

**THE 2017 HURRICANE SEASON: A REVIEW OF
EMERGENCY RESPONSE AND ENERGY INFRA-
STRUCTURE RECOVERY EFFORTS**

HEARING
BEFORE THE
SUBCOMMITTEE ON ENERGY
OF THE
COMMITTEE ON ENERGY AND
COMMERCE
HOUSE OF REPRESENTATIVES
ONE HUNDRED FIFTEENTH CONGRESS

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¹The information has been retained in committee files and also is available at <http://docs.house.gov/meetings/IF/IF03/20171102/106573/HHRG-115-IF03-20171102-SD010.pdf>.

²The information has been retained in committee files and also is available at <http://docs.house.gov/meetings/IF/IF03/20171102/106573/HHRG-115-IF03-20171102-SD003.pdf>.

**THE 2017 HURRICANE SEASON: A REVIEW OF
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THURSDAY, NOVEMBER 2, 2017

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:34 a.m., in room 2123, Rayburn House Office Building, Hon. Fred Upton (chairman of the subcommittee) presiding.

Members present: Representatives Upton, Olson, Shimkus, Latta, Harper, McKinley, Kinzinger, Griffith, Johnson, Long, Bucshon, Flores, Mullin, Hudson, Walberg, Walden (ex officio), Rush, McNerney, Green, Doyle, Castor, Sarbanes, Welch, Tonko, Loeb sack, Schrader, Kennedy, Butterfield, and Pallone (ex officio).

Also present: Representative Bilirakis.

Staff present: Ray Baum, Staff Director; Mike Bloomquist, Deputy Staff Director; Adam Buckalew, Professional Staff Member, Health; Allie Bury, Legislative Clerk, Energy/Environment; Karen Christian, General Counsel; Kelly Collins, Staff Assistant; Zack Dareshori, Staff Assistant; Wyatt Ellertson, Professional Staff Member, Energy and Environment; Adam Fromm, Director of Outreach and Coalitions; Jordan Haverly, Policy Coordinator, Environment; A.T. Johnston, Senior Policy Advisor, Energy; Mary Martin, Chief Counsel, Energy and Environment; Alex Miller, Video Production Aide and Press Assistant; Brandon Mooney, Deputy Chief Counsel, Energy; Mark Ratner, Policy Coordinator; Annelise Rickert, Counsel, Energy; Dan Schneider, Press Secretary; Peter Spencer, Senior Professional Staff Member, Energy; Jason Stanek, Senior Counsel, Energy; Madeline Vey, Policy Coordinator, Digital Commerce and Consumer Protection; Hamlin Wade, Special Advisor for External Affairs; Everett Winnick, Director of Information Technology; Andrew Zach, Senior Professional Staff Member, Environment; Priscilla Barbour, Minority Energy Fellow; Jeff Carroll, Minority Staff Director; Rick Kessler, Minority Senior Advisor and Staff Director, Energy and Environment; John Marshall, Minority Policy Coordinator; Jon Monger, Minority Counsel; Alexander Ratner, Minority Policy Analyst; Tim Robinson, Minority Chief Counsel; Tuley Wright, Minority Energy and Environment Policy Advisor; C.J. Young, Minority Press Secretary; and Catherine Zander, Minority Environment Fellow.

Mr. UPTON. The Subcommittee on Energy will now come to order.

And the Chair will recognize himself for an opening statement.

OPENING STATEMENT OF HON. FRED UPTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

So, this year's Atlantic hurricane season was unprecedented. Four named storms in close succession slammed into the Gulf, Puerto Rico, and the U.S. Virgin Islands. These hurricanes caused catastrophic damage and energy supply disruptions across the country. While Texas and Florida are further down the road to recovery, a humanitarian crisis is unfolding in Puerto Rico—a number of colleagues from this committee have been down there—and the U.S. Virgin Islands, where the majority of folks still remain without power for more than a month after Hurricane Maria made landfall.

Today's hearing will review the emergency response and energy recovery efforts in the wake of those storms. It will help us begin to understand what went right and what went wrong, what lessons can be learned, and how we, as policymakers, can identify gaps, so that when the next hurricane hits, we will be better prepared.

As a result of Hurricane Harvey, more than 275,000 customers lost power in Texas, and severe flooding also affected the supply and delivery of transportation fuels, compounding response challenges and energy impacts across the Gulf. Hurricane Irma left more than a million customers without power across Puerto Rico and the Virgin Islands. More than 6 million customers in Florida and another million in Georgia and South Carolina also lost power. Then, two weeks after Irma, Hurricane Maria delivered the knockout punch, wiping out the entire grid on Puerto Rico and the Virgin Islands. At peak, more than 3½ million folks were without power.

As with most disasters, energy restoration is performed by Federal, State, and local authorities, who provide vital resources, infrastructure support, and logistical coordination, and by industry, which provides the expertise and manpower to restore energy supply and services.

As we have witnessed nightly in the news, recovery on the islands has been painfully difficult and slow. Questions are mounting regarding the role of the Puerto Rico Electric Power Authority, PREPA, and its initial reluctance to request mutual aid from mainland electricity companies that were standing by ready to assist immediately after the storm. Rather than request mutual assistance, as Texas and Florida did in the preceding storms, PREPA took the unusual step to award a contract to a virtually unknown company which it then canceled. The deals that PREPA signed immediately following the storm are now the subject of an investigation by this committee, as they should be.

Today we are going to hear from two witness panels which will provide perspective from the Federal level, the State level, and the industry responder level. As we have seen in recent weeks across the areas affected by the storms, each disaster creates its own set of problems. Today's witnesses can help us understand the factors that contribute to these problems and what we may do to ensure a more effective response going forward.

It will also help us understand the challenges that they face as they move energy and product in the aftermath of devastating storms. While we have seen alarming devastation, we have also seen some aspects of the response go right. At this point, by most accounts, the Department of Energy's support functions have gone well. DOE's coordination of regulatory assistance, or waivers, during the disasters has gone well. Their informational assistance has been consistent and helpful to Government and industry alike.

We will hear this morning about the Strategic Petroleum Reserve, which during Harvey served to provide emergency petroleum swaps to make up for the temporary loss of supply and keep prices at the pump somewhat stable.

We will also receive an important update on the various restoration efforts to bring power back to the folks of Puerto Rico and the Virgin Islands. It will be particularly helpful to understand what have been the barriers to a more rapid recovery, what we are learning about coordination of emergency response and restoration on these Territories, and what is needed more from us, the Congress. How can we apply these lessons going forward? This hearing should help us answer some of those critical questions.

[The prepared statement of Mr. Upton follows:]

PREPARED STATEMENT OF HON. FRED UPTON

This year's Atlantic hurricane season was unprecedented—four named storms in close succession slammed into the Gulf Coast, Puerto Rico and the U.S. Virgin Islands. These hurricanes caused catastrophic damage and energy supply disruptions across the Nation. While Texas and Florida are further down the road to recovery, a humanitarian crisis is unfolding in Puerto Rico and the U.S. Virgin Islands, where the majority of people still remain without power more than a month after Hurricane Maria made landfall.

Today's hearing will review the emergency response and energy recovery efforts in the wake of these storms. It will help us begin to understand what went right and what went wrong. What lessons can be learned, and how we as policy makers can identify gaps, so that when the next hurricane hits, we are better prepared.

As a result of Hurricane Harvey, more than 275,000 customers lost power in Texas, and severe flooding also affected the supply and delivery of transportation fuels-compounding response challenges and energy impacts across the Gulf Coast. Hurricane Irma, left more than 1 million customers without power across Puerto Rico and the Virgin Islands. More than 6 million customers in Florida and another 1 million in Georgia and South Carolina also lost power. Then, just two weeks after Irma, Hurricane Maria delivered the knockout punch, wiping out the entire grid on Puerto Rico and the Virgin Islands. At peak, more than 3.5 million people were without power.

As with most disasters, energy restoration is performed by Federal, State, and local authorities, who provide vital resources, infrastructure support, and logistical coordination, and by industry, which provides the expertise and manpower to restore energy supplies and services.

As we've witnessed nightly in the news, recovery on the islands has been painfully difficult and slow. Questions are mounting regarding the role of the Puerto Rico Electric Power Authority (PREPA) and its initial reluctance to request "mutual aid" from mainland electricity companies that were standing-by ready to assist immediately after the storm. Rather than request mutual assistance as Texas and Florida did in the preceding storms, PREPA took the unusual step to award a contract to a virtually unknown company which it then canceled. The deals that PREPA signed immediately following the storm are now the subject of an investigation by this committee.

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This hearing should help us begin to answer these critical questions.

Mr. UPTON. And I yield now to the ranking member of the subcommittee, my friend, the gentleman from Illinois, Mr. Rush.

OPENING STATEMENT OF HON. BOBBY L. RUSH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. RUSH. I want to thank you, Mr. Chairman, for holding this important hearing, examining the 2017 hurricane season and the emergency response and energy infrastructure recovery efforts surrounding these emergencies.

Mr. Chairman, I hope this will not be a "one and done" hearing. Folks know in this year's historic and devastating hurricane season that there are many, many critical interrelated issues that must be addressed.

While I appreciate having witnesses here to discuss the GAO report that we requested last year, the fact of the matter, Mr. Chairman, is that, as we speak, there are still many millions of American citizens living without electricity, and many are facing dire life-and-death conditions. It is over a month now that Hurricanes Harvey and Irma and Maria shattered their lives and devastated their livelihoods.

Mr. Chairman, it is my hope that this hearing will shed light on what additional steps need to be taken quickly to restore power while also assuring those residents in Puerto Rico and the U.S. Virgin Islands specifically that their Government has not forgotten about them and that we will provide the exact same effort and the exact same attention to helping them as we would for any other American citizen.

Mr. Chairman, as you know, more than six weeks after Hurricane Maria initially made landfall, nearly 70 percent of Puerto Rico and 80 percent of the U.S. Virgin Islands still, Mr. Chairman, still lack the power needed for basic everyday services, such as lighting their homes, treating drinking water, preserving food and medicine, or even making emergency calls, among other critical functions that are so necessary to normal and daily activities.

While immediate attention must be focused, Mr. Chairman, on providing essential resources to protect the safety of individuals and help them cope in maintaining their lives, over the long term we must also help to rebuild the energy infrastructure in a way that makes it stronger and more resilient against extreme weather conditions.

Mr. Chairman, Hurricanes Irma and Maria exposed the vulnerability of the Puerto Rico and U.S. Virgin Islands electric grids to extreme weather, while some communities expected to remain without power for even months on end. In fact, a study released last week by the Rhodium Group concluded that the outages caused by Hurricane Maria resulted in 1.25 billion hours of electricity-supply disruption to households in Puerto Rico and the U.S. Virgin Islands, Mr. Chairman, making this sole event the Nation's largest blackout that was ever recorded. "We can find no event in recorded U.S. history where there were as many people without power for as long as has occurred over the past month in Puerto Rico and the U.S. Virgin Islands," the report stated.

Mr. Chairman, I look forward to engaging today's distinguished panel on the progress that has been made, the additional steps that must be taken to immediately get the power back on, as well as the ways that we build more resilient and sustainable infrastructure that is less vulnerable to an extreme weather condition that we have witnessed and that we certainly will witness in the future.

Thank you, Mr. Chairman. I yield back the balance of my time.

Mr. OLSON [presiding]. The gentleman yields back.

The Chair now calls upon the chairman of the full committee, Mr. Walden, for 5 minutes.

OPENING STATEMENT OF HON. GREG WALDEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

Mr. WALDEN. I thank the gentleman and acknowledge his uniform today.

The 2017 hurricane season has been among the worst in recent memory. Four major storms have wreaked havoc all over our Gulf Coast and, more recently, in Puerto Rico and the Virgin Islands. While fuel supplies and electricity have been restored on the mainland, a humanitarian crisis continues to unfold in Puerto Rico and the U.S. Virgin Islands, and I think you hear that from both sides of the aisle here. This is a real, real serious situation we all care deeply about.

As we often do following natural disasters, it is not uncommon to see stories in the news about heroics and acts of personal sacrifice and great kindness. We trust that our policymakers can put aside their differences to do what is in the best interest of the country. We have already passed initial supplemental disaster relief funding this Congress, but we understand that much more is needed, and we will continue to work with the administration and our colleagues, so that our fellow citizens can get the additional resources they need to recover and to rebuild.

In this committee we roll up our sleeves and we search for solutions to the various challenges that present themselves after a major disaster. We want to make sure that the agencies under our jurisdiction are well-prepared and that you all are responding appropriately, both now and that we learn from lessons of bad incidents and are ready and even better prepared for the next storm or the next disaster.

If you are lacking certain authorities, let us know. We would like to expedite recovery. We want to know about these things, so that we can help fix them. We are all in this together.

We want to be practical and we want to be forward-thinking. How can we help ensure the relevant Federal response is well-coordinated with State, local, and industry responders? How do we ensure decisions are made to guarantee taxpayer funding provides the maximum benefit for those in need and that taxpayers aren't ripped off? If we need to rebuild, what can we do to make our infrastructure more resilient?

Because of this committee's broad jurisdiction over public health, emergency telecommunications, and the supply and delivery of energy, we will be gathering facts, perspectives, and lessons learned. We have already heard from witnesses on our Oversight and Investigations Subcommittee hearing about HHS's public health preparedness for and responses to the hurricanes. We will soon examine the disaster response related to environmental hazards and telecommunications as well.

But today we are focusing on emergency response and energy infrastructure recovery, both for fuel supply and the electric grid. This year we have already been confronted with several different challenging situations: historic flooding in Houston, possibly the greatest evacuation in Florida's history, an energy crisis in Puerto Rico and the U.S. Virgin Islands that could leave millions without power for estimated months to come.

We may take for granted how lucky we are that we can flip a switch and the lights come on. For our citizens in Puerto Rico and the U.S. Virgin Islands, however, almost every aspect of their lives has been deeply disrupted. Hospitals without external generators cannot serve their patients. Getting that power restored is critical. Water treatment plants without power threaten the health of individuals that rely on them for safe water. And those who live in remote areas that do not have access to fuel are cut off even from the most basic of necessities.

The witness panel today will provide important perspectives about the state of current fuel and electric supply recovery efforts, what worked, what could be done better under urgent circumstances of the hurricanes, and what may be considered in the future. I expect this will be an excellent hearing for us to identify vulnerabilities and assess what is needed to better prepare and respond to future storms and disasters.

And with that, I want to thank you for being here today. I appreciate the testimony which you have already submitted that I have, and thanks for the good work you and your teams are doing out there. We really want to learn from you and be even better prepared when the next disaster hits.

So, with that, Mr. Chairman, unless anybody else on our side seeks the remaining minute, I would yield back.

[The prepared statement of Mr. Walden follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

Let me welcome Secretary Perry to his first appearance before the Energy and Commerce Committee. I understand that yesterday DOE held a ceremony to celebrate its 40 years as a cabinet agency. A lot has changed in this country and in the world since Congress created the department—especially in the national security and energy security space, where DOE provides critical functions for the country.

While the domestic and international energy posture is substantially different from what it was in the 1970s, I do not believe the importance of DOE's role serving the national and public interest has diminished.

This past August, Secretary Perry joined me at an energy roundtable with local officials and energy leaders at the McNary Dam, on the Columbia River in Umatilla County, Oregon, which produces power for the Bonneville Power Administration. Of course, Secretary Perry could not leave Umatilla County without a famous Hermiston watermelon—the best in the world. I believe Secretary Perry also left with a greater appreciation of the tremendous, zero-carbon-emitting power resource we have that's helping grow the economy in Oregon and throughout the Northwest.

The next day, I had the pleasure of accompanying Secretary Perry to DOE's Pacific Northwest National Laboratory and then to the Hanford Site, just up the Columbia River from my Oregon district.

A couple of observations from that visit are pertinent for today: First, it was evident that abundant energy was critical to the historical success of Hanford's industrial operations, which built nuclear reactors and produced the plutonium vital to winning World War II and later maintaining the Nation's nuclear deterrent program.

Second, Hanford's success, and subsequent cleanup operations, led to advances in engineering practices, research and development programs, and scientific activities necessary for the site's safe and secure operations. These advances led to the development of a world-class national laboratory. Today, the Pacific Northwest National Laboratory, in collaboration and partnership with DOE's 16 other national laboratories, provide scientific and technical breakthroughs to meet our national security and energy security needs—from securing our electric grid to advancing storage technologies.

As we examine the DOE management and mission priorities today, we should keep in mind the benefits of the interconnected nature of the department's missions. But these missions across DOE's enterprise can be expensive and difficult to manage. And so, it is the responsibility of the secretary and the Congress to ensure the department is appropriately aligned to perform these missions in a cost-effective manner, and to the maximum benefit of the taxpayer.

As Chairman Upton has indicated, the energy threats today are not the same as the threats of the 1970s, but they remain significant. This committee will work in the coming months and through this Congress to ensure the department's organization and missions are aligned with the energy security challenges of today.

At my direction, Vice Chairman Barton has already started to facilitate, in coordination with the Energy Subcommittee, work to ensure DOE resources are focused on the core missions of nuclear and energy security, environmental remediation, and mission-enabling science and R&D programs. At the same time, the committee will be examining expired DOE authorizations—many of which expired over a decade ago, to ensure more fully appropriate program alignment.

I look forward to your testimony, Secretary Perry, it will be helpful to both these efforts. I'd also like for you to address the recent questions that have arisen regarding your travel expenditures. In closing, I look forward to working closely with DOE and my colleagues as we ensure the agency is positioned appropriately for the energy security challenges that lie ahead.

Mr. UPTON [presiding]. I just might ask a question of the vice chair of the committee. Are you intending to wear that jersey on the House floor when we take the picture of the full House this afternoon?

Mr. OLSON. Mr. Chairman, that is not an issue. I tried to wear this about three weeks, and it was banned. So, this will not be in the picture—

Mr. UPTON. All right.

Mr. OLSON [continuing]. Much to your disappointment, I can tell.

Mr. UPTON. I just was curious because, then, we would always be able to find you forever, right, in that picture?

[Laughter.]

Mr. WALDEN. Now, Mr. Chairman, I yield back the balance of my time.

Mr. UPTON. Yes, the gentleman yields back.

I recognize the ranking member of the full committee, Mr. Pallone from New Jersey, for an opening statement.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. Thank you, Mr. Chairman, for convening today's hearing reviewing the disastrous 2017 hurricane season, which has wreaked havoc on many parts of our country.

And I am grateful to former Senator Nieves of Puerto Rico and Mr. Rhymmer of the Virgin Islands for coming here today. I guess they are on the second panel.

But I am disappointed that the committee did not even receive a response to its outreach to the Puerto Rico Electric Power Authority, or PREPA. I have serious concerns not only about how PREPA has overseen the effort to restore power in Puerto Rico, but also, more broadly, on how PREPA has managed or, more accurately, mismanaged the grid in Puerto Rico over the years.

Now, today we are focusing on the energy infrastructure recovery efforts. I must say that accounts from the areas affected by these storms paint a dire situation that completely contradicts the often rosy stories that come from the White House. The truth is that, taken together, Puerto Rico and the Virgin Islands are currently experiencing the largest blackout in American history, and this nightmare for our fellow citizens is far from over.

The central question for us today should be, why is it taking so long to restore power in Puerto Rico and the Virgin Islands, and who is actually in charge of the effort to restore power to Puerto Rico? No one person or entity seems to be in charge, and it is fostering a chaotic and ineffective effort to restore power on the island. And I want answers, and so do many of my colleagues on both sides of the aisle.

I am also troubled by the maze of contracts with numerous companies for overlapping missions, a patchwork that is failing to turn the lights back on in Puerto Rico. And that needs to change now. I am deeply concerned by the terms of the contract PREPA signed with Whitefish and Cobra Acquisitions, which went so far as to bar PREPA from holding the companies liable for delayed completion of grid repair work or letting the Government audit their work. Now, Governor Rossello has since taken steps to have the Whitefish contract canceled, but we need to learn more about how these contracts are being awarded and whether the bidding process is truly competitive. That is why Chairmen Walden and Upton and Ranking Members Rush, DeGette, and I have requested documents and a briefing from Whitefish, so we can learn more about how that troubling agreement materialized.

Additionally, FEMA issued a statement that said it had no involvement in the development of this contract. Well, my question is, why not? The Federal Government should be engaged in the contracting process of large-scale rebuilding contracts for which U.S. taxpayers will ultimately foot the bill. The Federal Government needs to step up and take charge to expedite power restoration efforts. Missions like this are why we have a strong Federal Government. And simply put, the Trump administration needs to

be doing more. If we can't get the power turned back on soon, more people are going to die. This is a humanitarian crisis, and our Government owes it to the citizens in these Territories to do everything it can to fix it.

And while restoring power quickly is the most urgent concern, it is also crucial that the grid in Puerto Rico and the U.S. Virgin Islands be rebuilt with more modern energy technology focused on increased resiliency, energy efficiency, and renewable energy. Replacing the old grid as it stood before the storm will cost taxpayers more money and do nothing to make electricity in Puerto Rico more reliable or affordable.

So, as Congress prepares the next emergency spending bill, we must make changes to the current law to enable the rebuilding to occur in a way that lays the groundwork for constructing a modern electricity grid in the Territories. Failing to invest wisely in Puerto Rico now will only cost all taxpayers more down the road. And we must consider innovative ways for turning around Puerto Rico's situation, including alternatives to PREPA for overseeing the rebuilding and operation of the grid, and all ideas, from privatization—which I am not really a fan of—but from privatization to creation of a new Federal Power Marketing Administration. All these things have to be up for discussion. And whatever road we go down must have buy-in from the Puerto Rican people and the Government.

I don't know if anybody wants my minute that I still have. If not, Mr. Chairman, I will yield back.

[The prepared statement of Mr. Pallone follows:]

PREPARED STATEMENT OF HON. FRANK PALLONE, JR.

Mr. Chairman, thank you, for convening today's hearing reviewing the disastrous 2017 hurricane season, which has wreaked havoc on many parts of our country. I am grateful to former Senator Nieves of Puerto Rico and Mr. Rymer of the Virgin Islands for coming here today, but disappointed that the committee did not even receive a response to its outreach to the Puerto Rico Electric Power Authority (PREPA). I have serious concerns not only about how PREPA has overseen the effort to restore power in Puerto Rico, but also more broadly on how PREPA has managed—or more accurately, mismanaged—the grid in Puerto Rico over the years.

Today we are focusing on the energy infrastructure recovery efforts, and I must say that accounts from the areas affected by these storms paint a dire situation that completely contradicts the often rosy stories that come from the White House. The truth is that, taken together, Puerto Rico and the Virgin Islands are currently experiencing the largest blackout in American history. And, this nightmare for our fellow citizens is far from over.

The central questions for us today should be: why it is taking so long to restore power in Puerto Rico and the Virgin Islands, and who is actually in charge of the effort to restore power to Puerto Rico? No one person or entity seems to be in charge, and it is fostering a chaotic and ineffective effort to restore power on the island. I want answers and so do many of my colleagues on both sides of the aisle.

I am also troubled by the maze of contracts with numerous companies for overlapping missions—a patchwork that is failing to turn the lights back on in Puerto Rico. It needs to change now. I am deeply concerned by the terms of the contracts PREPA signed with Whitefish and Cobra Acquisitions, which went so far as to bar PREPA from holding the companies liable for delayed completion of grid repair work or letting the Government audit their work.

Governor Rosselló has since taken steps to have the Whitefish contract canceled, but we need to learn more about how these contracts are being awarded and whether the bidding process is truly competitive. That's why Chairmen Walden and Upton, and Ranking Members Rush, DeGette and I have requested documents and a briefing from Whitefish so we can learn more about how that troubling agreement materialized.

Additionally, FEMA issued a statement that said it had no involvement in the development of this contract. My question is: why not? The Federal Government should be engaged in the contracting process of large scale rebuilding contracts for which U.S. taxpayers will ultimately foot the bill. The Federal Government needs to step up and take charge to expedite power restoration efforts.

Missions like this are why we have a strong Federal Government—simply put, the Trump administration needs to be doing more. If we can't get the power turned back on soon, more people are going to die. This is a humanitarian crisis, and our Government owes it to the citizens in these Territories to do everything it can to fix it.

While restoring power quickly is the most urgent concern, it is also crucial that the grid in Puerto Rico and the U.S. Virgin Islands be rebuilt with more modern energy technologies focused on increased resiliency, energy efficiency and renewable energy. Replacing the old grid as it stood before the storm will cost taxpayers more money and do nothing to make electricity in Puerto Rico more reliable or affordable.

As Congress prepares the next emergency spending bill, we must make changes to current law to enable the rebuilding to occur in a way that lays the groundwork for constructing a modern electricity grid in the Territories. Failing to invest wisely in Puerto Rico now will only cost all taxpayers more down the road. And, we must consider innovative ways for turning around Puerto Rico's situation, including alternatives to PREPA for overseeing the rebuilding and operation of the grid. All ideas, from privatization to creation of a new Federal power marketing administration must be up for discussion. And, whatever road we go down, we must have buy-in from the Puerto Rican people and Government.

Thank you. I look forward to hearing from our witnesses today.

Mr. UPTON. The gentleman yields back.

At this point we are ready for the testimony. Thank you in advance or thank you for sending your testimony in advance. It will be made part of the record. We would like each of you to take no more than 5 minutes to summarize your testimony. At that point, when that is completed, we will be asking questions.

We are joined first by Patricia Hoffman, the Acting Undersecretary for Science and Energy, Principal Deputy Assistant Secretary for the Office of Electricity Delivery and Energy Reliability, at the Department of Energy. Welcome. Thank you.

STATEMENTS OF PATRICIA HOFFMAN, PRINCIPAL DEPUTY ASSISTANT SECRETARY, OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY, DEPARTMENT OF ENERGY; RAY ALEXANDER, DIRECTOR OF CONTINGENCY OPERATIONS, ARMY CORPS OF ENGINEERS; DEANN T. WALKER, CHAIRMAN, PUBLIC UTILITY COMMISSION OF TEXAS; ROBERT F. CORBIN, DEPUTY ASSISTANT SECRETARY, OFFICE OF PETROLEUM RESERVES, DEPARTMENT OF ENERGY; AND FRANK RUSCO, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT, GOVERNMENT ACCOUNTABILITY OFFICE

STATEMENT OF PATRICIA HOFFMAN

Ms. HOFFMAN. Chairman Upton, Ranking Member Rush, and distinguished members of the subcommittee, I appreciate the opportunity today to discuss energy security and emergency response issues related to the 2017 hurricane season.

The mission of the Office of Electricity Delivery and Energy Reliability is to develop innovative, cutting-edge solutions to ensure our Nation's energy infrastructure remains reliable, affordable, and resilient. In order to fulfill this mission, the Department of Energy leverages the technical capabilities of National Laboratories and partnerships with the key private sector stakeholders to focus on early-stage research and transformative projects.

Our organization is also the lead for providing energy-related expertise to the Federal Energy Management Agency, also known as FEMA, our interagency partners, and the administration, as part of the Department of Energy's emergency response activities. DOE serves as the lead organization for Emergency Support Function 12 under the National Response Framework and as the sector-specific agency for energy. As the lead for ESF-12, DOE is responsible for providing information and analysis about energy disruptions and to assist in facilitating the restoration of damaged energy infrastructure.

During Hurricanes Harvey, Irma, Maria, Nate, we have worked with industry and the Federal, State, Territorial, and local partners to facilitate response and recovery. Overall, DOE has received 18 mission assignments and has deployed more than 110 personnel to the response efforts. Each of these storms has presented unique challenges to the energy sector.

With respect to Hurricane Harvey, we saw peak electricity outages of about 300,000 customers in Texas and Louisiana. While offshore and onshore, crude oil and natural gas productions were disrupted by the storm, the greatest impacts were to the midstream and downstream oil and refining sectors. At its peak, more than 4 million barrels per day of refining capacity, representing more than 20 percent of the U.S. refining capacity, was offline. It took several weeks for floodwaters to recede, but the refining systems in Texas and Louisiana have resumed normal operations. In addition, flooding closed two key injection points along the Colonial Pipeline, forcing the system to operate intermittently at reduced rates for several weeks before normal service was resumed.

Hurricane Irma, the second category 4 hurricane to make landfall in the United States this year, caused approximately 8 million electric customer outages from the Caribbean to the southeastern United States. At Irma's peak on September 11th, there were approximately 7.8 million customer outages in Florida. Three days later, on September 14th, power had restored to approximately 5 million customers, 64 percent of those customers. And five days later, restoration was at 98 percent.

DOE is also playing a significant role in supporting the restoration and recovery efforts in the U.S. Virgin Islands and Puerto Rico from Hurricane Maria. In Puerto Rico, the U.S. Army Corps does have the primary role in emergency restoration and rebuilding the infrastructure, but DOE has deployed personnel and equipment from the Western Power Area Administration to provide mutual assistance through a mission assignment from FEMA and is working to facilitate additional mutual assistance with industry.

Days after Bruce Walker was confirmed as the Department of Energy's new Assistant Secretary for the Office of Electricity Delivery and Energy Reliability, he was on the ground in Puerto Rico assisting other DOE personnel in coordination with the Governor, PREPA, FEMA, and the Army Corps of Engineers. Recently, the Governor and PREPA have requested additional line workers and equipment necessary for the restoration of power.

Secretary Perry and our DOE team look forward to a thoughtful conversation focused on our response and recovery efforts for this hurricane season, and a focus on reliability, affordability, and resil-

ience of the electricity system from hurricanes as well as other extreme weather events.

I would like to take a moment and thank the hard utility workers for their time and their efforts in responding to the hurricane season. But, like any event, there is always some hard lessons learned, and we look forward to improving our efforts.

So, thank you, and I look forward to your questions.

[The prepared statement of Ms. Hoffman follows:]

**Written Testimony of Principal Deputy Assistant Secretary Patricia Hoffman
Office of Electricity Delivery and Energy Reliability
U.S. Department of Energy
Before the
House Committee on Energy and Commerce
Subcommittee on Energy
November 2, 2017**

Chairman Upton, Ranking Member Rush, and distinguished Members of the Subcommittee, I appreciate the opportunity today to discuss energy security and emergency response issues related to this active hurricane season.

The mission of the Office of Electricity Delivery and Energy Reliability (OE) is to develop innovative, cutting-edge solutions to ensure that our Nation's energy infrastructure remains reliable, affordable, and resilient. In order to fulfil this mission, the U.S. Department of Energy (DOE or Department) leverages the technical capabilities of the National Laboratories and partnerships with key private sector stakeholders to focus on early-stage research and transformative projects.

Our organization is also the lead for providing energy-related expertise to the Federal Emergency Management Agency (FEMA), interagency partners, and the Administration as part of DOE's emergency response activities. DOE serves as the lead agency for Emergency Support Function #12 - Energy (ESF-12) under the National Response Framework and as the Sector Specific Agency for Energy. As the lead for ESF-12, DOE is responsible for providing information and analysis about energy disruptions and to assist in facilitating the restoration of damaged energy infrastructure.

During Hurricanes Harvey, Irma, Maria, and Nate, and in the weeks following these events, we have worked with industry and Federal, state, territorial, and local partners to facilitate response and recovery. Specifically, as part of the whole-of-government response to these disasters, the Department deployed response personnel to support state emergency operations centers, FEMA Incident Management Assistance Teams, and regional and national response coordination centers, including several weeks of 24 hour coverage at FEMA's National Response and Coordination Center (NRCC) in Washington, DC. DOE's responders worked with interagency partners as well as with state government and industry representatives to identify information and resource gaps and inform DOE's engagements to support the restoration efforts.

Overall, DOE has deployed more than 100 personnel to support the response to the 2017 Hurricane Season from Headquarters, DOE sites across the country, the Power Marketing Administrations (PMAs), and DOE's National Laboratories.

Hurricane Harvey

Each of these storms presented unique challenges to the energy sector. With respect to Hurricane Harvey, we saw peak electricity outages of about 300,000 customers in Texas and Louisiana. While offshore and onshore crude oil and natural gas production was disrupted by the storm, the greatest impacts were to the midstream and downstream oil and refining sectors. At its peak, more than four million barrels per day of refining capacity, representing more than 20% of total U.S. refining capacity, was offline. It took several weeks for flood waters to recede, but the refining systems in Texas and Louisiana have resumed normal operations. In addition, flooding closed two key injection points along the Colonial Pipeline, forcing the system to operate intermittently at reduced rates for several weeks before normal service resumed.

Hurricane Irma Response

Hurricane Irma, the second category-four hurricane to make landfall in the United States this year, caused over seven million electric customer outages from the Caribbean to the southeast United States.

At Irma's peak on September 11, there were 7.8 million electric customer outages in Florida. Three days later on September 14, power had been restored to about 5 million customers – 64% of those customers – and 5 days later the restoration was at 98%. Overall, Florida Power and Light (FPL) was able to restore power at a pace roughly four times faster than it did after Hurricane Wilma in 2005.

One of the reasons this expeditious restoration was possible is the mutual assistance provided by numerous electric utilities. The energy sector mobilized more than 60,000 workers from more than 250 investor-owned electric companies, public power utilities, and electric cooperatives from all across the United States and Canada to assist with power restoration.

This restoration was aided by a number of factors, including the increased coordination between various levels of government and the private sector, which allowed the mutual assistance resources to rapidly access restoration locations. In addition, FPL has invested nearly \$3 billion since 2006 to build a more storm-resilient electrical grid to reduce potential damage and outages, and to help restore power faster following outages. Some of these investments included smart meters and flood monitoring capabilities which allowed substations and electrical equipment to shut down more efficiently and with less damage.

Hurricane Maria

DOE is also continuing to play a significant role in supporting the restoration and recovery efforts in the U.S. Virgin Islands and Puerto Rico. In the U.S. Virgin Islands, DOE has deployed 29 responders, including 25 personnel and 10 line-trucks from the Western Area Power Administration to provide mutual assistance through a mission assignment from FEMA and has worked to facilitate additional mutual assistance with industry.

Hurricane Maria made landfall in Puerto Rico as a Category 4 hurricane on September 20, bringing powerful winds and major flooding that destroyed much of the territory's transmission and distribution infrastructure and left virtually all 1.6 million electricity customers on the island without power. According to initial estimates from the Puerto Rico Electric Power Authority (PREPA), at least 80 percent of the transmission and distribution system was affected by Hurricane Maria. However, as of October 31, 33.4% of normal peak load has been restored. While this figure has little bearing on customer-level outcomes, it may be the best proxy available to measure progress in this challenging environment.

In Puerto Rico, the United States Army Corps of Engineers (USACE) has assumed a significant role in the emergency restoration of electrical infrastructure. USACE Temporary Emergency Power Planning and Response Teams are assisting with assessments and generator installations at critical facilities. In October, USACE was also tasked to lead planning, coordination, and integration efforts to support Puerto Rico with the restoration of the electrical power grid due to impacts caused by Hurricane Maria. USACE is managing this effort as the lead for Emergency Support Function #3 - Engineering and Public Works, in close coordination with DOE.

DOE has a responder deployed to coordinate with FEMA as well as seven subject matter experts from the PMAs to provide technical support to USACE with restoration planning, cost estimates, validation, and quality assurance. Additionally, through DOE-funded projects, we are leveraging the expertise of our National Laboratories to develop potential long-term solutions to improve the resiliency of the Puerto Rican infrastructure. I want to assure the Committee that DOE will continue to support the work needed to restore power to the U.S. Virgin Islands and Puerto Rico.

Conclusion

I am grateful for the hard work of DOE's emergency responders in this active and challenging hurricane season. We have made progress, but there is still more to do. Over the next several months, DOE's primary focus in Puerto Rico and the U.S. Virgin Islands will be working with our partners to support the mission of restoring the power grids and critical infrastructure.

Secretary Perry and our DOE team look forward to a thoughtful conversation focused on our response to this season's hurricanes, and on the reliability, affordability, and resilience of the electricity system from hurricanes, as well as other extreme weather events.

Thank you, and I look forward to your questions.

Mr. UPTON. Thank you very much.
Next, we're joined by Ray Alexander, the Director of Contingency Operations for the Corps of Engineers.
Welcome.

STATEMENT OF RAY ALEXANDER

Mr. ALEXANDER. Chairman Upton, Ranking Member Rush, and members of the subcommittee, my name is Ray Alexander, Director of Contingency Operations, the U.S. Army Corps of Engineers. Thank you for the opportunity to testify today.

The Corps conducts emergency response activities under two basic authorities, the Stafford Act and Public Law 84-99. Under the Stafford Act, we support FEMA under the National Response Framework as the lead Federal agency for Emergency Support Function 3, public works and engineering. ESF-3 provides temporary emergency power, roofing, and housing, debris management, infrastructure assessment, and critical public facility restoration.

Under Public Law 84-99, we prepare for disasters through planning, coordination, and training with local, State, and Federal partners. We assist State and local entities to implement advanced measures that prevent or reduce storm event damages. We repair damage to authorized Federal projects and work with States and municipalities to rehabilitate and restore eligible non-Federal flood infrastructure to prestorm conditions.

When disasters occur, Corps teams and resources are mobilized from across the command to assist local offices with their response to the event. As part of this mission, the Corps has more than 50 specially-trained teams supported by emergency contracts that perform the wide range of support missions I just described. These contracts are preawarded and can be quickly activated to execute many of these missions.

This year the Corps has supported FEMA-led Federal response and recovery operations in multiple events, including Hurricanes Harvey, Irma, and Maria. FEMA directed 37 mission assignments to the Corps for Hurricane Harvey. Currently, the Corps has 195 employees deployed. The Corps assisted in temporary emergency power and continues to support the State of Texas in the development and implementation of a temporary housing project management plan. Debris teams led by subject matter experts continue to provide States and municipalities the technical assistance to define requirements and monitor debris removal and disposal operations in 15 counties.

FEMA directed 81 mission assignments to the Corps for Hurricanes Irma and Maria. Currently, the Corps has over 1500 personnel deployed. As of this morning, the Corps has completed over 1,000 assessments and over 500 temporary generator installations in the Caribbean. This includes 250 assessments and 150 installations in the U.S. Virgin Islands and over 750 assessments and 400 installations in Puerto Rico. Under FEMA authority, we are assisting Puerto Rico with the operation and maintenance of critical non-Federal generators across the island as well.

The Corps has completed over 14,000 temporary roofing installations in Florida and is on track to complete that mission by 4 November. We have also completed over 7,000 temporary roofing in-

stallations in the Caribbean, including over 2500 in the U.S. Virgin Islands and 4700 in Puerto Rico. Roofing requirements have been extensive, requiring additional material and construction support, which initially slowed progress. We have adjusted. We have added additional capacity, and we are seeing daily improvements.

Corps debris subject matter experts provided technical assistance to counties across Florida and Georgia in response to Hurricane Irma, and continue to provide oversight to five regions within the Florida Department of Emergency Management. The Corps is working to remove an estimated 1 million cubic yards of debris in the U.S. Virgin Islands and over 6 million cubic yards in Puerto Rico.

The Corps works closely with the U.S. Coast Guard and the National Oceanic and Atmospheric Administration and local authorities to open harbors and navigation channels across all affected areas, critical to restoring commerce and the flow of commodities, and essential equipment to reach affected communities.

The Corps worked closely with officials of Texas and Florida to manage local flood control reservoirs during a period of unprecedented rainfall. In Puerto Rico, Corps dam and levee teams inspected 17 priority dams and worked closely with the Puerto Rico Electrical Power Authority, PREPA, to stabilize a spillway feature, the Guajataca Dam. Additionally, the Corps cleared existing out-flow conduits and placed emergency pumps to further reduce water levels in the dam, and restored flow to a critical treatment plant that supports the needs of over 30,000 people.

On September 30th, the Corps received a FEMA mission assignment under Stafford Act authority to assist PREPA in conducting emergency repairs to the power grid itself. We are partnering with PREPA. We have established a general officer and senior-executive-led task force to oversee work and provide technical assistance.

The Department of Energy has embedded experts in our team and continues to assist in our efforts. Within two weeks of receiving this mission assignment, we awarded contracts for large-scale temporary power generation to stabilize the grid in San Juan and for additional line repair assets that will assist ongoing efforts by PREPA.

The Corps remains fully committed and capable of executing other Civil Works activities across the Nation, despite our heavy involvement in these ongoing response and recovery operations. We also remain ready and poised to assist in future events, should they occur.

This concludes my testimony, and I look forward to answering any questions you may have. Thank you.

[The prepared statement of Mr. Alexander follows:]

DEPARTMENT OF THE ARMY CORPS OF ENGINEERS

COMPLETE STATEMENT OF

**MR. CHARLES (RAY) ALEXANDER
DIRECTOR OF CONTINGENCY OPERATIONS**

BEFORE

**COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENERGY
UNITED STATES HOUSE OF REPRESENTATIVES**

ON

**THE 2017 HURRICANE SEASON: A REVIEW OF EMERGENCY
RESPONSE AND ENERGY INFRASTRUCTURE RECOVERY EFFORTS**

NOVEMBER 2, 2017

Mr. Chairman and distinguished members of the Subcommittee:

I am honored to testify before you today to discuss the authorities and responsibilities of the U.S. Army Corps of Engineers (Corps) during disaster response and recovery operations. I am Ray Alexander, Director of Contingency Operations for the U.S. Army Corps of Engineers.

The Corps conducts its emergency response activities under two basic authorities: the Stafford Disaster and Emergency Assistance Act (Stafford Act); and Public Law 84-99, 33 U.S.C. 701n as amended (PL 84-99). Under the Stafford Act, we and other Federal agencies support the Federal Emergency Management Agency (FEMA) under the National Response Framework (NRF). In this capacity, the Corps is the lead Federal agency for Emergency Support Function 3 (Public Works and Engineering), but works under FEMA's direction. ESF-3 provides Temporary Emergency Power, Temporary Roofing, Debris Management, Emergency Infrastructure Assessment, Critical Public Facility Restoration, Temporary Housing, Demolition/Structural Stabilization, and support to FEMA Command and Control Nodes/ESF3. Under PL 84-99, we prepare for disasters through planning, coordination, and training with local, state, Federal partners; and by assisting state and local entities in implementing advance measures to prevent/reduce storm event damages. After the emergency event, PL 84-99 authorizes the Corps to repair damage to authorized Corps projects, and work with states/municipalities to rehabilitate and restore eligible non-Federal flood infrastructure to pre-storm conditions.

When disasters occur, Corps teams and other resources are mobilized from across the country to assist the local Corps districts and offices respond to the event. As part of this mission, the Corps has more than 50 specially-trained response teams, supported by emergency contracts, to perform the wide range of public works and engineering-related support missions I just described. Additionally, the Corps uses pre-awarded contracts that can be quickly activated for missions such as debris removal, temporary roofing, commodities distribution, and generator installation.

2017 Hurricane Season – With regard to hurricane activity, 2017 has been an unusually active season. The Corps has been involved in the FEMA-led Federal response and recovery operations in support of multiple events, including Hurricanes Harvey, Irma, and Maria.

Hurricane Harvey –On August 25, 2017, Category 4 Hurricane Harvey made landfall along the central Texas coast near Rockport, Texas, between Port Aransas and Port O'Connor and the President approved an Expedited Major Disaster Declaration for Texas. Large amounts of rainfall fell across the greater Houston metropolitan area causing record flooding. FEMA has identified \$93.7 million in Mission Assignments for the Corps to assist in Hurricane Harvey response and recovery. Currently, the Corps has 201 Corps employees deployed at key response nodes.

Temporary Emergency Power: As of September 11, 2017, the Corps completed 68 pre-installation inspections and 45 generator installations at identified critical public facilities fulfilling the temporary emergency power mission in Texas.

Temporary Housing: Corps teams, in conjunction with FEMA, continue to assist the State of Texas with the development and implementation of a temporary housing Project Management Plan. The plan includes establishing 20,000 travel trailers and 4,000 mobile housing units. The Corps continues to conduct reconnaissance and assessments, identifying sites to fulfil the scope of this plan, and establishing conceptual layouts for the assessed sites. The Direct Housing Assessment Team is providing technical monitors that continue to prepare Site Inspections Reports in 26 counties.

Debris Management: Debris Teams led by Corps subject matter experts continue to provide locals with technical assistance in defining requirements and monitoring debris removal and disposal operations in 15 counties. 461,000 cubic yards of debris have been removed to date and that number continues to rise.

Hurricanes Irma and Maria – Category 5 Hurricane Irma made landfall over the U.S. Virgin Islands on September 6, 2017, while also impacting Puerto Rico with Category 2 winds, 12 foot storm surge and up to 20 inches of rain. Hurricane Irma made landfall in southern Florida/Florida Keys on September 9, 2017. Soon thereafter, Category 5 Hurricane Maria made landfall over Puerto Rico on September 20, 2017, causing major damage to critical infrastructure and homes. FEMA has identified \$1.7 billion in Mission Assignments for the Corps to assist in Hurricanes Irma and Maria response and recovery (45 Mission Assignments totaling \$176.3 million for Hurricane Irma and 34 Mission Assignments totaling \$1.5 billion for Hurricane Maria). Currently, the Corps has over 1,243 personnel deployed in various locations supporting the recovery missions.

Temporary Emergency Power: As of October 31, 2017, the Corps and its contractors have completed 740 of 827 requested pre-installation inspections (for temporary generators) and 392 generator installations in Puerto Rico. The Corps and its contractors have completed 249 of 277 pre-installation inspections (for temporary generators) and 140 general installations in the U.S. Virgin Islands.

Temporary Roofing: In order for the Corps and its contractors to install temporary covering (blue roof), the government and its contractors require validated rights of entry. As of October 31, 2017, the Corps and its contractors have completed 13,127 blue roof installations and collected 14,822 validated rights of entry in Florida. At this time, requests for temporary roofing have begun to decrease in Florida. In the U.S. Virgin Islands, the Corps and its contractors have completed 2,255 blue roof installations and collected 4,120 rights of entry. An additional contractor began blue roof installations on October 24, 2017. In Puerto Rico, the Corps and its contractors have completed 3,986 blue roof installations and collected over 17,000 rights of entry.

Debris Management: As of October 31, 2017, the Corps has removed approximately 141,000 cubic yards of the estimated over 1 million cubic yards of debris in the U.S. Virgin Islands and 62,500 cubic yards of the estimated over 6 million cubic yards of debris in Puerto Rico. Corps debris subject matter experts provided technical assistance to counties across Florida and Georgia in response to Hurricane Irma and continue to provide oversight to five regions within the Florida Department of Emergency Management.

Dam and Levee Safety, Assessments, and Response: In Puerto Rico, Corps Dam and Levee teams inspected 17 priority dam locations and Guajataca Dam was the only site deemed in critical condition. Hurricane Maria caused a significant rise in the water level of the dam, and resulted in overflow of the spillway. The spillway structure was compromised and the surrounding area began to erode, posing immediate risk to 70,000 residents. Corps teams placed over 500 Jersey barriers and over 1,300 super sand bags to cease any further erosion and allow for long-term repair of the spillway. Additionally, the Corps teams cleared existing outflow conduits and are positioning to place piping and pumps to further reduce the water level in the dam. When the water level reaches 25 feet below the spillway, more substantial repairs will begin.

Power Mission: On September, 30 2017, the Corps was given a FEMA Mission Assignment, within the authority of the Stafford Act, to assist the Puerto Rico Electric Power Authority (PREPA) in further repairing the power system to its pre-storm condition. The Corps is conducting this mission.

The Corps remains fully committed and capable of executing its other Civil Works activities across the Nation despite our heavy involvement in these ongoing response and recovery operations. We also remain ready and poised to assist in future events as they may occur. This concludes my testimony and I look forward to answering any questions you might have. Thank you.

Mr. UPTON. Thank you very much.

Next is DeAnn Walker, the Chair of the Public Utility Commission for Texas. You have got to be a happy woman today as well with the Astros.

STATEMENT OF DEANN T. WALKER

Ms. WALKER. Yes. Thank you very much for your invitation to appear here today.

My name is DeAnn Walker. I am the chairman of the Public Utility Commission of Texas. I have happily held that seat since September 20th. So, I am new to this.

I believe I have a unique perspective on restoration from hurricanes. The State Operations Center in Texas creates what they call a Tiger Team of utility personnel that is located within the State Operations Center to help with restoration, to coordinate with Federal/State officials throughout an event. I have now served three hurricanes in the State Operations Center. Hurricane Rita and Hurricane Ike, I was actually representing a utility in the State Operations Center. During Hurricane Harvey, I was working for Governor Abbott and was down in the State Operations Center working with the utilities to restore service.

We believe that the electric industry and the infrastructure in Texas fared very well during Hurricane Harvey compared to past hurricanes. As has been stated, we had under 350,000 at any one time. We had more than that, but the utilities were continually restoring service during that time. The longest we had any customers out was for two weeks, and that was in the Rockport area, which was the direct hit of the eye of Hurricane Harvey. So, it took the brunt of it. During a storm, the PUC, as I said, works with State, Federal, and local agencies to restore power.

I wanted to focus the rest of my time on what we are taking as action items to better prepare for a new hurricane. Due to the amount of flooding that we had, some cities and towns, areas received 60 inches of rain throughout Hurricane Harvey. Many substations in our area flooded for the first time ever. So, we are looking at, and we moved in for the first time ever, mobile substations to help serve those customers. We are looking at whether or not it is prudent for the State as a whole, all of the utilities to get together and purchase these mobile substations to have on hand in such an event. We are also working with the utilities to elevate those substations when they rebuild them, so that we are taking care of hardening the system in the process of rebuilding.

I have also asked the State to look at whether or not we can better utilize utilities within Texas to send equipment and personnel. We were drawing people from all over the United States under mutual assistance crews, which we greatly appreciate, but I would like us to look and see if we can rely on the Texans that we have. SPS in the Panhandle and El Paso in far west Texas never were called on to help, and obviously, they were closer than a lot of places.

We have been working through the process with FEMA for how to interconnect their temporary housing, so that we could have one seamless process for all utilities to implement. We are trying to do that on the fly. I would like us to further address that process in the meantime before the next storm hits us.

We also learned that not every utility is reporting outages consistently. In Texas we require that all utilities report outages to us and to DOE on a county- and ZIP-code-wide basis, but there is not consistency between the utilities on how that was being done. For instance, some of the flooded substations, once they had a plan to bring in the mobile substation, they took those outages and moved them to planned outages. So, they were no longer showing up as being impacted by the hurricane. I don't think that is an accurate representation. So, I have asked to look at that.

There are many other things that we have started looking at to correct and to, hopefully, do better. I am running out of time. I wanted to, again, thank you for your time today.

[The prepared statement of Ms. Walker follows:]

STATEMENT OF DEANN T. WALKER
CHAIRMAN OF THE
PUBLIC UTILITY COMMISSION OF TEXAS

BEFORE THE U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENERGY

“THE 2017 HURRICANE SEASON: A REVIEW OF EMERGENCY RESPONSE
AND ENERGY INFRASTRUCTURE RECOVERY EFFORTS”

NOVEMBER 2, 2017



Summary

Hurricane Harvey will be one of the most costly natural disasters in United States history. It made landfall near Rockport, Texas, at approximately 10:00 P.M. on August 25, 2017, as a Category 4 storm. It ultimately impacted the Texas coastline from Corpus Christi to the Louisiana border. There was significant damage in the Corpus Christi area due to the high wind speeds, while the Houston to Louisiana area mainly experienced severe flooding. The PUCT's initial assessment is that Texas utilities generally did an outstanding job responding to the storm. Power was restored to the vast majority of customers that could receive power by the second week after landfall of the storm, which was remarkable given the inability to access many areas until early September.

During an event, such as Hurricane Harvey, the State Operations Center (SOC) assembles a team of individuals from the affected electric utilities to work collaboratively with the PUCT as well as State and Federal officials on restoration of the electric system. At the SOC, the PUCT is the lead agency on issues related to electric outages and restoration, serving as the liaison with utilities, electric generators, key industrial facilities, other state agencies, and local officials, in order to provide situational awareness and facilitate restoration. During a storm, the PUCT as well as other State officials and agencies work closely with Federal agencies in order to facilitate restoration of electric service to an affected area. These agencies include the Department of Energy, the Army Corp of Engineers, the Federal Energy Management Agency, and the Department of Homeland Security.

Introduction

Chairman Upton, Ranking Member Rush, and members of the Subcommittee,

My name is DeAnn Walker, and I am the Chairman of the Public Utility Commission of Texas (PUCT). The PUCT is the regulatory body in Texas for electric, telecommunications, and water utilities, with the majority of work relating to the oversight of electric utilities that serve 27 million Texans, most of them through fully competitive wholesale and retail markets. I want to thank you for the opportunity to testify today and provide the perspective of the State of Texas on the electric sector's response to Hurricane Harvey.

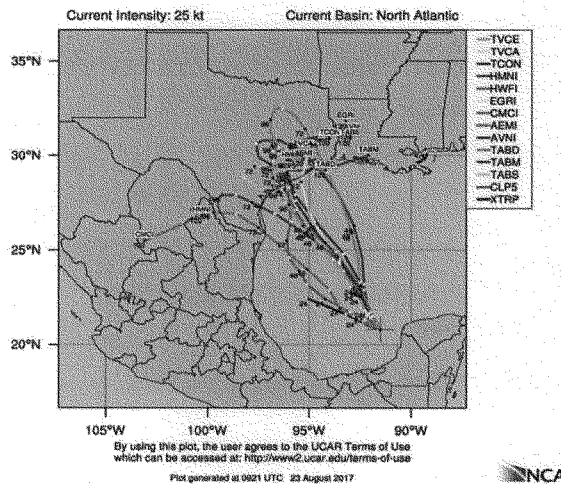
Overview of Hurricane Harvey

As you are aware, Hurricane Harvey will end up as one of the most costly natural disasters in United States history. It made landfall near Rockport, Texas, at approximately 10:00 P.M. on August 25, 2017, as a Category 4 storm and was the strongest hurricane to hit the Texas coast since Hurricane Carla in 1961. Port Aransas and Rockport, which are directly northeast of Corpus Christi, experienced sustained winds in excess of 100 miles per hour with gusts that exceeded 135 miles per hour. Hurricane Harvey, unlike Hurricanes Ike and Rita, then stalled inland and slowly meandered around southeast Texas for the next three days, ultimately re-entering the Gulf, and making its final landfall just east of the Texas-Louisiana border on August 30, 2017.

The path of Harvey presented a number of unique issues related to the Texas electric sector. First, the short time period over which Harvey strengthened into a hurricane as well as the wide range of potential locations for its landfall limited the time for utilities to prepare and stage crews.

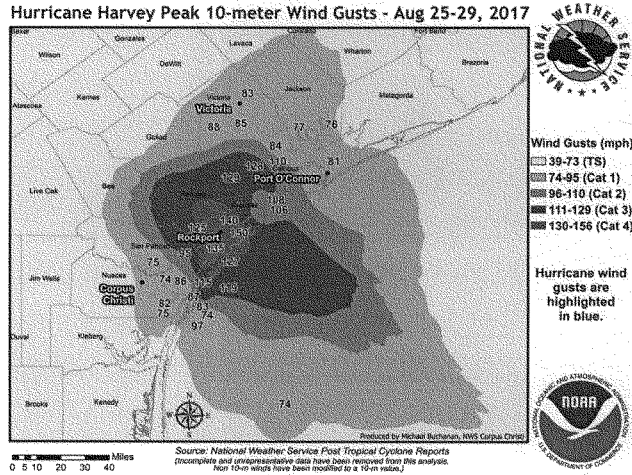
Figure 1 shows the wide divergence in forecast models two days before the storm hit with essentially the entire Texas coast being at risk.

Figure 1: August 23 Hurricane Harvey Forecast Track Map



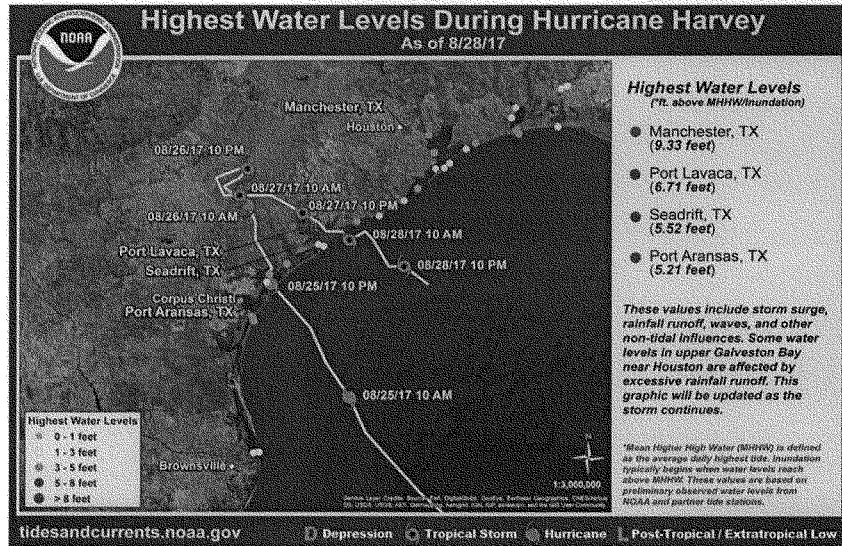
Second, the peak wind gusts of the storm as it made initial landfall reached 150 miles per hour in some areas (Figure 2). This created substantial wind storm damage to the electric infrastructure in the Rockport and Port Aransas areas. AEP Texas, the primary electric provider in this area, ultimately experienced impacts to 68 transmission substations, had 61 transmission lines that locked out during the storm, had 766 transmission structures downed or damaged, needed to repair or replace over 5,700 distribution poles, and replaced 712 miles – or nearly 4 million feet – of transmission and distribution conductor.

Figure 2: Hurricane Harvey Peak Wind Gusts



While that amount of damage to the infrastructure was substantial and a challenge to repair under typical storm aftermath, Harvey proceeded to persist as a Tropical Storm and stalled in the AEP Texas service area for a substantial amount of time – remaining inland as a named storm for 117 hours after initial landfall. The resulting persistent wind conditions and flooding created significant challenges for AEP Texas to fully assess the status of the system, as well as making ingress to impacted areas very difficult and dangerous. Figure 3 shows the meandering route taken by the storm through August 28th when Harvey re-entered the Gulf of Mexico.

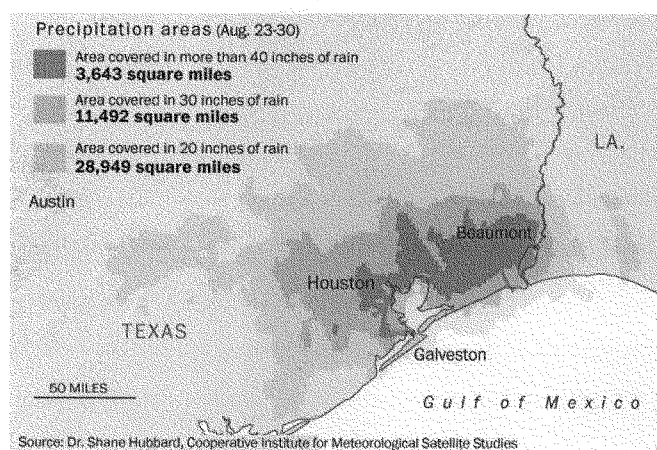
Figure 3: Harvey Storm Track through August 28th



As AEP Texas and other utility providers began the restoration process in the areas of Texas to the northeast of Corpus Christi, Harvey’s rain bands continued across the Houston area, and later, the Beaumont and Port Arthur areas. As electric utility outages began to drop in the AEP Texas service area, outages began to increase in the CenterPoint Energy, Texas New-Mexico Power, and Entergy service areas, primarily due to flooding, wind damage from tornadoes, and lightning strikes. At least 37 tornadoes were declared to have occurred between Port O’Connor and Beaumont from August 25 through August 29, with hundreds of tornado warnings issued, and the Houston area experienced more than 42,000 lightning strikes.

There was also unprecedented torrential rain experienced by much of this area. Figure 4 shows the scale of historic flooding. To provide a sense of the scale of the flooding caused by the storm, approximately 27 trillion gallons of water rained down over six days. The area of Texas covered by more than 40 inches of rain is larger than the states of Delaware and Rhode Island combined. The area covered by 20 inches of rain is larger than ten states, including West Virginia.

Figure 4: Precipitation over Southeast Texas from August 23 to August 30



The scope and degree of this flooding presented obvious challenges to restoration of the electric system. First and foremost, many areas were simply inaccessible for as long as a week after the storm passed the area. Utilities had to reach equipment by boat or air boat, all-terrain vehicles, or amphibious and high water vehicles, and had to use helicopters and drones to reach areas to make damage assessments. Secondly, the extensive flooding impacted utility equipment – particularly substations – that had never before experienced flooding issues. For Entergy Texas, the loss of the City of Beaumont’s water supply required the relocation of Entergy’s command

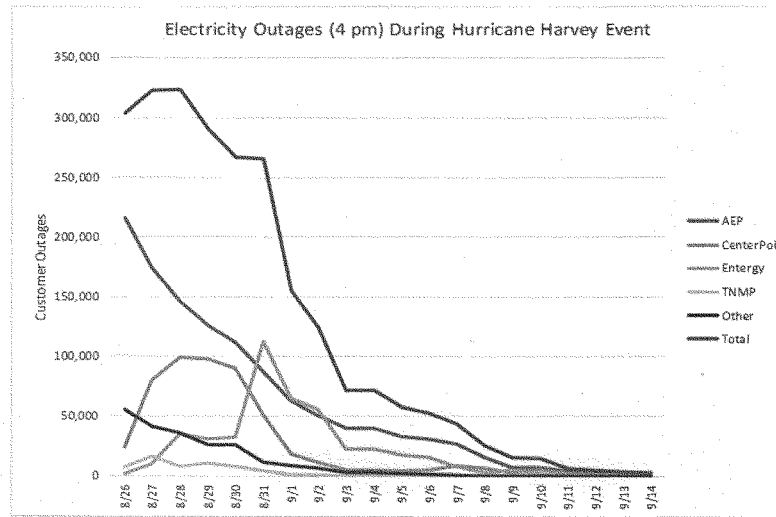
center to Conroe, which is approximately 100 miles away from Beaumont, and distribution operations center to Baton Rouge, which is approximately 190 miles away. In addition, Interstate 10 into Beaumont was closed on either side of the city.

Utility Response

Even with these unprecedented challenges, the PUCT's initial assessment is that Texas utilities generally did an outstanding job responding to the storm. Power was restored to the vast majority of customers that could receive power by the end of the first week in September, which was remarkable given the inability to access many areas until early September.

Figure 5 shows the PUCT's daily recording of electric outages at a 4:00 P.M. snapshot for every day of the event. The chart illustrates the path of the storm from initial landfall in the AEP Texas service area, followed by its movement toward Houston, which is the CenterPoint Energy service area, and ultimate final landfall in the Entergy service area, which includes Beaumont and Port Arthur. Total storm outages did not exceed 350,000 simultaneous customers, although the total number of customer restorations was much higher as utilities worked to restore outages as they occurred throughout the storm and aftermath. Areas with the most long-lasting outages were, as expected, those areas with wind-storm damage from the initial landfall as well as customers served from severely flooded substations.

Figure 5: Electricity Outages During Hurricane Harvey Event



The efforts of the Texas utilities to modernize the electric grid through advanced metering infrastructure and other intelligent grid technologies appears to have substantially aided in utility restoration. CenterPoint Energy alone operated 250 devices impacting 140,000 customers that helped to avoid over 41 million outage minutes for customers. AEP Texas, Texas-New Mexico Power, and CenterPoint Energy were able to utilize advanced metering systems to (1) remotely have knowledge of power outages without the need for customers to call in; (2) execute service orders remotely; and, (3) accurately bill customer accounts without the use of estimation routines that have resulted in significant issues in past storms.

As discussed above, utilities also utilized new technologies, such as drones, to assess damage, evaluate work conditions, and increase real-time situational awareness, and deployed mobile and temporary substations to route power around flooded and damaged substations.

The PUCT's Role in Emergency Response

Because of the broad and complex array of natural and other threats that face Texas and the importance of Texas' energy infrastructure to the nation, the PUCT, together with state leadership and other state agencies, considers emergency response planning and recovery as a key function of the agency, particularly given our unique role overseeing the Electric Reliability Council of Texas (ERCOT). The Texas State Operations Center (SOC) operates around the clock to monitor and analyze these threats to the State, and is activated when disasters pose an imminent threat to Texas. During an event, such as Hurricane Harvey, the SOC assembles a team of individuals from the affected electric utilities to work collaboratively with the PUCT as well as State and Federal officials on restoration of the electric system.

At the SOC, the PUCT is the lead agency on issues related to electric outages and restoration, serving as the liaison with utilities, electric generators, key industrial facilities, other state agencies, and local officials, in order to provide situational awareness and facilitate restoration. During Harvey, these activities included the following:

- working with the Texas Department of Transportation and the Texas Department of Public Safety to facilitate utility crew movement and escorts for large utility equipment, such as mobile substations;
- coordinating with ERCOT, utilities, and refineries to facilitate rapid restart of refineries – particularly in the Corpus Christi area;

- coordinating with ERCOT and the Railroad Commission of Texas regarding natural gas supply prioritization to electric generators; and,
- working with the Office of the Governor on rule and statute suspension, where needed, to facilitate restoration.

During a storm, the PUCT as well as other State officials and agencies work closely with Federal agencies in order to facilitate restoration of electric service to an affected area. These agencies include the Department of Energy, the Army Corp of Engineers, the Federal Energy Management Agency (FEMA), and the Department of Homeland Security. Issues that are addressed include the following:

- reporting of outages and estimated restoration times;
- potential need for emergency power provisions between Entergy and the ERCOT system;
- prioritizing restoration of critical infrastructure;
- siting and interconnecting back-up generators for critical customers;
- facilitating the utility connections for FEMA mobile housing units; and,
- addressing the process for inspections of facilities for reconnection after repairs have been completed and electric service needs to be restored.

PUCT's After Action Items

While the preliminary assessment is that the State's emergency management planning and system, as well as the preparations and restoration efforts by the utilities during and after the storm event, proved to be effective, there is room to improve for the next storm. As such, the PUCT will

conduct an after-action review of a number of items, including reviews of the inventory of spare utility equipment among Texas utilities, communication methods by utilities to the public and state officials on outage status, evaluation of the utilities' mutual assistance programs and equipment sharing, and issues unique to market processes in the ERCOT competitive retail electricity market.

Conclusion

I want to thank the Subcommittee for the opportunity to provide a Texas perspective on these issues. Ensuring the reliability and recovery of our nation's power grid after major weather events is an exceptionally important and complex undertaking, and I applaud your focus on this subject. I stand ready to work with you to continue active and productive coordination between the Federal and State agencies in future events.

Mr. UPTON. Thank you.

Next, we are joined by Robert Corbin, Deputy Assistant Secretary for the Office of Petroleum Reserves, the U.S. Department of Energy.

STATEMENT OF ROBERT F. CORBIN

Mr. CORBIN. Chairman Upton, Ranking Member Rush, and distinguished members of the subcommittee, it is an honor to appear before you today to discuss the Strategic Petroleum Reserve.

The Strategic Petroleum Reserve, or SPR, was established under the authority of the Energy Policy and Conservation Act in December 1975. At that time U.S. oil production was in decline, oil price and allocation controls separated the U.S. oil market from the rest of the world, and the global commodity market for oil as we know it now did not exist.

Today the global oil market has changed the environment in which the SPR operates. Although domestic oil production has increased dramatically in recent years, the global oil market is the largest commodity market in the world, making U.S. consumers subject to global commodity price fluctuations. Regardless of U.S. oil import levels, a severe global oil supply disruption today would impact domestic petroleum product prices.

In the event of a serious international oil supply disruption, offsetting disrupted supplies with SPR crude oil in concert with other countries that hold strategic oil stocks can help reduce an increase in international oil prices and the resulting adverse economic impacts that could otherwise occur.

The SPR maintains and operates four major oil storage sites, two in Texas and two in Louisiana. The SPR's current crude oil inventory is approximately 670 million barrels stored in 60 underground salt caverns with a design capacity of 713.5 million barrels. The SPR is designed to provide the capability to draw down and deliver crude oil from the storage sites to designated distribution points, a design drawdown rate of 4.415 million barrels per day. The SPR can physically begin to draw down crude oil in as little as two days of notification, and taking into account the time required to meet sales requirements and draw down and deliver crude oil within 13 days of a presidential finding. SPR operating costs are less than 25 cents per barrel of design capacity per year, the lowest reported cost among oil stock-holding Nations.

As a member of the International Energy Agency, or IEA, the U.S. has two primary oil stock-holding obligations. As a net oil importer, the U.S. must maintain oil stock-holding inventories equal to at least 90 days of net petroleum imports. As of June 30th, 2017, the U.S. held 149 days of net petroleum imports.

The U.S. must also be able to contribute a proportionate share to an IEA collective action in response to an oil supply disruption, based on its percentage share of IEA oil consumption. As of June 30th, 2017, the U.S. must contribute 43.2 percent of all barrels released during any IEA collective action.

As global oil trade increases, the potential role of the SPR to help mitigate global supply disruptions expands, regardless of the level of U.S. net oil imports. Without the ability to replace disrupted oil

supplies in the global market, global oil prices could increase significantly and the U.S. and global economy could be harmed.

SPR infrastructure has performed capability to ensure the SPR has been able to respond to every emergency release situation presented throughout its history. However, SPR facilities are aging. A significant amount of infrastructure components are at or beyond their design life, and equipment will be further stressed due to nine consecutive years of congressionally mandated crude oil sales.

Congress, recognizing the need to modernize SPR infrastructure, included provisions in the Bipartisan Budget Act of 2015 to address this concern by authorizing the drawdown and sale of up to \$2 billion worth of SPR crude oil over a 4-year period to carry out an SPR modernization program. In response, the SPR has initiated a major capital asset acquisition project to modernize aging SPR infrastructure for systems upgrades and equipment replacement to ensure the SPR can meet mission requirements for the next several decades.

Hurricane Harvey severely impacted U.S. Gulf Coast crude oil infrastructure, closing refineries, ports, and supply pipelines. Many impacted refineries were operable following the passage of Harvey, but in some cases were unable to secure crude oil feedstock to recommence or continue operations, resulting in multiple requests for emergency exchanges of SPR crude oil. After assessing prevailing supply conditions and consulting with other Federal agencies regarding the status of crude oil infrastructure, the SPR received approval from the Secretary of Energy to execute six emergency exchange agreements. First deliveries of crude oil were provided on August 30th, just two days after the initial request was received. Deliveries to the remaining companies also commenced within days after those requests were received and continued until deliveries totaling 5 million barrels were completed on September 28th. These emergency exchanges helped alleviate the loss of crude oil supply, allowing the affected refineries to begin and/or continue operations that otherwise would have been halted due to the impacts of Hurricane Harvey.

This concludes my statement. Thank you for the opportunity to speak with you today about the SPR, and I look forward to answering any of your questions.

[The prepared statement of Mr. Corbin follows:]

Testimony of Deputy Assistant Secretary Robert F. Corbin
Office of Petroleum Reserves
U.S. Department of Energy
Before the
U.S. House Committee on Energy and Commerce
Energy Subcommittee
November 2, 2017

Chairman Upton, Ranking Member Rush, and Members of the Subcommittee, it is an honor to appear before you today to discuss the Strategic Petroleum Reserve (SPR).

Mission and Role of the U.S. Strategic Petroleum Reserve

The mission of the SPR is to protect the United States economy from severe petroleum supply interruptions through the acquisition, storage, distribution, and management of emergency petroleum stocks, and to carry out U.S. obligations under the International Energy Program (IEP).

From October 1973 to March 1974, the Organization of Arab Petroleum Exporting Countries (OAPEC) imposed an oil embargo on the United States due to U.S. support of Israel during the Yom Kippur War of October 1973. In response, the United States Congress passed, and President Gerald R. Ford signed, the Energy Policy and Conservation Act (EPCA) in December 1975. Among other initiatives, it authorized the establishment of the SPR and called for a stockpile of petroleum that could mitigate the economic damage of disruptions.

The SPR remains a key national energy security asset, even as the nature of energy security evolves. Today's lower oil prices, increased domestic oil production, and reduced U.S. oil import dependency have changed the U.S. energy landscape.

Since the establishment of the SPR in 1975, U.S. and global oil markets have changed the environment in which the SPR operates. When the SPR was established, U.S. oil production was in decline and oil price and allocation controls separated the U.S. oil market from the rest of the world. At the time, a truly global commodity market for oil, as we know it today, did not exist. Although U.S. oil production has increased dramatically in recent years, the global oil market is the largest commodity market in the world, making consumers subject to global commodity price fluctuations.

The original 1970s-era goal of EPCA focused on avoiding “national energy supply shortages.” A loss of supply to U.S. refineries is no longer the singular focus of the SPR. Because the United States is linked to the global market, it is exposed to global price fluctuations. When global oil prices spike, U.S. oil prices spike. Regardless of U.S. oil import levels, a severe global oil supply disruption today would impact domestic petroleum product prices. Past oil price fluctuations have been followed by multiple quarters of weak world-wide economic growth. This focus on price was codified in the EPCA amendments of 1990, which added price impacts to the criteria for an SPR drawdown.

In the event of a serious international oil supply disruption, commercial stocks and global spare production capacity could provide some relief for lost output, but cannot provide assured additional supply. Offsetting disrupted supplies with SPR oil, in concert with other countries that hold strategic oil stocks, can help reduce an increase in international oil prices and the resulting adverse economic impacts that could otherwise occur.

SPR Organization, Assets and Capabilities

The SPR operates under the leadership and direction of the Deputy Assistant Secretary for the Office of Petroleum Reserves, a Program Office within the Department of Energy’s (DOE) Office of Fossil Energy. The Headquarters Program Office maintains responsibility for program management of the SPR, providing oversight of the SPR program, including major engineering projects; environmental, safety, security, and occupational health issues; oil distribution planning and analysis; budgeting and financial management; and the drawdown and operations of the SPR. The Program Office also conducts strategic planning, policy analysis, and major program studies, and engages with domestic and international stakeholders.

The SPR Project Management Office, located in New Orleans, Louisiana is responsible for the operation and management of all SPR field activities, as well as oversight of the Department’s Management and Operating (M & O) Contractor, who performs the day-to-day operations and maintenance activities of the SPR’s crude oil storage sites.

The Department operates and maintains four major oil storage sites in the Gulf Coast region: the Bryan Mound and Big Hill sites in Freeport, Texas and Winnie, Texas, and the West Hackberry and Bayou Choctaw sites in Hackberry, Louisiana and Plaquemine, Louisiana, respectively. These sites are located in close proximity to Gulf Coast refineries and midstream infrastructure. The SPR’s crude oil inventory of 671.7 million barrels (as of October 13, 2017) consists of both sweet and sour crude oil available for release in the event of an oil supply disruption. The crude oil is stored across the four sites in 60 underground caverns with a total design capacity of 713.5 million barrels and 115 operational wellbores. The SPR is designed to provide the capability to draw down and deliver crude oil from the storage sites to designated distribution points, with additional access to commercial pipeline networks and marine terminals, at a design drawdown rate of 4.415 million barrels per day. Each site is capable of drawing down and delivering crude

oil to the designated distribution points until 90% of the inventory is depleted. SPR operating costs are less than \$0.25 per barrel of design storage capacity per year, the lowest reported cost among oil stockpiling countries.

U.S. International Energy Program Obligations

One of the SPR's core missions is to carry out U.S. obligations under the (IEP), the 1974 treaty that established the International Energy Administration (IEA). Under the Coordinated Emergency Response Mechanism, adopted in 1984, selling oil into the market (rather than exchanging the oil withdrawn from stocks among members) became the preferred approach to address oil supply disruptions. The IEA monitors the world oil market and, in the event of a global oil supply crisis, calls for the release of strategic oil stocks.

As a member of the IEA, the United States has two primary obligations:

1. As a net oil importer, the United States must maintain crude oil and/or refined product stock inventories, whether held by industry or government, equal to at least 90 days of net petroleum imports. Of the 29 IEA member countries, 25 other net importers have the same obligation. The remaining three members do not have a stockholding obligation because they are net oil exporters. As of June 30, 2017 the U.S. held 149 days of net petroleum imports, based on an SPR crude oil inventory of 678.9 million barrels and 2016 net import figures.
2. The United States must be able to contribute a proportionate share to an IEA collective action response based on its share of IEA oil consumption. This obligation can be met by any measure a member nation may choose, including release of strategic or commercial stocks. As of June 30, 2017, the United States must be prepared to contribute 43.2% of the barrels released in an IEA collective action response. The United States government relies on the use of the SPR to meet this requirement, although commercial stocks may also contribute voluntarily.

It is also important to note that U.S. domestic conventional and unconventional production alone would not be able to ramp up quickly enough to make up for the lost barrels in a crisis. The SPR can physically begin to drawdown its stored crude oil in as little as two days of notification, and taking into account the time required to meet all sales process requirements, can be ready to drawdown and deliver crude oil within thirteen days of a Presidential Finding. Domestic production would take months to expand substantially.

According to the BP Statistical Review of World Energy 2017, the movement of oil around the world grew by nearly 11 million barrels per day from 2006 to 2016, and this trend is likely to continue. As global oil trade increases, the potential role of the SPR to help mitigate global supply disruptions expands, regardless of the level of U.S. net oil imports. The portion of this traded oil imported by IEA member countries is decreasing as consumption has increased in non-OECD countries. In step with this trend, the ability of IEA stocks to address a crisis will

become strained. Without the ability to replace disrupted oil supplies on the global market, global oil prices could increase significantly, and the U.S. and global economy could be harmed. Accordingly, one important way to measure the SPR's effectiveness is by its ability to address the requirements that will arise from a collective action response to a disruption, rather than strictly how many days of U.S. oil imports it represents.

Modernization of SPR Infrastructure

The infrastructure and equipment to support a drawdown across the SPR is both large and complex. In addition to the underground storage caverns and wellbores, this infrastructure includes 80 pumps for crude oil, raw water, brine, and firefighting systems; more than 5,400 valves; 33 heat exchangers; 21 brine disposal wells; 16 above ground storage tanks holding crude oil, waste oil, and firefighting water; a crude oil degasification plant; and over 200 miles of crude oil, raw water, and brine disposal pipelines that must be maintained.

SPR infrastructure has performed capably to ensure the SPR has been able to respond to every emergency release situation presented throughout the SPR's history. However, SPR facilities are aging and a significant amount of infrastructure components are at or beyond their design life. The first and only SPR life extension project was conducted in the late 1990s. This project addressed essential SPR configuration and system improvements necessary to ensure the ability to maximize the SPR's drawdown rate. However, it did not replace many pieces of rotating equipment such as pumps and motors, and did not completely address some other SPR infrastructure elements. Further, nine consecutive years of crude oil sales from the SPR (beginning in FY2017) utilizing equipment beyond its design life increases the risk of additional equipment failures that could potentially impact the ability to conduct these sales in the statutorily-mandated timeframes.

Congress, recognizing the importance of the SPR as a valuable national energy security asset, established an Energy Security and Infrastructure Modernization (ESIM) Fund in Section 404 of the Bipartisan Budget Act of 2015 (Public Law 114-74) for the purpose of providing for the construction, maintenance, repair, and replacement of SPR facilities. In establishing the ESIM Fund, Congress made the following findings:

1. The SPR is one of the nation's most valuable energy security assets;
2. The age and condition of the SPR have diminished its value as a Federal energy security asset;
3. Global oil markets and the location and amount of U.S. oil production and refining capacity have dramatically changed in the 40 years since the establishment of the SPR; and
4. Maximizing the energy security value of the SPR requires a modernized infrastructure that meets the drawdown and distribution needs of changed domestic and international oil and refining market conditions.

Section 404 also directed the Secretary of Energy (the Secretary) to establish an SPR modernization program to protect the U.S. economy from the impacts of emergency supply disruptions. This program may include:

1. Operational improvements to extend the useful life of surface and subsurface infrastructure;
2. Maintenance of cavern storage integrity; and
3. Addition of infrastructure and facilities to optimize the drawdown and incremental distribution capability of the SPR.

Section 404 also authorized the Secretary to draw down and sell crude oil from the SPR in the amount of \$2 billion, over the four year period encompassing fiscal years 2017 through 2020, for the purpose of carrying out an SPR modernization program. In response, the SPR has initiated a major capital asset acquisition project known as Life Extension Phase II (LE2). The purpose of this project is to modernize aging SPR infrastructure through systems upgrades and associated equipment replacement to ensure that the SPR can meet mission requirements for the next several decades. Affected SPR infrastructure that will be addressed by this project include crude oil transfer systems; raw water systems; brine disposal systems; power distribution and lighting systems; physical security systems; firefighting systems; a new crude oil processing (degasification) plant; and auxiliary systems and facilities. An initial analysis of alternatives to consider work activity packages for this project was completed in December 2016, and a supplemental analysis of alternatives to refine the initial work activity packages selected was completed in June 2017, leading to the commencement of project design work in August 2017 and procurement of long lead-time equipment in September 2017. This project has a current estimated cost range of \$750 million - \$1.4 billion with a current estimated completion date range between fiscal year's FY2022 and FY2024.

Congressionally-Mandated Crude Oil Sales

As mentioned above, beginning in FY2017, the SPR began nine consecutive years of mandatory sales, referred to as the "decade of drawdowns". In 2015 and 2016, three separate laws were enacted that mandate the Secretary of Energy to sell 149 million barrels of crude oil, with the proceeds to be deposited in the general fund of the Treasury.

1. Section 403 of the Bipartisan Budget Act of 2015 (Public Law 114-74) mandates the sale of 58 million barrels between FY2018 and FY2025 for federal government deficit reduction;
2. The Fixing America's Surface Transportation (FAST) Act (Public Law 114-94) mandates the sale of 66 million barrels between FY2023 and FY2025 for funding offsets to finance transportation infrastructure; and

3. The 21st Century Cures Act (Public Law 114-255) mandates the sale of 25 million barrels between FY2017 and FY2019 for funding offsets to finance medical initiatives.

Hurricane Harvey Emergency Response Efforts

Hurricane Harvey made landfall as a major hurricane on August 25, 2017 just north of Corpus Christi, Texas. Harvey's path eventually impacted U.S. Gulf Coast crude oil infrastructure as a hurricane and as a tropical storm from Corpus Christi, Texas to Lake Charles, Louisiana from August 25 through August 30. During this period, 20 refineries in this area were impacted (seventeen closing, and three running at reduced operations for limited periods) comprising over 5.6 million barrels of crude oil processing capacity. In addition, nine major ports in the area were closed, and the major east-west crude oil pipeline between Houston, Texas and Houma, Louisiana was not operating. Many of the impacted refineries were operable following the passage of Harvey but, in some cases, were unable to secure crude oil feedstock to re-commence or continue operations. As a result, the SPR received a total of eight requests for emergency exchanges of crude oil from six companies – one request submitted just prior to the hurricane's landfall was denied, since SPR personnel had been evacuated as a safety precaution and the requested SPR site was not available for drawdown; and one request was withdrawn shortly after submission due to availability of an alternate supply source. Evaluation of the remaining 6 requests commenced immediately upon receipt of the requests.

After assessing prevailing supply conditions and consulting with other Federal agencies regarding the status of ports and other supply infrastructure, the SPR received approval from the Secretary to execute six emergency exchange agreements with four companies. The first deliveries of crude oil were provided on August 30, just two days after the request was received. Deliveries to the remaining companies also commenced within days after the initial requests were received and continued until all deliveries totaling five million barrels of SPR crude oil were completed on September 28. These emergency exchanges helped alleviate the loss of crude oil supply, allowing the affected companies to begin and/or continue refinery operations that otherwise would have been halted as a result of the impacts from Hurricane Harvey. Repayment of these crude oil loans recently commenced and are anticipated to conclude in March 2018.

Conclusion

In conclusion, I want to thank you for the opportunity to speak with you today about the SPR and its operational challenges. I look forward to answering any of your questions.

Mr. UPTON. Thank you very much.

Lastly, on the first panel we are joined by Frank Rusco, Director of the Natural Resources and Environment from the GAO. Welcome.

STATEMENT OF FRANK RUSCO

Mr. RUSCO. Chairman Upton, Ranking Member Rush, and members of the subcommittee, thank you for the opportunity to discuss our past and ongoing work on energy resilience and particularly the effectiveness of the Strategic Petroleum Reserve in responding to domestic petroleum supply disruptions caused by extreme weather and other events.

The SPR was created at a time when global oil supply was dominated by OPEC and oil markets were characterized by long-term contracts with fixed prices. At that time a global oil supply disruption, as occurred during the Arab oil embargo, had the effect of physical oil shortages and in the United States and elsewhere long lines at the gas pump. It made sense at the time for the SPR to be comprised of crude oil centrally held in cheap salt dome storage in Louisiana and Texas, near the Nation's largest refining centers.

Today global oil markets are robust, and prices change to accommodate supply and demand, so that physical shortages and long lines are less of an issue. In addition, the use of the SPR has been primarily in response to domestic supply disruptions, particularly those caused by extreme weather events, rather than global supply shortages. My remarks will focus on how well the SPR is able to respond to these domestic supply disruptions.

The SPR has been partially successful in responding to domestic supply disruptions in instances when Gulf Coast refineries and pipelines are operational but crude oil supplies to these refineries have been disrupted. For example, this year following Hurricane Harvey the SPR was able to supply several refineries with crude oil by pipeline while shipping ports were closed.

However, the SPR has been less effective in responding to reductions in petroleum products in the rest of the country, as has occurred multiple times when hurricanes have shut down refineries or shut down power to other petroleum infrastructure. In this latter cases, including following Hurricane Harvey when as much as 34 percent of the Gulf Coast refining capacity was shut in, the real supply problem was gasoline, diesel, and jet fuel, and the SPR has only a small reserve of gasoline in the Northeast and no other petroleum product reserves. As a result, the SPR cannot provide needed petroleum products to Florida, the Eastern Seaboard, and other regions typically supplied by Gulf Coast refiners.

DOE has recognize the desirability of having regional reserves of petroleum products. For example, in 2014, DOE identified five regions that are vulnerable to petroleum product supply disruptions. These include the West Coast, which is vulnerable to earthquakes and tsunamis, parts of six Midwestern States vulnerable to earthquakes, a number of States vulnerable to extreme cold weather, and the entire coast from Texas up to Massachusetts that is vulnerable to hurricanes.

With the exception of the small gasoline reserves held in the Northeast, there are no other petroleum product reserves held by

the SPR in any of these vulnerable regions. Further, while DOE has recognized these vulnerabilities and conducted some studies of alternatives to the current composition and configuration of strategic reserves, it has not completed these studies. As a result, DOE cannot determine the efficacy of creating regional petroleum product reserves.

In contrast to how the SPR is configured, most other countries with strategic reserves have chosen to hold significant quantities of petroleum products in addition to crude oil, and some have chosen to spread these reserves out across their countries to be closer to centers of demand. For example, Germany chooses to hold about 55 percent of its strategic stocks as petroleum products. France spreads its reserves across seven geographic zones that enable it to distribute petroleum products to distribution networks all over the country.

The United States has benefitted from European strategic stocks of petroleum products during past hurricane damage to Gulf Coast refining and production infrastructure. For example, in response to Hurricane Katrina in 2005, as prices of gasoline rose across the United States, shipments of gasoline from Europe began arriving on the East Coast within days. This mitigated the economic effects of the hurricane-caused refinery and oil production shutdowns.

As DOE undertakes a modernization program of its existing systems, this committee and others have requested that we undertake an evaluation of the SPR, its size, composition, location of reserves, and options for improving its effectiveness. We will report our findings in the next few months.

Thank you. This concludes my oral remarks. I will be happy to answer any questions you may have.

[The prepared statement of Mr. Rusco follows:]

United States Government Accountability Office



Testimony
Before the Subcommittee on Energy,
Committee on Energy and Commerce,
House of Representatives

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STRATEGIC PETROLEUM RESERVE

Preliminary Observations on the Emergency Oil Stockpile

Statement of Frank Rusco, Director,
Natural Resources and Environment

Chairman Upton, Ranking Member Rush, and Members of the Subcommittee:

I am pleased to be here today to discuss our work on energy resilience, specifically preliminary observations from our ongoing work looking at the Strategic Petroleum Reserve (SPR)—the world's largest government owned stockpile of emergency oil. U.S. energy systems are vulnerable to a range of potential disruptions, including from international events, such as conflicts or terrorism incidents that may affect oil supplies, and domestic ones, such as from hurricanes and other severe weather events, which can disrupt oil and gas supplies and cause temporary fuel or electricity shortages. Because of the central role that energy plays in the U.S. economy and the configuration of the nation's energy system, vulnerabilities may have wide-ranging implications for energy production and use, ultimately affecting transportation, industrial, agricultural, and other critical sectors of the economy that require reliable energy. We have reported on energy vulnerabilities as well as on federal efforts to address them.¹ Recent experience with hurricanes Harvey, Irma, and Maria underscores these vulnerabilities. In addition to damaging infrastructure and property, and causing the loss of life, the hurricanes disrupted the operations of refineries representing at least 15 percent of the nation's refining capacity, affected fuel distribution, and left millions of U.S. citizens without electricity.

After the Arab oil embargo, over 4 decades ago, Congress authorized the creation of the SPR to include the ability to release oil to the market during supply disruptions and protect the U.S. economy from damage. The SPR is managed by the Department of Energy (DOE). The SPR held 673.7 million barrels of oil as of September 30, 2017 which is worth about \$38.4 billion at prices as of October 30, 2017.² According to DOE's 2014-

¹For example, in January 2017, we reported on federal grid resiliency efforts, finding that such efforts were fragmented across the Department of Energy, Department of Homeland Security, and the Federal Energy Regulatory Commission, and that these efforts overlapped to some degree, but were not duplicative. GAO, *Electricity: Federal Efforts to Enhance Grid Resilience*, GAO-17-153 (Washington, D.C.: Jan. 25, 2017). In January 2014, we found that U.S. energy infrastructure may be affected throughout all major stages of the energy supply chain, increasing the risk of disruptions. GAO, *Climate Change: Energy Infrastructure Risks and Adaptation Efforts*, GAO-14-74 (Washington, D.C.: Jan. 31, 2014).

²This calculation is based on average market oil prices as of October 30, 2017, in part, referenced from the West Texas Intermediate which is a domestic oil used as a benchmark for pricing.

2018 strategic plan, the SPR benefits the nation by providing an insurance policy against actual and potential interruptions in petroleum supplies caused by international turmoil, hurricanes, accidents, or terrorist activities.³ Releasing SPR oil during a disruption is intended to mitigate damage to the economy by replacing disrupted oil supplies, thereby reducing price increases that can result in economic damage. When processed, oil is converted into refined petroleum products such as gasoline and diesel fuel.

The SPR also helps the United States meet its stockholding obligations as a member of the International Energy Agency (IEA)—an international energy forum of 29 member nations established in 1974 to help members respond to major oil supply disruptions.⁴ IEA members have agreed to fulfill obligations, including holding reserves of oil or refined petroleum products equaling 90 days of net petroleum imports, and to release these reserves, utilize demand restraint measures, increase surge production, or utilize fuel switching during an IEA collective action in response to oil supply disruptions. In September 2014, we found that changes including increasing oil production, shrinking oil imports, and changing oil and fuel distribution patterns have important implications for the SPR.⁵ In that report, we concluded that changing market conditions have implications for the size, location, and composition of the SPR, and recommended that the Secretary of Energy undertake a comprehensive reexamination of the appropriate size of the SPR. In addition, in 2015, Congress required the Secretary of Energy to complete a long-range strategic review of the SPR.⁶ DOE completed its review in August 2016 which reviewed the size,

³U.S. Department of Energy, *U.S. Department of Energy Strategic Plan 2014-2018*, March 2014.

⁴The United States and 28 other Organisation for Economic Co-operation and Development countries are members of the IEA. The 29 member countries are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Republic of Korea, Luxembourg, The Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

⁵GAO, *Changing Crude Oil Markets: Allowing Exports Could Reduce Consumer Fuel Prices, and the Size of the Strategic Reserves Should Be Reexamined*, GAO-14-807 (Washington, D.C.: Sept. 30, 2014).

⁶Bipartisan Budget Act of 2015, Pub. L. No. 114-74, § 402, 129 Stat. 584, 589 (2015).

composition, infrastructure needs, and distribution capability of the reserve.⁷

My statement today is based primarily on preliminary observations from ongoing work and focuses on (1) how DOE has used the SPR to address domestic petroleum supply disruptions; (2) the extent to which the SPR is able to respond to domestic petroleum supply disruptions; and (3) how other IEA members have structured their strategic reserves and the extent to which DOE has evaluated these structures.

As part of our ongoing work, we reviewed reports and studies, including by DOE, IEA, and the U.S. Energy Information Administration (EIA)⁸ and interviewed DOE and IEA officials. Specifically, to describe how DOE has used the SPR to address domestic petroleum supply disruptions, we reviewed DOE, IEA, and EIA documents. To examine the extent to which the SPR is able to respond to domestic petroleum supply disruptions, we reviewed documents and reports from DOE, IEA, and DOE's Inspector General and interviewed DOE officials. We also reviewed our past work from August 2006 through September 2014.⁹ To describe how other IEA members have structured their strategic reserve systems to respond to disruptions, we reviewed IEA documents on members' reserve systems, reviewed a French document on its reserve system, and interviewed IEA officials about these systems. To describe the extent to which DOE has evaluated these structures, we reviewed DOE documents and

⁷U.S. Department of Energy, *Long-Term Strategic Review of the U.S. Strategic Petroleum Reserve: Report to Congress*, (Washington, D.C.: Aug. 2016).

⁸EIA is a statistical agency within DOE that collects, analyzes, and disseminates independent information on energy issues.

⁹See: GAO, *Strategic Petroleum Reserve: Available Oil Can Provide Significant Benefits, but Many Factors Should Influence Future Decisions about Fill, Use, and Expansion*, GAO-06-872 (Washington, D.C.: Aug. 24, 2006); GAO, *Strategic Petroleum Reserve: Improving the Cost-Effectiveness of Filling the Reserve*, GAO-08-726T (Washington, D.C.: Apr. 24, 2008); GAO, *Strategic Petroleum Reserve: Issues Regarding the Inclusion of Refined Petroleum Products as Part of the Strategic Petroleum Reserve*, GAO-09-695T (Washington, D.C.: May 12, 2009); GAO-14-807.

⁹See: GAO, *Strategic Petroleum Reserve: Available Oil Can Provide Significant Benefits, but Many Factors Should Influence Future Decisions about Fill, Use, and Expansion*, GAO-06-872 (Washington, D.C.: Aug. 24, 2006); GAO, *Strategic Petroleum Reserve: Improving the Cost-Effectiveness of Filling the Reserve*, GAO-08-726T (Washington, D.C.: Apr. 24, 2008); GAO, *Strategic Petroleum Reserve: Issues Regarding the Inclusion of Refined Petroleum Products as Part of the Strategic Petroleum Reserve*, GAO-09-695T (Washington, D.C.: May 12, 2009); GAO-14-807.

interviewed DOE officials. We shared the information in this statement with DOE, and the agency provided comments.

We are conducting the work upon which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Strategic Petroleum Reserve

The Energy Policy and Conservation Act (EPCA) of 1975 authorized the SPR, partly in response to the Arab oil embargo of 1973 to 1974 that caused a shortfall in the international oil market.¹⁰ The SPR is owned by the federal government, managed by DOE's Office of Petroleum Reserves, and maintained by Fluor Federal Petroleum Operations LLC.¹¹ The SPR stores oil in underground salt caverns along the Gulf Coast in Louisiana and Texas. DOE established an initial target capacity for the SPR of 500 million barrels based on U.S. import levels and implemented a phased approach to create large underground oil storage sites in salt formations, to reach a physical storage capacity of 750 million barrels. The SPR currently maintains four storage sites with a physical capacity of 713.5 million barrels.

Three recent laws required sales of oil from the SPR to fund its modernization and other national priorities. The Bipartisan Budget Act of 2015 provided for the drawdown and sale of 58 million barrels of oil from fiscal years 2018 through 2025 and authorized the sale of up to \$2 billion worth of oil through fiscal year 2020 to be used for an SPR modernization program.¹² The Fixing America's Surface Transportation Act provided for the drawdown and sale of 66 million barrels of oil from fiscal years 2023

¹⁰Pub. L. No. 94-163, § 154(a), 89 Stat. 871, 882 (1975)(codified as amended at 42 U.S.C. § 6234(a).

¹¹Fluor Federal Petroleum Operations LLC is the current DOE Management and Operating Contractor for the SPR.

¹²Pub. L. No. 114-74, §§ 403, 404, 129 Stat. 584, 589 (2015).

through 2025.¹³ The 21st Century Cures Act provided for the drawdown and sale of 25 million barrels from fiscal years 2017 through 2019.¹⁴ DOE estimates that, as a result of these sales, the SPR will hold between 506 and 513 million barrels of oil by 2025. For member countries to meet net petroleum import obligations, the IEA counts both public and private oil reserves, although the United States meets its IEA obligation solely through the SPR.¹⁵ As of July 2017, according to IEA data, the SPR held the equivalent of 141 days of import protection and U.S. private oil held the equivalent of an additional 216 days, for a total of about 356 days.¹⁶ Based on EIA projections of net imports, between 506 and 513 million barrels of oil would be equivalent to about 242 and 245 days of net imports in 2025.¹⁷

Regional Refined Product Reserves

The United States has two regional refined product reserves—Northeast Home Heating Oil Reserve and Northeast Gasoline Supply Reserve.

- **The Northeast Home Heating Oil Reserve**, which is not part of the SPR,¹⁸ holds 1 million barrels of ultra low sulfur distillate, used for heating oil, for homes and businesses in the northeastern United States,¹⁹ a region heavily dependent upon the use of heating oil, according to DOE's website. The distillate is stored in leased

¹³Pub. L. No. 114-94, § 32204, 129 Stat. 1311, 1740 (2015).

¹⁴Pub. L. No. 114-255, § 5010, 130 Stat. 1033, 1197 (2015).

¹⁵Public reserves are owned by the government or an independent organization set up by the government, known as an agency. Private reserves, also called industry reserves, are oil held for commercial and operational purposes as well as oil held by industry to meet minimum national reserve requirements.

¹⁶According to the IEA data source, the total does not equal the sum of industry and public reserves due to rounding.

¹⁷This calculation is based on DOE officials' estimated reserve level of SPR in 2025 and forecast changes in net imports from the EIA reference case forecast from its Annual Energy Outlook 2017.

¹⁸The Energy Act of 2000 authorized the establishment of the Northeast Home Heating Oil Reserve, and specifically provided that such a reserve is not a component of the SPR. Pub. L. No. 106-469, § 201(a)(3), 114 Stat. 2029, 2034 (2000) (codified as amended at 42 U.S.C. § 6250(a)).

¹⁹The term Northeast, for purposes of the Northeast Home Heating Oil Reserve, is defined as the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, and New Jersey. 42 U.S.C. § 6250(b)(1).

commercial storage in terminals located in three states: Connecticut, Massachusetts, and New Jersey. In 2000, President Clinton directed the creation of the reserve to hold approximately 10 days of inventory, the time required for ships to carry additional heating oil from the Gulf of Mexico to New York Harbor.²⁰

- **The Northeast Gasoline Supply Reserve**, a part of the SPR, holds a 1 million barrel supply of gasoline for consumers in the northeastern United States. According to DOE's website, this region is particularly vulnerable to gasoline disruptions as a result of hurricanes and other natural events. In response to Superstorm Sandy, which caused widespread gasoline shortages in the region in 2012, DOE conducted a test sale of the SPR and used a portion of the proceeds from the sale to create the reserve in 2014. The gasoline is stored in leased commercial storage in terminals located in three states: Maine, Massachusetts, and New Jersey.

**Statutory Release
Authority for the SPR**

Under conditions prescribed by EPCA, as amended, the President has discretion to authorize the release of petroleum products from the SPR to minimize significant supply disruptions.²¹ In the event of an oil supply disruption, the SPR can supply the market by selling stored oil. Should the President order an emergency sale of SPR oil, DOE conducts a public sale, evaluates and selects offers, and awards contracts to the highest qualified bidders. Purchasers are responsible for making their own arrangements for the transport of the SPR oil to its final destination. The Secretary of Energy also is authorized to release petroleum products from the SPR through an exchange for the purpose of acquiring oil for the SPR.²² According to DOE officials, this authority is sometimes utilized in

²⁰Initially, the Northeast Home Heating Oil Reserve held two million barrels of high sulfur heating oil. In 2011, the two million barrels of high sulfur heating oil was sold and replaced with one million barrels of ultra low sulfur distillate.

²¹ Pub. L. No. 94-163, § 161, 89 Stat. 871, 888 (1975) (codified as amended at 42 U.S.C. § 6241). The statute provides for a drawdown of the reserve upon a finding by the President that drawdown and sale are required by a "severe energy supply interruption," as defined by statute, or obligation under the international energy program. 42 U.S.C. § 6241(d). Limited drawdowns may be conducted if the President finds that a circumstance is, or is likely to become, a domestic energy supply shortage of significant scope or duration, action taken would assist directly and significantly in preventing or reducing the adverse impact of such shortage, and the Secretary of Defense has found that action taken will not impair national security. 42 U.S.C. § 6241(h).

²²See 42 U.S.C. § 6240(a).

oil supply disruptions when a specific volume of SPR oil is provided to a private sector company in an emergency exchange for an equal quantity of oil plus an additional amount as a premium to be returned to the SPR in the future. According to DOE's website, emergency exchanges are generally requested by a company after an event outside the control of the company, such as a hurricane, disrupts commercial oil supplies. The Secretary of Energy is also authorized to carry out test drawdowns through a sale or exchange of petroleum products to evaluate SPR's drawdown and sales procedures. When oil is released from the SPR, it flows through commercial pipelines or on waterborne vessels to refineries, where it is converted into gasoline and other petroleum products, and then transported to distribution centers for sale to the public.

Changing Petroleum Markets

Petroleum markets have changed substantially in the 40 years since the establishment of the SPR, including increases in global markets, increases in domestic oil production, and declines in net petroleum imports.

- **Increases in global markets.** At the time of the Arab oil embargo, price controls in the United States prevented the prices of oil and petroleum products from increasing as much as they otherwise might have, contributing to a physical oil shortage that caused long lines at gasoline stations throughout the United States. Now that the oil market is global, the price of oil is determined in the world market, primarily on the basis of supply and demand. In the absence of price controls, scarcity is generally expressed in the form of higher prices, as purchasers are free to bid as high as they want to secure oil supply. In a global market, an oil supply disruption anywhere in the world raises prices everywhere. Releasing oil reserves during a disruption provides a global benefit by reducing oil prices in the world market.
- **Increases in domestic oil production.** Reversing a decades-long decline, U.S. oil production has generally increased in recent years. According to EIA data, U.S. production of oil reached its highest level in 1970 and generally declined through 2008, reaching a level of almost one-half of its peak. During this time, the United States increasingly relied on imported oil to meet growing domestic energy needs. However, recent improvements in technologies have allowed producers to extract oil from shale formations that were previously considered to be inaccessible because traditional techniques did not yield sufficient amounts for economically viable production. In

particular, the application of horizontal drilling techniques and hydraulic fracturing—a process that injects a combination of water, sand, and chemical additives under high pressure to create and maintain fractures in underground rock formations that allow oil and natural gas to flow—have increased U.S. oil and natural gas production.

- **Declines in net petroleum imports.** One measure of the economy's vulnerability to oil supply disruptions is to assess net petroleum imports—that is, imports minus exports. Net petroleum imports have declined by over 60 percent from a peak of about 12.5 million barrels per day in 2005 to about 4.8 million barrels per day in 2016. In 2006, net imports were expected to increase in the future, increasing the country's reliance on foreign oil. However, imports have declined since then and, according to EIA's most recent forecast, are expected to remain well below 2005 import levels into the future. Canada and Mexico are the nation's major foreign sources for imported oil. Furthermore, the United States has increased its exports of oil and refined petroleum products.

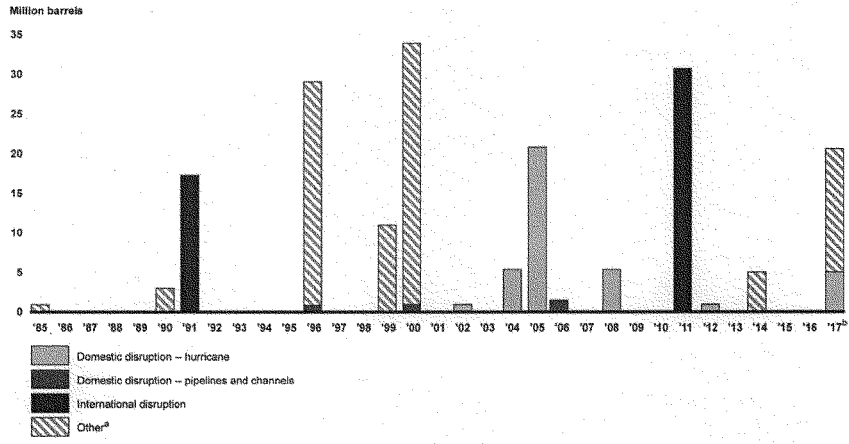
**DOE Has Primarily
Used Exchanges
from the SPR to
Private Companies to
Address Domestic
Petroleum
Disruptions**

To quantify how DOE has used the SPR to address domestic petroleum supply disruptions, we reviewed DOE and EIA documents. We also reviewed our past work from August 2006 to January 2014.

Our preliminary analysis indicates that DOE has primarily used exchanges to private companies in response to domestic supply disruptions such as hurricanes and other events. DOE has released oil 24 times from 1985 through September 2017, including 11 releases in response to domestic supply disruptions.²³ Of these 11 releases, 10 were exchanges, including 6 exchanges in response to hurricanes. One of the 11 releases was an SPR sale in response to Hurricane Katrina, which was part of an IEA coordinated action release. Historic releases from the SPR are shown in figure 1.

²³ The remaining 13 releases were conducted in response to international disruptions, or for budget deficit reduction, test sales to assess SPR operations, and other SPR operational needs. DOE officials stated that two additional releases were under way as of October 2017, that are not included in this 24 release total—those required in fiscal year 2018 under the Bipartisan Budget Act and the 21st Century Cures Act. As those sales are in process and yet not complete, GAO did not include them in its total of 24 releases.

Figure 1: Preliminary Analysis of Historical Strategic Petroleum Reserve Releases



Sources: Department of Energy (data); GAO (analysis). | GAO-18-209T

Note: Although the Strategic Petroleum Reserve (SPR) was created in 1975, DOE did not release oil from it until 1985. There were multiple releases in 1996, 2000, 2005, 2006, and 2017. For these years, the figure shows the sum of the released volumes under each category.

^aOther includes sales for budget deficit reduction, test sales to assess SPR operations, and other SPR operational needs.

^bData for 2017 are through September.

Our preliminary analysis also indicates that the six exchanges from DOE to U.S. refineries in response to hurricanes totaled about 28 million barrels.

- Based on our preliminary analysis of DOE documents, most recently, in response to Hurricane Harvey in 2017, DOE exchanged 5 million barrels of oil to Gulf Coast refineries that requested supplies. Refinery operations largely depend on a supply of oil and feedstocks. Hurricane Harvey closed or restricted ports through which 2 million barrels of oil per day were imported, and several refineries had no supply options except for SPR oil. According to DOE officials, exchanges from the SPR have allowed refineries to continue to

operate until alternative supply sources became available, ensuring continued production of refined petroleum products for use by consumers.

- Based on our preliminary analysis of DOE documents, DOE's most significant response to a hurricane was in 2005 following Hurricane Katrina. As we reported in January 2014, oil platforms were evacuated and damaged, virtually shutting down all oil production in the Gulf region as a result of the hurricane.²⁴ Based on our preliminary analysis of DOE documents, exchanges from the SPR, totaling 9.8 million barrels of oil, helped refineries offset this short-term physical supply disruption at the beginning of the supply chain, thereby helping to moderate the impact of the production shutdown on U.S. oil supplies. In addition to these exchanges, DOE also participated in an IEA collective action that was called in response to Hurricane Katrina by selling 11 million barrels of oil from the SPR, and IEA member countries delivered and sold much needed gasoline and other products to the United States. In total, DOE sold or exchanged 20.8 million barrels of oil from the SPR.

Our preliminary analysis of DOE documents and reports also showed that although almost all of DOE's releases in response to domestic supply disruptions have been from the SPR, DOE also used the Northeast Home Heating Oil Reserve in response to Superstorm Sandy in 2012. According to DOE's website, the agency transferred approximately 120,000 barrels of fuel to the Department of Defense to help provide fuel for first responders.

The SPR Is Limited in Its Ability to Respond to Domestic Disruptions

Based on our past work and preliminary observations, the SPR is limited in its ability to respond to domestic petroleum supply disruptions for three main reasons. First, as we reported in September 2014, reserves are almost entirely composed of oil and not refined products, which may not be effective in responding to all disruptions that affect the refining sector.²⁵ Second, as we reported in September 2014, reserves are nearly entirely located in one region, the Gulf Coast, which may limit responsiveness to disruptions in other regions. Third, during the course of our ongoing work, we reviewed DOE and energy task force reports that

²⁴GAO-14-74.

²⁵GAO-14-807.

found that the statutory authorities governing SPR releases may inhibit their use for regional disruptions.

- **Composition:** As we reported in September 2014, the SPR is almost entirely composed of oil, which may not be effective in responding to all disruptions that affect the refining sector. In September 2014, we reported that many recent economic risks associated with supply disruptions have originated from the refining and distribution sectors, which provide refined products, such as gasoline, rather than from shortages of oil.²⁶ Oil reserves are of limited use in such instances. We reported in May 2009 that following hurricanes Katrina and Rita, nearly 30 percent of U.S. refining capacity was shut down for weeks, disrupting supplies of gasoline and other products.²⁷ The SPR could not mitigate the effects of disrupted supplies because it holds oil. As of September 2017, over 99 percent of the SPR and its Northeast Gasoline Supply Reserve component (about 674 of 675 million barrels) is held as oil rather than as refined products, such as gasoline and diesel. Moreover, Gulf Coast hurricanes severely impacted refinery operations, such as Hurricane Katrina in 2005, Hurricane Ike and Hurricane Gustav in 2008, and Hurricane Harvey this year. According to DOE officials, oil reserves are not able to mitigate the potential effects of large-scale Gulf Coast refinery outages that may impact refined product deliveries.
- **Location:** As we reported in September 2014, the SPR is nearly entirely located in one region, the Gulf Coast, which may limit its ability to respond to disruptions in other regions.²⁸ In the Gulf Coast, the SPR is located close to a major refining center as well as to distribution points for tankers, barges, and pipelines that can carry oil from it to refineries in other regions of the country. Most of the system of oil pipelines in the United States was constructed in the 1950s, 1960s, and 1970s to accommodate the needs of the refining sector and demand centers at the time. Given the SPR's current location in the Gulf Coast, transporting oil from the reserve may impact commercial distribution of oil. Based on our ongoing work, according to DOE's 2016 long-term strategic review of the SPR, the agency reported that the expanding North American oil production and the resulting shifts in how oil is transported around the country have

²⁶GAO-14-807.

²⁷GAO-09-695T.

²⁸GAO-14-807.

reduced the SPR's ability to add incremental barrels of oil to the market under certain scenarios in the event of an oil supply crisis. This means that while the SPR remains connected to physical assets that could bring oil to the market, in many cases, forcing SPR oil into the distribution system would result in an offsetting reduction in domestic commercial oil flows. As we reported in September 2014, it may be more difficult to move oil from the SPR to refineries in certain regions of the United States. For example, since no pipelines connect the SPR to the West Coast, supplies of petroleum products and oil must be shipped by pipeline, truck, or barge from other domestic regions or by tanker from foreign countries. Such modes of transport are slower and more costly than via pipelines. For example, it can take about 2 weeks for a vessel to travel from the Gulf Coast to Los Angeles—including transit time through the Panama Canal.

- **Statutory release authorities:** In the course of our ongoing work, we reviewed DOE and energy task force reports that found that the statutory authorities governing SPR releases may inhibit their use for regional disruptions. DOE is authorized to release petroleum distillate (fuel) from the Northeast Home Heating Oil Reserve upon a finding by the President of a severe energy supply interruption that includes a dislocation in the heating oil market or other regional supply shortage.²⁹ On the other hand, because the Northeast Gasoline Supply Reserve is a part of the SPR, DOE can release gasoline from that reserve only after the President makes the statutorily required findings for release from the SPR, which do not explicitly include the existence of a regional supply shortage.³⁰ According to DOE's 2016 long-term strategic review of the SPR, a regional product reserve is meant to address regional supply shortages, whereas the SPR of which the Northeast Gasoline Supply Reserve is a part of, is meant to

²⁹42 U.S.C. § 6250b(a). For purposes of the Northeast Home Heating Oil Reserve, a "dislocation in the heating oil market" can be deemed to occur only when the price differential between crude oil and heating oil, according to specified metrics, increases by more than 60 percent over its 5-year rolling average, the differential continues for 7 consecutive days, and the differential continues to increase thereafter. 42 U.S.C. § 6250b(b). The President can also find a severe energy supply interruption if there is a circumstance other than a dislocation in the heating oil market that constitutes a regional supply shortage of significant scope and duration and a release would assist directly and significantly in reducing the adverse impact of such shortage. 42 U.S.C. § 6250b(a)(2).

³⁰42 U.S.C. § 6241(d), (h). According to DOE's long-term strategic review of the SPR, the purpose of the Northeast Gasoline Supply Reserve is to address regional supply shortages that can stem from localized natural disasters, such as severe winter weather or hurricanes impacting the Northeast, or from other incidents that may impact regional fuel supplies.

address severe energy supply interruptions that have a national impact. As a result, according to DOE's 2016 long-term strategic review of the SPR, in practice, this means that the release of the gasoline reserve would have to have a national impact. The Quadrennial Energy Review of 2015 recommended that Congress integrate the authorities of the President to release products from the regional product reserves—the Northeast Home Heating Oil Reserve and Northeast Gasoline Supply Reserve—into a single, unified authority by amending the trigger for the release of fuel from the two refined product reserves so that they are aligned and properly suited to the purpose of a product reserve, as opposed to an oil reserve.³¹

As discussed, based on our preliminary observations, DOE has used the SPR in response to domestic supply disruptions, but the effectiveness of these releases is unclear because DOE has not formally assessed all of them. DOE has exchanged about 28 million barrels of oil in response to hurricanes, but we found only two reports assessing DOE's response to hurricanes Gustav, Ike, Katrina, and Rita, and it is unclear whether DOE has examined other responses. According to a 2006 DOE Inspector General report, DOE used the SPR and its assets with great effectiveness to address emergency energy needs in the crises surrounding hurricanes Katrina and Rita,³² but the concentration of SPR sites along the Gulf Coast meant the United States also had to rely on refined petroleum products from Europe. The report noted that despite being in the path of the hurricanes' destruction, the SPR promptly fulfilled requests for oil from refineries suffering from storm-related supply

³¹U.S. Department of Energy, *Quadrennial Energy Review: Energy Transmission, Storage, and Distribution Infrastructure*, April 2015. In a presidential memorandum released on January 9, 2014, the President created a Quadrennial Energy Review task force. The memorandum directed the task force to conduct a Quadrennial Energy Review and identified the challenges facing the nation's energy infrastructures as the focus of its first installment. The 2015 review recommended updating the SPR's release authority to reflect modern markets. Under the statute governing the SPR's release authority, while a limited drawdown can be ordered in anticipation of price increases, a full drawdown of the reserve cannot be ordered until a supply interruption has, among other things, resulted in a severe increase in the price of petroleum products. 42 U.S.C. § 6241(d), (h). The 2015 review also recommended that the authority to anticipate an economy-damaging price increase as a result of a severe energy supply interruption should be added to the broader EPCA drawdown authority to more closely conform to other EPCA goals of preventing "a severe increase in the price of petroleum products" that "is likely to cause an adverse impact on the national economy."

³²U.S. Department of Energy, Office of Inspector General, *The Department of Energy's Use of the Strategic Petroleum Reserve in Response to Hurricanes Katrina and Rita – Audit Report*, DOE/IG-0747, (Washington, D.C.: Dec. 2006).

shortages. However, the damage caused by Hurricane Katrina demonstrated that the concentration of refineries on the Gulf Coast and resulting damage to pipelines left the United States to rely on imports of refined petroleum products from Europe, as part of an IEA collective response. Consequently, regions experienced a shortage of gasoline, and prices rose. DOE testified in 2009 that despite a response from the SPR and IEA, some markets south of Virginia and north of Florida could not be immediately supplied with refined products due to a lack of infrastructure to receive and distribute imports from the Atlantic coast to inland population centers.³³ Exchanges with multiple refiners totaling 5.4 million barrels of SPR oil were authorized to hurricanes Gustav and Ike in 2008. DOE assessed this response and submitted a report to Congress in 2009.³⁴ According to DOE's 2009 report, the exchanges conducted in September and October 2008 were successful in providing emergency petroleum supplies to refiners experiencing shortages caused by hurricanes Gustav and Ike.

As we reported in May 2009, as originally enacted, EPCA envisioned the possibility that the SPR would include a variety of petroleum products stored at locations across the country.³⁵ In a 2009 hearing, the then Deputy Assistant Secretary for Petroleum Reserves testified that DOE still considers a large SPR focused on oil storage to be the best way to protect the nation from the negative impacts of a short-term international interruption to U.S. oil imports; however, the hurricanes of 2005 and 2008 showed that the SPR may be limited in its ability to address some short-

³³U.S. Department of Energy, David F. Johnson, Deputy Assistant Secretary for Petroleum Reserves, *Developing Refined Products Storage in the Strategic Petroleum Reserve*, testimony before the Committee on Energy and Natural Resources, United States Senate, May 12, 2009, accessed October 4, 2017, <https://energy.gov/fe/articles/developing-refined-products-storage-strategic-petroleum-reserve>.

³⁴U.S. Department of Energy, *Report to the Congress on the Strategic Petroleum Reserve 2008 Emergency Test Exchanges*, (Washington, D.C.: Aug. 2009).

³⁵GAO-09-695T.

term interruptions to domestic refined products supply and distribution infrastructure.³⁶

Other IEA Members Structure Their Reserves Differently, with Some Holding Industry Reserves and Refined Products, and DOE Has Taken Steps to Explore These Structures

Based on information reviewed during the course of our ongoing work, to respond to disruptions, 27 of the 29 IEA member countries use one of five reserve structures, also known as stockholding structures, in which these countries hold public reserves, industry reserves, or a combination of these.³⁷ The five structures are shown in figure 2. Also, most members hold refined petroleum products, with many members holding at least a third of their reserves in refined petroleum products. Some members hold their refined petroleum products in different regions across their country to respond to disruptions.

³⁶U.S. Department of Energy, David F. Johnson, Deputy Assistant Secretary for Petroleum Reserves, *Developing Refined Products Storage in the Strategic Petroleum Reserve*, testimony before the Committee on Energy and Natural Resources, United States Senate, May 12, 2009, accessed October 4, 2017, <https://energy.gov/fe/articles/developing-refined-products-storage-strategic-petroleum-reserve>.

³⁷The IEA refers to the various approaches that IEA member countries use to hold their reserves of oil or petroleum products as "stockholding structures." As net exporters, Canada, Denmark, and Norway do not have a stockholding obligation under the International Energy Program Agreement. However, despite being net exporters, Norway and Denmark have stockholding structures by law. According to IEA officials, Australia is not compliant in meeting its stockholding obligations currently.

Figure 2: Preliminary Analysis of Strategic Reserve Structures Used by International Energy Agency Member Countries

Countries that use public reserves ^a		Countries that use industry reserves to some extent ^b		
1. Government. A country's government is responsible for holding reserves for emergency purposes. <ul style="list-style-type: none"> • Czech Republic • New Zealand • United States Government-owned reserves are typically financed through a country's central government budget and held exclusively for emergency purposes.	2. Agency. A country's government establishes a separate organization that is responsible for holding reserves for emergency purposes. <ul style="list-style-type: none"> • Belgium • Estonia • Germany • Hungary • Ireland • Slovak Republic The separate organizations may vary from country to country, but in all cases are defined by state legislation.	3. Industry. A country places a compulsory stockholding obligation on private companies for holding reserves for emergency purposes. <ul style="list-style-type: none"> • Greece • Luxembourg • Norway • Sweden • Switzerland • Turkey • United Kingdom Private companies may include importers, refiners, or wholesalers.	4. Combination of government and industry. A country uses both government and industry structures for holding reserves for emergency purposes. <ul style="list-style-type: none"> • Japan • Korea • Poland 	5. Combination of agency and industry. A country uses both agency and industry structures for holding reserves for emergency purposes. <ul style="list-style-type: none"> • Austria • Denmark • Finland • France • Italy • Netherlands • Portugal • Spain

Source: GAO analysis of International Energy Agency information. | GAO-18-209T

Note: According to International Energy Agency officials, as net exporters, Canada, Denmark, and Norway do not have a stockholding obligation under the International Energy Program Agreement. However, despite being net exporters, Norway and Denmark have stockholding structures by law. One country, Australia, relies on industry reserves, but does not place a compulsory obligation on industry.

^aPublic reserves are reserves that are owned by the government or an independent organization set up by government, known as an agency.

^bIndustry reserves, also called private reserves, are reserves held for commercial and operational purposes as well as reserves held by industry to meet minimum national reserve requirements.

Based on our preliminary analysis of information on the 29 IEA member countries, 18 place a stockholding obligation on industry either exclusively or in part to meet their total emergency reserve needs. Most of these countries distribute the stockholding obligation in proportion to companies' share of oil imports or of sales in the domestic market. However, several member countries instead impose a higher obligation on refineries because of their high amount of operating oil.

According to a 2014 IEA report,³⁸ most IEA members hold some amount of refined petroleum products, and a European Union (EU) directive generally requires EU members to ensure that at least one-third of their stockholding obligation is held in the form of refined petroleum products.³⁹ For example, according to the IEA's website, Germany's stockholding agency, Erdölbevorratungsverband (EBV), holds 55 percent of its reserve in refined petroleum products such as gasoline, diesel fuel, and light heating oil.⁴⁰ In contrast, the United States holds almost all of its reserves in oil rather than refined petroleum products.

Some IEA member countries geographically disperse their reserves of refined petroleum products to be able to respond to domestic disruptions. For example, according to the IEA's website, to maintain a wide geographical distribution of emergency reserves, the French stockholding agency stores refined petroleum products in each of its seven geographic zones.⁴¹ Moreover, according to the IEA's website, France's agency stores petroleum product reserves in each zone; reserves in each zone should represent specified amounts based on consumption in order to respond to emergencies.⁴² During a labor strike in December 2013, France used its emergency reserves to supply local gas stations when delivery of fuel was impeded for a prolonged period of time, according to a French document. In another example, the IEA reported that Germany holds petroleum product reserves in several regions in the country and that the reserves are to be distributed throughout Germany, so that a minimum reserve equivalent to a 15-day supply is maintained in each of

³⁸International Energy Agency, *Energy Supply Security, Emergency Response of IEA Countries* (Paris, France: 2014).

³⁹Specifically, the EU directive states that if a member has not committed to maintaining at least 30 days of specific reserves, it shall ensure that at least one-third of its obligation is held in the form of certain specified products, including petroleum products. See Council Directive 09/119, art. 9, 2009 O.J. (L 265) 15 (EU).

⁴⁰International Energy Agency, *Germany Oil Stocks*, accessed September 20, 2017, <http://www.iea.org/countries/membercountries/germany/oilstocks/>, and International Energy Agency, *Energy Supply Security, Emergency Response of IEA Countries* (Paris, France: 2014).

⁴¹International Energy Agency, *France Oil Stocks*, accessed September 25, 2017, <http://www.iea.org/countries/membercountries/france/oilstocks/>.

⁴²International Energy Agency, *France Oil Stocks*, accessed September 25, 2017, <http://www.iea.org/countries/membercountries/france/oilstocks/>.

five designated supply areas.⁴³ The rationale for this is to prevent logistical bottlenecks that could occur if all emergency reserves were stored centrally, according to a 2014 IEA report.⁴⁴

Based on our preliminary observations, DOE has taken some steps to evaluate different structures for holding reserves. However, the agency has not formally evaluated other countries' structures in over 35 years and has not finalized its 2015 studies on regional petroleum product reserves. According to DOE officials, the agency explored the feasibility of adopting the industry structure shortly after creating the SPR and concluded that this and other structures were not feasible in the United States. In 1980, DOE studied the feasibility of adopting the agency structure, which is the most similar to the SPR since the only major difference is how the reserve is funded,⁴⁵ according to DOE officials. According to IEA documents, in the agency structure, generally the reserve is funded by a tax or levy on products or industry, which is passed down to the consumer. In contrast, the SPR is funded through congressional appropriations. However, DOE officials we interviewed cautioned that the agency has not reassessed its findings from 35 years ago. As mentioned above, in 2016 DOE reassessed the SPR in light of the changing global oil market, but this assessment did not include a review of other IEA countries' structures.

Our preliminary review indicates that DOE examined the feasibility of additional regional petroleum product reserves in two 2015 studies, but it did not finalize these studies or expand the SPR to include additional reserves. In September 2014, we reported that DOE officials told us they were conducting a regional fuel resiliency study that would provide insights into whether there is a need for additional regional product reserves and, if so, where these reserves should be located. The Quadrennial Energy Review of 2015 recommended that the agency analyze the need for additional or expanded regional product reserves by undertaking updated cost-benefit analyses for all of the regions of the

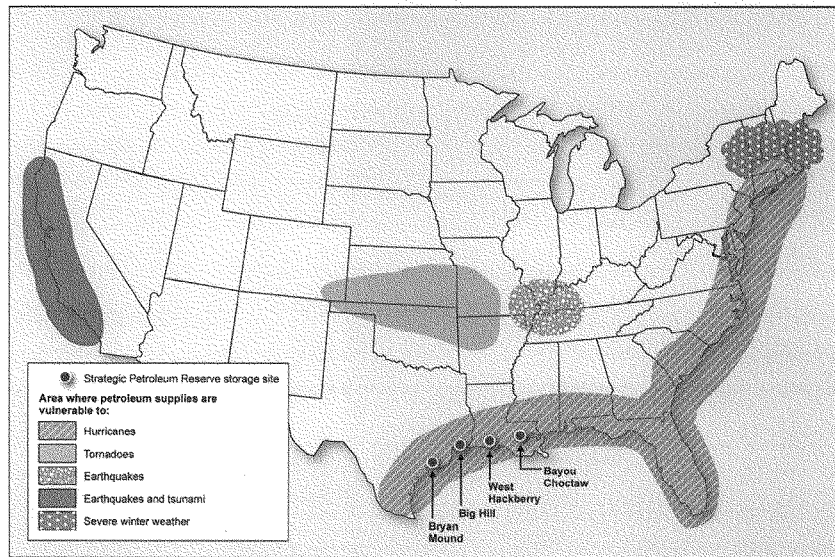
⁴³International Energy Agency, *Energy Supply Security, Emergency Response of IEA Countries* (Paris, France: 2014).

⁴⁴International Energy Agency, *Energy Supply Security, Emergency Response of IEA Countries* (Paris, France: 2014).

⁴⁵As mentioned above, the establishment of the SPR was authorized by statute. According to DOE officials, establishment of an agency structure in the United States as an alternative to the SPR would similarly require new legislation.

United States that have been identified as vulnerable to fuel supply disruptions. Figure 3 illustrates vulnerabilities that DOE identified in 2014.

Figure 3: U.S. Strategic Petroleum Reserve Locations and Regional Petroleum Supply Vulnerabilities Identified by the Department of Energy in 2014



Sources: Department of Energy; Map Resources (map). | GAO-18-209T

In response to the 2015 recommendation, DOE contractors studied the feasibility of additional regional petroleum product reserves, as part of the SPR, in the U.S. Southeast and West Coast regions to address supply vulnerabilities from hurricanes and earthquakes, respectively. According to DOE officials, weather events in the Southeast are of higher probability but lower consequence, and events in the West Coast are of lower probability but higher consequence. DOE did not finalize its 2015 studies on regional petroleum product reserves and make them publicly available.

According to DOE officials, because consensus could not be reached within the Administration on several issues associated with the refined product reserve studies, these studies were not included as part of DOE's 2016 long-term strategic review of the SPR. Our ongoing work indicates that DOE's 2016 long-term strategic review of the SPR did not account for the risks of domestic supply disruptions as a factor in determining the appropriate size, location, and composition of the SPR. Prior to the two 2015 studies, in 2011, DOE carried out a cost-benefit study of the establishment of a refined product reserve in the Southeast and estimated that such a reserve would reduce the average gasoline price rise by 50 percent to 70 percent in the weeks immediately after a hurricane landfall, resulting in consumer cost savings, according to the Quadrennial Energy Review of 2015.⁴⁶

In closing, I note that we are continuing our ongoing work examining issues that may help inform future considerations for the SPR. Given the constrained budget environment and the evolving nature of energy markets and their vulnerabilities, it is important that DOE ensures the SPR is an efficient and effective use of federal resources. We look forward to continuing our work to determine whether additional DOE actions may be warranted to promote this objective.

Chairman Upton, Ranking Member Rush, and Members of the Subcommittee, this concludes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

⁴⁶According to DOE officials, all aspects of the 2011 study remain draft and pre-decisional since DOE did not officially approve the study.

**GAO Contact and
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If you or your staff have any questions about this testimony, please contact Frank Rusco, Director, Natural Resources and Environment, at (202) 512-3841 or ruscof@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Key contributors to this testimony include Quindi Franco, Assistant Director; Philip Farah, Ellen Fried, Nkenge Gibson, Cindy Gilbert, Gregory Marchand, Patricia Moye, Camille Pease, Oliver Richard, Danny Royer, Rachel Stoiko, Marie Suding, and Kiki Theodoropoulos.

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Mr. UPTON. Well, thank you all. At this point we will move to questions from the dais.

Mr. Alexander, you said in your testimony that the Corps is overseeing the work that is done by PREPA in Puerto Rico. I would like to ask the question, how has that gone? Because this subcommittee has tried to contact PREPA both by email and phone. They are not answering. There is no heartbeat that we are getting back. So, how has that oversight gone?

Mr. ALEXANDER. Sir, perhaps I misstated. We have a task force—again, general officer, senior-executive-led—that is overseeing our mission to restore the grid, as assigned by FEMA. What we are doing with PREPA, though, is we are working in coordination and collaboration with them, so that we can have well-defined, focused areas of operation. So, we are not working in each other's area and we ensure that there are no gaps. We are only working with PREPA; we are not working for PREPA, but we are working in coordination with PREPA.

The oversight of the Corps' mission assignment we believe is going well. Again, we were assigned this mission on 30 September. Within 18 days, we were able to award three major contracts, one for temporary power generation, two 30-megawatt power plants to be put in the vicinity of the Palo Seco Power Plant near San Juan, and restore the power grid around San Juan. Those generators have arrived. They have been installed, and we have additional load on the grid in the greater San Juan area as of several days ago.

The other two contracts focused on line repair, transmission distribution/line repair. A larger contract to Fluor, a \$240 million contract. They have boots on the ground today. They are conducting assessments. They are starting to have crews arriving. I believe, as I said in my testimony, we are ramping up quickly, 620 by the end of this weekend, and that number will double by mid-November.

And then, we also have a company named PowerSecure. They are fully engaged and will be—they, too, have assessment teams on the ground. Their equipment is actually en route by sea now on a MARAD, Ready Reserve Fleet vessel that should arrive at Ponce port on 3 November.

Mr. UPTON. Did the Corps have any advance knowledge of working with PREPA prior to the contract that they established with Whitefish and Cobra? Were you aware of that contract before it was signed?

Mr. ALEXANDER. No, sir, we were not. We were engaged in our temporary power mission under the Stafford Act, and we have been working that since the 6th of September. The news that PREPA had independently committed in a contract to another company, we were not consulted; we were not aware.

Mr. UPTON. You indicated in your written testimony that the temporary housing plan includes establishing—this is as it relates to Texas—20,000 travel trailers and 4,000 mobile housing units. I presume that most of those are for folks that were actually displaced, homeowners or families that were displaced. Do you know what that number is for Puerto Rico? It's 20,000 for Texas. Do you know what the number would be for Puerto Rico?

Mr. ALEXANDER. No, I do not, sir.

Mr. UPTON. Ms. Hoffman, I have met with a number of pharmaceutical/medical device companies, many with very large operations in Puerto Rico. We are all aware of the critical need to get those facilities back online. It is a public health priority because it is so critical for patients to ensure that their products that are being manufactured there don't go into a shortage. How are you incorporating medical manufacturing in an approach to restore the grid in Puerto Rico?

Ms. HOFFMAN. So, thank you.

Critical infrastructure, critical loads on an electric system is very important, utilities. In our conversation with the utilities, with FEMA and the interagency partners, we discussed what are some of those priority restoration efforts and helping with the communications, so that we understand where some of those needs are and where some of the activities should be with respect to restoration processes. So, those coordinations occur with FEMA and with the local utilities in the Territory itself.

Mr. UPTON. OK. Thank you. My time has expired.

I recognize the ranking member of the subcommittee, Mr. Rush, for 5 minutes.

Mr. RUSH. I want to thank you, Mr. Chairman.

Mr. Alexander, I am kind of curious, not "kind", I am very curious about your Army Corps of Engineers' lack of information about this Whitefish contract. You, the Army Corps of Engineers, were unaware of this contract, is that correct?

Mr. ALEXANDER. Yes, sir.

Mr. RUSH. The Governor says he was unaware of this contract.

Mr. ALEXANDER. I'm sorry, sir, did you say—

Mr. RUSH. The Governor of Puerto Rico has stated publicly that he was unaware of this contract.

Mr. ALEXANDER. The Governor of Puerto Rico said he was unaware?

Mr. RUSH. Right.

Mr. ALEXANDER. Sir, I am not privy to that. I do not know.

Mr. RUSH. Are you aware that this contract is being canceled or has been canceled?

Mr. ALEXANDER. Sir, I understand that the Governor has given the direction to terminate that contract. Whitefish and other contractors, they are completing the task, the last task they have been assigned. So, they are still working on the island.

Mr. RUSH. Do you have any information about who executed that contract?

Mr. ALEXANDER. No, I do not.

Mr. RUSH. Do you trust PREPA? Do you trust them?

Mr. ALEXANDER. Sir, I have no reason not to. Again, we are working in collaboration with them on restoring the power.

Mr. RUSH. Do you have any estimate in terms of how much additional dollars the cancellation of this contract will cost the American people?

Mr. ALEXANDER. No, I do not.

Mr. RUSH. All right. Secretary Hoffman, the economic consulting firm Rhodium Group concluded that Maria cost 1.25 billion hours of electricity supply disruption to households, which they say is the

longest disruption in recorded history. Do you concur with their finding?

Ms. HOFFMAN. I will have to look at the information, but it is a significant duration for outage for Puerto Rico.

Mr. RUSH. And what is the best estimate on when power will be fully restored to both the U.S. Virgin Islands and Puerto Rico?

Ms. HOFFMAN. So, that is information that the Governor as well as PREPA is looking at, as well as partnerships with the Army Corps of Engineers, on the supplies that are needed, the resources that are required for restoring power. Some initial indications are that for, I would say 50 percent—I believe the Army Corps has estimated that 50 percent of the island will be restored by the end of December, and that the significant portion of the restoration will occur later on.

Mr. RUSH. Mr. Alexander, can you give us some insight on your opinions about the timeline, the estimated timeline? There might be some others on the panel that might also have some idea about the estimated timeline for Puerto Rico and, also, the U.S. Virgin Islands.

Mr. ALEXANDER. Sir, as for Puerto Rico, we estimated 30 percent of the prestorm load on the grid would be restored by 30 October. We did achieve that metric on time before the 30th. I believe we are up over 31, 32 percent today. Our estimate is 50 percent prestorm load restored by 30 November. And then, as we go on into the new year, we are estimating 75 percent by 31 January.

Mr. RUSH. Anyone else want to add?

[No response.]

All right. Mr. Alexander, is the Corps currently involved in discussions with PREPA, or any other Government entity in Puerto Rico, to ensure that when the grid is repaired, it will meet construction—it will be a way to account some of the lessons learned from this ongoing catastrophe for the American taxpayers' dollars are not being wasted?

Mr. ALEXANDER. Sir, we are focused on executing the mission we have been assigned, which is the restoration of the grid to prestorm conditions, the load, and we are coordinating with PREPA as we do that. We actually, though, are working with the Department of Energy on what a more resilient grid might look like, as they lead the effort to develop recommendations and cost estimates. But, for now, we are executing our mission under the Stafford Act, which does not allow for any permanent construction or enhancement of the existing grid.

Mr. RUSH. I yield back, Mr. Chairman.

Mr. UPTON. The Chair will recognize the vice chair of the subcommittee, the gentleman from Houston, Texas, Mr. Olson.

Mr. OLSON. I thank the Chair.

And welcome to all five witnesses. A special pony up to the new chairwoman of the PUC of Texas, Ms. DeAnn Walker. My daughter Kate is a junior at SMU, your alma mater, and she loves it.

My first two questions are for you, Mr. Alexander, one about Harvey and one about Irma. First of all, Harvey. As you know, sir, I live in Fort Bend County, Texas. When Fort Bend floods, it floods. We have had four major floods in the past 3 years. Our drainage district works hard 24/7, 365, to make sure our drainage ditches

are maintained. After the first major flood in 2015, the Army Corps told our drainage district they need a Section 404 permit under the Clean Water Act to maintain the ditches. The maintenance of a drainage ditch is supposed to be exempt from the permitting process under Section 404. But the Corps disputed the exemption and referred the district to the EPA. The EPA agreed it is maintenance work and the county should be good to go. But here we are, 2 years and four floods later, with Fort Bend County still unable to fix this critical problem. And now, Harvey has made a bad problem much, much worse.

These repairs can't wait. Texas and Fort Bend need to rebuild after Hurricane Harvey. Things are being made worse with erosion and piles of silt. We don't need red tape at the Corps hindering the maintenance project that should be exempt under Section 404(f)(1)(C) of the Clean Water Act.

My question is, will you guarantee me that your office will work with my staff and local Fort Bend County officials, under Judge Bob Hebert, to get this fixed ASAP, so Texans can protect their livelihoods?

Mr. ALEXANDER. Sir, thank you. I acknowledge your concerns. I am generally aware of this issue in Fort Bend. While I do not have all the specific details here with me today, I can assure you and can guarantee you that the Corps remains committed to working with our partners and your office to resolve this issue.

Mr. OLSON. Great. ASAP, please.

The next question about Hurricane Irma that follows up on comments and questions from my colleague from Illinois, Mr. Rush. Sir, have you ever talked to someone on the ground in PREPA? Have you, yourself, talked to someone on the ground PREPA about the situation in Puerto Rico?

Mr. ALEXANDER. No, sir, I have not.

Mr. OLSON. Wow, have not. OK.

The second round of questions is for you, Ms. Walker. First of all, I want to thank you for your service to our State. I appreciate your work in guiding us through Harvey. And I know Drew Vincentchild at the PUC. You have been our PUC Chair for 41 rather intense days, I do believe. And as you know, for a city like Houston, I want you to talk about how Harvey as being a storm event with heavy rain as opposed to wind and storm surge, and how does that change the impacts you have to address? And what was the biggest surprise you had to recovery? Can we help with that surprise to mitigate that, either DC or NGOs? How can we address your concerns/surprises after Hurricane Harvey with our grid there in Fort Bend County, Texas?

Ms. WALKER. Well, as you noted, wind damage is very different than flooding damage, and Houston did have the flooding damage during this hurricane. The biggest surprise was the amount of rain. There was substations such as Memorial substation that took on water that had never taken on water in the 50 years that it had been there. And so, we were having to come up during the storm with ways to address all of the flooding, moving crews. Frankly, they were using aquatic equipment that they had never used before to get to things because of the flooding.

Houston, also, downtown experienced heavy flooding. I believe I heard that 83 of the downtown buildings lost power, and I think some still are without power. Luckily the medical center did not. We have reinforced the medical center time and time again since Hurricane Allison. It wasn't a hurricane, but since Allison.

And so, I am not sure of anything that you all can pass here that would help us. We continue to learn from each storm. Each storm is different. Hurricane Ike was a wind event. It took, out of 2.2 million, it took out 2 million. It was a much different storm.

Mr. OLSON. Again, being a Member who lives in the area, I have to thank you so much because, when Harvey hit my house twice in two days, we never ever, ever lost power. So, thank you for that. I yield back.

Ms. WALKER. Thank you.

Mr. UPTON. The Chair recognizes the ranking member of the full committee, Mr. Pallone.

Mr. PALLONE. Thank you, Mr. Chairman.

Obviously, in addressing the panel, I have to say it, express my concern that the Federal response so far is nowhere near where it needs to be. Reports indicate nearly 70 percent of Americans on the island are without electricity. The New York Times recently described the situation of Puerto Rico, quote, "like going back in time". Most of my questions are of Mr. Alexander and the Corps.

Mr. Alexander, who is in charge of the effort to restore power in Puerto Rico and the Virgin Islands? Is it the Army Corps or another agency?

Mr. ALEXANDER. Sir, again, our mission assignment from FEMA is to restore the grid to prestorm condition in coordination/collaboration with PREPA.

Mr. PALLONE. That is fine. I just wanted to get—

Mr. ALEXANDER. OK.

Mr. PALLONE. You answered my question.

Is there a strategic plan for these Federal restoration efforts?

Mr. ALEXANDER. Sir, if you look at strategic beyond the regional restoration, that is being looked at by Energy and other departments and the interagency—

Mr. PALLONE. So, the DOE is more responsible for a long-term plan, is that what you are saying?

Mr. ALEXANDER. For full, permanent grid restoration enhancement, yes, sir.

Mr. PALLONE. And you are more involved in trying to get things up and going?

Mr. ALEXANDER. Sir, we are involved in trying to restore the grid in different sectors as expeditiously as possible with concentration initially on San Juan and, then, out to seven larger municipalities on the island, and then, finally, preparing and transitioning to PREPA for permanent service.

Mr. PALLONE. All right. Now how many companies—yes, I understand the Corps has several contracts with private companies for restoration work—how many companies has the Corps contracted with to perform the grid-rebuilding work in Puerto Rico?

Mr. ALEXANDER. Sir, we have contracted with three companies.

Mr. PALLONE. And will the Army Corps provide the committee with copies of those contracts, so that we can get an understanding

of their scope? Would you be willing to do that through the chairman?

Mr. ALEXANDER. Sir, I will have to speak to our contracting authority and see what is permissible because it is acquisition-sensitive material.

Mr. PALLONE. All right. If you can, we would appreciate it. I know I am acting through the chairman in asking you for it.

We have heard varying reports as to how long it will take to restore power to the citizens of Puerto Rico. By some accounts, it will be many more months until power is fully restored. So, Mr. Alexander, when did the Army Corps receive its mission to repair Puerto Rico's grid from FEMA?

Mr. ALEXANDER. On 30 September.

Mr. PALLONE. And Hurricane Maria made landfall in Puerto Rico on September 20th. Do you know why it took FEMA 10 days to give the Army Corps its mission?

Mr. ALEXANDER. Sir, we were not involved in deliberation. We were executing our temporary emergency power at that time.

Mr. PALLONE. All right. Just on that issue, does the Army Corps mission assignment provide—well, I guess you did answer that. You basically said, if I understood, that the short-term repairs in San Juan and these other areas is under your jurisdiction, but the long-term and fully reconstruction of a more efficient and resilient grid, that would be more DOE, correct?

Mr. ALEXANDER. Yes, sir.

Mr. PALLONE. All right. So, then, let me turn to Ms. Hoffman, to the DOE witness. If the Army Corps is not responsible for making long-term improvements, is the DOE taking the lead on this effort?

Ms. HOFFMAN. So, the Department of Energy is looking at strategies for long-term improvements with respect to strengthening the grid. So, ideas such as energy storage, microgrids or minigrids, options for rerouting power, better situational awareness, all those activities are activities that we are looking at. But, once again, the actual financing and implementation is the responsibility of the utilities or the governance structure that will be decided for Puerto Rico.

Mr. PALLONE. But you stated in your testimony that DOE is leveraging the National Labs to develop long-term solutions to improve resiliency. What is the status of that effort?

Ms. HOFFMAN. So, the National laboratories, we have been in active discussion with the Grid Modernization Lab Consortium in looking at areas such as planning activities, situational awareness, looking at analysis-type activities, as well as hardening activities. What this is going to have to be done as is mirrored up with the existing rebuilding process and looking at how some of the innovative solutions can be married in and built upon the existing rebuilding. So, that is going to take time and it is going to have to run in close coordination. So, we have seven technical experts in Puerto Rico working with the Army Corps to understand the timing and the extent of where their activities are going and opportunities for the future.

Mr. PALLONE. All right. Thank you so much.

Thank you, Mr. Chairman.

Mr. UPTON. The Chair will recognize the gentleman from Illinois, Mr. Shimkus.

Mr. SHIMKUS. Thank you, Mr. Chairman.

I want to try to go to three different directions real quick. But, Mr. Alexander, I am a former military officer. Someone has to be in charge. So, I think it is very troubling that we have you all there trying to restore the grid and you are not in consultation with PREPA. The basic question is, if you are going to call and yell at someone to get the job done, does anyone know who we are going to call? Mr. Alexander?

Mr. ALEXANDER. Sir, my job is really—

Mr. SHIMKUS. Yes, you have been very good at trying to answer this tactfully. But who do we call?

Mr. ALEXANDER. FEMA.

Mr. SHIMKUS. We call FEMA?

Mr. ALEXANDER. FEMA.

Mr. SHIMKUS. OK. Do we get our answer?

Mr. ALEXANDER. It is the authority we are operating under.

And I will say this: from our Chief of Engineers to our South Atlantic Division commanding general, and to a number of colonels that are on the ground in Puerto Rico, they collaborate and meet with PREPA on a daily basis.

Mr. SHIMKUS. OK. Thanks. So, I think we probably should have FEMA here. That is who we should have had, FEMA, as far of this committee hearing. So, maybe we will do that as a followup.

Because, obviously, we all know the history behind PREPA and the bankruptcy and their questionable practices and their ability even to provide power before the storm.

Does anyone know why it took—and Puerto Rico is separate because it is an island; it is far away; it is hard. Other States usually have, with the utilities have mutual assistance agreements. And you will see folks flow. Does anyone know if PREPA had a mutual assistance agreement with any stateside utility? Does anyone know that?

Ms. HOFFMAN. It is my understanding that PREPA had not asked for mutual assistance agreements. Early on in the storm they just did ask for it.

Mr. SHIMKUS. Yes, I have been told it took five weeks, PREPA took five weeks to ask anybody for help.

Ms. HOFFMAN. Yes, a letter was submitted two days ago, I believe, for mutual assistance. But, generally, the industry is very forward-leaning in discussing with the utilities and activating mutual assistance—

Mr. SHIMKUS. Well, we see it all the time.

Ms. HOFFMAN. Yes.

Mr. SHIMKUS. I mean, the trucks are on the road, whether there is an ice storm, whether there is in my neck of the woods a tornado, whether it is hurricanes. I have members of my congregation who are utility workers, and they are gone. That is a disappointing statement.

I also wanted to put on the record, I think we wanted the Nuclear Regulatory Commission to submit a letter for this hearing because the hurricanes did come through some of our locations where we have nuclear power plants, and we think that would help build

the record of the resiliency, baseload power, the importance of that. And I would ask that, if we finally get a letter from the NRC, Mr. Chairman, that we are allowed to submit that for the record.¹

And the last point, I really want to go to Mr. Rusco and maybe Mr. Corbin. The crude oil world has changed significantly since the establishment of the SPRO. I have been here a long time, 20 years, and I think one thing is for sure: we have always bought high and sold low. Is that a safe statement in the history of the SPRO, in the purchase of crude oil? Mr. Rusco, do you want to answer that?

Mr. RUSCO. I think that, just by the nature of when it was established, you know, it was established after a crisis. Usually, when DOE has had authority to expand, it is——

Mr. SHIMKUS. Quickly.

Mr. RUSCO [continuing]. After a crisis. And so, it has been at higher prices.

Mr. SHIMKUS. So, we have a history of buying high and selling low?

Mr. RUSCO. At least buying high.

Mr. SHIMKUS. And your testimony talked about refined products. In the world really now the need is for immediate refined product, not base crude oil. In the old days when we were worried about deploying forces to Europe and sea lanes being closed, and importation of crude oil, a SPRO made sense. Am I right, based upon your testimony today, that you are saying maybe regional systems—well, actually, regional systems which DOE was supposed to analyze, and that there would be more focus on refined product?

Mr. RUSCO. I think that it is fair to say that most other countries that have strategic reserves have chosen to do that, for the reasons that you state, yes.

Mr. SHIMKUS. Thank you. I hope my colleagues will follow up on some of those questions. I have run out of time. I yield back.

Mr. UPTON. The Chair recognizes the gentleman from California, Mr. McNerney.

Mr. MCNERNEY. Well, I thank the chairman, and I thank the witnesses this morning.

Mr. Alexander, you mentioned prevention as a part of the mission. Within the Stafford Act framework, can the electric structure of Puerto Rico be rebuilt to improve grid resilience and using sustainable technology?

Mr. ALEXANDER. Sir, the Stafford Act allows us to restore the grid to prestorm conditions, meeting U.S. Code, electrical code, in order to satisfy life, health, safety requirements. Some have interpreted that to mean we are making a more resilient or betterment on the system, but that is not the case.

Mr. MCNERNEY. OK. Ms. Hoffman, has there been a credible estimate of the cost difference between rebuilding a system that is resilient and just rebuilding the old system to look like it did before?

Ms. HOFFMAN. There has not been a complete cost estimate, taking into consideration the amount of work that has been done and that is being planned to be accomplished from the Army Corps of Engineers. So, there has been discussion around different advanced

¹The information has been retained in committee files and also is available at <http://docs.house.gov/meetings/IF/IF03/20171102/106573/HHRG-115-IF03-20171102-SD010.pdf>.

solutions, but that needs to be baselined with the work and the building planout. So, that needs to be evaluated still.

Mr. MCNERNEY. So, it could be that building a system that is resilient and sustainable wouldn't cost much more than just rebuilding the old system up to code?

Ms. HOFFMAN. I think the analysis has to be completed.

Mr. MCNERNEY. OK. Thank you.

The Office of Electricity has worked on a State Energy Risk Assessment Initiative that helps States understand the risks to their infrastructure. Did the Virgin Islands and Puerto Rico have a risk profile before the hurricanes?

Ms. HOFFMAN. I would have to go back and look into that. I am not sure whether they did do a risk profile with the State assessments.

Mr. MCNERNEY. Thank you.

Mr. Stafford, is it true that the National Science Foundation facility at the radiotelescope has an infrastructure that supported FEMA operations subsequent to the hurricane?

Mr. SHIMKUS. You said "Stafford".

Mr. MCNERNEY. Oh, Mr. Alexander? Excuse me. Thank you, my colleague from Illinois.

Go ahead.

Mr. ALEXANDER. Sir, now that I know it was me you were talking to, could I ask you, please, to repeat the question?

Mr. MCNERNEY. Sure. Is it true that the National Science Foundation facility radiotelescope infrastructure survived well enough to serve as a FEMA operations center?

Mr. ALEXANDER. Sir, I am not aware of that.

Mr. MCNERNEY. OK. I was going to ask you what differentiated that facility that survived from facilities that did not survive. Does anyone have a clue to that question?

Mr. ALEXANDER. I do not.

Mr. MCNERNEY. No?

Ms. WALKER, you highlighted the inconsistencies in tracking outages in the system. Would better tracking of outages be beneficial? Or how would it be beneficial?

Ms. WALKER. It helps us determine where to deploy services, such as, we call them pods, but water, food, whether or not outages are going to be restored quicker, and we know how many in the area have outages. We are able to, then, deploy the needs for that community better with that knowledge; also, working with the Corps of Engineers on deploying temporary generators. It just helps us to understand where to deploy for those needs.

Mr. MCNERNEY. Do you have the authority to require utilities to report outages?

Ms. WALKER. Yes, we do.

Mr. MCNERNEY. Is that authority a State authority or is it a Federal authority?

Ms. WALKER. It is a State.

Mr. MCNERNEY. Thank you.

Ms. Hoffman, how does the DOE go about helping utilities prioritize which lines, substations, and so on, should be put online first?

Ms. HOFFMAN. So, thank you very much for the question.

The utilities have a restoration plan as they look at their outage management system. They look at prioritization for transmission lines to get the most customers on as soon as possible and, then, work down into the distribution system. But they first must do damage assessments and assess really the extent of the damage on the system, and accelerating that damage assessment really helps a utility outline the restoration process.

What the Federal Government does is look at where the critical infrastructure is and are there any special needs with respect to storing large loads or storing critical infrastructure, whether it be telecommunication facilities, hospitals. And so, that is an ongoing discussion. But it gets melded with a utility's restoration plan and the utility's commitment with respect to how they are doing the restoration.

Mr. MCNERNEY. I yield.

Mr. UPTON. The Chair recognizes the gentleman from Ohio, Mr. Latta, for 5 minutes.

Mr. LATTA. Well, thanks very much, Mr. Chairman, and for calling this hearing today. And thanks to our witnesses for being here.

Ms. Hoffman, if I could ask you my first question, you noted that one of the reasons for the rapid electrical recovery in Florida was the nearly \$3 billion in grid resiliency improvements since 2006. Could you elaborate as to what those improvements were, and will DOE be working with Florida going forward to identify additional hardening practices?

Ms. HOFFMAN. So, thank you, sir, for the question.

The investments by Florida really have stimulated from activities that looked at, first, situational awareness, so looking at advance meter and infrastructure to provide the situational awareness that we have been talking about. Because, once you have that awareness, you can do an outage management system. You can actually look at how you can advance and preposition crews for a restoration process. It also has allowed for advanced switching to be able to minimize the amount of customers without power; versus taking down a whole feeder system, you can really isolate damage on a system and look at restoration opportunities.

Other things that the utilities have done is hardening their infrastructure by looking at stronger poles, looking at concrete poles, steel poles, versus your traditional wooden poles. But all these capabilities are pulled together with an advanced kind of communications and control system, but a situational awareness system that can help with the restoration process.

Mr. LATTA. OK. You are talking about the different types of poles. Are there other things that they were doing on hardening, did you say?

Ms. HOFFMAN. So, with respect to substations—and this would probably go more for Sandy, but also looking at hardening substations and being able to—

Mr. LATTA. And how do they go about hardening the substations?

Ms. HOFFMAN. Pardon?

Mr. LATTA. How do they go about hardening the substations?

Ms. HOFFMAN. So, when hardening the substations, you really look at increased capabilities with respect to duration, being able to support prevention of damage from wind, but also from flooding.

So, it goes back to supporting infrastructure, so that you don't see the flooding damage that can occur.

Mr. LATTA. OK. Thank you.

Ms. Walker, if I could turn to you, can you elaborate on working with the Federal agencies after Hurricane Harvey? And could you see any improvements that need to be made between Federal, State, local, industry, all working together out there? Or what is your view as to what happened, and is there anything that can be improved on?

Ms. WALKER. I think there are improvements that we can make. My view is that the time to make those is before the next storm. I found myself in the State Operations Center addressing issues that I think are better to try to handle after the storm and get ready for the next one. Some have to do with the interconnection for the FEMA temporary housing. Some had to do—

Mr. LATTA. Could you elaborate on that, on the temporary housing, because I know I've seen different press reports on that, but would you elaborate on the temporary housing of FEMA?

Ms. WALKER. Once they bring in temporary housing, it is not set, usually, right at the meter that the house is on. So, the utilities have to set a new pole. There are processes in Texas for each utility, and my guess is throughout the country for each utility, on how those processes are to interconnect the new customer, a new facility.

And we would like to streamline that for all utilities in Texas. We had five major utilities impacted by Harvey and, then, multiple coops and municipalities. And so, we are hoping to have one process for FEMA to have to go through, instead of multiple different processes. So, that is an example.

Mr. LATTA. OK. Any other examples you can think of that would be how to improve things out there?

Ms. WALKER. We understood, or I understood, during Hurricane Harvey that there were issues, chokepoints, as they were called during Hurricane Ike, related to the processes, inspection processes, for cities to get homes reconnected once they are rebuilt, once they are remodeled. And so, I think that is something we can address going forward, how those inspections are done, who does them, to make sure we have enough people on the ground.

It was during recovery. It is not, to me, the time to try to be addressing things like that. And I just think that that is something we can look at going forward.

Mr. LATTA. OK. Well, thank you very much, Mr. Chairman. My time is just about expired, and I yield back.

Mr. OLSON [presiding]. The gentleman yields back.

The Chair now calls upon the gentleman from Pennsylvania, Mr. Doyle, for 5 minutes.

Mr. DOYLE. Thank you, Mr. Chairman.

Ms. Hoffman, welcome back to our committee. It is always nice to have another Penn-Stater here at the committee.

Let me ask you, in your testimony you explained DOE's role in restoration and recovery efforts in those areas affected by recent hurricanes. A DOE piece from 2015 published in Power & Energy Magazine that is still on your energy.gov site explained that, and I quote, "Both the frequency and intensity of these disaster events

have been trending higher in recent years, with 7 of the 10 costliest storms in U.S. history occurring in the last 10 years. These weather disaster events represent one of the most significant threats posed by climate change.” Now that was published in 2015. And since that time, we have witnessed the most extreme month of hurricanes that has ever been recorded earlier this year.

So, I want to ask you, how is the Department of Energy responding to this increasing threat of climate change and extreme weather events?

Ms. HOFFMAN. So, the Department of Energy is looking at all hazards, including extreme weather, as we look at investment opportunities or research opportunities for advancing our electric grid. And so, a lot of our research focuses on advanced technologies, energy storage capabilities, advanced minigrids or microgrids, as they are called. We are looking at advanced capabilities that the utility industry can build and invest in for hardening and improving the infrastructure.

Mr. DOYLE. Yes, I mean, exactly. In fact, that article goes on to detail the SmartGrid R&D Program which is designed to improve grid resilience and, also, modernizing the grid through the adaptation and integration of advanced technologies.

So, in your testimony you explain your recommendation for the rebuild as being formed in consultation with the National Labs. And a presentation from my NREL earlier this year explained the importance of distributed generation, calling it “a large factor in developing resiliency with clean energy technologies and solutions”.

So, my question is, is the Department, in making recommendations to those that are helping rebuild the grid in Puerto Rico, which will essentially be a brand-new system, are you urging deployment of distributed systems and renewables?

Ms. HOFFMAN. So, distributed generation, combined heat and power, which is probably the most efficient form of distributed generation, is an option that should be considered in any sort of restoration improvement process. But one of the things that we are going to have to think about moving forward is how are we going to repair systems if another emergency happens. As you look at Puerto Rico, which had, I believe, over 8,000 solar panels there, what is the process in which the Department of Energy and the restoration activities in the next event, how are we going to orchestrate the repair of those systems?

As you look at an efficient restoration process, there is an advantage to restoring the core electric grid. So, microgrids might a good balance between the two of looking at siting generation closer to load, but I think it has to be an individual evaluation with respect to the state of the system and the opportunities from that point of view.

Mr. DOYLE. Thank you.

Let me just ask anybody on the panel, does anyone have a comment regarding FEMA’s resistance to authorizing reconstruction aid? My understanding is this makes local governments and local utilities ineligible for long-term grants. And I am also concerned, because Puerto Rico is only eligible for emergency services, that these contracts don’t end up following Federal procurement rules and we end up with situations like Whitefish Energy. Has any of

your agencies weighed in on this topic? Is there an expected timeline for action on this? Anyone?

[No response.]

I mean, FEMA authorized in 10 days in Houston, in Texas, and I believe in a couple of weeks in the Virgin Islands. But, yet, still, for some reason, this hasn't been fully authorized. They claim they are working on it; they are close to it. Could anyone explain what this holdup is and why it has taken so long?

[No response.]

I think you are right when someone said we should have had FEMA up here. FEMA should be sitting on this panel, too, because it seems like a lot of the questions we have need to be answered by them.

Well, let me ask it. Do any panelists have suggestions for any highly beneficial action we could take to help expedite the rebuilding efforts in a prudent, sustainable manner? Can you give any suggestions to this committee on what we should be doing that we are not doing right now?

Ms. HOFFMAN. Sir, if I may add some comments?

Mr. DOYLE. I am glad to see Penn State stepping up to the plate here and at least answering a question.

[Laughter.]

Ms. HOFFMAN. As we look forward to investing in resilience, I know it is something that the Administrator of FEMA is looking at, as well as the Department. It is, how do we build in resilience and how do we think about that upfront investment ahead of a disaster, and looking at what funds are available, to really think about investing for resilience?

Mr. DOYLE. The idea that our citizens are going to go another three months without electricity is just unconscionable, I think.

I yield back.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the gentleman from Ohio, Mr. Johnson, for 5 minutes.

Mr. JOHNSON. Thank you, Mr. Chairman.

I appreciate the opportunity to ask of this panel. A very, very important hearing that we are having today because we saw the effects of the hurricanes and how the destruction that occurred during and afterwards, how that affected not only the areas that were hit, but other regions of the country as well, since so much of our energy resources reside there on the Gulf Coast.

So, Mr. Corbin, how much does the Northeast Gasoline Supply Reserve cost on an annual basis? Let's get that question out of the way first.

Mr. CORBIN. Thank you for the question, Mr. Johnson.

For the Northeast Gasoline Supply Reserve, the average storage contracts, which are for leased commercial storage for the product, are approximately \$19.60 per barrel per year. And when you include overhead costs, to include quality assurance and administration of your IT/sales platform, in the event you have to release the gasoline, it comes to a little over \$20 per barrel per year, sir.

Mr. JOHNSON. OK. So, is the higher per-barrel cost of storing gasoline versus crude oil a good use of taxpayer dollars, do you think?

Mr. CORBIN. That is really not for me to decide, whether that is a good use of the taxpayer dollars.

Mr. JOHNSON. But you have got an opinion?

Mr. CORBIN. I will say, Mr. Johnson, that in terms of the cost of storage for refined products, the United States has, out of 14 countries that participated in benchmarking studies that are stock-holding countries, the U.S. has by far the highest cost for gasoline storage out of the 14 countries.

Mr. JOHNSON. OK. All right.

Also, Mr. Corbin, continuing on, the SPR is almost entirely located in the Gulf Coast region of the United States, limiting its ability to respond to disruptions in other parts of the country, particularly if we were to have a repeat of what we saw recently. For example, the West Coast has relatively few pipelines that are connected to the SPR, meaning that some petroleum products must be shipped by truck, barge, or other domestic methods or by tankers even from foreign countries. These modes of transport, obviously, are slower and more costly and limit the usefulness of the Strategic Petroleum Reserve. So, how would expanding, in your opinion, how would expanding the number of SPR locations across the country enhance the effectiveness of the SPR?

Mr. CORBIN. First, I would just like to make a correction to your statement, sir. There are no pipelines that directly connect the SPR to the West Coast of the United States.

The SPR, as I mentioned in my testimony, our crude oil is stored in underground salt caverns in two sites in Texas, two in Louisiana. Salt cavern storage is very inexpensive. We have the lowest operating cost of any stock-holding country in the world for our crude oil. There are no salt domes along the West Coast of the United States. There are some outside of the immediate Gulf Coast area, but they are not significant. So, crude oil storage would be problematic on the West Coast.

Mr. JOHNSON. So, you are basically saying—I don't mean just the West Coast; I mean other regions of the country as well. I mean, the question centered on the West Coast. So, you are saying, in your opinion, developing other storage areas for the SPR around the country in different regions would be problematic?

Mr. CORBIN. For crude oil storage. Now, in discussions that were mentioned by Mr. Shimkus earlier, and talked about refined product storage, the U.S. Government currently has two refined products reserves, the Northeast Gasoline Supply Reserve and the Northeast Home Heating Oil Reserve. They are both very small, 1 million barrels apiece. They are intended to meet regional supply disruptions.

There are challenges associated with product reserves, regardless of the model that is used. Both of the product reserves that are currently in existence, they are, essentially, Government-owned refined product in leased commercial storage facilities. In any product reserve with that model, there is an initial refined product acquisition cost associated with it. In studies that we did in PADD 5, which is the West Coast, and in the Southeast U.S., my staff found that there is little to no spare commercial storage capacity. And as I mentioned previously, the leased commercial storage costs are high.

Mr. JOHNSON. OK. All right.

Mr. Chairman, I yield back.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the gentlelady from Florida, Ms. Castor, for 5 minutes.

Ms. CASTOR. Thank you, Mr. Chairman. And I want to thank Chairman Upton and Ranking Member Rush, and the professional staff, for bringing this hearing to be. And thanks to all of our witnesses.

There is a very serious tension that the Congress has to address as soon as possible. On the one hand, we need to restore power in Puerto Rico and the U.S. Virgin Islands as quickly as possible, but, on the other hand, Congress has an overarching responsibility to protect the taxpayer from future losses by building a more resilient, modern, distributed grid with better technology, technology, by the way, that has largely been funded by the taxpayers that we see in our National Laboratories that is used by utilities and businesses all across the country.

Senator Ramon Luis Nieves, who is in the audience and is going to testify on the next panel, is a former chairman of the Puerto Rican Senate Committee on Energy. He says the current grid is obsolete, the grid before the storm, before the hurricanes. He said in his testimony, "Appropriating taxpayer money just to repair an old 20th century grid would be a waste of resources." In fact, Ken Buell, the Director of Emergency Response and Recovery with the U.S. Department of Energy, stated that, "We really should think in terms of rebuilding at this point, not just repairing the old grid."

The problem that we have all got to grapple with is PREPA is largely in debt. They do not have the wherewithal now to take the lead on this. They have governance problems. Gosh, what else do we have to know after this Whitefish contract controversy? I think we have a very significant responsibility to protect the taxpayers here.

A few weeks ago, there was a congressional briefing provided by the Department of Homeland Security, FEMA, and the U.S. Army Corps of Engineers was there. They also relayed that they only have the authority now to go in and make repairs, and not do the kind of rebuilding of a modern grid that needs to happen.

In fact, Mr. Alexander, in your testimony you say that your mission right now is to repair the power system to its prestorm condition, is that correct?

Mr. ALEXANDER. Yes, ma'am.

Ms. CASTOR. Ms. Hoffman, what kind of direction do you need from the Congress to begin to go beyond a planning stage and do something that your very own Director of Emergency Response and Recovery has said needs to be done? And do you agree that you need that authority to go beyond repairing?

Ms. HOFFMAN. So, I think there has to be an ability for the Department of Energy to work closely with PREPA in planning and actively engaging and discussing what some of those advanced technologies solutions are. So, the forum has to be codified, so that there can be active engagement and discussion of what are the opportunities. I know that PREPA has their own plans and their own

activities, but how do we really take the advancements and provide that?

Ms. CASTOR. So, you think, yes, it would be helpful for Congress to provide additional clarity, so that you can move forward to do what, on a bipartisan basis, what experts have advised that needs to be done in Puerto Rico?

Ms. HOFFMAN. Yes.

Ms. CASTOR. And the Virgin Islands? OK.

Ms. HOFFMAN. Yes.

Ms. CASTOR. We have got to do this with a sense of urgency, though. Mr. Alexander, how do we do this? As you keep going on to repair, what kind of advice, what kind of clarity do you need from the Congress in maybe the next emergency aid package, maybe in something that would allow you to go beyond just repairing the old, obsolete grid and moving forward on something that would protect the taxpayers?

Mr. ALEXANDER. So, while we recognize that the prestorm grid was not in good condition, the current authorities under the Stafford Act, and the mission assigned from FEMA, limits us to restoring to prestorm condition, meaning U.S. Code. I think this is, ultimately, a policy decision. Do we need to relook at the Stafford Act? As written, it was—

Ms. CASTOR. And Colleagues, let me—thank you very much—in previous emergency aid packages for Superstorm Sandy and for Katrina, it has been the Congress that has been able to go beyond the Stafford Act that limits the Government to just going and repairing what was, and building in, instead, a new resiliency, whether it is in housing or defense installations and things like that, those previous emergency aid package. We have never had a blackout and destruction of an electric grid the scale of this ever before in the country, and that is why this is something new this committee needs to work on together with our colleagues in the Senate and, hopefully, with DOE, as they have expressed they are already doing some of this planning. But, to put this into action, it is going to be our responsibility to actually pass that authorization in the next emergency aid package or before.

And I yield back my time.

Mr. OLSON. My friend's time has expired.

The Chair now calls upon the gentleman from the Commonwealth of Virginia, Mr. Griffith, for 5 minutes.

Mr. GRIFFITH. Thank you very much, Mr. Chairman. I appreciate it,

Ms. Hoffman, during a hearing before this committee, Secretary Perry mentioned that microgrids could be a solution to quickly restore electricity after future natural disasters. I am also interested in how microgrid technology could be used to provide power to rural and rural mountainous areas of the country. Do you believe Puerto Rico could benefit from microgrids and, if so, how?

Ms. HOFFMAN. So, thank you very much for the question.

Microgrids provide an opportunity to bring generation closer to the load and be able to manage supply and demand on a more local basis. In Puerto Rico you have the generation on one side of the island and, of course, the load on the other side of the island. So, ultimately, you really would like to be able to create a minigrid or

a microgrid. It would be able to balance that in a different form. But that does require generation, and it does require load management and advanced communications and controls to be able to manage that on a more localized basis. So, you look at things such as energy storage and other generation that can be meshed very well with a local distribution system.

Mr. GRIFFITH. Now would you see that as exclusive of the current type of system or would you see it as an ancillary except in times of disaster?

Ms. HOFFMAN. So, ideally, I would love to think about how you build off of the existing system and capitalize on the existing investment, where it is electrically feasible. And then, once again, that requires close coordination with the existing infrastructure. Whenever utilities look at isolation or separation of the grid and look at microgrids, they are looking at utilizing the existing assets and being able to build upon those assets with new technology and new capabilities.

Mr. GRIFFITH. And if you are suddenly cut off, as we have seen in Puerto Rico, from your supply of either electricity or the fuel to produce that electricity, doesn't that require that the microgrid also have some kind of a fuel source that it can tap into in cases of emergency?

Ms. HOFFMAN. Absolutely. You need a fuel source. You need redundancy. You need to be able to ensure reliability of the microgrid. Whether it is a utility-owned or a private-sector-owned, you have to have that redundancy and capability for your customers.

Mr. GRIFFITH. I appreciate that.

What are the current limitations associated with the microgrid technology, if any?

Ms. HOFFMAN. So, some of the current limitations are really looking at microgrid controllers to be able to have an ability from a standards form to be able to look at control of the microgrid, looking at cybersecurity. Regardless of who owns the electric grid and how the electric grid is developed, you have to be secure. You also have to have the capability to dynamically manage supply and demand. So, looking at some of the advanced control solutions and things along those lines, as well as the generation technology.

Mr. GRIFFITH. Now let me ask you this: can you envision that a microgrid might be as small as, say, just a power source that would handle a hospital and its needs or a factor and its needs for short periods of time, as a part of the system as a whole, but, then, also, in times of emergency be able to take care of those needs where we have seen problems in Puerto Rico and other places?

Ms. HOFFMAN. So, absolutely. We have seen microgrids at university campuses, at hospitals. So, it can be as small as one wants to define a microgrid, but also can be larger from a minigrid point of view, if you want to support multiple services in a locality.

Mr. GRIFFITH. And I would assume that, based on what we have already discussed, that if you had, if for some reason in the natural disaster your fuel source was damaged, but the rest of the equipment was still good, that it would be easier to drop in the fuel, for the Federal Government to come in after the disaster and drop in

the fuel than it would if you drop in a whole new system, isn't that correct?

Ms. HOFFMAN. I think that has to be evaluated on a system basis, to be fair.

Mr. GRIFFITH. OK.

Ms. HOFFMAN. I mean, you are bringing in a lot of fuel, and it kind of comes down to what really is it required for a cost-effective restoration. What we are talking about is getting the power back on for as many customers as possible as efficiently and as effectively as possible. And so, in some cases that may be putting in, re-establishing a grid system and a grid network. In other cases in a localized community that is very far and isolated, it may be putting onsite generation there and creating a minigrid in the near term until lines and power can be restored from a main grid point of view.

Mr. GRIFFITH. And I appreciate that. Of course, in my neck of the woods where we have a lot of coal and some natural gas, but a lot of coal, we think that might be an answer for us, and maybe for others, to have that fuel source available and have the big microgrid ready to go.

With that, Mr. Chairman, I appreciate it very much and yield back.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the gentleman from Iowa, Mr. Loeb sack, for 5 minutes.

Mr. LOEBSACK. Thank you, Mr. Chair.

Thanks to the panel today for your excellent testimony, and we have had a lot of great questions.

I guess I want to join in with everyone else in expressing the fact that I was heartbroken by the devastation of these most recent storms. I think it is unfortunate that we are probably going to see a lot more of this down the road. So, we are going to be faced with these issues, I think, across the country.

And many of us represent districts that have already been affected over the years by this kind of devastation. I represented Cedar Rapids, Iowa, for 6 years. Back in 2008, we had the Flood of the Century or the flood of whatever number of centuries, and the river crested at 31 feet, 9 feet over the previous record. There was \$2.5 billion damage done immediately in Cedar Rapids, the economic loss of probably the same. And they have been through a lot, like a lot of communities around this country, and just most recently what we have seen in Puerto Rico and Texas and Florida.

I do want to, I guess, address my concerns more to Mr. Alexander than anybody with respect to the Corps. You know, the Corps I know ranks the projects, and we are going to have a lot of projects coming up, what we have seen recently, projects for reconstruction, for flood mitigation. I run the benefit/cost ratio, and it has to be at least 1-to-1, as you know.

Cedar Rapids was 1.2-to-1. We authorized the project to go forward in 2014, but we haven't seen any movement on it in terms of funding. And this is going to happen in these other instances, too. We are going to have a lot of challenges, sort of where to prioritize, where to put the money.

But I have a lot of concerns with this benefit/cost ratio. It seems awfully bureaucratic to the folks who are living in these communities when they want to prevent floods in the future. Can you address that issue and give us any hope at all that, not just Cedar Rapids, Iowa, but these communities that are going to be faced with flood mitigation down the road might get some relief and actually see some projects built?

Mr. ALEXANDER. Sir, I am familiar with benefit/cost ratios and prioritizing and racking and stacking of projects, and the needs are many, but the budget is limited. But my focus is on contingency operations. And so, to adequately address your question, I would have to refer to our Civil Works personnel. So, I could have my staff coordinate with them.

Mr. LOEBSACK. Yes, I suspected that might be the case, but I am going to go ahead and submit a question on the last. Then, if you can get us an answer from the relevant person at the Corps, that would be great. Again, I just want to bring up this issue more than anything else, because going forward this is going to cost, as we know, billions of dollars for reconstruction in these communities. And a lot of them are going to face the same questions that Cedar Rapids faced since 2008, and a lot of other communities around the country, and it is something that we are going to have to pay close attention to and we are going to have to resolve that issue, because folks are going to be depending upon those reconstruction funds to make sure that they can go forward with their communities.

So, thanks to all of you.

And thank you, Mr. Chairman. With that, I will yield back.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the patient gentleman from West Virginia, Mr. McKinley, for 5 minutes.

Mr. MCKINLEY. Very patient, very patient. Thank you, Mr. Chairman.

Mr. OLSON. Very patient.

Mr. MCKINLEY. Mr. Chairman, given the aftermath and all the discussion here we have had about the natural disasters we have had in Florida, Texas, Louisiana, Puerto Rico, I really want to applaud the Department of Energy's efforts to refocus the narrative and the discussion about reliability and resiliency, because really it underscored how serious that problem is if we don't address it. So, thank you for what you are doing, and for Secretary Perry, for focusing on that, because I think that could have some impact.

But my question, a little along the same line, has to do with the petrochemical industry in the Houston and Louisiana, all of the Gulf Coast, where we were so hard hit when that Category 4 hit there that it wiped out or shut down 17—I think there are 23 crackers down in that area—17 of them were shut down. One of them is still out. Sixty percent of our production of polyethylene and propylene were lost for a period of time. It showed how vulnerable we are in that area.

And I know that, in contact with folks that have reached our office, because of that slowdown, because of the lack of cracker facilities to be able to provide the ethylene and propylene around the country, companies all across America that use their plastic resins are slowing down as a result. One company, particularly, in my dis-

tract was working seven days a week. It is now down to five because it can't get the plastics.

So, this thing is serious about it. What we have done, or what I think DOE maybe has an interest—and I would like to hear more from you—is that, rather than taking a page from the Strategic Petroleum Reserve of having it all in one location, what if we were to locate an ethane storage up in the northern Appalachian area, right where the Marcellus and the Utica shale formations are located, so that we could have a secondary supply, a secondary source, to be able to provide that, the petrochemical supplies of material for around the country?

Do you have a thought about that from DOE's position, here they may be on having a secondary? It is not replacing Houston by any stretch. It is just having something that is in another location, so it is not vulnerable to the weather.

Ms. HOFFMAN. So, Congressman, you bring up an important issue. It is location, location, location. Diversity is very important. And as we look at any sort of, whether it is fuel product, chemical product, having and thinking about having flexibility in where that product is developed also looks at our security and resilience for the Nation. So, I understand that in the Appalachian area there is a lot of natural gas resources and a byproduct of natural gas and the ability is ethane. And so, I know that the Secretary had a roundtable discussion and is looking at the opportunity. But it brings up the important point that we need to think about diversity and I wanted to say "generation diversity," but product diversity in the United States.

Mr. MCKINLEY. Following up on that is that, during last year's appropriation process, our office had introduced an amendment to the appropriation bill to see that a study was undertaken to confirm whether or not there was an interest or possibility and potential for having it in the Marcellus and the Utica shale formations. That has been since, I think it was May. Do you have a sense? Can you give me a status on how far along, if it has been undertaken yet, to make a determination of the feasibility of locating a secondary ethane storage?

Ms. HOFFMAN. So, I understand the Department is undertaking a study in this area, and it is my understanding that this study will be completed in 2018.

Mr. MCKINLEY. Do you have an idea when in 2018? In December or is that going to be in September or October?

Ms. HOFFMAN. I don't have that.

Mr. MCKINLEY. OK.

Ms. HOFFMAN. I will get back to you on that answer.

Mr. MCKINLEY. If you could back to me, I would appreciate it. And I yield back. Thank you.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the gentleman from the Bay State, the Bay Line State—I'm sorry—the Old Line State, Mr. Sarbanes, for 5 minutes. I apologize.

Mr. SARBANES. All those names work.

Thanks to the panel.

I wanted to ask you, Mr. Alexander, to step back in terms of the Corps' relationship to these disasters that have been occurring with

more frequency, and give me a sense of how much the Corps' mission and effort and sort of the deployment of its various projects has changed over the last few years in either response to the disasters that we are seeing, these natural disasters, or in anticipation that the frequency of them is going to increase. Is that an analysis that is happening? Can you cite some trends in terms of the Corps' projects around this, the kind of requests that come in that are related to resiliency and adaptation, and so forth, in addition to just efforts to respond to things that happen? So, if you could give that kind of 30,000-foot perspective, that would be helpful.

Mr. ALEXANDER. Thank you, sir.

First, every year following a storm season, we do an after-action review and we identify lessons learned, and we work to develop and establish best practices, so that we can improve ourselves and train accordingly. How can we work with State and local governments to help them prevent and work toward mitigation of a disaster?

We are always looking at how we can improve our critical infrastructure. We have an aging infrastructure, as you know. So, that is a separate issue. We acknowledge that infrastructure needs to be resilient in order to withstand storms such as this, flooding on the Mississippi, tornadoes out in the Midwest. We are looking, as we move forward and develop and study projects and future projects, we are looking at ways to ensure that a greater degree of resilience is incorporated in those designs.

Mr. SARBANES. Are you seeing an increase? Is there a marked increase or at least something measurable in the kinds of proposals that are coming into the Corps that relate to these extreme weather events, either responding to something that has happened or projects that are anticipating increased exposure from these events? And has the Corps' kind of scoring system for projects been adjusted in any way relative to what has been happening with these kinds of disasters and weather events?

Mr. ALEXANDER. I am not in a position to adequately address your question. I can say, I mean, we do every year; we have requests for additional flood damage mitigation projects. How can we increase the resilience in levee systems and support and mitigate flooding in low-lying areas, flood plains, things of that nature?

Mr. SARBANES. I would appreciate it, if it were possible, to go back to the Corps, and maybe after the analysis following this hurricane season has been completed, to see if you could give us some information about trends over the last few years in terms of the number of projects that fall into that kind of a basket and, as I said, whether the Corps is putting that analysis and thinking into a strategic plan for the Corps going forward that may lead to creating different sets of priorities for project based on some of these issues. So, if that is something, certainly getting that analysis—I assume we can get some report on the analysis that is done on an annual basis—that would be helpful, but, then, any additional perspective you can bring on those kinds of trends would be helpful.

Mr. ALEXANDER. Yes, sir, we will.

Mr. SARBANES. Thanks. I yield back.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the gentleman from Missouri, Mr. Long, for 5 minutes. Welcome back, Billy.

Mr. LONG. Thank you, Mr. Chairman.

And, Ms. Hoffman, 10 or so years ago, my hometown of Springfield, Missouri, we received a devastating ice storm where there were folks out of power for 10, 12 days, two weeks, whatever, and the utility companies came in from all over to help us in that situation. I know the recent situation in Florida, from the Washington, DC, area here in Maryland, Virginia, and Springfield, Missouri, again sent crews down to Florida to help in that situation. So, I know what it is like whenever people—neighbors helping neighbors, so to speak.

You note in your testimony that mutual assistance provided by electric companies, public utilities, and electric cooperatives across the country played an important role in restoring power so quickly in Florida. Could you discuss the logistics of bringing in as many as 60,000 workers from across the country to quickly assess and restore, or assess restoration locations, and how this effort is being coordinated by industry?

Ms. HOFFMAN. So, thank you very much for the question. And I think it is an impressive network, and the aggressive posture that the utility industry has had, as well as the lessons learned from Katrina and past events, that the utilities have really taken it upon themselves to have a leadership position in developing a mutual assistance network. This is a network where utilities talk among each other, request mutual assistance, and it is organized to provide mutual assistance to utilities that request it. And this is across the United States. There is different coordination and different entities that are responsible for a mutual assistance request in different areas of the country.

The utilities that provide mutual assistance, they talk about the management structure; they talk about laydown procedures with respect to equipment and equipment necessary. And there is a huge coordination with respect to supplies and the availability of resources.

Mr. LONG. OK. What role do State or Federal emergency operations officials have in monitoring the use of mutual assistance and to ensure that it is applied to the most critical areas?

Ms. HOFFMAN. So, this is real interesting, and I thank you for bringing up the point. What we deal with is, first and foremost, the utilities are in a leadership position, as they should be, for providing response and recovery. The Federal agency and the Federal Government and the Department of Energy, what we do is help understand when is it outside the ability of a utility to be able to manage their response and recovery efforts, and what are the resources that are required, the gaps that are needed in providing support. So, whether it is transportation issues, access issues. And so, that is the activities that the Department of Energy and the Federal Government help with. And that is whether it is hours of service waivers, whether it is weight restriction waivers, whether it is understanding if there is a priority, whether it is a heavy load like a chemical facility or a pharmaceutical or a hospital, what some of those restoration needs are.

Mr. LONG. Speaking of the Federal Government, what does the Federal Government do to remove regulatory roadblocks to recovery and repair efforts, and are there areas that we can improve in those?

Ms. HOFFMAN. So, the efforts that the Federal Government does and looks at are from a waiver point of view. So, looking at access to any sort of damaged area, to making sure that the utilities—I guess where I would go with this answer is I will be very pointed here. It is that utilities nowadays are very much seen as emergency responders. Typically, that has been the health and the safety side of things. But now, as you look at critical infrastructure and as you look at the needs moving forward, telecommunications and electricity are primary for providing an effective restoration process and life and safety. And so, access for utilities in a damaged infrastructure environment, being able to be forward-leaning in getting utility resources there, are absolutely critical as we move forward. And it is going to be more critical as we look at onsite generation and being able to restore power.

Mr. LONG. OK. Thank you.

And will the Department of Energy be working with the States and Territories impacted by these recent hurricanes to assess grid resiliency efforts and identify ways to improve grid resiliency?

Ms. HOFFMAN. Yes.

Mr. LONG. OK. I wish we had time today for an EMP discussion with all of you, but perhaps another day. It seems like our time is taken up today with talking about the Astros all the time.

Mr. Chairman, I yield back.

Ms. HOFFMAN. I look forward to future conversations on that.

Mr. OLSON. The conversation is a problem, my friend, about the Astros? Is that a big problem?

The gentleman yields back.

The Chair now calls upon the gentleman from New York 20, including the State capital of Albany, Mr. Tonko, for 5 minutes.

Mr. TONKO. Thank you, Mr. Chair.

While we hear about restoration working along in some of our States, many of our fellow Americans in Puerto Rico and the United States Virgin Islands remain in the middle of the most serious blackout in United States history. Restoring services is absolutely critical, but we also need to acknowledge the risks of this happening again and the need to support the development of a more resilient grid moving forward.

Over the last decade, extreme weather and fire events have cost the Federal Government well over \$350 billion, according to the Office of Management and Budget. A GAO report last week estimated that these costs will likely rise in the future, due to the effects of climate change. This is not a choice between pay now or pay later. It is a pay now by supporting research, hardening infrastructure, and making meaningful investments to adapt to and mitigate climate change, or pay now in multibillion-dollar emergency spending packages. The fiscally sensible approach is to acknowledge the risk posed by extreme weather and to make the necessary investments that will mitigate it.

We just passed the 5-year anniversary of Superstorm Sandy hitting the Northeast. We have seen a lot of effort in New York to

build a more resilient grid, but the experience of Sandy shows that rebuilding takes time. And it is clear that lessons learned from one disaster can make future response and recovery more effective. We have been learning from Sandy. We are learning from Harvey, from Irma, and from Maria, and the learning will continue until we address some of the preventative measures.

So, Ms. Hoffman, your testimony mentioned that Florida Power & Light has made major investments since 2006 to build a more storm-resilient grid. Similar work has been done in New York State in regard to Sandy. How can a smarter, modernized grid be more resilient?

Ms. HOFFMAN. So, thank you, Congressman, for the question.

A smarter grid allows for advanced communications and controls. It allows for rerouting power. It allows for an accelerated situational awareness.

So, let's first talk situational awareness and the ability to have smart meters and you are able to have better visibility into your system, be able to isolate damage, be able to reroute power. And so, having that ability allows you to be forward-leaning on placement of resources, to have a very effective restoration process, well-planned, well-distributed with respect to priorities and how a restoration process can be done.

With respect to being able to reroute power, you can really look at isolating customers and being able to make sure that you can restore most of, a large number of customers quickly, as well as prevent damage to additional customers unnecessarily.

Mr. TONKO. Thank you.

And, Ms. Walker, can you explain how grid modernization efforts in Texas, advanced meters, and others, aided in a more rapid recovery there?

Ms. WALKER. Yes, sir. Thank you for the question.

The advanced meter systems that we have—we have them through most of the ERCOT region—were very helpful. It notified the utilities of when those customers were out. So, they knew where those customers were located. It also helped, as Ms. Hoffman said, in rerouting and knowing where they needed to send their crews, and being able to reroute electricity to serve people in a more timely fashion. So, we found that it was very helpful to have the advanced meter systems and the new technologies.

Mr. TONKO. Thank you.

And DOE's quadrennial energy review heavily focused on critical infrastructure interdependencies. I am particularly concerned by the harrowing statistics of Puerto Ricans without access to safe drinking water. Water, telecommunications, hospital, and public safety infrastructure are dependent on electricity.

So, Ms. Hoffman, is a more resilient grid system, perhaps one that includes microgrids, distributed generation, and storage, important for supporting rapid response and recovery in regard to and in interaction with these other critical infrastructure needs?

Ms. HOFFMAN. So, thank you, Congressman.

Using a microgrid in a smart fashion around critical infrastructure is absolutely important. As you look at telecommunications, as you look at water and wastewater treatment plants, it is really how do we harden those areas to allow for them to either sustain or be

able to recover quickly. And having generation closer to these critical loads, through the form of a microgrid, is absolutely important. I know that ConEd and areas in New York are also looking at how do they harden their infrastructure.

And I do want to say I appreciate NIPA and their efforts in going down to Puerto Rico as well and supporting the recovery efforts.

Mr. TONKO. Thank you.

Has there been any interaction with EPA and DOE in regard to this interdependency on infrastructure?

Ms. HOFFMAN. Sorry, you said EPA?

Mr. TONKO. Yes. Any efforts with drinking water, DOE, and the infrastructure, the electric utility?

Ms. HOFFMAN. Thank you very much. I understand.

Through the Electric Sector Coordinating Council and through our responsibility as a sector-specific agency, we have had coordination discussions with the telecommunication sectors and some of the other critical infrastructure sectors to think about how do we really move forward from a restoration process, from a hardening process, from an advanced technology process, from a coordination process, and moving forward and strengthening our economy.

Mr. TONKO. Thank you so much.

Mr. Chair, I yield back. And congratulations.

Mr. OLSON. Thank you. The gentleman's time has expired.

The Chair now calls upon the gentleman from Florida, Mr. Bilirakis, for 5 minutes.

Mr. BILIRAKIS. Thank you, Mr. Chairman. Thanks for allowing me to sit on the committee.

And then, also, I want to congratulate you on the Astros' victory. They are a model. They really accomplished quite a bit this year, and I like the way they rebuilt their team.

So, anyway, can I have an extra 2 minutes because of that?

Mr. OLSON. As long as you want to talk like that, you can have 10 minutes.

[Laughter.]

Mr. BILIRAKIS. All right, but I am going to root for another team next year. You know that.

But, in any case, I wanted to talk about—Ms. Walker, if I can ask you a couple of questions? I understand that there is a site prioritization when utilities are being restored and in the midst of a response resources are often spread thin. If there are two hospitals—this is a question—if there are two hospitals in a given area, how do utilities determine which facility is responded to first?

Ms. WALKER. Well, in Texas the hospitals by statute are required to have backup generation. So, they do have that requirement. I am not sure how they are decided which one they respond to first. I know that for CenterPoint Energy during Hurricane Ike that that was the first areas that the company went to, was to the hospitals. So that all of the personnel were trying to restore service to those. So, I am not for sure and I would have to look into how they would decide between two.

Mr. BILIRAKIS. Thank you.

What role do utility companies play in crafting a State's disaster response plan and determining which sites are prioritized?

Ms. WALKER. They have complete power to come up with their plan on how to restore power. The Commission does have levels that we ask them to look at, which are the critical structures such as hospitals. By statute, they also have to respond to nursing homes. We clearly have them respond to refineries and things in the ship channel. So, there is a tier, but the utilities are responsible for setting their own priorities.

Mr. BILIRAKIS. Thank you.

How much flexibility does a utility company have in determining which sites are restored first?

Ms. WALKER. They have a lot in Texas. They do work, and Texas recovery is at the local level, so they do work also with their counties and their cities to make those determinations. But the utilities in Texas have a significant amount of determination on how they restore power.

Mr. BILIRAKIS. Thank you.

The next question to the panel, what challenges still exist for Florida and what are your post-storm recommendations? What DOE resources are available to the communities like mine impacted by Irma? Who would like to be first?

Ms. HOFFMAN. I will start. Florida had a very effective restoration process. They had the arrangements from a mutual assistance point of view. They looked at, and their investments in the infrastructure have helped with, hardening their systems. Their advanced control and metering has advanced their capabilities. At this stage in the game, Florida really looked at their codes and standards from a perspective of a Category 3 hurricane. As we are looking at Category 4 hurricanes and additional hurricanes, I think now it comes down to, what are some of the additional new capabilities to mitigate a Category 4 and higher-level hurricanes that they are going to have to consider?

I think from a fuel distribution point of view, that was the one area of looking at distributing fuel. Gasoline was a challenge in Florida, but I think it was also partly that the necessary evacuation that occurred had a run-on on gasoline stations. And so, it looks at, they did advance by having generation hookup. So, from an electrical point of view, they advanced capabilities there. But if I had one area, it is probably look at the distribution network with respect to gasoline.

Mr. BILIRAKIS. The fuel issue, yes, definitely. We were very fortunate in the Tampa Bay area, I think as you know, to dodge the Category 3 or 4, but God forbid we have one.

So, anyone else want to comment? I don't have much time. I know I asked for an additional couple, but I was just kidding. But does anyone else want to comment on that? Any suggestions?

[No response.]

That is great input. I really appreciate that.

Thank you very much, Mr. Chairman. I yield back.

Mr. OLSON. The gentleman is always welcome here. He yields back.

The Chair now calls upon the man who is working very hard for a bipartisan agreement to allow me to wear this jersey on the House floor later today, Gene Green from Houston, Texas, 5 minutes.

[Laughter.]

Mr. GREEN. I thank my colleague and neighbor for yielding to me.

For our colleague from Florida, I know there were some problems with gasoline supplies there, and maybe you can tell me, does Florida import all your gasoline and diesel? I didn't know if you had any refineries in Florida. OK. Well, that is OK because we want to keep selling you the stuff we produce in Texas and Louisiana.

But, anyway, being a native Houstonian and going through lots of storms and hurricanes over the years, Harvey was probably the toughest, even compared to Hurricane Carla who hit us in 1960, 1961. But every 8 years we have a tropical storm or a hurricane. In 2008, we had Hurricane Ike, which damaged our infrastructure because it was a wind storm, the storm surge, but the wind. By the time Harvey got to Harris County, it was mostly rain. And our biggest problem was typically so much rain that it overflowed a lot of our sanitary sewer systems in the west side of Houston, and even Houston facilities and our smaller cities and how that did.

But, somewhere along the way when we have these thousand-year storms that are happening so often, and the average rainfall in Houston is 49 inches a year and you get 52 inches in five days, I don't know how we can deal with it. We just have to dig more reservoirs, spend more money to contain that water, because water is a precious commodity and we need to do it, instead of letting it go into the Gulf of Mexico.

This is the first storm that I have had where I have had fatalities in our district. We lost eight people in our district. Two of them were breadwinners in their family, because they thought they could go through this high water in an underpass.

But the sad one was that we lost a family of six in our district on Greens Bayou, northeast Houston. The bayou, we have been working on it for decades to build detention ponds upstream, but the family turned off into the bayou, literally, because they thought it was the road. And it was widely publicized the family was missing, but we didn't find them until after the water went down down in Greens Bayou, northeast Harris County.

But, as far as for the utilities, we didn't have that big a problem. But, as we are sitting here, we will get another hurricane or a tropical storm. And so, that is what I am concerned about.

It is important we try to learn from these lessons of these storms. We are in the middle now of building back houses, shops, and communities, but we know we have to do better on the flood infrastructure, both working with the Corps of Engineers and in Harris County. We have a Harris County Flood Control District. We tax ourselves to keep from flooding in Harris County, so we can partner with the Corps. But it is essential that we fund the Corps of Engineers, FEMA, and other related agencies in our next supplemental.

I am concerned about Puerto Rico because their electric grid was in pretty bad shape even before. And some of us were talking on the Energy Subcommittee a week ago about this may give us the opportunity for the United States to actually provide an electric system in Puerto Rico, because I understand they are still burning fuel oil.

Again, coming from Texas, we can put all the windmills up and all the solar, which you can't get wind and solar. We would be glad to have an LNG export/import facility there, because, one, it would be much cleaner than fuel oil. It would probably be cheaper, too, because the price of natural gas is relatively cheap.

I would just like to ask—like I said, I have driven around Puerto Rico, but I don't live there and I don't represent it, but I know they need help in getting literally the whole grid back up. Is that something that we could look at through the Department of Energy to see if we could redo the grid in Puerto Rico to where it would be brought up to what we would consider standards?

Ms. HOFFMAN. I think it is an opportunity to look at all technologies and different solutions for investment in Puerto Rico, and looking at how we can harden the system. But everything should be on the table of what advancements can be done with respect to their energy infrastructure. Forty-seven percent of Puerto Rico electricity comes from petroleum, 34 percent from natural gas, 17 percent from coal, and 2 percent of renewable energy. And so, there is a lot of opportunities to think about the generation mix as well as the location of generation, and the use of the transmission and distribution system, as well as demand/response and customer engagement.

Mr. GREEN. Yes. Well, I know in Texas we have had success with the wind power, not only in west Texas, but south Texas, and it gives us that type of opportunity to have a different fuel supply, although it is hard today to heat with low-price natural gas. That is why some of our coal plants are problems.

Ms. Walker, in your testimony you said that the PUCT's initial assessment of the Texas utilities is that they did an outstanding job of responding to the storm. And I know over the years we have had partnerships with other States and other communities, that we will send our utility workers up there when they have a problem. When there are ice storms in Dallas, we will take care of that. But I don't remember seeing that much in the Houston or southeast Texas area.

Ms. WALKER. Mutual assistance?

Mr. GREEN. Yes.

Ms. WALKER. There probably wasn't that much because the damage was very different and the cause of the outages was very different. Usually, the mutual assistance comes in to repair wind damage, the poles going own, the wires going down. Houston and Beaumont was flooding. And so, most of that was due to the substations being out. And so, once we were able to get these mobile substations in or the waters recede and get those substations back up and running, we were able to restore the customers.

The outages in those areas really weren't very long-lasting. They were more like a thunderstorm. And Houston and CenterPoint Energy and Entergy were continually restoring customers. And so, their numbers were very low on an ongoing basis, although they ultimately restored a lot of people.

Mr. GREEN. And that is why it worries me, because here in Puerto Rico I think they are still only about 30 percent of the power that has been restored. So, it is really a case that we need to work on.

So, thank you, Mr. Chairman. I yield back.

Mr. OLSON. The gentleman's time has expired.

Seeing no members seeking to ask questions, the Chair wants to thank our five witnesses. Thank you, thank you, thank you for coming here today.

I remind our witnesses that every member can submit questions for the record for 10 days. Once you get that, you have 10 days to respond.

Mr. RUSH. Mr. Chairman, I request, I would like to make a statement.

Mr. OLSON. Yes, sir, you have a minute, Bobby.

Mr. RUSH. A minute? Thank you, Mr. Chairman.

Mr. Chairman, I must say, with all due respect, as we conclude this panel and are getting ready and prepare to introduce the next panel, with all due respect, Mr. Chairman, I simply smell a rat here. I really smell a rat.

PREPA's lack of response to this subcommittee's efforts to invite them to attend and provide witness testimony to this subcommittee is most disgusting and extremely disrespectful. Mr. Chairman, that said, I strongly request that we use our subpoena authority to demand that PREPA come to this subcommittee and disclose to Members of Congress who are members of the subcommittee what were the facts involved in its awarding this \$300 million contract, which I call the sweetest of sweetheart deals, to repair and reconstruct Puerto Rico's electrical infrastructure.

And I also believe, Mr. Chairman, that as has been stated by Members of both sides during this panel, that FEMA should also be invited to be at the same witness table. Mr. Chairman, we ought to get to the bottom of this, and we have got to know what happened, when did it happen, and who is responsible for this absurd sweetheart deal that is going to result in numerous people paying an extraordinary additional amount of millions of dollars because of the delay in the withdrawal of this contract.

So, I really request that we use our subpoena authority to make sure that PREPA stop disrespecting the United States Congress.

Thank you. I yield back.

Mr. OLSON. And, my friend, I share your concerns. It sounds kind of odd, what happened there, but I will talk to the chair for the subcommittee, Mr. Upton, and the full committee, Mr. Walden, about the subpoena issue.

But, right now, a point of personal privilege before the first panel leaves, and this is maybe at the risk of offending Ms. Castor. But, Commissioner Walker, I hope you are going to SMU Saturday, joining my daughter and my wife to watch SMU beat the tar out of Central Florida.

[Laughter.]

The panel is dismissed.

OK. Second panel, are you all ready? And just like before, we will start out with opening statements from all of the panelists, followed by questions from members.

And I recognize Thomas Fanning. Tom is the President and CEO of Southern Company. He is here on behalf of the Electricity Sub-sector Coordinating Council.

Tom, you have 5 minutes for an opening statement.

STATEMENTS OF THOMAS A. FANNING, PRESIDENT AND CHIEF EXECUTIVE OFFICER, SOUTHERN COMPANY, ON BEHALF OF THE ELECTRICITY SUBSECTOR COORDINATING COUNCIL; JULIO A. RHYMER, SR., EXECUTIVE DIRECTOR AND CHIEF EXECUTIVE OFFICER, VIRGIN ISLANDS WATER & POWER AUTHORITY; CHET THOMPSON, PRESIDENT AND CHIEF EXECUTIVE OFFICER, AMERICAN FUEL & PETRO-CHEMICAL MANUFACTURERS; MAX E. MCBRAYER, JR., CHIEF SUPPLY OFFICER AND CHIEF FINANCIAL OFFICER, RACETRAC PETROLEUM, INC., ON BEHALF OF THE NATIONAL ASSOCIATION OF CONVENIENCE STORES AND THE SOCIETY OF INDEPENDENT GASOLINE MARKETERS OF AMERICA; RAMON-LUIS NIEVES, ATTORNEY AT LAW, FORMER MEMBER, SENATE OF PUERTO RICO; AND CATHERINE B. KENNEDY, VICE PRESIDENT, NATIONAL NURSES UNITED

STATEMENT OF THOMAS A. FANNING

Mr. FANNING. Thank you. Thank you for inviting me to testify today.

My name is Tom Fanning. I am the chairman, president, and CEO of Southern Company. I am also the immediate past chairman of the Edison Electric Institute, the association that represents all U.S. investor-owned electric companies. However, I am addressing you today in my role as one of three co-chairs of the Electricity Subsector Coordinating Council. We collaborate closely with our colleagues from public power utilities and rural electric cooperatives on the ESCC.

I am pleased to address the subcommittee and to share the steps the electric power industry is taking to make energy infrastructure smarter and more resilient, allowing us to continue delivering affordable and reliable power.

The 2017 hurricane season highlights the critical importance of cooperation and coordination among electric utility companies, the Government, and other key infrastructure industries to ensure fast, efficient recovery for customers.

The electric sector faces constantly-evolving threats to the energy grid. The industry's risk mitigation strategy emphasizes a defense-in-depth approach. We focus on preparation, prevention, response, and recovery, with an emphasis on the isolation of and enhanced protections for critical assets.

While this hearing is focused on storm response and recovery, it is important to note that our companies do not build the energy grid or our security responses to meet only one type of threat. We must prepare and plan for them all, whether manmade or natural, malicious or unintentional, relating to the cyber or physical security, or a combination of threats.

Weather is an unavoidable part of our business. In the aftermath of such events, the industry works to identify gaps, compile lessons learned, and disseminate best practices. As an industry, we strive to be better today than we were yesterday and to be better tomorrow than we are today.

Since Superstorm Sandy 5 years ago this week, the electric power industry has combined efforts across all segments of the in-

dustry and has worked with the Government partners to streamline restoration efforts and to improve preparation for and response to major threats that cause significant outages.

The benefits of this coordination were visible over the past several months as the industry and Federal Government worked to prepare for and respond to the hurricanes. There is an understandable urge to compare storms, but the reality is that each storm is different. The common threads, however, are the need for resilient infrastructure, a plan for response and recovery, and the awesome nature of our industry's ability to respond to emergencies.

Before I close, I would like to underscore the importance of the ESCC. During the most recent storms, the ESCC held daily coordination calls among impacted companies and Government officials to address critical operational issues such as identifying specialized equipment needs, removing temporary flight restrictions for both manned and unmanned aircraft to assist with aerial damage assessments, coordinating how industry could re-enter and access disaster areas, and coordinating response efforts with the oil and natural gas, telecommunications, transportation, and water and wastewater sectors.

Energy Secretary Rick Perry was on every call and was frequently joined by other officials such as Homeland Security Acting Secretary Elaine Duke. These calls were essential to identify and address critical issues in the response and recovery efforts.

The reliability and resiliency of the energy grid are of paramount importance. Our customers expect the lights to go on when they flip a switch. When the power goes out, our customers expect that it will be on soon.

The electric power sector will continue to strive to meet those expectations through a multilayered strategy, to invest in smart energy infrastructure, continuous enhancement of our industry/Government partnership, and the grit of the amazing men and women who make the energy grid work day-in and day-out.

The subcommittee is showing great leadership with its focus on preparedness, and we look forward to working with you on this critical topic.

Thank you again for the opportunity to testify on behalf of the ESCC, and I look forward to your questions.

[The prepared statement of Mr. Fanning follows:]

**The 2017 Hurricane Season:
A Review of Emergency Response and Energy Infrastructure Recovery Efforts**

**Thomas A. Fanning
Chairman, President, and Chief Executive Officer
Southern Company
Testifying on behalf of the
Electricity Subsector Coordinating Council**

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The electric sector faces constantly evolving threats to the energy grid. The industry's risk mitigation strategy emphasizes a "defense-in-depth" approach. We focus on preparation, prevention, response, and recovery, with an emphasis on isolation of, and enhanced protections for, critical assets. While this hearing is focused on storm response and recovery, it is important to note that our companies do not build the energy grid or our security responses to meet only one type of threat. We must prepare and plan for them all, whether manmade or natural, malicious or unintentional, relating to cyber or physical security, or a combination of threats.

Weather is an unavoidable part of our business. In the aftermath of events, the industry works to identify gaps, compile lessons learned, and disseminate best practices. As an industry, we strive to be better today than we were yesterday, and to be better tomorrow than we are today.

Since Superstorm Sandy five years ago this week, the electric power industry has combined efforts across all segments of the industry and has worked with government partners to streamline restoration efforts and to improve preparation for and response to major events that cause significant outages. The benefits of this coordination were visible over the past several months, as the industry and federal government worked to prepare for and respond to the hurricanes.

Congressional Testimony

The 2017 Hurricane Season:
A Review of Emergency Response and Energy Infrastructure Recovery Efforts

Thomas A. Fanning
Chairman, President, and Chief Executive Officer,
Southern Company

Testifying on behalf of the
Electricity Subsector Coordinating Council

Testimony before the
Subcommittee on Energy
Committee on Energy and Commerce
United States House of Representatives

November 2, 2017

Chairman Upton, Ranking Member Rush, and Members of the Subcommittee, thank you for inviting me to testify today. My name is Tom Fanning, and I am the chairman, president, and chief executive officer of Southern Company, but I'm appearing before you today in my role as a co-chair of the Electricity Subsector Coordinating Council (ESCC).

I also am the immediate past Chairman of the Edison Electric Institute (EEI). EEI is the association that represents all U.S. investor-owned electric companies. EEI's member companies provide electricity for 220 million Americans and operate in all 50 states and the District of Columbia.

The electric power industry—which includes EEI's members and the members of the American Public Power Association (APPA) and the National Rural Electric Cooperative Association (NRECA)—supports more than 7 million American jobs and contributes \$880 billion annually to U.S. gross domestic product, about 5 percent of the total. APPA, EEI, and NRECA also come together to chair the ESCC. I serve as one of three co-chairs of the ESCC; my fellow co-chairs are Duane Highley, President and CEO for Arkansas Electric Cooperative Corp. and Arkansas Electric Cooperatives, Inc., and Kevin Wailes, CEO of Lincoln Electric System in Nebraska.

The ESCC serves as the principal liaison between the electric sector and the federal government for coordinating efforts to prepare for, and respond to cybersecurity threats, physical terrorism, and natural disasters that imperil critical infrastructure. The ESCC includes electric company CEOs and trade association leaders representing all segments of the industry. Their counterparts include senior Administration officials from the White House, relevant Cabinet agencies, federal

law enforcement, and national security organizations. The ESCC is where these senior leaders from industry and government come together to set strategy and priorities on the security, resiliency, and responsiveness of the industry and, by extension, the nation.

I am pleased to address the Subcommittee today to share what steps the electric power industry is taking to make energy infrastructure stronger, smarter, and more resilient to continue delivering the safe, affordable, secure and reliable power that Americans count on.

The electric sector faces constantly evolving threats to the energy grid. The industry's risk mitigation strategy emphasizes a "defense-in-depth" approach that focuses on preparation, prevention, response, and recovery, with an emphasis on isolation of, and enhanced protections for critical assets. While this hearing is focused on storm response and recovery, it is important to note that our companies do not build the energy grid or our security responses to meet only one type of threat. Whether manmade or natural, malicious or unintentional, relating to cyber or physical security, or a combination of threats, we must prepare and plan for them all.

This hearing comes in response to a series of devastating events. In August, Hurricane Harvey's high winds, torrential rains, and storm surge caused significant damage and catastrophic flooding in parts of Texas and Louisiana. Days later, Hurricane Irma devastated parts of the Caribbean, including the U.S. Virgin Islands and portions of Puerto Rico, and brought unprecedented damage to the southeastern United States. Every county in Florida was impacted by the storm, as well as parts of Alabama, Georgia, North Carolina, and South Carolina.

Following Irma, Hurricane Maria developed in the Atlantic Ocean as one of the strongest hurricanes on record. After impacting the U.S. Virgin Islands, Maria passed directly over Puerto Rico, knocking out power to the entire commonwealth. The work to restore power in Puerto Rico and in the Virgin Islands continues. Most tragically, each of these events resulted in the loss of life.

Weather is an unavoidable part of our business. In the aftermath of events, the industry works to identify gaps, compile lessons learned, and disseminate best practices. We have learned from these storms and from previous storms. As an industry, we strive to be better today than we were yesterday, and better tomorrow than we are today. Since Superstorm Sandy five years ago, the electric power industry has combined efforts across all segments of the industry and worked with government partners to streamline restoration efforts and to improve preparation for and response to major events that cause significant outages. The benefits of this coordination were visible over the past several months, as the industry and federal government worked to prepare for and respond to the hurricanes.

There is an understandable urge to compare storms, but the reality is that each storm is different. One common thread, however, is the need for a resilient infrastructure and a plan for response and recovery. Electric companies across the sector are making investments to harden the energy grid. As an industry, we plan and regularly exercise for a variety of emergency situations, including natural disasters that could impact our ability to provide electricity. In two weeks, thousands of participants from industry and government will participate in a biennial industry-wide grid security and incident response exercise known as GridEx; this iteration is GridEx IV.

As with the previous exercises, it will result in a report that identifies gaps and recommendations for industry and government. It will be another tool to strengthen our coordination and preparation.

Indeed, each storm is different. However, each of the recent storms is instructive to the benefits of investments in resiliency, the need to prepare, and the awesome nature of our industry's ability to respond to emergencies.

Harvey

Harvey, a Category 4 hurricane, was the first major hurricane to make landfall in the United States since Hurricane Wilma in 2005. The storm brought historic flooding to southeastern Texas, including nearly 52 inches of rain in some locations and strong winds in places not impacted by flooding. The daily peak outages during Harvey were around 350,000 customers. However, an estimated 1.4 million restorations occurred throughout Texas and Louisiana, due to flooding and the slow-moving nature of the storm that required multiple repairs. More than 10,000 electric power industry workers from at least 21 states mobilized to restore power to customers impacted by Harvey.

Irma

Irma, a Category 4 hurricane when it made landfall in Florida, was the most intense storm to hit the United States since Hurricane Katrina. More than 7.8 million customers were impacted in Florida, Georgia, Alabama, South Carolina, and North Carolina at the peak on September 11, 2017. More than 60,000 workers were involved in the restoration, coming from more than 250

electric companies across the United States and Canada. This was one of the largest power restoration efforts in U.S. history. That effort resulted in 95 percent of customers being restored within one week. The speed of the recovery was noted by the U.S. Energy Information Administration:

“About 15% of customers were without power at noon on September 10, and power outages peaked at 3:00 p.m. on September 11, affecting 64% of customers. In contrast, Hurricane Wilma moved quickly across the southern part of the state, knocking out power to 36% of customers in Florida. Although the percentage of Florida customers without power during Irma was significantly higher than during Wilma, the rate of electric service restoration has been more rapid. Five days after Irma’s landfall, the share of customers without power had fallen from a peak of 64% down to 18% (a recovery rate of about 9% of customers per day). Power outages during Wilma declined from 36% of customers to 16% by the fifth day after landfall (an average recovery rate of about 4% of customers per day). . . . Since 2005, Florida Power & Light and other utilities in the state have made significant investments to improve their hurricane preparedness. These utilities have upgraded electric infrastructure, including replacing wooden utility poles with concrete poles. Utilities have also deployed smart grid technologies, which provide more timely and more accurate information about outages and can help utilities better target restoration efforts.”¹

¹ <https://www.eia.gov/todayinenergy/detail.php?id=32992>

Maria

Maria was the second Category 5 storm of the 2017 season and caused widespread destruction to all infrastructure on Puerto Rico and the U.S. Virgin Islands, including the energy grid. Power restoration has been, and will continue to be, a challenging and complicated effort. The entire electric power industry continues to closely coordinate with its federal government partners to support these efforts. Unlike Hurricanes Harvey and Irma, mutual assistance has yet to be triggered in response to Maria. Mainland electric companies are ready to support the restoration and rebuild of Puerto Rico's infrastructure and provide any expertise, resources, crews, or materials needed to turn the lights on for our fellow Americans.

Nate

Nate made landfall on October 7 in southeast Louisiana and Mississippi as a Category 1 hurricane with winds of 85 mph. I mention Nate because it was notable for not causing widespread outages. Some may think that the region "dodged a bullet" because of the relatively minimal damage and impacts, with about 100,000 customers losing service during the storm. However, the quick response and recovery are in fact evidence that investments in resilient infrastructure and preparation pay off.

Prepare, Respond, Recover – The Role of the ESCC

Hurricanes like Harvey, Irma, Maria, and Nate draw attention to the critical importance of cooperation and coordination among electric companies, the government, and other key infrastructure industries to ensure fast, efficient recovery for customers.

Following Superstorm Sandy in 2012, the industry and government worked together to streamline restoration efforts and to improve how the sector prepares and responds to major events that cause significant outages. In October 2010, the National Infrastructure Advisory Council (NIAC) issued a report, “A Framework for Establishing Critical Infrastructure Resilience Goals,” that included nine recommendations. The first recommendation was for the White House to “initiate an executive-level dialogue with electric and nuclear sector CEOs on the respective roles and responsibilities of the private sector in addressing high-impact infrastructure risks and potential threats...” That recommendation eventually led to the creation of the ESCC.

The ESCC is comprised of the CEOs of 21 electric companies and nine major industry trade associations. It includes all segments of the electric power industry, representing the full scope of electricity generation, transmission, and distribution in the United States and Canada. Each year, the ESCC convenes three coordination meetings with senior government officials to identify emerging security issues and to develop approaches to mitigate risk, including cyber and physical security. However, the ESCC is much more engaged than three formal meetings a year with the government. Those “blue sky” meetings help prepare the industry and government for response efforts. In between, there’s constant work together leveraging industry and government executives and subject matter experts to develop numerous initiatives with the goal of improving the industry’s preparedness and resilience. During incidents, the ESCC helps to coordinate efforts across industry and government in response to all hazards.

Over the past several years, this partnership has resulted in a number of important changes in how both government and industry work together to protect critical infrastructure. One outgrowth from the creation of this group is the ESCC Playbook – a framework for senior industry and government executives to coordinate response and recovery efforts and communications to the American public. The playbook has been tested in a series of exercises and informs our response and recovery efforts today.

Exercising the playbook means that the industry and our government partners can fix problems in real time during disasters. During the most recent storms, the ESCC held daily coordination calls among impacted companies and government officials to address critical operational issues such as identifying specialized equipment needs; removing temporary flight restrictions for both manned and unmanned aircraft to assist with aerial damage assessments; coordinating how industry could re-enter and access disaster areas; and coordinating response efforts with the oil and natural gas, telecommunications, transportation, and water and wastewater sectors.

Department of Energy Secretary Rick Perry was on every call and was joined frequently by other officials such as Department of Homeland Security Acting Secretary Elaine Duke. These calls were essential to identifying and addressing critical issues in the response and recovery efforts.

Conclusions

The reliability and resiliency of the grid are of paramount importance. Our customers expect the lights to go on when they flip a switch. When power goes out, our customers expect that it will be on soon. The electric power sector will continue to strive to meet those expectations through a multi-layered strategy to invest in smarter energy infrastructure, continuous enhancement of our

industry-government partnership, and the grit of the amazing men and women who make the energy grid work day in and out.

The Subcommittee is showing great leadership with its focus on preparedness, and we look forward to working with you on this critical topic. Thank you again for the opportunity to testify on behalf of the ESCC, and I look forward to your questions.

Mr. OLSON. Thank you, Mr. Fanning.

And now, the Chair is glad to call upon Mr. Julio Rhymer, the Executive Director of the Virgin Islands Water & Power Authority, that suffered devastation from two hurricanes, Irma and Maria. A 5-minute opening statement, Mr. Rhymer. Thank you.

STATEMENT OF JULIO A. RHYMER, SR.

Mr. RHYMER. Good evening, Mr. Chair, other honorable members of the Subcommittee on Energy.

My name is Julio A. Rhymer, Sr. I am an Executive Director and Chief Executive Officer of the Virgin Islands Water & Power Authority.

On behalf of the Governor of the Virgin Islands, the honorable Kenneth E. Mapp; the Virgin Island Delegate to Congress, Honorable Stacy Plaskett; the members of the 32nd Legislature of the Virgin Islands, and the Governing Board of WAPA, I thank you for the invitation to provide testimony on the energy challenges facing the U.S. Virgin Islands as a result of the passage of Hurricanes Irma and Maria.

As you all are aware, in September of 2017, the Virgin Islands faced the phenomenon of two back-to-back Category 5 hurricanes within two weeks. According to the Saffir-Simpson Wind Scale, a Category 5 hurricane has sustained winds of greater than 157 miles per hour. There were cases in Hurricane Irma that winds were sustained at above 190 miles an hour.

WAPA's transmission and distribution facilities were, plain and simple, destroyed by the catastrophic winds of two hurricanes. Due to Hurricane Irma's impact on September 6th, 2017, the St. Thomas, St. John, Water Island, and Hassel Island electrical transmission distribution system suffered significant damage. The St. Thomas system sustained damages of approximately 80 percent; St. John, approximately 90 percent; Water Island, 90 percent, and Hassel Island, 90 percent.

Approximately two weeks later, on Tuesday, September 19th, 2017, Hurricane Maria caused damage to almost 60 percent of the transmission and distribution system on St. Croix. The islands of St. Thomas, St. John, Water Island, and Hassel Island did not receive any significant damage from a result of Hurricane Maria.

To date, the Authority has approximately 536 linemen and other related off-island personnel in the Territory, restoring WAPA's electrical infrastructure. With the assistance of FEMA, naval vessels and cruise ships have been brought in to provide sleeping quarters for the off-island crews, since many hotels and guesthouses throughout the Territory remain closed after sustaining major damages during these two hurricanes.

By far, the biggest challenge that I would like to focus on today is funding the day-to-day operations and hardening of the system in the event of future storms. Without question, these hurricanes have decimated WAPA's finances. While we appreciate the assistance that has been, and will be, forthcoming to rebuild the systems that were damaged, one of our primary concerns as the Authority is the ability to meet prestorm expenses. Prior to hurricanes, the Authority's revenues were approximately \$25.6 million per month. Since the hurricanes events, and since we are unable to provide

electrical service and bill customers, revenues have dropped below \$2 million per month.

WAPA has reoccurring expenses such as payroll, insurance, plant operation and maintenance, debt service, and previously-executed contracts, and financing agreements it must pay. To address this dramatic shortfall, the Authority has sought, through the government of the Virgin Islands, a community disaster loan. Any support or assistance that you can offer in this regard is appreciated.

One of the evident takeaways from the two Category 5 hurricanes, and significant damages to this regional system Territorywide, is that there is an urgent need for WAPA to rebuild its transmission and distribution systems, but to harden it to a point where it is resilient to wind storms. WAPA believes it would significantly reduce its post-storm hurricane period by undergoing more of its critical infrastructure and by moving away from wooden poles and introducing composite poles on the major distribution circuits.

WAPA must also address its grid, since it is too susceptible to damage from wind storms. WAPA had a proposed plan to construct a series of microgrids on each island. Each microgrid would be a localized group of electrical facilities that would either work in tandem with the generating facilities or an option for disconnection where they can stand alone. In the event the power and the main grid is interrupted for any reason, the microgrid would function as a small facility generating its own power at this point.

Currently, you have in the works a microgrid on the island of St. Croix that is actually going to go out for bid, and that will provide, basically, power through solar and battery storage to our airport facilities, a waste treatment facility, a correctional facility, and, basically, a police station at this point. What we are actually attempting to do here, as a utility moving forward, is to harden our system, No. 1, and, basically, make it more resilient by having microgrids.

I would like to thank you for the opportunity to appear before the Subcommittee on Energy. I am available to answer any question that you may have on this matter.

[The prepared statement of Mr. Rhymer follows:]



JULIO A. RHYMER, SR.
EXECUTIVE DIRECTOR/CEO
VIRGIN ISLANDS WATER and POWER AUTHORITY

**STATEMENT BEFORE THE
COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENERGY
UNITED STATES CONGRESS**

HEARING ON

*The 2017 Hurricane Season: A Review of Emergency Response & Energy
Infrastructure Recovery Efforts
As a result of the Recent Hurricanes*

NOVEMBER 2, 2017

Good day Chairman Upton, Ranking Member Rush, and other Honorable members of the Subcommittee on Energy. My name is Julio A. Rhymer, Sr. I am the Executive Director/Chief Executive Officer of the Virgin Islands Water and Power Authority ("V.I. WAPA," "WAPA," or the "Authority"). On behalf of the Governor of the Virgin Islands, the Honorable Kenneth E. Mapp, the Virgin Islands Delegate to Congress, the Honorable Stacey Plaskett, the members of the 32nd Legislature of the Virgin Islands, and the Governing Board of the WAPA, I thank you for the invitation to provide testimony on the energy challenges facing the Virgin Islands as a result of the passage of Hurricanes Irma and Maria on September 6, 2017 and September 19, 2017, respectively.

SECTION 1. INTRODUCTION

Hurricanes are not an unusual occurrence in the Caribbean where the Atlantic Hurricane Season runs from June 1st to November 30th, with the peak period from early August through the

end of October. Based on historical weather records dating back to the 1950s, the Atlantic region typically experiences 12 tropical storms with sustained winds of 39 mph, of which six turn into hurricanes, with winds reaching 74 mph or greater, and three develop into major hurricanes, Category 3 or higher, with sustained winds of at least 111 mph. It is important to note that most of these hurricanes do not make landfall in the U.S. Virgin Islands, and that a hurricane passes near the U.S. Virgin Islands, on average, every three years, and makes a direct hit on the islands, on average, every eight years.

As all of you are aware, in September of 2017, the Virgin Islands faced the phenomenon of two back to back category five hurricanes. According to the Saffir-Simpson Wind Scale that is used by the National Hurricane Center to classify hurricanes based on wind speed, a Category Five hurricane has sustained winds greater than 156 mph.

SECTION 2 – OVERVIEW OF THE HOW THE AUTHORITY OPERATES

Before I tell you about the devastating impact the hurricanes have had on the utility, allow me to provide you a brief overview of how electrical service is provided to the businesses and resident of our community. Like most other Caribbean islands, the USVI has no conventional energy resources to meet its power needs. While U.S. mainland utilities can connect to grids to purchase power from other utilities in the continental United States, island utilities such as V.I. WAPA are small, isolated and do not benefit from being interconnected to a grid comprised of other utilities. The separation of the islands by water, coupled by the depth of the ocean floor also makes interconnection via submarine cables both technically and financially prohibitive. To maximize the benefit of market conditions, island utilities have historically purchased small simple-cycle, oil-fueled, generating units. From the 1980s to approximately

September of 2003, the inflation-adjusted price of a barrel of crude oil on the NYMEX was generally under \$25/barrel. The attraction of such low-cost fuel, combined with the economies of scale, provided the framework for island utilities, like WAPA, to purchase these oil powered units.

As a result of the Virgin Islands being comprised of several small islands separated by water, duplicate generation systems and increased reserves are required to meet the demand for electrical services. V.I. WAPA, for example, has two independent generation systems. One system, located on St. Thomas, serves the islands of St. Thomas, St. John, Water Island, and Hassel Island, and the other is located on St. Croix. Our two power plants sit more than 40 miles apart and are not interconnected due to the depth of the ocean floor.

In recent years, WAPA has met some success in the diversification of 100% reliance on fossil fuel. We have implemented up 15 MW of Net Metering, and through public/private partnerships we have added approximately 8.2 MW of solar power to our electric grid. Through these initiatives, WAPA now has the capability to derive up to 20% of its generation capacity from renewables.

In yet another effort to reduce our reliance on fuel oil, WAPA partnered with VITOL Group, a multi-national energy and commodity trading company, to construct and operate Liquefied Petroleum Gas (LPG) terminals, supply LPG and manage the conversion of WAPA's gas units. Several of WAPA's generators are now tri-fuel capable, and can be fueled by oil, LPG, or natural gas.

In March of this year, WAPA contracted with Wartsila North America, to provide the first new generation for the Authority's operation in over a decade. The three new generators, at 7 MW each, will burn LPG to produce electrical power. The units were expected on island by the end of this year, with completion in the first quarter of 2018; however, due to the hurricanes, there will be a slight delay. The move to smaller units emerged from an Integrated Resource Plan developed for WAPA to provide a roadmap for future generation needs. The grant, for \$500,000, was funded by the Department of Interior.

Utilizing FEMA hazard litigation grants, limited portions of the utility's electric power transmission and distribution ("T&D") systems have been placed underground. Critical infrastructure such as the territory's hospitals, airports, and approximately 75% of the main business districts are underground. After Hurricanes Irma and Maria, those facilities were among the first to be restored. The remainder of the T&D system is comprised largely of aerial circuits suspended by wooden poles. While this has been the lowest cost method of developing a T&D system, it is also the most vulnerable in windstorms.

SECTION 3: IMPACT OF THE STORMS

While our power generating plants in Estate Richmond on St. Croix and Krum Bay on St. Thomas suffered minimal impact from the hurricanes, the transmission and distribution systems did not fare as well. Damage to the systems was estimated at 80% on St. Thomas and more than 90% on St. John, with Water Island and Hassel Island each suffering approximately 90% destruction. Following the passage of Hurricane Irma on September 6, WAPA, utilizing its own line department personnel along with on-island contractors, engaged a Territory-wide reconstruction and restoration effort. Two weeks later, on September 19, Hurricane Maria left

about 60% damage to St. Croix's T&D system, while the remainder of the Virgin Islands did not receive any further damage.

In our ongoing recovery efforts following the hurricanes, WAPA continues to address the five (5) critical areas necessary to rebuild our electrical system. These are: equipment, materials and supplies, funding for operations, emergency restoration crews and housing for crews. There are presently in excess of 520 off-island linemen in the Virgin Islands restoring our T&D systems, beginning with the primary circuits. Their work will end when every residential area of our territory has been energized. These crews, which typically consist of six individuals, are being provided primarily by Haugland Energy Group, LLC, BBC Electrical Services, and utilities from the North East Public Power Association. With the assistance of FEMA, a contracted cruise ship have been brought into the territory to provide sleeping quarters for off-island personnel, since many hotels and guest houses throughout the territory closed after sustaining major damages to their infrastructure during the two hurricanes.

Bringing vehicles, materials, and equipment has also been a challenge. Because of our unique geographical location, surrounded by water, V.I. WAPA cannot truck materials and supplies to the islands, and air travel cannot readily supply the large quantities of these items needed. Almost all needed vehicles, equipment, and supplies that cannot be sourced on-island are shipped in via cargo shipping, which, as you can imagine, competes for space with all other government agencies, businesses, and individuals that are shipping cargo with relief materials to the Virgin Islands. In terms of materials, large quantities of poles, conductors, insulators, single-phase and three-phase transformers are being ordered to build and repair overhead sub-transmission (35 kV) circuits, build and repair three-phase main distribution feeder lines (15kV

and 25kV) along the Authority's feeder routes, build and repair three-phase and single-phase laterals along existing distribution routes, install and replace pole-mounted distribution transformers up to 75 kVA on 15kV and 25 kV distribution systems, and install and repair secondary conductors to customer service drop locations. The current focus is on restoring overhead transmission feeders and main distribution feeder trunks.

To restore the transmission and distribution system, the Authority will require additional equipment, including pole trucks, bucket trucks, and digger derricks, along with other vehicles such as trucks and sport utility vehicles. The purpose of the pole trucks in the current restoration is to transport poles to the specific sites for replacement. Pole trucks will be deployed with each crew in order to assist with the restoration process. Bucket trucks will be used to string lines, dress poles, and service lines to customer locations. These are essential pieces of equipment for the entire restoration. Digger derricks will be used to dig holes for the new poles to be planted. The additional vehicles such as pick-up trucks and sport utility vehicles will be used to transport crews, support personnel, and additional supplies not housed on the other pieces of equipment. These vehicles will also be used to survey and assess damages for all sectors of the transmission and distribution system.

By far, the biggest challenges, and the ones I would like to focus on today, are the funding for day-to-day operations, as well as hardening of the system in the event of future storms. The hurricanes, it goes without saying, have decimated the finances of WAPA. It is a significant hardship for the utility to operate and pay for day to day expenses, much less these extraordinary expenses that accompanies the restoration efforts. We wish to thank the Congress the Senate and the Honorable President Donald L. Trump for passing speedy relief in the form of

a \$36.5 billion aid measure that would help the Virgin Islands and Puerto Rico restore our infrastructure.

While we appreciate the assistance that has and will be forthcoming to rebuild the systems that were damaged, our primary concerns with the Authority's operation is our ability to meet our pre-existing expenses. Prior to the hurricanes, the Authority's revenues were, on average, \$26.5 million per month. After the hurricanes and the destruction of the T&D systems, and since we cannot bill customers, our revenues have dipped to below \$2 million per month. The V.I. Water and Power Authority has recurring expenses such as payroll, insurance, operation and maintenance of the plants, debt service, previously executed contracts, as well as financing agreements we must pay. To address these expenses, the Authority through the Government of the U.S. Virgin Islands, has sought a Community Disaster Loan. Any support or assistance that you can offer in this regard is appreciated.

One of the evident takeaways from having to rebuild the T&D systems four times within the last three decades is an urgent need for WAPA to not just rebuild our transmission and distribution system to what it was before the storm, but to harden or otherwise make it impervious to windstorms. One step in such direction would be achieved through the use of composite poles. Research has indicated that composite poles, even with wind-loading attachments, have better withstood the devastating winds of major hurricanes, when compared to the wooden poles now in use by WAPA. A second step toward building a more resilient system would be the relocation of overhead facilities to underground. The total number of composite poles that would be needed to replace wood poles on the main distribution feeders in the St.

Thomas-St. John district is 4,290, and 5,854 for the St. Croix District. The approximate cost of materials and supplies to complete restoration is \$30,000,000.

In addition to hardening our distribution system, WAPA must also address the electric grid which is also susceptible to damage from windstorms. WAPA's proposed plan is to construct a series of micro grids on each island.

Each microgrid would be a localized grouping of electricity sources that would operate in tandem with WAPA's generating facilities. Each could be disconnected and function autonomously as physical and/or economic conditions dictates. For example, In the event of an electrical service interruption, the microgrid would function as a small facility generating on its own power. Currently, WAPA is planning to develop the first ever micro grid facility in the Virgin Islands, in conjunction with the Virgin Islands Port Authority at the St. Croix Henry R. Rohlsen Airport. This microgrid would be energized with 4 MW of solar power and 2 MW battery storage. As funding permits, additional microgrids will be developed at other locations within and around the Territory. Plans for the Authority's grid, as well as efforts for a more robust T&D system are all contingent on acquiring the necessary funding for these projects. The Authority has already approached the USDA's Rural Utility Service in regards to funding these projects, as well as our future needs. I would like to thank you for the opportunity to appear before the Subcommittee on Energy today. I am available to answer any questions that you may have.



JULIO A. RHYMER, SR.
EXECUTIVE DIRECTOR/CEO
VIRGIN ISLANDS WATER and POWER AUTHORITY

STATEMENT BEFORE THE
COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENERGY
UNITED STATES CONGRESS

HEARING ON

*The 2017 Hurricane Season: A Review of Emergency Response & Energy
Infrastructure Recovery Efforts*

November 2, 2017

SUMMARY:

- On September 6th and 19th, 2017 two back to back category five hurricanes hit the Virgin Islands destroying transmission and distribution facilities on both islands.
- There are five (5) critical areas that must be addressed in order for the electrical system to be restored: equipment, materials and supplies, funding for operations, emergency restoration crews and housing for restoration crews.
- The current major challenges are the funding for day to day operations and hardening of the system for future hurricane events.

Mr. OLSON. Thank you, Mr. Rhymer. And I heard what Irma didn't destroy, Maria drowned.

Mr. RHYMER. Yes, it did.

Mr. OLSON. The Chair now calls upon Mr. Chet Thompson. Chet is the President and CEO of the American Fuels & Petrochemical Manufacturers.

Mr. Thompson, you have 5 minutes for an opening statement.

STATEMENT OF CHET THOMPSON

Mr. THOMPSON. Thank you, Mr. Vice Chairman, Ranking Member Rush, and members of the subcommittee. Thank you for having me here today.

My name is Chet Thompson. I am the President and CEO of the American Fuel & Petrochemical Manufacturers. AFPM represents the refining and petrochemical industries. Our members represent 120 refineries, 140 petrochemical facilities. That represents 98 percent of U.S. production capacity. More than half of that capacity is located along the Gulf Coast.

Hurricane Harvey impacted our facilities in the fuel supply chain very hard. Hurricane Irma impacted the fuel supply chain, but largely in Florida, while Nate's impact on our assets was rather minimal.

But, more importantly, the combination of Hurricanes Harvey, Irma, and Maria were devastating to the people of the Gulf Coast, particularly those in Houston and the Beaumont area, Florida, and Puerto Rico. Many of those impacted are part of our extended oil and gas family. Our hearts and prayers continue to go out to those still struggling to recovery, and we stand by them and will help them any way we can.

As a result of this personal impact on us, the subject of today's hearing is particularly important to our industry. So, I would like to limit my time this afternoon only to three key points of my written testimony.

First, by and large, the U.S. refining and petrochemical industries weathered the storm fairly well and proved to be very resilient. This did not happen by accident. Rather, it was the result of lots of hard work and preparation, and with the help of an incredibly dedicated workforce and Federal, State, and local first responders. They are the true heroes coming out of these events.

If you wanted to draw the storm up that could wreak the most havoc on our industry, Harvey was it. Harvey hit Corpus Christi as a Category 4 storm, moved right up the east coast, stalled largely over Houston, which is the epicenter of the refining and petrochemical industries. It dumped over 60 inches of rain in some locations and more than a trillion gallons of water across Texas and Louisiana.

At its peak, Harvey knocked 24 of our refineries offline. That represents 25 percent of all U.S. refining capacity. It had a similar impact on our petrochemical members. It knocked 60 percent of U.S. petrochemical capacity down. That is 80 percent of the capacity found in the Gulf Region.

Harvey also had a significant impact on the entire fuel supply chain. It shut down ports, pipelines, terminals, rail, and certainly

gasoline stations. Our facilities couldn't get feed into their plants, and we certainly couldn't get products out.

This had the potential to be catastrophic for the fuels and petrochemical supply chains, but in the end it wasn't. Just two weeks after Harvey made landfall, 20 of the 24 facilities that went down had restarted. And the petrochemical facilities made substantial progress during this period as well.

Again, this was not by accident. Facilities were prepared for the storms. They had applied many of the lessons learned in the aftermaths of previous storms like Katrina and Rita. For example, our facilities developed more sophisticated preparedness plans, improved storm monitoring, hardened critical infrastructure, elevated pumps and generators, procured spare parts so we could be ready to move with recovery efforts after the storm. We upgraded our IT systems to help us locate employees and ensure that they had the assistance they needed. All of this made a difference. We came back online much faster than we did after prior storms.

The second point I would like to make, the Federal and State response was significantly improved compared to previous storms. One of the lessons we have learned is that we have to better coordinate Federal, State, and local governments. So, over the last few years, we have been working hard in that regard, working closely with DOE and DHS to improve our relationships.

The results during Harvey, in particular, were excellent. We were in constant contact before, during, and after the storms. The improved coordination was most evident in the quick review and approval of fuel waivers, unlike in prior storms, helping us get fuel to where it was needed quickly and efficiently. Our Federal and State partners, particularly Secretary Perry, Administrator Pruitt, Governors Abbott and Scott, deserve kudos for these improvements.

If I had to identify the one area that could be improved, it would be better communication by our Government to consumers about the fuel supply chain and the challenges that often accompany events like hurricanes. For example, the Government could help us explain the timelines for bringing facilities back online and getting products back to the distributors and the marketers. And it could also help us discourage panic buying that always seems to accompany these types of events.

Third and finally, as always, our companies will work with Federal and State authorities to identify and apply lessons learned. Although we did fare fairly well, no doubt there are going to be things we can learn and improve upon to make future responses even better. We would caution anyone to resort to any knee-jerk reactions or conclusions, particularly those based on a few isolated events, before full assessments are in.

So, I know I am running out of time. I thank everyone for my time and the opportunity to speak today.

And again, I would like to express our thanks and appreciation for our incredible workforce and our first responders. They certainly deserve our appreciation.

So, thank you, and I am happy to answer any questions.

[The prepared statement of Mr. Thompson follows:]



House Committee on Energy and Commerce, Subcommittee on Energy

Hearing entitled "The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts"

Testimony of Chet Thompson, President and CEO, American Fuel & Petrochemical Manufacturers

November 2, 2017

The American Fuel & Petrochemical Manufacturers ("AFPM") appreciates the opportunity to provide testimony on the effectiveness of public and private sector response efforts to Hurricanes Harvey and Irma. AFPM is proud to represent more than 95 percent of the nation's refining and petrochemical manufacturing capacity. Our members make the gasoline, diesel, jet fuel, and petrochemicals that make modern life possible. Hurricanes Harvey and Irma demonstrated not only the resiliency of our nation's energy sector, but also the dedication of the nation's first responders and the incredible people that work in the refining and petrochemical industries.

The U.S. Gulf Coast, and Houston in particular, is the heartbeat of the global energy and petrochemical sectors. Texas is home to 30 refineries with more than 5.4 million barrels per day ("bpd") of refining capacity. Louisiana is home to another 19 refineries and 3.3 million bpd of capacity. Combined, these two states are home to more than half of U.S. refining capacity. There are 30 olefins (ethylene and propylene) production complexes in the U.S.; 19 are in Texas and eight are in Louisiana. Texas alone has the capacity to produce roughly 125 million pounds per day of ethylene, which is viewed as a leading indicator of growth in the manufacturing sector. Altogether, the refining and petrochemical industries contribute \$229 billion to the economies of Texas and Louisiana and support nearly one million jobs. Our employees not only worked around the clock to prepare for and respond to one of the largest hurricanes in U.S. history, but did so while dealing with displaced family and friends, not to mention the personal loss of homes, cars, clothing, and everything else we take for granted.

AFPM is proud to report that our industries were well prepared and weathered Hurricane Harvey fairly well.

Hurricane Harvey forced 24 refineries representing 25 percent of U.S. refining capacity to shut down or run at reduced rates. But just two weeks later, refiners were almost fully operational and those still down or in the process of restarting were working to resume operations as quickly and safely as possible.

Safety is the core tenet of the fuel and petrochemical industries. Actions taken for hurricanes like Harvey and Irma are in the interest of safety – protecting employees, communities and the environment. The industries' swift and effective response is indicative of a workforce that prides itself on continuously improving upon its safety record, implementing best practices, investing in training and preparedness, and using the best-available technology to safeguard its people. The industries are confident these precautions helped mitigate damage and improve safety around these storms.

It took a team to mitigate Harvey's impact. The industries did not do this alone – we got tremendous help from our dedicated workforce, first responders and federal, state, and local authorities. A lesson



learned from Hurricanes Katrina and Rita was that these critical partners needed to improve working together. The government especially came through for the industries with better, accessible information. These partners deserve credit for the improvements since previous incidents.

Finally, despite the havoc wrought by Harvey on the supply side, the refining industry was prepared for Irma. For Harvey, there was a loss of production capabilities. The job was to keep and restore production as much, and as quickly as possible. There are no refineries in Florida, so Irma was more about a disruption in distribution and delivery of fuels. The refining industry's job was to get fuel to the people who needed it. To do this, the industry put as much product as it could into the market in advance of Irma and staged products on both coasts to get fuel to Floridians as soon as it was safe and infrastructure allowed. Our industries and our people have been resilient in the face of extraordinary circumstances.

I. Impact of Hurricanes Harvey and Irma on Transportation Fuel Supply and Distribution

Nothing is more important to AFPM's members than the safety of their employees, communities, and first responders. As a result, refineries will reduce or shut down operations if companies do not believe running can be done safely. Hurricane Harvey alone dumped 60 inches of rain and more than a trillion gallons of water across the U.S. Gulf Coast. The magnitude of the storm resulted in the closure or slowdown of an unprecedented 24 refineries along the U.S. Gulf Coast from Corpus Christi, Texas, to Lakes Charles, Louisiana (see Appendix A for a full list of impacted refineries). This affected 50 percent of the refining capacity in the region and 25 percent of total U.S. refining capacity. For context, Hurricanes Katrina and Rita resulted in the shutdown or reduced output of 20 percent of U.S. refining capacity in 2005. The impact on the U.S. petrochemical industry was even more pronounced—at its height the hurricane impacted nearly 60 percent of U.S. upstream chemical manufacturing capacity. Petrochemicals like ethylene, propylene, and xylene form the foundation for many of the chemicals and plastics found in everything from food packaging to medical equipment and mobile devices. These supply chains were disrupted for many weeks following the storm.

Despite the temporary disruption in the refining sector, the market was well-supplied. In fact, heading into Hurricane Harvey, U.S. inventories of gasoline (230 million gallons) were well above the five-year historical average. As supplies were disrupted, the East Coast drew down this inventory. East Coast total gasoline inventories in the week ending September 1, 2017, fell by 2.2 million barrels, or 3.5 percent, compared with the previous week. Almost all of this drawdown occurred in the Lower Atlantic region, which stretches from Virginia to Florida. This weekly drop in inventories was smaller than the drop that occurred following a previous outage of the Colonial Pipeline in September 2016, when Lower Atlantic gasoline inventories fell by nearly six million barrels.

The global fuel supply chain is extraordinarily complex. At the most basic level, it starts with upstream oil exploration and production, both on-shore and off-shore. Crude oil is gathered and shipped via pipeline, rail, and maritime to U.S. refineries for processing into gasoline, diesel, jet fuel, heating oil, and many other products. Refined products are moved through the bulk transfer system to terminals, where they are blended with biofuel, moved onto trucks, and delivered to retail. Disruption along any portion of this supply chain can have ripple effects up and down the supply chain system. This can be as simple as retail stations losing power and the ability to pump fuel out of the underground storage tanks. It may include flooded roads that prevent the "last-mile" delivery of fuel to stations. It may be lack of access to pipeline, terminals, or any other major asset in the bulk transfer system.



To better illustrate the complexity of these fuel movement, we have included maps published by the U.S. Energy Information Administration ("EIA") in Appendix B that illustrate the flow of crude oil and petroleum products throughout the U.S. The primary challenge in recovery was overcoming the logistical barriers in getting product to consumers, as virtually every aspect of the bulk distribution system – pipelines, ports, and terminals – was also impacted, creating ripple effects along the full supply chain.

Many crude oil and petroleum product pipelines were affected by Harvey. The most significant outage was the Colonial Pipeline, which connects to 29 refineries and 267 distribution terminals and carries up to 2.5 million barrels per day of gasoline, diesel, and jet fuel from Houston through the Southeast U.S., and as far north as New York Harbor. Likewise, pipeline outages within Texas disrupted product flows to parts of the state, including Dallas. As a result, trucks typically used for the "last mile" of the supply chain were resourced as far away as Kansas City to pick up fuel, a 1,500-mile roundtrip. Despite the market being well-supplied, consumers engaged in panic-buying. In fact, demand in parts of Texas doubled over a short period of time, putting a strain on available supplies. In Florida, demand increased five-fold as millions of people evacuated in front of Hurricane Irma. The panic increased demand complicated relief efforts and contributed to supply issues in some areas.

The U.S. Gulf Coast is home to a dozen ports in three sectors (Corpus Christi, Houston and Galveston, and Port Arthur and Lake Charles). These ports are heavily trafficked with ships delivering crude oil to U.S. refiners and with product shipments to other parts of the U.S. and abroad. Hurricane Harvey temporarily closed or severely impacted the operating status of the majority of ports in the Gulf Coast region, from Corpus Christi to Lake Charles, and every port in between. Flooding, submerged obstacles, currents, security concerns, and other factors complicated efforts to get crude oil to refineries and product out of refineries to consumers via marine vessel. According to the American Chemistry Council, port closures affected 39 percent of waterborne chemicals trade.

Crude and refined product storage and distribution terminals are essential links in the petroleum supply chain. These facilities ship and receive crude oil and refined products from pipelines, marine vessel, rail and truck. As of March 2017, 49 percent of total U.S. working crude oil storage capacity and more than 40 percent of working storage capacity for both motor gasoline and diesel fuel were located in the Gulf Coast region. Many of the crude oil and refined product terminals along the U.S. Gulf Coast in the path of Harvey were preemptively shuttered before Hurricane Harvey made landfall, and remained closed through landfall, flooding, and cleanup. In addition, Hurricane Harvey drastically disrupted the railroads that support these terminals as well as refineries and petrochemical plants in the region. Specifically, Union Pacific Corporation and BNSF Railway, the two leading U.S. railroads, and regional railroad Kansas City Southern all suspended operations in the area affected by the storm. Rail shipments out of Houston were delayed through mid-September, though steadily improving. It wasn't until September 19 that Union Pacific, for example, was able to announce Gulf Coast operations had been fully restored. After conducting inspections and repairs to damaged rail infrastructure, the railroads began limited service in the region approximately a week after the storm. It's not possible to determine the precise impact of Harvey on rail traffic, but it has been clearly negative, so far. We estimate that the area immediately affected by Harvey accounted for approximately 764,700 originated carloads in 2014 (the most recent year for which data are available).



Despite the significant challenges presented by Hurricane Harvey, within 29 days, all but a couple facilities were back up and running. This is a testament to the professionalism, preparation, determination, and resiliency of the refining and petrochemical industries. Thanks to investments the industries have made and a well-coordinated federal, state, and local response, facilities were able to recover more quickly than after previous events. However, this process is not without challenges. Restarting a refinery requires more than simply flipping a switch—it is a complicated process that can take several weeks. The relatively quick resumption in output is significant given that restarting plants is much more complicated than flipping on a light switch. Restarts take time. Like shutdowns, restarts must be done slowly and deliberately to protect the health and safety of employees, as well as communities and environment.

Restarts after storms include securing safe access to the site, and checking the integrity of equipment, storage tanks, process units, and instrumentation. They also include inspecting facilities for any storm damage, making any necessary repairs, and verifying that there are sufficient feedstocks, such as oil and natural gas, available for processing from ports and pipelines. Inbound supplies must be able to arrive at the refinery and outbound products must have a clear route to market, so transportation infrastructure is also examined before opening.

As soon as all facilities are determined to be safe, crews move to energize electrical systems and cautiously ramp up activity in process units to begin turning raw materials into products such as diesel, gasoline, and jet fuel.

When a refinery is restarted, operators proceed slowly and carefully because piping systems may have unprocessed hydrocarbons inside of them that are left over from the shutdown. Operators also work to identify any anomalies or changes in the system as units are brought back online. Making sure each unit is operating normally keeps the overall system safe.

While Hurricane Harvey primarily impacted the ability for the U.S. to produce fuels, the primary challenge with Hurricane Irma was getting fuel to consumers in a safe and timely manner.

Transportation fuel markets in Florida rely entirely on supply from outside the region, primarily product supplied by marine tanker and barge, but also, to a lesser degree, by truck. Marine terminals, which are primarily concentrated at deep-water ports along Florida's Gulf of Mexico and Atlantic coastlines, receive bulk products on tankers and ocean-going barges from Gulf Coast refining centers and foreign supply sources. From the marine terminals, products are further distributed to markets along the coastline by intrastate barge and truck movements, and via pipeline to Orlando. Markets in the Florida Panhandle are also supplied from distribution terminals in Mobile, Alabama, as well as terminals in Bainbridge, Georgia, that receive fuels from the Colonial Pipeline. These deliveries into Florida from the Southeast region are made by truck.

The rapid spike in demand in advance of Irma made it difficult for gas stations and distributors to keep stations supplied as consumers filled up their cars and stocked up on fuel in preparation for uncertain conditions. During and immediately following the storm, impacts of Irma on infrastructure including ports, roads, and power, created challenges to moving fuel from terminals to retail outlets. To prepare, the industry put as much product as it could into the market in advance of the storm and staged products on both coasts to get fuel to Floridians as soon as it was safe and infrastructure allowed.



II. Industry and Government Preparation and Response

The state and federal governments and the refining and petrochemical industries were well-prepared for Hurricanes Harvey and Irma, having learned and applied lessons from previous storms. This preparation increased safety and minimized downtime and consumer impacts. In fact, following Hurricanes Katrina and Rita it took 91 days for the industry to return to 89 percent of pre-hurricane inputs. After Harvey and Irma, the industries returned to 88 percent of inputs only 29 days after landfall.

In the wake of Hurricanes Katrina and Rita in 2005, the industries took steps to mitigate the impact of natural disasters. For example, many Gulf Coast refineries built and elevated refinery control rooms to avoid flooding and hardened them to withstand Category 5 storm wind speed. Refineries and chemical plants installed redundant power supplies and elevated generators and electrical systems to avoid flooding. Companies had also worked with local and state governments to develop alternative supply plans and establish clear lines of communication.

More recently, in the wake of Superstorm Sandy in 2012, Secretary of Energy Ernest Moniz asked the National Petroleum Council (“NPC”) to study vulnerabilities in the oil and gas infrastructure and effective ways for industry and government to communicate to address energy supply disruptions. By the time of the NPC study, the petroleum refining industry, especially along the U.S. Gulf Coast and post Katrina/Rita, had already taken significant steps to improve resiliency, response, and coordination - and during the NPC study AFPM members and other petroleum industry participants were focused on how to improve communications with both the federal and state government(s) to streamline and support restoration and operations during and after an event. The NPC released its report in December 2014 and made seven recommendations. As a general matter, the federal, state, and industry coordination was significantly improved compared to prior storms. AFPM offers a brief assessment on each of the NPC recommendations.

	Recommendation	AFPM Assessment
1	Harmonize DOE’s energy response team structure with the National Incident Management System (NIMS) Incident Command System (ICS).	AFPM is not in a position to fully evaluate the degree to which DOE’s emergency response team structure was harmonized with the NIMS ICS.
2	Leverage the Energy Information Administration’s subject matter expertise within DOE’s energy response team to improve supply chain situation assessments.	AFPM is not in a position to fully evaluate how EIA’s expertise was utilized. However, both DOE and DHS situation reports were very helpful, although the DOE reports were less granular than in previous disasters.
3	Establish company liaisons and direct communication with DOE’s energy response team to improve situation assessments.	Industries supplied liaisons with the DOE Infrastructure Security and Energy Restoration Department (ISER) and DOE was very responsive to industry requests.
4	Streamline and enhance processes for obtaining temporary regulatory relief to speed up recovery.	The process and approval for temporary regulatory relief measures were significantly improved from previous disasters. Further discussion of waivers follows below.



5	States should increase engagement with the oil and natural gas industry in their energy assurance plans, and industry members should assist states in such efforts.	States have been doing this through DOE exercises and the National Association of State Energy Officials ("NASEO") exercises. AFPM has been involved in multiple DOE and NASEO exercises over the last couple of years to help DOE and state officials understand the oil and gas ("ONG") supply chain. Recently NASEO has developed a draft State Emergency Fuel Plan that has been shared with industry stakeholders for review and comment—which is a great step toward states better understanding the fuel situation in their state and surrounding states. In the past each state had its own independent plans with varied degrees of detail. Over the last couple of years, industries have increased their participation in DOE and NASEO exercises such as the annual DOE Clear Path exercises, the NASEO Liberty Eclipse exercise, and presented at NASEO meetings.
6	Both DOE and states should establish routine education and training programs for key government emergency response positions.	AFPM is not in a position to evaluate DOE and state responsiveness to this recommendation.
7	Both DOE and states should improve their comprehensive drill and exercise programs and include industry participation. Reciprocal invitations extended by companies to DOE and states are recommended.	DOE and states have made important strides on this recommendation. The quality of the exercises has improved, and the early engagement with industries to help develop the exercises has improved, as well. AFPM and other ONG members have participated in these exercises. Likewise, the ONG Sector Coordinating Council recently has been inviting DOE to industry exercises.

To prepare for these events, AFPM members will typically have a cross-functional emergency management team that includes operations, safety, security, human relations, purchasing, contracting, and government relations. These teams develop comprehensive crisis management plans that include personnel responsibilities and plans for material support. The frontline of hurricane response are the ride-out crews that actually stay at the refineries during the duration of the storm to address emergencies and facilitate access to the site later. ExxonMobil alone had 780 ride-out crews at Baytown and Beaumont. This involves substantial logistical planning that includes accommodations, supplies, equipment, and communications capabilities. Companies plan for their vehicle, fuel, and power needs that may arise.

In addition to the logistical issues associated with running a facility, refineries and petrochemical facilities must also remain vigilant regarding site security to ensure these national security assets are



protected during the chaos of a major storm. This includes everything from ensuring entrances are guarded to providing essential employees with letters designating them as critical so they are able to travel during curfews.

The response to Hurricanes Harvey and Irma was significantly improved compared to previous storms, particularly for regulatory relief and access. AFPM's members were particularly pleased with the communication and coordination between federal authorities and industries. The Department of Energy, Department of Transportation, Department of Homeland Security, and Federal Emergency Management Agency held daily joint calls with trade associations and companies representing critical infrastructure. These calls served to provide updates on issues like site access, port closures, curfews, and the status of infrastructure, but also allowed industries to make officials aware of problems or questions. FEMA did an outstanding job taking access/reentry requests and state and local governments were very proactive communicating the local reentry procedures early, which helped avoid confusion later.

Federal and state authorities took many actions to support an efficient and effective recovery effort, including expeditiously processing waiver requests.

- **Fuels.** On August 30th, the Environmental Protection Agency ("EPA") granted a multi-state waiver for requirements of low-Reid Vapor Pressure ("RVP") conventional gasoline and reformulated gasoline ("RFG"). The next day, EPA expanded the waiver to include 38 states and Washington, D.C. These waivers are critical to allow refiners to make and sell winter-grade fuel that includes components like butane that can be used to increase the volume of fuel supply. For most states, the low-RVP waiver expired on September 15th with the usual switch to winter gasoline. In addition to the multi-state waivers by EPA, states waived state requirements for RFG and RVP specifications. For instance, Texas has a federally-enforceable Low Volatility State Implementation Plan (SIP) that was in place until October 1st.
- **FERC Tariffs.** The fuel waivers granted by EPA are less effective if the fuel cannot be shipped through the pipeline infrastructure to reach consumers, even if it meets specifications. An issue arose when the Colonial Pipeline system refused to accept higher RVP gasoline (11.5#, also called A3 into Colonial) because it did not have a tariff on file with the Federal Energy Regulatory Commission ("FERC"). Prior to Harvey and the RVP turn (Sept 15th), refiners had still been selling remaining inventories of lower RVP gasoline (9# or also called A2 into Colonial). Although all of the individual states along Colonial, and New York Harbor had granted RVP waivers, Colonial still required that all nominated volumes meet that specific pipeline product specification, even though that product would be downgraded when it co-mingled with all the inventory in the line. As a result of the delay, Colonial could not pump from Houston (West of Lake Charles) into its mainlines and reach its full one million bpd pump rate, resulting in a temporary disruption of supplies into Colonial and up through the Southeast/Northeast. At Colonial's request, FERC approved an emergency waiver tariff on September 5th. Although this was resolved quickly, the issue resulted in a couple days of confusion and frustration for several refiners trying to move product into the market.
- **Jones Act.** The Jones Act requires cargo that is shipped between U.S. ports move on U.S.-flagged ships that are built, crewed, and owned by U.S. citizens. As a result of its strict



requirements, shipping goods on a Jones Act vessel often costs as much as three times more than moving the same cargo a similar distance between a U.S. port and foreign location using a non-Jones Act vessel. On September 8th the Department of Homeland Security waived the Jones Act for refined petroleum products shipped from New York, Pennsylvania, Texas, and Louisiana to South Carolina, Georgia, Florida, and Puerto Rico, ahead of Hurricane Irma. On September 11th the waiver was expanded to include shipments from all states in PADD 1B (Central Atlantic) and PADD 3 (Gulf Coast) to all states in PADD 1C (Lower Atlantic).

- **Hours of Service Relief.** Twelve states, including Puerto Rico and the U.S. Virgin Islands, declared states of emergency due to Harvey and Irma. In response, the Federal Motor Carrier Safety Administration issued an emergency declaration and waived Federal Motor Carrier Safety Regulations, including Hours of Service Regulations. These waivers allowed the trucking industry and AFPM member companies to more effectively support recovery and resupply efforts.
- **Emergency Response Support.** During response efforts fuels and other materials that may be regulated by the Pipeline and Hazardous Materials Safety Administration ("PHMSA") are essential elements to a quick recovery. To foster a more efficient response, PHMSA issued an Emergency Waiver of the Hazardous Materials Regulations to persons conducting operations in support of disaster and recovery efforts in Texas and Louisiana. This waiver supported the movement of essential fuels and recovery products to impacted areas and aided in the recovery. For example, generators would typically be characterized as "dangerous goods" or "hazardous materials," triggering certain requirements for labeling and shipping documents. This waiver streamlined the ability of officials to quickly move these goods into affected areas.
- **Pipeline Operator and Inspection Relief.** Following the event to ensure safe operation of pipeline infrastructure, pipeline operators must conduct inspections and in some cases repair to damaged infrastructure. To assist in these effort PHMSA issued an emergency stay of enforcement for operators affected by hurricanes. This stay provided companies with a larger pool of skilled workers to aid in recovery. This relief aided in the recovery efforts and ensured essential mid-stream energy infrastructure resume operation quickly.
- **Strategic Petroleum Reserve.** The U.S. Strategic Petroleum Reserve ("SPR") is the largest government-owned stockpile of emergency crude oil in the world. Established in the aftermath of the 1973-74 oil embargo, the SPR provides the President with a powerful response option should a disruption in commercial oil supplies threaten the U.S. economy. It is also the critical component for the United States to meet its International Energy Agency obligation to maintain emergency oil stocks. The SPR has a design storage capacity of 713.5 million barrels and as of late October held 670 million barrels.

Crude can be made available from the SPR either as a drawdown and sale based on a Finding of a Severe Energy Supply Disruption or as a time exchange whereby the recipient receives crude from the SPR in exchange for a delivery of crude oil at an agreed future time. Following Hurricane Katrina, on September 2, 2005, President George W. Bush issued a Finding of a Severe Energy Supply Interruption that authorized and directed the Secretary of Energy to drawdown



and sell crude oil from the SPR. Following Hurricane Isaac in 2012 one million barrels of crude oil from the SPR were made available, and following Hurricanes Gustav and Ike in 2008, more than five million barrels were made available to refiners.

Hurricane Harvey closed ports, disrupting marine delivery of crude oil to U.S. Gulf Coast refineries, and shut-in Gulf of Mexico oil production. The severe flooding from Harvey also disrupted the operation of pipelines that supply U.S. onshore and Canadian crude oil production, and shut in some U.S. onshore production. As a result, crude oil from the SPR was made available to refineries for delivery by pipeline. Through September 28, a total of five million barrels of oil from the SPR had been delivered to Gulf Coast refineries, helping to continue their processing operations and prevent further supply disruptions.

III. The Industry's Dedicated Employees are the Heart and Soul of their Communities

The devastation along the Gulf Coast brought daily images of heartbreak as lives were upended and many of those stories were about our employees. Yet, we also saw overwhelming support from the community—businesses to individuals, alike.

The real story is about the employees themselves. There are too many stories to tell them all, but a few really stand out as great examples of the dedication of the U.S. fuel and petrochemical manufacturing industries' employees even as they had water pouring through their own homes. For instance, Dan Misko, an ExxonMobil employee in Beaumont, Texas, and a team of about 60 people — a combination of ExxonMobil personnel, city employees, and contractors — worked with the city day and night to come up with a temporary solution to help restore its water service. The water dropped by Hurricane Harvey caused the Neches River to swell to more than 20 feet around the utility's pumping station, knocking out pumps at the city's water plant. The plant processes more than 21 million gallons of water a day to serve a community of more than 100,000 people. Misko and team transported excess plastic pipes from the refinery to the water plant, and crews were deployed around the clock for the next 72 hours to build eight, 600-foot-long pipelines. Eight temporary pumps were installed to help restore water service in Beaumont.

Jason Meyer, Rusty Till, and Pedro Alvarez, all employees of the Chevron-Phillips Chemical Company, took their boats and together rescued nearly two hundred people over the course of several days and helped ferry supplies and medical equipment.

Industry-wide, as the flood waters receded, coworkers helped each other with housing, cleaning, and repairs.

In addition to providing tens-of-millions of dollars in supplies and aid to local recovery efforts, AFPM's member companies sprung into action to provide relief for their employees and to help directly with recovery efforts. For instance, many companies offered displaced employees hotel rooms and longer-term housing, helped arrange for rental vehicles for those who lost cars, provided interest free loans, and helped underwrite the cost of out-of-network prescriptions and medical care. We had at least one member company paying for its maintenance crews to help clean up and repair employees' homes.

IV. Recommendations and Conclusion



The federal, state, local, and industry response was significantly improved compared to previous incidents, but there is always something to learn and improve upon. First and foremost, government must continue to find ways to coordinate efficiently among various agencies and jurisdictions while keeping lines of communication open with industry stakeholders. One particularly useful tool has been the DOE Clearpath exercise, a multi-stakeholder exercise that actually simulated a hurricane strike on the Gulf Coast this year. Such exercises help industry and government officials to know each other and develop lines of communication before disasters strike. Regular exercises also help educate federal and state officials about the fuel supply chain, which is extraordinarily complex, helping to improve decision making. One specific example of how this can be improved is that there was inaccurate and/or incomplete information about flooded highways and major roadways in Southeast Texas, which impacted companies' ability to plan safe routes for emergency supplies to flow to impacted sites.

Companies have assets today that can help facilitate better information, but in some cases were unclear on whether/how they might be used. The best example is the use of commercial drones to help facilitate information needed for reentry procedures. AFPM urges the Federal Aviation Administration to establish guidelines on commercial drone use to facilitate emergency response operations—particularly relating to utility and energy infrastructure restoration efforts—following a natural disaster. This guidance would help to speed up emergency response and energy facility reentry efforts following extreme weather events (as was recently seen with Hurricane Harvey), which would, in turn, ensure the safety of facility workers and the surrounding public.

In addition to big-picture communications, there will undoubtedly be other lessons learned as governments and industry review the preparation, response, and recovery efforts. For instance, the high-water rescue assets provided by local government quickly became overwhelmed. The local U.S. Coast Guard responded quickly, but also had inadequate local resources at its disposal. In fact, at least one company quickly built a private high-water rescue capability, which was instrumental in several rescues of employees and families. Without the volunteer rescue assets, the loss of life may have significantly increased.

Furthermore, it is critical to review public communications about available fuel supplies. As with previous emergencies, retail fuel supplies were exhausted before landfall. This is not a new problem, but is a repeat problem for all significant storms. Within 24-48 hours prior to landfall, families were refueling all vehicles, as well as additional fuel for generators. This results in the initial non-availability of premium and diesel fuels followed by the lack of availability of regular grade gasoline at most stations. It is critical that the public be informed about the challenges with recovery, but are not induced to engage in "panic-buying."

Finally, AFPM urges industry and government to take a comprehensive look at infrastructure development to work collaboratively to modernize areas of need. This may include everything from seawalls to drainage systems. For the refining and petrochemical industries, each company is already reviewing their own processes and procedures to make the next response even more effective.

AFPM and its members look forward to identifying and discussing lessons learned with federal, state, and local policymakers to improve upon our response efforts for future storms.



Appendix A—Refineries Impact by Hurricane Harvey

Refineries Impacted by Harvey

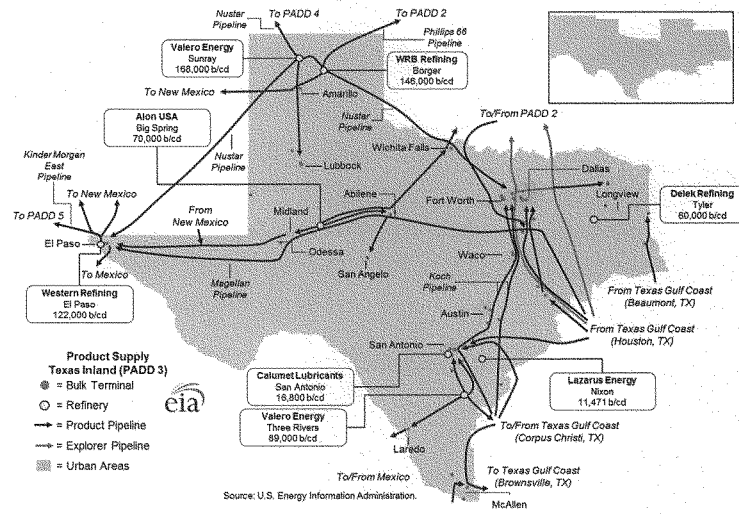
Refinery	Crude Distillation Capacity Thousand Barrels per Day Total	
	Location	Capacity
Motiva Port Arthur	Beaumont Port Arthur	603.0
Total Port Arthur	Beaumont Port Arthur	225.5
Valero Port Arthur	Beaumont Port Arthur	335.0
XOM Beaumont	Beaumont Port Arthur	362.3
Total Beaumont/Port Arthur	TOTAL	1,525.8
Buckeye Texas Processing	Corpus Christi	46.3
Citgo Corpus Christi	Corpus Christi	157.5
Flint Hills Corpus Christi	Corpus Christi	296.5
Magellan Condensate Splitter	Corpus Christi	42.5
Valero Corpus Christi	Corpus Christi	293.0
Valero Three Rivers Corpus Christi	Corpus Christi	89.0
	TOTAL	924.7
Kinder Morgan Splitter Galena Park	Houston	84.0
Lyondell Basell Houston Refining	Houston	263.8
Marathon Galveston Bay	Houston	459.0
Marathon Texas City	Houston	86.0

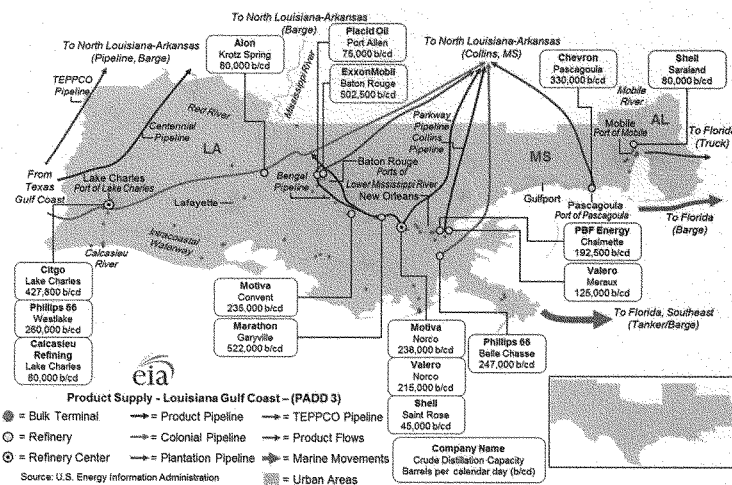
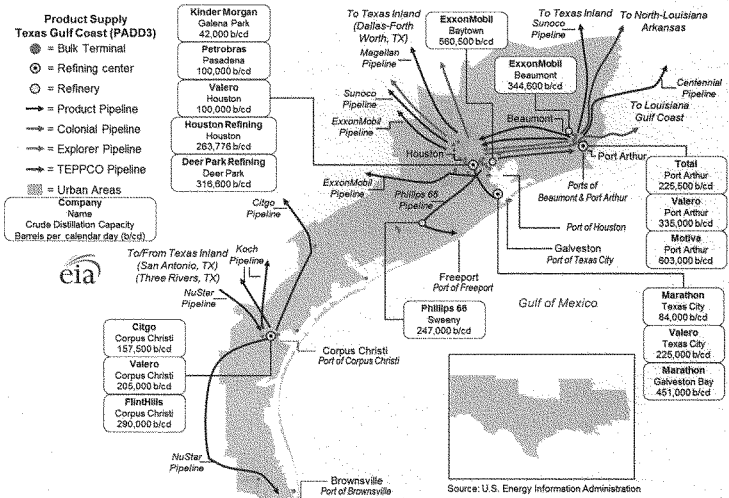


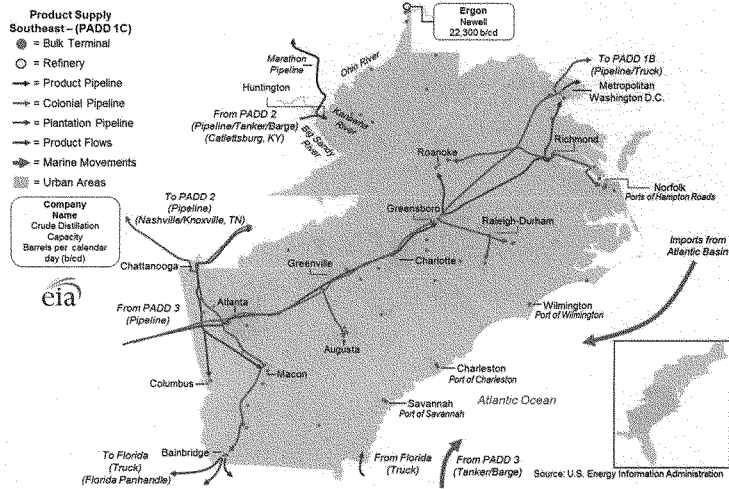
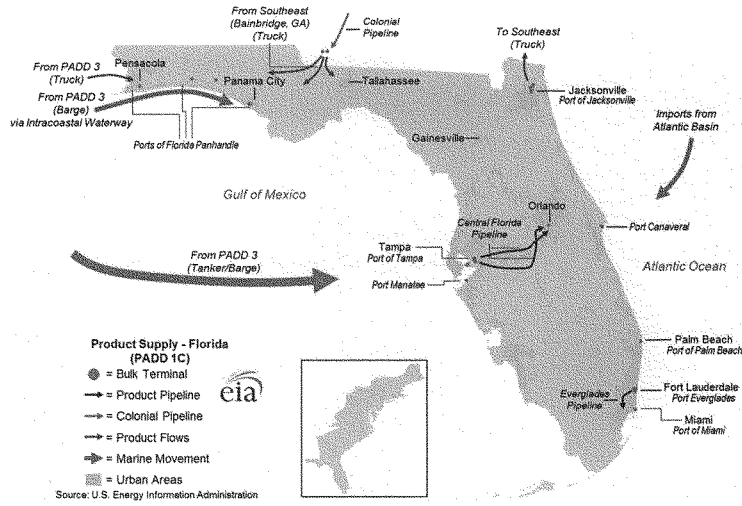
<i>P66 Sweeny</i>	Houston	247.0
<i>Pasadena Refining</i>	Houston	112.2
<i>Petromax Refining Houston</i>	Houston	25.0
<i>Shell Deer Park</i>	Houston	325.7
<i>Valero Houston</i>	Houston	191.0
<i>Valero Texas City</i>	Houston	225.0
<i>XOM Baytown</i>	Houston	560.5
Houston	TOTAL	2,579.2
<i>Citgo Lake Charles</i>	Louisiana Gulf Cost	425.0
<i>P66 Westlake</i>	Louisiana Gulf Cost	260.0
<i>Calcasieu Lake Charles</i>	Louisiana Gulf Cost	104.0
Louisiana Gulf Coast	TOTAL	789.0



Appendix B—Energy Information Administration Supply Chain Maps

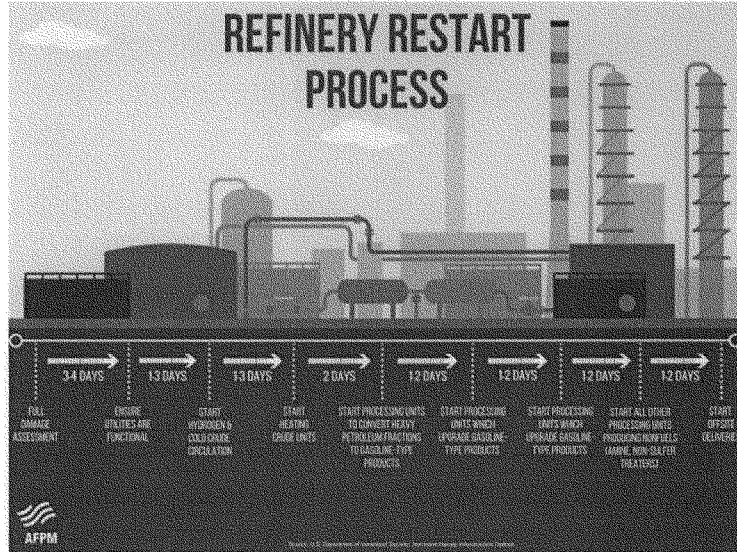








Appendix C—The Refining Restart Process





Testimony Summary for Chet Thompson, AFPM President and CEO

Hurricane Harvey was arguably the most significant storm impacting the U.S. refining and petrochemicals industry, but our preparation and dedicated workforce helped the industries weather the challenge.

The amount of water dumped by Hurricane Harvey impacted 24 refineries with a quarter of U.S. refining capacity. The hurricane also affected 60 percent of Gulf Coast upstream petrochemical capacity (including ethylene and propylene), representing 58 percent of total U.S. chemical capacity. In addition to refining and petrochemical facility outages, the Hurricane also had a significant impact on the supply chain. This included access to crude oil because of port closures and pipeline outages, but also logistical challenges with getting refined product from our facilities to consumers.

Despite the logistical challenges, just two weeks after Harvey made landfall, 20 of these refiners had restarted or were in the process of restarting. Roughly two weeks after Harvey subsided, 28 percent of Gulf Coast upstream chemical capacity had restarted. In fact, following Hurricanes Katrina and Rita it took 91 days for the industry to return to 89 percent of pre-hurricane inputs. After Harvey and Irma, the industry returned to 88 percent of inputs only 29 days after landfall.

That our industries by and large withstood the storm and that is not by accident. Industry and governments both learned from previous experience that we needed to improve working together. The government especially came through for the industries with better, accessible information. These partners deserve credit for these improvements since previous incidents.

Despite the challenge presented by Harvey, the fuel industry was prepared for Irma. There are no refineries in Florida, so Irma was more about a disruption in distribution and delivery of fuels. The refining industry's job is to get fuel to the people who need it. To do this the industry put as much product as it could into the market in advance of the storm and staged products on both coasts to get fuel to Floridians as soon as it was safe and infrastructure allowed.

The federal and state response was significantly improved compared to previous storms

Our industries didn't do this alone — our companies are gratified by the communication and coordination exhibited between operators, first responders and federal, state and local authorities exhibited throughout unprecedented scale and reach of these weather events. In addition to the improved communication and coordination between the public and private sectors, both federal and state authorities were much quicker with fuel waivers and other actions needed for an efficient and effective recovery effort.

Finally, as always, our companies will work with federal and state authorities to identify lessons-learned and prepare for the next disaster

The federal, state, local, and industry response was significantly improved compared to previous incidents, but there is always something to learn and improve upon. The most important issue is communication, and governments must continue to find ways to coordinate efficiently among various agencies and jurisdictions while keeping lines of communication open with industry stakeholders. For the refining and petrochemical industries, each company is already reviewing their own processes and procedures to make the next response even more effective.

Mr. OLSON. Thank you, Mr. Thompson.
The Chair now calls upon Mr. Max McBrayer. Max is the Chief Supply Officer for RaceTrac Petroleum, Incorporated.
You have 5 minutes, sir.

STATEMENT OF MAX E. MCBRAYER, JR.

Mr. MCBRAYER. Thank you. Mr. Vice Chairman, Mr. Ranking Member, and members of the subcommittee, thank you for the opportunity to testify today on the retail community's response efforts to 2017 hurricane season.

My name is Max McBrayer. I am the Chief Supply Officer and the Chief Financial Officer of RaceTrac Petroleum, Inc. I am testifying today on behalf of the National Association of Convenience Stores and the Society of Independent Gasoline Marketers of America. RaceTrac is a family-owned business, headquartered in Atlanta, Georgia, operating more than 450 convenience stores across 12 States and employing nearly 9,000 team members.

The 2017 hurricane season had a devastating effect on America's fuels infrastructure and markets. During Hurricane Harvey, flooding damaged more than a quarter of the U.S. refining capacity and shut down fuel pipelines. This put severe strain on the domestic fuel supply. Hurricane Irma led to an increased demand for fuel in Florida, further straining the fuels market and causing prices to rise sharply.

Natural disasters directly and severely affect the retail fuels market. Margin on fuel sales range between 2 and 20 cents, and retailers must constantly react to changes in supply and demand to ensure their prices remain competitive.

During any severe weather event, wholesale fuel prices become more volatile as the market tries to assess and anticipate supply availability. When these unwelcome changes occur, retailers respond to meet their cost.

Due to the infrastructure damage, compliant fuel inventories became strained, leading to escalating wholesale prices. Retail market prices generally reflect rapid increase in the wholesale prices. In this instance, fuel retailers made individual decisions on whether to increase prices and risk losing customers or potentially take losses by keeping prices low and not covering the increased wholesale cost.

Despite the tough situations, the fuel market was supported by the actions of both the Federal Government and the State governments. The governments worked with us to deal with the issues before, during, and after the hurricanes.

Communication and coordination initiatives were particularly important. For example, the Governors of Texas and Florida held conference calls with industry and Government stakeholders where they listened to concerns and rendered prompt assistance.

In Florida specifically, the Governor's office waived certain restrictions for highways, helped ensure that ports prioritized fuel shipments, coordinated escorts for fuel trucks and ships, easing the movement of product to the retail fuel locations.

At the Federal level, disaster response efforts spanned a number of agencies, which ultimately issued more than 30 waivers to help deal with fuel supply issues. Of particular importance to RaceTrac

was the waiving of hours-of-service limitations for drivers providing assistance to affected areas. These waivers were the difference between getting fuel to our customers in a reasonably affordable and timely manner and not being able to supply customers with the fuel they needed.

In response to State petitions, Federal agencies also eased restrictions on the type of product that retailers could sell. For example, EPA temporarily waived certain reformulated gasoline requirements under the Clean Air Act.

Despite the major disruptions to the fuel distribution system after the hurricanes, the impact on consumers and the economy was still less than what occurred with Hurricanes Katrina and Rita in 2005. This is because the Government worked with the private sector to respond appropriately.

There are still important lessons to be learned, however. For instance, there is no good coordinated effort to make sure that consumers were informed of the status of fuel supplies via social media. As the hurricanes approached, we believe that much of the panic about fuel availability caused a significant and totally unnecessary pull on the available fuel supply. The panic lessened when information on the fuel supply was shared with the public. In addition, bottlenecking at ports and fuel terminals was a problem that the Government could have done more to alleviate.

Finally, in the hurricanes' aftermath, truck drivers and other employees found it difficult to get to affected areas quickly. Anything that can be done to remove hurdles for fuel transportation would speed up recovery efforts in the wake of future hurricanes.

RaceTrac believes the collaboration between the public and the private sectors was critical to the successful response efforts. We are proud to have been able to serve the communities that we operate in.

And I thank you for the opportunity to provide this testimony.
[The prepared statement of Mr. McBrayer follows:]

Statement of
Max E. McBrayer, Jr.
Chief Supply Officer and Chief Financial Officer
RaceTrac Petroleum, Inc.
Atlanta, Georgia

On Behalf of the
National Association of Convenience Stores (NACS)
And the
Society of Independent Gasoline Marketers of America (SIGMA)

Before the
U.S. House Committee on Energy and Commerce,
Subcommittee on Energy
November 2, 2017

Hearing on
“The 2017 Hurricane Season: A Review of Emergency Response and
Energy Infrastructure Recovery Efforts”

I. SUMMARY OF TESTIMONY

1. The 2017 hurricane season significantly damaged the U.S. fuels infrastructure. Notwithstanding this damage, the Federal and state governments' timely action with regard to fuel, transportation, and other emergency waivers ensured that the retail fuel market had a continuous source of supply, benefitting American consumers.
2. In addition, the unique and effective collaboration between state governments and the private sector in Florida and Texas mitigated the damage inflicted and enabled the market to respond swiftly and nimbly to the natural disasters.

II. INTRODUCTION

Chairman Upton, Ranking Member Rush, and members of the Subcommittee, thank you for the opportunity to testify today on the retail fuels community's recent hurricane disaster response efforts. My name is Max McBrayer, and I am the Chief Supply Officer and the Chief Financial Officer of RaceTrac Petroleum, Inc. ("RaceTrac").

I am testifying today on behalf of the National Association of Convenience Stores ("NACS")¹ and the Society of Independent Gasoline Marketers of America ("SIGMA").² Members of NACS and SIGMA, including RaceTrac, account for approximately 80 percent of retail motor fuels sales in the United States.

The 2017 hurricane season was a historic multi-part weather event that tested the nation's fuel infrastructure to a degree previously unseen. Yet, it was also a moment of triumph for cooperation between the government and the private sector. In response to the situation surrounding Hurricanes Harvey, Irma, Maria, and Nate, the Federal government along with state governments expeditiously issued over 60 various fuel, hours of service, Jones Act, and Supplemental Nutrition Assistance Program waivers that enabled the marketplace to respond more quickly to the natural disaster. But the government did not act in a vacuum. The governments of Florida and Texas both opened effective direct lines of communication with the private sector, which enabled a degree of robust real-time collaboration never before seen.³ This communication and collaboration permitted the market to address concerns swiftly as they arose

¹ NACS is an international trade association representing the convenience store industry with more than 2,200 retail and 1,600 supplier companies as members, the majority of whom are based in the United States.

² SIGMA represents a diverse membership of approximately 260 independent chain retailers and marketers of motor fuel.

³ Other state governments assisted with the response efforts by waiving hours of service requirements for truckers transporting supplies to the affected areas.

and thereby lessened the harm from the hurricanes. My testimony addresses all of these points in greater detail below.

A. BACKGROUND ON THE FUEL RETAILING AND CONVENIENCE INDUSTRY

In 2016, the fuel wholesaling and convenience industry employed more than 2.3 million workers and generated \$549.9 billion in total sales, representing approximately 3 percent of U.S. Gross Domestic Product. Of those sales, approximately \$317 billion came from fuel sales alone. Because of the number of fuel and other transactions in which the industry engages, fuel retailers and marketers handle approximately one of every 30 dollars spent in the United States. Fuel retailers serve about 160 million people per day—around half of the U.S. population—and the industry processes over 73 billion payment transactions per year. Nevertheless, the convenience store and fuel retail industry is truly an industry of small businesses. Approximately 63 percent of convenience store owners operate a single store.

The fuel wholesaling and convenience store market is one of the most competitive in the United States. Fuel retailers operate on tiny margins (around 2 percent or less) and are unable to absorb incremental cost increases without passing them on to consumers. Today, there are approximately 150,000 retail fueling facilities throughout the nation, and less than 5 percent are owned and operated by the integrated oil companies. The majority are owned by independent companies, whether single-store operators or regional chains, and each of these businesses have different approaches to how they buy and sell fuel.

B. ABOUT RACETRAC

Headquartered in Atlanta, Georgia, family-owned RaceTrac has been serving guests since 1934 and now operates more than 450 convenience store locations and employs nearly 9,000 team members. Every day, RaceTrac operates under its mission to “make people’s lives simpler and more enjoyable”—and for that reason, the company has been named a top workplace across many of the states in which it operates, and has been recognized on the Forbes list of largest private companies every year since 1998. In fact, in 2014, Convenience Store Decisions named RaceTrac as its “Chain of the Year.”

RaceTrac Petroleum, Inc. is composed of two operating retail divisions: RaceTrac and RaceWay, and a mix of subsidiaries. RaceTrac operates more than 450 RaceTrac retail fuel and convenience stores across four southern states: Georgia, Florida, Louisiana, and Texas; and also owns 250 contract-operated RaceWay retail fuel and convenience stores in 12 states (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia). Energy Dispatch, the transportation company that hauls fuel for RaceTrac, endeavors to provide the best-in-class fuel hauling services for RaceTrac and RaceWay. Metroplex Energy is a wholesale fuel supplying company that secures bulk fuel to supply RaceTrac and RaceWay stores and other third-party companies by rail, pipeline, truck, barge and vessel.

Due to RaceTrac's presence in 12 states, we play an important role in providing fuel to consumers in different markets—and we are fully aware of the many statutory, regulatory, logistical, and other factors that affect different fuel markets. Each day, we must ensure that our stores remain stocked with the fuels that meet the required federal and state specifications of a particular market. In addition, because we operate throughout the Gulf Coast and along the Southeastern United States,⁴ we are very attuned to the weather risks and logistical impediments that may impact our ability to supply our retail locations—and were directly affected by the 2017 hurricane season. As described in more detail below, we learned from that most recent experience that effective public-private sector collaboration is essential to ensuring the successful functioning of the retail fuels market during a natural disaster.

III. U.S. FUEL MARKET INFRASTRUCTURE & HURRICANES

Fuel industry infrastructure spans across the country, making up a complex system of interconnected refineries, blenders, pipelines, terminals, transporters, and retailers. As with other supply chains, disruption in even one area can cause a ripple effect to spread throughout the entire industry. During natural disasters, those effects are often more dramatic, as disruption may occur across more than one part of the supply chain. The hurricanes of the past summer wrought harm to much of the fuel supply chain, from manufacture to retail.

In late August, Hurricane Harvey made landfall in Texas, ultimately dumping more than 50 inches of rain on affected areas and setting the record for the most rainfall ever recorded in the continental U.S. from one storm.⁵ The rain and winds adversely affected the ability of fuel retailers to operate—both in terms of acquiring necessary fuel supply and delivering that fuel out to customers. More damaging, however, was the severe flooding, which was severely detrimental to the fuels infrastructure. Many fuel dispensers ended up underwater and out-of-service and the flooding crippled the fuels market from the point of manufacture, immediately shutting down about 10 out of the 141 U.S. refineries—and ultimately damaging about 48 total refineries—meaning that more than one-third of the nation's refining capacity was harmed by the hurricane. The effects of refinery closures, as well as pipeline closures,⁶ spread across the country and up the Eastern seaboard, resulting in limited fuel supply and causing fuel prices to rise sharply.

⁴ For example, Florida is home to more than 200 RaceTrac stores and more than 40 RaceWay locations (this number can vary as new stores open, but as of the date of this testimony, there are around 250 total in the state); Texas is home to more than 110 RaceTrac stores and 50 RaceWay locations (again, numbers can vary, but there are around 160 stores in Texas).

⁵ Erin Brodwin and Skye Gould, Rains from Hurricane Harvey Broke 60 Years of U.S. Continental Records - Here's Why, *BUS. INSIDER* (Aug. 29, 2017), www.businessinsider.com/harvey-rain-rainfall-break-record-2017-8.

⁶ Colonial Pipeline Co, which transports product from Texas to the Eastern seaboard, and Explorer Pipeline, which transports product from Texas north to the Midwest, both closed temporarily due to effects from Hurricane Harvey. Other pipelines affected included certain Magellan Midstream and Kinder Morgan pipelines.

See Catherine Ngai, Key Fuel Lines Restart as Concerns Ease over Supply Crunch after Harvey, *REUTERS* (Sept. 3, 2017), <https://www.reuters.com/article/us-storm-harvey-energy/key-fuel-lines-restart-as-concerns-ease-over-supply-crunch-after-harvey-idUSKCN1BE0I0>; *see also* Kenneth Rapoza, Here's How Many Barrels of Oil Have Been Lost

As refineries and pipelines slowly began to re-open after the damage wrought by Hurricane Harvey, Hurricane Irma headed towards Florida where state and local officials issued mandatory evacuation orders, leading to increased demand for fuel in anticipation of the storm. Florida does not receive fuel via pipeline—its markets rely on trucks, tankers, and barges. Prices in Florida already had begun to rise in the state due to disruptions in the overall U.S. fuel supply chains resulting from Hurricane Harvey. The subsequent diversion of land and sea traffic due to Hurricane Irma, as well as the significant wind damage created once the storm made landfall, further affected the Florida fuels market and caused prices to rise even higher; in some places, prices increased by up to \$0.40/gallon. The fuels market was further battered by Hurricanes Maria and Nate, which dealt blows to Puerto Rico and oil production in the Gulf of Mexico, respectively.

On a normal day, prices fluctuate in the retail fuels market. This is because the fuel commodities market is one of the most competitive commodities markets in the nation. In fact, margins on fuel sales often fluctuate between 2¢ - 20¢ and retailers must constantly react to changes in supply and demand to ensure that their prices remain competitive; the price on the sign is often the sole factor driving consumers' decisions about where to buy fuel. In a rapidly escalating wholesale market, retail market prices generally reflect the increase in the wholesale price. Retailers generally attempt to generate sufficient revenues to cover the costs of replacing the inventory which they have just sold. This phenomenon is most noticeable in markets where wholesale prices are escalating rapidly.

Price fluctuations during emergencies are unavoidable. During any severe weather event or catastrophe, including a hurricane, wholesale fuel prices become more volatile as the market tries to assess and anticipate supply availability and as access to wholesale product may become restricted. When these unwelcome changes occur, retailers respond to meet their costs (often at a fairly quick rate). With the effects of refinery and pipeline closures due to Hurricane Harvey impacting the market, supply during Hurricane Irma was limited, putting dramatically increased pricing pressure on fuel retailers, who then made individual decisions on whether to increase prices and risk losing consumers, or potentially take losses by keeping prices low (and not covering their increased wholesale replacement costs). It is also important to note that the supply concerns arising during the autumn hurricane season are always exacerbated by the transition from summertime to wintertime fuel that occurs on September 15th. This is because in the weeks leading up to the transition (and during the middle of the most active part of the hurricane season), everyone is drawing down on inventories at exactly the time when we need product in place. In other words, inventories of product that is usable through September 15th are being drawn down to minimums at the same time the inventories of product for use after September 15th are being built.

Seeking to mitigate the infrastructure impediments and the resulting negative market effects of the hurricanes, both the Federal government and state governments worked with fuel

to Hurricane Harvey, FORBES (Aug. 28, 2017), <https://www.forbes.com/sites/kenrapoza/2017/08/28/heres-how-many-barrels-of-oil-have-been-lost-to-hurricane-harvey/?#6d8bbe04637c>.

industry stakeholders in an attempt to preempt negative effects of the storms, as well as deal effectively with the aftermath

IV. HURRICANE RESPONSE EFFORTS

The clear communication between state governments and the private sector and the timely response efforts of the Federal government were essential to our ability to effectively respond to the disaster.

A. STATE EFFORTS

State-level communication and coordination initiatives were critically important to fuel retailers' hurricane preparation and recovery efforts, and helped minimize service disruptions caused by Harvey and Irma. In Texas, Governor Greg Abbott's team held conference calls with the local state associations, including the Texas Food and Fuel Association, local retailers, and emergency responders—and the state was instrumental in petitioning the Environmental Protection Agency for fuel waivers to address supply concerns. Florida Governor Rick Scott and his administration deserve special recognition for their close engagement with a wide range of stakeholders in the fuel supply system during Hurricane Irma. Governor Scott led daily (and sometimes twice-daily) conference calls that included federal disaster response officials, convenience and fuel retailers (including NACS, the Florida Petroleum Marketers Association, and individual companies including RaceTrac), oil companies, terminal operators, and other segments of the supply chain before, during, and after the storm. The governor's office listened closely to industry concerns and rendered prompt assistance. For example, to help retail locations stay open as long as possible, the governor arranged for state police to help employees who stayed on the job until the last minute get to evacuation centers with their families.

Working with federal and local officials, the governor's office also rescinded weight and driver restrictions for highways, helped ensure that ports prioritized fuel shipments, and coordinated police and military escorts for fuel trucks and ships, easing the movement of product from tankers and barges, through ports and terminals, to retail fuel locations, and ultimately consumers' gas tanks. In addition, the state governments requested the fuel waivers that are discussed in further detail below. These are just a few examples of exemplary state-level actions highlighting the importance of real-time communication and cooperation between multiple levels of government and the fuel industry to ensure supply stability during a natural disaster.

B. FEDERAL EFFORTS

At the Federal level, disaster response efforts spanned a number of departments and agencies, including the Environmental Protection Agency (EPA), the Federal Motor Carrier Safety Administration (FMCSA), the Federal Energy Regulatory Commission (FERC), the Internal Revenue Service (IRS), the Department of Homeland Security (DHS), and the U.S. Department of Agriculture (USDA).⁷ Between the end of August, as Hurricane Harvey bore

⁷ The focus of this testimony is on the fuel supply chain, but the prompt efforts of USDA to provide emergency Supplemental Nutrition Assistance Program (SNAP) benefits and waive SNAP hot foods restrictions was critical to making sure hurricane victims had access to food.

down on Texas and Louisiana, to the end of September and even into October as Hurricanes Maria and Nate affected the Eastern U.S. coast, Federal agencies responded to state petitions and expeditiously issued more than 30 waivers in an effort to respond to fuel supply issues and prevent future problems.⁸

Of particular importance to RaceTrac were FMCSA's regional emergency declarations, which waived hours of service limitations and certain fee requirements for drivers providing direct assistance to states affected by the disasters. In a time of emergency, these waivers allowed drivers to quickly and efficiently travel through surrounding states to gain access to affected areas, enhancing supply lines and allowing vital goods, including fuel, to get to those in need. For RaceTrac, these waivers were the difference between getting fuel to our customers in a reasonably affordable and timely manner, and not being able to supply members of our communities with the fuel they needed.

Aside from improving transportation of goods during the emergencies, Federal agencies also eased restrictions on the type of product that could be sold by retailers.⁹ This is significant because the U.S. fuels market is characterized by "boutique" fuels, the natural result of states and municipalities implementing diverse fuel specifications for different geographic areas in order to reduce emissions and otherwise meet weather/seasonal needs. This means not all fuel is fungible: certain types of fuels can be used in some parts of the country but not in others—so when there are supply constraints, it can quickly become difficult for retailers to find market compliant fuel to sell. Thus, the fuel waivers issued by EPA, which relaxed fuel specification requirements in an assortment of geographical areas, were extremely important because they enhanced fuel fungibility and facilitated the speedy acquisition of fuel. For example, to "minimize or prevent the disruption of an adequate supply of gasoline," EPA waived certain reformulated gasoline requirements (RFG). In addition, EPA temporarily eliminated restrictions on the use of gasoline that contains 15 percent ethanol (*i.e.*, E15),¹⁰ effectively ending the summer ban and allowing the sale of E15 in 38 states and the District of Columbia.¹¹

EPA's timely response to market conditions led to the issuance of these and many necessary fuel waivers that were critical in helping fuel retailers, particularly small independent operators, to get product out to consumers and thereby lessening the impact of these natural disasters. In short, for many fuel retailers, these waivers were vital to ensuring they could keep their retail fuel locations "wet" (*i.e.*, supplied with fuel). Given RaceTrac's sophistication with regard to its fuel supply, however, EPA's fuel waivers were less significant to the day-to-day

⁸ For a compilation of federal and state waivers, see SIGMA, Hurricane Waivers and Resources, <https://www.sigma.org/hurricane-harvey>.

⁹ For example, recognizing the existence (or beginnings of) diesel fuel shortages, the IRS waived penalties related to the use of certain types of diesel fuel on highways.

¹⁰ Generally, fuel retailers are not allowed to sell E15 during the summer months, as it is considered too volatile and has less favorable emission characteristics.

¹¹ See *e.g.*, August 31, 2017 Waiver, <https://www.epa.gov/sites/production/files/2017-08/documents/secondmultistate083117.pdf>.

running of our business during the hurricane than were FMCSA's and various states' hours of service waivers. Nevertheless, the importance of the fuel waivers for the marketplace cannot be understated.

DHS also tried to boost the fuel industry supply chains when it waived the Jones Act¹²—a law requiring goods shipped in the U.S. to be carried aboard U.S. vessels.¹³ This waiver was designed to enable fuel to reach areas in need more quickly, regardless of the vessel transporting it. This was particularly important in Florida, which is not supplied by pipeline, and receives the majority of its fuel by ship or truck.

C. SUCCESSES, LESSONS LEARNED, GOALS FOR THE FUTURE

The many successes of the 2017 hurricane response efforts stand in stark contrast to what occurred during Hurricanes Katrina and Rita in 2005, when fuel supply and distribution disruptions led to chaos in the marketplace. This is all the more remarkable since the 2017 hurricane season had a more substantial and sustained impact on U.S. refining capacity and the two major pipelines (Explorer and Colonial) compared to the 2005 hurricane season.¹⁴ In short, despite the major disruptions to the fuel distribution system after Hurricanes Harvey and Irma, the impact on consumers and the economy were significantly less than in 2005 because the government behaved much differently.

In the chaos after Katrina, the government confiscated or commandeered distribution equipment to respond to the emergency; in this instance, the public and private sector worked together to respond to the crisis. From this experience, we have learned that communication and collaboration are the keys to success. In preparation for a major weather event, it is important for government to have a “response checklist” of what needs to happen when, share that checklist with the private sector, and coordinate with the private sector to expand and effectuate that checklist. For example, rather than telling industry what to do, the Governors of Texas and Florida conducted regular communications with industry via open telephone conferences to troubleshoot issues.¹⁵ They asked the private sector what to do and when; and there was real-time

¹² The first Jones Act waiver was issued on September 8, 2017, https://www.dhs.gov/sites/default/files/publications/17_0908_AS1_Jones-Act-Waiver.pdf.

¹³ The Jones Act prohibits the transportation of cargo between points in the U.S., either directly or via a foreign port, or for any part of the transportation, in any vessel other than a vessel that has a coastwise endorsement (e.g. a vessel that is built in and owned by persons who are citizens of the United States). See 46 U.S.C 55102, stating “a vessel may not provide any part of the transportation of merchandise by water, or by land and water, between points in the United States to which the coastwise laws apply, either directly or via a foreign port” unless the vessel was built in and documented under the laws of the United States and is wholly owned by persons who are citizens of the United States.

¹⁴ Rita and Katrina Have Shut 23 Percent of U.S. Oil Refining Capacity (Sept. 22, 2005), NY TIMES online, <http://www.nytimes.com/2005/09/22/business/rita-and-katrina-have-shut-23-percent-of-us-oil-refining-capacity.html>.

¹⁵ The governors opened lines of communication before the disaster struck and maintained those lines of communication during the hurricanes to ensure that the retail community and the government could respond and adapt to the communities' needs.

cooperation to respond to an ever-changing threat landscape. Such cooperation with industry is unique—and it is commendable.

Notwithstanding these successes, there are important lessons to be learned and goals to improve future response efforts. While there were open lines of communication to discuss on-the-ground response before and during the disasters, there was no concerted effort to shape the discourse on social media. As such, panic hit before and immediately after the hurricanes touched down and there was an instantaneous and significant pull on the available fuel supply. However, once people were appropriately informed there would be gasoline available, the market calmed and convenience store supply repositories stabilized. In short, once the government and the private sector was able to break through the social media “noise” and panic, we were able to alleviate anxiety and lessen the stress on the available supply. From this, therefore, I urge governments and the private sector to also plan to coordinate information campaigns to the public prior to weather events to preemptively contain the panic that is prone to ensue.

In addition, bottlenecks at ports and fuel terminals has been a recurring theme this hurricane season, and federal and state governments could do more to help alleviate the problem during future natural disasters. For example, this Committee could consider a legislative solution that would grant truck drivers and other employees critical to fuel delivery some kind of temporary “responder” status that would relax port authority access restrictions to allow non-local truck drivers temporary access to ports in affected areas in emergency situations.

A temporary “responder” designation would also help mitigate a related challenge that RaceTrac and similarly situated companies experienced during the recovery process: in the hurricanes’ aftermath, truck drivers and other employees critical to fuels systems operation found it extremely difficult to get into affected areas promptly. After Harvey, for example, when many of our Houston-based employees were stranded by flooding, we tried to send in employees from other in-state and out-of-state locations. Ultimately, however, those employees were unable to proceed much farther than Dallas, and could not get to the Houston area in a timely fashion. Anything state and federal government agencies can do to remove logistical hurdles for fuel transportation (*e.g.*, special consideration by state law enforcement, port authorities, or federal disaster response officials) would significantly expedite fuel supply recovery efforts in the wake of future hurricanes.

V. CONCLUSION

RaceTrac believes the swift collaboration between the public and private sectors was critical to the successful response to the 2017 hurricane season, and is proud to have been able to successfully serve many communities throughout the Gulf Coast and the Eastern seaboard during this difficult time.

Thank you for the opportunity to testify before you today. I am happy to answer any questions you may have.

Mr. OLSON. Thank you, Mr. McBrayer.

The Chair now calls upon the honorable Ramon Luis Nieves, who is now an attorney at law, was a former distinguished member of the Senate of Puerto Rico.

You have 5 minutes for an opening statement, sir.

STATEMENT OF RAMON-LUIS NIEVES

Mr. NIEVES. Thank you, Chairman Olson, Ranking Member Bobby Rush, members of the subcommittee.

My name is Ramon-Luis Nieves. I had the privilege to serve the people of Puerto Rico as senator of San Juan and chairman of the Committee on Energy. I currently practice law in the State and Federal courts of Puerto Rico.

I want to thank the subcommittee for this opportunity to discuss Puerto Rico's energy challenges. As a resident of San Juan, I have personally suffered the problems associated with the lack of electricity for more than 40 days. The currently energy crisis is destroying our economy and our way of life.

Nobody denies the challenges of repairing the collapsed energy grid of Puerto Rico, but I submit to you that most of the challenges to turn the lights back on in Puerto Rico are neither natural nor geographic. They are manmade.

The Puerto Rico Electric Power Authority, PREPA, was already a bankrupt, fragile, and useless entity before Hurricane Maria made landfall. The Power Authority's grid was obsolete, lacking adequate maintenance.

The recent Whitefish debacle is exhibit A of the governance issues plaguing PREPA. As we evaluate energy options for Puerto Rico, we must be particularly alert about disaster contractors who may try to take advantage and profit off of our people's misery.

But I didn't take two flights from San Juan to complain about PREPA. I come before you with proposals to help us transform Puerto Rico's energy model.

Energy equals life. As most Puerto Ricans sadly understood after Hurricane Maria, the lack of a strong, resilient, and smart energy system has the potential of killing people and destroying the economy. The actual death toll not of Hurricane Maria, but of Hurricane PREPA has not been properly disclosed by the government of Puerto Rico.

While working hard to turn the lights back on as soon as possible, policymakers must also think long term. A plan to transform Puerto Rico's energy model, supported by significant Federal support funding, is the right course of action.

Technology and innovation are transforming the energy industry. Puerto Rico must break free from PREPA's centralized energy model. The people of Puerto Rico deserve an energy model whereby more and more customers are able to opt for distributed generation or go off the grid in their homes and business.

Policymakers are agreeing with the idea of a new energy model based on several regional microgrids. Microgrids for key Government security and health installations, such as hospitals, will also help recovery efforts after future storms and hurricanes.

The mandate to regulate microgrids is already in our law books. Act No. 133 from last year the last bill that I sponsored in the Sen-

ate, to include microgrids as a mandate. However, a Federal mandate to include microgrids in a new energy model for Puerto Rico will certainly help.

PREPA has also pointed out that the Stafford Act restricts to rebuild the grid as it was. Perhaps you may be able to change that by amending Federal law.

PREPA's old, and now collapsed, grid is not able to deal with the technical challenges of an energy model that embraces renewable power. However, as I have said, countless policymakers agree that just repairing the old, obsolete energy grid of Puerto Rico will be a colossal waste of taxpayer dollars. PREPA is broke. So, the Federal Government is the only entity able to finance this key project.

Let's talk about PREPA's governance. The Whitefish scandal is a sad example of the shameful and incompetent governance that characterizes PREPA. PREPA awarded a no-bid \$300 million contract to an unknown company with just two employees. The Government recently requested PREPA to cancel the contractual agreement, but 40 days after Hurricane Maria, and hundreds of deaths later, PREPA did what it should have done from the start, request the mutual aid offered by private and public electric companies. But where was PREPA's governing board? Nobody really knows, but I submit to you that this Whitefish business is very harmful to Puerto Rico's credibility.

Very quickly, since my time is almost up, PREPA collapsed under its \$9 million debt. Congress, the administration, and the oversight board must create a financial solution for PREPA's debt. Aggressive restructuring of the debt, combined with new Brady-type bonds and continued oversight over PREPA, could be a way to solve this monumental problem.

And just to finish up, the most efficient way to transform the energy model of Puerto Rico is by giving the proper resources to Puerto Rico's independent energy commission. An independent and strong regulator is key for our recovery. In order to guarantee the Federal funds to build a new energy grid are properly used and allocated, I propose that the Revitalization Coordinator of Puerto Rico under PROMESA and the Puerto Rico Energy Commission be given sole authority over PREPA. PREPA shall cease to exist in its present form.

Just to wrap up, thank you for the opportunity. The people of Puerto Rico urgently need to turn their lights back on, but we also demand the resources to create a new energy model for our island. Our lives depend on it.

Thank you.

[The prepared statement of Mr. Nieves follows:]

**Testimony of Ramon-Luis Nieves, Esq.,
former Senator and Chairman of the Committee on Energy,
Senate of Puerto Rico,
before the Subcommittee on Energy,
Committee on Energy and Commerce
U.S. House of Representatives
November 2, 2017**

**“The 2017 Hurricane Season: A Review of Emergency Response and
Energy Infrastructure Recovery Efforts”**

Chairman Fred Upton, Ranking Member Bobby Rush, members of the Subcommittee on Energy:

My name is Ramon-Luis Nieves. I had the privilege to serve the people of Puerto Rico as a state senator, representing the District of San Juan. After my return to the private sector, I founded RL Legal & Consulting Services, LLC. I currently practice law in the state and federal courts of Puerto Rico.

I want to thank the subcommittee for this opportunity to discuss Puerto Rico's energy challenges. Puerto Rico is suffering from the longest blackout in U.S. history. As a resident of San Juan, I have personally suffered the problems associated with the lack of electricity for more than forty days. The current energy crisis is destroying our economy and our way of life. Our friends and families are emigrating by the thousands. The government estimates that close to 15% of our population will emigrate as a consequence of Hurricane Maria and the subsequent lack of energy.

More than forty days after Hurricane Maria made landfall, several million Puerto Ricans, U.S. citizens, lack electricity in their homes and businesses. The

businesses that have been able to open, are testing the limits of their power generators.

Nobody denies the challenges of repairing the collapsed energy grid of Puerto Rico. 80% of the grid was destroyed by a category 5 Hurricane. The Islands of Puerto Rico have a mountainous geography. Trucks from energy companies cannot arrive the next day after a natural disaster, since this U.S. territory is an Island (surrounded by “water, big water”, as the President stated a few weeks ago).

But I submit to you that most of the challenges to “turn the lights back on” in Puerto Rico are neither natural, nor geographic: they are man-made.

The Puerto Rico Electric Power Authority of Puerto Rico (PREPA) was already a bankrupt, fragile and useless entity before Hurricane Maria made landfall. The power authority’s grid was obsolete, lacking adequate maintenance. For years, consumers and businesses have suffered from high energy costs, unreliability and constant interruptions.

PREPA was one of the “crowning jewels” of the mid-Twentieth Century economic miracle that transformed Puerto Rico. In just forty (40) years, PREPA accomplished its original mission: to provide total electrification to the residents of Puerto Rico.

The utility currently struggles to operate a centralized grid, where power generation is based in the southern part of Puerto Rico, while most of the energy consumption concentrates in the North. PREPA owns and operates a centralized energy system: power generation, transmission and distribution infrastructure are

controlled by the public corporation. Two private entities AES (coal) and Ecoelectrica (natural gas), and several utility scale renewable energy projects, sell their energy to PREPA. These private entities account for more than a third of the Island's electric power generation. As is the case with most Island electric power systems, which are isolated systems, PREPA depends mostly on imported oil to generate energy. 98% of all electricity in Puerto Rico is generated by burning fossil fuels.

As accurately described by the Center for the New Economy, PREPA operated for more than 70 years as a tax-exempt, self-regulated, public monopoly, with broad powers including unsupervised rate-making, and debt-issuing authority.

Congress's decision to repeal the IRC Section 936 tax incentive regime, Puerto Rico's manufacturing backbone, precipitated a deep economic depression, now on its eleventh year. High oil prices, continued migration of thousands of residents, and industries closing, severely affected the revenues of the utility. PREPA and the governing political parties of the Commonwealth refused to adapt. They rather chose the slippery slope of enormous borrowing. In 2010, 2012 and 2013, PREPA authorized ten (10) bond emissions, for a combined amount of \$5.3 billion in debt.

But PREPA was not just financially broke before Maria made landfall. Politics also destroyed the utility's chance to transform itself. The improper intervention of local political factions undermined PREPA's decision making for years: from its governing board, full of political cronies, to its day-to-day management, and even the recruiting process of its employees. At the start of any new administration of the

government of Puerto Rico, the prevailing party awards its loyalists with numerous management and technical posts at PREPA. Any recently elected politician is overwhelmed by hundreds of petitions from party loyalists to ‘facilitate’ recruitment at PREPA, known for its generous labor benefits. For years, political organizations operating at the heart of the utility raised thousands of dollars in campaign contributions. Bondholders, brokers, consultants, political parties, fuel suppliers, and others have used PREPA as a cash cow since forever.

The recent Whitefish debacle, which I’ll address later, is Exhibit A of the governance issues plaguing PREPA, which affect the recovery efforts. PREPA has historically ignored legal mandates, such as the ones ordering it to embrace renewables and regulate wheeling, for example. Weak and politically dependent governing boards frequently cede control to the Governor’s Mansion (La Fortaleza). Transparency is such a joke at PREPA, that the unions usually assume the role of spokespersons for the utility. PREPA became such a politically powerful force over the decades, that no Legislature dared to perform adequate oversight. That is, until 2014, when the Senate of Puerto Rico stepped up to the challenge.

But I didn’t take three flights from San Juan to complain about PREPA. I come before you with proposals to help us transform Puerto Rico’s energy model.

Energy equals life. As most Puertoricans sadly understood after Hurricane Maria, the lack of a strong, resilient, and smart energy system has the potential of killing people, and destroying the economy. Official government figures currently

place the death toll of Hurricane Maria at 59. But that statistic is misleading. Recent reports state that the government authorized almost a thousand cremations. Also, on a personal note, dozens of friends have shared with me countless stories of their elderly loved ones dying as a result of the lack of electricity in their homes, hospitals and care-centers. The actual death toll, not of Hurricane Maria, but of Hurricane PREPA, has not been properly disclosed by the government of Puerto Rico.

While working hard to “turn the lights back on” as soon as possible, policymakers must also think long term. Puerto Rico’s short term recovery, and future prospects of economic development, depend on building a new energy grid. Countless policymakers already agree that just repairing the old, obsolete energy grid of Puerto Rico will be a colossal waste of taxpayer dollars. Governor Ricardo Rosselló, President Donald Trump, the Department of Energy, the Puerto Rico Energy Commission, senators and representatives, as well as the energy industry, all agree that a plan to transform Puerto Rico’s energy model, supported by significant federal funding, is the right course of action.

A decentralized energy system

PREPA has historically adhered to the old utility model, which until recently had not changed much since the times of Thomas Alva Edison. In the old, centralized model, energy consumers had a passive relationship with their utility. They received electricity generated, transmitted and distributed by the utility, and payed their bills.

Technology and innovation are transforming the energy industry. The development of batteries for storage, lower costs or more favorable financing models for the renewable market, net metering, microgrids and community-shared solar, are disrupting the old utility business model. Energy consumers now have the option to become active elements of the equation, not just passive consumers.

Puerto Rico must break free from PREPA's centralized energy model. The people of Puerto Rico deserve an energy model whereby more and more consumers are able to opt for distributed generation; net metering in their homes and business, or opting to go "off the grid", with the combination of renewables and storage; a system that regulates and allows wheeling for the industrial sector, so they can opt to purchase their power from private generators, offering more competitive rates than the utility.

Creative public-private partnerships, as well as new power purchase agreements with private generators, must be pursued. For years, advocates of power authority's centralized model have frowned upon these options. Their time is up.

As other utilities have been doing for years, PREPA could even become a player in the renewable market. Sadly, that ship sailed years ago: the oil-addicted PREPA did nothing to embrace the renewable market through its little known, and now inactive subsidiary, PREPA Renewables.

Policymakers are finally agreeing with the idea of a new energy model based on several regional microgrids in Puerto Rico. Microgrids for key government,

security and health installations (such as hospitals), would also help recovery efforts after future storms and hurricanes.

The mandate to regulate microgrids is already in our law books: Act No. 133-2016, the last bill sponsored by me that became law. The Puerto Rico Energy Commission recently announced an expedited process to enact proper regulations for microgrids.

Microgrids present a unique opportunity for industries and residential communities. Although used for decades, Hurricane Sandy in 2012 opened a new dialogue on microgrids in the United States. Several business models for microgrids are actively discussed by energy stakeholders. Prominent researchers at the University of Puerto Rico-Mayagüez College of Engineering, such as Efraín O'Neill, Ph.D., contribute regularly to the discussion with research on the possibilities of microgrids.

Significant federal resources are required to build a new energy grid

A stronger, resilient and “smarter” grid is required to properly decentralize Puerto Rico’s energy model. The old (and now collapsed) grid, was only able to integrate of 580 MW of renewable power. The grid that is currently being repaired lacks “smart grid” technology; hence, the old grid is not able to deal with the technical challenges of an energy model which embraces renewable power, and includes active energy consumers.

Appropriating taxpayer money just to repair an old 20th Century grid is a waste of resources. Ken Buell, director of Emergency Response and Recovery with the U.S. Department of Energy, stated that “we really should think in terms of rebuilding at this point”, not just repairing the old grid. Judith Enck, former EPA administrator, concluded that “it’s absolutely imperative that FEMA not fund rebuilding an inadequate system”.

There are no official cost estimates for the project proposed herein. Building the infrastructure for a decentralized energy model is obviously a multibillion dollar project. But with the insolvency of PREPA and the government of Puerto Rico, the federal government is the only entity able to finance this key project.

PREPA's governance...and the Whitefish debacle

The Whitefish scandal currently occupies media space that could rather be used to portray the current humanitarian crisis in Puerto Rico. But, as stated earlier, Whitefish is a sad example of the shameful and incompetent governance that characterizes PREPA.

The energy industry watched with dismay as PREPA declined to activate the mutual aid protocols of the American Public Power Association and the Edison Electric Institute. Instead, PREPA opted to award a no-bid \$300 million contract to a company with just two employees, totally unknown in the industry, and even unknown by an energy regulator from Montana, their home state.

The Whitefish contract included provisions that would have raised the attention of a first-year law student. It precluded audits from government authorities over the work performed, and absurd and illegal clause. The contract represents that FEMA approved it, which is false. FEMA knew about the contract after the fact, and has “significant concerns” about the process of procurement and the contract prices.

The government recently requested PREPA to cancel the controversial agreement, and attempted to take distance from it. Now, forty days after Hurricane Maria, PREPA did what it should have done from the start: request the mutual aid offered by the private and public electric companies of APPA and EEI. Finally, help is on the way, after wasting forty days.

But where was PREPA’s governing board? PREPA has stated that it failed to make contact with their board for fourteen days after Maria. Obviously, they had to pass judgment on the Whitefish contract, which they did.

The fact that nobody in that board appears to have seriously questioned the Whitefish agreement, raises two possibilities: either they rubber-stamped the management’s decision, without reading, or somebody lobbied PREPA really hard to favor Whitefish. I hope that we will know the real Whitefish story, soon enough.

I submit that Whitefish is the direct result of the current government’s recent legislation to control PREPA’s board. For the first time in PREPA’s history, a professional, non-partisan and independent board was appointed in 2016, as mandated by Act No. 4-2016. But it was short-lived. Now, government officials and

other members selected by the governor control the board. This politically controlled board delivered Whitefish.

Federally-sanctioned solution to PREPA's unpayable debt

In 2014, PREPA collapsed under its \$9 billion debt. Bankruptcy was not an option because Congress, in a yet unexplained 1984 decision, 'mysteriously' excluded PREPA from the bankruptcy provisions of Chapter 9. The local legislature tried to provide a "bankruptcy type" solution for PREPA, but the so-called Recovery Act was struck down by the United States Supreme Court in 2016.

Pursuant to the PROMESA Act, Congress imposed a Financial Oversight and Management Board over the Commonwealth to deal with the Island's fiscal nightmare. On behalf of PREPA, the Board filed for the bankruptcy-type process under Title III of PROMESA.

I respectfully submit that building a new energy grid for Puerto Rico, as has been proposed, will not be possible until PREPA's debt situation is solved. PREPA's \$9 billion debt was already unpayable before Hurricane Maria. Now, with its grid collapsed, the people leaving by the thousands, and businesses closing, there is no way for PREPA and its customers, the people of Puerto Rico, to pay the debt. Failure to pay PREPA's debt is not a moral issue: it is a financial impossibility.

Bondholders would have reason to object a project to decentralize Puerto Rico's energy model. They bought bonds based on the business model of a centralized energy

utility. The prospect of a utility that agrees to lose earnings, as a result of its decentralization, runs counter to their financial interests.

Congress, the Administration, the Oversight Board, and even the federal court must consider enabling a process to create a financial solution for PREPA's debt. If there is political will, a creative financial solution will certainly emerge. Aggressive restructuring of the debt, combined with new, Brady-type bonds, and continued oversight over PREPA, could be the way to build a new energy model and infrastructure in Puerto Rico.

PR Energy Commission: an Independent and Strong Regulator

The most efficient way to transform the energy model of Puerto Rico is by getting politics out of PREPA. Decisions about energy policy and management must be based on facts, data, and compliance with applicable laws and regulations.

Hence, a strong and independent energy regulator is the only way to guarantee that politics no longer control decisions over the energy sector.

Act No. 57-2014, the "Act for the Transformation and Energy Relief of Puerto Rico", paved the way to end PREPA's inefficient monopoly. The Energy Reform Act contains a strong and forward-looking declaration of public policy, as well as specific mandates to transform PREPA, and develop the framework for a vibrant private energy sector. The creation of a powerful and independent Energy Commission ended

seven decades of self-regulation. The Energy Commission has broad powers of regulation and dispute resolution over PREPA and the private energy sector.

For the first time in its existence, PREPA was required to prepare an Integrated Resources Plan (IRP). The IRP creates a roadmap of the electric power system in Puerto Rico during a twenty (20)-year period. The Energy Commission now has the authority to approve PREPA's rates, and concluded its first ever rate review in early 2017. For political reasons, PREPA's basic rate had not been revised since 1989.

A new legal framework for energy regulation and management was established by Act 57. Apart from the powerful Energy Commission, the Act created the Independent Consumer Protection Office, an energy advocate for consumers. New powers of oversight and authority to implement energy policy were also delegated to the State Energy Public Policy Office.

Congress, the Administration and the Oversight Board have expressed their support for the Energy Commission created under Act No. 57-2014.

Title V of PROMESA provides for the appointment of a Revitalization Coordinator who will assess "critical projects" to (i) improve performance of energy infrastructure and overall energy efficiency; (ii) expedite the diversification and conversion of fuel sources for electric generation from oil to natural gas and renewables; (iii) promote the development and utilization of energy sources found on Puerto Rico; (iv) contribute to transitioning to privatized generation capacities in

Puerto Rico and (v) support the Energy Commission in achieving its goal of reducing energy costs and ensuring affordable energy rates.

The Oversight Board has named Mr. Noel Zamot as both Revitalization Coordinator, and chief restructuring officer of PREPA (a decision challenged by the government of Puerto Rico).

In order to guarantee that federal funds to build a new energy grid are properly used and allocated, I propose that the Revitalization Coordinator and the PR Energy Commission be given sole authority over PREPA. PROMESA already mandates that the Revitalization Coordinator will work with the PR Energy Commission, so this proposal is a logical step. Neither Puerto Rico, nor the U.S. government, need another Whitefish situation.

Thank you for this opportunity. The people of Puerto Rico urgently need to turn the lights back on. But we also demand the resources to create a new energy model. Our lives depend on it.

Mr. OLSON. Thank you, Senator Luis Nieves.

We saved the best for last, ma'am. Our final opening statement is going to be from Ms. Cathy Kennedy, and she is the Vice President of the National Nurses United.

Ma'am, you have 5 minutes for an opening statement. Welcome.

STATEMENT OF CATHERINE B. KENNEDY

Ms. CATHERINE KENNEDY. Vice Chairman Olson, Ranking Member Rush, and members of the subcommittee, good afternoon, and thank you for inviting National Nurses to take part in this hearing.

My name is Catherine Kennedy of Carmichael, California, and I have been a registered nurse for 37 years. I currently serve as the Vice President of National Nurses United, which is the largest union of RNs in the country. I submit the testimony today on NNU's behalf.

From October the 4th through the 18th, I served on a voluntary deployment to Puerto Rico with NNU's Registered Nurse Response Network to assist with Hurricane Maria's disaster relief. Fifty nurses deployed with R&R into Puerto Rico among 300 skilled union members organized by AFL-CIO.

NNU nurses very much appreciate your holding this hearing and providing us the opportunity to share our account of the public health crisis that we witnessed. NNU's full report on the conditions of Puerto Rico is attached to my written testimony.

The lack of electricity is endangering people's lives and leading to preventable death and illness. I was the lead RN for the healthcare teams on the deployment. I helped to organize nurses into teams and, with a map of the island, we tracked the public health assessment of each community that we visited, evaluating whether people had access to food, water, and healthcare, their basic living conditions, and medical needs. Time and time again, we saw that lack of power exacerbated the disaster or created new ones.

Basic medical services were down in many areas and not fully functioning in others. An acute public health crisis has developed. Without electricity, people with chronic illnesses, such as diabetes and hypertension, cannot refrigerate their medications. For example, in Loiza, nurses worked with elderly residents who had to put their insulin in bowls of tepid water, trying to keep this lifesaving medication cool enough to use.

Pharmacies could not refrigerate their medications, either. They also cannot access computer systems which store prescription orders. Therefore, patients were scrambling to find doctors to write new prescriptions, so they can give them to the pharmacies. But many doctors' offices were closed, partly because the grid is still down and accessing reliable generators and fuel for them was nearly impossible.

Pharmacies also cannot access insurance information. So, patients are being asked to pay full price for medications. Most people don't have cash, and if they had money in the bank, they can't access it because the ATMs and the banking process systems are also down.

As long as the power grid is down, hospitals cannot function at full capacity. Generators are prone to failure, and fuel is hard to

access. With generators, hospitals can't perform certain procedures or tests which use a large amount of energy. And at one hospital we know that they could not perform MRIs as long as they relied only on generators.

Without reliable power, the problems of accessing food and water are amplified. The simple act of purchasing food and water, when it is available, is nearly impossible. Stores can't take credit cards, and ATMs don't work. Bank services that normally take minutes now take hours.

The people of Puerto Rico are unable to refrigerate and cook their food. They must rely on canned and processed foods, which are high in sodium. Access to food in rural communities is especially difficult. As long as there is no power, people will be reliant on relief organizations to provide food and water for them.

Electricity is also needed to run wastewater treatment plants and to restore the functioning of water utilities. Without clean running water, nurses have witnessed the beginnings of multiple outbreaks of waterborne diseases, including leptospirosis, an animal-borne bacterial disease that can be fatal if not treated in time.

Then, there are problems accessing FEMA aid. People can't access FEMA's online notices and aid application. For those that are able to apply for aid, they are told that necessary followup communication will be sent either by text or email. People don't have power right now. They are not going to receive any followup for their FEMA applications.

NNU urges Congress to use its oversight and appropriation authority to ensure that FEMA and other U.S. agencies respond to this crisis effectively. It is unacceptable that citizens of the richest country on earth have been denied necessary humanitarian aid and left to die. With a growing climate crisis, relief to Puerto Rico must come in the form of responsible measures that can build a sustainable energy future.

Thank you again for giving NNU the time to share the stories of the people and places in Puerto Rico that we cannot and must not forget. Thank you.

[The prepared statement of Ms. Kennedy follows:]

**Testimony of Catherine B. Kennedy, RN
On Behalf of National Nurses United Before the
House Energy and Commerce Committee
Subcommittee on Energy
November 2, 2017**

SUMMARY

- National Nurses United (NNU), with the Registered Nurse Response Network (RNRN), sent 50 registered nurses (RNs) to Puerto Rico to assist with Hurricane Maria disaster relief from October 4 to October 18, coordinating with a 300-union member relief delegation of the AFL-CIO.
- RN volunteers observed that, without access to power, basic medical services were down in many areas of Puerto Rico and not fully functioning in most others. An acute public health crisis has developed, including lack of refrigeration for medicine, exacerbation of respiratory illnesses, limited to no access to money or insurance for prescriptions, spread of dangerous waterborne bacterial disease, and failing generators in hospitals.
- Without power, people have had trouble accessing food and clean running water even if supplies are available because water treatment plants are not fully functioning and many electronic banking systems are inoperable.
- Lack of power created barriers for Puerto Ricans seeking FEMA aid and aid applications because aid applications and FEMA announcements rely on text, email, and web-based communications.
- RNs witnessed first-hand the dire conditions for Puerto Rican residents and the insufficient response from federal relief agencies in this disaster.
- NNU urges Congress to take the following actions immediately to prevent further erosion of public health conditions in Puerto Rico and to put the island back on a path to recovery.

**Testimony of Catherine B. Kennedy, RN
On Behalf of National Nurses United Before the
House Energy and Commerce Committee
Subcommittee on Energy
November 2, 2017**

Chairman Upton, Ranking Member Rush, and other Members of the Subcommittee, good morning and thank you for inviting National Nurses United (NNU) to provide testimony on Hurricane Maria disaster relief in Puerto Rico. My name is Catherine Kennedy, of Roseville, CA. I have been a registered nurse (RN) for 37 years, and I am one of the Vice Presidents of NNU, the largest union representing RNs in the United States. NNU currently has over 150,000 members who work as bedside healthcare professionals in every state in the nation. I submit this testimony on Hurricane Maria disaster response efforts today on NNU's behalf.

On October 18, I returned from a two-week volunteer deployment with NNU's Registered Nurse Response Network (or as we call it RNRN) to Puerto Rico to assist with Hurricane Maria disaster relief. RNRN is a national network of direct-care RNs that coordinates sending volunteer RNs to disaster stricken areas where and when they are needed most. RNRN is a project of the California Nurses Foundation, which is a 501(c)(3) non-profit organization, affiliated with National Nurses United. RNRN first deployed nurses after the South East Asian Tsunami in 2004, and again in 2005 when Katrina and Rita — two of the most destructive hurricanes in history — dramatically exposed America's flawed disaster relief system. RNRN has since responded to other disasters, including the earthquake in Haiti in 2010, super storm

Sandy in 2012 and Typhoon Haiyan in 2013, in addition to other humanitarian missions and ongoing first aid support.

Shortly after Hurricane Maria made landfall in Puerto Rico on September 20, 2017, a large delegation of 50 volunteer nurses deployed with RNRN to Puerto Rico as part of a 300-person delegation of skilled union members organized by the AFL-CIO. The deployment took place from October 4 to October 18 – I returned to the mainland exactly two weeks ago.

NNU nurses, especially those of us who were on the ground in Puerto Rico, very much appreciate your holding this hearing and providing us the opportunity to share with you the perilous public health crisis that we have witnessed. I would like to tell you about the realities we witnessed and outline for you the many ways in which the lack of electricity and energy is endangering people's lives and leading to preventable death and illness.

NNU's full report on the conditions in Puerto Rico that RNRN volunteers observed are attached to this testimony.

The RNRN and AFL-CIO Disaster Relief Deployment to Puerto Rico and FEMA Response

After arriving in Puerto Rico, I helped to organize nurses into teams to provide skilled nursing care and assess the public health of communities they visited. We evaluated many different factors including access to food, water, and healthcare, basic living conditions, and medical needs. In many of the communities we visited outside of San Juan, we were the first relief workers that communities had seen. As a result, our nurses were at times the first people to clear roads in order to reach rural communities, or to purchase and deliver food for people who had not yet been assisted by FEMA or other agencies.

I took the role as the lead RN for the AFL-CIO deployment's healthcare teams. I was responsible for overseeing which municipalities the teams were visiting. With a map of the island, we tracked the health assessment of each community we visited. What we saw time and time again was that the lack of electricity and the lack of energy sources exacerbated the disaster or created new ones.

The reality of this situation hit home for me, when in the first days of our deployment, I visited homes in Cupey, a neighborhood in San Juan, with an industrial hygienist. We were assessing the living conditions, especially as they related to safe drinking water. Normally, the first thing you would advise someone to do when water is unsafe to drink is to boil their water. I asked the residents we were visiting if they had electricity or gas to boil their water – all of them said no.

The Public Health Impact Resulting From Lack of Power

Without access to power, basic medical services are down in many areas and not fully functioning in most others. An acute public health crisis has developed.

Without electricity, people with chronic illnesses cannot refrigerate their medications. For example, a group of our nurses travelled to Loiza and worked with elderly residents who depended on insulin. The residents had put their insulin in bowls of tepid water, to try to keep this life-saving medicine cool enough to use. The fact is that without refrigeration, people with diabetes, hypertension, and other illnesses are at risk of severe illness and death.

Patients who require the use of breathing treatments for respiratory illnesses were unable to use their medications because many of the drug delivery devices need electricity. People with asthma who rely on Nebulizers have been unable to perform necessary breathing treatments.

Without power, pharmacies cannot refrigerate their medications nor can they access their computer systems which store prescription orders for refills. Patients have been left scrambling to find doctors to write new prescriptions for their medications, so that the pharmacy can process it. Yet, many doctor's offices are closed. As of October 18 when I left, there were clinics and pharmacies in rural areas that remained closed, partly because the grid was still down and accessing reliable generators and fuel is nearly impossible.

Without their computer and online systems, pharmacies cannot access insurance information for patients. As a result, many are asking patients to pay the full cost of medication. Most people do not have the cash to pay for prescriptions, and even if they have money in the bank, they cannot access that cash because many ATMs and the electronic banking system are also down. The ATMs that are working have long lines, with people waiting hours to withdraw money, if they have access to a vehicle and gas in order to make the trip to one that is working.

When we first arrived, two weeks after the hurricane hit, hospitals were still not able to run at full capacity, and had to operate under dangerous circumstances. My understanding is that most hospitals are now up and running with generators, but they cannot depend on generators in the long term. Generators are perpetually failing and fuel is hard to access. Running on gas, generators throughout the community create their own health problems, exacerbating respirator distress caused by black mold and posing carbon monoxide risks.

Perhaps most important in the short term, is that when a hospital relies solely on a generator, there are certain procedures that cannot be performed because of the amount of energy they use. We experienced this first hand during our deployment when two of the nurse volunteers needed to be hospitalized. I was able to observe the situation in multiple San Juan hospitals, as we tried to find the best care available for our volunteers. One of the nurses needed an MRI, and

the doctor informed us that they could not do the MRI because the hospital was relying only on a generator.

As long as hospitals are relying solely on generators, patients will be denied the full care that they need.

Finally, during the time I was there, as many of you may have heard through media reports, the USNS Comfort was just off the shore of Puerto Rico, but most of its 250 beds were unused weeks after the Hurricane hit, even though its services were badly needed. Without electricity, communication was constrained throughout the island, and so many clinicians were unaware that the Comfort was close by. Or, if they were aware, they did not know how to transfer their patients to the ship. Having served on the USNS Comfort previously, I know that its services would have greatly helped the people of Puerto Rico in the first weeks after the disaster, if only we could have transferred patients to the ship.

Lack of Access to Food and Water

We immediately saw that because of the power outage, people could not access food and water even if supplies were available. Without reliable power, the electronic banking system was initially inoperable and much of it is still not up and running. This makes the simple act of purchasing food and water – when there is some available – nearly impossible. Stores cannot take credit cards, and ATMs do not work. Bank services that under normal circumstances take minutes, now can take hours to complete in Puerto Rico. If someone did have cash when the hurricane first hit, that money quickly ran out.

Without electricity or energy, Puerto Ricans are unable to refrigerate and cook their food. Without ready access to fresh food, they must rely on canned and processed foods, which are

often high in sodium. This can be incredibly dangerous for the many people with chronic health concerns. As I think many of you know, most people have not had access to food, especially in rural communities. As long as there is no power in Puerto Rico, people will continue to be reliant on relief organizations to provide food and water.

Electricity is also needed to run waste water treatment plants, and to restore the functioning of water utilities so that residents have clean running water. Since water treatment plants had not been restored during our time in Puerto Rico, nurses witnessed the beginnings of multiple outbreaks of water borne diseases including leptospirosis, an animal-borne bacterial disease that can be fatal if not properly treated in time.

Puerto Rican residents are facing excruciating questions: do they suffer from severe dehydration or drink from contaminated rivers or streams that could lead to their death? Should they risk contracting and spreading a potentially lethal epidemic of leptospirosis, or risk using Superfund well water or untreated water coming from a spring? Everyday, our nurses on the deployment saw our fellow citizens in Puerto Rico desperate for safe drinking water and forced to make terrible choices.

Problems Accessing FEMA Aid and Aid Applications

In the report NNU released, there is first hand testimony from our nurses who witnessed the problems people faced in accessing FEMA aid applications. Without power, people weren't able to access FEMA's online notices about where and when FEMA would be available. When people knew that FEMA would be in their communities to collect applications for aid, it was through word of mouth.

Even if families figured out when FEMA would be in town, the lack of power raised more barriers. In one town, RNs met families that lined up for aid at 10 p.m. the night before FEMA was there. In another, people were lining up as early as 3 a.m. Doors would open at 8 a.m. and lines would be cut off by FEMA at 10AM. For those who made it through the line, they were told that necessary follow-up communications on their FEMA aid applications would be sent by an outsourced company that only texts or emails. Families in desperate need for FEMA aid were now left to the whims of faulty electric utilities and the hopes that internet, email, or cell service would be restored in time.

Federal Government Response Has Been Inexcusably Delayed and Unacceptably Insufficient.

Based on the experiences of our nurses, the federal government's response to the critical health and safety needs of Puerto Ricans has been woefully insufficient. Given the complex challenges outlined above, it is necessary that the government step in swiftly to ensure that Puerto Ricans regain access to electricity and power immediately.

The response to Hurricane Maria has also been inadequate in other areas. Most notably, our nurses were appalled by the lack of food and water assistance provided by FEMA, and the quality of that assistance where it existed. Those who received food from FEMA received junk food, like Pop-Tarts and Oreos. After waiting in line for hours for FEMA assistance, we watched as residents walked away with only a snack-sized pack of Cheez-its and a small bottle of water. Repeatedly, in town after town, residents told RNs that we were the first relief workers they had seen – even a full three weeks or more after Maria had made landfall.

In one community, an RNRN volunteer reported that seemingly every single resident had conjunctivitis. In other communities, the presence of black mold, and residents sleeping on wet

couches, were posing significant health concerns. Our RNs found people who they worry may die before sufficient food, water, or medicine reaches them. In a desperate effort to help, our nurses conducted public health education, producing and distributing a flyer, and going on the radio to teach people how to clean black mold and disinfect their water.

I'm so proud of our nurses. The map tracking RNRN's relief efforts shows all that we accomplished in two weeks. But it is painful to know that, for many Puerto Ricans, relief is certainly too little and may be too late to stave off a public health crisis. Every day in Puerto Rico, I asked myself – and I know the other RNs volunteering by my side asked themselves – if we could provide this aid, how has our government, with all its resources, been unable to do the same?

It is unconscionable that the people of Puerto Rico are suffering and dying. This is a public health crisis that should never have reached this point. Congress must act now to get Puerto Rico the disaster relief it so desperately needs.

It is the responsibility of the federal government to step in during humanitarian crises — like the one in Puerto Rico — when state and local governments cannot take care of their residents alone. It is unacceptable for us to say that we cannot and should not rely on the federal government for support, and that people need to be more resilient in a disaster without the full aid of their federal government. This kind of rhetoric cannot hide the fact that the federal government is shirking its responsibility and abandoning American citizens to patronage of profit-driven corporations that are wholly unaccountable to the public.

NNU urges Congress to use its oversight and appropriations authority to ensure that FEMA and other U.S. agencies respond to this crisis swiftly and effectively. It is unacceptable that citizens of the richest country of Earth have been denied necessary humanitarian aid and left

to die. Importantly, with the growing climate crisis, relief to Puerto Rico must come in the form of responsible measures that can build a sustainable energy future.

Thank you again for giving NNU and the RN Response Network the time to share the stories of the people and places in Puerto Rico that we cannot – and must not – forget.

RNRN Observations: Post-Hurricane Maria Disaster Conditions on the Ground in Puerto Rico.

RNs witnessed first-hand the dire conditions Puerto Rican residents are facing and the insufficient response from federal relief agencies in this disaster. Conditions I witnessed with other RNs in Puerto Rico include:

- Many communities had still not received any federal assistance or relief from FEMA or other agencies by the end of this deployment on October 18, 2017.
- Residents who had contact with FEMA stood in line for hours in the blistering heat, waiting for desperately needed water and food. Instead, many were asked to fill out paperwork “to collect data” and apply for FEMA assistance.
- They were given only a small bottle of water and a small pack of Cheez-It crackers.
- Residents in communities where FEMA personnel were not present have been unable to apply for FEMA assistance online because of the lack of electricity and internet service.
- Residents continuing to live in houses without roof and soaked interiors where there is dangerous black mold growing that creates respiratory distress and illness.
- Residents desperate for water using containers that used to hold anti-freeze and other toxic agents to gather water from potentially contaminated streams.

- Major areas away from urban centers where residents still had received no provisions and had no running water and no electricity.
- Nurses had to sometimes clear debris in roads themselves in order to gain access to communities who had not received any aid since the hurricanes had struck.
- Dangerous debris and trash piled up outside homes that had not been cleared by authorities, creating many health hazards. Many residents were clearing debris themselves without proper protective gear, and, in some areas, residents are creating landfills without better options.
- Many people who have lost weight since the hurricanes hit due to lack of food (skipping meals, or giving their food to their children instead of eating themselves).
- A lack of basic healthcare services – many local doctors' offices were closed and hospitals were often full and lacking supplies (including clean drinking water), and running on generators prone to failure.
- An outbreak of leptospirosis, a dangerous bacterial disease that had already claimed lives.
- Numerous communities without clean water that are at risk of an outbreak of water-borne illnesses.
- Many of the same conditions they witnessed continue five weeks after hurricane hit Puerto Rico.

Federal Relief Actions Must Be Taken Immediately to Address the Growing Public Health and Safety Crisis in Puerto Rico.

NNU urges Congress to take the following actions immediately to prevent further erosion of public health conditions in Puerto Rico and to put the island back on a path to recovery:

Using oversight authority, Congress must ensure the expeditious functioning and efficacy of FEMA and other U.S. relief efforts on the ground. To deal with the immediate crisis, FEMA and the U.S. armed forces should greatly expand the use of air drops into Puerto Rico of water, food, and medicine. Human and financial resources must be deployed to overcome the bottlenecks that are keeping help from reaching those most in need, which range from a lack of communication to blocked roads to a shortage of vehicles and drivers to make deliveries.

The U.S. Department of Defense must supply greater technological and logistics support to Puerto Rico. This should include providing technical assistance with restoring electricity to the island, installing temporary telecommunications connections in remote areas, and continuing to deploy boots on the ground to help clear roads and deliver humanitarian aid.

Congress must provide resources this fiscal year to address Puerto Rico's looming Medicaid crisis, which is more severe after Hurricane Maria. The Medicaid shortfall was a problem before Hurricane Maria, and is now even more severe given the public health dangers following the storm. In the long term, Congress must ensure that Puerto Rico receives the same federal Medicaid funding as U.S. states, which would save Puerto Rico hundreds of millions of dollars annually. Efforts to address Puerto Rico's humanitarian needs in the wake of Hurricane Maria are inadequate if not extended to solving the island's impending Medicaid crisis. Without immediate action from the U.S. Congress, the territory will not have sufficient funds to continue operating its Medicaid program in 2018, which would strip nearly half of its 3.5 million residents of health insurance at a time when they need it most.

Congress must ensure that patients who need care can access the services of the USNS Comfort. The Comfort has served as a critical site for emergency medical treatment in the aftermath of natural disasters. The USNS Comfort has critical staff, equipment and supplies that are not readily available to many people in Puerto Rico right now. At a time of increased health care crises, we must use all resources available to us to care for patients in need, and our hope is that more people who are not able to get the care that they need can be transferred to the USNS Comfort.

Congress must act to obtain a waiver for FEMA cost-sharing requirements for all categories of expenditures. Given Puerto Rico's financial situation, this waiver must be for 100% of all cost-sharing. This will allow FEMA to immediately authorize full reconstruction aid, known as C-G public assistance, to Puerto Rico. C-G public assistance would provide Puerto Rico with critical infrastructure aid in the rebuilding of roads and bridges, water control facilities, and public buildings and utilities. After Hurricane Katrina in 2005, FEMA spent \$13.4 billion to rebuild parts of Louisiana, almost \$10 billion of which came from the C-G assistance program. While FEMA authorized C-G assistance for Texas only 10 days after Hurricane Harvey made landfall, Puerto Rico continues to suffer without this critical aid five weeks after the disaster.

FEMA must extend the 60-day deadline for filing claims for disaster relief. While much of the island remains without reliable electricity and internet service, it is nearly impossible for people to assess the property damage and submit claims in the normal timeframe. Considering estimates that Puerto Rico's power grid may not be fully operational for as long as six months or longer, FEMA must extend the deadline to file a disaster claim until power and internet is fully restored to the island.

Attachments

1. Biographical Information for Catherine B. Kennedy, RN
2. National Nurses United, Report on Conditions in Puerto Rico and Call for Immediate Congressional Action – released October 26, 2017.

Biographical Information for Catherine B. Kennedy, RN

Catherine B. Kennedy graduated from Samuel Merritt/Saint Mary's College and has worked as a Registered Nurse for the past 37 years. She currently works as a staff nurse at Kaiser Permanente – Roseville (Women and Children's Center) in the Neonatal Intensive Care Unit. She is the Secretary for the California Nurses Association and one of the Vice Presidents for National Nurses United (NNU).

In 2013, Cathy was appointed by the California Senate as a Commissioner to the California Healthcare Workforce Policy Commission (CHWPC) which is under the direction of the Office of Statewide Health Planning and Development (OSHPD).

In 2015, Cathy volunteered as a nurse representing RNRN (Registered Nurses Response Network) which is part of the California Nurses Foundation (CNF) nonprofit 501 3c organization. During this deployment, she worked with young military healthcare professionals and corpsmen/women on the USNS Comfort for 30 days and treated over 10,000 Jamaican and Nicaraguan people during this time. Cathy believes that healthcare is a human right.

Report on Conditions in Puerto Rico and Call for Immediate Congressional Action

A large delegation of 50 volunteer registered nurses from across the U.S. returned on October 18, 2017 from Puerto Rico after a two-week disaster relief effort in the wake of Hurricane Maria. The returning nurses are part of the Registered Nurse Response Network (RNRN), a disaster relief program sponsored by National Nurses United, and are among 300 union members the AFL-CIO organized for the relief mission to Puerto Rico.

While working in Puerto Rico, these RNs witnessed communities and neighborhoods that remained devastated four weeks after hurricane Maria made landfall. They provided care and other support for residents living in severely damaged homes who had not received help from FEMA or any other relief agency. These RNs described an ineffective federal response that has led to deadly conditions including extreme lack of food, water and medicine; people living in houses infested with black mold; and water-borne illnesses such as leptospirosis.

The RN volunteers witnessed the perilous conditions residents are enduring. From the outskirts of San Juan to isolated mountain towns, they encountered many residents who had yet to be assisted by the U.S. government's relief effort. Many were staying in houses that had been destroyed by the hurricane – they were flooded, roofless, and most do not have electricity, sufficient food, and clean drinking water. Many residents told the nurses that they were the first people offering them assistance. In addition to providing medical care, the RNs created public health pamphlets to distribute and instructed residents on how to decontaminate their water and remove black mold from their homes. They also visited community radio stations where they provided health tips and water decontamination instructions on the air.

Nurse testimonies include:¹

"These communities are at great risk of water borne illness epidemics. They need clean water that is safe to drink. It is outrageous that we are leaving our fellow Americans with essentially no aid. Many more will die if we don't step up." —Erin Carrera, RN

"Today our team traveled into the center of the island into the mountain town of Utuado. These towns are so isolated that relief efforts have not made it into these areas. It was due to impassable roads. But the local community cleared most of the roads. People said we were the first relief group to come into the area ... They're struggling to get basics such as food, water and medicine." —Roxanna Garcia, RN

"We couldn't believe this is part of the United States. We did home visits in a low-income community with the public health liaisons who identify those in need and help them do basic blood pressure checks, blood sugar checks, refill their meds, etc. They have already had chronic diseases going on and now their environment is full of hazardous materials and sanitation is so poor." —Hau Yau, RN

Among conditions our RNs witnessed:

- Many communities had still not received any federal assistance or relief from FEMA or other agencies by the end of this deployment on October 18, 2017.
- Residents who had contact with FEMA stood in line for hours in the blistering heat, waiting for desperately needed water and food. Instead, many were asked to fill out paperwork “to collect data” and apply for FEMA assistance. They were given only a small bottle of water and small pack of Cheez-It crackers.
- Residents in communities where FEMA personnel were not present have been unable to apply for FEMA assistance online because of the lack of electricity and internet service.
- Residents continuing to live in houses with roofs blown off and soaked interiors where there is dangerous black mold growing that creates respiratory distress and illness.
- Residents desperate for water using containers that used to hold anti-freeze and other toxic agents to gather water from potentially contaminated streams.
- Major areas away from urban centers where residents still had received no provisions, had no running water and no electricity.
- Nurses had to sometimes clear debris in roads themselves in order to gain access to communities who had not received any aid since the hurricanes struck.
- Many people who have lost weight since the hurricanes hit due to lack of food (skipping meals, or giving their food to their children instead of eating themselves).
- A lack of basic healthcare services – many local doctor’s offices were closed and hospitals were often full and lacking supplies (including clean drinking water), and running on generators that sometimes fail.
- An outbreak of leptospirosis, a dangerous bacterial disease that had already claimed lives.
- Numerous communities without clean water that are at risk of the outbreak of water-borne illness epidemics.

The nurses’ first-hand accounts are supported by official government sources, including the Federal Emergency Management Agency (FEMA), the government of Puerto Rico, and the Centers for Disease Control and Prevention (CDC); advocacy and professional organizations; and news reports. Many of the same conditions they witnessed continue five weeks after Hurricane Maria made landfall.

- **Approximately one million people lack access to running water.** According to status.pr, 74% of Puerto Rico Aqueduct and Sewer Authority (PRASA) customers have water service.ⁱⁱ However, contrary to a statement on the FEMA website,ⁱⁱⁱ *this water may not be potable*. Those with running water have been advised by the Puerto Rican water authority to boil it for five minutes or treat it with chlorine.^{iv} Those without access to running water are drinking and bathing in water from contaminated rivers and wells. With just over half of wastewater treatments operating,^v AP reports that raw sewage is pouring into Puerto Rico’s rivers and reservoirs.^{vi} Some have resorted to drinking from wells on superfund sites that have been contaminated by hazardous chemicals.^{vii}
- **There is a daily shortfall of 1.8 million meals.** According to the *Guardian*, FEMA officials report that, together with its partners, they are providing only 200,000 meals a day when more than 2 million people are in need. “‘We are 1.8 million meals short,’ said

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Energy and Commerce Committee, Subcommittee on Energy
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one senior Fema [sic] official. "... And it's not going away. We're doing this much today, but it has to be sustained over several months."^{xviii} In addition, with 1.3 million of Puerto Rico's poorest residents receiving food stamps, only 39% of businesses are able to process the electronic payments that make up 75% of the monthly benefit.^{ix}

- **More than three-quarters of Puerto Rico Electric Power Authority (PREPA) customers are without electrical service.**^x Although Governor Roselló has pledged to have 95% of the power restored by December, his public affairs secretary, Ramón Rosario Cortés stated: "We have 230 brigades. If we used only these brigades, we'd be talking long months — years."^{xi}
- **37% of telecommunications has yet to be restored.**^{xii} This figure includes wired and wireless service. Nearly half of cell towers and two-thirds of the cell antennas are down.
- **Most roads remain impassable.** According to FEMA: "392 miles of Puerto Rico's 5,073 miles of roads are open, allowing for passage through the outer ring of the island."^{xiii}
- **60,000 homes need roofing help but only 38,000 tarps have been delivered.**^{xiv} One type of roof repair being provided is designed to last only 30 days making roofing repair and exposure to the elements an ongoing problem.^{xv} Those that went up first may already need to be replaced.
- **The healthcare infrastructure has been devastated.** Although 65 of 67 hospitals are operational, only 49 have electricity.^{xvi} In addition, most of the hospitals are only partially functioning and are using generators; only twenty are actually connected to the electricity grid.^{xvii} Those running by generator are vulnerable to lapses in fuel delivery. Although most dialysis centers are open, some have shortened hours and reduced dialysis treatments from four to three hours.^{xviii} Yet, despite great need, the Navy ship USNS Comfort remains largely idle. The *Wall Street Journal* reports: "The USNS Comfort, a 70,000-metric-ton ship staffed with roughly 800 medical and support personnel and 250 beds, has treated only about 150 people since it arrived on Oct. 3, said a U.S. Navy spokesman aboard the vessel."^{xix} CNN reports: "Only 33 of the 250 beds on the Comfort — 13% — are being used, nearly two weeks after the ship arrived."^{xx}
- **Disease outbreaks and serious health problems loom.** According to the Infectious Diseases Society of America, Puerto Ricans are at serious risk of waterborne, mosquito-borne, food-borne, and mold-related illnesses.^{xxi} The CDC has advised healthcare providers "to be vigilant in looking for certain infectious diseases, including leptospirosis, dengue, hepatitis A, typhoid fever, vibriosis, and influenza."^{xxii} According to Puerto Rico state epidemiologist Carmen Deseda, 74 cases of leptospirosis had been reported as of October 19th, which is more than the 60 cases Puerto Rico typically experiences in a year.^{xxiii} In addition to the increased risk, the healthcare system is severely compromised. The *Huffington Post* reports: "When asked if the health system on the island currently had the infrastructure to deal with a possible outbreak of any disease, [Governor] Roselló admitted that the hospital system is 'very frail' ..."^{xxiv}

Nurses demand the following actions be immediately taken to address the crisis:

- Congress must exercise its oversight authority to ensure the expeditious functioning and efficacy of FEMA and other U.S. relief efforts on the ground. To deal with the immediate crisis, FEMA and the U.S. armed forces should greatly expand the use of air drops into Puerto Rico of water, food, and medicine. Human and financial resources must be deployed to overcome the bottlenecks that are keeping help from reaching those most in need, which range from a lack of communication to blocked roads to a shortage of vehicles and drivers to make deliveries.
- The Department of Defense must supply greater technological and logistics support to Puerto Rico. This should include providing technical assistance with restoring electricity to the island, installing temporary telecommunications connections in remote areas, and continuing to deploy boots on the ground to help clear roads and deliver humanitarian aid.
- Congress needs to immediately provide resources this fiscal year to address Puerto Rico's looming Medicaid crisis. The Medicaid shortfall was a problem before Hurricane Maria, and is now even more severe given the public health dangers following the storm. In the long term, Congress must ensure that Puerto Rico receives the same federal Medicaid funding as U.S. states, which would save Puerto Rico hundreds of millions of dollars annually. Efforts to address Puerto Rico's humanitarian needs in the wake of Hurricane Maria are inadequate if not extended to solving the island's impending Medicaid crisis. Without immediate action from the US Congress, the territory will not have sufficient funds to continue operating its Medicaid program in 2018, which would strip nearly half of its 3.5 million residents of health insurance at a time when they need it most.
- The federal government must immediately ensure that patients who need care can access the services of the USNS Comfort. The Comfort has served as a critical site for emergency medical treatment in the aftermath of natural disasters, and RNRN/NNU volunteers have served on missions including disaster relief in Haiti after the 2010 earthquake as well as the humanitarian assistance mission Continuing Promise in 2010 and 2015. The USNS Comfort has critical staff, equipment and supplies that are not readily available to many people in Puerto Rico right now. At a time of increased health care crises, we must use all resources available to us to care for patients in need, and our hope is that more people who are not able to get the care that they need can be transferred to the USNS Comfort.
- The administration must respond immediately to the governor's request to waive FEMA cost-sharing requirements for all categories of expenditures. Given Puerto Rico's financial situation, this waiver must be for 100% of all cost-sharing. This will allow FEMA to immediately authorize full reconstruction aid, known as C-G public assistance, to Puerto Rico. C-G public assistance would provide Puerto Rico with critical infrastructure aid in the rebuilding of roads and bridges, water control facilities, and

public buildings and utilities. After Hurricane Katrina in 2005, FEMA spent \$13.4 billion to rebuild parts of Louisiana, almost \$10 billion of which came from the C-G assistance program. While FEMA authorized C-G assistance for Texas only 10 days after Hurricane Harvey made landfall, Puerto Rico continues to suffer without this critical aid five weeks after the disaster.

- FEMA must extend the 60-day deadline for filing claims for disaster relief. While much of the island remains without reliable electricity and internet connections, it is nearly impossible for people to assess the property damage and submit claims in the normal timeframe. Considering estimates that Puerto Rico's power grid may not be fully operational for as long as six months, FEMA must extend the deadline to file a disaster claim by at least an additional 120 days, or until power and internet is fully restored to the island.

The response to the crisis in Puerto Rico from the U.S. federal government has been unacceptable for the wealthiest country in the world.

During this humanitarian crisis, nurses urge the Trump Administration and Congress to take immediate action for the people of Puerto Rico by enacting the series of urgent measures outlined above. The US federal government must do everything in its power to assist the Puerto Rican people to recover from Hurricane Maria.

Appendix

Following are some of the first hand reports from registered nurses on the ground:

- “We met a man who lives in a two-story house with his elderly mom. He was sitting in a wheelchair on the second floor where there used to be a roof. His right ankle was wrapped with toilet paper roll with a dirty gauze underneath. When unwrapped, a portion of internal fixation metal hardware used to stabilize his right ankle is exposed. There is also a quarter-sized ulcer with yellow drainage on his dorsal foot. He told us he has had multiple orthopedic surgeries for his right foot due to a former injury. Because of the hurricane, he loses follow up with his doctor and now he is stuck because his cell phone stops working and he has no transportation to go to a doctor’s visit. We told him that his foot looked infected and he needed to go to an emergency room. He replied that he worried no one will take care of his foot because he has no money, and he would just sit and wait in the ER for hours without being attended. He asked us to talk to a local doctor, any doctor who can ensure his admission in the hospital. We brought his information back to the command center but the answer was disappointing—that we have no legitimate status to make referrals in Puerto Rico, and that a local doctor would need to see him first—but there is no timeline on when and how it’s going to happen. We left this guy with questions unanswered, along with the risk of sepsis and death from an infected foot hardware.”—Hau Yau, RN
- “Spent the day in Río Grande, a hard hit area outside of San Juan. No power or water here since Maria. We set up a clinic at a FEMA site (their first time here). People lined up for blocks since 10 pm last night. But FEMA was only handing out papers! Papers, which need to be filled out in order that they might receive some reimbursement eventually. Each person received a small bottle of water, a mini bag of Cheeze-Its and a little pack of vanilla cookies. Outrageous. Meanwhile grocery stores have limited supplies and lines for many blocks. What amazes me is how kind, calm and sharing the Puerto Ricans are, sharing with and helping their friends, family and neighbors. We were able to provide care to some, not nearly enough, but one small contribution to this tragedy today.” – Erin Carrera, RN
- “Today we went to Corozal after meeting in the disaster command center this a.m. We set up a clinic at a school where families are living, and then the mayor drove us up a hill to do door-to-door assessments. Families were extremely relieved to see us. We are seeing a breakout of leptospirosis in the community here, at least three people have died and FEMA is not releasing water to the community. Yesterday, people stood in line since 10 p.m. the previous night in hopes FEMA would show up and give them food and water. To everyone’s dismay FEMA showed up, but they were not there to get food or water, they were there to fill out paperwork. They handed one bottle of water and a snack pack of Cheez-Its. I saw many patients yesterday; there were so many I lost count. It was

really sad, however it's always amazing to see the spirit of the community. Neighbors are banding together to care for each other offering their last food to us not knowing if there will be any more food delivered to them." – Kent Savary, RN

- "It's hell here. The people have nothing, yet they are first to offer you the shirt off their back." – Laura Maceri, RN
- "Today we went to a town called Barraquita. They had almost no water or food. They were desperate. Even asking if we had carried any water at all for them to drink. It was hard to even fathom the destruction and how they can even begin to clean it. They are relying on rain water and 1 million chickens died there in the storm and the decomposed bodies are causing people to be sick. There is hardly any way for them to clear the debris and they have little money, no way to work, and they are afraid to drive anywhere for help because they have little gas and they are afraid what they will do if something happens to their car. We did a lot of teaching about purifying water for drinking, handed out solar lamps and a lot of emotional support. Overwhelming is the only thing I can say to describe it. They are even afraid to get aid dropped in their barrio because of the potential for violence." – Jordyn Olachea, RN
- "FEMA is here with supplies, but out of approximately 40 towns accessed so far FEMA hasn't released food or water in ANY of them other than one air drop. The people of Puerto Rico are starving and have no access to water. People are dying from Leptospirosis, a specific bacteria in the water system. The situation is becoming dire." – Randee Litten, RN
- "Yesterday we went to Utuado, a town up in the center of the island. We stopped many times along the way to educate people on water safety. It's a mountain community with small pueblos all over, many cut off since Maria by fallen bridges and blocked roads. We stopped in the center of town at the National Guard. They had lists of all the areas that had been seen by medical groups. We went to an area that nobody had visited where roads were recently opened. People are somehow surviving with the food and medicine they had on hand. They have received NO provisions. There is no running water and no electricity. Nobody is aware of the risks of drinking untreated water. We went house-to-house teaching families and asking that they spread the word. We also provided urgent care where we could." – Erin Carrera, RN



On the southern edge of San Juan municipality, where there has been no contact with FEMA, Red Cross or any official relief. This family has been sleeping in their roofless house on soaking wet furniture for weeks. The youngest child has (unsurprisingly) developed a rash. When RN Lucia Lopez gave the mother hydrocortisone cream, she burst into tears

NOTES

- ⁱ A collection of first-hand accounts by RNs in the delegation is available in the Appendix.
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- ^{xii} “Dashboard.” *Government of Puerto Rico*. October 23, 2017. Viewed October 23, 2017. <http://status.pr/>
- ^{xiii} “Hurricane Maria.” *Federal Emergency Management Agency*. October 18, 2017. Viewed October 23, 2017. <https://www.fema.gov/hurricane-maria>
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Mr. OLSON. Thank you, Mrs. Kennedy.

And now is the fun time, questions from the Members. And the Chair will yield to himself for 5 minutes of questions.

My first questions are for you, Mr. Thompson. First of all, I have to say congratulations. I mean, I was there for Hurricane Ike, Tropical Storm Allison. I was there for Hurricane Harvey. Most of our capacity was in that storm. You guys came roaring back. So, congratulations for getting that turned around so quickly.

I have talked to a lot of people. You guys have gotten much better preparing for hurricanes or sort of natural disaster. Yes, we are going to take a hit; we know it. I have heard like with Katrina, Rita, and Ike, you all learned how to not fully shut down our refinery, but keep it warm, so to speak, not the complete shutdown, but keep it going where it is that risk of some sort of breach. But, once the storm clears, get that thing up like that.

So, I just want you to talk about how you prepare a refinery that is directly in the path of a storm like Harvey to make sure to get that thing back online as quickly as possible.

Mr. THOMPSON. Well, thank you for the question, and I address some of this in my opening remarks. Most of this, of our ability to weather the storms, one was our credible workforce. We literally had thousands of people that were riding out these facilities. When their own families and houses were in peril, they were helping keeping our facilities literally above water and ready to go.

Also, lots of preparation. We have been working on storm for years, working with the National Petroleum Council, working with DOE and DHS. This was not something that we prepared for just a few weeks ago.

We took all the lessons learned from prior storms and we put them in the action. We hardened our infrastructure. We elevated what we could elevate. We have much better storm-tracking capabilities now. So, we could identify exactly where the storm was going and identify when we had to bring the systems down.

Safety is the No. 1 responsibility. So, our facilities will come down when safety demands it. And so, for those facilities where they realized that they weren't going to be hit as hard, they could remain warm and ready to go. Some of the facilities, indeed, had to come all the way down.

So, I would just end by saying a lot of hard work, a lot of dedication. And again, we can't applaud our employees enough.

Mr. OLSON. And lessons learned, which I know it just goes with the territory. You will have some leaks, some chemical leaks, you know, whatever. For example, we have these big tanks that have floating tops. And the water got so high, almost 5 feet of rain overcame the capability, and you had some small leaks.

So, my question is, what are you all doing to prevent and respond to these spills before they happen? Because I know it is amazing what happened. I mean, it was such a stellar performance. But how do you make it even better going forward?

Mr. THOMPSON. Well, I can assure that every company, those impacted and those that even weren't directly impacted are assessing how we responded to the storm, what went well, what didn't go well. We, as a trade association, bring our members together. We

share information. And we will work to improve. Very storm, we learn from the prior one to get better.

Mr. OLSON. Thank you.

A question for you, Mr. McBrayer. I mean, I was driving around pretty much for a week after Harvey hit and you could find gasoline. Some shops were shut down. My question is, was that because of power, because of lack of supply, lack of the gasoline, or lack of the employees being able to get to work because of all the floods? So, what was going on there? Because, again, you could find it, but some stations weren't up and running and, as you mentioned, there was some price gouging because of all sorts of rushes because people are panicking that there will be no gasoline.

Mr. McBRAYER. All of the things that you mentioned, Mr. Vice Chairman, are correct. Some of it is due to the fact that we rely upon the employees who are living in the affected area. And like any good employer, we are more concerned about their life at home and being sure that they are prepared to meet the needs of their family before they return to work.

We do have some problems with the electrical supply. Getting generators into our stores, specifically, was quite challenging in the Houston area because of the amount of flooding in the roadways. There are some stores that just choose not to buy at the costs that tend to go up during these disasters.

But most everyone is working hard because in our business we build 50-year assets. We are there for a long time. And so, our long-term mentality is to provide what our guests, our consumers, need, and to work hard to do that.

It is a site-by-site issue as to what the problems are and what we may need to do. We have stores in the south Houston area with some water in tanks. We have had stores that were completely flooded out that are still yet to reopen. But you have to assess your assets one at a time and do things you can quickly in order to bring them back online.

Mr. OLSON. One further question, Mr. Fanning. You brought up UAVs, and that is a big deal, hard back home. A town called Missouri City had some levies, not so much oil production, but levies that may be breaching. They were fine, the UAVs, they could see it and, then, they were grounded. So, how about the role of UAVs in these disasters for oil and all the operations with the petrochemical industry? Because those things are working and, for some reason, they were shut down because there was some kind of danger. And that was just not right to do because of that breach; they may have prevented a breach because they saw it with the UAVs. So, any idea about oil and gas operations, refining, storage, whatever, that UAVs could help out?

Mr. FANNING. Yes. Well, we don't impact oil and gas particularly. But, in response to any storm, there should be a comprehensive plan that is undertaken, really driven by the local authorities.

I was listening to your prior panel. Very interesting, in that every utility works with—for example, in Georgia, they would work not only with the Federal agency FEMA, but with GEMA. Within that context, all critical infrastructure is evaluated with respect to the approaching threat. And therefore, we develop a set of prior-

ities and, essentially, a response regime as to how to provide the best benefit going forward.

I can't speak to Missouri or whatever the impact is there, but I would assume that they have taken those things into account.

Mr. OLSON. Thank you. I am aware of my time.

The Chair now recognizes the gentleman from Illinois, the ranking member, Mr. Rush, for 5 minutes.

Mr. RUSH. I want to thank you, Mr. Chairman.

Ms. Kennedy, your testimony has been very, very amazing testimony. I am amazed at the breadth of the tragedies that are occurring, even as we speak, in Puerto Rico. And I am amazed at the lack of proper attention by those in our Government in determining their response to this American tragedy in Puerto Rico.

There are some who are disputing the official death toll. Some say that, oh, 51 casualties due to the hurricane. But, yet, the Puerto Rican Department of Public Safety confirmed that over 900 bodies have been authorized for cremation since Hurricane Maria tore through their island on September the 20th. And that 900 figure includes deaths related to lack of oxygen and other fatalities that appear to be due to the power outage. Yet, some say that those fatalities should just be considered natural deaths.

Do you concur with this definition from your experiences? You have spent time there. Do you believe that the death toll from Hurricane Maria is actually 51 or is it closer to 900, or is it somewhere in between?

Ms. CATHERINE KENNEDY. Well, thank you for the question.

We were there from October the 4th through the 18th. And as I said in my testimony, what the nurses saw was that, when you get outside of San Juan, that they were pretty much cut off from electricity, from communication, from anything. So, when you ask me what was the death toll, do I believe whether it is 51 versus 911, or somewhere in between, personally, I think it is more of the higher.

What we saw was people were desperate. We were considered almost the first ones that they even saw as it relates to food or water, or any kind of communication. And through word of mouth, they did say that the neighbor passed, whether it was through leptospirosis or natural causes—you mentioned the lack of electricity and without oxygen. So, yes, I think it is rather on the high side.

Mr. RUSH. Mr. Nieves, do you have any further insight into the actual number of fatalities and the reason for those fatalities?

Mr. NIEVES. Yes. Basically, I really agree with Ms. Kennedy. The official death toll of 59 up until now is very superficial and misleading. By personal experience, I have talked with dozens of family, friends, that have told me, "Oh, my grandmother died. She passed because she didn't have electricity in her nursing home." A lot of elderly people that do not have electricity are simply dying.

And so, how can you relate that to Hurricane Maria? It is very difficult because it didn't happen that day. But the death toll is, in my view, in the hundreds.

Mr. RUSH. So, even today, as we sit here in this committee room, there are people who are still dying in Puerto Rico simply because they have no electricity, even today?

Mr. NIEVES. Yes. As I said in my testimony, people are dying today not because of Hurricane Maria, but because of Hurricane PREPA, because they don't have electricity in their homes and care centers.

Ms. CATHERINE KENNEDY. I would agree. Without electricity, without power, you know, there are stories where patients actually go to San Juan when the electricity is up, and they take their nebulizers and plug them in, so that they can do the breathing treatments. Or they may sit in clinics where they have access to oxygen and use the oxygen there throughout the day, and then, they go home where there is no electricity and they are without oxygen, without anything.

Mr. RUSH. Thank you, Mr. Chairman. I yield back.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the gentleman from Illinois, Mr. Shimkus, for 5 minutes.

Mr. SHIMKUS. Thank you, Mr. Chairman.

It is great to have you here. I want to direct some of my questions to Mr. Fanning.

Mr. Fanning, if the electricity went out in Atlanta, Georgia, who would get called?

Mr. FANNING. Initially, Paul Bowers, President of Georgia Power Company, but that is a pretty clear deal.

You know what is interesting in these storms, we have, essentially, people that run the storm activity. They are fully empowered to work with whatever State, local, Federal government, to get the lights on as fast as we can. They have a clear sense of priority and they get the job done.

Mr. SHIMKUS. Again, Puerto Rico is an island. It is very difficult, and I kind of wish the administration would have deployed the 82nd Airborne and just had a parachute jump into a lot of communities that don't have access. At least there would be a meal ration. And the military has even solar packs that they take in Afghanistan. If there was one thing I wish they would have done more than anything, it is really deployed.

But you also heard in the first panel that the fact that there was no request for help until five weeks later. That is not normal. I mean, you represent the Electricity Subsector Coordinating Council.

Mr. FANNING. That is right.

Mr. SHIMKUS. Isn't that something that you all do as part of that?

Mr. FANNING. Absolutely. In fact, I would argue, especially this year—the Electricity Subsector Coordinating Council was originally formed to focus on cyber and physical security. We have added to that, given the success we have demonstrated on those issues, this notion of storm response.

Following Sandy, the electric utility industry reorganized what we call regional mutual assistance groups. And so now, under the kind of structure of the ESCC, we bring together, really for the first time, an enhanced collaboration, not only of investor-owned utility responses, but also collaboration/coordination with municipal utilities, cooperative utilities.

We offer that up and we participate in a series of restoration activities, Federal Government, local, and with each other. And we do that, also, interdependent with the other kind of industries that you all were talking about in the last segment. And that is telecom, so important; water and sewer; health care.

Believe it or not, we go beyond the notion of offering assistance just for the restoration of electrons. In Houston, particularly, my company got called on for two things that had nothing to do with electricity.

One was for the humanitarian rescue effort. Within 20 minutes of a phone call, we sent forward pilots and drones to help identify where survivors and other people may be.

Secondly, through Alabama Power, we delivered machinery that was able to operate in very high water conditions that were used to help rescue people.

Mr. SHIMKUS. Thank you.

And PREPA, or the Puerto Rican Electric Power Authority, they are not involved in this group, are they?

Mr. FANNING. So, PREPA works under the aegis of the American Public Power Association, which is, essentially, a municipal organization. We offered help, but PREPA, the State of Puerto Rico, for whatever reason, elected to pursue a different path, not pursue the mutual assistance rubric and really go through bilateral—

Mr. SHIMKUS. Yes, and let me go to the elected representative, Mr. Nieves. When we look back now on lessons learned and how we want to move forward, would you agree that we probably should look at ways in which the whole community can be helpful and develop these memorandums of understanding where we can get joint use and quick response? That would be probably a pretty good lesson learned in this?

Mr. NIEVES. Well, the thing is, the fact is that the American Public Power Association, and I understand that at least the Electric Institute offered since day one mutual assistance to PREPA, but PREPA pursued another way. So, it is not a lack of an agreement, but it was a lack of will from PREPA's part. And then, we have the Whitefish situation.

Mr. SHIMKUS. Yes, yes. And I am sure we are going to have time to continue to look at that. But, believing your testimony, which I do, that is, I would call that criminal negligence. And I am sorry for that.

My time has expired, Mr. Chairman. I yield back.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the gentlewoman from Florida 14, Ms. Castor, for 5 minutes.

Ms. CASTOR. Thank you, Mr. Chairman.

Thank you all very much for being here.

The more we hear directly from folks like you that are in the U.S. Virgin Islands and Puerto Rico, the more disturbing it gets. I think you can sense the outrage building from this committee over the Puerto Rico Electric Power Authority.

Mr. Nieves, are you surprised that PREPA did not respond to this committee and, in essence, refused to appear here?

Mr. NIEVES. I am sad to say that I am not surprised. When I used to Chair the Senate's Energy Committee, one of the things

that we found is their total lack of transparency. So, to me, I assume this is a lack of respect for this committee that PREPA is not here on this group.

Ms. CASTOR. And were you surprised to hear Mr. Alexander, who is the lead for the U.S. Army Corps of Engineers in repairing the grid in Puerto Rico, were you surprised to learn that he hasn't even been able to have a conversation with PREPA.

Mr. NIEVES. Sadly, I am not surprised.

Ms. CASTOR. So, how do we justify taxpayer dollars now going to repair a grid in Puerto Rico, trying to work with PREPA after they refused to interact with the committee? They are not working with the Army Corps of Engineers. They are wasting taxpayer money through this Whitefish contract that has outraged so many people. And yet, the need is so great on the island. How do you recommend that we move forward? We are going to have to address the PREPA situation in law as soon as possible, I would assume.

Mr. NIEVES. Yes. First of all, we have to really understand and consider at the end of the day, given PREPA's governance problems, we need to think that people are dying. Our economy is dying. So, how do we work around that, or PREPA's lack of governance and transparency?

My suggestion, and that I did in my testimony, is that since Congress already passed the PROMESA act, and the oversight board named a Revitalization Coordinator that has been appointed to take over PREPA, that Congress finds a way, a mandate, a specific mandate, that Federal taxpayer money to create a new energy grid be under the supervision of the Revitalization Coordinator of the board and the Puerto Rico Energy Commission, which is an independent, non-political, nonpartisan, and highly technical body. So, you can bypass PREPA and the government of Puerto Rico. So, that could be a way to get around it.

Ms. CASTOR. And this has to be, we have to have a sense of urgency to do this, because they are talking about the next emergency bill maybe will be in December, hopefully. I mean, there is a lot of things on the agenda for Congress in December. But time is of the essence here.

Mr. NIEVES. Yes.

Ms. CASTOR. And, Colleagues, we simply have to find a way to at least begin to plan to build in some resiliency, get the power on, but begin to lay the groundwork for a modern electric grid, and address the ineptitude of the Puerto Rico Electric Power Authority. Lives hang in the balance.

We have the experts at our fingertips. We have the technology to do this. Does Congress have the capacity to act with a sense of urgency, knowing how our fellow citizens are suffering there? So, that is a challenge for us.

So, I thank you all very much for being here.

And I yield back my time.

Mr. OLSON. The gentlelady yields back.

The Chair now calls upon the gentleman from Mississippi, Gregg Harper, for 5 minutes.

Mr. HARPER. Thank you, Mr. Chairman. Congratulations to the Astros.

Mr. OLSON. Thank you.

Mr. HARPER. And I know it was a great series.

I want to thank each of you for being here. This is still something that just is stunning, the hurricanes we have had to deal with this season. And certainly what has happened in Puerto Rico has concerned us all.

So, Mr. Fanning, I know you mentioned that it is more than just power or restoration of power. It is also telecom, water and sewer issues. Can you talk for a moment and tell us how utilities use their communications network to recovery and respond from hurricanes and other weather-related events, and how reliable do those communications networks need to be?

Mr. FANNING. Yes. Thank you, Congressman, and thank you for your service to the great State of Mississippi.

Mr. HARPER. Thank you.

Mr. FANNING. The best example of that is Katrina, as you well know. I think Katrina and the national story gets told around New Orleans in the breaching of the dam. The truth is, in Mississippi, when Katrina came through, every light was out around Mississippi Power.

And when you went in to try to restore that activity, the streets were unrecognizable. You couldn't even use, essentially, GPS to find your way around. All of the telecom was out as well.

We have to have an interconnected effort between telecom and electricity in order to most efficiently respond to these sorts of disasters. Southern Company, as a matter of its own resilient strategy, has our own dedicated telecom company called Souther Linc, in which we can bring in mobile cells on wheels, towers essentially, to set those things up.

As I am working within the context of the ESCC as it relates to Puerto Rico, early on—and this is where the ESCC was not asked to help in a mutual assistance effort—but, still, we were working with different parts of the economy to try to bring help to that island.

I called personally John Donovan. He is roughly the No. 2 guy at AT&T, as I understand it. And also, at—hold on—at Verizon, Lowell McAdam, who is the CEO there, to link together our efforts in bringing help down there. And we assured each other that, between telecom and electricity, we would provide every level of support, whether it was even asked for or not, to try to get that situation rectified.

Congressman, it is critical. If we are going to communicate with people in the field, if we are going to have people in the field without telecom, we need some way to kind of communicate to get the stuff back on. It is absolutely critical.

Mr. HARPER. So, you provided assistance in that area, even though it was not requested by PREPA?

Mr. FANNING. That is right. And in fact, I will give great kudos to the folks at FEMA, whether it is Brock Long who has done a heck of a job. I was on the floor of FEMA during a weekend during this situation. Another guy that works in DHS, Chris Krebs; in the White House, Tom Bossert, all of these people have been champions in trying to aid the situation without a whole lot of encouragement.

Mr. HARPER. Got you.

You know, Southern Company is right in the middle of what I guess we would call the hurricane belt. But Southern Company has a long and good track record of restoration after a hurricane, not only in your home service area, but helping your neighbors, certainly through the ESCC and others.

Have you seen changes based on lessons after Katrina that you are using today to improve that?

Mr. FANNING. Oh, sure. We have this mantra I had in my opening statement. We want to be today better than yesterday; tomorrow better than today. And no matter how good we think we are, we can always be better, me included.

And we are accountable for always improving. When you think about some of the testimony, life-and-death matters that are at stake here, you know, it isn't just about electrons; it is about restoring hope to communities and people's ways of life.

And so, we always work hard to think about what we can do better. I think the latest iteration, whether it is Harvey, whether it is Irma, the ESCC has demonstrated a much better capability of working across not only investor-owned utilities, munis, and coops, but also across cross-sector industries, telecom, finance—

Mr. HARPER. Right.

Mr. FANNING [continuing]. Water, et cetera. And so, those are particularly good things.

The other thing is this whole notion—and we have heard a lot about new technology being brought to bear. Good heavens, we deployed that in terms of resiliency as a strategic objective of America, whether it is cybersecurity, protection against terrorists from a physical standpoint, but also against natural disasters.

Mr. HARPER. Fine. Thank you, Mr. Fanning.

My time has expired. I yield back, Mr. Chairman.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the gentleman who made sure that Texans signed Justin Verlander to get us through the playoffs here, Gene Green, Texas 29.

[Laughter.]

Mr. GREEN. I wish I could claim, except going to a couple of the games. But thank you, Mr. Chairman.

Mr. Thompson, you talk about how quickly refined production was back online after Harvey. And I would like to commend the job industry did in our district, because in east Harris County we have five refineries. I sat down and met with Lyondell refinery and, also, with Shell. And a lot of folks don't understand you just can't turn switches off and on and get them back up. But now the price of gas is going down because all those refineries are back up. I know in our area—and I assume over in Beaumont-Port Arthur also—I know a lot of my constituents worked around the clock to get that back up.

One of the concerns I had, though, was the issue with the tanks. In east Harris County, we have the tanks that are—we keep building them because it is either holding crude or product or whatever. The engineering of them now is a floating roof. Because of the amount of water that hit the top of that, it actually turned that top over, and water went into whatever product was there. It could have been crude oil; it could have been refined products, and emis-

sions from that, but also overflowing. Because when you get 52 inches of rain anywhere, you are going to have a problem.

Has the industry looked at what we are going to do? I know, talking with the two companies, they said, we are going to have to look at it because how do we plan for 52 inches of rain. But see if engineering-wise there is a way we don't repeat that problem if we have another—well, not if; it is when we are going to have another storm because on the Texas Gulf Coast—I am a native Houstonian; we have lived through them, and we will get through this, too, but it is not pretty. But we need to learn from our mistakes if we have another 52-inch rain in those plants.

Has there been talk about how, across from API—because, like I said, just talking with two companies, they said they had to look at it and see what is going on.

Mr. THOMPSON. Thank you for the remarks.

Yes, our industry, as I have said open remarks, we fared fairly well. We proved to be resilient. We weren't perfect by any stretch of the imagination. We were better prepared than we were in prior storms. We have installed a lot of floating roofs, which you know are better for the environment. In the normal States, emissions are much lower.

But we weren't prepared for 60 inches of rain at times. And so, some tanks did have some failures. But the key is that was the exception and not the rule—

Mr. GREEN. Yes.

Mr. THOMPSON [continuing]. For sure. And I can assure you that this is already a No. 1 topic of conversation, about to prevent this going forward, and there will be lots of discussion. And I am sure there will be engineering to make sure these problems don't happen going forward, to the best we can.

Mr. GREEN. OK. Can you talk a little bit about the difference in how quickly the refining sector came back up online, and the difficulty, how long it took for the petrochemical sector in Houston?

Mr. THOMPSON. Yes. Well, certainly the refining industry came back online a little bit more quickly. A lot of that was from preparation. The petrochemical side, we knocked out, as you know, 60 percent of the national capacity, 80 percent in the Gulf. About 75 percent of that capacity has returned to the industry. Some of our facilities, they were under lots of water and it has taken a lot of time to get those facilities back up. Repairs have had to be made, and that just takes time. But we are well on our way. We think we have turned the corner and, hopefully, we will be back up to full capacity soon.

Mr. GREEN. And I also know that you can tell that at the price at the pump because the prices went up 25–30 cents a gallon, but now it is back down, maybe not in Washington, but at least in southeast Texas it has gone back down to maybe a little higher than it was, but still it is not \$2.49; it is \$2.19 that you can get on the side of the road now.

Mr. THOMPSON. And certainly we are getting back closer to prehurricane levels, but one thing I will point out is, since that time, the price of crude oil is certainly higher.

Mr. GREEN. Yes.

Mr. THOMPSON. And so, some of that is being reflected at the pump as well.

Mr. GREEN. Yes.

I yield back, Mr. Chairman. Thank you.

Mr. OLSON. The gentleman yields back.

The chairman now calls upon the House's best birdwatcher, the man from the Commonwealth of West Virginia—

Mr. GRIFFITH. Virginia.

Mr. OLSON. I am sorry. Virginia. I am confused.

[Laughter.]

Mr. GRIFFITH. You have been in the chair a long time.

[Laughter.]

I appreciate it.

Mr. OLSON. Five minutes, my friend.

Mr. GRIFFITH. Thank you very much.

Mr. Fanning, Mr. Harper touched on this a minute or two ago, but making sure we have lines of communication up. The National Infrastructure Advisory Council, noting this absolute criticality that communications play in grid resilience, suggested that electric utilities may need some dedicated spectrum space. What do you think?

Mr. FANNING. Well, listen, there is a number of solutions that go to that very important problem. Even to be provocative, in the circumstance of a national emergency, should you have dedicated internet access? There is a lot of things that you need to clear the way for.

Let me just give great kudos. So many people today I think lose faith in Government and the institution and the people that run it, and all that. I can say without equivocation that, in response to these events, whether it is in the White House with Tom Bossert, whether it is Energy Secretary Perry, one of the things that we can do is to work with these folks. And these folks can clear the way to get the work done.

So often, I think the question goes to who is in charge. You know who really knows how to get stuff done are the line crews and the supervisors and the people that have the boots on the ground to get this done. And when there are barriers, what we have got to do is work in this effective public/private partnership to get whatever barriers exist cleared away. The Government in this case has been fabulous during Harvey and Irma particularly.

Mr. GRIFFITH. I appreciate that, and thank you for your answer.

Mr. RHYMER, I was very pleased, as I was listening to your testimony, to hear you talk about microgrids and what you all are planning on doing. I particularly like the way you described how you are going to have them interact with the full system, and then, if they need to be standalone—I thought that was very good and I appreciate it. I hope you all success in that, and I look forward to seeing it at some point when it is working, because I think that is helpful. Not just in the islands, but in mountains and other regions of the United States those kinds of concepts can be very, very helpful. So, thank you for that.

Mr. RHYMER. Thank you.

Mr. GRIFFITH. Mr. Nieves—did I say that close to right? Thanks.

I appreciated your stark comments. It seems that there have been a lot of problems with the electric utility in Puerto Rico for some time, based on your comments. I am just wondering, you know, the Federal Government is going to be asked to come in there and spend a lot of money. I understand that and think that is right. But, if we do so, are you willing—do you think that the Government there, particularly the electric utility, is going to be willing to introduce some of these novel concepts like microgrids, and working on ways to use Puerto Rico as a land of experiments where we can try different things? They won't all necessarily work, but things that we can do to try to make the grid better long time, and try out some of these new ideas that are out there that have been talked about for years, but we have never had an opportunity.

And for all the tragedy that is taking place in Puerto Rico, for which I am very sorry and worry about figuring out what we can do, we may have the opportunity to do something better. Do you think that the utility company would be willing to embrace some of that?

Mr. NIEVES. Well, my proposal during testimony is that, if the Federal Government is going to step up and allocate considerable resources to not just repair the old grid, but to create a new grid, you cannot do that alone. You have to also establish a specific mandate in the law saying we are appropriating this "X" amount of dollars to build a new grid for Puerto Rico, but with these specifications.

And I respectfully submit that macrogrids could work; regional microgrids for Puerto Rico could really work to create a strong, resilient system. That might as well be ordered by Federal law.

Under Puerto Rico local law that I worked on last year when I was a senator, we authorized microgrids. And the Puerto Rico Energy Commission is right now working on an expedited regulation to put them in place. But I really submit that "X" amount of dollars appropriated by our Federal Government have to be with a specific Federal mandate.

Mr. GRIFFITH. And I appreciate that and would agree that we are going to have to do some different things there. One of the things that I think might help is if we have the utility accountable to shareholders. I don't know how you would spin that off with the assets they have. But I noticed from your comments that one of the problems was that you had, while it was a semi-regulated monopoly, it was a nonprofit. And it is amazing, when you are trying to figure out ways to make yourself more efficient, you come across ways to make at least a little bit of profit, even if it is not required to be much profit. Anyway, it is a thought to think about, and I hoped that you would consider that as well.

And my time is way over. So, I have to yield back. Thank you.

Mr. NIEVES. Thank you.

Mr. OLSON. The gentleman from the Commonwealth of Virginia yields back.

The Chair now calls upon the gentleman from Amsterdam, New York, Mr. Tonko, for 5 minutes.

[Laughter.]

Mr. TONKO. Thank you, Mr. Chair.

Mr. Rhymer, your testimony mentioned that the Water & Power Authority had used FEMA hazardous litigation grants to bury infrastructure underground, making it more resilient. When did you receive those grants?

Mr. RHYMER. We received those grants approximately in 2010–2011.

Mr. TONKO. OK.

Mr. RHYMER. And we have underground a portion of St. Thomas and a portion of St. Croix. We are currently seeking additional hazardous litigation grants currently to underground St. John in the Cruz Bay area and additional parts of St. Thomas and St. Croix.

Mr. TONKO. OK. And is there any other FEMA money you are asking to secure beyond that burying of cable? Anything with your microgrids? Are you requesting—

Mr. RHYMER. Well, we are seeking to get litigation grants for the microgrid stuff, renewable energy stuff that actually adds to the microgrid. We are also looking to do some hardening of the system in terms of administration, in terms of the buildings. Like the line department building is completely destroyed. So, basically, we need to have that building be resilient.

Mr. TONKO. Thank you.

New York State and the utilities there benefitted greatly from mutual assistance in the aftermath of Superstorm Sandy. And now, it is our turn to be called upon. It is your turn to be called upon in making things better.

Mr. Fanning, do you believe the utility industry's mutual assistance efforts work well?

Mr. FANNING. Oh, they are outstanding.

Mr. TONKO. I know islands present unique challenges to mobilizing workers and equipment, but can you think of specific reasons why mutual assistance would be resisted?

Mr. FANNING. No.

Mr. TONKO. OK. Mr. Nieves, you testified that Puerto Rico's grid had limitations certainly in the amount of renewable resources that could be integrated into its energy mix. What were the reasons for that?

Mr. NIEVES. Yes. According to a 2014 report that PREPA received, the grid, as it stood before Maria, could only integrate up to 580 megawatts of renewable power. Renewable power has certain technical issues that the grid that we had could not really tolerate without jeopardizing the system.

Mr. TONKO. Is it a matter of better interconnect devices? There is technology already shelf-ready, I would believe, that might be able to help—

Mr. NIEVES. That is correct.

Mr. TONKO [continuing]. Your situation?

Mr. NIEVES. Well, PREPA's grid was not a smart grid. It was not a grid that could really accommodate a system whereby customers are also generating power, renewable power, so they are not just passive customers of our energy model. So, according to that report from Siemens, PREPA's grid only can tolerate up to that amount of renewable power, which is really unacceptable, and a really small amount.

Mr. TONKO. And, Ms. Kennedy, thank you for making it so clear that Puerto Ricans are still dealing with a life-and-death situation. Can you further explain the health impacts you have seen due to a lack of safe water in Puerto Rico?

Ms. CATHERINE KENNEDY. Sure. Like I said, we were there for about two weeks. One of the things that the nurses had to go out and do was really within the community to take a look at what kind of resources were available. Time and time again, it was the lack of clean running water.

One of the things that the nurses saw was that people were very desperate. So, they were actually drinking from river water. Water that came down they would save from their roofs. As you know, with hurricane, you have rodents and, of course, bacteria. So, the prospect of leptospirosis was imminent. And clearly, there were people that were infected, but, again, if treated properly, then, I mean, it wouldn't be life threatening. But these were things that we saw for the last two weeks.

Mr. TONKO. Right. I have also seen some photos shared with me by family members in my district. They cause grave concern.

I believe—and I think Ms. Kennedy would agree—that we need to have a serious discussion about waiving cost-sharing requirements, especially for critical public health infrastructure such as our water systems. It is a public health and public safety situation.

I would also express that Puerto Rico can learn a great deal from New York's REV Initiative. It was in response to the Superstorm Sandy situation. And that State, our State, my home State, has worked to understand changes in the traditional utility business model and how to plan for a more decentralized grid.

My concern is that, if we build back to this failed system that you cite, it is a very troublesome investment made by any level of Government and the private sector, and we need to do better than that and encourage smart, flexible, and reliable grid for a cleaner and stronger energy future.

And with that, I yield back. And congratulations on last night.

Mr. OLSON. Thank you, thank you, thank you.

The gentleman yields back.

The Chair now calls upon the gentleman from our neighbor to the north, Oklahoma, Mr. Mullin, for 5 minutes.

Mr. MULLIN. Chairman, you are in almost a giddy form today. I wonder why.

[Laughter.]

Mr. OLSON. Guilty as charged.

Mr. MULLIN. The best thing is the third baseman for the Dodgers, I guess, can shave and cut his hair now, right?

Hey, I appreciate you guys coming up here and informing Members of Congress. It is very important for us to have a working relationship in a situation like this.

It has been a long day, and I appreciate your all's patience. But I feel like we are going to continue to learn from these lessons. What we don't want to do is get in the habit of repeating them.

Mr. Fanning, if you don't mind, I would like to start with you. The physical work of the restoration I know falls mainly on industries, but what role does the Federal Government play in this?

Mr. FANNING. Oh, they play an exceedingly important role. As I described earlier, when I think about the role of the ESCC, I describe it kind of in three levels. The first is to harmonize the efforts of the Federal Government. This is truly a public/private partnership, particularly in a super-regional kind of disaster where we absolutely—

Mr. MULLIN. When you talk about a private/private partnership—

Mr. FANNING. Right.

Mr. MULLIN [continuing]. Does the partnership end when the Federal dollars are put in and, then, the utility companies reap the benefits of it? Or do the Federal dollars, since it is a partnership, get paid back?

Mr. FANNING. Listen, the partnership exists whether there is a disaster or not.

Mr. MULLIN. Sure.

Mr. FANNING. This is our, what we call, playbook.

Mr. MULLIN. Right.

Mr. FANNING. This is our regime in which we respond to cyber, physical security, or natural disasters. And what it describes here is, frankly, not only the unity of effort, the “what’s” of a restoration effort, but also the unity of message and the “how’s” around a restoration effort. That has to be coordinated and harmonized between the Federal Government and not only electricity in this case, but, as we said before, the lifeline sectors. In cyberwarfare, it is going to be in the context of finance, telecom, electricity. Broadly, it would include transportation and water, and then, there are other priorities going from that.

Don’t ever forget the need to harmonize, also, State and local government efforts, the boots on the ground that ultimately will impact our ability to deliver.

Mr. MULLIN. So, when we are talking about a partnership, are we talking about just in financial support or, as you are describing, all the above from the logistics behind it, from the Federal Government stepping out and getting some of the red tape out, letting you guys go to work, getting some waivers in place?

Mr. FANNING. Yes, Congressman, absolutely right. In fact, somebody else mentioned this National Infrastructure Advisory Council made a recommendation to the President to form something called a SICC, Strategic Infrastructure Coordinating Council, of electricity—

Mr. MULLIN. We have acronyms for everything around here.

[Laughter.]

Mr. FANNING. Yes. Yes, I know it.

Electricity, finance, telecom. And what we will do is bring CEOs together, so me and others representing the electricity sector, finance, telecom, to put together a common set of regulatory permissions, legislative initiatives, harmonizing technology systems, information-sharing, and physical coordination. If we can get that done, that is an enormous activity.

The other thing that I think we need to do is inform policy-makers like you all. And that is why I applaud this effort. Because there is so much noise around these kinds of disasters or potential

disasters, we have to take action before they get here. If all we are doing is reacting to the latest disaster—

Mr. MULLIN. Thank you.

Mr. FANNING [continuing]. We are way behind the ball.

Mr. MULLIN. Yes.

Mr. FANNING. We have got to pitch, not catch.

Mr. MULLIN. No, I agree with that. But look at that; wasn't that neat. You get a little zing in there for our chairman. Wow. That was thinking on your feet.

[Laughter.]

I agree with that. We would love to move to a point of being more proactive than reactive, and take the lessons learned. So, I actually applaud the idea of putting together that committee, so to say, where we can say, "Hey, look, this is our lessons. These are what we need. These are the roadblocks that need to be dropped. This is why it happens." And let's move forward, so we can react faster.

Mr. FANNING. And, Congressman, I think it needs to be CEO-led. Eighty-seven percent of the critical infrastructure is owned by private industry.

Mr. MULLIN. Right.

Mr. FANNING. We have to work together.

Mr. MULLIN. Mr. McBrayer, I have got just a short time here. The EPA issued several fuel waivers—

Mr. MCBRAYER. Yes.

Mr. MULLIN [continuing]. Along the way for diesel and gasoline that maybe didn't meet the standards, but was able to get delivered. Was it effective? Was that helpful?

Mr. MCBRAYER. I think it was effective and helpful at the time. I think one of the things we have to adjust to as it relates to getting fuel to folks who are your constituents, our consumers, is that, at least in the Southeast, we are transitioning from summer-grade gasoline to winter-grade gasoline on September 15th every year. Because of the nature of the two specifications, winter-grade gasoline is less costly than summer-grade gasoline. So, whether your inventory is in your store or whether you are a placeholder for inventory in a terminal, the financial incentive is to diminish the amount of supply that you have going into September 15 and 16 because you are going to take in many cases a 10-to-15-cent devaluation of that inventory, basically, at 12:01 a.m. on the 16th.

One of the things I would ask from a Federal perspective is to take a look at that date. Is that really the only date that we can in the Southeast convert from the lower-RVP to the higher-RVP gasoline? Or is there a way to allow that date to move from time to time, or be fixed, so that folks like RaceTrac and other members of our association are not forced by the changing cost to diminish inventories in a time where hurricanes are more likely to occur?

Mr. MULLIN. Thank you. That is a great point.

And, Mr. Chairman, thank you for entertaining a little bit more time here. I yield back.

Mr. OLSON. And seeing only Astros fans, but no further Members seeking to ask questions, I would like to thank all of our witnesses again for being here today.

I have a unanimous consent and our nine documents for the record.

No. 1 is the PREPA letter to EEI and APPA.

No. 2 is an APPA letter to the Energy and Commerce subcommittee on mutual aid.

No. 3 is an APPA and EEI letter to Mr. Ricardo L. Ramos Rodriguez.

No. 4 is a letter from a farmer to the Energy and Commerce's Energy Subcommittee.

No. 5 is the EIA supplemental testimony with attachments.¹

No. 6, AdvaMed letter.

No. 7, letter from the FDA.

No. 8, GridWise Alliance document.

No. 9, letter to Senators Murkowski and Cantwell from the former EPA official and Puerto Rico Energy Commissioner.

Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Mr. RUSH. Mr. Chairman, I want to restate or reiterate my request that PREPA be subpoenaed and that we have FEMA before this subcommittee in the near future.

Mr. OLSON. As I told my friend, I will carry that message to Chairman Upton and Chairman Walden.

Pursuant to committee rules, I will remind members that they have 10 business days to submit additional questions for the record. As to the witnesses, submit their response in 10 business days upon receipt of those questions.

And one final comment, a point of personal privilege. You guys have, it looks like, 23½ hours to get to Houston for our big parade for our Astros.

[Laughter.]

Without objection, the subcommittee is adjourned.

[Whereupon, at 2:31 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

¹The information has been retained in committee files and also is available at <http://docs.house.gov/meetings/IF/IF03/20171102/106573/HHRG-115-IF03-20171102-SD003.pdf>.



Government of Puerto Rico
Puerto Rico Electric Power Authority

October 31, 2017

Mrs. Sue Kelly, President and CEO
American Public Power Association
2451 Crystal Drive, Suite 1000
Arlington, VA 22202, USA

Mr. Tom Kuhn, President
Edison Electric Institute
701 Pennsylvania Avenue, N.W.
Washington, D.C. 20004-2696

Dear Sue and Tom:

Due to the catastrophic destruction to our electrical infrastructure following hurricanes Irma and Maria, I urgently request your assistance in restoring the electrical infrastructure of the Puerto Rico Electric Power Authority (PREPA).

We know the American Public Power Association and the Edison Electric Institute have relationships across the electricity sector on the mainland and request your assistance in bringing resources to Puerto Rico to support power restoration on the island. We also understand that you have relationships with key Federal and state government partners that can help expedite these requests.

DM

It is our expectation that crews and resources will be required as soon as possible and ending at a date yet to be determined.

Due to the design similarities of our systems and recent experience in undertaking large scale restoration following Superstorm Sandy, we would initially request assistance from New York State public and private utilities, but understand that the scope of damage and need for certain expertise could require additional support from electric companies from across the United States. Public and private utilities from Florida are also available and can mobilize quickly due to distance and transportation logistics between Florida and Puerto Rico.

While our requests will likely grow as crews are brought in to work on our system and better assessments of the damage are conducted, at this juncture we are requesting:

Chief Executive Officer
G.P.O. Box 354267
San Juan, Puerto Rico 00936-4267

☎ 787-521-4666
📠 787-521-4665



"We are an equal opportunity employer and do not discriminate on the basis of race, color, gender, age, national or social origin, social status, political ideas or affiliation, religion, for being or perceived to be a victim of domestic violence, sexual aggression or harassment, regardless of marital status, sexual orientation, gender identity or immigration status, for physical or mental disability, for veteran status or genetic information."

Mrs. Sue Kelly
Mr. Tom Kuhn
Page 2.

1. 600 full time equivalent transmission and distribution line workers and associated equipment, including a minimum of 5 helicopters (3 heavy lifting and 2 light for crew transfer to transmission towers), required to support their work in restoring the transmission and distribution systems; and,
2. Management, supervisory, and administrative support with regards to the coordination of the restoration efforts, including, but not limited to: incident command, logistics, housing, transport, and supply chain staff and support.

Bear in mind that extensive portions of the transmission lines in Puerto Rico run through rugged mountainous terrain with little or no road access. Also, that there are subcontracted crews in Puerto Rico, including APPA members, that already have mobilized men and heavy equipment, have become familiar with PREPA's operations and may be at your disposal creating minimal delays in restoration work. We anticipate that due to the duration of the assistance required to repair the damaged infrastructure, additional support may be required once additional specifications, requirements, and logistics are determined.

Please confirm back to me your willingness to participate in the effort along with an appointed designee with whom we can work with to make immediate progress in addressing this request.

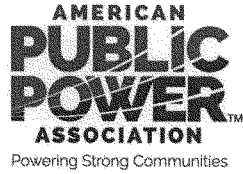
Cordially,



Ricardo L. Ramos Rodriguez
Chief Executive Officer

CC:

Mr. Thomas P. Bossert, Assistant to the President for Homeland Security and Counterterrorism
Lieutenant General Todd T. Semonite, United States Army Corps of Engineers
Mr. Dan Brouillette, Deputy Secretary, United States Department of Energy
Mr. Christopher C. Krebs, Senior Official Performing the Duties of the Under Secretary for the
National Protection and Programs Directorate
Mr. Brock Long, Administrator, Federal Emergency Management Agency



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November 1, 2017

The Honorable Fred Upton
Chairman
House Energy & Commerce Committee
Subcommittee on Energy
2183 Rayburn House Office Bldg.
Washington, D.C. 20515

The Honorable Bobby Rush
Ranking Member
House Energy & Commerce Committee
Subcommittee on Energy
2188 Rayburn House Office Bldg.
Washington, D.C. 20515

Dear Chairman Upton and Ranking Member Rush:

On behalf of the American Public Power Association (APPA or Association), I am writing to express our appreciation for the House Energy & Commerce Committee's Subcommittee on Energy holding a hearing to examine emergency response and energy infrastructure recovery efforts during the 2017 hurricane season. APPA is the national service organization representing the interests of over 2,000 community-owned, not-for-profit electric utilities. These utilities include state public power agencies, municipal electric utilities, and special utility districts that provide low-cost, reliable electricity and other services to over 49 million Americans.

APPA, along with the Edison Electric Institute (EEI) and National Rural Electric Cooperative Association, participates in the Electricity Subsector Coordinating Council (ESCC), a public/private partnership outlined in the National Infrastructure Protection Plan for critical infrastructure owners and operators. It serves as the electricity sector's principal liaison with the government on policy-level security issues and engages regularly with its federal government counterparts, including senior Administration officials from the White House, Department of Energy (DOE), Department of Homeland Security, Federal Energy Regulatory Commission, Federal Bureau of Investigation, and others. Tom Fanning, Chairman, President, and CEO of Southern Company, is a co-chair of the ESCC and is testifying before the subcommittee on behalf of the ESCC. APPA supports his testimony.

Hurricanes Harvey, Irma, and Maria caused widespread damage and impacted millions of Americans throughout the South and in the Caribbean. Public power utilities and their customers were impacted by all three storms, but particularly by Hurricanes Irma and Maria. Hurricane Irma caused widespread damage to the islands of St. Thomas and St. John in the U.S. Virgin Islands (USVI) and Key West, Florida. All 63 counties of Florida and large parts of Georgia, as well as Puerto Rico, were also impacted the storm. Irma was soon followed by Hurricane Maria, which caused significant damage to St. Croix in USVI and Puerto Rico. Mutual aid played an important role in helping restore power to many impacted communities and is ongoing in the efforts to restore power to USVI.

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In the aftermath of these devastating storms, APPA has received a lot of questions about mutual aid. Common questions include what is it? How does it work? How is it invoked? Who pays for it? Given the many questions we have received, we thought it would be helpful to provide an overview on the mutual aid process.

Mutual aid is when utilities help one another in times of need. The Association, together with state and regional public power utilities and organizations, coordinate the mutual aid network for the nation's public power utilities. More than 1,100 utilities across the country participate. Utilities that want to give and get help for power restoration after a disaster sign up for this network. The network also maintains a list of independent contractors that can be called upon when extra help is needed.

When (and even before) a major disaster hits a utility's service territory and the utility knows that its own crews and equipment will not be enough to restore power quickly, it calls for mutual aid. It provides its best estimates of how many people it needs and what type of skills they should have. The utility also specifies equipment and materials needs. Other utilities in the network respond with what they can offer.

The actual dispatch and movement of crews from different utilities is coordinated by utility and public power association personnel who volunteer as regional and national mutual aid coordinators. Such efforts require substantial logistics management. The utility that is requesting mutual aid generally arranges to house, feed, and care for the crews that come in from other utilities, and provides them the necessary work/safety briefings to do their jobs effectively. Requesting utilities generally send their own employees out to support visiting crews.

Typically, a public power utility requesting assistance pays other utilities that send help. Rates are determined through agreements entered into by the utilities. As units of state and local government, public power utilities are eligible for partial reimbursement of restoration expenses by the Federal Emergency Management Agency (FEMA), if all relevant conditions and requirements are met.

In addition to helping public power utilities in need, public power utilities also provide mutual aid to cooperatives and investor-owned utilities when requested and have also received assistance from cooperatives and IOUs when needed. In the aftermath of Superstorm Sandy, the entire industry has worked more closely on restoration efforts with the goal of bringing back power to all customers as soon as possible. Mr. Fanning's testimony discusses some of the industry's efforts to improve coordination not just within the industry, but with our federal government partners.

When Hurricane Harvey hit the Gulf Coast in September, most public power utilities were spared the worst, but did provide mutual aid to others directly impacted by the storm. Approximately 160,000 public power customers in Texas lost power and service was restored to nearly all of them within three days. Robstown, Texas, which is near Corpus Christi, suffered wind damage, but restored power to 95 percent of its customers within two days. Some public power utilities in East Texas lost power due to transmission outages in the area, but their distribution systems did not incur substantial damage. Walt Baum, the Executive Director of the Texas Public Power Association, an APPA member, testified before

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the House Science, Space, & Technology Committee on October 3, 2017, on recovery efforts in Texas after Hurricane Harvey and the industry's efforts to maintain a reliable and resilient grid, including the importance of mutual aid to resiliency. I encourage the Energy Subcommittee to review Mr. Baum's insightful testimony to the Science Committee, which is available [here](#)

Hurricane Irma impacted public power utilities in USVI, Puerto Rico, Florida, and Georgia. The hurricane inflicted significant damage to the islands of St. Thomas and St. John in USVI. Julio Rhymer, the Executive Director of Virgin Islands Water and Power Authority (USVI WAPA) is testifying at the hearing and his testimony describes the terrible impact Irma, and then Maria, has had on the residents of USVI, knocking out power everywhere. USVI WAPA requested mutual aid after Irma and public power utilities from New England have sent down crews to assist in the recovery efforts. Given the extensive damage done by the hurricane, USVI has requested additional mutual aid through APPA. We are working with other public power utilities, as well as Western Area Power Administration and contractor crews to assist USVI WAPA in its recovery efforts.

Puerto Rico was also hit by Irma, knocking out power to much of the island. The Puerto Rico Electric Power Authority (PREPA), an APPA member, had restored power to most of its customers before being devastated by Hurricane Maria just over a week later.

APPA member Keys Energy Services in Key West, Florida, was directly hit by Hurricane Irma, which took down most of its distribution and transmission facilities. As the storm moved up through Florida, it impacted every single public power utility in the state. More than 800,000 public power customers in Florida were without power at the height of the outages, but 98 percent of them had their power restored within seven days. In addition, there were significant outages among some of our Georgia members.

Mutual aid played a key role in restoring the power quickly in Florida and Georgia. Public power utilities aided one another in the restoration efforts. They also aided IOUs and were aided by IOUs to restore power. The Florida Municipal Electric Association, an APPA member, played a central role in coordinating mutual aid for the utilities impacted by the hurricane in the state. As Mr. Fanning notes in his testimony, "this was one of the largest restoration efforts in U.S. history" and the speed of the recovery was acknowledged by the U.S. Energy Information Administration.

Hurricane Maria knocked out power to St. Croix in USVI, the one island not substantially impacted by Hurricane Irma, and all of Puerto Rico. APPA member New York Power Authority (NYPA) sent technical subject matter experts and drones down to Puerto Rico as part of a state-led mission initiated by New York Governor Andrew Cuomo, at the request of Puerto Rico Governor Ricardo Rossello. NYPA's personnel worked with PREPA on damage assessments of specific PREPA generation, transmission, and substation facilities.

In addition, FEMA, the U.S. Army Corps of Engineers (USACE), and DOE have personnel on the ground. In early October, FEMA put USACE in charge of the mission to restore power. USACE has

House Energy & Commerce Committee
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November 1, 2017

selected contractors to assist in the recovery efforts and is testifying at the hearing on its efforts. Four public power utilities from Florida are currently in Puerto Rico assisting in the recovery efforts as subcontractors. On October 31, 2017, PREPA requested mutual aid from APPA and EEI. The Association is pleased to have received this request and will work with PREPA, our government partners and their contractors, and the industry to support the ongoing power restoration process.

APPA appreciates the opportunity to submit this letter to the Energy Subcommittee and provide background on the mutual aid process for public power utilities. Thank you for holding this important hearing on emergency response and energy infrastructure recovery efforts during the 2017 hurricane season.

Sincerely,

A large black rectangular redaction box covering the signature of Susan N. Kelly.

Susan N. Kelly
President & CEO

SNK/DW

cc: The Honorable Greg Walden
The Honorable Frank Pallone



October 31, 2017

Mr. Ricardo L. Ramos Rodriguez
Chief Executive Officer
Government of Puerto Rico
Puerto Rico Electric Power Authority
G.P.O. Box 364267
San Juan, Puerto Rico 00936-4267

Dear Ricardo:

We received your letter this morning requesting additional support for power restoration in Puerto Rico. We now are working together and with our member companies throughout the industry to support this request. We look forward to working with you and with our government partners and their contractors to bring crews, equipment, material, and technical experts to the island to restore power for the people of Puerto Rico.

As you noted, Hurricane Maria caused historic damage to the Commonwealth's infrastructure, and there are considerable logistical challenges that will complicate the power restoration effort. While this will not be a typical restoration process, we are fully committed to overcoming those challenges and to bringing our experience and resources to Puerto Rico.

We have designated Scott Aaronson, Executive Director for Security and Preparedness at the Edison Electric Institute, and Mike Hyland, Senior Vice President for Engineering Services at the American Public Power Association, to be your points of contact for coordinating with the electric power industry on the mainland United States.

Thank you again for reaching out. We share your sense of urgency and look forward to working with you on the restoration mission. Please do not hesitate to contact us if we can provide any additional assistance to you or our fellow citizens in Puerto Rico.

Sincerely,

A black rectangular redaction box covering the signature of Sue Kelly.

Sue Kelly
President and CEO
American Public Power Association

A black rectangular redaction box covering the signature of Tom Kuhn.

Tom Kuhn
President
Edison Electric Institute



Stephen J. Ubl
President & Chief Executive Officer

November 1, 2017

The Honorable Fred Upton
Chairman
Subcommittee on Energy
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

The Honorable Bobby Rush
Ranking Member
Subcommittee on Energy
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

Dear Chairman Upton and Ranking Member Rush:

On behalf of our members, PhRMA wants to thank you for convening the November 2, 2017, hearing on "The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts." We appreciate your consideration of this important issue and want to provide additional information as you focus on the recovery efforts in Puerto Rico after two recent hurricanes – most notably Hurricane Maria – struck the island this season. Specifically, we want to provide information about how our members with manufacturing or other interests there are managing with the devastation and highlight areas where additional assistance would aid in returning Puerto Rico's manufacturing base to full capacity and maintain that base in the longer term.

While our members have a substantial manufacturing presence on the island, our industry recognizes that we are just one of many entities adversely impacted by these Hurricanes and that the situation on the ground is extremely challenging for many families and businesses. To help address these challenges, our members are working with government at every level and private stakeholders to help coordinate relief on the ground and to provide people impacted by the disaster with access to medicines, potable water and other necessary supplies. PhRMA and many of our members are also working closely with Healthcare Ready, an independent relief organization we helped establish which coordinates the delivery of medicines and other healthcare resources to people impacted by natural disasters.

These hurricanes have also had an adverse impact on our manufacturing facilities and the welfare of many of our employees in Puerto Rico. We are working in close coordination with federal, commonwealth, and local agencies to restore our facilities to 100 percent capacity, and we are making good progress.



The Honorable Fred Upton
The Honorable Bobby Rush
November 1, 2017
Page 2 of 3

With respect to the medicines we manufacture, supply is generally stable. More importantly, we believe that these supplies will be sufficient to meet the short term needs of patients and the health care community. This determination is based on the contingency planning that our member companies have undertaken, the ability of our member companies to shift production to other manufacturing locations and the reserve supplies of medicines they maintain.

We have particularly appreciated the leadership of Commissioner Scott Gottlieb, United States Food and Drug Administration (FDA) and the collaborative efforts of FDA's Drug Shortage Team and Emergency Operations Center. FDA has shared information with our members and displayed great willingness to discuss alternatives to assure continued product supply. However, if services, especially electricity, are not restored in the near future, the supply situation could worsen.

To further this progress, we thought it would be helpful to share with you some discrete areas where additional assistance could accelerate the restoration of our members' manufacturing capabilities to full capacity. These areas include:

Restoring the Power Supply and the Electrical Grid

- This is a critical issue as generators have run for prolonged periods, and reliance on generators for manufacturing operations is suboptimal. The dearth of available skilled electrical technicians and generator service technicians exacerbates the issue.
- Resumption of electrical power would also help decrease employee absenteeism and restore normalcy to employees' lives.

Returning Employees to Work Safely

- Food security and facilitating the resupply of groceries would help employees return to work safe and healthy. Economic aid would support the local population and ensure a stable social environment.
- Restoration of roads and road lighting would allow employees to travel safely during daytime and at night and facilitate resumption of around-the-clock manufacturing operations.

Restoring Municipal Water and Waste Water Systems

- Ensuring that water can be reliably and safely sourced, and that waste water can be treated, would enable employees to resume more healthy living conditions and would help our industry restore manufacturing to full capacity.



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Facilitating Efficient Transportation

- Alleviating congestion and blockages on roads and at port terminals would facilitate the transportation of goods and materials on and off the island.
- Adequate fuel supplies would help ensure generator power is maintained (until electrical power is fully restored) and that vehicles on the island are able to transport supplies and employees.

Restoring Telecommunications, Cellular and Internet Service

- Limitations on service restrict communications between and among companies' multiple plants on Puerto Rico and their ability to coordinate with employees and government agencies.

Sincerely,





701 Pennsylvania Avenue, NW
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Tel: 202 783 8700
Fax: 202 783 8750
www.AdvaMed.org

November 2, 2017

The Honorable Fred Upton
Chairman, Subcommittee on Energy
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515

The Honorable Bobby Rush
Ranking Member, Subcommittee on Energy
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515

RE: November 2, 2017 Hearing, *The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts*

Dear Subcommittee Chairman Upton and Subcommittee Ranking Member Rush:

On behalf of the over 300 manufacturers of medical devices and diagnostics that AdvaMed (the Advanced Medical Technology Association) represents, we commend you for holding this hearing. Restoration of the electrical grid in Puerto Rico is essential for the thousands of employees of medical device manufacturers who live on the island and for manufacturing to return to full capacity. As you work with FEMA and other agencies on the recovery efforts, we request that you stress the importance of restoring electricity to medical device manufacturing facilities and critical suppliers to prevent supply shortages of life saving and life sustaining medical devices.


AdvaMed alone represents more than 20 medical technology companies with over 30 manufacturing facilities in Puerto Rico that account for over 15,000 jobs on the island. Their products help patients worldwide live longer, healthier, and more productive lives and include diabetes care products, cardiovascular, trauma, critical care, orthopedic, and neurological devices, along with advanced cancer diagnostics and therapies.

As you may know, we have been working closely with our agency partners as recovery efforts continue in Puerto Rico following the devastation from Hurricane Maria and greatly appreciate the efforts of FDA, HHS, and FEMA.

The appropriate prioritization of electrical infrastructure repairs to bring medical device manufacturers back onto the grid is essential to ensuring as little disruption as possible to patient care worldwide. As the delivery of medical technology plays a vital role in the entire health care ecosystem, we would be grateful for any assistance you could provide in prioritizing these facilities as electrical infrastructure recovery plans are developed and implemented.

As recovery efforts continue across the island, the companies we represent are committed to the people and the economy of Puerto Rico. Please do not hesitate to let me know if we may be of service in any capacity in your efforts moving forward.

Sincerely,


Scott Whitaker
President & CEO
AdvaMed

Bringing innovation to patient care worldwide





November 2, 2017

The Honorable Fred Upton
 Chairman
 Subcommittee on Energy and Power
 U.S. House of Representatives
 2183 Rayburn House Office Building
 Washington, DC 20515

The Honorable Bobby L. Rush
 Ranking Member
 Subcommittee on Energy and Power
 U.S. House of Representatives
 2188 Rayburn House Office Building
 Washington, DC 20515

The Honorable Greg Walden
 Chairman
 Energy and Commerce Committee
 U.S. House of Representatives
 2125 Rayburn House Office Building
 Washington, DC 20515

The Honorable Frank Pallone, Jr.
 Ranking Member
 Energy and Commerce Committee
 U.S. House of Representatives
 2322A Rayburn House Office Building
 Washington, DC 20515

Dear Chairmen Upton and Walden and Ranking Members Rush and Pallone:

The Food and Drug Administration (FDA) greatly appreciates the Energy and Commerce Committee's attention to the 2017 hurricane season and your particular focus on Puerto Rico following Hurricane Maria. I appreciated the opportunity to testify last week before the Subcommittee on Oversight and Investigations hearing entitled "Examining HHS' Public Health Preparedness for and Response to the 2017 Hurricane Season."

Thank you for your continued commitment to the recovery of Puerto Rico and your support of FDA's efforts to advance these shared goals.

Medical product manufacturing is a critical part of the Puerto Rican economy. There are more than 80 FDA-registered medical product manufacturers across the island. This industrial base is an important source of jobs and economic vitality for the island and it is a key to Puerto Rico's economic recovery. The manufacturing facilities are also a pivotal source of critical medical products for the entire United States. About 8 percent of all pharmaceuticals used in the United States are manufactured in Puerto Rico. Many sophisticated and critical medical devices are also manufactured on the island. Helping to bring these resources back in operation is an important goal for FDA and for Puerto Rico.

After Hurricane Maria, I visited Puerto Rico and the FDA headquarters on the island. I met with the Governor of Puerto Rico, Ricardo Rossello, to discuss the importance of getting medical product facilities fully back to operation to help Puerto Rico and to help all Americans who need

U.S. Food & Drug Administration
 10903 New Hampshire Avenue
 Silver Spring, MD 20993
www.fda.gov

important medical products made on the island. Since my visit, I have continued to stay in touch with the Governor's team as we advance these efforts.

We are actively working every day to engage with companies to ensure continued operations on the island. Companies are functioning at different levels based on the damage done by Hurricane Maria and on their generator capacity. We are keeping a close watch on the most critical medical products that are at the highest risk for shortage. In urgent cases, when critical products are at issue, we have intervened with government partners such as the Federal Emergency Management Agency and the Department of Homeland Security to help secure fuel to maintain production lines and get clearance to move logistical support onto the island and finished goods to their intended recipients. We are communicating with the firms and, in some cases, are in daily contact with them to help them manage the evolving challenges. We are prepared to act quickly to help prevent drug and device shortages.

The Subcommittee's hearing "The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts" is examining a critical component of Puerto Rico's recovery. We share the goal of restoring the island's electrical grid. Restoring the grid is imperative for public health because of the significant medical manufacturing performed in Puerto Rico. To date, FDA has been working on a case-by-case basis with federal and local government partners to provide logistical support and fuel to drug and device companies to enable them to continue operations. Our next priority is to ensure manufacturers get back to stable production as soon as possible to ensure supply of critical products to patients across the United States. Our experts will be working closely with local and federal partners to prioritize a small subset of critical facilities—plants that manufacture medically important products that are sourced primarily or only in Puerto Rico—for consideration for earlier access to the rebuilt grid. Most facilities can only engage partial production on generators. Over time, and for a subset of facilities, our work to avert shortages might entail helping them to get back closer to full production.

Thank you again for the opportunity to testify before your committee. Best wishes for a successful hearing, and please let me know if I can be of assistance on this or any other issue.

Sincerely,

A black rectangular redaction box covering the signature of Scott Gottlieb.

Scott Gottlieb, M.D.
Commissioner of Food and Drugs



**Written Testimony for the Record
Submitted by the GridWise Alliance¹**

**Energy Subcommittee of the House Energy & Commerce Committee
“The 2017 Hurricane Season: A Review of Emergency Response and Energy
Infrastructure Recovery Efforts” Hearing
November 2, 2017**

Background:

Current disaster relief law generally requires rebuilding or replacing damaged infrastructure with “like” (i.e., similar) infrastructure in most cases, though it can be rebuilt “to code.” However, as we have witnessed, neither the status quo, nor building to code, are anticipated to be sufficient to withstand projected future extreme weather events. Recurrence of destruction in future storms could be extremely costly – tens of billions of dollars (at least, potentially), as we are seeing now.

In the wake of Hurricanes Harvey and Irma, Texas and Florida were able to re-energize their power grids significantly faster than in previous hurricanes (further data are provided below). These quicker recoveries were due, in no small part to, to grid modernization investments by local utilities.

Thus, steps should be taken now to rebuild infrastructure in a manner that increases system resilience, reliability, and security to reduce the scale of damage and destruction and the speed of power restoration in the future. In other words, this is why some changes in law are needed to enhance flexibility to enable the electric system to be rebuilt in a more resilient and “smarter” manner.

In addition to the transmission and distribution lines, the generation in Puerto Rico is (or was) vulnerable because it is situated near the coast to take advantage of cooling water.

¹ The GridWise Alliance consists of electric utilities, information technology and telecommunications equipment and service providers, National Laboratories, Regional Transmission Organizations (RTOs)/Independent System Operators (ISOs), and academic institutions. This testimony does not represent the views of all GridWise members.

Key Messages:

- Consideration should be given to repairing and/or rebuilding in the short- and longer-term in a more resilient, “smarter” manner – where it makes sense to do so, as elaborated on below.
- **Flexibility in current law is needed to enable this approach of near-term and longer-term rebuilding in a more resilient, “smarter” manner to occur.**
- A number of process and coordination-related steps also need to be addressed.
- **A holistic systems planning approach is needed.** Planning at least can be started in parallel with immediate restoration of power, at least to major portions of populations in Puerto Rico and the U.S. Virgin Islands.
 - More specifically, a damage assessment can be done, likely fairly quickly, as can some immediate power restoration efforts.
 - These steps can occur along with planning for, and implementing, some near-term solutions that could be more resilient and “smarter,” as well as a longer-term, *phased approach* toward developing and re-building a more resilient, sustainable electric system, which will take time to completely rebuild.
 - System planning can be iterative and can be updated along the way.
 - Different approaches might be appropriate for different parts of the islands.
 - Cost-effectiveness should be ensured over the long term or project lifetime.
 - Public-private partnerships should be leveraged for the recovery effort, where appropriate.
- **Focusing on the desired outcomes or objectives is important:** i.e., to create a resilient, reliable, and secure system design.
 - Thus, picking specific technological or other solutions likely should be avoided, especially on an ad hoc basis – again, focusing outcomes or objectives.
 - Planners and engineers should aim to design a system that meets resiliency, cost, and other metrics and, in doing so, utilize the best mix of technologies and capabilities for the intended outcomes. Options for technologies and capabilities that are available to achieve such outcomes include but are not limited to: outage detection and management systems (e.g., smart meters), those that enable “islanding” of portions of the grid, microgrids, distributed energy resources, and energy storage (e.g., flywheels, batteries), and digital and flood-resistant substations.
- Many critical infrastructure systems and sectors have interdependencies, so there is a need to look holistically at systems and across critical infrastructure sectors. For instance, planners should consider coordinating, including co-locating (or optimizing other synergies), between and among multiple infrastructures/sectors, e.g., telecommunications, electricity, and water infrastructure.

- Having checks and balances in place, as well as transparency, and reporting/metrics/accountability for funding also are recommended, where appropriate.

Examples of Rebuilding in a More Resilient, “Smarter” Manner:

- Wooden poles could be replaced with concrete or steel ones.
- A transmission line, or portion of a line, could be repaired to help restore power. Then, the line could be made more resilient, e.g., by creating redundancies or hardening. After these steps occur, the original line could be replaced or upgraded, if necessary.
- A variety of resources, such as solar, batteries, microgrids, and/or diesel could be used to help restore power in certain parts of the island and/or to critical facilities relatively quickly. These systems could later be upgraded to provide more permanent grid support.
- Given the current location of generation sources, some type of reliable generation with adequate “fuel supply” near critical loads, such as hospitals, likely should be part of the overall resiliency planning considerations.

Information about Restoration in the Wake of Hurricane Irma:

FPL:

- Hurricane Irma “impacted all 35 counties and 27,000 square miles of FPL service territory, causing more than 4.4 million customers [(i.e., 90 percent of the company’s customers)] to lose power.”²
- To prepare, “FPL assembled and pre-positioned the largest restoration workforce in U.S. history, which grew to approximately 28,000 at its peak.”³
- “This preparation and coordinated response, combined with [\$3 billion in] hardening and automation investments that FPL has made since 2006 to build a stronger, smarter and more storm-resilient energy grid, enabled the company to restore service to over **2 million customers in 1 day**” – i.e., to restore nearly 50 percent of the outages.⁴ (Emphasis added) This is an “80% improvement compared to [Hurricane] Wilma restoration efforts.”⁵

² Edited Transcript of NextEra Energy, Inc. earnings conference call or presentation, text version of transcript, October 26, 2017 (1:00 p.m. GMT), available at: <https://finance.yahoo.com/news/edited-transcript-nee-earnings-conference-122613065.html?.tsrc=applewf>.

³ NextEra Energy, Inc. and NextEra Energy Partners, LP, Third Quarter 2017 Release, October 26, 2017, available at: <http://www.investor.nexteraenergy.com/phoenix.zhtml?c=88486&p=EarningsRelease>.

⁴ Edited Transcript of NextEra Energy, Inc. earnings conference call or presentation, text version of transcript, October 26, 2017 (1:00 p.m. GMT), available at: <https://finance.yahoo.com/news/edited-transcript-nee-earnings-conference-122613065.html?.tsrc=applewf>.

⁵ Edited Transcript of NextEra Energy, Inc. earnings conference call or presentation, text version of transcript, October 26, 2017 (1:00 p.m. GMT), available at: <https://finance.yahoo.com/news/edited-transcript-nee-earnings-conference-122613065.html?.tsrc=applewf>.

- “Within three days, 75 percent of FPL customers were restored and within five days, 90 percent of customers were back on.”⁶ The “full restoration was completed 10 days after Hurricane Irma left FPL’s service territory.”⁷
- FPL “completed the fastest storm restoration of the largest number of customers by any one utility in U.S. history.”⁸
- “Hurricane Irma had an approximately 50% higher damage potential than Hurricane Wilma” and 15% more of the population (90% in Irma versus 75% in Wilma) lost power during Irma.⁹ Yet, “there was an approximately 80% reduction to pole damage and an 80% improvement in the time to energize all substations following the storm when compared to Hurricane Wilma.” Moreover, “while the average customer outage from Hurricane Wilma lasted for over 5 days, the average outage for customers affected by Hurricane Irma was roughly 2 days, a 60% improvement.”¹⁰
- “The total GDP within [FPL’s] service territory averages over \$1 billion per day. By reducing the average customer outage by more than 3 days when compared to Wilma,” the “avoided economic loss to the state has more than paid for the \$3 billion in hardening investments . . . made since 2006.”¹¹
- Final storm costs are preliminarily estimated to be “approximately \$1.3 billion.”¹²

⁶ Von Ancken, Erik, “FPL shares lessons learned after Hurricane Irma knocked out power statewide,” Orlando.com, October 17, 2017, available at: <https://www.clickorlando.com/news/lessons-learned-for-fpl-after-irma>.

⁷ NextEra Energy, Inc. and NextEra Energy Partners, LP, Third Quarter 2017 Release, October 26, 2017, available at: <http://www.investor.nexteraenergy.com/phoenix.zhtml?c=88486&p=EarningsRelease>.

⁸ NextEra Energy, Inc. and NextEra Energy Partners, LP, Third Quarter 2017 Release, October 26, 2017, available at: <http://www.investor.nexteraenergy.com/phoenix.zhtml?c=88486&p=EarningsRelease>.

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¹⁰ Ibid.

¹¹ Ibid.

¹² Ibid.

October 31, 2017

The Honorable Lisa Murkowski, Chair
 United State Senate Committee on Energy and Natural Resources
 Washington, DC 20510-6150

The Honorable Maria Cantwell, Ranking Member
 United State Senate Committee on Energy and Natural Resources
 511 Hart Senate Office Building
 Washington, DC 20510

Dear Senator Murkowski and Senator Cantwell:

Hurricanes Irma and Maria took a catastrophic toll on Puerto Rico's electricity system, affecting critical facilities and basic municipal, business, and residential functions. The hurricanes also caused significant damage to the electric grid's transmission and distribution assets. Two thirds of the island is still without power and has been without power for 50 days, while peak loads are currently reaching approximately 10% of pre-hurricane levels. Many key businesses and residents have begun fleeing the island. Without electricity, the island's water and sewage systems and cell towers remain inactive. If the grid stays offline, a large number of people will continue to be at risk of serious illness from heatstroke, dehydration, or exposure to contaminated water.

We are writing to you as former government officials who are extremely concerned about rapidly deteriorating conditions in the territory of Puerto Rico. We appreciate your October 26, 2017 letter to Senator Mitch McConnell and Senator Charles Schumer, but want to provide additional information as you review this issue and strongly urge you to take immediate action to direct all federal agencies to change course and rebuild the electricity grid based on energy efficiency, resiliency, decentralization and renewable energy. It is expected that Congress will act in the coming weeks on another budget supplemental hurricane bill. That legislation should direct federal agencies to change what they are currently doing in Puerto Rico, and also the US Virgin Islands, in rebuilding the electrical grid. We fear that federal dollars are being used to re construct the previous unreliable, expensive and dirty electricity grid that existed prior to the hurricanes. This makes little environmental sense and even less fiscal sense. Unless Congress intervenes and provides new direction to FEMA and other agencies, they will fund rebuilding the old electricity grid, and that grid will come down during the next hurricane as it did during Irma and Maria.

[Here is an op-ed](#) that we co-authored on this issue on October 27, 2017.

While 873 of 1,100 gas stations are open and the supply of diesel fuels to hospitals and other critical facilities has improved; the road to recovery will be long. The Governor has set a goal for 95% restoration by December 15th, however this is likely to be difficult as the U.S. Army Corps of Engineers estimates a full year for complete power restoration. Required repairs includes putting 62,000 distribution poles back up and the trucks needed to do so are in short supply. The head of the electric utility, PREPA (the largest public utility in the United States), estimates repairs will cost \$5 billion, with other estimates far higher.

Today, many workers from Puerto Rico and across the United States are working to rebuild the grid, funded in part by FEMA. However, under the constraints of the Stafford Act, these crews are rebuilding the grid 'as was'. And with many inexperienced workers, the quality of grid reconstruction may suffer. This process will return the island to an electricity system to using antiquated generation located far from the population centers, fragile transmission and distribution lines, and limited technological upgrades – which leaves Puerto Ricans paying more, getting less, and still exposed to hurricanes.

Even if Puerto Rico's electric grid is returned to pre-hurricane status – it would not be considered reliable, resilient, or cost-effective. PREPA targets have a monthly system average interruption frequency index of 0.33, or an expectation that on average, a customer will have four outages per year. However, historically PREPA customers experience 11.5 outages per year on average. Outage duration was also high. When outages occurred, the average outage was over two hours long. Puerto Ricans experience four to five times the number of service outages as U.S. customers on average, despite the fact that they pay the second highest rates (over 20¢/kWh) in the U.S. after Hawaii, driven higher by expensive imported bunker fuel.

The system's low reliability could in part be explained by the fact that PREPA hasn't performed major upgrades to its grid in decades, and the median age of the island's power plants at 44 years—more than double the industry standard of 18 years. It's hard to find replacement parts when individual pieces of equipment break down.

The pre-hurricane system also faced the problem of overcapacity. A recession starting in 2007 combined with an 11 percent decline in population to produce a 19 percent decrease in electricity consumption and 14 percent decrease in peak load since 2004. With the rebuild of the grid taking months, one report suggests 500,000 people could leave the island for good as a result of the hurricanes, potentially leading to a future rate spiral – burdening those who remain with even higher costs for electricity.

Puerto Rico has an opportunity to rebuild quickly, and in a manner that supports the people's energy priorities: a resilient, cost-effective, de-centralized and sustainable grid. Even before the 2017 hurricanes, the island could have provided a significant fraction of its electricity with renewables at a net cost savings. Best-in-class power purchase agreement (PPA) offers for solar and wind — on the order of 10–15¢/kWh — will be lower than bunker fuel costs, even if damaged generators are replaced by higher-efficiency units. Renewable energy and energy efficiency would mitigate the macroeconomic impacts of fuel price volatility on the country's economy.

By coordinating rebuilding efforts with investment in renewables and demand-side management, there is an opportunity to realize even greater cost savings. Renewables and, especially, demand-side management and energy storage can provide peak generating capacity to the grid, allowing Puerto Rico to minimize investment in new generating assets. Locally deployed resources can also defer, minimize, or avoid transmission and distribution expenses. Designing the new grid for flexibility and avoiding capital costs reinvested in legacy infrastructure can allow for higher levels of renewable energy, likely at cost savings to the current system.

This coordinated investment would also be significantly more resilient and sustainable and decentralized. By siting generation closer to loads, especially in the North and in remote communities or islands of Vieques and Culebra, and connecting in "islandable" microgrids that can maintain operations during larger grid outages, it is possible to prioritize critical loads and minimize restoration time, as already seen with recent projects from Tesla and Sunrun, as well as other pre-existing solar systems on the island. Investments in microgrids and other distribution improvements, as well as energy storage can improve cost-effectiveness and reliability.

A coordinated rebuild would allow hard-hit communities and anchor businesses to be repowered earlier, and allow many communities the opportunity to shape and participate in the energy sector directly. Prioritizing distributed microgrids could avoid the costs of rebuilding certain costly and hard to access lines to remote communities while restoring services faster. An investment plan that leveraged this resource, and planned for eventual grid integration of most of these remote systems, would result in a

stronger and more resilient grid in the long run, minimize the risk of flight from residents and businesses currently without power, and require less total funding from the US Government.

To seize these benefits, a few key steps appear clear, and more will emerge from a coordinated response of all involved in Puerto Rico.

- Change key Stafford Act provisions to direct FEMA to fund a better rebuild of the grid, not rebuilding what was damaged by the hurricanes.
- Deploy federal funds (HUD, CDGB, Disaster Recovery, DOE, etc.), and other loans to quickly deploy solar and storage microgrids to key parts of Puerto Rico using an open and transparent procurement process. In other words, the opposite of what transpired with the Whitefish contract.
- Operational and business model restructuring of PREPA to ensure they are prepared to lead this rebuild and the operation of the grid thereafter
- Set a long-term vision, and support grid-level investment in new renewable technologies, storage, energy efficiency, distributed generation and grid intelligence to better prepare for the future and create jobs
- Support a strong and independent regulatory body to minimize costs, and ensure an electricity system that will support future energy policies that will help Puerto Rico rebound.

Your leadership in the weeks ahead, could help transform the entire electricity grid in Puerto Rico and the US Virgin Islands in a manner that will prevent future suffering by the residents of the territories and transform the economy. This is a situation where rapid investments in resilient, renewable and decentralized energy sources makes environmental, public health and fiscal sense. We would be happy to discuss these issues further and can be reached at Judithaenck@gmail.com and Ramon.Javier.cruz@gmail.com. Thank you.

Sincerely,

Judith Enck
Former EPA Region 2 Regional Administrator
(including NY, NJ, Puerto Rico and US Virgin Islands)

Ramon Cruz
Former Commissioner, Puerto Rico Energy Commission
Former Vice Chair, Puerto Rico Environmental Quality Board

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS
Congress of the United States
House of Representatives
COMMITTEE ON ENERGY AND COMMERCE
2125 RAYBURN HOUSE OFFICE BUILDING
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Majority (202) 225-2327
Minority (202) 225-3641

December 4, 2017

Ms. Patricia Hoffman
Acting Under Secretary for Science and Energy
Principal Deputy Assistant Secretary
Office of Electricity Delivery and Energy Reliability
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Ms. Hoffman:

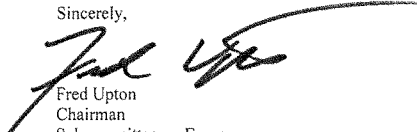
Thank you for appearing before the Subcommittee on Energy on November 2, 2017, to testify at the hearing entitled "The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Monday, December 18, 2017. Your responses should be mailed to Allie Bury, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Allie.Bury@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,



Fred Upton
Chairman
Subcommittee on Energy

cc: The Honorable Bobby L. Rush, Ranking Member, Subcommittee on Energy

Attachment



Department of Energy
Washington, DC 20585

February 27, 2018

The Honorable Fred Upton
Chairman
Subcommittee on Energy
Committee on Energy and Commerce
U. S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

On November 2, 2017, Principal Deputy Assistant Secretary Patricia Hoffman testified regarding a hearing entitled "The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts".

Enclosed are answers to questions submitted by Representatives Bilirakis and you.

If you need any additional information or further assistance, please contact me or Fahiyeh Yusuf, Office of Congressional and Intergovernmental Affairs at (202) 586-5450.

Sincerely,



Marty Dannenfelser
Deputy Assistant Secretary for House Affairs
Congressional and Intergovernmental Affairs

Enclosures

cc: The Honorable Bobby Rush
Ranking Member



QUESTIONS FROM CHAIRMAN UPTON

- Q1. Please provide a description and timeline of DOE personnel and activities on Puerto Rico and the U.S. Virgin Islands.
- A1. The U.S. Department of Energy (DOE) continues to support restoration and recovery efforts related to Hurricanes Maria and Irma in Puerto Rico and the U.S. Virgin Islands (USVI). DOE Emergency Support Function #12 – Energy (ESF-12) responders were deployed to Puerto Rico in support of the Federal Emergency Management Agency (FEMA) until the week of February 19 and DOE continues to provide ESF #12 support to FEMA as needed. DOE ESF #12 responders deployed to the USVI demobilized on January 12 and a team from DOE’s National Renewable Energy Laboratory (NREL) completed a deployment to perform assessments of USVI electricity infrastructure. A team of 25 available personnel and 10 line-trucks from DOE’s Western Area Power Administration (WAPA) went to St. Thomas to provide mutual aid, through a DOE mission assignment from FEMA and at no cost to WAPA’s rate payers, to restore the transmission system on the island. The WAPA crews completed work on the transmission system and finished work on November 29.

DOE has also relied upon subject matter experts from several Power Marketing Administrations (PMAs) to provide technical assistance to the U.S. Army Corps of Engineers (USACE) for restoration planning on Puerto Rico and had a person deployed to assist FEMA with ESF-15 – External Affairs. In addition to DOE’s deployments of personnel, there are also DOE personnel who volunteered for the FEMA Surge Capacity Force.

Finally, Secretary Perry, Deputy Secretary Brouillette, and Under Secretary Menezes have all visited Puerto Rico and the USVI, and Assistant Secretary Bruce Walker spent two weeks in Puerto Rico to help coordinate electricity restoration efforts between FEMA, USACE, the Puerto Rico Electric Power Authority (PREPA), and industry. A timeline of key DOE activities is below:

- September 3: ESF-12 responders deploy to Puerto Rico, St. Thomas, and St. Croix

- September 4: ESF-12 responders deploy to the FEMA Region II Response Coordination Center; ESF-12 responders were already deployed to the FEMA National Response Coordination Center to provide 24/7 coverage for Hurricane Harvey
- September 6: Hurricane Irma impacts the USVI and Puerto Rico
- September 17: ESF-12 responders demobilize from Puerto Rico—PREPA reports 96% of customer outages from Hurricane Irma had been restored
- September 17/18: Advance team from WAPA travels to San Juan, Puerto Rico in preparation for arrival in St. Thomas
- September 19/20: Hurricane Maria impacts the USVI and Puerto Rico; ESF-12 responders on St. Thomas and St. Croix shelter-in-place with FEMA Incident Management Assistance Team
- September 19: ESF-12 responders pre-position in Atlanta, GA for deployment to Puerto Rico
- September 19/20: FEMA declares response to Hurricane Maria a Level 1 event and transitions incident support responsibilities of the FEMA Region II Response Coordination Center into the National Response Coordination Center
- September 20: Line-trucks from WAPA ship en route to St. Thomas
- September 22: ESF-12 responders arrive in Puerto Rico
- September 24: WAPA advance team arrives on St. Thomas, begins assessments of the transmission system, and prepares for arrival of additional personnel and equipment
- September 28–October 2: Seventeen additional personnel and the line-trucks arrive on St. Thomas, from WAPA
- October 4: USACE receives Mission Assignment from FEMA to support grid restoration in Puerto Rico. USACE formally requests subject matter experts from DOE to provide technical assistance; however, DOE and USACE had already been in close coordination in preparation for expanded mission
- October 6: DOE begins deployment of personnel to support FEMA with ESF-15 on Puerto Rico
- October 18: Subject matter experts from PMAs begin engagement in Puerto Rico to provide technical assistance to USACE

- October 23: Assistant Secretary Bruce Walker deploys to Puerto Rico for two weeks
- November 1: Assistant Secretary Walker visits St. Croix
- November 9: FEMA National Response Coordination Center demobilizes
- November 28: DOE Recovery Support Function responder deploys to Puerto Rico to support recovery mission under National Disaster Recovery Framework (NDRF)
- November 29: WAPA personnel and equipment complete restoration of the transmission system on St. Thomas
- December 12: NREL personnel arrive in the USVI to support assessments of energy infrastructure—onsite assessment complete within two weeks
- January 12: ESF #12 responders deployed to USVI complete demobilization
- January 26: DOE deployed a responder to Puerto Rico under a FEMA NDRF mission assignment to represent DOE as a primary agency in the Infrastructure Systems Recovery Support Function supporting the creation of the Federal recovery plan
- February 19: ESF #12 responders deployed to Puerto Rico demobilize—DOE subject matter experts remain deployed to provide technical assistance to USACE and DOE continues to provide ESF #12 support as needed

Throughout the deployment of personnel for Hurricanes Harvey, Irma, Maria, and Nate, the DOE Energy Response Organization has been activated at DOE Headquarters providing support to deployed personnel, FEMA, and other Federal partners as well as coordinating with industry. Personnel were also deployed to the Region IV and VI Coordination Centers and State Operations Centers in Texas, Florida, Georgia, Alabama, and Louisiana for hurricanes as well as California in support of wildfires.

DOE is also supporting implementation of the NDRF and serves as a primary agency for Infrastructure Systems on the Recovery Support Function Leadership Group (RSFLG). The RSFLG meets regularly to coordinate cross-cutting recovery issues specifically related to Puerto Rico and the USVI. DOE briefed the RSFLG on the One Vision Plan at its most recent Under Secretaries level meeting on January 9, 2018. The One Vision Action Plan for Power Restoration for Puerto Rico integrates plans and materials from multiple resources (New York Power Authority; PREPA; Puerto Rico Oversight,

Management, and Economic Stability Act (PROMESA); Governor's plan; and others) into a unified solution set. The draft Plan—due February 5, 2018, and to be released April 30, 2018—will incorporate resilient measures, and will be utilized in the Puerto Rico Recovery Plan. DOE also sent personnel to Puerto Rico through a FEMA Mission Assignment specifically to address recovery-related concerns there and work with other RSF partners to focus on a resilient recovery.

On Puerto Rico, as of February 21, PREPA reports that 84.5 percent of normal peak load and 85.6 percent of customers (1,261,513 of 1.47 million) have been restored and all 78 municipalities are at least partially energized or have an energized facility. As of February 21, approximately 92 percent of substations have been restored, and there were 4,896 line workers and associated personnel supporting the restoration efforts. USACE, as the coordinating agency for ESF 3 – Public Works and Engineering, received a mission assignment from FEMA to lead the Federal role in repairing the hurricane-damaged electrical power grid in support of the Government of Puerto Rico. USACE has partnered with PREPA, DOE, and FEMA to restore safe and reliable power to the people of Puerto Rico. USACE has awarded several major contracts to assist with the restoration efforts covering the crews and equipment to work on the transmission and distribution lines that need repairs, and for generators to stabilize the power grid, such as those installed in Palo Seco. USACE has also worked with PREPA to identify the materials and equipment needed for the restoration effort, which have been procured through the Defense Logistics Agency. USACE utilized the U.S. Navy's USNS Brittin Roll-On-Roll-Off Cargo Ship to transport these materials and equipment between Charleston, South Carolina and the Puerto Rico. In addition to the USACE restoration efforts, DOE and FEMA have worked closely with industry, through the Electricity Sub-Sector Coordinating Council, to facilitate mutual assistance and additional subject matter experts from utilities across the country.

In the USVI, as of January 31, the Virgin Islands Water and Power Authority (VIWAPA) reported that 51,473 customers (93 percent of total customers and 99 percent of customers currently eligible to receive power) have had electrical power restored. VIWAPA also began a *No Customer Left Behind* campaign aimed at reconnecting all

customers who can be restored to the electric grid and who may have been bypassed during the initial phase of restorations. As of January 31, following the completion of DOE's ESF #12 mission in the USVI and given VIWAPA's progress, DOE has discontinued regular updates on the restorations efforts but remains available to support if needed. DOE and FEMA have worked with industry to facilitate mutual assistance, including crews and equipment from the Northeast Public Power Association and VIWAPA has retained two off-island contractors to support the restoration efforts.

QUESTIONS FROM REPRESENTATIVE BILIRAKIS

- Q1. You mentioned in your response to my question regarding challenges that still exist post-storm for Florida that Florida needs to re-examine its fuel distribution network since it was identified as a vulnerability following the storm.
- Q1a. What resources (technical expertise and assistance, grants, etc.) are available from DOE to assist Florida as it re-examines its fuel distribution network and seeks to implement changes?
- A1a. The U.S. Department of Energy (DOE), through the Office of Electricity Delivery and Energy Reliability, works closely with State and local governments on energy assurance planning, including fuel distribution. DOE also works with State and local organizations, including the National Association of State Energy Officials (NASEO), the National Emergency Management Association (NEMA), National Governors Association (NGA), and the National Conference of State Legislatures (NCSL).

DOE is supporting improved emergency fuel planning by providing technical expertise through organizations including NASEO and NEMA. The goal of these efforts is to enhance planning, coordination, and planning of fuel distribution during emergencies. These efforts will include the publication by NASEO of a fuel emergency guide for State governments and an emergency fuel planning workshop. The publication and workshop are meant to share best practices and provide planning templates, sample language for executive orders, and hosting exercises and planning workshops that will bring Federal, State, local, tribal, and territorial governments together with law enforcement and industry. These efforts are meant not only to unify effort, but also to unify messaging during an emergency to better inform citizens and customers of potential impacts and actions to take during an event. DOE anticipates completing these actions by May 31, 2018, in time for the 2018 hurricane season.

- Q2. Florida Power and Light (or FPL) is the nation's 3rd largest electric utility and its smart grid is widely considered to be an industry 'gold standard' for performance and resiliency. In fact, FPL received 2 industry awards earlier this year for its performance during the 2016 hurricane season. Yet, despite the awards and continued system investments totaling nearly \$3 billion since 2006, Irma laid waste to a large portion of the grid prompting FPL to announce that their West Coast system in Florida would need a "wholesale rebuild."
- Q2a. What is currently being done to ensure better grid resiliency against future natural and manmade disasters?
- A2a. DOE works closely with State and local governments and industry to enhance the resilience of the Nation's energy infrastructure. One way DOE ensures resilience is through existing emergency authorities. The Department has existing authorities under section 202(c) of the Federal Power Act to issue emergency orders during disasters or other energy emergency situations. DOE has leveraged these authorities in the past to support interconnection power flows to keep the lights on.

The Fixing America's Surface Transportation Act gave the Secretary of Energy new authority, upon declaration of a Grid Security Emergency by the President, to issue emergency orders to protect or restore the reliability of critical electric infrastructure or defense critical electric infrastructure. This authority allows DOE to support energy sector preparations for and responses to various events, including electromagnetic pulses (EMP), geomagnetic disturbances (GMD), and cyber and physical attacks.

As part of a comprehensive effort to reduce the impact of severe weather and other events, DOE has supported research and development to enhance resilience, including advanced grid technologies, microgrids, and energy storage. DOE continues to pursue increased resilience through other activities, including our recent Resilient Distribution Systems Lab Call awards. Under the Grid Modernization Initiative, DOE announced the award in September of up to \$32 million over three years to the Grid Modernization Laboratory Consortium to support early stage research and development of next-generation tools and technologies to further improve the resilience of the Nation's critical energy infrastructure, including the electric grid and oil and natural gas infrastructure.

Another way DOE is working to ensure grid reliability in the organized markets is through the rule proposed to the Federal Energy Regulatory Commission in September that would ensure that certain reliability and resilience attributes of electric generation resources are fully valued. A reliable, resilient electric grid depends on a diverse mix of resources, and must include traditional baseload generation with on-site fuel storage that can withstand major fuel supply disruptions caused by natural and man-made disasters.

Q2b. What public utility and energy delivery challenges still exist?

A2b. The 2017 hurricane season highlighted the need for a focus on energy system resilience. The recent severe weather events, changing resource mix, and dynamic nature of grid technologies—including changes on the demand side—are bringing grid resilience to a new, more prominent place in the national dialogue on this topic. Specifically, as we keep an eye on day-to-day reliability, as well as resource adequacy, we must also incorporate additional issues related to resilience into the discussion.

Q2c. How do we proactively address during our recovery process?

A2c. DOE is cognizant of its unique role in addressing these challenges and that it is critical to be proactive and cultivate an ecosystem of resilience, including: a network of producers, distributors, regulators, vendors, and public partners, acting together to strengthen the ability to prepare for, respond to, and recover from disruptions. This includes continuing to partner with industry, other Federal agencies, State and local governments, and other stakeholders to address the issue of resiliency. Federal interagency partners are implementing the National Disaster Recovery Framework (NDRF) through regular series meetings of the Recovery Support Function Leadership Group (RSFLG). DOE is one of the primary agencies (along with FEMA and the Department of Transportation) under the Infrastructure Systems (IS) Recovery Support Function, which is coordinated by the U.S. Army Corps of Engineers (USACE). DOE briefed the RSFLG on the One Vision Plan at its most recent Under Secretaries-level meeting on January 9, 2018. The One Vision Action Plan for Power Restoration for Puerto Rico (PR) integrates plans and materials from multiple resources (New York Power Authority, PR Electric Power Authority, PR Oversight, Management, and Economic Stability Act (PROMESA), Governor's plan, and

others) into a unified solution set. The draft Plan—due February 5, 2018, and to be released April 30, 2018—will incorporate resilient measures, and will be utilized in the PR Recovery Plan. During the recovery process there are opportunities to identify where additional or new mitigation measures could improve the overall resilience of the system, such as flood monitoring at substations, cement and composite poles to replace damaged wood poles, and incorporating advanced grid technologies.

- Q3. Puerto Rico recently invited Tesla to pilot new technologies in the U.S. territory in an effort to get their grid back up in a low-cost, efficient manner. Are there other grid projects underway across the U.S. using this or a similar public-private model? If not, are there currently any barriers in statute that need to be addressed to pave the way for more such projects?
- A3. Many companies have offered aid to Puerto Rico, looking to explore use of various types of technology and/or financing. Tesla specifically offered simple replacement of diesel engines, which gives Tesla a chance to test their product. Other companies are interested in financing commercial demonstrations of microgrids, which would generally be larger projects, but could involve major investments with uncertain returns. Issues in Puerto Rico have included theft of equipment and lack of certainty regarding return on investments.

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS
Congress of the United States
House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6115

Majority (202) 225-2027
Minority (202) 225-3041

December 4, 2017

Mr. Charles Alexander
Director of Contingency Operations
U.S. Army Corps of Engineers
441 G Street, N.W.
Washington, DC 20314

Dear Mr. Alexander:

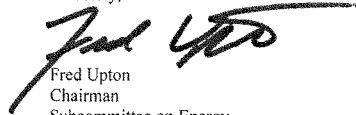
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Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,



Fred Upton
Chairman
Subcommittee on Energy

cc: The Honorable Bobby L. Rush, Ranking Member, Subcommittee on Energy

Attachment

The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure
Recovery Efforts

Committee on Energy and Commerce, Subcommittee on Energy

November 2, 2017

Attachment – Additional Questions for the Record

The Honorable Fred Upton

1. The Army Corps of Engineers is the primary agency for ESF#3 related to public works and engineering, including conducting preincident and postincident assessments of public works and infrastructure; executing emergency contract support for life-saving and life-sustaining services; providing technical assistance to include engineering expertise, construction management, and contracting and real estate services; providing emergency repair of damages public infrastructure and critical facilities.
2. Please detail all activities the Corps engage in under this function to evaluate the integrity and viability of drinking water delivery systems and infrastructure under this authority for Hurricanes Harvey, Irma, and Maria.

Answer: The U.S. Army Corps of Engineers, primary agency under ESF #3 and the U.S. Environmental Protection Agency (EPA), support agency to the Corps under ESF#3 and primary agency under ESF#10, conducted water and wastewater system assessments and provided water-related technical assistance during the 2017 hurricane season. Specifically, the Corps and EPA deployed personnel to coordinate and execute all necessary assessments, evaluation, and design/build response and recovery actions associated with ensuring the safety of drinking water and wastewater systems in the affected area in coordination with the appropriate State agencies, as directed by FEMA and requested by the State or Territorial governments. These actions included but are not limited to providing laboratory support for water sample collection, analysis and data interpretation; assessing public water and wastewater systems; facilitating the contact with Federal, State and local agencies and providing oversight of drinking water and wastewater system restoration, and related activities, including repairs.

3. Please detail the interactions between the Corps and the U.S. Environmental Protection Agency or State/Territorial agencies with primary enforcement authority for Federal environmental laws in support of ESF#3 for Hurricanes Harvey, Irma, and Maria.

Answer: Prior to awarding any contract in response to ESF#3 mission assignments, the Corps coordinates directly with ESF #10 (EPA) to identify and address all environmental requirements set forth by all Federal, State/Territorial agencies. The Corps takes action to avoid, minimize and mitigate actions that impact the environment. In cases where environmental impacts cannot

be avoided, the Corps documents these impacts and follows environmental law to disclose and address these impacts.

4. Please detail any funding requests or response and recovery recommendations made to or denied by the Federal Emergency Management Act for addressing water, waste water, or solid waste under this function.

Answer: FEMA aided the Government of Puerto Rico's request for water, waste water, and solid waste by providing funding under three separate mission assignments. The primary mission assignment was accomplished by funding provided directly to Puerto Rico's water and sewage agency, PRASA, who in turn contracted the assessment of their infrastructure system(s) to a contractor. A second mission assignment was provided to the EPA to focus on environmental impacts and potential threats to people's health, as well as the safety of those in the affected areas. EPA's mission included sampling, analysis and lab support, and getting wastewater systems up and running. The third mission assignment provided to the Corps was limited in scope and amounted to our providing personnel to support the efforts of the previously discussed primary mission assignments. While the Corps had limited interactions with the PRASA contractor conducting the assessments, the Corps did coordinate regularly with EPA as its mission assignment evolved over time. While the PRASA contractor focused their efforts on the major population centers, FEMA modified the Corps mission to conduct assessments to water and waste water infrastructure systems in remote areas of Puerto Rico. In this effort, the Corps included EPA for assistance in determining water potability. All Corps funding requests to FEMA were approved with respect to water, waste water, and debris management in Puerto Rico. Any and all recommendations to FEMA were considered by FEMA and forwarded to the Puerto Rican government for consideration and potential implementation.

5. Please provide all guidance or information to date provided to Army Corps by FEMA or PREPA regarding coordination efforts to rebuild the electrical grid.

Answer: On September, 30 2017, the Corps was given a FEMA mission assignment, within the authority of the Stafford Act, to assist the Puerto Rico Electric Power Authority (PREPA) in further repairing the power system to its pre-storm condition.

This mission assignment from FEMA states that the Corps will "...lead planning, coordination and integration efforts in preparation to execute electrical power grid restoration in Puerto Rico due to impacts caused by Hurricane Maria. Develop and execute applicable temporary repairs to the segments electrical grid to allow interim restoration of system segments as directed by FEMA until the full electrical grid restoration can be implemented."

The Corps works through the unified command group (Governor's power restoration coordinator, FEMA, the Corps and PREPA) on a daily basis to coordinate efforts to rebuild the electrical grid. Through the unified command group, the Corps and PREPA developed a master plan for transmission and another for distribution that prioritizes lines for restoration enabling work to continue in a materials constrained environment to restore power and ensure the public safety. It is important to note the critical path is materials needed to restore power, this is addressed in another response below.

All critical infrastructure such as hospitals have temporary generation until the power grid is restored and they are connected to it. In addition, seven remote communities have micro-grids established using the repaired distribution lines and electric substations connected to generators until the transmission grid is restored. Two more micro-grids are planned for a total of nine at this time. The combination of temporary power, interim micro-grid power and permanent power restoration are proving very effective.

6. Please provide a timeline of Army Corps awareness and involvement with any and all contracts or activities with PREPA since August 2017.

Answer: Although the Corps and PREPA meet daily to establish direction for line assignments, contract oversight for PREPA's contractors and their own workforce are solely the responsibility of PREPA. The Corps has no involvement in contracts awarded and managed by PREPA. However, under the FEMA mission assignment received by the Corps, the Corps oversees only its federal contracts to execute mission assignments.

The Corps coordinates with PREPA on a daily basis for planning and execution of the power grid restoration. This includes identification, acquisition and transport of materials; prioritization, assignment and coordination of work; and synchronization of communication activities. The Corps does have visibility of line assignments being worked by Corps contractors, PREPA and PREPA contractors, and public sector utilities under mutual aid agreement with PREPA. This helps to reduce interferences between workforces.

7. Please provide a copy of all contracts awarded by Army Corps for power restoration on Puerto Rico.

Answer: See attached. As assigned by FEMA, the Corps leads the federal role in repairing the hurricane-damaged electrical power grid in support of the Government of Puerto Rico. The Corps executes this mission in coordination with its other Federal partners from FEMA and the Department of Energy (DOE) and the Corps has received \$1.909 billion towards this effort to date. Below is a description of the contracts.

Line repair contracts

- On October 16, 2017, the Corps awarded a \$240 million time and materials contract to Fluor Corp. to repair the power grid in Puerto Rico. This contract was later modified to increase the ceiling on the original contract to \$505 million. FEMA has provided all these funds. On December 7, 2017, the Corps also awarded a second time and materials contract with an \$831 million ceiling to Fluor Corp. to support ongoing work to restore the power grid in Puerto Rico. To date \$500m have been provided for this second contract. The remaining \$331M is being held FEMA as a risk management reserve until it is needed.
- On October 19, 2017, the Corps awarded a sole source time and materials \$40 million contract to PowerSecure, Inc. to provide additional support to the repair of distribution and transmission lines. In early November, the Corps increased the contract by \$48 million, now totaling \$88 million. This was done to accelerate restoration work. On Nov 17, 2017, the

contract ceiling was increased by \$302M to a total contract capacity of \$390M. The additional funds will bring additional people, equipment and materials to the effort to repair hurricane-damaged transmission and distribution lines to western portion of the island.

Generation contracts

- On November 6, 2017, the Corps awarded a \$19 million contract to APTIM Federal Services, LLC. for the installation of one 25MW generator for temporary power at the Yabucoa Power Plant. This was needed to ensure more reliable power for the Yabucoa and Humacao areas, the most heavily impacted areas located in southeast Puerto Rico. On December 9, 2017, the contract was increased to \$36M to provide two months of operations and maintenance through Feb 12, 2018.
- On October 8, 2017, the Corps awarded a \$35.1 million contract to Weston Solutions to provide 50 MW capacity to the Palo Seco Power Plant, which stabilized the power grid. On October 29, 2017 the contract was increased to \$80M to provide four months of operations and maintenance through February 28, 2018.

Defense Logistics Agency Contract: On October 8, 2017, FEMA provided \$80 million to the Corps to order materials for all entities performing power restoration which now includes: the Corps' contractors, PREPA and its contractors, and public sector utilities under mutual aid agreement with FEMA. Subsequently FEMA provided four additional increases to the Corps' materials mission assignment totaling \$240 million.

FEMA assigned the material acquisition mission to the Corps to ensure only one entity would place demands on an extremely constrained supply chain nationally and internationally to preclude a situation where multiple contractors would be in competition upon the supply chain. It is important to note that many materials needed for the Puerto Rico grid restoration are no longer manufactured and require retooling by manufacturers which adds to delays. In addition, many materials normally used nationwide were depleted at public utilities and suppliers. Many of those recently received had manufacture dates in mid-December 2017. Hence, the decision to leverage the Defense Logistics Agency by the Corps synchronized the entire material demand requirement from one entity for all users in grid power restoration.

The Honorable Gus Bilirakis

1. Would you discuss how we can best streamline agency coordination to prevent bureaucratic overlap and redundancies which can lead to waste and unnecessary delays and hamper the effectiveness of response?

Answer: All agencies involved in the Hurricane Maria response effort will complete a formal After Action Review concerning their emergency response efforts for these events. This process will provide recommendations to FEMA and the affected State and Territorial Governments for potential use in future events, including the 2018 Hurricane Season.

- a. With a coordinated, interagency response, are there interagency goals that drive response and preparedness strategies?

Answer: The National Response Framework (NRF) is the guiding document to assist the Federal Government in ensuring proper agency coordination takes place, and to prevent overlap of missions and to reduce redundancy across the Federal family.

- b. If so, what are these goals?

Answer: The Corps executes its emergency response mission through the National Response Framework (NRF). The NRF, part of the National Preparedness System, sets the strategy and doctrine for how the whole community builds, sustains, and delivers the Response core capabilities identified in the National Preparedness Goal in an integrated manner with the other mission areas. To support the Goal, the objectives of the NRF are to:

- Describe scalable, flexible, and adaptable coordinating structures, as well as key roles and responsibilities for integrating capabilities across the whole community, to support the efforts of local, state, tribal, territorial, insular area, and Federal governments in responding to actual and potential incidents.
- Describe, across the whole community, the steps needed to prepare for delivering the response core capabilities.
- Foster integration and coordination of activities within the Response mission area.
- Outline how the Response mission area relates to the other mission areas, as well as the relationship between the Response core capabilities and the core capabilities in other mission areas.
- Provide guidance through doctrine and establish the foundation for the development of the Response Federal Interagency Operational Plan (FIOP).
- Incorporate continuity operations and planning to facilitate the performance of response core capabilities during all hazards emergencies or other situations that may disrupt normal operations.
- The NRF is composed of a base document, Emergency Support Function (ESF) Annexes, and Support Annexes.

The Federal Government and many state governments organize their response resources and capabilities under the ESF construct. ESFs have proven to be an effective way to bundle and manage resources to deliver core capabilities. The Federal ESFs are the primary, but not exclusive, Federal coordinating structures for building, sustaining, and delivering the response core capabilities. Most Federal ESFs support a number of the response core capabilities. In addition, there are responsibilities and actions associated with Federal ESFs that extend beyond the core capabilities and support other response activities, as well as department and agency responsibilities.

The Corps of Engineers serves as the coordinating agency for one of the fourteen ESFs within the NRF. ESF-3, Public Works and Engineers has as its goal/objective the mission to Stabilize

critical infrastructure functions, minimize health and safety threats, and efficiently restore and revitalize systems and services to support a viable, resilient community.

To that end, the Corps of Engineers in Puerto Rico, established a general officer led division forward headquarters located in San Juan to coordinate our FEMA mission assignments to achieve these objectives and goals. One major subordinate task force was led by a colonel for power restoration and another, was established to execute program management to oversee mission execution for all other FEMA mission assignments.

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS
Congress of the United States
House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

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Minority (202) 225-3641

December 4, 2017

Mr. Robert F. Corbin
Deputy Assistant Secretary
Office of Petroleum Reserves
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Mr. Corbin:

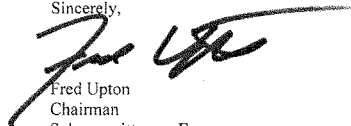
Thank you for appearing before the Subcommittee on Energy on November 2, 2017, to testify at the hearing entitled "The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Monday, December 18, 2017. Your responses should be mailed to Allie Bury, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to Allie.Bury@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,



Fred Upton
Chairman
Subcommittee on Energy

cc: The Honorable Bobby L. Rush, Ranking Member, Subcommittee on Energy

Attachment



Department of Energy

Washington, DC 20585

February 27, 2018

The Honorable Fred Upton
Chairman
Subcommittee on Energy
Committee on Energy and Commerce
U. S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

On November 2, 2017, Deputy Assistant Secretary for Petroleum Reserves Robert Corbin testified regarding a hearing entitled "The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts".

Enclosed are answers to questions submitted by Representatives Bilirakis and you.

If you need any additional information or further assistance, please contact me or Fahiyeh Yusuf, Office of Congressional and Intergovernmental Affairs at (202) 586-5450.

Sincerely,



Marty Dannenfelser
Deputy Assistant Secretary for House Affairs
Congressional and Intergovernmental Affairs

Enclosures

cc: The Honorable Bobby Rush
Ranking Member



QUESTIONS FROM CHAIRMAN UPTON

- Q1. How does the Administration's budget request for a half-liquidation of the SPR fit into the Department's long-term vision for the SPR?
- Q1a. Congress has already directed a drawdown and modernization plan. Is the Department committed to clearing the maintenance backlog and modernizing the SPR?
- A1. The Department is still analyzing the impacts and footprints of a half-liquidation of the SPR. Potential issues we are further analyzing are the possibility of a loss of resilience/redundancy due to site closures and a diminished drawdown rate.
- A1a. Yes, the Department is committed to clearing the maintenance backlog and modernizing the SPR.
- Q2. GAO's testimony stated that DOE contractors studied the feasibility of regional products reserves in the Southwest and West Coast regions to address supply vulnerabilities.
- Q2a. Please provide these studies and any analysis conducted by DOE relating to regional products reserves.
- A2a. The Department currently has no final studies on these topics.
- Q3. The Northeast Gasoline Supply Reserve (NGSR) was established by Secretary Moniz in 2014 with funds obtained by the Department through a test sale of crude oil from the SPR. The NGSR has not been utilized and does not have the statutory authority to operate as a regional products reserve.
- Q3a. Please explain why the NGSR has failed to achieve its intended purpose.
- Q3b. Please provide a full accounting of the cost of the Northeast Gasoline Supply Reserve.
- A3a. The NGSR was created to ease gasoline shortages that may result from sudden and unexpected supply interruptions in the Northeast US following Hurricane Sandy. Since the creation of the NGSR, there has not been a gasoline supply disruption in the Northeast that has met the statutory release criteria. Because the NGSR was administratively established as part of the SPR, it must meet the same statutory requirements and conditions for release that apply to the SPR.

A3b. The total cost of acquiring the government-owned gasoline stored in the NGSR was \$121,906,638.49. The total cost of the commercial leased storage contracts (spanning the period from July 1, 2014 through December 31, 2018) was \$88,298,000. Administrative costs, which include a quality assurance inspection program to ensure product specification as well as support for the Information Technology sales platform, are:

FY 2014 (actual)	\$ 48,000.00
FY 2015 (actual)	\$548,581.98
FY 2016 (actual)	\$615,102.70
FY 2017 (actual)	\$325,050.80
FY 2018 (estimated)	\$325,000.00
FY 2019 (estimated Oct-Dec)	\$ 81,250.00

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS
Congress of the United States
House of Representatives
COMMITTEE ON ENERGY AND COMMERCE
2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-6115
Majority (702) 225-2927
Minority (202) 225-3041

December 4, 2017

Mr. Thomas A. Fanning
Chairman, President, and CEO
Southern Company
30 Ivan Allen Jr. Boulevard, N.W.
Atlanta, GA 30308

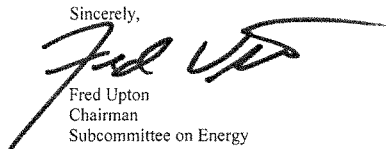
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Fred Upton
Chairman
Subcommittee on Energy

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Attachment

Questions for the Record – Tom Fanning

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Rep. Richard Hudson

1. After each disaster we learn lessons about how to improve responses to emergencies at the federal level and how to better assist with state, local, municipal, and private entities. I am curious about one facet and that involves manpower. While we focus on the immediate need for equipment and supplies to be rushed to areas hurt by storms, there is also a need for qualified experts to flow to the region. When I see the massive scope of damage to power lines, for example, I wonder if there are enough linemen and women available to tackle the laborious work needed to rebuild our grid. North Carolina has been a leader in creating high-skilled job-training programs. At both Stanly Community College and Sandhills Community College, the advanced manufacturing programs are the critical training grounds for high-skilled manufacturing workers. In addition, I have worked with my colleagues on several pieces of legislation to address this critical issue. My question to you Mr. Fanning is twofold:

a. Are companies able to find, train, and retain a workforce that can meet not only the daily challenges of operating a grid, but react to a natural disaster? Are we training enough folks at this point?

b. I have heard from some of my utilities that there is also an issue with retirements affecting the workforce. As the current universe of lineworkers age, are we doing what we need to do to have the next generation of experts trained?

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Thank you for your questions Congressman Hudson. The Electricity Subsector Coordinating Council does not endorse legislation, and since I am responding in my capacity as an ESCC co-chair, I won't comment on the legislative aspect of your question. However, I know your bill H.R. 338, promoting a 21st century energy and manufacturing workforce, enjoys support from many stakeholders, including the electric power sector.

More than a decade ago, the electric power industry saw the challenges you've mentioned—a coming wave of retirements, and the need to recruit and retain the future workforce—and formed the Center for Energy Workforce Development (CEWD), a non-profit consortium of electric, natural gas, and nuclear companies and their associations —the American Gas Association (AGA), American Public Power Association (APPA), Edison Electric Institute (EEI), Nuclear Energy Institute (NEI), National Rural Electric Cooperative Association (NRECA), and Distribution Contractors Association. CEWD has strategic partnerships with many other stakeholders including organized labor, career and technical schools, community colleges, government agencies, and workforce boards. (<http://www.cewd.org/>)

According to a recent study (<http://mjbradley.com/sites/default/files/PoweringAmerica.pdf>) conducted for APPA, EEI and NRECA, the electric power industry directly provides nearly 2.7 million jobs nationwide through its employees, contractors and supply chain, and investments. That workforce is responsible for all of the work required to keep the energy grid operating safely and reliably; everything from routine

maintenance and operations to emergency restoration when the power does go out.

Specifically, as it relates to natural disasters, the electric power industry utilizes a voluntary mutual assistance program to restore power following major outages. When an impacted company requires resources that outstrip its available workforce, it turns to its peers to "borrow" restoration workers. As I noted in my testimony, more than 10,000 electric power industry workers from at least 21 states mobilized to restore power to customers impacted by Hurricane Harvey, and more than 60,000 workers, coming from more than 250 electric companies across the United States and Canada were involved in the restoration following Hurricane Irma.

To your second question on retirements and its impact on the workforce, that was the organizing principle that created CEWD. More than 10 years later, the solutions are in place and that coming wave of retirements is less of a concern. However, you correctly identify the need to train the next generation of grid experts. CEWD is focused on closing the skill gaps for the most critical jobs such as lineworkers, technicians, engineers and plant operators. The industry has put in place a number of solutions, but in particular, I'll mention the work the industry has done to hire more men and women who have served our country. According to the jobs study referenced above, military veteran hiring accounted for more than 10 percent of new hires in the electric power industry as of year-end 2014, the latest year for which data are available.

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