

Oct. 23, 2017

U.S. Federal Energy Regulatory Commission  
Secretary of the Commission  
888 First Street NE  
Washington, DC 20426

Re: Docket No. RM18-1

Thank you for the opportunity to comment on the Grid Reliability and Resilience Pricing Proposed Rule (“NOPR”) in Docket Number RM18-1, in which the Secretary of the U.S. Department of Energy (DOE) proposes that the U.S. Federal Energy Regulatory Commission (“FERC” or “Commission”) consider and finalize the NOPR. This document constitutes the comments of the Center for Climate and Energy Solutions (C2ES) on the NOPR.

C2ES is an independent, nonprofit, nonpartisan organization dedicated to advancing practical and effective policies and actions to address our global climate change and energy challenges. We prefer an economy-wide pricing mechanism for addressing climate change, but in the absence of that, we believe the Commission should consider options to ensure appropriate compensation for suppliers of zero- and low-carbon electricity for their emissions reduction benefits. As such, the views expressed here are those of C2ES alone and while informed by our conversations with business leaders, do not necessarily reflect the views of members of the C2ES Business Environmental Leadership Council (BELC).

Key comments:

- The Commission should consider establishing a process to allow for more stakeholder input on the concept of resilience in power markets and other ideas described in the NOPR, given the novelty and importance of this subject. We recommend three technical conferences that the Commission should hold with regard to resilience: (1) establish key resilience metrics; (2) examine why internalizing resilience is just and reasonable, and (3) other externalities (e.g. carbon) that should be internalized in the markets.
- The RTOs, ISOs and the DOE Partnership for Energy Sector Climate Resilience have a lot of expertise; the Commission should engage them in developing a final rule.
- To incentivize a truly resilient electricity system, additional eligibility requirements should be included, such as storm hardening or other resilience strategies to weather and climate vulnerabilities.
- The transmission and distribution system is a greater threat to reliability and resilience than fuel supply; we recognize that FERC has implemented transmission and distribution reliability standards. There are likely additional actions that could be taken to increase resilience and FERC action should take these into consideration.
- Any reliability or resilience payments should take a broad and long-term view of “resilience” and should prioritize low and non-emitting sources, i.e. nuclear, hydropower, renewables or fossil fuels with carbon capture technology (because of the additional resilience benefits these sources provide, when taking a broad view).

- If the NOPR does not prioritize low and non-emitting sources, it could potentially slow down a trend toward increasing fuel diversity by abetting the premature closure of existing nuclear power plants and discouraging investment in new natural gas, wind, solar and other capacity. Additionally, it would likely raise electricity prices for consumers with potentially limited benefits for resilience.

We appreciate the efforts of Secretary Perry and the Commission to open for debate the proper recognition and pricing of grid resilience benefits in power markets. The Secretary has properly opened a conversation about whether the current interpretation of “just and reasonable” is too limited to support the electric grid of the future. Markets have done a good job of fostering competition and delivering low-cost power to consumers. However, some generation and grid attributes have not been appropriately valued, such as environmental benefits related to decarbonization and resilience to climate change impacts and overreliance on a single fuel source. We believe that other attributes, including zero- and low-emitting sources and long-term climate resilience contribute to our national security and are not currently valued by the market. We agree with the analysis provided by the Edison Electric Institute, the Nuclear Energy Institute, and the Global Energy Institute at the US Chamber of Commerce and relied on by Secretary in the NOPR that:

“From the Consumer perspective, the objective of a grid-based power system is to minimize the cost of reliably balancing power system demand and supply in real time with enough supply resilience to mitigate the potential impact of significant deviations from normal operation in order to provide the electric services that they want, whenever they want them, and at a price that internalizes all costs, subject to the security of supply constraints in an AC power system.”<sup>1</sup>

Secretary Perry has taken an important step in trying to internalize externalities into pricing in the organized markets. However, he has only tried to internalize one source of market failure and we believe that more work is required to establish the evidentiary basis to get the pricing of resilience correct. What we know, and the Supreme Court has recognized, is that greenhouse gas emissions are an unregulated pollutant that directly affects human health. We believe that the re-examination of the requirements that rates and services be just and reasonable should also include the incorporation of the price of carbon into the wholesale markets.

Based on our review of the NOPR, we would like to present for your consideration the following analysis and recommendations.

First, as an organization that focuses on climate policy at the international, national, and sub-national levels, we see clearly that across the United States, states, cities, and businesses continue to plan for long-term reliability and resilience to climate change impacts. These impacts are known to affect the reliability and resilience of the U.S. energy sector, as described

---

<sup>1</sup> Lawrence Makovich and James Richards, “Ensuring Resilient and Efficient Electricity Generation,” September 2017, p. 18, <https://www.ihs.com/info/0917/electricity-generation-special-report.html>

in a 2013 DOE report.<sup>2</sup> Furthermore, actions to reduce carbon emissions are intimately linked with actions to increase resilience because reducing carbon emissions in the near-term can prevent the worst impacts of climate change in the future.

One example of state action to reduce emissions came in August 2016, when the New York Public Service Commission approved a clean energy standard (CES), which helps to achieve overall greenhouse gas emission reduction goals of 40 percent by 2030 and 80 percent by 2050 from 1990 levels and a 50 percent renewable energy mandate by 2030.<sup>3</sup> The New York CES also created zero-emission credits (ZECs) for existing nuclear energy generation, in recognition of the environmental and fuel diversity benefits this baseload resource provides. In December 2016, the Illinois legislature passed the Future Energy Jobs Act, which also created ZECs.<sup>4</sup> These state trends reflect continuing momentum towards decarbonization and long-term resilience to climate change impacts. We believe that any action taken by FERC should complement these state initiatives and others (e.g., renewable portfolio standards) and not diminish them.

The power industry is already taking voluntary action to increase the grid's resilience to climate impacts, for example through the Department of Energy's *Partnership for Energy Sector Climate Resilience*. The 17 utilities that participate in that program are sharing best practices and working to advance the entire industry in building resilience to climate change impacts. We encourage the Commission to rely upon the insights formed in that Partnership between federal and utility experts in finalizing a rule to address reliability and resilience. Notably, that Partnership has identified the electricity transmission and distribution system's climate vulnerabilities as a more urgent threat to reliability and resilience than fuel supply.<sup>5</sup>

Large consumers, including tech companies and their growing demand for clean energy, have also been motivating action on decarbonization and resilience; companies like Apple, Google, Amazon and Microsoft have made significant investments in renewable and clean energy across their operations. These corporate commitments to renewable energy have extended beyond the tech sector to include companies such as Wal-Mart, Target, IKEA, and recently financial institutions such as JPMorgan Chase & Co.

---

<sup>2</sup> U.S. Department of Energy, *U.S. Energy Sector Vulnerabilities to Climate Change and Extreme Weather* (2013), <https://energy.gov/sites/prod/files/2013/07/f2/20130716-Energy%20Sector%20Vulnerabilities%20Report.pdf>.

<sup>3</sup> Office of Governor Andrew Cuomo, *Governor Cuomo Announces Establishment of Clean Energy Standard that Mandates 50 Percent Renewables by 2030* (Aug. 1, 2016), available at <https://www.governor.ny.gov/news/governor-cuomo-announces-establishment-clean-energy-standard-mandates-50-percent-renewables>

<sup>4</sup> Illinois Public Act 99-0906 (the "Future Energy Jobs Bill"), available at <https://www.illinois.gov/sites/ipa/Pages/default.aspx>

<sup>5</sup> U.S. Department of Energy, *A Review of Climate Change Vulnerability Assessments: Current Practices and Lessons Learned from DOE's Partnership for Energy Sector Climate Resilience* (2016), <https://energy.gov/sites/prod/files/2016/10/f33/A%20Review%20of%20Climate%20Change%20Vulnerability%20Assessments%20Current%20Practices%20and%20Lessons%20Learned%20from%20DOEs%20Partnership%20for%20Energy%20Sector%20Climate%20Resilience.pdf>.

In light of these subnational and non-state actor trends towards decarbonization and resilience to climate impacts, we believe that the NOPR could have wide-ranging and potentially negative implications for zero and low carbon resources in wholesale electricity markets, for state and local policymakers concerned about carbon emissions, fuel diversity and for electricity prices for businesses and consumers. Specifically, the NOPR could potentially slow down a trend toward fuel diversity by abetting the premature closure of existing nuclear power plants and discouraging investment in new natural gas, wind, solar and other capacity. It could also raise electricity prices for consumers with potentially limited benefits for resilience.

With this context in mind, we would like to provide our thoughts on the issues raised for public comment by the Commission's Office of Energy Policy on Oct. 4, 2017.

### **Increasing stakeholder input**

We believe that while there may be a need for reform related to the valuation of grid resilience benefits, we do not believe that there is an emergency that requires an expedited rulemaking procedure. As evidence, we point to the 2014 Polar Vortex event described in the NOPR. In fact, while the electricity system was severely tested during that event, actual disruptions were limited. Moreover, the North American Electric Reliability Corporation (NERC) found that over 17,700 MW of the 19,500 MW capacity lost during the event were lost due to frozen equipment, not a lack of fuel.<sup>6</sup> Since then, many companies have taken steps to increase winterization practices at generating stations, making it less likely that similar disruptions caused by a Polar Vortex event would occur in the future. And, the need for a ninety day fuel supply to ameliorate a future polar vortex has not been adequately developed and demonstrated to be a preferred strategy to alternatives, either customer-based, such as demand response, or increased use of other supply options. Rather, we believe that the Commission should take a more deliberate and broader path, and request that the ISOs and RTOs conduct analysis to review the extent to which grid resilience benefits are not currently appropriately valued and to propose a range of solutions that could be considered.

From our perspective, it is important to distinguish between the concepts of reliability and resilience. The Energy Policy Act of 2005 gave the Commission authority over the reliability of the bulk-power system.<sup>7</sup> The Commission certified NERC as the Electric Reliability Organization to "provide for an adequate level of reliability of the bulk-power system."<sup>8</sup> NERC routinely conducts seasonal and longer-term regional reliability outlooks and we believe that this process is effective at flagging issues and providing sufficient lead time to address them. In contrast, the process for ensuring system resilience in the face of increased extreme weather events has more recently become a significant concern to governments and utilities. Resilience generally

---

<sup>6</sup> NERC, "Polar Vortex Review," September 2014. Available at: [http://www.nerc.com/pa/rrm/January%202014%20Polar%20Vortex%20Review/Polar\\_Vortex\\_Review\\_29\\_Sept\\_2014\\_Final.pdf](http://www.nerc.com/pa/rrm/January%202014%20Polar%20Vortex%20Review/Polar_Vortex_Review_29_Sept_2014_Final.pdf).

<sup>7</sup> See 16 U.S.C. § 8240.

<sup>8</sup> See 116 FERC ¶ 61,062 (2006); 16 U.S.C. § 8240(c)(1).

refers to “the ability to anticipate, prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions.”<sup>9</sup>

C2ES recommends the convening of a stakeholder working group to establish better metrics for resilience analogous to the NERC metrics for reliability. Ultimately, the issue that the FERC must address is the nature of the product that customers will pay for through the organized markets. Metrics provide a first step in developing those metrics. The existing DOE Partnership for Energy Sector Climate Resilience would be a natural convening body for this working group, given the depth of public and private sector expertise it has on the topic and the significant investment that DOE has already made with the national labs (e.g., Argonne National Lab) on developing resilience metrics.<sup>10</sup> We expect working group involvement would increase the time allotted to finalize this rule, but we believe the additional time is warranted.

### **Resiliency and climate change risks**

We encourage the Commission to take a broad view of reliability and resilience, and consider additional factors like storm hardening beyond the vulnerability of 90-day fuel supplies to both natural and manmade disasters.

An increase in extreme weather events throughout the U.S. is very likely. The Polar Vortex, however, is just one event type. Climate change presents a different set of risks to electricity reliability and resilience that the NOPR does not consider. Increasing temperatures can make some water sources unavailable for cooling, thereby preventing some generating resources from running in summer months. Likewise, changing precipitation patterns can make drought conditions more likely and can cause water levels to fall below the depth of water intake pipes, thereby preventing generating stations from operating. Hydropower stations can also be adversely affected. In other regions, increasing precipitation intensity in some parts of the country may also put more substations at risk of flooding.

We would encourage a final rule to adopt a broad definition of resilience that accounts for these factors in addition to on-site fuel supply. This could be done in the determination of eligibility for payment. For example, a generating resource may need to prove it had implemented flood-proofing to withstand a 500-year rain-event in addition to having on-site fuel supply. Because the industry is still in an early stage of developing metrics for resilience (in contrast to the well-established metrics for reliability), we encourage the Commission to work closely with the DOE Partnership for Energy Sector Climate Resilience and the RTOs/ISOs to finalize eligibility requirements that appropriately account for these additional considerations.

---

<sup>9</sup> Definition from EO 13653, which was revoked by EO 13783 for other reasons unrelated to the definition of resilience.

<sup>10</sup> See for example, <https://energy.gov/epsa/downloads/conceptual-framework-developing-resilience-metrics-electricity-oil-and-gas-sectors>

We also believe that as NERC has established reserve margins for reliability (generator adequacy), it could also establish regional, seasonal reserve margins for resilience assets. A separate and important concern is how to value the reliability and resilience benefits that the transmission and distribution system provides. Market payments for this service could be considered as part of a final rule. We encourage the Commission to consider how to value resources that are resilient to these long-term risks. For example, in determining eligibility for any reliability/resilience payments, FERC might account for cooling water source climate and weather vulnerability. DOE has produced guidance documents on current industry best practices to assess vulnerability that could be used to inform such an eligibility determination.<sup>11</sup>

### **Source of disruptions**

The NOPR highlights concerns related to the early retirement of coal and nuclear resources, but it does not propose a mechanism to price the reliability and resilience benefits of the transmission and distribution system; we would encourage the Commission to consider this key link in its technical conferences.

We agree that the retirement of large baseload units for economic or other reasons presents a challenge for RTOs/ISOs. A priori, the RTO/ISO must and does perform a reliability analysis to determine the impact to the power system when and if the unit retires. Typically, the retirement can proceed after transmission upgrades (which can take several years) are completed. All other things equal, greater numbers of retirements in a short time-frame can make finding alternatives (including building new generation) more challenging, time consuming and expensive.

However, most disruptions to the power system occur due the vulnerability of transmission and distribution lines to severe weather, not as a result of fuel supply interruptions to a particular generation resource.<sup>12</sup> Rhodium Group recently noted that between 2012 and 2016 fewer than 0.00007 percent of total customer-hours disrupted were the result of fuel supply emergencies.<sup>13</sup> Anticipating and addressing transmission and distribution vulnerabilities should improve system recovery rates and lower long term costs.

Completely restoring service after power pylons, poles and lines are downed can take days to even months, as is being witnessed in Puerto Rico following the impacts of Hurricane Maria. A more resilient power system is one that can be restored more quickly after the damage/impacts occur. Distributed resources that can operate in isolation from the bulk

---

<sup>11</sup> For example, *Climate Change and the Electricity Sector: Guide for Climate Change Resilience Planning* (DOE, 2016)

[https://energy.gov/sites/prod/files/2016/10/f33/Climate%20Change%20and%20the%20Electricity%20Sector%20Guide%20for%20Climate%20Change%20Resilience%20Planning%20September%202016\\_0.pdf](https://energy.gov/sites/prod/files/2016/10/f33/Climate%20Change%20and%20the%20Electricity%20Sector%20Guide%20for%20Climate%20Change%20Resilience%20Planning%20September%202016_0.pdf)

<sup>12</sup> Rhodium Group, "The Real Electricity Reliability Crisis," Oct. 3, 2017, Available at: <http://rhg.com/notes/the-real-electricity-reliability-crisis>.

<sup>13</sup> Ibid.

transmission system (“islandable”) or have on-site back-up power can improve resilience to extreme events by decreasing the number of customer outages after an event. We encourage the Commission to consider how these sources might be eligible for some resilience payments in wholesale electricity markets.

### **Fuel diversity**

The NOPR raises critical questions about fuel diversity, which is important for resilience and reliability, and is an issue of concern for utilities and state commissions. Having a diverse fuel mix helps reduce operational and price risks. Fuel diversity, like insurance, comes at a cost. Just as the Commission determines if a market is competitive, it could determine through a formula if the fuel mix is diverse.

In aggregate, the United States generates electricity from a diverse set of resources. However, at the state and regional level, the mix is less diverse. For example, in 2016 Connecticut generated 49 percent of its electricity with natural gas and 46 percent with nuclear power - effectively a dual fuel state. If its lone nuclear power plant were to retire prematurely, Connecticut would be largely dependent on a single fuel. On a regional basis, Connecticut is part of ISO New England (ISO-NE), which also gets around half of its power from natural gas, 31 percent from nuclear, 7 percent from hydro, and 10 percent from other renewables.<sup>14</sup> With the scheduled retirement of Massachusetts’ Pilgrim nuclear power plant in 2019, ISO- NE’s fuel diversity will decline as nuclear’s share will fall by 5 percent.

Nationally, the deployment of greater quantities of wind and solar power have increased fuel diversity. Regionally, the level of fuel diversity varies. However, diversity can occur within a single fuel source. For example, wind energy can be more diverse when it is more geographically dispersed. Therefore, it needs to be examined carefully and consistently in every region. The NOPR could potentially slow down the trend toward increasing fuel diversity by discouraging investment in new natural gas, wind, solar and other capacity. We encourage the Commission to consider fuel diversity, both regionally and nationally, in its final rule.

### **Importance of low- and zero-emitting sources**

C2ES believes that nuclear power, the United States’ largest source of zero- emission electricity, along with renewables and fossil units with carbon capture use and storage technology (CCUS) must play a role in any long-term, low-carbon climate strategy. To the extent that these existing units play a role in contributing to grid resilience and reliability, we think that they should be duly compensated.

---

<sup>14</sup> ISO New England, “Resource Mix,” Accessed on October 20, 2017: <https://www.iso-ne.com/about/key-stats/resource-mix>

However, we also recognize that the electricity system is evolving. We believe that several energy generation technologies could potentially provide grid reliability and resilience benefits, and we encourage the Commission to continue to work with stakeholders to determine eligibility requirements for proper compensation. As the 2014 Polar Vortex demonstrated, demand response and intermittent resources like wind energy can help provide grid reliability and resilience benefits.<sup>15</sup> Additionally, existing energy storage systems should also be considered for eligibility because of the benefits they provide. A more flexible grid is more resilient to many stresses, and these flexible resources should therefore be considered for eligibility. To the extent that a new resource, a repowered retired resource or other unit meets the criteria for cost-recovery, it too should be eligible for remuneration, but the focus must be on low- and zero-emitting sources.

Although we do not believe that an emergency currently exists that would warrant an expedited rulemaking schedule, we do believe there is an existential threat to the existing nuclear fleet, and this process should be conducted as expeditiously as possible to provide greater certainty to these units. If it is shown that baseload units that store 90 days of fuel on-site add valuable resiliency to the grid, we support prioritizing payments to resources that are low or non-emitting first, followed by emitting units on an as-necessary basis. This ranking is motivated by taking a long-term view of resilience and recognizing that generating sources that emit greenhouse gases today will contribute to climate change and therefore decrease grid reliability and resilience in the future.

### **Impact on Consumers**

If the NOPR were finalized as proposed, the additional payments to eligible units, other things being equal, would likely raise electricity rates and customer bills. A prudent decision on the part of the Commission would include information on the impact on market prices and customer bills. Currently, reliability is so high that this impact on consumers may not be justified. However, if there are environmental benefits like reducing emissions and if there are grid hardening benefits that reduce outage duration, that might be helpful and represent a real value. For this reason, we have outlined in these comments some alternative approaches for the Commission to consider. These include establishing a definition for resiliency through an open, public process and establishing a market mechanism to compensate utilities for benefits related to decarbonization and grid hardening (e.g. generators that could withstand 500-year events).

There are numerous studies to show that economy-wide carbon pricing is the most cost-effective way to reduce emissions. However, in the absence of that we would like to propose

---

<sup>15</sup> PJM, "Analysis of Operational Events and Market Impacts During the January 2014 Cold Weather Events," May 8, 2014. <http://www.pjm.com/~media/library/reports-notice/weather-related/20140509-analysis-of-operational-events-and-market-impacts-during-the-jan-2014-cold-weather-events.ashx>

that the Commission consider options to ensure appropriate compensation for suppliers of zero- and low-carbon electricity for their emissions reduction benefits.

### **Other areas of concern**

There are two additional aspects of the NOPR which cause us some concern. First, it is unclear to us what the rationale is for a 90-day fuel supply requirement. We encourage the Commission to undertake a thorough public process to obtain further comment about the appropriate requirements for fuel supply. Resilience to a hurricane or other extreme weather event would likely only require a couple days' supply. Rhodium and the Partnership for Energy Sector Climate Resilience have noted that the primary vulnerability is really the transmission and distribution lines. The Commission should ask the RTOs and ISOs to conduct studies reviewing reliability issues. The 90-day requirement should be based on a range of realistic scenarios (i.e., not just the Polar Vortex) and the process should be transparent. A supply requirement of a few days is likely sufficient to address the majority of conditions that would threaten reliability and resilience. A shorter time requirement could benefit electricity consumers by allowing for eligibility of advanced distributed resources, like microgrids or on-site energy storage, providing financial payments for their reliability and resilience benefits.

Second, we believe that, as generators upgrade their facilities (e.g. fuel storage, structures and other equipment) to comply with the terms of the NOPR and make their plants more resilient, they should continue to comply with applicable environmental regulations. Existing emission limits should be respected, unless there is a true emergency, which is acknowledged under existing laws. Increasing the size of a coal pile to comply with the 90-day on-site fuel requirement (which may not be necessary for some) could be challenging for some operators to achieve. It should not come at the expense of violating existing environmental rules regarding soil, air and water quality.

In conclusion, we appreciate the efforts of Secretary Perry and the Commission to open the debate on whether grid reliability and resilience benefits are appropriately compensated in wholesale electricity markets and whether the current interpretation of "just and reasonable" is too limited to support the electric grid of the future. To move forward, the Commission should consider establishing a process to allow for more stakeholder input on the concept of resilience in power markets and other ideas described in the NOPR. We encourage the Commission to work with the RTOs, ISOs, and the DOE Partnership for Energy Sector Climate Resilience given their expertise in these areas. We believe that any reliability or resilience payments should take a broad and long-term view of "resilience" and should prioritize low and non-emitting sources because of the additional resilience benefits these sources provide, referring specifically to nuclear, hydropower, renewables and fossil fuels with carbon capture technology. We are concerned that if the NOPR does not prioritize low and non-emitting sources, it could have negative impacts on the growing list of states, cities, and businesses who have pledged to reduce carbon emissions. It would likely raise electricity prices for consumers and reduce overall investment in low and zero-emitting sources. We would like to underscore the importance of considering additional eligibility requirements such as storm hardening or other

resilience strategies to weather and climate vulnerabilities to incentivize a truly resilient electricity system. Finally, the transmission and distribution system is a greater threat to reliability and resilience than fuel supply, and any FERC action should take this into consideration. Thank you again for the opportunity to comment on the NOPR. We would like to offer our assistance to you throughout the on-going discussion and implementation process.

Sincerely,

A handwritten signature in cursive script that reads "Bob Perciasepe".

Bob Perciasepe  
President  
Center for Climate and Energy Solutions  
2101 Wilson Boulevard  
Suite 550  
Arlington, VA 22201  
703-516-4146  
perciasepeb@c2es.org