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PART 1: POWERING AMERICA: DEFINING RELIABILITY
IN A TRANSFORMING ELECTRICITY INDUSTRY

THURSDAY, SEPTEMBER 14, 2017

House of Representatives,

Subcommittee on Energy,

Committee on Energy and Commerce,

Washington, D.C.

The subcommittee met, pursuant to call, at 10:00 a.m., in Room 2123, Rayburn House Office Building, Hon. Pete Olson presiding.

Present: Representatives Olson, Barton, Shimkus, Murphy, Latta, McKinley, Kinzinger, Griffith, Johnson, Long, Bucshon, Flores, Cramer, Walberg, Walden (ex officio), Rush, McNerney, Green, Doyle, Castor, Tonko, Loebsack, Butterfield, and Pallone (ex officio).

Staff Present: Ray Baum, Staff Director; Elena Brennan, Legislative Clerk, Energy/Environment; Karen Christian, General Counsel; Wyatt Ellertson, Research Associate, Energy/Environment;

Adam Fromm, Director of Outreach and Coalitions; Tom Hassenboehler, Chief Counsel, Energy/Environment; Jordan Haverly, Policy Coordinator, Environment; A.T. Johnston, Senior Policy Advisor, Energy; Mary Martin, Deputy Chief Counsel, Energy & Environment; Alex Miller, Video Production Aide and Press Assistant; Brandon Mooney, Deputy Chief Energy Advisor; Annelise Rickert, Counsel, Energy; Dan Schneider, Press Secretary; Jason Stanek, Senior Counsel, Energy; Madeline Vey, Policy Coordinator, DCCP; Andy Zach, Senior Professional Staff Member, Environment; Priscilla Barbour, Minority Energy Fellow; Rick Kessler, Minority Senior Advisor and Staff Director, Energy and Environment; John Marshall, Minority Policy Coordinator; Alexander Ratner, Minority Policy Analyst; Andrew Souvall, Minority Director of Communications, Outreach and Member Services; and Tuley Wright, Minority Energy and Environment Policy Advisor.

Mr. Olson. The hearing will come to order.

Good morning and welcome. We find ourselves this morning with a bit of a challenge on the House floor. Votes may start within 5 minutes, multiple roll call votes, may be up to 1-1/2 hours voting on the House floor.

In the interest of time -- I had a great opening statement written by my Texas constituent Annelise. I will not give it but ask unanimous consent to put that in the record.

Without objection, so ordered.

[The prepared statement of Mr. Olson follows:]

******** COMMITTEE INSERT ********

Mr. Olson. Mr. Rush, would you like to speak or put your statement for the record?

Mr. Rush. For the record.

Mr. Olson. For the record.

[The prepared statement of Mr. Rush follows:]

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Mr. Olson. Okay. Guys, moving forward, we have three witnesses here. We have Mr. Chatterjee, Ms. Hoffman, and Mr. Cauley.

You guys have 5 minutes for opening statements.

Mr. Chatterjee, the head of FERC. You have 5 minutes.

STATEMENTS OF NEIL CHATTERJEE, CHAIRMAN, FEDERAL ENERGY REGULATORY COMMISSION (FERC); PATRICIA HOFFMAN, ACTING UNDER SECRETARY FOR SCIENCE, ACTING ASSISTANT SECRETARY FOR THE OFFICE OF ELECTRICITY, DEPARTMENT OF ENERGY (DOE); AND GERRY CAULEY, PRESIDENT AND CEO, NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION (NERC)

STATEMENT OF NEIL CHATTERJEE

Mr. Chatterjee. Thank you, Mr. Chairman, Ranking Member Rush, members of the subcommittee, for the opportunity to be before you today. Before I begin my remarks, I just want to very briefly reflect on the passing of Senator Domenici who passed away yesterday, former chairman of the Senate Energy Committee, who was a leader in this space. And he will be remembered.

I would like to start by taking a moment to acknowledge all of those impacted by Hurricanes Harvey and Irma. The loss of life and widespread devastation wrought by the storms has been absolutely heartbreaking to see. I know I speak on behalf of those in the room and for Americans across the country when I say that our thoughts and prayers are with those affected at this difficult time. We know the road ahead will not be easy, but we will be with you every step of the way.

It was good to see Congress act swiftly to begin providing some of the resources that are needed to those relying on it. We at the

Federal Energy Regulatory Commission are ready to do our part as well.

It is times like these that also remind us how important the reliability and resiliency of the electric grid is in our day-to-day lives. Rebuilding from these storms is going to take time. But I have been inspired by the way that the brave men and women of the utility industry have already stepped forward to help.

Crews from all over the country are assisting in this effort. In addition, FERC and NERC have issued a joint statement to encourage mutual assistance and assure companies that they won't be penalized for helping restore service. FERC also granted an extension on filing deadlines so that people and companies could focus on what is most important: recovery.

And, finally, in response to the loss of refineries due to the storms, the Commission issued an emergency pipeline waiver to accelerate the delivery of much-needed fuel and to help ensure the continued flow of gasoline to the Northeast. We will continue to keep all those affected by Hurricanes Harvey and Irma in our prayers as they work to rebuild their homes and lives.

While this is a transformational and exciting period for the electric power industry, we must be mindful that developments not threaten the robustness or security of the electric grid. FERC supports the reliability and the resiliency of the grid in several ways. Congress entrusted FERC with the responsibility to approve and enforce mandatory reliability standards for the grid in 2005. FERC relies on NERC to develop and propose new or modified reliability standards for

FERC's review. These standards include both physical and cybersecurity standards.

Much of this is covered in my written testimony. So, in the interest of time, I am going to speed ahead and just say that a reliable and resilient grid requires the development of needed energy infrastructure. FERC supports that development through its statutory responsibility to authorize the construction of certain energy infrastructure, such as interstate natural gas pipelines, liquefied natural gas terminals, and non-Federal hydropower generation. While the lack of a quorum has rendered the Commission unable to act on applications for such projects for much of this year, I am pleased to report that FERC is now addressing the backlog and will continue to make steady progress in the coming weeks and months. I am proud to report that, since the restoration of the quorum, we have put out 62 orders and will continue to do that.

Certainly, FERC's efforts in all of these areas covered in my written testimony will continue to involve cross-sector, interagency, and public-private coordination. Working with our Federal partners, State colleagues, relevant industries, and other stakeholders, FERC will continue to seek ways to ensure the reliability and resiliency of the electric grid.

I am committed to working with the subcommittee to continue these efforts, and I would like to reiterate my appreciation to the chair and ranking member for holding this critical hearing. Thank you for allowing me the opportunity to be with you today. I apologize for the

abbreviated remarks, and I would be happy to answer any questions you may have.

[The prepared statement of Mr. Chatterjee follows:]

******** INSERT 1-1 ********

Mr. Olson. Thank you, Chairman Chatterjee.

The chair now calls upon Ms. Patricia Hoffman. She is the Acting Under Secretary for Science, the Acting Assistant Secretary of the Office of Electricity at the Department of Energy.

You have 5 minutes, ma'am.

STATEMENT OF PATRICIA HOFFMAN

Ms. Hoffman. Chairman Upton, Vice Chairman Olson, Ranking Member Rush, and distinguished members of the subcommittee, I appreciate the opportunity to discuss with you electricity reliability issues in a rapidly transforming electricity industry. The U.S. electric sector is in the midst of sweeping changes. Looking ahead, I see little reason to expect that this process will slow down or that we will reach new equilibrium any time soon. Accordingly, I think the fundamental challenge is now to understand this process and manage it so that our Nation's electric infrastructure remains reliable, affordable, and resilient.

Before I discuss any further details, I would like to echo the comments by Chairman Chatterjee and that our thoughts and prayers are there for those that are affected. Our organization also provides energy-related expertise to FEMA and the administration as part of our emergency response activities. We have been actively engaged in the response, recovery, and rebuilding efforts from Hurricane Harvey and Hurricane Irma. The actions that the departments have taken is in

support of a whole-of-government response to these disasters and includes deploying 26 people to State emergency operation centers, Regional and National Response Coordination Centers. We have authorized up to 5.3 million barrels of oil for exchange from the Strategic Petroleum Reserve. We have supported State and regional fuel waivers under the jurisdiction of EPA and hosted coordination calls with DOE and emergency response personnel in the electric sector, the oil and natural gas sector, and State energy offices.

As Secretary Perry has noted on numerous occasions, America is blessed to have the incredible energy systems and resources we have today. The millions of dedicated men and women who work in the electric industry and are providing response activities to restore power, to move fuels, and to repair infrastructure is doing a tremendous job and should be recognized for their dedication and service.

Over the last several months, DOE, led by my office, has explored numerous issues central to protecting the long-term reliability and resiliency of the electric grid. We are seeking to inform policymakers of the facts and trends in the electric sector and provide a common focal point of discussion for all affected stakeholders.

In addition, we do research at our national laboratories with our industry partners. We have focused on new technologies for operating, planning, and monitoring and protecting the grid. The Department announced on Tuesday up to $50 million to national laboratory-led teams focused on resilience and cybersecurity.

In order to keep my comments short, I just want to say, in

conclusion, Secretary Perry and our DOE team look forward to a thoughtful conversation focused on reliability, affordability, and resilience in the electric system. The implications are profound, and we have one electric grid. And we are more dependent on it than ever for our economic well-being and national security. The grid must function, and it must function well in that it must meet a number of competing technical and economic requirements.

And, for me, managing this change means we must think about the grid holistically in a single interactive set of policies; we must monitor the grid's characteristics and performance; we need to develop a more systematic way of looking ahead; and, finally, we must manage change with new processes and practices for collaboration that requires coordination between the Federal and private sector partners.

Thank you, and I look forward to your questions.

[The prepared statement of Ms. Hoffman follows:]

******** INSERT 1-2 ********

Mr. Olson. Thank you, Ms. Hoffman.

The chair now calls upon Mr. Gerry Cauley. He is the president and CEO of the North American Electric Reliability Corporation.

You have 5 minutes, sir.

STATEMENT OF GERRY CAULEY

Mr. Cauley. Thank you, Vice Chairman Olson, and Ranking Member Rush, and the members of the subcommittee. Thank you for conducting this timely hearing as we face a period of rapid change in the electricity industry. Driven by an abundance of natural gas, public policy, advances in technology, market forces, and customer preferences, this transition is altering our understanding of base load power and how generating resources are dispatched.

As the Electric Reliability Organization, NERC is focused on the emerging challenges presented by the Nation's rapidly changing resource mix. With appropriate policies, careful planning, and strong actions, I am confident the electricity sector will continue to accommodate these changes and enhance reliability and resilience. Even with the changes already under way, the bulk power system remains highly reliable and resilient and shows improved performance each year. This record demonstrates the strong commitment to reliability by all stakeholders. But reliability requires constant vigilance more now than ever.

Let me take a moment to describe NERC's role in identifying

emerging reliability risks before they become bigger problems. Each year, we conduct a long-term reliability assessment that looks at the reliability of a system 10 years out. Annually, we also provide a state-of-reliability report that looks at the grid performance over the previous year. We conduct special assessments focused on challenges, such as the integration of renewables and distributed energy resources and the increased reliance on natural gas infrastructure.

We analyze system events, such as the unexpected loss of power from solar farms in California during the Blue Cut fire in August of 2016.

Over the past 6 years, the 50 largest events impacting the grid were caused by severe weather, leaving NERC to focus on resilience as a priority going forward. Through our studies, we are able to provide risk-informed recommendations to continuously improve reliability and resilience.

Next, I would like to turn to how the change in resource mix will affect reliability. The grid is highly interconnected and depends on having the right combination of resources and transmission. It is important to maintain a continuous supply of essential reliability services in the right locations on the system. As just a few examples, these include inertia, frequency response, voltage control, stability, and ramping to meet changes in demand and variability of renewable resources. Conventional base load units with relatively high availability rates and onsite fuel have historically provided these

essential reliability services. When these units retire, new resources coming on to the system must replace these essential reliability services that are being lost. As more resources move behind the meter, it is also increasingly important for the system operators to have visibility into those resources. As our power supply becomes increasingly dependent on natural gas, we must ensure this just-in-time fuel is as reliable and secure as the power plants that need the fuel to operate.

Many issues and recommendations identified by NERC are reflected in DOE's staff report on electricity markets and reliability. Both NERC and the DOE study agree on the need to maintain essential reliability services, promote resilience, coordinate gas/electric issues, and collaborate with Canada and Mexico on reliability.

More specifically, I would like to highlight several recommendations of my own. FERC, States, and markets should review the economic and market factors driving base load generation into early retirements and provide tangible incentives for maintaining a diverse and resilient resource mix. All new resources should have the capability to support essential reliability services. Markets should explicitly value and price capacity, essential reliability services, and enhanced resilience through fuel diversity. Policymakers should evaluate alternatives for ensuring adequate capacity of gas pipelines and storage to meet electricity production needs during extreme conditions and ensure that gas infrastructure is as secure from cybersecurity and physical security threats as the grid that it

supplies.

Markets should incent and, as needed, require all resources, including demand response, ensure those resources will perform in both normal and extreme conditions.

And, finally, policymakers should seek alternatives to streamline siting and permitting of transmission.

To address the challenges and benefits of a more diverse resource mix, industry stakeholders and policymakers must understand and plan for the risks of our rapidly changing resource fleet. NERC plays a critical role as an objective and independent expert organization, and I appreciate the opportunity to share our thoughts and expertise with you here today.

Thank you.

[The prepared statement of Mr. Cauley follows:]

******** INSERT 1-3 ********

Mr. Olson. Thank you, Mr. Cauley.

The chair now calls upon the ranking member of the full committee, Mr. Pallone, for 5 minutes.

Mr. Pallone. Mr. Chairman, I will just submit my statement for the record because my understanding is that there are going to be votes. And I will just submit it for the record. I will ask unanimous consent.

Mr. Olson. Without objection, so ordered.

[The prepared statement of Mr. Pallone follows:]

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Mr. Olson. And I thank you all for your testimony.

And now we begin the question-and-answer portion of this hearing.

I will begin with a question and recognize myself for 5 minutes.

Hurricane Harvey hit my home State twice, but we never lost power at my home in Sugar Land. Some people are still without power in Texas, Louisiana. A lot of people in Florida don't have power because of Hurricane Irma. Without power, there is much greater damage: mold, even death, as we saw in Florida.

My first question is for you, Ms. Hoffman. I know that DOE has been very busy assisting with Hurricane Harvey and Hurricane Irma recovery efforts. We applaud that. But can you talk a second about the programs DOE has in its place not only to recover but to also prepare for storm events in the future?

Ms. Hoffman. Yes, Vice Chairman. Thank you very much for the question. The Department has been actively engaged with utilities through our R&D program to look at advanced technologies that we have helped support the industry, test out on the grid, such as automated switching, rerouting of power, the ability for utilities to do outage management, to really take a look at and be proactive in the response characteristics for identifying where the outages are. If you remember, customers usually have to call the utility to let them know their power is out. Now the utilities have been able to automate a lot of those systems.

In addition, we have been working with the States and the regions to really exercise and understand the different -- each hurricane is

different. The damage is significant. And we have been helping the States prepare for this.

Mr. Olson. Well, thank you.

What has been the role of the ESCC, the electricity subsector coordinating council, during hurricane preparations and response?

Ms. Hoffman. The Electric Sector Coordinating Council has had a significant role. It is the focal point of coordination between the Federal Government and CEOs, the leaders in the electric utility industry. This allows for continuity of message and activities, that we are all on the same page of what the priorities are and what the activities and the needs are by industry to the highest level of the Federal Government, as well as industry, in supporting a coordinated, but most importantly an effective, restoration process.

Mr. Olson. And back home, the people say it is working very well. Glad to hear it is working well on your side.

My final question, Ms. Hoffman, is, a few months ago, we passed a bill out of this committee, H.R. 3050, that helps improve State energy assurance planning. How does an energy assurance plan help a State deal with extreme weather events, like Harvey, Irma, and more hurricanes?

Ms. Hoffman. So energy assurance planning is an important activity that the States undertake to really take a hard look at scenarios of potential events that could impact their State but also look at how this affects the energy resources. So it allows us to look at contingency, and it really thinks about, how do we build in

resilience in partnership with the States?

Mr. Olson. Thank you.

My last question is for you, Chairman Chatterjee. In order to have a reliable electricity system, we must protect our grid from cybersecurity threats. For example, I understand you participate in the grid exercises. How do these types of exercises make the electricity system more reliable? And what else are you doing in terms of cybersecurity?

Mr. Chatterjee. Thank you for the question, Vice Chairman. The Commission and I myself take cybersecurity and protecting our grid from cyber attacks very seriously. FERC is focused on ensuring reliability in the face of some of the cyber challenges that we have. We also have an Office of Energy Infrastructure Security that is trying to stay ahead of potential threats to the grid and participate in some of these activities. There is no question that threats to our system of electricity generation distribution, whether from hurricanes or from cyber attacks, are of the utmost concern to the Commission, and I will continue to work with you all and my colleagues to ensure the safety of our grid.

Mr. Olson. Thank you. That is all my questions.

The chair now calls upon the gentleman from Illinois, the ranking member of the subcommittee, Mr. Rush, for 5 minutes.

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

I want to ask all three of you the first question. In your professional opinion, do you anticipate that climate change will

continue to play a significant role in threatening the Nation's energy infrastructure due to more frequently occurring superstorms, hurricanes, and other natural disasters, including heat waves, droughts, fires, and flood? Each one of you, I would like for you to respond, beginning with you, Mr. Chatterjee.

Mr. Chatterjee. I think it is important, as we confront these storms and the impacts that they have had on our grid, that we ensure that, as our grid transforms for the future, that we ensure that we can bounce back from these types of events and have a really reliable and resilient grid.

As the vice chairman mentioned, when the power goes out, people really suffer. I was on an ESCC call with Secretary Perry in which he talked about the fact, after a couple of days, you are hot, you are tired, you are wet, and if you don't have power, you start to get upset. And it is important that, in response to these weather events and challenges, that we have a reliable and resilient grid. And I think the role of the Commission will be to look that, as we are in this transformational period, that we ensure that the reliability, the world class, second-to-none reliability that our country has enjoyed can be maintained going forward.

Mr. Rush. Ms. Hoffman.

Ms. Hoffman. I would echo the Chairman's comments, that I believe it is the duty and responsibility of the electric industry to be forward leaning and to think about different scenarios and events that will happen, build it off of the knowledge base of we have

experienced, and look about how do we build in resilience moving forward; what can we do to our infrastructure to continue to support an effective restoration process, to getting the lights on as quickly as possible?

Mr. Cauley. So, understanding climate change is outside of my expertise or my organization's expertise, but we do see, in recent years, in my time as 8 years as CEO, it seems as we are seeing an increase in the magnitude and severity of events, flooding and storms. And it is something, as the other two panelists mentioned, I think we have to think about in the design of our systems and our preparations to think about, how do we prepare for more extremes than we have seen historically?

Mr. Rush. Each of you, do you feel as though there is a sense of urgency that is apparent in the Congress or in both administrations or in the administration, be it Republican or Democrat? Is there a sense of urgency about greater reliability in the event of severe weather challenges?

Mr. Chatterjee. I can speak that -- and I laid out in my opening remarks some of the steps that the Federal Energy Regulatory Commission took immediately to respond to the devastation that was wrought by Hurricanes Harvey and Irma. And I can say that we most certainly view the reliability and resilience of our grid with the utmost sense of urgency.

Ms. Hoffman. With two Cat 4 hurricanes impacting the mainland of the United States, there is definitely a sense of urgency.

Secretary Perry, former Governor of Texas, recognizes the devastation to life and the economic development and human safety. So it is definitely forefront on our radar.

Mr. Cauley. I sense that there has been a strong focus on resilience of the grid through both of the most recent administrations. And we are working hard on that.

An example of the investment -- and the reason is, in my opening remarks, I mentioned the 50 most significant events we have seen in the U.S. in the last 5 years are all weather related. So it says we can invest more in hardening and protecting our system.

Florida Power & Light, in Irma, had recently invested $3 billion on hardening using concrete poles, steel poles, elevating substations, and making it -- and the equipment that was hardened performed significantly better than the equipment that had not been hardened yet. So it was a good demonstration.

Mr. Rush. I have just a short period of time now. I want to ask Chairman Chatterjee and Mr. Cauley, according to the cybersecurity firm Symantec Corporation, there has been an uptick in activity by a group of hackers code-named Dragonfly 2.0 within our domestic energy networks after years of seemingly being inactive. Are FERC and NERC monitoring this activity? And are you both confident that you have the tools to address this issue in order to prevent this group from sabotaging our electric infrastructure?

Mr. Chatterjee. Thank you for the question, Congressman. We are aware of the Symantec report and have been coordinating closely

with other Federal agencies, as well as the NERC ISAC, and industry to assess and address this matter as appropriate. If it would be helpful to members of the subcommittee, we could seek to coordinate with other agencies to provide additional information in a nonpublic setting.

Mr. Cauley. Dragonfly has been around for 3 or 4 years. We have been aware of it and communicating with the industry. This new reincarnation of Dragonfly 2 is recent. And it has characteristics that would make it operative within control systems, within substations, and so on. So it is of interest. The instances that we have seen have not gotten into those systems. They were picked up through traffic between the utility systems and information going offshore. So it has not done any harm. It has not infiltrated the systems yet. But it is there, and it is active.

Mr. Rush. I yield back, Mr. Chairman.

Mr. Olson. The gentleman yields back.

The chair now calls upon the gentleman from Texas, the chairman of the full committee -- the vice chairman, Joe Barton.

Mr. Barton.

I ask all members, please adhere to the 5-minute time. Please, please, please. We have got so many people and questions that we are running out of time.

Chairman Barton, you are up.

Mr. Barton. Because of what you just said, Mr. Chairman, I am going to ask one question, and then I will yield to anybody on my side.

Many, many States are adopting renewable portfolio standards, and some of them are fairly aggressive. They want to have at least 50 percent -- and there might be even a few States that are above that -- of their electricity generation with renewables. My question, I guess, would be to Mr. Cauley, who is head of NERC, is it possible to meet the same reliability standards if you go to a generation system that is predominantly renewable?

Mr. Cauley. I think, from what we are seeing, it is technically feasible, but there are a lot of reliability challenges. I gave the example of August a year ago, in California, there was a wildfire that caused a transmission wire to trip. When 1200 megawatts of solar panels saw that, they thought it was the system collapsing, so they all shut down at the worst time. And so there has to be coordination.

Wind and solar do not inherently come with the controls to provide frequency response, voltage response. They just want to put out megawatts; they want to put out power. But, technically, we have been working with the vendors to show them some of those weaknesses and things that need to be done.

Mr. Barton. In the short term, the answer is no; it is not possible.

Mr. Cauley. -- it is --

Mr. Barton. But in the long term, with some battery research and other things, it is, perhaps, possible?

Mr. Cauley. Well, I think the technology is there today. It just requires a lot of coordination.

Mr. Barton. I would yield to Mr. Shimkus.

Mr. Shimkus. Thank you, Joe.

And because it is on the same line, this is to Mr. Chatterjee.

We had the qualifying facilities, the PURPA hearing last week or 2 weeks ago. So just a couple questions that kind of segue right into what Joe was saying. One is: Some of the electricity markets talked about how that there may be a need to -- an opportunity to curtail the QS to make sure they continue to keep the reliability of the grid. You have any comments object that?

Mr. Chatterjee. I want to be careful, Congressman, as we have --

Mr. Shimkus. I don't want you to be careful.

Mr. Chatterjee. As you know, Congress enacted PURPA in 1978. I think we have heard from numerous stakeholders that there is an interest in reviewing potential reforms. Significant changes to PURPA would require congressional action. There are steps that FERC can take with respect to PURPA implementation on minor issues. And we held a technical conference on this. But I think we --

Mr. Shimkus. Let me just go at it this way: You understand that there is a concern that maybe some of these projects are located for the benefit of the investors over the grid reliability?

Mr. Chatterjee. It is certainly something that we are looking at.

Mr. Shimkus. And let me follow up with this: The last mile debate, hopefully you listened or saw part of the testimony --

Mr. Chatterjee. Yes, sir.

Mr. Shimkus. -- where some of these qualifying facilities were able to break down the parcels to kind of game the system. Is that part of your review and discussion?

Mr. Chatterjee. It absolutely is. And it is something that we would review to see whether that is something that the Commission could handle within its purview, potentially not require a statutory change from Congress.

Mr. Shimkus. Great. Thank you.

And I yield back to Chairman Barton.

Mr. Barton. I would be happy to yield to any other member.

If not, Mr. Chairman, I yield back to you.

Mr. Olson. The gentleman yields back.

The chair calls upon the ranking member of the full committee, Mr. Pallone from New Jersey, for 5 minutes.

Mr. Pallone. Mr. Chairman, I would like to yield my time to the gentlewoman from Florida.

Ms. Castor. Well, I thank the ranking member, Mr. Pallone, very much.

And thank you to our witnesses for being here today.

I want to thank the utility workers all across the country who have flooded into Florida -- and I know they did into Texas -- to help get the power back on after millions and millions of my neighbors in Florida lost power. So my hats off to them on behalf of the citizens of the State of Florida. They still have some work to do, but they are making good progress.

But I think these extreme weather events, these two hurricanes, in addition to the other events we have seen just in the past few years, require a modern, dramatic response to what is happening with the cost of the changing climate. These disasters are very expensive. And it is time to make a dramatic investment in a modern grid, something that is more resilient, something that serves the need of our citizens in a better way. We have the brightest minds here in America, and we need to put them to work, and we need to put the technology to work, whether that is burying lines that we haven't invested in before, a greater distributed energy grid, building in the renewables over time. I agree they are not the answer in the short term. But in the long term, these distributed grids, building in renewable energy, is going to help us reduce the cost of the changing climate.

We have to do more on-demand management. That has been a battle in the past, and there are some challenges. But we have got to do this. The business models, in many States, simply do not match the challenges ahead of us. And I hear that the Department of Energy wants to be proactive on this. But I don't know how we do that when we have seen such tremendous proposed cuts from the Trump administration in resilience, in research. We have got to rethink that. And I am calling on all of my colleagues who understand the challenges ahead. We can't simply cut our way and think we are going to be able to address these costs and these challenges ahead.

Ms. Hoffman, certainly these cuts, proposed cuts, to research and development and resiliency are going to put us further behind. How

do we keep up in an era where we need to be investing more in a modern grid to ensure we don't have the power outages, and we are addressing the costs of the changing climate?

Ms. Hoffman. Thank you, very much, for the question.

The administration is focused in its fiscal year 2018 budget on early-stage research. And we really are concentrating on maximizing the effectiveness of work at the Department of Energy. We did provide a budget to Congress for fiscal year 2018, and I know it is under deliberations for the House and Senate. And we look forward to what Congress provides back for what the Department will implement as part of our fiscal year 2018 appropriations.

Ms. Castor. You are right. And it is back on the Congress in a lot of ways. And I hope that they are listening and understand the huge cost if we do not address this. Look at what we are facing already in emergency aid packages, flood insurance, rising property insurance, property taxes because local governments have to raise taxes to harden their water/wastewater infrastructure and everything they are doing, just the loss of life that we are seeing.

So my message this morning, on the heels of these disasters, is let's do more working together, everyone in the utility industry, the scientists we have out there, and take this on. This is a real call to action. And I share Mr. Rush's sense of urgency, as he put it.

So, thank you, and I yield back.

Mr. Olson. The gentlelady yields back.

The chair now calls upon the gentleman from North Dakota,

Mr. Cramer, for 5 minutes.

Mr. Cramer. Thank you, Mr. Vice Chairman.

And thank you, witnesses, for your service and for being with us today.

I am going to ask of the Chairman first, Chairman Chatterjee, as the policy leaders here, we need to respond to establish a path for base load generation, especially coal. North Dakota is a big coal-producing State. It is mine mouth. It is low cost. It is efficient. And I worry about the early shutdown, the forced shutdown, frankly, of base load generation, especially with plants that have useful life left in them. And it really doesn't do anything, in my view, to protect America's future energy position while also increasing the cost of electricity for consumers.

And, of course, again, speaking to my State, most of these plants are -- belong to vertically integrated utilities, which I think has a special concern about this, where the consumers pay for the facilities whether they are running or they are not running. I think this gets lost a lot of times.

Can you elaborate, from a FERC perspective a little bit, on any strategies that you could deploy that would help adequately compensate base load regeneration?

Mr. Chatterjee. Thank you for the question, Senator -- sorry, Freudian slip.

Mr. Cramer. It happens a lot lately.

Mr. Chatterjee. It has a nice ring to it.

Thank you for the question. Obviously, being from Kentucky and having grown up in Kentucky, I have seen firsthand the importance of coal-fired generation and what coal-fired generation means for the delivery of not just affordable but reliable electricity. And, certainly, growing up seeing that, I have an appreciation for the role that coal-fired generation plays in our marketplace.

In terms of what strategies or path forward, the Commission is fuel-neutral. And we will look to ensure that, as our grid undergoes this transformation, that we ensure that we evaluate the attributes of fuel sources to see what values they provide and see what -- if there is a demonstrated need for reliability, whether or not those things can be compensated.

I believe the Democratic nominee for the vacancy on the Commission testified to this last week. And he said that, while currently, per the DOE report, he believed that there was not threats to reliability, even he admitted that we had to closely monitor this and watch this. And I think I would echo those remarks. We are going to closely watch and monitor whether, in fact, transitions in the grid do lead to vulnerabilities and threats to reliability and resilience, and whether, in fact, we would need to take steps to ensure that that need is met.

Mr. Cramer. Thank you for that.

Along the same lines, as you know, a lot of States, they have taken some steps to try to work around market solutions to preserve these plants and their benefits. But, in most cases, these efforts have been

challenged. Understandably, they have been contested on the basis that they undermine your authority or FERC's authority. How can we deal with this? How should we deal with this? Or is this just going to be litigation or regulation by litigation? Is there a way to deal with the States?

Mr. Chatterjee. Certainly, it is within the State's purview, and I believe in States' rights. And States, it is their prerogative to determine their sources of generation and their generation mix. When it affects interstate commerce and potentially does have threats to reliability, I think FERC has, you know, the authority to weigh in there. I think that it will be something that we will look at closely and carefully; and build a record; adhere to, you know, the science and engineering and technology of the grid; and make those careful determinations.

Mr. Cramer. Thank you, and congratulations, by the way.

In my remaining minute, Ms. Hoffman, I want to maybe talk about the role of coal going forward, again, especially with new technologies, the R&D that is being developed for cleaner coal, of fuel emissions, you know, carbon capture, sequestration, utilization, all of those technologies that are very promising but, at this point, not quite to marketability, while at the same time -- I guess my question is, how can DOE, both through its R&D and in its advocacy, find ways to build that bridge -- I call it a bridge -- using the existing tools or maybe expanding on them, especially considering we have tax reform coming up? Do you see any way for DOE and Congress to work to build

a bridge to that ultimate future of cleaner coal?

Ms. Hoffman. So, Congressman, I would love to continue to work with you in exploring additional ideas. Through our research program, we will continue to invest in advancement in coal technology, utilization of coal, looking at job growth and looking at opportunities to continue to support the coal industry.

Other things that we would like to be able to recognize is the value that coal brings, as the study brought out, and can it be compensated for the services it provides, frequency support, frequency response, fuel diversity.

Mr. Cramer. Thank you. And good report. I appreciate it.

Thanks all of you.

Thank you, Mr. Chairman.

Mr. Olson. The gentleman yields back.

The chair now calls upon the gentleman from California, Mr. McNerney, for 5 minutes.

Mr. McNerney. I thank the chairman.

And I thank the witnesses.

I just want to bring to Mr. Cramer's attention: North Dakota has the biggest wind potential resource of any State in the country. So don't discount alternative energy in North Dakota.

I want to follow up a little bit on Ms. Castor. Yes, we need to build more resiliency into our electric grid. We need to acknowledge climate change because that is one of the drivers. But it is not the only driver: cyber issues, physical threats, other drivers. And as

co-chair of the bipartisan Grid Innovation Caucus with Mr. Latta, a Republican, our mission is to move forward in that to get the Congress excited about grid innovation and resiliency. So let's keep that line of communication open.

Ms. Hoffman, I want to start out with a question about the disaster. When disasters strike, like the hurricanes that we just saw, there are utilities sharing resources. But what I want to know, are there barriers to the sharing of resources between utilities that we could address here?

Ms. Hoffman. Thank you, Congressman, for the question. I think that the biggest barrier is allowing the resources to get to the location of where it needs to be as quickly as possible.

Mr. McNerney. Physical barriers?

Ms. Hoffman. Physical movement.

Other barriers and other things that we are trying to do is accelerate the assessment time period, which goes down to information sharing as part of the public-private partnership so that we understand exactly what the damage is so we can effectively move resources to respond.

Mr. McNerney. Thank you.

Again, Ms. Hoffman, cyber attacks are becoming greater threats, including state-sponsored attacks, such as the potential connection between Dragonfly and Russia, on attacks on our electric grid. So we must continue to focus on cybersecurity to build our grid cyber resiliency. So, in addition to FERC's Order 829 related to supply

chain management, are there additional steps that DOE is or should be taking with regard to supply chain management to the bulk power system?

Ms. Hoffman. Congressman, absolutely. It is one of the areas that we all should be focusing on is supply chain management. What the Department is doing is partnering with the supply chain sector that supports the electric industry, helping them look at vulnerabilities, look at mitigation solutions, but also look at ways to get ahead of the game and really identifying ways to monitor any sort of intrusions that come on the system, but also be able to look for abnormal behaviors.

Mr. McNerney. Okay. Good. And we are looking at some legislation that might actually enhance your capabilities in that regard.

Also, there are several traditional reliability and resiliency framework tools, including CAIDI, SAIDI, and SAIFI, if you know what those are, and the interruption cost estimate calculator, is there room for improvement on those tools? Should they be upgraded regularly?

Ms. Hoffman. Yes, Congressman. We always should take a look at any tools for new technologies and capabilities to advance the utilization. It will help us, in the long term, define, what does resiliency mean, and what are the cost-effective investments that we should focus on? So all those tools are valuable in establishing a baseline but also helping identify priorities.

Mr. McNerney. In the interest of courtesy, I will yield back. But I am going to submit questions for the record.

[The information follows:]

******** COMMITTEE INSERT ********

Mr. Olson. I thank my friend.

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.

In the interest of time, I will submit some questions that I had for the record that I had for some folks.

[The information follows:]

******** COMMITTEE INSERT ********

Mr. Griffith. And I will try to abbreviate my questions as much as I can.

Chairman Chatterjee, you have said that the existing coal and nuclear fleet need to be properly compensated to recognize the value they provide the system. Regardless if one agrees or not, it is clear that some States do agree and are taking action within the jurisdiction to compensate generation resources for attributes that are not being properly recognized in the wholesale markets.

Given the current backlog of issues at FERC, how high of a priority do you see FERC placing on the issue of proper compensation in wholesale markets? And as a part of that, let me just say, because of time, I would love to get an extended answer, but for purposes of today's hearing, so that folks at home know, high, medium or low?

Mr. Chatterjee. We can walk and chew gum at the same time. I would say high.

Mr. Griffith. High. Okay. I appreciate that very much.

Ms. Hoffman, the recently released DOE staff report found that the uncertainties surrounding New Source Review requirements has led to a significant lack of investment in plant and efficiency upgrades. And I look to the question I just asked where we have acknowledged that coal and nuclear fleets are important for grid reliability across the country. And so we have that lack of investment in plant and efficiency upgrades and that the New Source Review program has impeded or resulted in the cancellation of projects which would maintain and improve reliability, efficiency, and the safety of existing energy

capacity -- and a lot of times that is coal, but it is other things as well. That is why I have authored two bills to modernize and streamline the New Source Review Program. Can you provide a brief overview, again, looking at another date for a longer answer perhaps, but can you provide what DOE plans have -- that there are to ensure that this burdensome permitting program does not further impact grid reliability? In other words, I am working on the legislative end. What are you doing on the administrative end?

Ms. Hoffman. Thank you, Congressman. We are working diligently to streamline the review and permitting process that is in the portfolio of the -- or jurisdiction of the Department of Energy. We are looking, on the transmission side, pre-application process. I would be more than glad to have an in-depth conversation on all the list of activities that we are working on.

Mr. Griffith. And I do appreciate that, anything you provide to our office. I do apologize that, because of hurricanes earlier in the week and now our compressed voting schedule today, that I can't get a lengthier answer.

And, Mr. Chairman, those being the two most vital of my questions -- others were important but those were the two most important -- I yield back.

Mr. Olson. The gentleman yields back.

Seeing no further members wishing to ask questions, I would like to thank all the witnesses for being here today. And I want to personally apologize for exposing you all to a good old-fashioned Texas

goat rope because of the floor votes. I appreciate your patience.

Pursuant to committee rules, I remind members that they have 10 business days to submit additional questions for the record. I ask that witnesses submit the response within 10 business days upon receipt of those questions.

Without objection, the subcommittee is adjourned.

[Whereupon, at 10:47 a.m., the subcommittee was adjourned.]