should have access to job opportunities associated with these infrastructure projects. When I say job opportunities, I mean high-paying, quality opportunities that offer West Virginians a means of obtaining the skills and knowledge required to cultivate a viable, long-term career path.

We have seen great success in our state when industry, workers and local community and technical colleges can provide students with the skills and training they need to succeed. For example, West Virginia's partnership with Bridge Valley Community and Technical College has ensured that students are learning in-de-

mand 21st century skills so that Toyota has access to a highly qualified work force. If you have not been down to our southern high-tech center, you should see that operation. The students are earning while they are learning, and they have a very, very, very good job waiting for them.

In conclusion, West Virginia has helped power the nation for decades. I have said this and I said this to the President and I have said this to many people in the White House. I said if you want to know how we feel in West Virginia, we feel like a returning Vietnam veteran. We have done everything you asked us to do, we have done the heavy lifting, we have done the hard work, and now you act like you do not appreciate it and you do not respect it and you do not really think it was needed.

Without West Virginia and the efforts that we have made over the last century, I assure you, we would not be sitting in the freest country on earth, the superpower of the world, if it had not been for what West Virginia has contributed.

With that, I say thank you all for being here. Madam Chairman, thank you.

Senator CAPITO. Thank you, Senator Manchin.

What I am going to do is introduce you individually, and then you can make your statement. Dr. Brian Anderson is the GE plastics Material Engineering Professor in Chemical Engineering at WVU. He is also a native of Ripley, I found out, so that is a mark of excellence, and he serves as a Director of the WVU Energy Institute. He graduated from WVU, and he has his advanced degrees from MIT. I want to welcome you here, Dr. Anderson.

STATEMENT OF BRIAN ANDERSON, DIRECTOR, WEST VIRGINIA UNIVERSITY ENERGY INSTITUTE

Dr. ANDERSON. Senator Capito, Senator Manchin, thank you very much and good afternoon. I really appreciate the opportunity to testify today.

As you mentioned, I am Brian Anderson. I am the Director of the WVU Energy Institute at West Virginia University (WVU). The WVU Energy Institute serves to facilitate collaborative and innovative solutions to the energy future of West Virginia and the United States. And as the coordinating institution of energy research at the flagship, land grant university in West Virginia, it is central to my organization's mission to work with stakeholders within the university and across the state and region to help further that land grant mission.

A key aspect of that mission is to assist in stimulating economic development in West Virginia. As you know, the economy of West Virginia has long been grounded in the energy sector. From the early development of oil and gas resources in the United States to the long history of the coal industry, much of the economic base of West Virginia is highly dependent on the energy resources with which the state has been blessed.

Almost 100 years ago, in 1921, the world's first commercial ethane cracker was built in Clendenin, West Virginia, due to the proximity of liquid rich natural gas production in the Elk and Kanawha River valleys. This development spurred on the modern petrochemical and plastics industry that we have today.

Due to the abundance and proximity to the natural resources in the U.S. Gulf Coast however, much of the expansion of the petrochemical industry and plastics industry has occurred in that region over the past half-century.

However, with advances in horizontal drilling and hydraulic stimulation techniques first developed in part by research done in Morgantown, West Virginia, at what is now the Department of Energy's National Energy Technology Laboratory, we are again now realizing abundant resources of natural gas and natural gas liquids in this region.

The Marcellus Shale is now the largest producer of natural gas in the United States, and the Utica Shale shows similar, if not more, prolific potential. These two Shales in the region are not only producing large volumes of natural gas but also of natural gas liquids such as ethane, propane, and butane.

Ethane and propane are the raw materials used to make pharmaceuticals, industrial, chemical and consumer goods. Over the last ten years, production of ethane and propane from the Marcellus and Utica Shales have driven the cost of these very valuable raw materials to a price point well below global and national prices. Connecting this valuable resource to the national and global markets will take modern robust infrastructure, the topic of this hearing.

I contend that the types of infrastructure necessary to benefit both the region and the nation is not only a reliable, modern network of pipelines but also a robust, regional system of natural gas liquid storage and distribution.

Recently Royal Dutch Shell Chemical Appalachia announced a final investment decision on building a multibillion-dollar ethane cracker in Pennsylvania not far from the West Virginia border. Shell has said that constructing the plant would employ about 6,000 workers and provide 600 permanent operational positions when it opens.

Shell, which has been pulling back in parts of its global operation, said that this facility was a particularly competitive project because it will use ethane from the Appalachian Basin, the lowest-cost shale gas basin in North America. The Shell ethane cracker will consume about 105,000 barrels of ethane per day, producing 1.6 million tons of polyethylene pellets per year to be molded into consumer products and packaging.

Two other companies are now examining the potential to join Shell in investing billions of dollars into this region and creating thousands of manufacturing jobs due to the proximity and abundance of the natural resources in the Appalachian Basin. Each of these other facilities would use another 50,000 to 100,000 barrels per day of ethane. With current ethane production rates in the basin at around 500,000 barrels per day, the resource is certainly sufficient to support a renewed and robust chemical industry, that is, as long as there is modern and robust energy transportation infrastructure to support that.

Last October, in a regional effort as mentioned by Senator Manchin, the Governors of West Virginia, Pennsylvania, and Ohio signed a regional cooperation agreement to enhance regional cooperation and job growth through the continuing development of

shale gas in the Appalachian Basin. In this agreement, four primary areas of cooperation were identified: marketing and promotion, work force development, transportation and infrastructure, and research. As part of the agreement, the states are working together to support infrastructure like pipelines, railroads, and roadways critical to shipping natural gas and natural gas-related products.

In addition, they are encouraging the state-sponsored universities such as us to collaborate on research to find appropriate end uses for natural gas products. They will also collaborate on preparing for emergency response, promoting recycling and environmentally friendly practices in the industry, as well as supporting entrepreneurship.

The WVU Energy Institute is playing a key role in each of these four areas in that tri-state agreement. In particular, we are leading an effort involving the state geologic surveys of these three states as well as an industry consortium currently with 12 members, also funded by the Claude Worthington Benedum Foundation, to examine the geologic potential for safe and reliable subsurface storage of natural gas liquids. The goal of this project is to provide essential data to support the development of the chemical manufacturing industry, promoting economic development.

As evidenced by the industry's commitment to our project, developing storage and transportation infrastructure is a critical pathway to developing the industry in the region. Subsurface storage and distribution and a network of pipelines will benefit both the raw material producers—the upstream oil and gas industry, as well as the chemical industry by fostering a readily available and reliable network and source of natural gas liquids and developing a predictable price point of the commodity in the region. Currently, there is only one spot pricing hub for natural gas liquids in the United States, and that is on the Gulf Coast.

Thirdly, promoting regional investment and a more robust ecosystem for the industry, it is all critical to establish a reliable trading hub into which producers can sell their products. The primary example of an ethane storage hub and associated piping in the United States exists between Brownsville, Texas, and Lake Charles, Louisiana. The piping and infrastructure necessarily—this infrastructure encourages the growth in this region due to its interconnectivity to multiple manufacturing facilities in the vicinity.

In conclusion, many projects at various stages of development are underway to build takeaway capacity from the region, moving the raw materials to the East Coast, to the Gulf Coast and to Canada. However, to spur on a more diverse national economy, a robust regional infrastructure is necessary. Advances in technology have provided us with an opportunity to implement best-in-class construction and monitoring techniques to ensure the safe operation of natural gas liquids storage facilities, as well as pipeline infrastructure, so regional and national collaboration is essential to the development of this reliable and robust interstate energy infrastructure.

The States of West Virginia, Pennsylvania, and Ohio have already begun collaborating to erase these state borders, and we look

forward to working with our Federal counterparts in this exciting effort.

And so, Senators Capito and Manchin, thank you very much for this opportunity to testify today, and I look forward to answering any questions you have.

[The prepared statement of Dr. Anderson follows:]

BRIAN ANDERSON, DIRECTOR, WEST VIRGINIA UNIVERSITY ENERGY INSTITUTE

SENATE ENERGY & NATURAL RESOURCES COMMITTEE

AUGUST 29, 2016

Introduction

Good morning, Chairman Murkowski, Ranking Member Cantwell and Members of the Committee. Thank you for the opportunity to testify today. My name is Brian Anderson. I am the Director of the WVU Energy Institute at West Virginia University. The WVU Energy Institute serves to facilitate collaborative and innovative solutions to the energy future of West Virginia and the United States. As the central coordinating institution for energy research at the flagship, land-grant university in West Virginia, it is central to my organization's mission to work with stakeholders within the university and across the state and region to help further the land-grant mission. A key aspect of that land-grant mission is to assist in stimulating economic development in West Virginia.

As you know, the economy of West Virginia has long been grounded in the energy sector. From the early development of oil and gas resources in the United States to the long history of the coal industry, much of the economic base of West Virginia is highly-dependent on the energy resources with which the state has been blessed. Almost 100 years ago, in 1921, the world's first commercial ethane cracker was built in Clendenin, West Virginia due to the proximity to liquid-rich natural gas production in the Elk and Kanawha River valleys. This development spurred on the modern petrochemical and plastics industry we have today.

The Petrochemical Industry Today

Due to the abundance and proximity to the natural resources in the U.S. Gulf Coast, much of the expansion of the petrochemical and plastics industry has occurred in that region over the past half century. However, with advances in horizontal drilling and hydraulic stimulation techniques first developed in part by research done in Morgantown, WV, at what is now the Department of Energy's National Energy Technology Laboratory, we are again now realizing abundant resources of natural gas and natural gas liquids in this region. The Marcellus Shale is now the largest producer of natural gas in the United States, and the Utica Shale shows similar, if not, more prolific potential. These two shales in the region are not only producing large volumes of natural gas, but also of natural gas liquids such as ethane, propane, and butane.

Monthly dry shale gas production

billion cubic feet per day

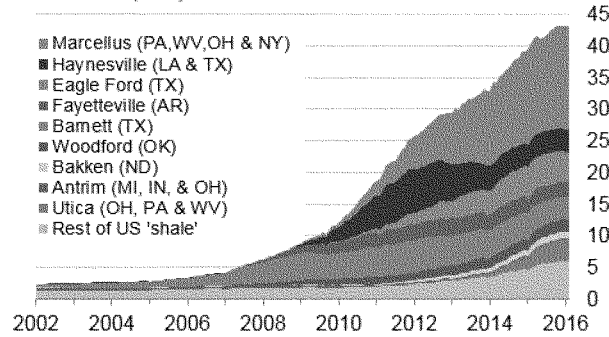


Figure 1: U.S. Natural Gas Production by Play

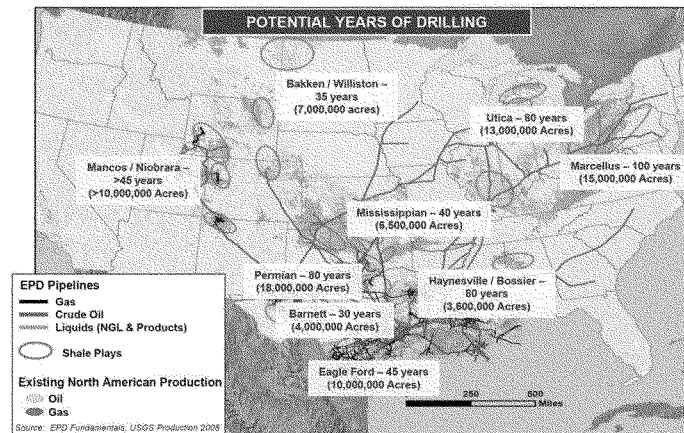


Figure 2: Potential Lifetime of North American Natural Gas

Ethane and propane are the raw materials used to make pharmaceuticals, industrial chemical, and consumer goods. Over the last ten years, production of ethane and propane from the Marcellus and Utica Shales have driven the cost of these valuable raw materials to a price point well below global and national prices. Connecting this valuable resource to the national and global markets will take modern, reliable infrastructure – the topic of this field hearing. I contend that the types of infrastructure necessary to benefit both the region and the nation is not only a reliable, modern network of pipelines, but also a robust, regional system of natural gas liquid storage and distribution.

Table 1: Natural Gas Liquids and Industrial Uses

Purity product	Conversion factor (Mcf/bbl)	Application	End-use product	Primary sector
Ethane	1.558	Ethylene for plastics production, petrochemical feedstock	Plastic bags, plastics, antifreeze, detergent	Industrial
Propane	1.499	Propylene for plastics/solvents/ petrochemicals, residential/ commercial heating, cooking	Plastics, solvents, LPG for home heating, stoves, BBQ, engines	Industrial, residential, commercial
Normal butane	1.288	Petrochemical feedstock, gasoline blendstock	LPG, synthetic rubber for tires, lighter fuel	Industrial, transportation
Isobutane	1.245	Petrochemical feedstock, gasoline blendstock	Alkylate for gasoline, aerosols, refrigerants	Transportation
Natural gasoline	0.940	Gasoline blendstock, ethanol denaturant, diluent for bitumen	Motor gasoline, Canadian crude oil imports	Transportation

Source: U.S. Energy Information Administration.

Ethane Crackers

Recently, Royal Dutch Shell Chemical Appalachia announced a final investment decision on building a multibillion-dollar ethane cracker in Pennsylvania, not far from the West Virginia border. Shell has said constructing the plant would employ 6,000 workers and provide 600 permanent operational positions when it opens. Shell, which has been pulling back in parts of its global operation, said this facility was a particularly competitive project because it will use ethane from the Appalachian Basin, the lowest-cost shale gas basin in North America. The Shell ethane cracker will consume about 105,000 barrels of ethane per day, producing about 1.6 million tons of polyethylene pellets per year to be molded into consumer products and packaging.

Two other global companies are now examining the potential to join Shell in investing billions of dollars into the region and creating thousands of manufacturing jobs due to the proximity and abundance of the natural resources in the Appalachian Basin. Each of these other potential facilities would use another 50,000 to 100,000 barrels of ethane per day. With current ethane production rates in the basin at around 500,000 barrels per day, the resource is certainly sufficient to support a renewed and robust chemical industry, that is as long as there is a modern and robust energy transportation infrastructure to support it.

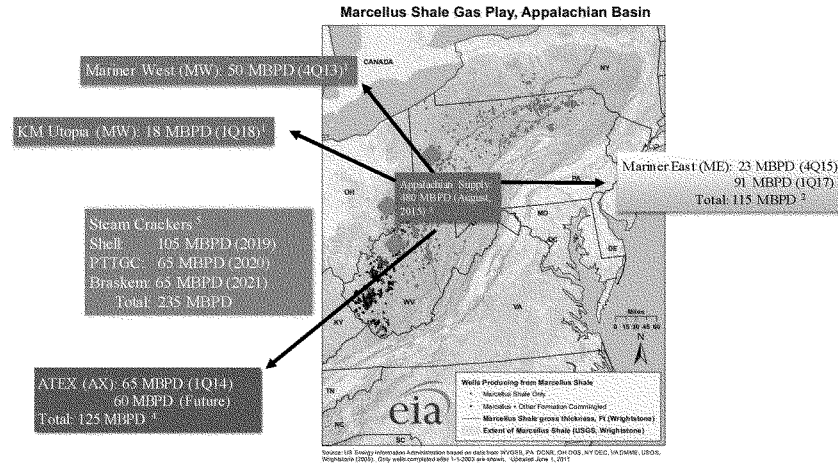


Figure 3: Estimated Ethane Supply and Announced Demand

Regional Cooperation

Last October, the Governors of West Virginia, Pennsylvania, and Ohio signed a Regional Cooperation Agreement titled the “Agreement to Enhance Regional Cooperation and Job Growth Through the Continuing Development of Shale Gas in the Appalachian Basin.” In this agreement, four primary Areas of Cooperation were identified: Marketing and Promotion, Workforce Development, Transportation and Infrastructure, and Research. As part of the agreement, the states would work together to support infrastructure like pipelines, railroads, and roadways critical for shipping natural gas and related products. In addition, they will encourage state-supported universities to collaborate on research to find appropriate end uses for natural gas products. They will also collaborate on preparing for emergency response, promote recycling and environmentally friendly practices in the industry, as well as support entrepreneurship.

The WVU Energy Institute is playing a key role in each of the four areas of focus in the Tri-State Governors’ Agreement. In particular, we are leading an effort involving the state geologic surveys of these three states as well as an industry consortium currently with twelve members to examine the geologic potential for safe and reliable subsurface storage of natural gas liquids. The goal of this project is to provide essential data to support of the development the chemical manufacturing industry, promoting economic development. As evidenced by the industry’s commitment to our project, developing storage and transportation infrastructure is a critical pathway to developing the industry in the region. Subsurface storage and a distribution network of pipelines will benefit both the raw material producers and the chemical industry by:

- Fostering a readily available and reliable source of natural gas liquids,
- Developing a predictable price point for the commodity in the region. There is currently only one spot pricing hub for natural gas liquids in the U.S.
- Promoting regional investment and a more robust ecosystem for the industry, and

- Establishing a reliable trading hub into which producers can sell their products.

The primary example of an ethane storage hub and associated piping, in the United States, exists between Brownsville, TX and Lake Charles, LA. The piping and infrastructure necessarily encourage growth in the region due to its interconnectivity to the multiple manufacturing facilities in the vicinity.

Conclusion

In conclusion, many projects at various stages of development are underway to build take-away capacity from the region – moving the raw materials to the east coast, the gulf coast, and to Canada. However, to spur on a more diverse national economy, a robust regional infrastructure is necessary. Advances in technology have provided us with an opportunity to implement best-in-class construction and monitoring techniques to ensure the safe operation of natural gas liquids storage facilities as well as pipeline infrastructure. Regional and national collaboration is essential to the development of robust and reliable interstate energy infrastructure. The states of WV, PA, and OH have begun collaborating to erase the state borders, and we look forward to working with our federal counterparts in this exciting effort.

Chairwoman Murkowski, Ranking Member Cantwell, thank you for this opportunity to testify today. I look forward to answering any questions.

Senator CAPITO. Thank you. Thank you very much.

Our next witness is Dr. John Deskins, and he is the Director at the Bureau for Business and Economic Research at WVU. He focuses primarily on state economic development, small business economics, government and tax expenditure, policies at the state level. He has a Ph.D. in Economics. So welcome, Dr. Deskins.

STATEMENT OF DR. JOHN DESKINS, DIRECTOR, WEST VIRGINIA UNIVERSITY BUREAU OF BUSINESS AND ECONOMIC RESEARCH

Dr. DESKINS. Senator Capito, Senator Manchin, thank you so much for inviting me to appear before you today. It is truly an honor to be here to discuss the importance of a modern, reliable energy infrastructure for the West Virginia and national economies.

By any measure, West Virginia is an energy state. For example, energy accounts for 17 percent of economic output in the state, making it the state's largest industrial super sector. Energy jobs are among the highest-paying jobs in the state, often by far. Coal is our largest export commodity, and natural gas is poised to become another key export commodity. Severance tax revenue from energy is vital to our state and local governments.

The deep decline in coal production that has occurred in recent years has had a devastating effect on our state's economy. Coal production has dropped to an expected 70 million tons for this year, down 56 percent from its 2008 level. This has led to a loss of 13,000 coal jobs and a direct loss of \$4 billion in economic output. For 2015, West Virginia's total economic output was lower than in 2011.

And these losses create a vicious cycle where we see continuing population loss, an aging population, drug abuse, and so on, making it even more challenging to attract new business to West Virginia, and therefore continuing that vicious cycle.

Some may read the numbers associated with declining coal output and imagine that the losses are spread across the coal-producing regions of the nation. We have seen a national drop in the demand for coal, caused by a perfect storm of three factors. But the effect of this drop in demand has been felt most strongly in the region with the lowest coalmine worker productivity, Central Appalachia, which of course includes southern West Virginia. There we have been mining the region's hotter-burning and cleaner coal deposits for well over a century, such that the coal that remains is generally deeper in the ground, in thinner seams, and more expensive to extract.

So in central Appalachia, coal production has fallen by 51 percent since 2010, compared to a decline of ten percent for the nation's other coal-producing regions, 51 percent versus ten percent. Coal production in northern West Virginia, part of the northern Appalachian coal seams, has generally been stable. Correspondingly, nearly all of the coal job losses that have occurred in West Virginia have come from our state's southern coalfields.

The concentration of these job losses has created a great depression in six counties, two of which Senator Manchin mentioned a second ago. But the six are Boone, Clay, Logan, McDowell, Mingo,

and Wyoming. Job losses over the past four years range between 25 percent and 33 percent in each of these counties.

Consider Boone County, our state's largest coal-producing county for many years. Their coal production and employment stand at around 30 percent of their 2010 levels. Statistics are beginning to show other losses in the county as less money is flowing to other local businesses—grocery stores, entertainment venues, etcetera. Losses in coal severance tax revenue have led to a severe public school layoff in the county.

The industrial mix in these counties also lends to the crisis. In Boone County in 2010, coal accounted for 55 percent of all the jobs in the county, making it difficult, if not impossible, for many laid-off coalminers to find alternate employment locally.

My point is the heavy concentration of losses in coal output and employment is far worse than would be the case if the losses were widely dispersed. The current situation gives rise to the question of whether these affected communities are sustainable over the long run.

The natural gas boom that West Virginia has enjoyed has helped for sure. The boom created around 3,000 high-paying jobs between 2010 and 2014. Many of those jobs have been lost since early 2015 due to a slowdown in natural gas drilling, but a return to growth is expected in coming years.

And while it is beneficial for our state in many ways, natural gas extraction is very capital-intensive, and as such, is unlikely to employ the number of workers needed to ensure broad prosperity. Broad prosperity associated with natural gas will require more downstream activity, creating more value added and more jobs.

Many call for industrial diversification as the solution to West Virginia's economic crisis. I myself make this call routinely in speeches and discussions across the state. It is crucial for West Virginia to cultivate strength in manufacturing, tourism, and other industries. However, industrial diversification is a long-term proposition which requires long-term action on the part of businesses, entrepreneurs, government and community leaders.

A more viable path for West Virginia in the short run is through strengthening our state's energy sector. As I believe all these figures indicate, this is desperately needed for our economy. And while many of the factors affecting energy in West Virginia are outside of the reach of policymakers, I hope the information provided here today can certainly help move our energy sector forward and our overall economy forward and help turn around this vicious cycle that plagues our state.

Thank you.

[The prepared statement of Dr. Deskins follows:]

John Deskins, Ph.D., Director, West Virginia University Bureau of Business & Economic Research

**Testimony before the Committee on Energy and Natural Resources,
Field Hearing to examine the economic importance of modern, reliable energy infrastructure
to West Virginia and the United States**

August 29, 2016

Chairwoman Murkowski, Ranking Member Cantwell, and members of the Committee, I serve as Director of the Bureau of Business & Economic Research at West Virginia University. Thank you for inviting me to appear before you to discuss the importance of a modern, reliable energy infrastructure to the West Virginia and national economies.

By any objective measure West Virginia is an energy state. For example:

- Energy accounts for 17 percent of economic output in the state, making it the state's largest industrial super sector.
- Energy jobs are among the highest paying jobs in the state, often by far.
- Coal is our largest export commodity, and natural gas is poised to become another key export commodity.
- Severance tax revenue from energy is vital to our state and local governments.

The deep decline in coal production in recent years has had a devastating effect on our state's economy. Coal production has dropped to an expected 70 million tons for this year, down 56 percent from its 2008 level. This has led to a loss of 13 thousand coal jobs and a direct loss of \$4 billion in economic output. For 2015, West Virginia's total economic output was lower than in 2011.

These losses create a vicious cycle where we see continuing population loss, an aging population, drug abuse, and so on, making it even more challenging to attract new business, thus continuing the cycle.

Some may read the numbers associated with declining coal output and imagine that the losses are spread across the coal-producing regions of our nation. We have seen a national drop in the demand for coal, caused by a perfect storm of three factors. But the effect of this drop in demand has been felt most strongly in the region with the lowest coal mine worker productivity, Central Appalachia, which includes Southern West Virginia. There we have been mining the region's hotter burning and cleaner coal deposits for over a century, such that the coal that remains is generally deeper in the ground, in thinner seams, and more expensive to extract.

In Central Appalachia, coal production has fallen by 51 percent since 2010, compared to a decline of 10 percent for the nation's other coal-producing regions. Coal production in Northern West Virginia, part of the Northern Appalachian coal seams, has been generally stable. Correspondingly, nearly all of the coal job losses that have occurred in West Virginia have come from our state's southern coalfields.

The concentration of these job losses has created a Great Depression in six southern counties – Boone, Clay, Logan, McDowell, Mingo, and Wyoming. Job losses over the past four years range between 25 percent and 33 percent in each of these counties.

Consider Boone County, our state's largest coal-producing county for many years. There coal production and employment stand at around 30 percent of their 2010 levels. Statistics are beginning to show other job losses in the county as less money is flowing to other local businesses – grocery stores, entertainment venues, etc. Losses in coal severance tax revenue have led to severe public school layoffs in the county.

The industrial mix in these counties also lends to the crisis. In Boone County in 2010, coal accounted for 55 percent of all of the jobs in the county, making it difficult, if not impossible, for many laid-off coal miners to find alternate employment locally.

My point is that the heavy concentration of losses in coal output and employment is far worse than would be the case if the losses were widely dispersed. The current situation gives rise to the question of whether these affected communities are sustainable over the long-run.

The natural gas boom that West Virginia has enjoyed has helped. The boom created around 3 thousand high paying jobs between 2010 and 2014. Many of those jobs have been lost since early 2015 due to a slowdown in natural gas drilling, but a return to growth is expected in coming years.

While it is beneficial for our state in many ways, natural gas extraction is very capital intensive, and as such, is unlikely to employ the number of workers needed to ensure broad prosperity. Broad prosperity associated with natural gas will require more downstream activity, creating more value added and more jobs.

Many call for industrial diversification as the solution to West Virginia's economic crisis. I myself make this call routinely in speeches and discussions across the state. It is crucial for West Virginia to cultivate strength in manufacturing, tourism and other industries. However, industrial diversification is a long-term proposition which requires long-term action on the part of businesses, entrepreneurs, government, and community leaders.

A more viable path for West Virginia's economy in the short-term is through strengthening our state's energy sector. As I believe these figures indicate, this is desperately needed. And while many of the factors affecting energy in West Virginia are outside of the reach of policymakers, I

hope that the information provided today can help make for better policy to move West Virginia forward.

Senator CAPITO. Thank you.

Our next witness is Mr. Chad Earl. Chad is the Director of Marketing and Business Development for ORDERS Construction Company in St. Albans, West Virginia, and has been there since 2013. He is a lifelong West Virginian, and he has an extensive background in infrastructure development. He is also a member of the 2016 Leadership West Virginia class. Welcome, Chad. Thank you.

STATEMENT OF CHAD EARL, DIRECTOR OF MARKETING AND BUSINESS DEVELOPMENT, ORDERS CONSTRUCTION COMPANY, INC.

Mr. EARL. Thank you. Yes, thank you for this invitation. It is truly an honor to come before you today to discuss my perspective and how important the energy industry and infrastructure development is to my family, our company, and all of West Virginia.

Let me begin by saying I am a proud and lifelong West Virginian. I grew up in Grantsville, which is a rural community in Calhoun County, and started helping my dad take care of oil wells when I was about 12 years old. I graduated from Glenville State College and worked my way through college as a pipeliner and environmental technician there in Glenville.

So when I think about it, the energy industry, particularly the oil and gas industry, has had a huge positive effect on my life. It gave my family the ability to support me and my brothers, and now it is giving me the opportunity, and many others like me, the ability to support their families and have promising careers.

I am active in several professional organizations related to the construction, manufacturing, and energy industries, all of which are affected by a reliable infrastructure that we are here to discuss today.

As I said, I am a native West Virginian. In fact, I share many of the same opinions and beliefs about West Virginia that I have heard Senators Capito and Manchin mention on several different occasions. I am sure they will agree with me when I say the beauty of our state is immeasurable, our natural resources are abundant, but it is the people from every corner of the state that is our greatest strength.

Our people are intelligent and hardworking and very passionate about their communities. They are proud of the heritage of belonging to one of the highest energy-producing states in the nation. We want to live here, and we want to stay in West Virginia. We want to stay home, and we want the opportunity for our children to live here and stay home if they choose to do so.

In order for this to happen, we need to create an economic environment that allows for growth. We need to have this opportunity with the natural gas industry. To be clear, shale gas is revitalizing West Virginia's economy.

I serve as the director of business development for ORDERS Construction Company. We are a family owned business and have been in business since 1964 and have expanded from a bridge-building contractor in our early days to a trusted, reputable and dependable construction company that spans many different business segments of the economy. Our markets include State and Federal highways,

manufacturing facilities, chemical and industrial complexes, water and waste plants, and energy companies as well.

Our group employs approximately 400 people with very good jobs, and most salaries are well above the national average. Because of the increased activity in the oil and gas fields, we have been able not only to retain the labor force that supports us but consistently add jobs and grow our business. This is more than important; it is vital to our local economies and the families that live here, especially when you look at the decline of the coal industry and the economic devastation of southern West Virginia.

I can point to over 50 positions within our company that have been created just to support the shale industry alone. We can continue to grow only if the energy industry remains strong because it impacts all businesses in West Virginia. It affects our tax base for roads and schools. It affects the chemical and manufacturing industry because it brings in raw materials and energy supply. It impacts other small businesses such as restaurants, gas stations, hotels, the school band, the football team. All of them get money from the gas industry, so it is no secret that in West Virginia our communities prosper when the energy industry is robust.

Expanding our energy infrastructure will create jobs. It will strengthen communities. It will help attract manufacturing to the region. Above all else, it will give this region of the country a little hope that our elected leaders are working with us and not the activists who have dedicated their agendas to help hinder progress as they work every day to try to put small businesses like ours out of business.

Each state in the country makes use of its resources. Massachusetts uses fishing. The Midwest and the flat fields has farming. Florida attracts tourists to its beaches for warm weather. West Virginia can harvest the massive gas deposits under it for the benefit of its people for decades to come; however, it will not happen without the support of government policies that allow it to be done and done properly.

Pipelines and energy production will continue to make us more stable from other regions of the world. The pipelines we build are more than pipelines. They are highways that deliver a required resource to end users, families, manufacturing facilities, and other small businesses, as well as schools and hospitals. They are the safest and most economical long-term transportation option available today.

Senators, make no mistake, shale is revitalizing West Virginia. Shale is providing small, family owned businesses like ours with the opportunity they need to bring this raw material to market and will continue to enhance our energy security and independence.

The men and women of West Virginia are industry professionals. Our history is that of an energy-producing state. Please help our people strengthen the state economy and help us produce and transport energy in our region that we so desperately need.

Thank you very much.

[The prepared statement of Mr. Earl follows:]



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August 23, 2016

United States Senate Committee on Energy and Natural Resources
 Monongalia County Justice Center-Field Hearing
 August 29th, 2016

By Chad Earl
 Director of Marketing and Business Development
 ORDERS Construction Company, Inc.

Distinguished Committee Members-

Hello and Welcome to Morgantown, West Virginia. Thank you for this invitation as it is truly an honor to come before you today to discuss my perspective and how important the energy industry and infrastructure development is to my family, our company, and all of West Virginia.

Let me begin by saying I'm a proud and lifelong West Virginian. I grew up in Grantsville, a rural community in Calhoun County and started helping my dad take care of oil and gas wells at the age of 12 years old. I graduated from Glenville State College and worked my way through college as a pipeliner and environmental technician for local service companies. When I think about it, the energy industry, particularly the oil and gas industry, has had a huge and positive impact on my life. It gave my family the ability to support me and my brothers. Now it is giving me, and many others like me, the ability to support their families and have promising careers. I'm active in several professional organizations related to the Construction, Manufacturing, and Energy Industries. All of which are effected by reliable infrastructure that we will discuss today.

As I said, I am a native West Virginian. In fact, I share many of the same opinions and beliefs about West Virginia that I've heard Senator Moore and Senator Manchin touch on several different occasions. I'm sure they will agree with me when I say the beauty of our state is immeasurable, our natural resources are abundant, but it's our people, from every corner of the state, which is our greatest strength.

Building Better Since 1964



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Our people are intelligent, hardworking, and passionate about their communities, and our heritage of belonging to one of the highest energy producing states in the Nation. We want to live and prosper here at home. We want the opportunity for our children to have healthy and productive lives here should they choose to do so.

In order for this to happen we need to create an economic environment that allows for growth. We now have this opportunity with the natural gas industry. To be clear, Shale gas is revitalizing West Virginia's economy.

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Our group employs approximately 400 people with very good jobs and most salaries are above the national average. Because of the increased activity in the oil and gas fields we have been able to not only retain the labor force that supports us, but consistently add jobs and grow our business. This is more than important, it is vital to our local economy and the families that live here. Especially when you look at the decline of the coal industry and the economic devastation of southern West Virginia. I can point to over 50 positions in our company that have been created to support the shale industry.

We can continue growth only if the energy industry remains strong because it impacts all business in West Virginia. It effects our tax base for roads and schools. It effects the chemical and manufacturing industries we work in for raw materials and energy supplies. It impacts other small business such as restaurants, gas stations, hotels, civic groups, school bands and sports teams.

It is no secret that in West Virginia, our communities prosper when the energy industry is robust. Expanding our energy infrastructure will create jobs. It strengthen communities, and help attract manufacturing to the region. Above all else, it will give this region of the country hope that our elected leaders are working with us, and not the activists who have dedicated their agendas to hinder

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progress as they work each day to put small family owned companies like ours out of business. Each state in the country makes use of its resources; Massachusetts – fishing; the Midwest – farming in flat, rich soils; Florida – attracting tourists to its beaches and warm weather, etc. WV can harvest the massive gas deposits under it for the benefit of its people for decades to come. However it won't happen without the support of government policies that allow it to be done and done properly.

Pipelines and energy production will continue to make us more secure from unstable regions of the world. The pipelines we build are more than pipeline – they are highways that deliver a required resource to end-users, families, manufacturers, other small businesses, as well as schools and hospitals. They are the safest and most economical long term transportation option.

Senators, make no mistake: shale is revitalizing West Virginia. Shale is providing small, family-owned businesses like ours with opportunity and we need the energy infrastructure to move this clean-burning resource to market, which will continue to enhance our energy security and independence.

The men and women of West Virginia are industry professionals and our history is that of an energy producing state. Please help our people strengthen our state economy and help us produce and transport the energy our region, and country, so desperately need.

Thank you for the opportunity to come before you and testify today.

Respectfully,

A handwritten signature in black ink, appearing to read "Chad Earl".

Chad Earl
Director of Business Development

Building Better Since 1964

Senator CAPITO. Thank you, Chad.

Our next witness is Mr. Steve Hedrick. Steve is the President and CEO of Mid-Atlantic Technology, Research and Innovation Center, known as MATRIC, in South Charleston, West Virginia. He has more than 20 years in the petrochemical industry, leading businesses, chemical manufacturing. In his capacity as President and CEO, he helps MATRIC deliver market-driven innovation, research and technical engineering.

Welcome, Mr. Hedrick. We are glad to have you here today.

STATEMENT OF STEVE HEDRICK, PRESIDENT AND CHIEF EXECUTIVE OFFICER, MID-ATLANTIC TECHNOLOGY, RESEARCH AND INNOVATION CENTER

Mr. HEDRICK. Thank you so much, Senator. I thank both of you for the opportunity to appear before you and before the committee today.

Good afternoon, ladies and gentlemen. Thanks for the opportunity to all of you. As was mentioned, my name is Steve Hedrick, and I am the President and Chief Executive Officer of MATRIC, a strategic innovation partner that provides deep, uncommon expertise and research and development infrastructure to solve the most challenging problems in the areas of science and technology. We are proudly based in South Charleston, West Virginia, and have a division here in Morgantown, West Virginia.

I am also a West Virginia native, and we have been through good times and bad and seemingly more bad lately, but we have shown resilience. I am a firm believer, whether you are running a business, a state or a country, a certain level of resilience is a pivotal component to success.

So one of the greatest ancient historians, Thucydides, once said, "The bravest are surely those who have the clearest vision of what is before them, glory and danger alike, and yet, not withstanding, go out to meet it."

In thinking about why we are here today, we are talking about this region, our state, our country, the future, the gift of energy below our feet. We are prepared to go out and meet the most challenging demands that our country can face and to do so from a position of authority. And what generates that position of authority, of course, is manufacturing, which is the cornerstone of West Virginia's future.

While we have seen apparent progress, we have yet to even begin to scratch the surface of the possibilities. But we know our vision. It is clear. And there is glory to be found for our citizens and their families, for our nation, when we achieve that vision.

But first, we need to realize our own new reality because, frankly, if we do not, we will never get out of this rut. So how do we do this? Investing in innovation and R&D and key assets like the West Virginia Regional Technology Park is a must because they are the keys to high-tech jobs in the quad-state region represented by Pennsylvania, Ohio, West Virginia, and Kentucky.

But the real reason we are all here today, of course, is infrastructure in energy. We cannot take advantage of the Utica, Rogersville, and Marcellus Shale opportunity without infrastructure to support the demands of the associated industries. The infrastructure re-

quirements associated with new build-outs must be delivered by multiple parties. Now it will not be easy, and it will not be cheap. We will need cooperation and support from the Federal and State governments, private equity, and existing business platforms, all to their mutual benefit.

Now you may be asking yourself what about Royal Dutch Shell's announcement earlier this month and its intentions to build a three-state ethane pipeline system to feed its Monaca, Pennsylvania, cracker. Are they not already doing this? Well, the answer is yes but no. This decision clearly demonstrates the necessity for specific infrastructure for Shell to be successful and that they cannot wait for a public-private partnership. But let me confirm it does not even begin to satisfy the need for infrastructure for the petrochemical industry to expand or to increase the demand side of the highly valuable and readily available natural gas liquids in this region.

More specifically, this announcement does not satisfy the need for ethane off-take for our natural gas industry, as Dr. Anderson mentioned a moment ago. There is simply too much ethane available for this single investment to advantage our nation to its maximum potential.

This cracker from Royal Dutch Shell and its associated pipeline has an estimated capacity of about 100,000 barrels a day. Rather than exporting additional ethane available via pipeline to the United States Gulf Coast, Europe, Asia, or even Canada, it could be utilized here in the Appalachian Basin here in America to maximize the value potential of our raw materials.

According to the publication Natural Gas Intelligence, ethane accounts for more than 50 percent of the typical NGL barrel in the Appalachian region, and with exports now leaving Marcus Hook near Philadelphia, ethane production has been increasing in the region. In fact, the midstream company MPLX's CEO, Gary Heminger, recently said, "With incremental ethane takeaway projects and the projected completion of a regional cracker facility, we anticipate reaching full utilization of our existing facilities." In other words, we need more infrastructure, and companies like Shell need more elasticity in the supply chain in order to maximize the benefit of ethane.

Now, we would propose that the corridors naturally created by the Ohio and Kanawha Rivers be utilized as a platform for a substantial pipe system that will support the distribution of key raw material and intermediate constituents, including but not limited to methane, ethane, ethylene, propane, propylene, and chlorine, all of which are significant building blocks to the petrochemical industry, and hence, our society.

We therefore must have substantial underground storage of the highest value and broadly used raw materials, specifically ethane, ethylene, and propane, and butane if we are able, and create a built-for-purpose Appalachian Storage Hub. This can be safely and efficiently done in naturally occurring underground caverns, in depleted natural gas extraction points, or even in depleted salt domes. In fact, the brightest minds in geological formations are currently studying the best location for the hub.

It is time for this to be done and done right to enable growth and prosperity for our citizens, our economy and our way of life. It is time for leadership, even boldness, in decades of incredible value creation, for a generational opportunity to be brought to fruition.

I urge you show your resilience and reinvest in our great nation through innovation and infrastructure to secure the success of another generation. I urge you, as Thucydides once wrote, to go out and meet this challenge and assure the investment in innovation and infrastructure by the public sector, by the Federal Government and supporting state governments that have the courage to do so as well. We should all do our part to make this happen, and each of you can count on me and on MATRIC to do our part, and thank you very much.

[The prepared statement of Mr. Hedrick follows:]

*Steve Hedrick
President and Chief Executive Officer
MATRIC*

Thank you for the opportunity to be here today.

My name is Steve Hedrick, and I am President and Chief Executive Officer of MATRIC. We're a strategic innovation partner that provides deep, uncommon expertise and research and development infrastructure to solve the most challenging problems in the areas of science and technology. And we're proudly based in South Charleston, WV.

I'm also a West Virginia native. We're a special breed. As have many Americans, we've been through good times and bad. And seemingly more bad. But we've shown resilience. And I'm a firm believer, whether you're running a business, running a state, or running a country, a certain level resilience, is a pivotal component of success.

One of the greatest ancient historians who chronicled nearly 30 years of war and tension between Athens and Sparta, Thucydides, once said...

"The bravest are surely those who have the clearest vision of what is before them, glory and danger a like...and yet not withstanding...go out to meet it."

And when we think about why we're here today, we're talking about this region, our state, the future. The gift - of Energy - below our feet. We are prepared to go out and meet the most challenging demands that our country can face, and do so from a position of authority.

And what generates that position of authority - that creation of value - is manufacturing, which is, without a doubt, the cornerstone of West Virginia's future. However, for the more than six years, it seems we've focused so hard on downstream manufacturing from that which is available to us in the natural gas liquids in our shale gas. We talked about the necessity for ethane crackers and downstream manufacturing. And, while we've seen affirmative announcements and apparent progress, we've yet to see this opportunity become a reality.

I'm here today to tell you, we need to realize our own **new reality**. Because, frankly, if we don't, we'll never get out of this rut.

So, how do we do this? There are two clear actions we must take.

First, now is the time to invest in innovation and R&D. We must. Innovation and R&D are keys to high tech jobs in the state of WV. There is an opportunity for the Appalachian Basin to be the nation's hub for innovation. For example, today the West Virginia Regional Technology Park is an innovation hub for industry and can offer resources for the petrochemical industry to re-emerge in West Virginia, Ohio, Pennsylvania and Kentucky. But we need more of this! Now is a great time for the petrochemical industry to invest in technology, innovation and R&D. We need to invest now in order to prepare for the future. Because today is not like it was 50 years ago. We don't have the luxury of simply relying on low energy prices. The reality is that we need to

rely on instability of the marketplace. We must be predictable in the face of uncertainty. How do we do this? Through innovation.

The second is infrastructure. We cannot take advantage of the Utica, Rogersville and Marcellus shale opportunity without infrastructure to support the demands and needs of the associated industries, to the benefit of our region and our country.

The infrastructure requirements associated with new build-outs must be delivered by multiple parties. It won't be easy. It won't be cheap. We'll need cooperation and support from the federal and state governments, private equity, and existing business platforms. All to their mutual benefit.

However, you may have heard Shell's announcement earlier this month with its intentions to build a three-state ethane pipeline system to feed its Monaca, Pennsylvania cracker. This clearly demonstrates the necessity for specific infrastructure for Shell to be successful, and they cannot wait for public-private partnership to make this happen for the full expansion of infrastructure that is necessary. However, let me be clear, this doesn't begin to satisfy the need for infrastructure for the petrochemical industry to expand... and increase the demand side of the highly valuable and readily available natural gas liquids from the Utica, Marcellus and Rogersville Shales. And, more specifically, this announcement does not satisfy the need for ethane offtake for our natural gas industry. There is simply too much ethane available for this single investment to advantage our nation to its maximum potential. This cracker from Shell and its associated pipeline has an estimated capacity of 100,000 barrels per day. Rather than exporting the additional ethane available via pipeline to the gulf coast, or to Europe, or to Asia, or to Canada; it could be utilized here in the Appalachian Basin, here in America, to maximize the value potential of our raw materials.

Moreover, Shell's pipeline system is even more validation that an Appalachian Storage Hub is needed more than ever in this region. According to *Natural Gas Intelligence*, ethane accounts for more than 50 percent of the typical NGL barrel in Appalachia... and with exports now leaving Marcus Hook near Philadelphia, ethane production has been increasing in the region. In fact, midstream MPLX's CEO Gary Heminger recently said, "with incremental ethane takeaway projects and the projected completion of a regional cracker facility, we anticipate reaching full utilization of our existing facilities." In other words, we need more infrastructure and companies like Shell need more elasticity in supply chain in order to maximize the benefit of ethane available to us.

I propose that the corridors naturally created by the Ohio and Kanawha Rivers should be utilized as a platform for a substantial pipe system that will support the distribution of key raw material and intermediate constituents, including but not limited to methane, ethane, ethylene, propane, propylene and chlorine. All of which are significant building blocks to the chemical industry, and hence to our society.

We, therefore, must have substantial underground storage of the highest-value and broadly-used raw materials - specifically ethane, ethylene and propane... and create a built-for-purpose Appalachian Storage Hub. This can be safely and efficiently done in naturally occurring underground caverns, in depleted natural gas extraction points or even in depleted salt domes. And, I'm sure you won't be surprised to learn that the brightest minds in geological formations are currently studying the best location for the Appalachian Storage Hub. This important work is already underway.

Because it is time for this to be done, to be done right, to enable growth and prosperity for our citizens, our economy and our way of life. It is time for leadership, for boldness, for decades of incredible value creation, for a generational opportunity to be brought to fruition.

I urge you show your resilience, and reinvest in our great nation through innovation and infrastructure to secure the success of another generation. I urge you to - as Thucydides once wrote - to go out to meet this challenge, and assure investment in innovation and infrastructure by the public sector, by the federal government and supporting state governments who have the courage to do so as well.

We should all do our part to make this happen, and each of you can count on me and on MATRIC to do our part. Thank you.

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Senator CAPITO. Thank you very much.

Our next witness is Mr. Jeffery Keffer. He is the President and CEO of Longview Power located in Maidsville, West Virginia. He has more than 32 years of experience in the power generation industry. I was lucky enough to tour your facility just recently and was amazed to see the good work that they are doing, but he continues to oversee the strategic management and business operations of Longview Power and Mepco. Welcome.

**STATEMENT OF JEFFERY KEFFER, PRESIDENT AND CHIEF
EXECUTIVE OFFICER, LONGVIEW POWER, LLC**

Mr. KEFFER. Thank you, Senator Capito, Senator Manchin.

I want to start by thanking you both for bringing the Senate Committee on Energy and Natural Resources to Morgantown today to talk about such an important topic for our State of West Virginia. Earlier this year both of you visited our plant and also took the time to meet with our employees, which they were very pleased with. Thank you.

I am here to report that the sunset on the coal-fired generation industry is highly exaggerated, and the model for the future of coal-fired generation in this country is a few short miles from here in Maidsville, West Virginia, at the Longview power plant.

Longview is four years young, while the average age of a PJM coal-fired fleet is 45 years. The plant initially cost \$2.1 billion to build, the largest private investment in West Virginia history, and last year, we invested another \$120 million to make the plant highly reliable.

Longview now reliably produces enough electricity for 700,000 homes while being the lowest-cost coal-fired generator in PJM and the most efficient, as measured by the lowest heat rate, of any coal plant in North America. The plant also has exceptionally low emissions and zero wastewater discharge to surface waters.

Now Longview is able to achieve these milestones through its state-of-the-art technology. In 2015, Longview made repairs and improvements to its oiler, its fuel and air controls. It replaced its control system and made a number of changes to its emission systems, all of which improved reliability. Since last November when we completed all that work, the plant has been available to produce electricity 98 percent of the time.

With this exceptional reliability and our highly effective emission system, we are able to remove targeted pollutants, including NOx, SO2, and PM—particulate matter—to well below the very stringent permitted levels for our plant. We also reduced CO2 emissions without adversely affecting cost or efficiency.

Now coal is not the only fuel required for coal-fired power plants to run, secondary fuel that is required to startup, and at Longview we use natural gas supplied from the local gas distribution company when it is available. And we have talked about the constraints that we are dealing with in this state in terms of the availability of natural gas where we need it.

So at Longview, in order to ensure that we had gas available to startup during peak seasons like the wintertime, we installed a unique LNG system, the largest mobile LNG system in the United States, in order to startup the plant when the pipeline capacity is

constrained. This allows us to meet very strict PJM capacity performance requirements. And when pipeline gas is available, we have been able to demonstrate that we can co-fire with up to 20 percent natural gas, further increasing the plant's efficiency and reducing its emissions.

Longview's coal supplier is Mepco, its affiliated coal company, and the coal is supplied by a 4-1/2 mile conveyor. Through its full integration with its fuel source and combined through a byproducts disposal facility, Longview achieves best-in-class results and produces low-cost electricity while minimizing environmental and community impacts.

Longview is a major employer and economic driver in northern West Virginia. Longview and Mepco together employ over 600 workers, providing well-paying jobs with combined annual payroll and benefits of \$72 million. We not only purchase our coal locally and limestone locally, we purchase over \$105 million per year of goods and services from local and regional vendors, and we made almost \$8 million in pilot and local tax payments annually.

Longview is demonstrating the future of coal-fired electrical generation with its best-in-class coal combustion technology and gas co-firing capability. Longview proves that replacing the existing 45-year-old coal fleet with modern, highly efficient, advanced coal plants can greatly improve our coal plant efficiency, reliably produce low-cost electricity, and lower conventional and CO2 emissions.

New advanced coal plants in West Virginia and other coal-dependent states could require the hiring of thousands of construction workers and could incorporate proven design improvements and use higher BTU fuel from Appalachia to produce and export electricity to energy-dependent states.

Designing new plants to co-fire with natural gas would further increase efficiencies and reduce conventional and CO2 emissions to levels that would help to meet national climate change goals, as is being demonstrated in Germany and Japan as we speak.

If we can achieve this, we do not need to retrain miners and workers but keep them working at the well-paying jobs they know well. All of the 600 employees at Longview and Mepco are paid highly competitive salaries. By building modern, advanced, highly efficient coal-fired plants, we would keep thousands of middle-class jobs in the region, maintain the stability of an electrical generation delivery system, and provide the low-cost, reliable electric power necessary to support homes and manufacturing in the USA.

Longview demonstrates what modern clean coal-fired power plant design and operation can achieve. Longview should be the future of coal: low-cost, very clean, and highly reliable.

I want to thank you very much, and I commend our story to you for your consideration in your deliberations in Washington. It is a great plant and we are very proud of what it is doing here in West Virginia. It sets a standard for not just the U.S. but for the rest of the world. Thank you.

[The prepared statement of Mr. Keffer follows:]

Jeffery Keffer
President and Chief Executive Officer
Longview Power, LLC

Chairwoman Capito and Senator Manchin, I want to start by thanking both of you for bringing the Senate Committee on Energy and Natural Resources to Morgantown today to talk about such an important topic to our State of West Virginia. I also want to thank Chairwoman Murkowski and Ranking Member Cantwell for supporting this hearing.

My name is Jeffery Keffer and I am the President and CEO of Longview Power, LLC in Maidsville, West Virginia. I want to take a minute to thank both of you for the time you have spent at the Longview Power Plant meeting our employees and touring our industry-leading facility. At the conclusion of this testimony I hope you will take back to the Senate one idea – the Longview is the future of clean coal-generating power in America and is a model for how to efficiently produce power from coal with very low emissions. We are always willing to share the Longview story and would be happy to do so with any of your colleagues if you would like.

Longview is a 778 Megawatt (MW) gross, 700 MW net, coal fired power plant. That means we produce enough electricity for about 700,000 homes. As you know, Longview started operating in late 2011 while the average age of the PJM fleet is 45 years old. The plant cost \$2.1 billion to build and last year we invested another \$120 million to make the plant highly reliable. Affiliated mines supply Longview's coal by conveyor.

All these factors combine to make Longview the lowest cost coal-fired generator in PJM and the most efficient as measured by the lowest heat rate of any coal plant in North America. Longview's low cost and high efficiency operations come with exceptionally low emissions and minimal wastewater discharge. In fact the plant has zero wastewater discharge to surface waters.

Longview is able to achieve these milestones through its state-of-the-art technology, including advanced combustion technology. Amec Foster Wheeler supplied Longview with a first-of-a-kind once-thru, low-mass flux vertical tube Advanced Supercritical Boiler. It was designed for high efficiency and modified for reliability. In 2015, Longview replaced over 1,000 boiler tubes to repair initial design and materials issues. Improvements to the fuel and air controls now provide best-in-class combustion control, including minimal slagging, better emissions control, and improved reliability. The overall design enables best in class performance over a wide range of fuels.

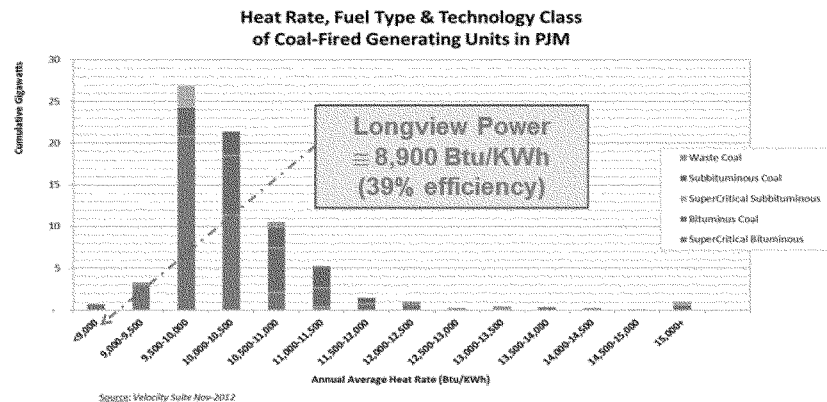
Longview's combustion controls and advanced emission technology effectively and reliably removes all targeted pollutants including nitrogen oxide (NOx) without adversely affecting efficiency. The Air Quality Control Systems (AQCS), provided by

Amec Foster Wheeler, achieves this through acid mist reduction, up to 99 percent particulate matter (PM) removal, sulfur dioxide (SO₂) removal through a Wet Flue Gas Desulfurization System (FGD), and mercury removal, making the plant fully MATS compliant. As a result, Longview is best in class in controlling pollutants and HAPS with these systems.

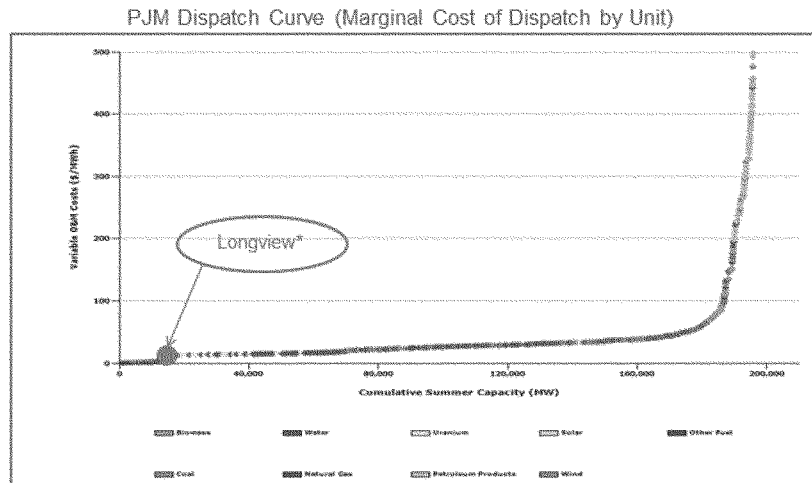
High efficiency with reliable cycling capability is achieved through the Siemens HMNN 770 MW Turbine System and Siemens Model # SGen6-300W Generator. This combination of modern design allows for fast ramping and up to 99% operating efficiency. The generator, repaired to “like new” conditions in 2015, also contains unique hydrogen inner cooling and water-cooled stator winding. This equipment has been incorporated into many new coal fired plants around the globe including in Germany.

Coal is not the only fuel required for a coal-fired power plant. Secondary fuel is required for startup and for significant load changes. At Longview, natural gas from a local gas distribution company is used when available. However, the local gas company has limited transportation capacity and must serve residential and key industrial users which, at times particularly during cold weather, take priority. Longview addressed this potential limitation by installing the world’s largest mobile LNG facility. This unique system provides Longview with full “inside-the-fence” startup reliability during peak winter seasons allowing Longview to meet PJM capacity performance requirements. We have also demonstrated that Longview is capable of co-firing up to 20 percent natural gas without additional cost.

As the graph of heat rate, fuel type and technology class of coal-fired generating units in PJM shows, Longview is the most efficient coal-fired unit in North America. Longview’s annual average heat rate at less than 8,900 Btu/KWh is exceptional and much lower than other coal plants. In fact, coal plants have not achieved this level of performance until Longview.

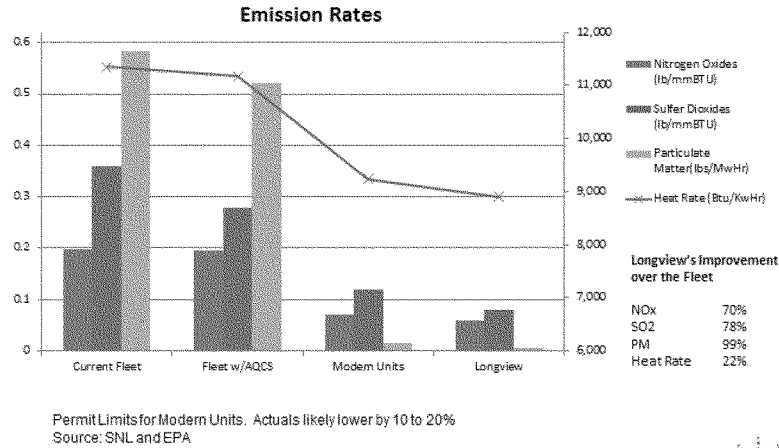


The plant's best-in-class heat rate or efficiency, low-cost fuel source and other project efficiencies combine to produce the lowest cost of dispatch, or delivery of electricity, of any coal-fired plant in the PJM Interconnection. Longview reliably provides low-cost, clean coal electricity to PJM, as shown here.



Longview data based on consolidated marginal cost of production of Longview and Mepco (Utility Plant data from SNL)
Longview marginal cost close to the cost of non-dispatchable, subsidized renewables

In conjunction with its low cost, Longview's actual emissions are well below its permitted limits. As Modern Highly Efficient Plants have very low emissions, Longview's nitrogen oxide, sulfur dioxide and particular matter emissions are significantly better than industry average emissions.



Through full integration with its fuel source and byproducts disposal, Longview produces low cost electricity while minimizing environmental and community impacts. Longview's competitive position is driven in part by fuel supplied by Mepco, its affiliate coal company, from mine mouth to the plant by a 4.5 mile conveyor. Longview also minimizes water requirements to less than 5,700 gpm on average and maximizes reuse of this water in its plant processes, so it only discharges about 30 gpm for treatment at an AMD treatment facility operated by Mepco. Longview recycles as much of its ash as it can sell, and Mepco's environmentally compliant beneficial reuse facility provides a long-term solution for ash and gypsum byproducts disposal for Longview. Of note, Mepco owns and operates two underground and one surface mine, and produces 3.6 million tons of coal per year for both Longview and Fort Martin.

Longview continuously achieves best in class results. In December 2015, Longview completed its 21-day reliability test, resulting in 99.5 percent Equivalent Availability Factor (EAF). The plant has continued to produce highly reliable service, averaging 98 percent EAF and 94% Capacity Factor (CF) since the reliability repairs were completed, while its sister units, or other new supercritical plants, average 66.9% C F. Longview's heat rate since reliability repairs completion is averaging less than 8,900 Btu / KWh. Even while making these repairs, Longview's 2015 annual heat rate was better than that of 2014, and was better than the number 1 ultra-critical plant's heat rate. As previously mentioned, Longview's emissions are well under permit limits, and its CO₂ emissions are 20 percent below all other coal-fired plants. Since November 2015 the plant has easily operated at its 700 MW net capacity and often exceeded that level for peak demand periods. Longview proves that modern, clean coal plants can achieve high availability and reliability with very low emissions.

While achieving best-in-class results, Longview also provides beneficial economic and community impacts. Longview and Mepco together employ over 600 workers, providing well-paying jobs with combined annual payroll and benefits of approximately \$72 million. The plant utilizes locally sourced coal and limestone. Longview and Mepco purchase over \$105 million per year of goods and services from local and regional vendors. They collectively contribute almost \$8 million in annual PILOT and local tax payments, and support a number of local and regional initiatives to enhance the environment and support the communities in which we reside and operate. As you can see, Longview is a major economic driver in northern West Virginia and southwestern Pennsylvania.

So, why are we not building modern, high efficiency, very low emissions coal plants like Longview?

Longview is demonstrating the future of coal fired electrical generation. The improvements in coal combustion technology that Longview implemented and completed in 2015 are working. Longview proves that replacing the existing coal fleet, which largely consists of 40+ year old plants, with modern highly efficient advanced coal plants, would greatly improve plants' efficiency and lower conventional and CO₂ emissions. These modern, highly efficient advanced coal plants could incorporate proven design improvements and use higher btu, or energy dense, fuel from Appalachia. West Virginia, and coal-dependent states across the nation, could facilitate the siting of mine mouth plants to reduce environmental and community impacts. With higher efficiency and targeted siting would come lower cost electricity. Modern advanced coal plants could also be designed to co-fire natural gas, further increasing efficiency and lowering cost to compete with gas-fired plants. This could also help to reduce CO₂ to levels that would help achieve the Clean Power Plan goals, as demonstrated in Germany and Japan.

Instead of retraining miners and workers, we can keep them working at skilled, well-paying jobs they already know well. For example, to construct Longview, we employed thousands of construction workers for 5 years, peaking at over 4,000 construction workers. On a day-to-day basis, Longview currently employs over 100 highly skilled workers and Mepco employs over 500 miners and support staff. In fact, 98 percent of Longview and Mepco employees are paid middle class or better salaries. To construct a typical, similar-sized natural gas-fired combined cycle power plant, it would employ less than 30 percent of the construction workers and only about 28 plant operators. Similarly, for renewables such as solar and wind, the typical utility size facility employs 100 to 200 construction workers over 8 to 12 months, and a few maintenance workers during operations. By building modern, advanced highly efficient and low emissions coal fired plants, we will keep thousands employed in middle class jobs, maintain the stability of our electrical generation and delivery system, and provide the low cost reliable electric power necessary to support residences and manufacturing in the USA.

Again, I ask, why are we not building modern, high efficiency, very low emissions coal plants like Longview?

Longview demonstrates what modern clean coal-fired plant design and operation can be for producing low cost, reliable electricity now, with very low emissions and full environmental compliance. Longview should be the future of coal – low cost, very clean and highly reliable.

In conclusion, I want to thank both of you and the Committee for tackling this crucial topic to West Virginia. As you look to the future of energy policy, I commend the Longview story to you for your consideration as an example of a power plant that works efficiently, effectively, and cleanly.

Senator CAPITO. Thank you.

Our final witness is Mr. Dan Poling. He is the Business Manager/Secretary-Treasurer of the District Council 53, International Union of Painters and Allied Trades. He has 43 years of experience in the construction industry.

Prior to his current position, he completed a U.S. Department of Labor registered apprenticeship class and worked as a craftsman for 25 years in the field before becoming an instructor. Welcome, Mr. Poling.

STATEMENT OF DAN POLING, BUSINESS MANAGER/SECRETARY-TREASURER, DISTRICT COUNCIL 53, INTERNATIONAL UNION OF PAINTERS AND ALLIED TRADES

Mr. POLING. Thank you. Thank you, Chairman Capito, Senator Manchin, for hearing this important issue to us here in West Virginia. Thank you for the opportunity to speak on this. I want to talk about the important topic we have here, examining the economic importance of modern, reliable energy infrastructure to West Virginia and the United States.

As you mentioned, as a Business Manager for Painters District Council 53, I represent 1,800 painters and allied trades in West Virginia and the surrounding counties around the borders. In addition, I am here today representing 20,000 construction workers affiliated with the West Virginia State Building and Construction Trades Council where I also serve as Vice President, and as such, I wanted to thank both of you for your continuing support in the trades, and we certainly appreciate the opportunity to work with you and to support our members.

Construction jobs relating to any industrial or commercial project in our state are critical to the economic future. Energy jobs—in particular the manufacturing of electricity from coal, wind, hydro, natural gas, or other resources—make up a substantial portion of our work of our members and contractors year in and year out.

Many people refer to construction jobs as temporary, and while that may be true in part, I would like to emphasize that thousands of construction workers earn their livelihood in the energy sector every year in occupations other than mining, drilling and facility operations. And as they talk about temporary, I myself, as you said, completed an apprenticeship—back in 1973 I began and completed it in 1976, and I have worked temporary jobs ever since and always been gainfully employed. I have over 70,000 hours as a temporary worker. So if that is temporary, I think we need maybe more of that. [Laughter.]

Mr. POLING. And at that time I have had health insurance, you know, and have a retirement to fall back on.

So I would like to talk about the available supply of skilled, drug-free construction workers, what it does for our state. First, this social infrastructure enhances prospects for new projects. Companies want to know their projects will be built on time and within budget. If companies are looking for skilled, qualified, drug-free workers in West Virginia, we only need to know how many and when do you want them to start.

Second, having local workers on the job maximizes the economic impact from projects. Local workers spend their paychecks in their

communities, pay into training and apprenticeship programs, have health insurance, retirement funds, and in general infuse the local economy with funds. When workers from outside the region are used on construction projects, there is a leakage of economic activity to other regions, and that negatively impacts our communities.

The labor component on a typical construction project is 25 percent. That means 25 percent of every dollar spent on a project like a school or a bridge goes to paying wages and benefits on average. On mega-industrial projects such as an ethane cracker that is very capital-intensive, expect the labor component to be a third of a third. By that I mean if a \$6 billion project is announced, we expect \$666 million to be spent on wages, \$666 million. That is a lot of paychecks, a lot. So paying attention to where paychecks from our energy projects land is critical to a healthy local economy.

Finally, I would like to mention our robust apprenticeship method of training workers for the construction trades. Apprenticeship is more than on-the-job training. It includes related hands-on training at 29 training centers in and around West Virginia. Programs cover a variety of occupations from boilermakers to sheet metal workers. These programs are private sector partnerships between trade unions and construction employers. Apprentices learn while they earn and at no cost to the apprentice or taxpayer. Together, we have developed the best way to create the most productive, highly skilled workers in the world.

Approximately ten percent of our work force is in the apprenticeship programs, which range from a three-to a five-year commitment. We would like to see that number increase to 20 percent, and given a commitment to hire locally, we certainly would be able to accomplish that goal. Such an increase could mean 4,000 apprentices per year getting the skills for a lifetime career, 4,000. That is community and technical college.

In conclusion, the energy sector remains a vital construction job creator for our economy. The growth of the natural gas industry has provided many needed jobs to local construction workers building pipelines and gas processing facilities. We anticipate groundbreaking on a new gas-fired electric generating facility in Moundsville later this year. Major pipeline projects are just a step away from completing their regulatory review. We are currently building a wind project in Grant County and recently completed a hydro project on the Ohio River.

Our workers continue to work on repair and modernization projects at many coal-fired power plants throughout the year, every year. We are excited about the jobs an ethane cracker—hopefully two or three—in the region could bring and the jobs such a project would create downstream as well.

I thank you all for inviting me here, and I appreciate the opportunity to be a part of this panel and to serve with these honorable speakers here. Thank you.

[The prepared statement of Mr. Poling follows:]



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Daniel J. Poling
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Secretary - Treasurer**

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Comments from Dan Poling, Business Manager of Painters District Council 53

August 29, 2016 - Morgantown

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Many people refer to construction jobs as temporary, and while that may be true in part I would like to emphasize that thousands of construction workers earn their livelihood in the energy sector every year in occupations other than mining, drilling and facility operations.

Having an available supply of skilled, drug free construction workers does much for our state.

First, this social infrastructure enhances prospects for new projects. Companies want to know their projects will be built on time and within budget. If companies are looking for skilled qualified drug free workers in West Virginia we only need to know how many and when do you want them to start.

Second, having local workers on the job maximizes the economic impact from projects. Local workers spend their paychecks in their communities, pay into training and apprenticeship programs, have health insurance and retirement funds, and in general infuse the local economy with funds. When workers from outside the region are used on construction projects there is a leakage of economic activity to other regions that negatively impacts our communities.

Pg.2
Comments from BM-ST Poling
Aug. 29, 2016

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Thank you for the opportunity to be part of this panel.

Senator CAPITO. Thank you. Thank all of you. With that, we will go to the question phase. I will start and keep mine to five minutes, and then we will go to Senator Manchin. We will go back and forth.

Dr. Anderson, let me ask you a question. I am really interested in this storage possibility for the Appalachian region. Could you just tell me and others, how many present-day storage units are there now for natural gas? There is one—what is it, in Texas or—

Dr. ANDERSON. Well, for natural gas liquids is what—

Senator CAPITO. Right.

Dr. ANDERSON.—we are specifically talking about. Really, there is the large-scale storage facility in Texas, Mont Belvieu, Texas, just northeast of Houston. There are smaller storage facilities around the country, but the Mont Belvieu facility is the only one that is large enough to warrant a natural gas liquids trade price point.

Senator CAPITO. Is there one in Canada too, or no?

Dr. ANDERSON. Actually, I am not sure.

Senator CAPITO. No. Okay. Well, in terms of the future, in my view to develop and create and keep the jobs in and around our region, we have to have something like this or all we are going to do is build pipelines to send it somewhere else. Would you agree with that?

Dr. ANDERSON. That is right. That is why we are proposing and working on—Steve Hedrick mentioned the Appalachian Storage Hub geologic project, and that is what we are—we are leading with the three state surveys specifically to try to lower the barriers to private industry and the storage facilities in this region.

Senator CAPITO. Do you know if the one that was built in Texas was a public-private partnership or do you know how that was financed?

Dr. ANDERSON. My understanding it was.

Senator CAPITO. Was?

Dr. ANDERSON. Over the course of time and—

Senator CAPITO. Mr. Hedrick, do you have a comment on that?

Mr. HEDRICK. Yes, ma'am, it was. As I understand it, the public-private partnerships were established after the Strategic Petroleum Reserve was put into place and the salt domes were—or the salt strata was well understood then northeast of Houston, and the extraction of the salt to allow for the storage of the liquid at that time.

Senator CAPITO. According to your statement, we already have some of the geological—because we have some abandoned wells, we have some salt mines. Is this a natural fit for the region? I know it is not just West Virginia but for the region?

Mr. HEDRICK. It is a natural fit for the region certainly. As an example, there are natural gas extraction points, methane extraction points in the State of West Virginia that are utilized as elasticity points for the Northeastern U.S. During any given summer, you see them growing. During winter, you see them falling normally when it is nice and cold during the winter.

There is also salt strata reaching from the Great Lakes across the State of Ohio down to the vicinity of New Martinsville, West

Virginia, in fact. They could avail us with the opportunity to do exactly what we have done in Mont Belvieu. And there are other areas. I am not a geologist and would not want to offer—

Senator CAPITO. Well, I want to be very supportive of that. I put that amendment into the energy bill to be supportive of this project because I think it could bear real fruit for the State of West Virginia.

Let me make another statement about that. There is a movement of “keep it in the ground” across the country that I think would be crossways with what we are trying to develop here in terms of a storage basin. I think there are some people that think if you keep it in the ground, you can just bring it up as rapidly as you may need it. That, I guess, is an unlikely scenario. You need that storage basin to be able to multiply the petrochemical and other industries close by. Could you speak to that?

Dr. ANDERSON. So about 85 percent of the natural gas that is in the ground is methane, and what we are talking about is the 15 percent that is not methane. And so what is necessary is to bring it out of the ground, fractionate it or de-ethanize it, separate the natural gas liquids on the surface, and then that is the raw material feedstock for the manufacturing and petrochemical industry.

Once you separate it and you have the 85 percent that is methane, that is what we use to produce power to heat homes. And so it is necessary to bring it up, separate it, and then store it as the natural gas liquid.

Senator CAPITO. Have it ready. Another thing that I have in the energy bill is streamlining on the regulatory thing. Mr. Earl, I know ORDERS Construction does a lot of energy work but also a lot of transportation work.

Mr. EARL. That is correct.

Senator CAPITO. Talk to us a little bit about the permitting. I know that in the transportation bill we both tried to streamline the regulatory regime there. Has that been working? And in my scenario we would have FERC be the lead agency. We would try to move these things side by side, have definite deadlines and those kinds of things in reporting, public reporting on how far along we are on the permitting process. Can you speak to that just generally?

Mr. EARL. Generally, yes. There are so many different agencies that a producer has to report to. It could be streamlining helped out quite a bit. I mean, you have, you know, OPS oil and gas, DEP, EPA, water and waste. It is just a continuing list of just—it is almost overbearing whenever they have to go through and fill out all these permits and get them in hand before we can start work.

Senator CAPITO. Right. And in that case time is money if you—

Mr. EARL. Yes.

Senator CAPITO.—have a permit application and you do not get permitted for five years, it exponentially increases the cost—

Mr. EARL. Yes.

Senator CAPITO.—and I think that is a consideration, without forgoing any of the environmental regulations. I think we could do a much better job.

Mr. EARL. Yes, correct. And, you know, whenever these guys are building wells now, I mean, they are \$7 million a pop, so they are regulated internally as well as externally.

Senator CAPITO. Right. Senator Manchin?

Senator MANCHIN. Thank you. Again, thank all of you for your statements.

I will start with Dr. Deskins. Doctor, your 2016 economic report went into us being into a downturn, which is an understatement.

Dr. DESKINS. Sure.

Senator MANCHIN. The downturn that we have had in energy, especially in our coal industry, which is a large trail of employment that is hard to replace even by the onslaught of the new gas finds that we have had. I think you acknowledged that in your report. When you look at basically the rapid downturn of the coal industry, was it market forces? Was it basically the EPA overreach, over-regulation or accelerating that? Where do you put the concern? And then also, how do we get reinvestments back into the energy market?

Dr. DESKINS. Sure. Thanks for that question. I think what we saw with coal was really a perfect storm. In my report I said three factors. I think we have the natural gas boom, which is critical, of vital importance in terms of putting downward pressure on coal. And I think that works in conjunction with the regulatory climate.

In my view, you know, coal had a cost advantage at one point in the past. Here is the cost of coal; here is the cost of natural gas. Natural gas boom lowers the cost of natural gas from the perspective of an electric power producer. The regulatory climate raises the cost of burning coal. So both of those together are working to tip the scale away from coal in favor of natural gas from the perspective of so many electricity producers.

It is really hard to say how much is due to one versus how much is due to the other. That would really require an in-depth analysis at the power plant level. But the two are working together and the two are both very important.

And a third piece of that puzzle is the export climate. Globally, economic growth is down. Europe is smaller now than it was in 2007 in terms of economic output. China is slower, Brazil, Russia. Slower economic growth globally means less need for steel, that means less demand for West Virginia coal exports.

So those three things came together at the same time, put tremendous downward pressure on national demand, but then as I said as well, that is not spread all the way across America. That demand is affecting central Appalachia, southern West Virginia particularly hard.

But the second part of your question was, how do we turn this around? I do not know all the answers but I know that it is absolutely crippling West Virginia. Natural gas is a positive obviously, but just from extraction, that is not creating nearly enough jobs to replace the lost coal jobs. We have to talk about midstream activities and downstream activities, bringing those in the state as well. That is the only way we are going to be able to get enough—

Senator MANCHIN. So basically just us having all this wonderful find of natural gas, whether it be Utica, Marcellus, whatever, is

never going to replace what we have had in the coal industry unless we are able to get the downstream investments?

Dr. DESKINS. That is my opinion. We have to——

Senator MANCHIN. So storage that we are talking about basically, all these different things just leads into my next question to either Dr. Anderson or Steve Hedrick. Are you looking at gas as a baseload? I mean, the only thing I ever understood as a baseload was coal and nuclear because you could not interrupt it; it was there.

Dr. ANDERSON. Right.

Senator MANCHIN. Gas is still interruptible no matter what you do with the pipeline. So is it going to be looked at from transmission as a fuel for baseload generation?

Dr. ANDERSON. Yes, it is. We have seen the shift of our neighboring states, the balance between coal and natural gas, and nationally, we have seen natural gas overtake coal as a baseload. And right now, just recently——

Senator CAPITO. How does that affect the transmission, basically our reliability of the system?

Dr. ANDERSON. Well, it puts additional load on the natural gas infrastructure and on the pipelines distributing our gas. And we see projects that are underway and taking gas from the Appalachian Basin across our mountains in West Virginia and Virginia and North Carolina to deliver the natural gas. It is now increasingly going into power plants in Virginia. Duke Energy just got into the rate base in Virginia, a natural gas power plant, extremely efficient and a CO2 footprint that is lower than the CDP standards.

Senator MANCHIN. Steve, you might want to talk real quick on why are we located centrally for this type of storage that could really help bring more of that product or keep that product in this area?

Mr. HEDRICK. Thank you, Senator, for that question. We are located within two-thirds of the population of the United States of American and one-third that of Canada. That is a day's drive easy, easy travel for transportation of material goods, finished goods like this bottle that is sitting in front of me. It would be perfect for that to occur.

It is also geographic diversification from the United States Gulf Coast away from natural disasters that are naturally occurring from hurricanes, of course. And, you know, I feel very sad, of course, for the people in Louisiana who have had to deal with a flood just like we have in West Virginia within the last six weeks or so.

But it is too great a detriment to industry as well, and the trillion-dollar hits that we take in the economy sequentially every hurricane season because they have to shut everything down because a hurricane rolls into the Gulf. I guess that can be smoothed out, if you will, by virtue of bringing an Appalachian Storage Hub to this Appalachian Basin.

Senator MANCHIN. Jeff, just to finish up real quick.

Mr. KEFFER. Senator Manchin, just to add to this because obviously we are producing power, selling it into PJM, who are closely what our competition is. Our competition really is now new gas-fired power plants that are being built throughout the region tak-

ing advantage of the opportunity that exists because of the abundance of gas.

We anticipate by the time we get many of those plants, I think there is like 35 or whatever in the queue at this point, many of those get built. Plus, with the crackers in place and the other opportunities to use gas, the question will then be or the issue will then be where does gas go? Gas has been historically a very volatile fuel and can be very expensive when there are constraints such as when the polar vortex occurred a couple years ago. In fact, there just was not gas, believe it or not, during that period of time and so there were many plants that could not operate.

So there is an opportunity there for baseload, and I think it is really part of the mix and it really needs to be part of a regional mix, as you were describing, in terms of power production. There is no reason why we cannot have gas-fired power plants, combined-cycle plants here in West Virginia and throughout the region that are supplying electricity to the people who need it who do not want to have those power plants. But we also need other sources of electricity for when the gas becomes expensive again, for when the gas is not available because of the constraints of the infrastructure, and I see that continuing to be pulled, as I described in my testimony.

Senator MANCHIN. I will follow up later with these questions.

Senator CAPITO. Yes, following up on that, Mr. Keffer, we are not building another plant like Longview in this country at this time, correct?

Mr. KEFFER. Unlike the Germans, unlike the Japanese, unlike the Chinese and people in India and across the world, no, we are not.

Senator CAPITO. That is what I was going to ask you, where are they building them? Every place but here?

Mr. KEFFER. Unbelievably, because in fact some of these countries like Germany and Japan have very restrictive climate control plans in place, even more so than what we would have here under the Clean Power Plan, and yet their mix of energy will include coal-fired power plants like Longview or more advanced plants than Longview.

Senator CAPITO. Is the reason that we are not building them here—is it the expense, the regulatory environment, the fear of the unknown, or a little bit of each?

Mr. KEFFER. Well, right now, we have got the regulatory environment that is clearly a block. It is not part of the Clean Power Plan but the carbon New Source Rule, which is an adjunct to it, would make it so that to build a Longview, you would have to incorporate carbon capture and sequestration. And there are not investors who are willing to take that kind of risk at this point in time because—and I know this is subject to litigation but I will just say what I think. It is really not commercially feasible—

Senator CAPITO. Right.

Mr. KEFFER.—at this point in time. Much more work has to be done—

Senator CAPITO. Go to Mississippi.

Mr. KEFFER. Well, that is a different type of plant—

Senator CAPITO. Right.

Mr. KEFFER.—but it also shows how difficult it is to make big leaps—

Senator CAPITO. Right.

Mr. KEFFER.—in the power industry. We made some incremental changes and leaps with Longview, and they were difficult enough to be able to make to see the results that we are seeing now. We had to reinvest additional amounts. But those huge leaps—which also people talk about renewables and talk about battery storage—that is another very, very large step into the future that we probably will not see for some time to come.

Senator CAPITO. That is an interesting technology, too, on the renewable side with the battery storage.

Dr. DESKINS, you mentioned just briefly that your projection for natural gas is that industry will take back off. I do not even know what the price—I know it has been very, very low. There are a lot of wells that are shut in. A lot of our companies, unfortunately, have laid off a lot of people. What makes you make that projection that it is going to get more—does that mean the price is going to go up? Because we know we have the supply. Is it because LNG is going to be coming on?

Dr. DESKINS. Sure. What we see with natural gas is not surprising or not really bad, and the good thing is production capacity with natural gas has outstripped our infrastructure, which is a good thing, right, for productive capacity to grow that much. But over time—the result is right now we have a glut of natural gas in this part of the country. We are causing that production capacity with their infrastructure constraints.

But as infrastructure improves to natural gas to where it needs to be across the country geographically, as infrastructure improves to get gas to where it needs to be in terms of industry and manufacturing, both of those are going to help improve the natural gas situation. And as we can move forward with an exported liquified natural gas to Europe, that is going to improve. All those things will expand—effectively, those three things are expanding the market for natural gas from this region. That will lead to price depreciation over the long run, and that is something that is going to benefit natural gas and coal both as those natural gas prices go up. As a matter of fact, one of our top sources of optimism in our coal forecast is if natural gas prices are even higher than we expect.

Senator CAPITO. Right.

Dr. DESKINS. That is going to be a source of optimism for coal, too.

Senator CAPITO. Right. Mr. Hedrick, both you and Dr. Anderson talked about the Shell investment, and I know that was on hold for, what, three or four years before they made the announcement?

Mr. HEDRICK. They made the final investment decision within the last six months. They are on an 18-month string. At that point they actually started spending significant dollars in their terms with regard to a multibillion-dollar investment. I think they are in right now more than \$100 million in prep for the site in engineering.

Senator CAPITO. What would you point to that, kind of, was the tipping point for them to go ahead and make that final decision? I know they pulled out of Alaska on a very significant project they

had going there for, gosh, I think decades. I am going to ask you, Dr. Anderson, too, but, Mr. Hedrick, do you have any opinion?

Mr. HEDRICK. I mean, as it often is, it was the assurance that they had predictability of supply for the raw material and predictability of demand for the product. I mean, those are the two key attributes that they had to have to make a multibillion-dollar investment without making the decision to put in pipelines just to supply themselves and the decision to latch onto long-term contracts, which I am not aware of their long-term contracts. I do not want to imply that I am. But without some assurance that they are going to have long-term supply for the raw materials, it is a hard decision to make, and they appear to have those locked down now.

Senator CAPITO. Dr. Anderson, do you have anything to add?

Dr. ANDERSON. Well, I agree with Steve's comments. I would say that, additionally, Shell is investing in one step further downstream than just the cracker, and the final product is polypropylene pellets or small balls that they can sell directly to the market—

Senator CAPITO. For plastics? Is that what that—

Dr. ANDERSON. Plastics, yes, for people to directly mold. So that is one aspect of it. Additionally, you know, I would hate to say, but the Pennsylvania tax credit that they have was a pretty big carrot for them, which would amount to about \$1.7 billion over the life of the plant in terms of feedstock and knowing that they have the raw materials that would be readily available to—

Mr. HEDRICK. And that comes down to creating predictability, right? Predictability in supply, predictability in cost, and for the tax base, predictability in revenue generation substituted with a facility.

I think that the other states, you know, Ohio, West Virginia, Kentucky and Pennsylvania in fact would appreciate further predictability with regards to PHMSA and what they would do across the long haul with regard to our interstate pipeline system and specifically, as we talked about, you know, a pipe from Monaca, Pennsylvania, across West Virginia and Ohio down to Catlettsburg, Kentucky. There has to be predictability or a mix of investment for the very same reasons that we are talking about with regards to shale.

Senator CAPITO. So that is refining into gasoline then you are talking about at Catlettsburg?

Mr. HEDRICK. At Catlettsburg they do have a refinery. They also have a propane-to-propylene manufacturing facility. The—

Senator CAPITO. Do you want me to tell you the chemistry of that?

Mr. HEDRICK. Yes, ma'am. [Laughter.]

Senator CAPITO. I will let Senator Manchin do that. [Laughter.]

Mr. HEDRICK. It is interesting that a very, very small underground storage facility in West Virginia that stores propylene and feeds that into Catlettsburg, Kentucky. It then feeds propylene back into Neal, West Virginia, to make polypropylene, which further goes into the market. I do not want to pretend that we have presented to you novel testimony really. It is proven that this works and it is proven that it is good for the Appalachian Basin and for the nation so—

Senator CAPITO. Yes, thank you. Senator Manchin?

Senator MANCHIN. It is frustrating, I know for myself and I am sure for Senator Capito at times, they believe because we come from West Virginia and we represent West Virginia that we do not care about the environment. You will have people, kind of pigeon-hole you on that. We kept saying, listen, the bottom line is West Virginia produces coal and the rest of the world is still using it.

There are utility people out here right now. I have not spoken to one utility person, whether it is in our region or around the country, that believes that electric generation they have the freedom to choose their portfolio. They believe that they have been forced because of Federal Government regulations to fuel-switch and put all their eggs in one basket, which could be detrimental to reliability but also, most important, to the cost of energy that keeps us competitive as a country.

These are the things that we are talking about. Ninety-four percent of our electricity in West Virginia comes from coal. We are switching it rapidly, very rapidly. As we do that, how vulnerable does that make us from the standpoint to be able to create the stability that we would like to have in manufacturing bases? Why have we not expanded off of our chemical valley that we have?

We have a tremendous chemical footprint in West Virginia, no pun meant here, but they are a shell of what they used to be. They are all operating at 50 percent less than their footprint. Why are they not expanding? I know we are starting to use now the new one we just talked about, Steve.

Dan, I would then ask you, as far as on the work force, what are we doing to our work force? I am more concerned today than I have ever been in the State of West Virginia when we have under 50 percent of the people that are eligible to be working as adults working and performing.

Mr. POLING. Well, thank you for that question, Senator. In the trades, we are trying several programs to—

Senator MANCHIN. Your apprentice programs and all that, yes.

Mr. POLING. Our apprenticeship programs, we have our returning vets. We get them in there. We try and develop technology to take those who at one time the job may have been too physical but to lessen that challenge so that people who have some minor handicaps can do something in the trade works and stuff so they can be productive instead of saying I am unable to work.

But all of our programs have things like that in place that we try to work with those that have any disadvantage at all that can become a productive, successful tradesman. There are a lot of jobs nowadays with technology and stuff that are more using your mind, not your hands so much. You have to have the basic understanding of math and science and things like that, but there are prospects for those folks like that. So we are trying to get the trades to basically give those folks an opportunity not just saying because they are not 250 pounds, six foot tall, you cannot be an ironworker. That is not true in today's world because of technology. So our trades are doing that, and we hope to bring more people in, and a few years ago, quite frankly, who did not have the opportunity.

Senator MANCHIN. Mr. Keffer, if I could ask you, on the Longview plant you were kind enough to have both of us and provide a tremendous tour of that facility. The Federal Government did not encourage you to build that plant, correct?

Mr. KEFFER. Oh, no. No, not at all.

Senator MANCHIN. If anything, they fought you every step of the way and probably increased the cost by ?

Mr. KEFFER. We benefited from being located here in West Virginia.

Senator MANCHIN. Yes.

Mr. KEFFER. For sure.

Senator MANCHIN. With that being said, you are saying you can gas-fire that plant also?

Mr. KEFFER. We can gas-fire up to 20 percent of its heat—

Senator MANCHIN. So you can basically have a multi-faceted plant that produces off of gas, taking advantage of gas prices versus coal prices and is more reliable?

Mr. KEFFER. That is exactly right.

Senator MANCHIN. And that is not encouraged either?

Mr. KEFFER. If it is a coal-fired plant and it has got a steam generator like ours, it could not be built at this point because of the regulation that is now in litigation.

Senator MANCHIN. Got you.

Mr. KEFFER. Yes, that is correct.

Senator CAPITO. And that is the Clean Power Plan?

Mr. KEFFER. Yes.

Senator MANCHIN. And you are a merchant plant?

Mr. KEFFER. We are a merchant plant.

Senator MANCHIN. You might want to explain just for the record.

Mr. KEFFER. Oh, sure. So yes, every day—

Senator MANCHIN. You are on the market.

Mr. KEFFER.—we bid into the market in PJM, which is the area that includes West Virginia, Pennsylvania, New Jersey, a bit of Illinois and Indiana. And they are the—PJM then buys all of the power wholesale and then redistributes it to the utilities, to—

Senator MANCHIN. So you get no guaranteed pricing by the PSC or any of that?

Mr. KEFFER. There is never guaranteed pricing. That is correct.

Senator MANCHIN. And you are able to compete in the marketplace. What is your capacity now? What are you all producing, what capacity rate?

Mr. KEFFER. We are producing more than what our—we have said our net is.

Senator MANCHIN. I got you.

Mr. KEFFER. We are 700 megawatts and during the hot days this summer, we have been—

Senator MANCHIN. You are able to sell all of your power?

Mr. KEFFER. We are up to about 710 from time to time, just being able to get those extra dollars out of our generation, yes.

Senator MANCHIN. Can I ask one more question?

Senator CAPITO. Sure, go ahead.

Senator MANCHIN. Dr. Deskins, the economy is what we are worried about and how in the world do we jumpstart this economy? Right now, I have been challenged by a lot by people saying I am

not sure you are going to have an ample work force. Do you see that as a concern that we may have, and how do we turn that around as quickly as possible?

Dr. DESKINS. Well, the first part of that question is easy. That is a desperate concern. I constantly talk about we want good transportation infrastructure. We want a good tax climate. All these things are important, but if a firm is not confident that it can find the workers that it needs who are healthy, well-skilled, well-educated, well-trained, and drug-free, then all the good positive tax climate, infrastructure, all these other things are not going to matter if a business is not confident that it is going to find the workers that it needs.

I think education, training, health, human capital, drug abuse, I think these are probably the most important concern that we have going forward, and I frequently cite this labor force participation rate or this employment-to-population ratio is the key concern for West Virginia going forward.

But it is not easy. We have so many challenges with regards to the brain drain. You know, many of the young men and women who we have pulled out of high school in West Virginia who we give a good college education to, many of them just find that it makes more sense for them to take a job in Ohio or PA, Virginia, wherever.

I mean, this all works together. We can create a healthier economy. Then, those young men and women will be more inclined to stay here, and that will help reverse many of our human capital, brain drain problems.

There is no easy answer. We have to focus on the basics, but we do need to keep our attention on health, drug abuse, education and cultivating opportunities. And the clearest, most shorter-term opportunities are in energy to make more sense for our young people to stay here and for people to migrate here. There is no silver bullet because it is a daunting challenge with 53 percent of our adult population wanting to have a job, the lowest number in the nation. We have been dead-last in that statistic every year since 1976. It is a challenge.

Senator CAPITO. Do you have any more questions?

I have two quick questions. My first question is, I hear a lot of optimism about where we can go because we are blessed. We have these resources, we have a willing, I think, more entrepreneurial spirit now to try to look at different and new ways to use this.

My concern is if we only talk about it and do not actually act on it in terms of the infrastructure. Getting back to the original topic of discussion, if we just say, yes, we do need some more pipelines but cannot attract the investment, yes, we need a storage area but we cannot attract the investment, my concern is, Dr. Anderson, I would ask you do you see a scenario where if we hesitate too long, we could again see our resource going somewhere else, being used all over like our coal basically has been for years? We use a lot of it here, but we export a heck of a lot of it all around the country. Can you speak to that?

Dr. ANDERSON. Senator Capito, yes, I completely agree with you. If we do not act quickly in this region and in the state, then pipe-

lines will be built to Philadelphia starting in Ontario and the Gulf of Mexico.

And so in this region what we are trying to do is to be active about turning this around is lowering all the barriers, having a predictable and consistent permitting environment. Those sorts of things are exactly what we need to do to lower the barrier for private industry.

And then on the other side what we are trying to do is capitalize that private investment through showing where the opportunities are, and, as Dr. Deskins mentioned, we need to work on the work force challenge as well.

But I completely agree with you. If we do not act now, then we will continue just to export our raw materials.

Senator CAPITO. Right. I know there are some other opportunities in terms of a cracker. Obviously, the one in Parkersburg, which has been talked about for several years, is still on hold. But there is also, I think, great hope that across the Arch Moore Bridge in Moundsville in Ohio, FirstEnergy has cleared a site there of a former power plant, and I have great hopes that will develop. If we could grab those investments, I think some of these other things can follow.

I do not have any other questions.

Senator MANCHIN. Just out of curiosity, if you were in our position, if you could go back to Washington and make any type of a recommendation for a change and that change could happen, what would be your recommendation for us to do for not just West Virginia but for our country? Basically, if we are going back and looking at economic vitality, every part of the country wants more jobs. I do not think any other part of the country needs jobs as bad as we need them right now. So if you were going to recommend one thing to Senator Capito and myself and we could change that, what would we go back and change? What would you ask? What would your recommendation be for us to change? We will go down the line. Dan, do you have any comments?

Mr. POLING. Yes. I would like to—and maybe part of this concept will not simply be about the wages and the drug testing and all that. I would like to somehow come up with something that says, when these projects come up, we put local workers on them. When Dr. Deskins was talking about competing with Ohio and Pennsylvania, that is true people go there to work because anybody will go to work where they can make more money. When we hold the wages down and expect more, then people want to go somewhere else.

So I guess my question would be if there is enough money to invest in infrastructure from the government to make this state be in a position where it needs to be to bring all this together, then I think that is a good thing. And then if you put some caveat on there that we use local workers to do it and to be drug-free, I think that is a great start.

I did want to make the comment, we talked about the trades and there was some question about drug-free workers. We have less than three percent failing our drug-testing programs, and when we go to these folks who need work, we have drug-testing prior to and randomly while they are there. And we have less than three per-

cent failing. The reason for that I believe is it is a risk and reward. These are good-paying jobs. People do not want to lose them. They do not want to get busted on a drug test and lose their jobs if you are paying them a good living.

So I think the two kind of go together, and I would have to ask you two if you could to invest in West Virginia from the Federal and the infrastructure——

Senator MANCHIN. You are saying make sure that any jobs that we could bring here are going to be West Virginia jobs first?

Mr. POLING. Local jobs for local people. I believe that——

Senator MANCHIN. Yes.

Mr. POLING.—and I believe in the drug-testing requirement on the project.

Senator MANCHIN. Yes. Jeff?

Mr. KEFFER. I would hope that we could use the opportunity with a change in Administration, regardless of which direction it goes, to step in and settle the Clean Power Plan litigation, make changes to the framework of that allow us to get going on building new advanced coal plants but also deal with the issue, the very real issue that has been recognized in the country of climate control.

Senator MANCHIN. Steve?

Mr. HEDRICK. So sometimes I am known for a little bit of boldness as you have known me over the years, and when I was in the Army I had tanks, M1A1, great pieces of gear. And the tank commander has at his disposal or her disposal as we move forward the opportunity to grab a commander's override it is called associated with that tank and pivot the turret on their own and make a decision to redirect the pathway of the gun if you will.

So what I would advise, if it is even feasible and possible that the commander's override be grabbed by the Federal Government to force state government's involvement in this and pivot this. When you have 49 percent of this brought forward as part of the public investment associated with this, the private sector needs to come forward with 51 percent right now. And that is a bold shift in the manner of our thinking and what we want.

But we are staring at adversity beyond that which we have seen in generations. Southern West Virginia and Eastern Kentucky are being crushed right now, and the social problems that come along with the declining education, increased drug problems and a lack of opportunity and pride to be able to work are very autumnal, and they go further and further and further.

The amount of money that we are going to spend across the next 20 years in supporting people who want to work but cannot and experience all of these problems I think is going to—we could dwarf that by a simple investment right now between the four states and the Federal Government.

Senator MANCHIN. Chad?

Mr. EARL. I think we are getting regulated out of business to some degree. From the people I have talked to, the rules or all the different regulations we have are not necessarily clear and there is a lot of overlap and who has jurisdiction over what. So I think that whole process could be streamlined. I mean, whenever it delays construction, construction costs in the wintertime go up approximately 15 percent, so they are banking on that because of different

permits and stuff that they have to have. So that is probably the biggest one for us to address.

Dr. DESKINS. I would say—I think that question—by the way, this is a fantastic question and I appreciate you offering me the opportunity to weigh in. But I would say first off, of course any positive regulatory policy surrounding clean coal technology, natural gas policies, research and development and those areas of course are one of our most clear short-term ways to carry this state.

But let me just say I really, really appreciated your comment at the very beginning about returning Vietnam veterans. I have never heard it put that way, but that is a great way to think about how West Virginia has supplied the nation's energy for so many years but how we have not been thanked enough for our contribution to our fundamental—being able to pay it forward.

So with that in mind, I would try to do what I can to really communicate the state that we really find West Virginia in, especially the great depression that we find in six counties. And I would call for any help that we can get from Washington with our drug crisis, with our health crisis, with our education crisis, and with our I would say significant infrastructure needs. All those are—well, those are essentially the problems. It is laughable for me to call it short-term issues, but those are—that is my answer.

Dr. ANDERSON. I think with the raw materials we have in this region, there are really three ways to get it to the population centers where it is used. West Virginia does not have a lot of population but, as Steve mentioned, within one day's drive is about two-thirds of the population of the United States and a third of Canada.

So the three ways to move those raw materials are either pipes, wires or roads. And so ultimately, what we want to do is upgrade the materials to where we end up stressing our road infrastructure because we are shipping so many end and finished goods. And so I think we see within the State of West Virginia the road infrastructure, a lot of wear and tear. And because of decreased tax revenues, we have seen a lot of wear on the road infrastructure.

I would encourage one way to help spur the investment of your pipes, wires or roads is to lower the barrier for the regulatory environment. We have heard this message a few times of the unpredictability of the regulatory environment, which lends itself to the unpredictability and the ability to get capital. And so when you go to an investor and there is an unpredictable regulatory environment such as the one we see at the moment, that leads to a difficulty getting investment. Leveling the playing field and the predictability of the regulatory environment I think would be a huge barrier to cross.

Senator MANCHIN. Let me make one final comment before Senator Capito wraps this up.

The thing that I was most appalled by and why I am most upset about the present Administration under President Obama, there was no plan. There was no plan. What do you do when an area is absolutely economically destroyed knowing that this major policy shift of this moving away from fossil that he would like to do in such a rapid way by turning the EPA loose—and I know we have been criticized for saying “war on coal.” I do not know what else

to call it. I really do not because it has been singly targeted in the Appalachian region. So I am trying to be as respectful as I can in trying to get policies forward.

I have come to the conclusion: The only way that we are ever going to succeed is follow the dollars, the tax credits, extenders. They have been pouring more and more tax credits and extenders into renewables, and the only thing I am going to say, if that is the policy direction, then we cannot collectively stop some of this other thing when you have an Administration desire to do something as they have done. We could at least say this that makes all the sense in the world: If you are going to use these tax extenders—they call them tax extenders—they are credits. They give them credits if they do certain things in certain fields. So if they are moving to solar or hydro or—

Senator CAPITO. Wind.

Senator MANCHIN.—wind in all of this, those credits should only be used in a germane energy where the losses are. So if the losses came from areas such as West Virginia and southwest Virginia and Kentucky, those credits have to be used there. It makes all the sense in the world. I am going to do everything I can to shut this system down the next time because, trust me, they love tax credits. The wind people are not letting tax credits go. Solar is not letting tax credits go.

I am asking how do you argue against at least using the credits if you are going to get them? We will build the best windmills, Danny. Our guys can build windmills. We can build solar. We can build anything you want. Just give us a chance. That is what I am most upset about is that there is no plan. There was no plan for a major policy shift in energy, and that is what we have got to correct, I think, as quickly as possible to give us all a chance to survive in this tough area.

Senator, thank you so much again for this hearing. And we are having Secretary Moniz come visit. Right now, he is scheduled for September the 12th.

Senator CAPITO. To Morgantown?

Senator MANCHIN. Yes, we are going to do this because he needs to see NETL, what NETL is doing. He needs to see what you are doing, Jeff, at Longview and basically what we can do in a balanced approach.

All of you will be invited, and we hope everybody shows up. Thank you.

Senator CAPITO. Well, thank you. I know the last thing is only the last thing until it is the last thing so I am going to say one thing about something Senator Manchin was saying. I have been on an effort—and I believe Senator Manchin is on this so I will not speak for him, but I know Senator Portman in Ohio is—to try to even this tax credit thing.

If you are going to go and build a coal-fired power plant and you can use carbon capture and sequestration, which Jeff has said is not occurring right now because it is not economically or probably technologically feasible, but when it gets there, let us put them on an even tax credit playing field so that fair is fair. It does not exist right now, and I think it would also get to some of the greater goals of cleaner, more efficient energy production.

With that, I would like to again thank Senator Manchin. As you can see, we work very well together and we have, I think, a unity of thought in this area. I would like to thank the witnesses, our hosts, and the committee. I would like to thank my staff, Jan Brunner and Kaylan Billingsley, for all their hard work of putting this together.

I would also like to thank the Chairman and Ranking Member of the Full Committee, Lisa Murkowski from Alaska and Maria Cantwell from the State of Washington. We could not have this here in West Virginia without their consent, so I want to thank them and the Full Committee staff as well.

Thank you all, and with that, I will adjourn this committee hearing.

[Whereupon, at 3:41 p.m., the hearing was adjourned.]

