

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

**Grid Reliability and Resilience Pricing**

**Docket No. RM18-1-000**

**Comments of the Institute for Policy Integrity at New York University School of  
Law on Department of Energy Proposal for Final Commission Action**

The Institute for Policy Integrity at New York University School of Law<sup>1</sup> (“Policy Integrity”) respectfully submits the following comments on the proposed rule for final action (“Proposed Rule”) by the Federal Energy Regulatory Commission (“FERC” or “the Commission”),<sup>2</sup> issued by the Secretary of Energy (“Secretary”) pursuant to section 403 of the Department of Energy Organization Act.<sup>3</sup>

Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in fields of administrative law, economics, and public policy. We write to make the following comments:

1. There is no record to support the Secretary’s Proposed Rule to find that existing Independent System Operator and Regional Transmission Organization (“ISO/RTO”) Open Access Transmission Tariffs (“tariffs”) are unjust, unreasonable, unduly discriminatory or preferential under section 206 of the Federal Power Act (“FPA”)<sup>4</sup> on account of a failure to value the contribution of “fuel-secure” generation to grid reliability or resilience.
2. Adopting the Proposed Rule would violate the Commission’s duty to ensure that wholesale rates are “just and reasonable” and “not unduly discriminatory or preferential” because guaranteed cost recovery for wholesale generators that have a 90-day on-site fuel

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<sup>1</sup> No part of this document purports to present New York University School of Law’s views, if any.

<sup>2</sup> *Grid Reliability and Resilience Pricing Rule*, Notice of Proposed Rulemaking, 82 Fed. Reg. 46940 (Oct. 10, 2017) [hereafter Proposed Rule].

<sup>3</sup> 42 U.S.C. § 7173.

<sup>4</sup> 16 U.S.C. § 824e(a).

supply would (a) increase the overall costs to customers without corresponding benefits that can justify the cost increase, and (b) unduly discriminate against other sources that can provide similar benefits without needing a 90-day on-site fuel supply.

3. To the extent that the Commission finds a need to make any changes to enhance resilience, it could (a) initiate a longer-term rulemaking process, consistent with how it has approached other significant actions to reform wholesale markets and (b) where possible, encourage technology-neutral market-based solutions that provide market participants with incentives to invest in resilience commensurate with the benefits provided.

The Commission, therefore, should “take final action” under section 403(b) of the Department of Energy Organization Act and reject the Secretary’s Proposed Rule.

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## **I. BACKGROUND**

### **A. Policy Integrity**

Policy Integrity has extensive experience advising stakeholders and government decisionmakers on the rational, balanced use of economic analysis, both in federal practice and at the state level. Policy Integrity has previously filed public comments and written reports and articles on issues pertaining to economic analysis of grid modernization, including comments in the Commission’s 2016 proposed rulemaking for electric storage participation in Commission-jurisdictional markets. Policy Integrity seeks to apply its economic, legal, and policy expertise to help advise the Commission on how to ensure that any action taken to help secure the reliability and resilience of the electric system reflects the best available economic and legal analysis.

### **B. Procedural Background**

On September 28, 2017, the Secretary issued the Proposed Rule which, if adopted by the Commission, would require ISOs/RTOs to submit tariff changes, which provide for (1) the purchase of electric energy from certain “eligible grid reliability and resiliency resources” and

(2) the recovery of costs and a return on equity for those resources.<sup>5</sup> “Eligible grid reliability and resiliency resources” include electric generation resources that are: (A) located within a Commission-approved ISO/RTO, (B) are able to provide essential energy and ancillary reliability services, (C) have a 90-day fuel supply on-site, (D) are compliant with all environmental requirements, and (E) are not already subject to state or local cost of service rate regulation.<sup>6</sup>

According to the Secretary, the Proposed Rule is necessary because the resilience of the grid is currently under threat due to the “premature retirements” of “fuel-secure” generators—generators that “can withstand major fuel supply disruptions caused by natural or man-made disasters.”<sup>7</sup> The Preamble to the Proposed Rule makes clear that the Secretary expects that these changes to ISO/RTO tariffs would primarily benefit coal-fired and nuclear power plants.<sup>8</sup> The Secretary requested final action by the Commission by December 9, 2017.

On October 2, 2017, the Commission noticed the Secretary’s Proposed Rule and established a comment procedure and a deadline of October 23, 2017, with reply comments due November 7, 2017.<sup>9</sup> On October 4, 2017, Commission Staff issued a Request for Information, including thirty questions, the answers to which “will assist Staff in understanding the implications of the proposed rule” (“Staff Request for Information”).<sup>10</sup> We have structured our comments below around those questions.

### **C. Statutory Background**

In order to require public utilities—including ISOs/RTOs—to implement tariff changes, the Commission must first find that existing tariffs or regulations affecting rates are “unjust, unreasonable, unduly discriminatory or preferential.”<sup>11</sup> The Commission must find that any “remedial practice it imposes is ‘just and reasonable.’”<sup>12</sup> The Commission must justify its

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<sup>5</sup> Proposed Rule, 82 Fed. Reg. at 46,948 (proposed to be codified at 10 CFR § 35.28(g)(10)(iii)(A)).

<sup>6</sup> Proposed Rule, 82 Fed. Reg. at 46,948 (proposed to be codified at 10 CFR § 35.28(g)(10)(i)).

<sup>7</sup> *Id.* at 46,941.

<sup>8</sup> *Id.* at 46,942 (discussing coal and nuclear plants as synonymous with “fuel-secure” generation).

<sup>9</sup> *Grid Reliability and Resilience Pricing*, Notice Inviting Comments, Docket No. 18-1-000 (Oct. 2, 2017).

<sup>10</sup> *Grid Reliability and Resilience Pricing*, Request for Information, Docket No. 18-1-000 (Oct. 4, 2017).

<sup>11</sup> 16 U.S.C. § 824e(a).

<sup>12</sup> *S.C. Pub. Serv. Auth. v. FERC*, 762 F.3d 41, 54 (D.C. Cir. 2014) (quoting 16 U.S.C. § 824e(a)).

findings with a record supported by substantial evidence.<sup>13</sup> If the Commission’s judgment is not based on empirical evidence, it must be based, at least, on “reasonable economic propositions.”<sup>14</sup> That is, the Commission must “specify the evidence on which it relied and explain how that evidence supports the conclusion it reached.”<sup>15</sup>

Notably, the Commission’s jurisdiction under the section 206 of the FPA is limited to facilities for the transmission and wholesale sale of electric energy “but shall not have jurisdiction . . . over facilities used in local distribution.”<sup>16</sup>

## II. SUMMARY OF RESPONSES

These comments primarily answer the questions posed in the Staff Request for Information, including the principles that should guide any definition of “resilience,” and the economically efficient ways of optimizing any investment in resilience, as we define that term. In answering those questions, the comments make the following points:

First, the Commission does not have support for any finding under section 206 of the FPA that (1) existing tariffs are unjust or unreasonable due to the “premature retirements” of “fuel-secure” resources or that (2) adopting a rulemaking that guarantees cost recovery for generators that have 90 days of fuel on site would be just, reasonable, and not unduly discriminatory or preferential. Specifically, the Commission has not:

1. Defined resilience and shown it that is under threat in the current markets;
2. Demonstrated that recent tariff changes made to increase fuel assurance have not been sufficient to address resilience concerns related to fuel disruption;
3. Shown that a 90-day on-site fuel threshold substantially enhances resilience; or
4. Explained why providing cost-of-service rates to generators with 90 days of fuel on site would be just and reasonable.

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<sup>13</sup> *Ameren Servs. Co. v. Midwest Indep. Transmission Sys. Operator, Inc.*, 121 FERC ¶ 61,205 at P 32 (2007) (“In a section 206 matter, the party seeking to change the rate, charge or classification has a dual burden—it must first provide substantial evidence that the existing rate is unjust, unreasonable or unduly discriminatory, and then demonstrate through substantial evidence that the new rate is just, reasonable and not unduly discriminatory.”); *see also S.C. Pub. Serv. Auth.*, 762 F.3d 65 (D.C. Cir. 2014).

<sup>14</sup> *See id.*

<sup>15</sup> *Id.*

<sup>16</sup> 16 U.S.C. § 824(b)(1). Similarly, the Commission’s jurisdiction over electric reliability is limited to the “bulk-power system” which explicitly excludes “facilities used in the local distribution of electric energy.” 16 U.S.C. § 824o.

Second, basic economic principles suggest that paying the full cost-of-service for only certain resources, such as the proposed “fuel-secure” resources, without commensurate benefits would cause inefficiency in existing wholesale markets. Therefore, the Proposed Rule would be unjust, unreasonable, and unduly discriminatory. In addition, the Proposed Rule fails to take into account countervailing threats to grid reliability and resilience exacerbated by the rule itself, including the increased dependence on large central-station generation and the increase in the likelihood and severity of extreme weather events due to increased greenhouse gas emissions.

Third, if the Commission determines that existing standards and market rules may be failing to provide an acceptable level of grid resilience, and currently there is no evidence to support that finding, it must first follow an appropriate procedure for building a record to support any finding that existing rules and practices must be reformed. In order to build that record, the Commission should initiate a process similar to what it has used for other rules and convene technical conferences, issue staff reports summarizing evidence and findings, and allow meaningful public comment periods on those reports. In any such effort, the Commission should prioritize, where feasible, technology-neutral solutions that encourage optimal investment in resilience by compensating resources only for those resilience benefits that such investments provide.

### **III. RESPONSE TO STAFF QUESTIONS**

#### **A. The Proposed Rule Is Not Supported by the Record**

As our answers to the following questions demonstrate, there is no record support for the Proposed Rule.

**Need for Reform (1). What is resilience, how is it measured, and how is it different from reliability? What levels of resilience and reliability are appropriate? How are reliability and resilience valued, or not valued, inside RTOs/ISOs? Do RTO/ISO energy and/or capacity markets properly value reliability and resilience? What resources can address reliability and resilience, and in what ways?**

*What is resilience, and how is it measured?*

Resilience is multi-faceted and should generally be defined as a system’s ability to resist high-impact, low-probability external shocks, adapt to changing conditions when such shocks happen, and recover from those shocks. Resilience at the system level was first defined in the

literature as “a measure of systems and of their abilities to absorb change and disturbance and still maintain the same relationships between populations or state variables” for ecological systems.<sup>17</sup> Since that time, the definition of resilience has evolved, varying by discipline and application. While the specific definition in each discipline varies, all definitions consider the ability of a system to resist, absorb and adapt, and recover after an external high-impact, low-probability shock.<sup>18</sup> The Presidential Policy Directive on Critical Infrastructure Security and Resilience, which establishes national policy on critical infrastructure security and resilience, likewise defines the resilience of critical infrastructure such as the electric grid as “the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions.”<sup>19</sup>

Figure 1 shows a conceptual resilience curve with respect to time. In the figure,  $R$  is a metric that can show the performance level of a system.<sup>20</sup> This metric can be based on various direct or indirect consequences, depending on the resilience goals. For example, the metric can focus on the direct consequences of a disruption to the generation, transmission, and distribution of electricity, such as the amount of energy services delivered or critical customer energy

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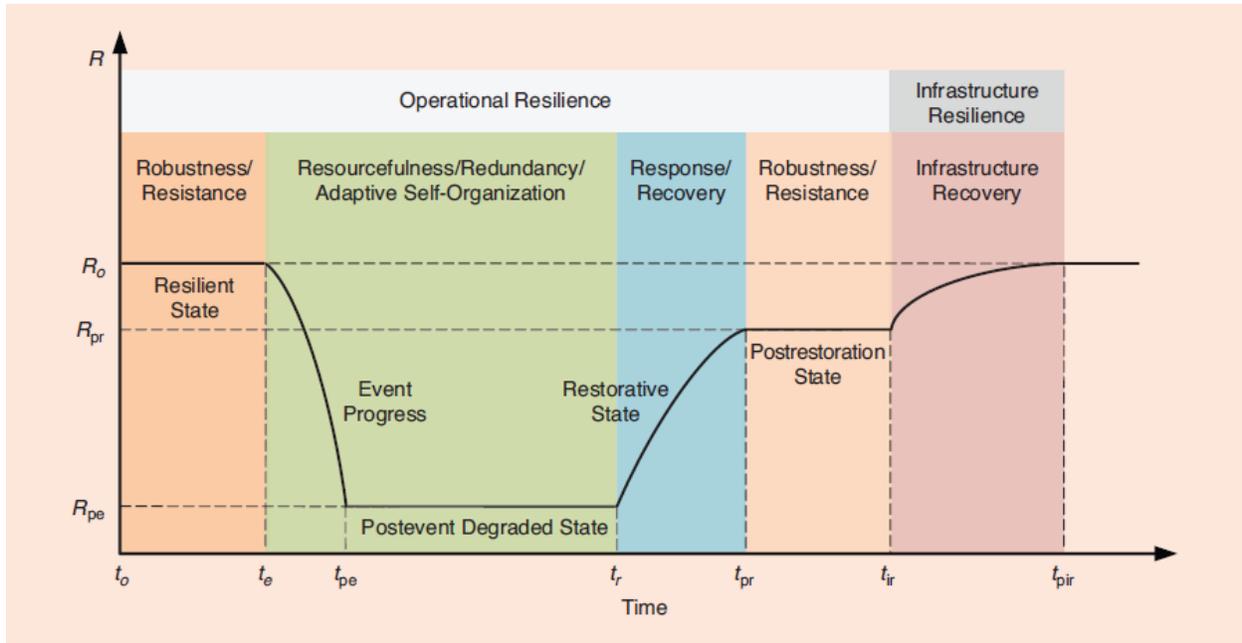
<sup>17</sup> C. S. Holling, *Resilience and Stability of Ecological Systems*, 4 ANNU. REV. ECOL. SYST. 1–23, 14 (1979).

<sup>18</sup> Mathaios Panteli & P Mancarella, *The Grid: Stronger, Bigger, Smarter?*, IEEE POWER ENERGY MAG., May/June 2015, at 58, <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7091066>; Min Ouyang & Leonardo Dueñas-Osorio, *Multi-dimensional Hurricane Resilience Assessment of Electric Power Systems*, 48 STRUCT. SAF. 15–24 (2014), <http://dx.doi.org/10.1016/j.strusafe.2014.01.001>; ERIC VUGRIN, ANYA CASTILLO & CESAR SILVA-MONROY, RESILIENCE METRICS FOR THE ELECTRIC POWER SYSTEM : A PERFORMANCE-BASED APPROACH (2017), <http://prod.sandia.gov/techlib/access-control.cgi/2017/171493.pdf>; DEP’T OF ENERGY, TRANSFORMING THE NATION’S ELECTRICITY SYSTEM: THE SECOND INSTALLMENT OF THE QUADRENNIAL ENERGY REVIEW 4–3 (2017), <https://energy.gov/sites/prod/files/2017/02/f34/Quadrennial%20Energy%20Review--Second%20Installment%20%28Full%20Report%29.pdf> [hereinafter “DOE QER”]; Henry H Willis & Kathleen Loa, *Measuring the Resilience of Energy Distribution Systems*, RAND Corp. 1–25 (2015); Cen Nan & Giovanni Sansavini, *A quantitative method for assessing resilience of interdependent infrastructures*, 157 Reliab. Eng. Syst. Saf. 35–53 (2017), <http://dx.doi.org/10.1016/j.res.2016.08.013>; DEP’T OF ENERGY, STAFF REPORT ON ELECTRICITY MARKETS AND RELIABILITY STAFF REPORT TO THE SECRETARY ON ELECTRICITY MARKETS AND RELIABILITY 187, 63 (2017), [https://energy.gov/sites/prod/files/2017/08/f36/Staff Report on Electricity Markets and Reliability\\_0.pdf](https://energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability_0.pdf) [hereinafter “DOE STAFF REPORT”].

<sup>19</sup> Presidential Policy Directive /PPD-21, Critical Infrastructure Security and Resilience (February 12, 2103), available at <https://obamawhitehouse.archives.gov/the-press-office/2013/02/12/presidential-policy-directive-critical-infrastructure-security-and-resil>.

<sup>20</sup> Panteli and Mancarella, *supra* note 18 at 59; Cen Nan & Giovanni Sansavini, *supra* note 18 at 38.

demand not served.<sup>21</sup> Alternatively, the metric can focus on indirect consequences or broader social perspectives such as the availability of critical services or the level of economic activity.<sup>22</sup>



**Figure 1.** A conceptual resilience curve associated with an event.

**Source:** Mathaios Panteli & P Mancarella, *The Grid: Stronger, Bigger, Smarter?*, IEEE Power Energy Mag., 59 (2015)

Figure 1 illustrates the range of different types of abilities a system needs to be considered resilient, including the ability to (1) resist shocks, (2) adapt to shocks, (2) respond to shocks, and (4) recover from shocks. In the period before the external shock at time  $t_e$ , the system demonstrates an initial level of performance  $R_o$ . At this stage, the resilience of the system depends on the capability of the system to prevent and resist any possible hazards, and to reduce the initial damage if a hazard occurs.<sup>23</sup> During this period, any resource or action that can reduce

<sup>21</sup> VUGRIN, CASTILLO, AND SILVA-MONROY, *supra* note 18 at 19–20; Henry H Willis & Kathleen Loa, *supra* note 18; Nan and Sansavini, *supra* note 18; JEAN-PAUL WATSON ET AL., CONCEPTUAL FRAMEWORK FOR DEVELOPING RESILIENCE METRICS FOR THE ELECTRICITY, OIL, AND GAS SECTORS IN THE UNITED STATES (2015), [https://energy.gov/sites/prod/files/2015/09/f26/EnergyResilienceReport\\_%28Final%29\\_SAND2015-18019.pdf](https://energy.gov/sites/prod/files/2015/09/f26/EnergyResilienceReport_%28Final%29_SAND2015-18019.pdf).

<sup>22</sup> *Id.*

<sup>23</sup> Panteli and Mancarella, *supra* note 18 at 60.

the probability of a high-impact, low-probability event, or the initial damage would improve resilience.

Once the high-impact, low-probability event happens, the system starts degrading. At this stage, the resilience of the system depends on operational flexibility and resourcefulness of the system to quickly adapt to evolving conditions, and therefore reduce the consequence of the event ( $R_o-R_{pe}$ ).<sup>24</sup> During this period, any resource or action that can reduce the level of degradation or slow down the degradation of the system can improve resilience.

Then, the system enters in to a restorative/recovery mode. At this stage, the resilience of the system depends on whether a system has a capacity to enable a fast response and the amount of time required to repair the damages.<sup>25</sup> During this period, any technology or action that can speed up the recovery process would improve resilience.

Finally, the system enters into a post restoration state and then an infrastructure recovery period.<sup>26</sup> Whether the system can return to its initial resilience level depends on the severity of the event.<sup>27</sup> While the system may return to normal operation, full infrastructure recovery may take longer.<sup>28</sup> For example, power may be restored quickly after a flood even though replacing all the damaged equipment may take longer. During this period, any technology or action that can reduce the time to fully recover would improve resilience.

It is important to note that the transition times shown in Figure 1 are as important as the levels of the performance metric  $R$  in characterizing the resilience of the system.<sup>29</sup> Not only is it important to minimize the consequence of, and hence the losses from, the event, but it is also important to ensure that the system degradation occurs slowly and the recovery time is minimized.<sup>30</sup>

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<sup>24</sup> *Id.*

<sup>25</sup> *Id.*

<sup>26</sup> *Id.*

<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

<sup>29</sup> *Id.*

<sup>30</sup> *Id.*

In addition, resilience has to be defined with respect to a specific threat.<sup>31</sup> For example, a system that can be considered resilient to extreme weather events because of underground wiring may not be as resilient to earthquakes.

Overall, the term “resilience” does not depend on one specific technology but rather on the capability of a system in its entirety. Any action or technology that can help a system prepare and resist a high-impact, low-probability external shock, reduce the amount of degradation, or speed up the recovery time can help improve resilience. Physical improvements such as hardening the distribution and transmission networks or weatherizing power plants,<sup>32</sup> operational improvements such as using advanced awareness systems or adaptive islanding,<sup>33</sup> or increased deployment of distributed energy resources and microgrids can all increase resilience.<sup>34</sup> And, all of these different strategies will have a different effect on a phase of the resistance or recovery process.<sup>35</sup> Any attempt to ignore the multi-faceted nature of resilience, and to focus on only one part of the puzzle, would be insufficient to address resilience. In order to fully analyze the value that any policy or intervention will have on grid resilience, it is important for the Commission to properly define resilience and analyze it in light of the various dimensions of resilience.

### ***How is resilience different from reliability?***

While they are related, resilience is not the same as reliability.<sup>36</sup> Reliability focuses on low-impact, high-probability events.<sup>37</sup> It is a static concept, and it evaluates power system states,

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<sup>31</sup> WATSON ET AL., *supra* note 21; VUGRIN, CASTILLO, AND SILVA-MONROY, *supra* note 18.

<sup>32</sup> Panteli and Mancarella, *supra* note 18 at 60.

<sup>33</sup> Yi Ping Fang, Nicola Pedroni & Enrico Zio, *Resilience-Based Component Importance Measures for Critical Infrastructure Network Systems*, 65 IEEE TRANS. RELIAB. 502–512 (2016), <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7407429>; M Panteli, DN Trakas & P Mancarella, *Boosting the Power Grid Resilience to Extreme Weather Events Using Defensive Islanding*, 7 IEEE TRANS. 2913–2922 (2016), <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7407429>; Eric D. Vugrin, Mark A. Turnquist & Nathanael J.K. Brown, *Optimal Recovery Sequencing for Enhanced Resilience and Service Restoration in Transportation Networks*, 10 INT. J. CRIT. INFRASTRUCTURES 218 (2014), <http://www.inderscience.com/link.php?id=66356>.

<sup>34</sup> NAT’L ACAD. OF SCI., ENG’G & MED., *ENHANCING THE RESILIENCE OF THE NATION’S ELECTRICITY SYSTEM* 77–78 (2017), <https://www.nap.edu/catalog/24836> [hereinafter “NAS REPORT”].

<sup>35</sup> Nan and Sansavini, *supra* note 18.

<sup>36</sup> Panteli and Mancarella, *supra* note 18 at 60; VUGRIN, CASTILLO, AND SILVA-MONROY, *supra* note 18 at 8; WATSON ET AL., *supra* note 21 at 16.

<sup>37</sup> Panteli and Mancarella, *supra* note 18 at 60; VUGRIN, CASTILLO, AND SILVA-MONROY, *supra* note 18 at 8; WATSON ET AL., *supra* note 21 at 16.

with a focus on customer interruption time.<sup>38</sup> Resilience, however, is a long term, ongoing, and adaptive concept. It evaluates power system states as well as the transition times between states.<sup>39</sup> And, it focuses on both customer interruption time as well as the time necessary for infrastructure recovery.<sup>40</sup> Because of these differences the metrics for reliability are not suitable for precisely measuring resilience.<sup>41</sup>

### ***What level of resilience is appropriate?***

The socially efficient level of resilience, as we have defined resilience, see *supra* at 7-11, depends on the incremental cost of achieving resilience improvements and the social benefit that increased resilience brings. This analysis requires not only a metric, or a combination of metrics that can measure resilience, but also corresponding valuations that can then be used to monetize the incremental resilience benefits. While there are some potentially useful valuation methodologies that are used to determine the desired reliability level such as the Value of Lost Load, which measures consumers' willingness to pay to avoid outages, it is not clear that these metrics translate well to the resilience context.<sup>42</sup> For example, because these metrics are static, they cannot measure the cost of a system failure that extends beyond a few hours.<sup>43</sup> The value of lost load can be expected to increase exponentially when the outages extend beyond weeks, such as the case in Puerto Rico after Hurricane Maria, when critical operations cannot be carried out and the conditions become life-threatening. In addition, standard reliability metrics are calculated by excluding outages due to outlier events with devastatingly high consequences, such as the extensive and long-duration power outages after Hurricane Maria.

Finally, a thorough resilience analysis has to take into account the uncertainty associated with high-impact, low-probability events. As explained by Sandia Labs, resilience should be analyzed given the probability distribution associated with the range of potential consequences

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<sup>38</sup> Panteli and Mancarella, *supra* note 18 at 60; VUGRIN, CASTILLO, AND SILVA-MONROY, *supra* note 18 at 8; WATSON ET AL., *supra* note 21 at 16.

<sup>39</sup> Panteli and Mancarella, *supra* note 18 at 60; VUGRIN, CASTILLO, AND SILVA-MONROY, *supra* note 18 at 8; WATSON ET AL., *supra* note 21 at 16.

<sup>40</sup> Panteli and Mancarella, *supra* note 18 at 60; VUGRIN, CASTILLO, AND SILVA-MONROY, *supra* note 18 at 8-9.

<sup>41</sup> MILES KEOGH & CHRISTINA CODY, NAT'L ASSOC. REG. UTIL. COMM'RS, RESILIENCE IN REGULATED UTILITIES 11–12 (2013), <https://pubs.naruc.org/pub/536F07E4-2354-D714-5153-7A80198A436D>.

<sup>42</sup> *Id.* at 8.

<sup>43</sup> *Id.* at 11.

related to a threat.<sup>44</sup> Such an analysis for different threat scenarios is necessary to be able to understand resilience effects of any physical, procedural or a policy change.<sup>45</sup>

More work is needed to determine the socially efficient level of resilience. Therefore, it is important for the Commission to determine appropriate metrics for resilience before adopting any policy that requires ISOs/RTOs compensate resources for any resilience attribute.

**Need for Reform (2). The proposed rule references the events of the 2014 Polar Vortex, citing the event as an example of the need for the proposed reform. Do commenters agree? Were the changes both operationally and to the RTO/ISO markets in response to these events effective in addressing issues identified during the 2014 Polar Vortex?**

The Proposed Rule relies substantially on specific recent extreme weather events to claim that retirement of “fuel-secure” generation (i.e., generation with 90- day on-site fuel storage) is undermining the resilience of the electric grid. For example, the Proposed Rule cites the 2014 Polar Vortex as an example of an extreme weather event in which the reliability and resilience of the grid would have been compromised, if not for generation with on-site fuel storage.<sup>46</sup> But the Polar Vortex example does not support the claim that on-site fuel storage is necessary to resist damaging conditions, reduce degradation in the face of extreme conditions, or speed recovery time once grid disruptions occur.

In its 2014 review of the Polar Vortex, the National Electric Reliability Corporation (“NERC”) explains that outages were the result of a number of factors including many that have either been systematically addressed by the Commission since 2014 or that would not have been mitigated by having more generation with on-site fuel storage available. The Proposed Rule’s emphasis on the importance of fuel supply is misplaced in light of the fact that the vast majority of outages that occurred were due to equipment failures and not fuel supply concerns. According to NERC, “of the approximately 19,500 MW of capacity lost due to cold weather conditions, over 17,700 MW was due to frozen equipment.”<sup>47</sup> An analysis of the causes of the Polar Vortex by PJM Interconnection (“PJM”) is consistent with NERC’s: “All conventional forms of

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<sup>44</sup> WATSON ET AL., *supra* note 21.

<sup>45</sup> VUGRIN, CASTILLO, AND SILVA-MONROY, *supra* note 18 at 21–22.

<sup>46</sup> Proposed Rule, 82 Fed. Reg. at 46942.

<sup>47</sup> N. AMER. ELEC. RELIABILITY CORP., POLAR VORTEX REVIEW at 2 (2014), [http://www.nerc.com/pa/rm/January%202014%20Polar%20Vortex%20Review/Polar\\_Vortex\\_Review\\_29\\_Sept\\_2014\\_Final.pdf](http://www.nerc.com/pa/rm/January%202014%20Polar%20Vortex%20Review/Polar_Vortex_Review_29_Sept_2014_Final.pdf) [hereinafter “NERC POLAR VORTEX REVIEW”].

generation, including natural gas, coal and nuclear plants, were challenged by the extreme conditions. Generators are required to submit outage data after the outage has occurred. . . . [T]he 42 percent of forced outages were due to equipment failures.”<sup>48</sup> To the extent that fuel availability was a problem, it was not limited to resources that lacked an on-site 90-day fuel supply. In fact, even coal generators that had stock-piled coal were unable to run because those coal piles froze.<sup>49</sup> The vast majority of the problems that caused power outages during the Polar Vortex would not have been mitigated had there been 90-day supply of coal stored onsite at existing plants.

**Need for Reform (3). The proposed rule also references the impacts of other extreme weather events, specifically hurricanes Irma, Harvey, Maria, and superstorm Sandy. Do commenters agree with the proposed rule’s characterization of these events?**

The Proposed Rule also points to other extreme weather events such as Superstorm Sandy and hurricanes Irma, Harvey, and Maria to assert that the retirement of coal and nuclear generation is creating such resilience risk that the Commission must act urgently.<sup>50</sup> As with the Polar Vortex, however, the evidence does not demonstrate that more on-site fuel storage would have substantially prevented outages during these events or allowed for a quick recovery after the fact.

In each event, the problems that caused power outages were unrelated to whether generators had stock-piled sufficient fuel. For example, the long recovery after Superstorm Sandy was primarily the result of extensive flooding.<sup>51</sup> During Hurricane Harvey, coal plants themselves were flooded and were forced to switch to natural gas after coal piles became

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<sup>48</sup> PJM INTERCONNECTION, ANALYSIS OF OPERATIONAL EVENTS AND MARKET IMPACTS DURING THE JANUARY 2014 COLD WEATHER EVENTS 24 (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>.

<sup>49</sup> NERC POLAR VORTEX REVIEW at 3; FERC Staff, Winter 2013-2014 Operations and Market Performance in RTOs and ISOs, Docket No. AD14-8-000 at 8 (April 1, 2014), <https://www.ferc.gov/legal/staff-reports/2014/04-01-14.pdf>.

<sup>50</sup> Proposed Rule, 82 Fed. Reg. at 46945.

<sup>51</sup> Nicholas C. Abi-samra, *One Year Later : Superstorm Sandy Underscores Need for a Resilient Grid*, IEEE SPECTRUM (Nov. 4, 2013), <http://spectrum.ieee.org/energy/the-smarter-grid/one-year-later-superstorm-sandy-underscores-need-for-a-resilient-grid>.

oversaturated.<sup>52</sup> During hurricane Irma, high winds and a potential storm surge required nuclear power plants to shut down, rendering their on-site fuel irrelevant.<sup>53</sup> After Hurricane Maria, Puerto Rico’s power plants were able to operate, but the destruction of the distribution and transmission grid will leave consumers without electricity for months.<sup>54</sup>

In none of these cases cited by the Proposed Rule would additional on-site fuel storage at coal and nuclear plants have reduced outages or sped recovery.

**Need for Reform (4). The proposed rule references the retirement of coal and nuclear resources and a concern from Congress about the potential further loss of valuable generation resources as a basis for action. What impact has the retirement of these resources had on reliability and resilience in RTOs/ISOs to date? What impact on reliability and resilience in RTOs/ISOs can be anticipated under current market constructs?**

The Proposed Rule suggests that Congress’ concern about the potential early retirement of “valuable baseload power plants in these markets, including reliable nuclear and coal plants” is enough to justify the need for the Proposed Rule.<sup>55</sup> However, this concern is based on misconceptions and, therefore, is not sufficient to support a Commission finding that existing ISO/RTO tariffs are unjust, unreasonable, or unduly discriminatory or preferential.

The Proposed Rule’s premise that power plants that can stockpile 90 days of fuel are “baseload” plants or particularly reliable is misconceived. The term “baseload” does not define a technological capacity. It generally refers to low-cost resources that would be most often called upon to meet the around-the-clock minimum level of demand.<sup>56</sup> Therefore, the term “baseload

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<sup>52</sup> Mark Watson, *Harvey’s Rain Caused Coal-to-Gas Switching: NRG Energy*, S&P GLOBAL PLATTS (Sept. 27, 2017), <https://www.platts.com/latest-news/electric-power/houston/harveys-rain-caused-coal-to-gas-switching-nrg-21081527>.

<sup>53</sup> Nicole Rodriguez, *Florida Power & Light Co. Nuclear Reactors Still Down, But Unharmed by Hurricane Irma*, TCPALM (Sept. 12, 2017), <http://www.tcpalm.com/story/weather/hurricanes/2017/09/12/florida-power-light-co-nuclear-reactors-still-down-but-unharmed-hurricane-irma/658227001/>.

<sup>54</sup> Rachel Becker, *After Hurricane Maria, What Will it Take to Turn Puerto Rico’s Power Back On?*, THE VERGE (Sept. 25, 2017), <https://www.theverge.com/2017/9/25/16362410/hurricane-maria-puerto-rico-power-outages-electrical-grid-destroyed><https://www.theverge.com/2017/9/25/16362410/hurricane-maria-puerto-rico-power-outages-electrical-grid-destroyed>.

<sup>55</sup> Proposed Rule, 82 Fed. Reg. at 46,943.

<sup>56</sup> JUDY W CHANG ET AL., THE BRATTLE GROUP, *ADVANCING PAST “BASELOAD” TO A FLEXIBLE GRID HOW GRID PLANNERS AND POWER MARKETS ARE BETTER DEFINING SYSTEM NEEDS TO ACHIEVE A COST-EFFECTIVE AND RELIABLE SUPPLY MIX 2–6* (2017), [http://www.brattle.com/system/publications/pdfs/000/005/456/original/Advancing\\_Past\\_Baseload\\_to\\_a\\_Flexible\\_Grid.pdf?1498246224](http://www.brattle.com/system/publications/pdfs/000/005/456/original/Advancing_Past_Baseload_to_a_Flexible_Grid.pdf?1498246224).

power plants” is not synonymous with power plants that can stock-pile fuel. Rather it refers to the operating characteristics and costs structures of resources.

Coal and nuclear power plants have historically been the plants most able to meet demand in this way at the lowest cost. Both coal and nuclear plants have high costs of starting up and shutting down, and therefore it is cheaper to run them at their full capability when possible.<sup>57</sup> Consequently, these types of resources are often called upon first to meet the level of minimum demand to minimize the costs of electricity generation. But it was due to those historical cost structures and operational characteristics that these plants were considered “baseload” plants, not due to any technical characteristic that was related to reliability. Reliability is a technology neutral concept.<sup>58</sup> Any changes in the cost structures of resources would change the type of the resource that would be most often called upon to meet the minimum level of demand. In the current electricity market, other kinds of resources may be able to operate as “baseload” plants instead of coal and nuclear. For example, in much of the country, the decline in natural gas prices has resulted in natural gas plants operating as baseload.<sup>59</sup> Elsewhere, utilities are considering renewable generators such as wind as the new baseload.<sup>60</sup>

It is also a misconception that being able to serve the “baseload” is synonymous with 100% reliability.<sup>61</sup> All generators regularly undergo outages for scheduled maintenance. In addition, all generators can experience unexpected outages. Just because they historically operated as “baseload” does not insulate coal or nuclear plants from unexpected outages.<sup>62</sup>

Moreover, the Proposed Rule does not provide evidence that the evolving generation mix, including the retirement of coal and nuclear plants, threatens reliability. In fact, reliability

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<sup>57</sup> *Id.* at ii, 2, 4.; DOE STAFF REPORT at 5, 187 (2017).

<sup>58</sup> PAUL HIBBARD, SUSAN TIERNEY & KATHERINE FRANKLIN, ANALYSIS GROUP, ELECTRICITY MARKETS, RELIABILITY, AND THE EVOLVING U.S. POWER SYSTEM (2017), [http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/ag\\_markets\\_reliability\\_final\\_june\\_2017.pdf](http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/ag_markets_reliability_final_june_2017.pdf).

<sup>59</sup> DOE STAFF REPORT at 38 (“because natural gas prices have been low for a sustained period, and because NGCC plants retain some of the flexible characteristics of CTs and operate at a higher efficiency and lower cost, these units often are now used for baseload power. As a result, some coal plants have been pushed higher on the merit order, which reduces their average capacity factors, negatively impacts their economics, and can ultimately lead to retirements”).

<sup>60</sup> Institute for Policy Integrity, *States Modernizing Energy Policy - 2017 "Green States" Conference*, YOUTUBE at 48:12 (Sept. 29, 2017), <https://www.youtube.com/watch?v=2Dj8cfM3cZY&t=5071s>.

<sup>61</sup> CHANG ET AL., *supra* note 56 at 6.

<sup>62</sup> In its review of the Polar Vortex, NERC found that coal plants accounted for 26% of generator outages and nuclear plants accounted for 12% of generator outages. NERC POLAR VORTEX REVIEW at 13.

assessments produced by the Department of Energy (“DOE”) and NERC, and ISOs/RTOs all show that there is no reliability threat even as the share of renewable resources increase and the share of coal or nuclear resources has concomitantly decreased.<sup>63</sup> NERC’s 2017 Reliability Report states that the Bulk Power System “provided an adequate level of reliability during 2016.”<sup>64</sup> In the same report, NERC also states that the resilience of the Bulk Power System to withstand “severe weather continues to improve.”<sup>65</sup> The Proposed Rule cites these studies to claim that retirement of “fuel-secure” power plants poses imminent reliability and resilience risk,<sup>66</sup> but those studies do not support that point at all.

It also important to note that the Proposed Rule does not address the biggest resilience concerns related to today’s grid. The biggest resilience threat is the result of the interconnected nature of the grid itself.<sup>67</sup> Failure of the distribution system is responsible for more than 90% of the outages.<sup>68</sup> Therefore, assuring that some generators have 90-day on-site fuel is not sufficient by itself to improve grid resilience unless the rest of the grid can be improved at the same time.

The Commission should recognize that its role is not to solve every resilience risk that the electric grid faces. Rather, as a federal regulatory agency, it must focus on ensuring market participants have appropriate incentives to enhance grid resilience of the bulk power system, including wholesale generation and transmission, but not including local distribution.<sup>69</sup> Given that there is no evidence at this time to suggest that there is a significant reliability or resilience risk that needs to be or can be solved at the wholesale level with a 90 day on-site fuel requirement, the Commission should reject the Proposed Rule.

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<sup>63</sup> N. Elec. Reliability. Corp., STATE OF RELIABILITY 2017 (2017), [http://www.nerc.com/pa/RAPA/PA/Performance%20Analysis%20DL/SOR\\_2017\\_MASTER\\_20170613.pdf](http://www.nerc.com/pa/RAPA/PA/Performance%20Analysis%20DL/SOR_2017_MASTER_20170613.pdf); U.S. DOE Staff Report, *supra* note 18; PJM INTERCONNECTION, PJM’S EVOLVING RESOURCE MIX AND SYSTEM RELIABILITY (2017), <http://www.pjm.com/~media/library/reports-notice/special-reports/20170330-pjms-evolving-resource-mix-and-system-reliability.ashx>.

<sup>64</sup> STATE OF RELIABILITY 2017, *supra* note 63 at vi.

<sup>65</sup> *Id.* at vi.

<sup>66</sup> Proposed Rule, 82 Fed. Reg. at 46,943.

<sup>67</sup> NAS REPORT, *supra* note 34 at 26.

<sup>68</sup> DOE QER, *supra* note 18 at 4-2.

<sup>69</sup> 16 U.S.C. § 824(b)(1) (“The Commission . . . shall not have jurisdiction . . . over facilities used in local distribution”).

**90-day Requirement (2). Is there a direct correlation between the quantity of on-site fuel and a given level of resilience or reliability? Please provide any pertinent analyses or studies. If there is such a correlation, is 90 days of on-site fuel necessary and sufficient to address outages and adverse events? Or is some other duration more appropriate?**

***The Proposed Rule Does Not Sufficiently Explain Why Retention of “Fuel-Secure” Generation Is Critical for Grid Resilience***

The Proposed Rule fails to clearly explain why “fuel-secure generation” is a critical or underprovided component of enhancing the resilience of the electric grid. On-site fuel storage does not address the most important risks to grid operations caused by high-impact, low-probability events. For example, it does not address threats to distribution or transmission networks, the risk of a cyberattack, weather events that result in frozen equipment, flooding of on-site fuel supplies, heatwaves that reduce plant efficiency,<sup>70</sup> obstructed transportation networks that limit the availability of plant operators, or earthquakes that cripple generation equipment. As the August 2017 *Staff Report to the Secretary on Electricity Markets and Reliability* (“DOE Staff Report”) states “while having fuel onsite reduces the risk that a generator will be unable to operate when needed, every type of fuel and power generation source has known vulnerabilities that can compromise its ability to perform reliably.”<sup>71</sup>

A policy that requires or incentivizes plants to retain 90 days of on site fuel could guard against generation outages and thus might improve resilience or reliability in two very limited circumstances:

- during an event that causes unexpected levels of demand without enough generation with firm fuel supply; or,
- during or after an event that physically disrupts fuel supply infrastructure.

In any event, there is no evidence that the Proposed Rule is necessary to address the very limited risk of a physical or economic fuel supply disruption. And the Proposed Rule fails to explain (1) why recent ISO/RTO changes to enhance fuel security are insufficient and (2) why providing cost-of-service generators that are *dispatched* (as opposed to, for example, capacity) would address any remaining concerns. These two issues are discussed in turn.

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<sup>70</sup> Alyson Kenward, *In Tennessee, Heat Waves Diminish Nuclear Power Output*, CLIMATE CENTRAL (April 10, 2011), <http://www.climatecentral.org/news/in-tennessee-heat-waves-frustrate-nuclear-power>.

<sup>71</sup> DOE STAFF REPORT, *supra* note 18 at 91.

***The Proposed Rule Does Not Support a Finding that ISO/RTO Action Already Underway to Address Fuel Assurance Are Insufficient***

Adopting the Proposed Rule on the basis of fuel security without explaining why changes already enacted by the Commission and ISOs/RTOs are insufficient would be arbitrary. Following the 2014 Polar Vortex, the Commission held a technical conference to assess the reliability (and, at least with respect to fuel security, resilience) implications of extreme weather events that cause fuel disruption.<sup>72</sup> This technical conference built on an earlier September 25, 2013 Capacity markets Technical Conference, in which the commission considered the effects of low natural gas prices, the retirement of aging generation resources, and compliance with state and federal environmental policies on resource adequacy.<sup>73</sup> As a result of these conferences, the Commission issued an order directing ISOs/RTOs to address “generator access to sufficient fuel supplies and the firmness of generator fuel arrangements (referred to generally as ‘fuel assurance’)” and to file reports on the status of their efforts to do so (“Fuel Assurance Order”).<sup>74</sup>

The technical conferences and Fuel Assurance Order resulted in significant action by ISOs/RTOs, including substantive tariffs changes. Pursuant to the Fuel Assurance Order, each ISO/RTO submitted compliance reports outlining existing policies and proposing additional actions intended to address fuel assurance concerns.<sup>75</sup> The changes that were already

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<sup>72</sup> See FERC Staff, *supra* note 49.

<sup>73</sup> See Centralized Capacity Markets in Regional Transmission Organizations and Independent System Operators, Docket No. AD13-7-000 (Sept. 25, 2013).

<sup>74</sup> *Order on Technical Conferences*, 149 FERC ¶ 61,145 (Nov. 20, 2014).

<sup>75</sup> PJM Interconnection LLC Report on Fuel Assurance Activities, Docket AD14-8-000 (Feb. 18, 2015); Fuel Assurance Status Report of ISO New England Inc., Docket No. 14-8-000 (Feb. 18, 2015); Report of the California System Operator Corporation, Docket No. AD14-8-000 (Feb. 18, 2015); Midcontinent Independent System Operator, Inc. Fuel Assurance Report, Docket No. AD14-8-000 (Feb. 18, 2015); Post-Technical Conference Report of the New York Independent System Operator, Inc., Docket No. AD14-8-000 (Feb. 18, 2015); Southwest Power Pool, Inc. Report Regarding Fuel Assurance Issues, Docket No. AD14-8-000 (Feb. 18, 2015). As is outlined in the DOE Staff Report, ISOs/RTOs have begun to implement some of the new policies identified in their compliance reports. DOE STAFF REPORT, *supra* note 18 at 91-92. PJM instituted its Capacity Performance Proposal, which was approved by the Commission. PJM Interconnection, L.L.C., 151 FERC ¶ 61,208 (“Capacity Performance Order”), order on reh’g and compliance, 155 FERC ¶ 61,157 (2015). The New York ISO identified, adopted, and implemented its Comprehensive Shortage Pricing enhancements. New York Independent System Operator Inc., 154 FERC ¶ 61,152 (March 1, 2016). The Midwest ISO (“MISO”) found that the fact that load serving entities in MISO are primarily state-regulated utilities “reduces the direct need for a specific MISO role relative to fuel assurance issues.” Midcontinent Independent System Operator, Inc. Fuel Assurance Report at 13, Docket No. AD14-8-000 (Feb. 18, 2015). Nonetheless, it identified and implemented a number of market enhancements, including emergency pricing rules. Midcontinent Indep. Sys. Operator, Inc., Letter Order, Docket No. ER16-1577-000 (June 13, 2016). ISO New England (“ISO-NE”) identified its previously approved Winter Reliability Programs, which were designed to encourage generators to maintain onsite fuel inventories and

implemented, or are currently being implemented, by each ISO/RTO that would be subject to the Proposed Rule were specifically designed to address the types of potential reliability and resilience concerns identified by the Secretary in the Proposed Rule.

Moreover, in its Fuel Assurance Order, the Commission explicitly rejected a finding that a one-sized-fits-all solution was appropriate to address fuel security in the ISOs/RTOs, stating that “although there are some common issues affecting all the RTOs/ISOs, there are also significant differences . . . and it may be that there is more than one right answer for addressing fuel assurance.”<sup>76</sup> Yet, the Proposed Rule directly contradicts this finding by seeking to impose a one-size-fits-all solution on all Commission-jurisdictional ISOs/RTOs by requiring that “fuel-secure” generation with a specific quantity of onsite fuel receive compensation that covers full costs of that plant and a reasonable rate of return. The Proposed Rule does not explain why a significant change in approach from that adopted in 2014 is necessary. But, the Commission, if it chooses to affirmatively act on the Proposed Rule, must do so before adopting such a change. As courts have held, “the requirement that an agency provide reasoned explanation for its action would ordinarily demand that it display awareness that it is changing position. . . . And of course the agency must show that there are good reasons for the new policy.”<sup>77</sup>

The Proposed Rule fails to give even minimal consideration to whether, without these changes, current tariffs are unjust or unreasonable. In order for the Commission to mandate changes to all ISO/RTO tariffs under section 206, it would need to make such an affirmative finding, supported by substantial evidence.<sup>78</sup> This must include a full consideration of the experience of ISOs/RTOs that have already implemented tariff changes designed to address the

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address concerns about pipeline deliveries of fuel during periods of high natural gas demand and stresses on pipeline systems. Fuel Assurance Status Report of ISO New England Inc. at 5-9, Docket No. 14-8-000 (Feb. 18, 2015) (citing Order on Technical Conferences, 149 FERC at P 12). These Programs are an interim step while ISO-NE implements its Pay For Performance capacity market design in 2018.

<sup>76</sup> Order on Technical Conferences, 149 FERC at P19.

<sup>77</sup> F.C.C. v. Fox Television Stations, Inc., 556 U.S. 502, 516 (2009).

<sup>78</sup> See *S.C. Pub. Serv. Auth.*, 762 F.3d at 54 (D.C. Cir. 2014) (upholding Order No. 1000 against claim that FERC failed to provide substantial evidence for finding that ISO/RTO tariffs were unjust and unreasonable *because FERC had considered and explained why existing practices were inadequate*).

same fuel assurance concerns raised by the Proposed Rule, and why these policies are inadequate.<sup>79</sup>

***The Proposed Rule’s Plan to Compensate “Fuel-Secure” Generators for Dispatch Is Unconnected to any Potential Benefits from Fuel Security***

The Proposed Rule fails to explain why a 90 day supply of on-site fuel could provide resilience benefits that would not be provided otherwise, or to quantify the magnitude of that benefit. Instead, it appears that the policy would preference dispatch of plants with on-site fuel regardless of whether those “fuel-secure” sources actually provide any benefit. And because the Proposed Rule is limited to ISOs/RTOs with capacity markets,<sup>80</sup> it makes little sense to adopt a policy that preferences the *dispatch* of plants with on-site fuel in the name of enhancing resilience,<sup>81</sup> if the benefits of on-site fuel occur not during normal dispatch but only during or after an event that disrupts fuel supplies. Therefore, the Secretary’s specific regulatory proposal is disconnected from the problem identified in the Proposed Rule’s preamble.

***The Proposed Rule Provides No Support for the Premise that A 90-Day On-Site Fuel Threshold Enhances Resilience***

Even if the Commission determined that on-site fuel provides some specific and currently uncompensated reliability or resilience value to the grid, the Proposed Rule’s threshold of 90-days of on-site fuel storage is not supported. Policy Integrity is not aware of any evidence showing that 90-days of on-site fuel storage (as compared to a lesser amount) would be necessary or even beneficial for enhancing grid reliability or resilience.

DOE collects data on major disturbances in electricity delivery to customers, which is published by the Energy Information Administration in its Electric Power Monthly.<sup>82</sup> A recent Rhodium Group analysis of this data found that, since 2012, only 0.00007% of customer-hours

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<sup>79</sup> See, e.g., *Demand Response Compensation in Organized Wholesale Energy Markets*, Order No. 745, 76 Fed. Reg. 16,658, 16,661-16,669 (Mar. 24, 2011), FERC Stats. & Regs. ¶ 31,322 at P 18-67 (2011) (providing extensive justification for why payment of less than LMP for demand response in *any* ISO was unjust and unreasonable).

<sup>80</sup> Proposed Rule, 82 Fed. Reg. at 46,948 (proposed to be codified at 10 CFR § 35.28(g)(1)(ii)).

<sup>81</sup> See *id.* at 46,948 (requiring ISOs/RTOs to establish rates for the “purchase of electric *energy* from an eligible reliability and resiliency resource” and to provide for the “recovery of costs and a return on equity for [a reliability and resiliency] resource *dispatched* during grid operations”) (emphasis added).

<sup>82</sup> U.S. Energy Info. Admin., Electric Power Monthly, Table B.2 Major Disturbances and Unusual Occurrences, 2016 (Sept. 26, 2017), [https://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.php?t=epmt\\_b\\_2](https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_b_2).

were disrupted by fuel supply emergencies since 2012.<sup>83</sup> DOE’s data also demonstrates that even if more on-site fuel might help mitigate outages at individual plants (which would not be necessary to mitigate customer outages), a 90-day requirement is arbitrary and not supported by experience.

Since 2011, of the 638 disturbances (which are events that create some risk to system adequacy or reliability,<sup>84</sup> and virtually never lead to outages as long as the disturbance itself), only three events lasted longer than 30 days. Two were fuel disruptions at hydroelectric facilities, for which only nature and not any Commission-approved on-site fuel incentive, would have been determinative.<sup>85</sup> The median disturbance length was 18 hours. This experience demonstrates a 90-day on-site fuel threshold is not justified as keeping that much fuel on site would not have provided any additional benefit in any disturbance since 2011. Short plant-specific fuel disruptions can be offset by supply from other plants, and can be mitigated by approaches other than overbroad on-site fuel storage requirements, such as electric storage.

A 90-day supply requirement is also out of step with fuel-security definitions developed by grid operators. For example, PJM defines fuel assurance as “the ability of a resource to maintain economic maximum energy output for 72 hours.”<sup>86</sup> Because there is no evidence that 90-days of on-site fuel storage would enhance resilience, compensating generation resources with on-site fuel storage only if they have 90-days worth of storage would be arbitrary.

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<sup>83</sup> Trevor Houser, John Larsen, & Peter Marsters, Rhodium Group, *The Real Electricity Reliability Crisis* (Oct. 3, 2017), <http://rhg.com/notes/the-real-electricity-reliability-crisis>.

<sup>84</sup> Specifically, balancing authorities, reliability coordinators, and some generators and utilities must report physical attacks that could potentially impact adequacy or reliability; cyber events that could potentially impact adequacy or reliability; loss of electric service to more than 50,000 customers for one hour or more; and fuel supply emergencies that could impact electric power system adequacy or reliability. See U.S. Department of Energy, Form OE-417 Electric Emergency Incident and Disturbance Report, available at [https://www.oe.netl.doe.gov/docs/OE417\\_Form\\_03312018.pdf](https://www.oe.netl.doe.gov/docs/OE417_Form_03312018.pdf).

<sup>85</sup> The two events were a 2013 “fuel disruption” at a California hydroelectric plant that resulted in the outage of a relatively small amount of capacity (176 MW) for 200 days and a 2016 “fuel disruption” at a different California hydroelectric plant that resulted in an outage for 44 days. U.S. Energy Info. Admin., Electric Power Monthly, Table B.2 Major Disturbances and Unusual Occurrences, 2016 (Sept. 26, 2017), [https://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.php?t=epmt\\_b\\_2](https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_b_2)

<sup>86</sup> PJM’s Evolving Resource Mix and System Reliability, *supra* note 63 at 19.

## **B. The Proposed Rule Would Violate FERC's Duty to Ensure Just and Reasonable Rates**

As our answers to the Commission's implementation question demonstrate, the Proposed Rule would violate the Commission's duty to ensure just and reasonable rates.

### **Implementation (3). What is the expected impact of this proposed rule on entry of new generation, reserve margins, retirement of existing resources, and on resource mix over time?**

Current wholesale markets, while far from flawless, are administratively designed to achieve the outcomes that a much idealized perfectly competitive market would have achieved. Since the introduction of the organized wholesale electricity markets, FERC and ISOs/RTOs have been working to improve the efficiency of the market. If implemented as intended, the Proposed Rule would be a move in the opposite direction, eliminating the efficiency gains achieved in the past decades.

The Proposed Rule would allow for the full cost recovery of certain eligible units that have a 90-day fuel supply on site.<sup>87</sup> How exactly the proposed rule would be implemented is not clear. For example, units could be required to continue to bid into wholesale electricity markets or could be dispatched outside the market construct. While the proposed regulatory text of the Proposed Rule suggests that eligible units would receive cost-of-service payments for electric *energy* produced only when dispatched, it could also be read to provide for cost-of-service regardless of dispatch (such as through the capacity market or wholly the outside ISO/RTO-administered market structure). Nonetheless, what is clear is that under any feasible interpretation or implementation of the Proposed Rule, as written, it will hurt the efficiency of the market both in the short- and the long-run.

In the short-run, if eligible units are asked to bid into the wholesale markets and clear, the bidding incentives of the eligible units will change. Therefore, price formation in the energy and capacity markets would be adversely affected. The current design of the energy markets provides strong incentives for generators to submit bids based on their operating costs. Generators rely on the revenue they earn from the markets to recover their costs, and thus they generally do not have any incentive to sell energy or capacity if the market price is below their operating costs.

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<sup>87</sup> Proposed Rule, 82 Fed. Reg. at 46,948.

Guaranteed full-cost recovery would eliminate any such financial incentive for eligible units. Because these units can recover their entire costs and are guaranteed a certain level of profit no matter what the market outcome is, even at low or negative prices, they will simply bid as low as necessary to get dispatched in the energy market or cleared in the capacity market. This artificial reordering of bids that is not based on a true value of a socially desirable attribute would lead to the inefficient dispatch of the eligible units instead of other, more economic, resources that could generate electricity cheaper. Therefore, generation costs will increase. In addition, because the consumers will have to pay for the full cost recovery of these inefficient plants (outside of the market), the total cost of electricity generation will increase even more. Importantly, because the amount of these payments is not truly correlated with any verifiable socially desirable attribute, eligible units will not offer corresponding benefits commensurate with their compensation, and, therefore, will reduce the net social welfare.

If, on the other hand, the eligible units are dispatched and paid without bidding into the market, that will hurt the efficiency of the market. Markets perform better when there are more buyers and more sellers. Removing a significant number of sellers from the market will reduce the functionality and the efficiency of the market.

In the long run, because energy and capacity prices will change, investment incentives will change. Eligible, inefficient “fuel-secure” plants will stay in the market longer because they will not face any financial pressure even though they are more expensive to operate. Ineligible existing plants, despite still being economic and hence more socially desirable, will face financial pressure and exit the market quicker. Incentives for investment in other types of generation will decrease, reducing the entry of more efficient nuclear, gas, and renewable plants that are not eligible under the Proposed Rule.

In addition, the way the Proposed Rule is structured will create perverse incentives for existing plants that are currently ineligible because they do not have a 90 day supply of fuel on site. Notably, this includes virtually all coal, gas, and petroleum plants.<sup>88</sup> These plants would have a strong incentive to hoard fuel just to become eligible for full cost recovery, even if such practice would not be economically efficient from a societal perspective. It will also incentivize

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<sup>88</sup> Gavin Bade, *Updated: DOE Cost Recovery Rule Divides Power Sector in House Hearing*, UTILITYDIVE (Oct. 4, 2017), <http://www.utilitydive.com/news/updated-doe-cost-recovery-rule-divides-power-sector-in-house-hearing/506452/>.

units to have significant quantities of other, less efficient fuel sources on-site such as diesel fuel just to be eligible.

Because, the Proposed Rule would significantly hurt the efficiency of the market, the resulting tariffs would be neither just nor reasonable. Further, because the Proposed Rule would compensate only certain resources for the supposed resilience benefits, and would not compensate all the other resources that can provide the same benefit such as renewables with energy storage, such action would be unduly discriminatory and preferential under the FPA.

**Other. The Proposed Rule is Not Just and Reasonable, and Is Unduly Discriminatory Because It Does Not Adhere to the Basic Economic Principles**

When empirical evidence—such as the Polar Vortex, recent hurricanes, and historical causes of generator outages—does not support a Commission finding that a tariff change would be just and reasonable, the Commission can rely on “reasonable predictions rooted in basic economic principles.”<sup>89</sup> However, here too the Proposed Rule fails.

As the letter from chairs of the Congressional committees and subcommittees responsible for oversight of FERC to then-Commission Chairman Norman Bay correctly states, electricity market prices for energy and capacity should reflect the “true marginal cost of supply, promote necessary investment, and produce meaningful price signals that clearly indicate where new supply and investment are needed.”<sup>90</sup> Any such price signal will necessarily have to depend on basic economic principles.

First, to guarantee socially efficient investment incentives that can achieve the optimal resource mix and that provide the desired level of reliability and resilience, the price signal should be technology neutral.<sup>91</sup> Claiming that certain, arbitrary, on-site fuel requirements will increase resilience without any scientific evidence, especially when these requirements can apply only to certain resources, would not only lead to socially inefficient price signals, but would also be unduly discriminatory under the FPA.

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<sup>89</sup> S.C. Pub. Serv. Auth., 762 F.3d at 76.

<sup>90</sup> Proposed Rule, 82 Fed. Reg. at 46,943-944 & n. 27.

<sup>91</sup> DOE STAFF REPORT, *supra* note 18 at 100.

There are other resources that can provide resilience benefits.<sup>92</sup> For example, distributed energy resources and microgrids can improve resilience.<sup>93</sup> Wind and solar generators, despite being dependent on weather patterns, are not at risk of fuel disruptions caused by extreme weather events such as floods. And, especially when combined with energy storage, they can provide additional resilience benefits by limiting the level of damage and speeding up the recovery. In addition, operational changes such as adaptive islanding<sup>94</sup> or the use of advanced metering can significantly improve resilience.<sup>95</sup> Therefore, any attempt to value and compensate resilience benefits of resources has to be based on a technology-neutral framework that provides incentives for the most cost-effective ways of achieving the desired level resilience. Because the Proposed Rule violates this technology-neutrality principle, it is unduly discriminatory.

Second, the price signal should be based on a true value for it to provide efficient investment signals. Guaranteeing a generator full recovery of costs, and a fair rate of return, regardless of the true resilience value it provides the grid would lead to inaccurate incentives and a higher than socially desirable level of investment in eligible resources without high enough corresponding benefit to justify the added cost. Instead, the compensation should be based on the expected value of the added resilience benefits each resource provides, if any. Because the Proposed Rule violates this basic economic principle it should be rejected as unjust and unreasonable.

Third, the price signal should be based on actual performance.<sup>96</sup> While paying a resource that can potentially increase resilience during an extreme event is important to ensure that there are enough such resources, it is equally important that the full compensation payment is based on the actual performance.<sup>97</sup> Conditioning compensation on realized performance aligns the incentives of the generators with the resilience goals of ISOs/RTOs and encourages the generators to take the necessary precautions to ensure that the system will indeed perform during an extreme event. Because the Proposed Rule does not have any performance requirements, it

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<sup>92</sup> Abi-samra, *supra* note 51.

<sup>93</sup> M Panteli, DN Trakas & P Mancarella, *supra* note 33.

<sup>94</sup> *Id.*

<sup>95</sup> WHITE HOUSE COUNCIL OF ECON. ADVISORS, ECONOMIC BENEFITS OF INCREASING ELECTRIC GRID RESILIENCE TO WEATHER OUTAGES, 10 (2013), [https://energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report\\_FINAL.pdf](https://energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf) (AMI significantly reduced the outage duration in Sandy).

<sup>96</sup> Vugrin, Castillo, and Silva-monroy, *supra* note 18.

<sup>97</sup> WATSON ET AL., *supra* note 21 at 27.

will fail to provide efficient incentives for achieving resilience goals while increasing cost to customers. Therefore, the Proposed Rule should be rejected as unjust and unreasonable.

Fourth, in any proposal that FERC considers, double payments should be prevented. The price signal should compensate the resources only to the extent that there is additional resilience value beyond what the resources already are (or will be) paid in energy, capacity, and ancillary service markets, or for their contributions to reliability. For example, if eligible generators are already being compensated for a reliability service such as black start (which is often paid based on the cost of providing that service), they should be compensated for resilience only to the extent that they can provide additional improvements to system resilience beyond their black start capabilities. Additionally, if an eligible generator is getting revenues from the markets that provide appropriate incentives, those revenues should offset payments for resilience attributes. Because the Proposed Rule does not take precautions to prevent double payments, it is not just and reasonable.

Finally, the compensation mechanism should be structured as part of the correct market segment based on the type of actions that can improve resilience. Because resilience is not well defined in the policy context, it is not apparent which type of products and services can improve resilience, and by how much. Therefore, even if the Commission finds that there is a need for valuing a new resilience attribute, it is not clear whether that attribute should be priced at the wholesale level, retail level, or a combination of these markets. Getting the compensation design and incentives wrong would increase the costs to consumers without any added benefits, and would lead to unjust and unreasonable rates.

If system resilience increases due to actions taken by the generators, compensating them through wholesale markets is appropriate. PJM's Capacity Performance Payment mechanism, for example, attempts to align the incentives of generators to ensure that they can perform during extreme weather events by internalizing the risk of fuel supply disruptions. However, compensating only generators for one resilience attribute is not sufficient to guarantee increased system resilience. If the transmission or the distribution network fails, even if all the generators are "fuel-secure" and properly weatherized, there will be outages.

Therefore, if the Commission finds support for addressing resilience, proper incentives should be provided for improved resilience at all levels of the electric grid. Given that the Commission has limited jurisdictional authority over distribution infrastructure and retail rates,

achieving truly efficient investment signals for grid resilience requires coordinated action between the Commission and state and local regulators, utilities and other stakeholders.

**Other. The Proposed Rule Could Negatively Affect Grid Resilience**

While reducing fuel disruption risk may help enhance resilience, other attributes of the large coal and nuclear generating units that would be kept online by the Proposed Rule may pose countervailing risks that any Commission policy to value resilience attributes of generation must take into account.

***Retention of Large Generators Creates Single-Points-of-Failure that Pose Resilience Risk***

The Commission should recognize that, while large central-station generation sources such as large coal and nuclear plants with significant on-site fuel storage may be resilient to certain rare threats, such as fueling disruptions, they may also make the electric system less resilient in other important ways. An electric grid dependent on large central-station generation may be less resilient to high-impact, low-probability events that incapacitate individual generators than an electric grid that has larger number of small generators. For example, in 2016, a lightning strike and subsequent fire suddenly incapacitated Unit 2 of the Grand River Dam Authority's (GRDA) Grand River Energy Center. This sudden incapacitation of a large generation unit resulted in DOE's issuance of an emergency order to keep another unit that was scheduled to close online.<sup>98</sup> Had replacement power been unavailable, this single event affecting only one generator could have resulted in significant outages. However, the loss of any single generator in a high-impact, low-probability event such as a lightning strike, facility fire, or targeted cyber attack would likely be much less disruptive for a grid powered by many smaller natural gas combined cycle plants, solar facilities, and wind turbines.

In one striking example, during Hurricane Harvey, coal plants themselves were flooded and were forced to switch to natural gas after coal piles became oversaturated.<sup>99</sup> The Commission must consider resilience tradeoffs when evaluating whether any compensation scheme or other policy aimed at increasing grid resilience is just and reasonable. To the extent the Commission implements a policy to value resilience attributes, it should do so in a way that

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<sup>98</sup> Dep't of Energy, Order No. 202-17-1(April 14, 2017), <https://energy.gov/sites/prod/files/2017/04/f34/Oklahoma.pdf>

<sup>99</sup> Watson, S&P GLOBAL PLATTS, *supra* note 52.

takes into account the fact that different resources have attributes that can both increase and decrease a variety of risks.

***The Commission Should Consider the Extent to Which the Proposed Rule Would Undermine Resilience by Exacerbating Extreme Weather Events***

In issuing the Proposed Rule, the Secretary has argued that the Commission is not required to perform an analysis of the environmental effects of the proposed tariff changes because the Commission's existing regulations provide a categorical exclusion from the requirements of the National Environmental Policy Act ("NEPA") for actions under sections 205 and 206 of the FPA.<sup>100</sup> However, in order to reasonably conclude that the proposed tariff changes are just and reasonable under the FPA, the Commission must nonetheless conduct an evaluation of the greenhouse gas emissions of the Proposed Rule.<sup>101</sup>

Any action that changes the probability and the magnitude of high-impact, low-probability events affects the resilience of a system. Emissions of greenhouse gases risks exacerbating climate change which, in turn, is expected to negatively affect performance of the electric grid. The Proposed Rule justifies cost recovery of certain generators under section 206 of the FPA primarily by asserting that those generators are critical to maintaining and improving grid resilience in order to reduce costs in the face of unexpected events such as extreme weather.<sup>102</sup> However, the Proposed Rule fails to consider the extent to which it would facilitate the continued or expanded operation of eligible units that increase emissions of greenhouse gases, the extent to which those increased emissions would exacerbate climate change, and the resulting impact on the resilience of the electric grid.

Because the climate effects of the Proposed Rule may increase the likelihood and the magnitude of disruptive events and create additional resilience costs, the Commission has the responsibility to analyze the extent to which grid resilience would be affected by increased emissions.

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<sup>100</sup> Proposed Rule, 82 Fed. Reg. at 46,947 (citing 10 CFR § 380.4(a)(15)).

<sup>101</sup> 16 U.S.C. § 824e(a).

<sup>102</sup> Proposed Rule, 82 Fed. Reg. at 46,942, 46,945.

### *The Proposed Rule Will Retain Generators that Exacerbate Climate Change*

The Proposed Rule is likely to increase carbon dioxide emissions as compared to business as usual. Of the approximately 92 GW of potentially eligible capacity,<sup>103</sup> approximately 59% is coal-fired. Coal-fired power plants are among the largest sources of greenhouse gas emissions in the United States.<sup>104</sup> In 2016, these plants generated almost 225 million MWh and emitted about 226 million metric tons of CO<sub>2</sub>. This constituted about 12.5% of total U.S. power sector emissions.<sup>105</sup>

### *Climate Change is Likely to Exacerbate Grid Resilience Risk*

Climate change is likely to undermine efforts to improve grid resilience. DOE's Quadrennial Energy Review outlines the significant reliability and resilience risks that will increase due to climate change:

U.S. temperatures are projected to continue rising in the coming decades. Electricity transmission and distribution systems carry less current and operate less efficiently when ambient air temperatures are higher. Case studies indicate that sudden, extreme heat can cause transformers to malfunction or stop working. Increasing temperatures also will likely increase electricity demand for cooling, which could increase utilization of transmission and distribution systems during peak demand periods. Increasing air and water temperatures also reduce the efficiency of power plant cooling, which increases the risk of partial or full shutdowns of generation facilities and loss of the grid services that they provide during heat waves.

Drought is also problematic. . . . A rapid spring thaw of the snowpack can overload reservoir capacity and lead to lost energy. Increasing the frequency and severity of wildfires (also linked to droughts), particularly in the West, may damage electricity transmission and distribution infrastructure (such as utility poles, lines, transformers, and substations) and lead to power outages.<sup>106</sup>

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<sup>103</sup> This includes unregulated merchant coal and nuclear plants located within all FERC-jurisdictional markets in 2016. The version of the Proposed Rule published in the Federal Register added a proposed limitation that, while unclear, could be read to limit cost recovery to units located only within those Commission-jurisdictional ISOs/RTOs that have capacity markets. This would potentially limit covered generation to 88 GW (57% coal) or 72 GW (55% coal), depending on whether MISO is included. SNL Financial.

<sup>104</sup> U.S. EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2015 at 3-7 (2017), [https://www.epa.gov/sites/production/files/2017-02/documents/2017\\_chapter\\_3\\_energy.pdf](https://www.epa.gov/sites/production/files/2017-02/documents/2017_chapter_3_energy.pdf).

<sup>105</sup> Merchant coal plants had an emission rate, on average, of 1.007 metric ton CO<sub>2</sub> per MWh in 2015. Dep't of Energy Energy Info. Agency, *Electric Power Annual*, <https://www.eia.gov/tools/faqs/faq.php?id=74&t=11>. Eligible coal generators generated approximately 224.9 million MWhs in 2016. SNL Financial.

<sup>106</sup> DOE QER at 2-10 to 2-11 (citations omitted); *See also* NAS REPORT, *supra* note 34 at 45.

A more detailed analysis of the negative effects of increased greenhouse gas emissions on generator and grid operations are detailed in the U.S. Global Change Research Program’s Third National Climate Assessment, which summarizes the impacts of climate change on the United States.<sup>107</sup>

*Failure to Consider the Extent to Which the Proposed Rule Could Exacerbate Grid Disruption in the Name of Improving Grid Resilience Would Be Arbitrary*

While the magnitude is unclear because the Proposed Rule does not include any environmental analysis, by increasing greenhouse gas emissions and, thereby exacerbating climate change, the Proposed Rule might increase the likelihood and magnitude of events that disrupt generator and grid operations. Consequently, the Proposed Rule itself risks undermining the very resilience that it aims to improve. Therefore an explicit evaluation of how the Proposed Rule would increase these costs must be at the heart of any decision to adopt a policy to support only specific types of resources in order to enhance resilience.<sup>108</sup> It would be arbitrary and capricious for the Commission to finalize a rulemaking requiring ISOs/RTOs to implement a policy that risks increasing the likelihood and the costs associated with grid disruptions on the basis that the rule is intended to reduce such costs.

Moreover, FERC should consider these countervailing risks when evaluating alternative policy Proposed Rules. Changes to market rules that address baseload power and fuel security concerns as outlined in the Proposed Rule should consider the resilience properties of other more flexible sources; it need not focus exclusively on high carbon-emitting resources. By pursuing a technology-neutral approach, the Commission could address fuel security and resilience concerns without increasing greenhouse gas emissions that may pose countervailing resilience risks. For example, renewable energy resources combined with storage or distributed energy resources can help the electric grid recover from severe weather events quickly and can operate

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<sup>107</sup> For a detailed account of the resilience impacts of increasing climate change, see Jan Dell et al., *Ch. 4: Energy Supply and Use*, CLIM. CHANG. IMPACTS UNITED STATES THIRD NATL. CLIM. ASSESS. 113–129 (2014).

<sup>108</sup> See *Grand Council of Crees (of Quebec) v. FERC*, 198 F.3d 950, 957-58 (D.C. Cir. 2000) (finding that “if [environmental] reviews (or other forces such as liability risks or firm commitment to environmental quality) cause the utility to incur costs, such costs would feed into the Commission’s normal rate calculation” and discussing related precedent).

without any need for on-site fuel. Energy efficiency and other demand resources can provide significant resilience benefits at low cost.<sup>109</sup>

The Commission must consider greenhouse gas emissions associated with the Proposed Rule and reasonable alternatives in order to determine whether the Proposed Rule would, in fact, be just and reasonable.<sup>110</sup>

**C. If FERC Decides to Address Resilience, FERC Must Focus on the Broader Concept of Resilience and Reject any Effort to Focus Only on “Fuel-Secure” Plants.**

**Other (3). Please describe any alternative approaches that could be taken to accomplish the stated goals of the proposed rule.**

At an oversight hearing in front of the House Energy and Commerce Committee, the Secretary repeatedly framed the Proposed Rule as an attempt to “start a conversation.”<sup>111</sup> The Commission should consider the Proposed Rule with this intent in mind.<sup>112</sup>

***The Commission Should Not Act Before Engaging in a Considered Process to Evaluate Whether Resilience Attributes Are Not Being Provided By the Market and Develop Solutions that Specifically Address the Problem***

The Secretary’s Proposed Rule cites a number of proceedings and actions that demonstrate that the Commission has, to-date, approached the need to make changes to established wholesale markets in a deliberate, considered, and rational way.<sup>113</sup> FERC has also

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<sup>109</sup> DAVID RIBEIRO ET AL, AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY, ENHANCING COMMUNITY RESILIENCE THROUGH ENERGY EFFICIENCY 12-20 (2015), <http://aceee.org/sites/default/files/publications/researchreports/u1508.pdf>.

<sup>110</sup> The Commission’s obligation to conduct an analysis of the climate impacts of the Proposed Rule is unlike the issue considered in *Grand Council of Crees (of Quebec)*, 198 F.3d. In that case, the court held that petitioner organizations did not have standing to assert a claim under the FPA for environmental damages, because environmental damages are not, themselves within the zone of interest protected by the FPA. In this case, however, FERC’s obligation to consider climate impacts of the Proposed Rule stems not from any general obligation to protect the environment, but because the Proposed Rule, if adopted, would impact resilience by exacerbating climate change.

<sup>111</sup> Energyandcommerce, *Department of Energy Missions and Management Priorities*, YOUTUBE (Oct. 12, 2017), [https://www.youtube.com/watch?v=M\\_eopvfK8Lc](https://www.youtube.com/watch?v=M_eopvfK8Lc) (“I don’t have any idea if there are better options — that’s one of the reasons we wanted to have this conversation . . . I’m not saying my letter to FERC is the be all, end all, but it’s obviously been very successful in getting the conversation going”).

<sup>112</sup> In fact, DOE’s Proposed Rule may be legally insufficient for the Commission to finalize any action adopting specific market reforms without going through such a process. *See Comments of the Harvard Environmental Policy Initiative*, Docket No. RM18-1-000 (Oct. 18, 2017).

<sup>113</sup> Proposed Rule, 82 Fed. Reg. at 46,944 (citing a number of completed proceedings include FERC’s Price Formation Proceedings, Price Formation in Energy and Ancillary Services Markets in Regional Transmission

begun, but not yet completed, a number of proceedings to address deficiencies in regulated markets.<sup>114</sup> But those proceedings are fundamentally different from the one currently under consideration. Notably, those proceedings all focused on improving price formation within wholesale markets based on *well-defined attributes* and based on extensive records developed through stakeholder engagement, technical conferences, and other processes. That is not the case here.

The fact that the Commission has developed or is in the process of developing a record for why and how to incorporate attributes such as fast-start, frequency response, or energy storage into market prices and interconnection requirements does not support the adoption of a rule to value other, different attributes such as “resilience” or “fuel-secure generation.”<sup>115</sup> To the extent that the Commission believes that there are uncompensated generation attributes related to reliability or resilience, it should adopt an approach to valuing and paying for those attributes similar to how it has approached developing significant market reforms in the proceedings identified in the Proposed Rule.

***The Commission Should Adopt a More Deliberative Procedure if it Plans to Consider a Significant Market Change, Such as the Change In The Proposed Rule***

The Commission’s approach to the issuance of Order No. 825—in which it required, pursuant to section 206 of the FPA, that each ISO/RTO align settlement and dispatch intervals and institute a mechanism to trigger shortage pricing—provides a good model. After explicit research into whether existing rules (i.e., Order No. 719) are insufficient or not,<sup>116</sup> the Commission initiated its Price Formation Proceeding to evaluate issues related to price formation

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Organizations and Independent System Operators, Docket No. AD14-14-000, June 2014; Order No. 825 in which FERC directed ISOs/RTOs to reform pricing to reflect shortage value, 155 FERC ¶ 61,276; Order No. 831 in which FERC raised existing energy market caps to better price scarcity, 157 FERC ¶ 61,115).

<sup>114</sup> Proposed Rule, 82 Fed. Reg. at 46,944 (citing a 2016 notice of proposed rulemaking in which FERC is considering requiring all new generating facilities provide frequency response in order to interconnect, 157 FERC ¶ 61,122; a December 2016 notice of proposed rulemaking that would require better pricing of fast-start resources, 157 FERC ¶ 61, 213; a January 2017 NOPR to properly allocate uplift costs, 158 FERC ¶ 61,047); *See also Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, 157 FERC ¶ 61,121.

<sup>115</sup> *See* Answer of FirstEnergy Service Company in Opposition to Joint Motion for Extension of Time at 2 n. 4, Docket No. RM18-1-000 (filed Oct. 10, 2017) (“these proceedings serve a different purpose than the present one, and will not result in support for resilient and reliable fuel-secure generation as is the goal here”).

<sup>116</sup> *Settlement Intervals & Shortage Pricing in Markets Operated by Reg'l Transmission Organizations & Indep. Sys. Operators*, 155 FERC ¶ 61276 P 9 (June 16, 2016).

in Commission-jurisdictional energy and ancillary services markets.<sup>117</sup> Under that general proceeding, the Commission staff conducted outreach, convened technical workshops on four specific topics related to price formation, and drafted staff reports on each topic, including on shortage pricing. The Commission then issued a notice requesting comment on the questions raised by the technical workshops and staff report, after which the Commission proposed specific findings and changes.<sup>118</sup> Only after considering comments to the specific proposal did the Commission finalize its finding that existing ISO/RTO tariffs were unjust and unreasonable and require revisions consistent with specific requirements included in the Order.

The Commission has used a similar process before adopting other significant changes. In adopting Order No. 1000, the Commission first evaluated the extent to which existing Order No. 890 was resulting in sufficient transmission planning and cost allocation; held three technical conferences to determine whether existing transmission planning processes were meeting needs; issued a Request for Comments with specific questions based on information developed at the technical conferences; issued a notice of proposed rulemaking with a specific proposal; and finalized a rule.<sup>119</sup> In adopting Order No. 745 in which the Commission found that ISO/RTO compensation of demand response in wholesale energy markets was unjust and unreasonable and ordered specific tariff changes to address this, the Commission followed a similar process. It first evaluated the extent to which existing Order No. 719, in which demand response was included in ISO/RTO markets but where compensation was set by the ISO/RTO, resulted in accurate pricing of demand response resources.<sup>120</sup> The Commission then issued a notice of proposed rulemaking and requested comment, held a technical conference and issued a supplemental notice of proposed rulemaking.<sup>121</sup> Only after an extensive record was developed did the Commission issue a final rule.<sup>122</sup>

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<sup>117</sup> *Id.*, at P 10.

<sup>118</sup> *Id.*, at P 11.

<sup>119</sup> *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities*, Order No. 1000, FERC Stats. & Regs. ¶ 31,323 (2011), *order on reh'g*, Order No. 1000-A, 139 FERC ¶ 61,132, *order on reh'g*, Order No. 1000-B, 141 FERC ¶ 61,044 (2012).

<sup>120</sup> *Demand Response Compensation in Organized Wholesale Energy Markets*, Order No. 745, 76 Fed. Reg. 16,658 (Mar. 24, 2011), FERC Stats. & Regs. ¶ 31,322 (2011).

<sup>121</sup> *Id.*

<sup>122</sup> *Id.*

If the Commission finds the need to take an affirmative action on resilience, it should follow a similar approach in this case.

***The Commission Should First Initiate a Proceeding to Determine if Existing Rules are Insufficient***

The Commission should first initiate a proceeding to determine whether the combination of current market design, existing or recently adopted ISO/RTO tariff changes (such as those described above with respect to fuel assurance), and existing reliability standards are providing adequate levels of resilience. Notably, notwithstanding the Proposed Rule's citation of the Commission's Price Formation Proceeding, the Proposed Rule does *not* address the issues raised by the Proposed Rule. None of the technical conferences or staff proposals in that proceeding addressed resilience or fuel security. Only two comments even contained the words "resilience" or "resiliency", and each word is mentioned only once.<sup>123</sup> In order to fully understand the scope of any market issues, the Commission will need to initiate a new proceeding.

This proceeding should also develop metrics for measuring resilience, both so that the Commission can evaluate which policies were able to advance resilience and so resilience can be measured with enough specificity to be valued in the market. Metrics used for measuring the effectiveness of reliability investments (i.e., how long service is interrupted and how often service is interrupted) are not necessarily applicable to resilience.<sup>124</sup> New metrics will need to be developed. Sandia National Laboratories has recently published a conceptual framework for developing resilience metrics for the electric sector that may be helpful to the Commission should it decide to go down this path.<sup>125</sup> Metrics developed should be able to measure resilience, as properly defined in the literature. Importantly, as discussed above, see *supra* 7-11, resilience is not a one-dimensional absolute concept and measuring resilience may require multiple metrics.<sup>126</sup>

Developing a resilience metric that is multifaceted and can measure incremental value is critical. Both existing market design and existing reliability standards, in effect, already

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<sup>123</sup> Comment of D.C. Energy, LLC, Inertia Power, LP and Vitol Inc., Docket No. AD14-14-000 (April 6, 2016), [http://elibrary.ferc.gov:1/idmws/file\\_list.asp?document\\_id=14446030](http://elibrary.ferc.gov:1/idmws/file_list.asp?document_id=14446030); Comments of Exelon Corporation, Docket No. AD14-14-000 (March 6, 2015), [http://elibrary.ferc.gov:1/idmws/file\\_list.asp?document\\_id=14309652](http://elibrary.ferc.gov:1/idmws/file_list.asp?document_id=14309652).

<sup>124</sup> KEOGH & CODY, *supra* note 41 at 7.

<sup>125</sup> WATSON ET AL., *supra* note 21.

<sup>126</sup> *Id.*

compensate generators and other market participants for provision of services that largely overlap with the resilience attributes identified in the Proposed Rule. The Commission should be careful not to overcompensate market participants for attributes that are already, in effect, being paid for through existing mechanisms.

If (and only if) the Commission finds substantial evidence that existing market design and reliability standards are insufficient to provide the desired level of resilience, the Commission could then design an approach commensurate with the problems identified.

At each stage of the process, the Commission would benefit from and should employ technical conferences, stakeholder dialog, solicit and gather evidence, prepare staff reports describing the evidence that the Commission proposes to rely on, and seek extensive public comment on any evidence or reports that the Commission prepares.

***If the Commission Determines that Existing Policies Are Insufficient, the Commission Should Consider Requiring ISOs/RTOs to Develop Specific Resilience Plans Rather Than Adopting Any Broad New Rule***

Any policy that seeks to address resilience should involve consideration of multiple types of threats (i.e., hurricane, earthquake, cyberattack, etc). The relative probability and magnitude of damage from these threats will likely vary by region. Given this locational variance, the actions required to improve resilience in one region might not be the same as in another.<sup>127</sup> For this reason, once consistent metrics have been developed, an ideal Commission action may be to allow each ISO/RTO to develop its own approaches to enhance resilience attributes with respect to different threats.

The Commission has used ISO/RTO-specific policy responses in a variety of cases. For example, as is discussed in more detail above, in response to the 2014 Polar Vortex, the Commission recently required each ISO/RTO to evaluate, report on, and develop solutions to concerns related to generator access to sufficient fuel supplies.<sup>128</sup> In Order No. 1000, the Commission directed each public utility transmission provider (including, but not limited to, Commission-jurisdictional ISOs/RTOs) to participate in a regional transmission planning process that met specific Commission-determined requirements (such as taking into account state policy)

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<sup>127</sup> NAS REPORT *supra* note 34 at 51.

<sup>128</sup> Order on Technical Conferences, 149 FERC ¶ 61,145.

and to take affirmative steps to identify regional solutions that would meet the region's transmission needs by developing a transmission plan.<sup>129</sup> Each public utility transmission provider was required to use a defined, extensive, and open stakeholder process.<sup>130</sup> Each public utility transmission provider was then required to file its transmission plan in a compliance filing with the Commission, providing the Commission the opportunity to evaluate the adequacy of these plans.<sup>131</sup>

The Commission could adopt a similar approach in this case, if it affirmatively finds a need to address resilience—as we have defined it. It could direct each jurisdictional ISO/RTO to develop a resilience plan. Each ISO/RTO would first evaluate the most significant resilience threats (based on likelihood and consequence). To the extent that these threats are not already being sufficiently addressed by existing market rules or reliability standards, each ISO/RTO would be directed to develop a plan to address those risks. Plans would have to be developed through a meaningful and open stakeholder processes. Each ISO/RTO would submit its resilience plan to the Commission for evaluation and approval, after a public comment process.

Some ISOs/RTOs are already beginning to engage in this process. For example, PJM recently issued a report on the reliability and resilience consequences of its resource mix shift as it becomes less dependent on coal and more dependent on natural gas and renewable generation sources.<sup>132</sup> PJM found that “many of the potential future resource portfolios are likely to be reliable because they are likely to provide adequate amounts of the defined key generator reliability attributes. This observation holds true even for potential resource mixes that are heavily reliant on natural gas-fired generation and thus lack fuel diversity.” Nonetheless PJM concluded that “[i]n parallel with inter-regional and national efforts, PJM and its stakeholders should continue to examine resilience-related low-probability and high-impact events which can cause significant reliability impacts.” PJM identified the lack of defined or quantified criteria for resilience as an obstacle for doing so, and laid out a set of questions for PJM and its stakeholders to consider in better understanding and responding to resilience risks.<sup>133</sup>

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<sup>129</sup> Order No. 1000, 136 FERC ¶ 61,051 at P 146.

<sup>130</sup> *Id.* at P. 150.

<sup>131</sup> *Id.* at P. 149.

<sup>132</sup> PJM'S EVOLVING RESOURCE MIX AND SYSTEM RELIABILITY, *supra* note 63 at 6-7.

<sup>133</sup> *Id.* at 39.

Notably, PJM’s questions show that any comprehensive approach to addressing resilience must go beyond the limited scope considered in the Proposed Rule. For example, PJM asks “How can distributed energy resources (including demand response and microgrids) and renewable resources provide additional reliability or resilience services through improvements such as improved inverter and storage technologies?”<sup>134</sup> To the extent it adopts an approach that gives discretion to ISOs/RTOs to develop policies that fit their risks and markets, the Commission should encourage or require all ISOs/RTOs to consider the wide range of technologies and resources that can provide resilience services. This broad focus should also be adopted by the Commission as it seeks to set the groundwork for ISO/RTO action. For example, the DOE Staff Report astutely identifies the need to “develop policy metrics and tools for evaluating [bulk power system]-wide provision of resilience and *considering all aspects of the electricity system that contribute to resilience, including regional generation characteristics, imports and exports, fuel supply and storage, transmission capability, DR, electricity storage, inertia, and other factors that determine the ability of grid operators to provide reliable electricity supplies.*”<sup>135</sup>

***The Commission Should, Where Possible, Encourage Solutions that Allow the Market to Appropriately Value Unvalued Attributes***

Rather than issuing the Proposed Rule, the Commission should encourage ISOs/RTOs to rely, where possible, on market-based technology-neutral solutions that compensate market participants for the value of the resilience attributes they provide.

This approach would be consistent with past practice. Organized, commission jurisdictional capacity markets were created, in part, to provide a market-based technology-neutral way of valuing an attribute (capacity needed for resource adequacy) that was arguably not being sufficiently valued by wholesale energy markets.<sup>136</sup> More recently, the Commission approved a new flexible ramping product in the market operated by the California ISO that will

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<sup>134</sup> Id.

<sup>135</sup> DOE STAFF REPORT at 128 (emphasis added).

<sup>136</sup> See Commission Staff Report, Centralized Capacity Market Design Elements, Docket No. AD13-7-000 at 1-2 (Aug. 23, 2013), <https://www.ferc.gov/CalendarFiles/20130826142258-Staff%20Paper.pdf> (outlining history of ISO/RTO capacity markets as a market-based region-specific tool for ensuring resource adequacy at just and reasonable rates).

enable the market to directly value the benefits provided by resources that ramp up and down to meet changes in system conditions.<sup>137</sup> By creating market-based solutions, the Commission has been able to facilitate technology-neutral approaches that provide identified generation attributes at the lowest cost.

### ***The Commission Should Consider Other Non-Market Solutions Where Appropriate***

Market-based solutions are not always possible. This is particularly true for the improvement of resilience through infrastructure upgrades rather than changes to generator incentives. Policy Integrity has extensively reviewed the existing literature on resilience and provides a collection of resources and recommendations that may be relevant below.

The National Academy of Sciences (“NAS”) recently established a Committee on Enhancing the Resilience of the Nation’s Electric Power Transmission and Distribution System to conduct a study.<sup>138</sup> That study resulted in a comprehensive set of recommendations aimed at identifying, developing, and implementing strategies to increase the power system’s resilience. Notably, none of the recommendations depend on keeping otherwise uneconomic generation online. The Commission should evaluate this report. Many of the recommendations could be incorporated into ISO/RTO resilience plans:

1. **Overarching Recommendation 1.**<sup>139</sup> Coordinate in conducting more regional emergency preparedness exercises that simulate low-probability, high-impact events.
2. **Overarching Recommendations 4.**<sup>140</sup> The NAS recommends the Commission and ISOs/RTOs evaluate whether electric grids would benefit from pre-positioned replacements for critical assets such as transformers, in order to help accelerate restoration after grid failure.
3. **Overarching Recommendations 7.**<sup>141</sup> The NAS recommends that the Commission and NERC establish “small system resilience groups . . . to assess and, as needed, to mandate strategies to increase the resilience of the U.S. bulk electricity system.” These groups could help with information sharing across already existing efforts to enhance resilience.
4. **Recommendations 2.1.**<sup>142</sup> The NAS recommends that DOE study the value to customers of assuring continuation of full or partial service during large-area, long-duration blackouts. It is possible that some customers may prefer lower electric bills with some

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<sup>137</sup> California Independent System Operator Corp., 156 FERC ¶ 61,226 (Sept. 26, 2016).

<sup>138</sup> NAS REPORT, *supra* note 34.

<sup>139</sup> *Id.* at 134.

<sup>140</sup> *Id.* at 135.

<sup>141</sup> *Id.*

<sup>142</sup> *Id.*

risk of service disruption; such information will be important in evaluating the relative costs and benefits of resilience improvements. The Commission could facilitate such information collection.

5. **Recommendation 2.2.**<sup>143</sup> The NAS recommends that DOE engage NERC, the National Association of Regulatory Utility Commissioners, the National Rural Electric Cooperative Association, and the American Public Power Association to coordinate assessment of resilience metrics. The Commission could, on its own or through ISOs/RTOs, fulfill the role NAS envisioned for DOE.
6. **Recommendation 4.7.**<sup>144</sup> The NAS recommends the Commission work with NERC and industry stakeholders to prioritize planning between natural gas and electric utilities, including the development of recovery strategies. As is outlined below, some of this is already underway following the Commission's 2014 Fuel Assurance Order.<sup>145</sup>

As part of its Quadrennial Energy Review, DOE identified recommendations for enhancing grid security and resilience, where resilience is defined as the multi-faceted issue we explained above. One such recommendation was the use of cost-benefit analysis for targeting resilience investments.<sup>146</sup> The Commission could work to adopt DOE's recommendation to develop uniform methods for performing cost-benefit analysis of resilience investments to better inform regulated utility decision-making. DOE recommends such valuation methods could be informed by establishment of a "community of practice," a stakeholder forum for the sharing of current best practices.

NERC has developed a series of risk profiles to help the electric utility industry prioritize, evaluate, and address risks. NERC Risk Profile #7, which NERC categorizes as "of moderate risk," addresses Extreme Natural Events.<sup>147</sup> NERC includes 17 recommendations spread across different timeframes ranging from one year to longer than five years. The Commission should consider the extent to which it should encourage or require regulated utilities to act consistent with these recommendations. For example, the Commission could require that ISOs/RTOs consider and address NERC recommendations in resilience plan compliance filings under the Fuel Assurance Order.

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<sup>143</sup> *Id.*

<sup>144</sup> *Id.*

<sup>145</sup> See Order on Technical Conferences, 149 FERC ¶ 61,145.

<sup>146</sup> DOE QER, *supra* note 18 at 7-22.

<sup>147</sup> N. Am. Elec. Reliability Corp., Risk Profile #7: Extreme Natural Events, [http://www.nerc.com/gov/bot/MRC/Documents/7\\_Ext\\_Natural\\_Events.pdf](http://www.nerc.com/gov/bot/MRC/Documents/7_Ext_Natural_Events.pdf).

As outlined above, PJM has conducted extensive scenario analyses to evaluate the extent to which its system is resilient to a wide variety of threats under different resource portfolios. As the DOE Staff Report recommends, other ISOs/RTOs may benefit from similar analyses.<sup>148</sup> The Commission could encourage or require similar scenario analyses as part of a required ISO/RTO resilience plan, to the extent they are not already doing so.

***The Commission Has Already Identified Some Alternative Approaches to Enhancing Resilience Through Fuel Assurance***

To the extent the Commission decides to focus exclusively on fuel security, despite the lack of record, it should consider the recommendations that it already adopted in the Fuel Assurance Order. In that Order, the Commission identified potential changes that, based on its expertise and information submitted through technical conferences, the Commission determined would have a meaningful impact on fuel assurance commensurate with the reliability (and resilience) benefits that they could provide. The Commission considered potential changes to capacity markets:

On one end of the spectrum, RTOs/ISOs could reform their centralized capacity markets to provide greater price incentives for capacity resources to be available, and impose stiff penalties for failure to perform, to encourage capacity resources to enter into firmer fuel arrangements. As explained above, the Commission has already approved one such proposal in ISO-NE. On the other end of the spectrum, RTOs/ISOs could take a more administrative approach by reforming their capacity markets and/or resource adequacy mechanisms to specifically require that capacity resources have certain fuel arrangements in place to be eligible to provide resource adequacy. For example, RTOs/ISOs might require that, to be eligible to participate in a centralized capacity market or to satisfy resource adequacy obligations in other constructs, a generator would have to demonstrate that it has in place the fuel arrangements required in the RTO's/ISO's definition of the capacity product or resource adequacy obligation. RTOs/ISOs could also combine aspects of both approaches. One way an RTO/ISO might consider implementing this approach is to discount the value of capacity resources (by lowering their capacity rating or some other means) based on their fuel arrangements.<sup>149</sup>

The Commission also considered potentially changes to energy and ancillary services markets:

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<sup>148</sup> DOE STAFF REPORT, *supra* note 18 at 128

<sup>149</sup> Order on Technical Conferences, 149 FERC at P 15.

With respect to potential reforms to energy and ancillary services markets, shortage pricing measures that accurately reflect the value to consumers of avoiding an involuntary curtailment could provide incentives for resources to pursue firmer fuel arrangements. Specifically, the potential to earn revenues to cover their costs and earn a return in a few high priced hours each year provides a strong incentive for resources to take steps (including firming their fuel arrangements) to ensure that they are available during those hours. In addition, the risk of higher prices during peak demand hours could provide a strong incentive for load to take steps to hedge against that risk, including entering into bilateral arrangements to support additional infrastructure needed to ensure fuel availability. Further, as described above, RTOs/ISOs can adjust market rules to provide greater certainty that generators will be able to recover their fuel costs, giving them greater incentives to make timely fuel procurement decisions. As with capacity markets, we encourage RTOs/ISOs to evaluate whether changes to energy market rules are necessary to ensure sufficient fuel cost recovery, thereby enhancing fuel assurance. We recognize that any solution involves a balance of interests, such as weighing the benefits of a particularly high level of fuel assurance with the associated costs, and encourage RTOs/ISOs to account for these trade-offs in their approaches to fuel assurance.<sup>150</sup>

Note that none of these recommendations include the drastic option of returning to cost-of-service ratemaking for asset classes that, only incidentally, provide some level of fuel assurance by virtue of their on-site fuel storage. In addition, the Commission went on to discuss the *tradeoffs* that existed among all the approaches.<sup>151</sup> A detailed analysis of trade-offs of different approaches is something that, again, the Secretary's Proposed Rule fails to do. But, it is necessary should the Commission decide to adopt a "resilience attribute" pricing rule.

#### **IV. CONCLUSION**

Maintaining a resilient electric grid is critical. However, identifying a policy response that can encourage needed investments in grid resilience without interfering with what wholesale electricity, capacity, and ancillary services markets are already doing well is a genuinely difficult and ill-defined problem. The Commission should not rush into a solution lightly, as doing so risks upending wholesale electricity markets without actually providing a more resilient electric grid. Rather, the Commission should carefully define any problem it is attempting to solve, provide for significant stakeholder engagement, and move forward using a considered, prudent process. The Secretary's Proposed Rule does not permit such an approach, either in timeline or

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<sup>150</sup> *Id.* at P 18.

<sup>151</sup> *Id.* at P 16.

substance. It does not provide the record needed for the Commission to conclude that existing ISO/RTO tariffs are unjust, unreasonable or unduly discriminatory. Such a finding is a required predicate to imposing any policy on existing ISOs/RTOs. And it does not include a record sufficient for the Commission to adopt the Secretary's proposed cost-of-service approach as a just, reasonable, and not unduly discriminatory or preferential remedial action. The Commission, therefore, should "take final action" under section 403(b) of the Department of Energy Organization Act and reject the Secretary's Proposed Rule. To the extent the Commission determines that jurisdictional markets are not or, in the future, may not sufficiently encourage investments that provide grid resilience, it can initiate a longer-term rulemaking process, consistent with how it has approached other significant actions that affect wholesale markets.

Respectfully submitted,

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