

162 FERC ¶ 61,012  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Kevin J. McIntyre, Chairman;  
Cheryl A. LaFleur, Neil Chatterjee,  
Robert F. Powelson, and Richard Glick.

Grid Reliability and Resilience Pricing

Docket Nos. RM18-1-000

Grid Resilience in Regional Transmission Organizations  
and Independent System Operators

AD18-7-000

ORDER TERMINATING RULEMAKING PROCEEDING,  
INITIATING NEW PROCEEDING,  
AND ESTABLISHING ADDITIONAL PROCEDURES

(Issued January 8, 2018)

1. The Commission previously has taken steps with regard to reliability and other matters that have helped to address the resilience of the bulk power system. The Commission recognizes that we must remain vigilant with respect to resilience challenges, because affordable and reliable electricity is vital to the country's economic and national security. As explained below, we are terminating the proceeding we initiated in Docket No. RM18-1-000 to address the Proposed Rule on Grid Reliability and Resilience Pricing (Proposed Rule) submitted to the Commission by the Secretary of Energy.<sup>1</sup> Nonetheless, we appreciate the Secretary reinforcing the resilience of the bulk power system as an important issue that warrants further attention. To that end, we are initiating a new proceeding in Docket No. AD18-7-000 to specifically evaluate the resilience of the bulk power system in the regions operated by regional transmission organizations (RTO) and independent system operators (ISO). In this order, we direct each RTO and ISO to submit information to the Commission on certain resilience issues and concerns identified herein to enable us to examine holistically the resilience of the bulk power system. The resilience of the bulk power system will remain a priority of this Commission. We expect to review the additional material and promptly decide whether additional Commission action is warranted to address grid resilience.

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<sup>1</sup> *Grid Resiliency Pricing Rule*, 82 Fed. Reg. 46,940 (Oct. 10, 2017).

## **I. Proposed Rule**

2. On September 29, 2017, the Secretary submitted the Proposed Rule pursuant to section 403 of the Department of Energy (DOE) Organization Act. The Proposed Rule directed the Commission to consider requiring certain RTOs and ISOs to establish a tariff mechanism providing for: (1) the purchase of energy from an eligible “reliability and resilience resource;” and (2) the recovery of costs and a return on equity for such resources (i.e., a “resilience rate”). The Proposed Rule stated that eligible reliability and resilience resources must be: (1) located in an RTO/ISO with an energy and capacity market; (2) be able to provide essential reliability services;<sup>2</sup> and (3) have a 90-day fuel supply on-site.

3. As the basis for these requirements, the Proposed Rule cited: (1) significant retirements of baseload generation, particularly coal and nuclear resources; (2) the 2014 Polar Vortex, which the Proposed Rule states exposed problems with the resilience of the grid; and (3) a growing recognition that organized markets do not compensate resources for all of the attributes they contribute to the grid, including resilience.

4. The Secretary directed the Commission to consider and take final action on the Proposed Rule within 60 days of the date of publication in the Federal Register, or, alternatively, to issue the DOE’s proposed rule as an interim final rule immediately, with provision for later modification after consideration of public comments.

5. The Commission initiated Docket No. RM18-1-000 to consider the Proposed Rule. The Commission issued a Notice Inviting Comments on the Proposed Rule on October 2, 2017, with initial comments due on October 23, 2017, and reply comments due on November 7, 2017.<sup>3</sup> In addition, on October 4, 2017, the Director of the Commission’s Office of Energy Policy and Innovation issued a request for information seeking responses and comment on a number of specific questions raised by the Proposed Rule.<sup>4</sup> The Commission received extensive comments and reply comments in response to the Proposed Rule and the Staff Request for Information from a wide variety of interested stakeholders, including utilities, generators, federal and state legislators, state regulatory

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<sup>2</sup> The essential reliability services were to include, but not be limited to: voltage support, frequency services, operating reserves, and reactive power. Proposed Rule at 18.

<sup>3</sup> *Grid Reliability and Resilience Pricing*, Notice Inviting Comments (Oct. 2, 2017).

<sup>4</sup> *Grid Reliability and Resilience Pricing*, Staff Request for Information (Oct. 4, 2017).

agencies and state attorneys general, industrial customers, environmental organizations, mining companies, other industries, and individuals.

6. On December 7, 2017, the Chairman of the Commission proposed to the Secretary of Energy that a 30-day extension be granted to address the Proposed Rule. On December 8, 2017, the Secretary of Energy responded, granting the extension and thereby giving the Commission until January 10, 2018, to address the Proposed Rule.

## **II. Discussion**

### **A. Background**

#### **1. Evolution of the Electric Power Industry**

7. To more fully understand the context in which the Proposed Rule was issued and the actions we are taking here, it is important to recount briefly the structural and operational origins and evolution of the electric power industry. Historically, vertically integrated utilities generally built and owned the generation, transmission, and distribution facilities needed to serve load within their respective defined service territories. Utilities constructed generation facilities that they determined were best suited to meet that load. Utility rates were historically regulated by federal and state regulators on a cost-of-service basis; the utilities charged for electric generation at rates calculated to compensate them for their actual costs plus a fair rate of return. In other words, during this early period, there was no market structure as we understand it in today's electric power industry.<sup>5</sup>

8. Beginning in the 1970s, statutory and regulatory developments at the federal and state level encouraged the development of competitive electricity markets, including encouraging the growth of non-utility generators.<sup>6</sup> In 1996, this Commission issued its

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<sup>5</sup> The Commission's Order No. 888, discussed below, recounts the historical landscape following enactment of the Federal Power Act (FPA) in 1935. *See Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, Order No. 888, FERC Stats. & Regs. ¶ 31,036, at 31,639-31,645 (1996).

<sup>6</sup> For instance, the Public Utility Regulatory Policies Act of 1978 and the Energy Policy Act of 1992 helped spur competition in the electric power industry. Additionally, the Commission began authorizing entities to make electric power sales at market-based rates starting in the late 1980s. The market-based rate program continues to be a critical part of the Commission's electric regulatory responsibilities.

landmark Order No. 888,<sup>7</sup> which required public utility transmission providers to provide open access transmission service and developed principles for the concept of ISOs and RTOs, and in 1999 the Commission issued Order No. 2000,<sup>8</sup> which expressly encouraged the development of such regional entities with the intent of using such entities to foster competitive power markets. Meanwhile, starting in the 1990s, a number of states restructured their retail electricity markets to allow for more competition in the generation sector, which further contributed to development of bulk power markets and increased reliance on independent regional bodies for operation of the grid.

9. The traditional vertically integrated model was significantly affected by these developments, particularly in regions of the country where RTOs and ISOs manage the transmission grid. Notably, subject to Commission approval, RTOs/ISOs have developed organized markets for electric energy and ancillary services, and a number of them have also established centralized capacity markets. Thus, for more than two decades now, support for markets and market-based solutions has been a core tenet of Commission policy. A result of this approach has been that in regions with organized markets, the Commission has largely adopted a pro-market regulatory model, wherein the Commission relies on competition in approving market rules and procedures that, in turn, determine the prices for the energy, ancillary services, and capacity products (where applicable). Under this pro-competition, market-driven system, owners of generating facilities that are unable to remain economic in the market may take steps to retire or mothball their facilities.

10. A continually evolving phenomenon that has affected the development and evolution of electric markets is innovation in the energy sector and the change in the energy resource mix. As part of its ongoing oversight of wholesale electric markets, the Commission continues to evaluate its current rules and has issued several orders to ensure that our rates in our markets remain just and reasonable and not unduly discriminatory or

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<sup>7</sup> *Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, Order No. 888, FERC Stats. & Regs. ¶ 31,036 (1996), *order on reh'g*, Order No. 888-A, FERC Stats. & Regs. ¶ 31,048, *order on reh'g*, Order No. 888-B, 81 FERC ¶ 61,248 (1997), *order on reh'g*, Order No. 888-C, 82 FERC ¶ 61,046 (1998), *aff'd in relevant part sub nom. Transmission Access Policy Study Group v. FERC*, 225 F.3d 667 (D.C. Cir. 2000), *aff'd sub nom. New York v. FERC*, 535 U.S. 1 (2002).

<sup>8</sup> *Regional Transmission Organizations*, Order No. 2000, FERC Stats. & Regs. ¶ 31,089 (1999), *order on reh'g*, Order No. 2000-A, FERC Stats. & Regs. ¶ 31,092 (2000), *aff'd sub nom. Pub. Util. Dist. No. 1 v. FERC*, 272 F.3d 607 (D.C. Cir. 2001).

preferential. For example, the Commission has acted to remove barriers to the integration and participation of variable energy<sup>9</sup> and demand response resources,<sup>10</sup> as well as revising or expanding compensation opportunities for various grid services, such as frequency regulation.<sup>11</sup>

11. The Commission's support of competitive wholesale electricity markets has been grounded in the substantial and well-documented economic benefits that these markets provide to consumers. In Order No. 890, for example, the Commission cited a DOE study that found that competition had reduced consumers' bills by billions of dollars a year, even as it found that additional savings could be achieved by removing congestion bottlenecks.<sup>12</sup> In Order No. 719, the Commission explained that effective wholesale competition protects consumers by "providing more supply options, encouraging new entry and innovation, spurring deployment of new technologies, promoting demand response and energy efficiency, improving operating performance, exerting downward pressure on costs, and shifting risk away from consumers."<sup>13</sup> At the same time, however, the Commission has continued to ensure that reliability is at the forefront of its responsibilities. The Commission's endorsement of markets does not conflict with its oversight of reliability, and the Commission has been able to focus on both without compromising its commitment to either.<sup>14</sup>

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<sup>9</sup> *Integration of Variable Energy Resources*, Order No. 764, FERC Stats. & Regs. ¶ 31,331 (cross-referenced at 139 FERC ¶ 61,246) (2012).

<sup>10</sup> *Demand Response Compensation in Organized Wholesale Energy Markets*, Order No. 745, FERC Stats. & Regs. 31,322 (cross-referenced at 134 FERC ¶ 61,187) (2011).

<sup>11</sup> *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, Order No. 755, FERC Stats. & Regs. 31,324 (cross-referenced at 137 FERC ¶ 61,064) (2011).

<sup>12</sup> *Preventing Undue Discrimination and Preference in Transmission Service*, Order No. 890, FERC Stats. & Regs. ¶ 31,241, at P 60 (2007) (citing DOE, National Transmission Grid Study (May 2002)).

<sup>13</sup> *Wholesale Competition in Regions with Organized Electric Markets*, Order No. 719, FERC Stats. & Regs. ¶ 31,281, at P 1 (2008).

<sup>14</sup> For example, the Commission has held that out-of-market actions may be warranted in certain instances to address demonstrated reliability concerns. The Commission has approved these actions, however, on a limited basis, only as a last resort, and only after there has been a specific showing of an immediate reliability need. *See*,

## 2. The Commission's Efforts to Help Ensure Bulk Power System Resilience

12. The Commission has taken action to address reliability and other issues with regard to the bulk power system that have helped with the bulk power system's resilience, even though we may not have used that particular term. For example, in response to the increasing use of natural gas for electric generation, the Commission conducted a multi-year effort to evaluate the coordination of wholesale natural gas and electricity market scheduling, resulting in significant improvements to those scheduling and coordination processes.<sup>15</sup> The Commission has also specifically examined the grid's response to the events of the 2014 Polar Vortex,<sup>16</sup> and how each RTO/ISO addresses fuel assurance.<sup>17</sup> Critically, the Commission has also approved significant capacity market reforms in ISO New England, Inc. (ISO-NE) and PJM Interconnection, L.L.C. (PJM) that are designed to bolster performance from capacity resources and to help address fuel supply issues during periods of system stress.<sup>18</sup> Those market reforms created financial

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*e.g., New York Independent System Operator, Inc.*, 150 FERC ¶ 61,116, at P 11 (2015) (“This last requirement reflects our belief that RMR filings should be made only to temporarily address the need to retain certain generation until more permanent solutions are in place and that all alternatives should be considered to ensure that designating a generator for RMR service is a last resort option for meeting immediate reliability needs”). *See also Cal Indep. Sys. Operator Corp.*, 87 FERC ¶ 61,250, at 61,968 (1999) (approving partial settlement concerning RMR agreements and stating that the Commission “in its promotion of efficient competitive markets, wishes to ensure that RMR operations under the settlement do not result in any unforeseen market distortions.”).

<sup>15</sup> *See Coordination of the Scheduling Processes of Interstate Natural Gas Pipelines and Public Utilities*, Order No. 809, FERC Stats. & Regs. ¶31,368 (cross-referenced at 151 FERC ¶ 61,049) (2015).

<sup>16</sup> *Centralized Capacity Markets in Regional Transmission Organizations and Independent System Operators*, 149 FERC ¶ 61,145 (2014) (order addressing technical conferences on, among other things, the 2014 Polar Vortex).

<sup>17</sup> *Id.*

<sup>18</sup> *See ISO New England Inc. and New England Power Pool*, 147 FERC ¶ 61,172 (2014), *reh'g denied*, 153 FERC ¶ 61,223 (2015), *appeal pending sub nom. New England Power Generators Ass'n v. FERC*, No. 16-1023 (D.C. Cir. filed Jan. 19, 2016). *See also*

incentives to enhance reliability during extreme operating conditions. While none of the Commission's efforts described above were specifically targeted at "resilience" by name, they were directed at elements of resilience, in that they sought to ensure the uninterrupted supply of electricity in the face of fuel disruptions or extreme weather threats. Further, the Commission has conducted significant work to address bulk power system reliability through the North American Electric Reliability Corporation (NERC) reliability standards, including its continued work on Critical Infrastructure Protection standards to protect the system against cybersecurity and physical security threats,<sup>19</sup> as well as geomagnetic disturbances.<sup>20</sup>

13. Notwithstanding these and other Commission efforts to address the resilience of the bulk power system, we conclude that resilience remains an important issue that warrants the Commission's continued attention, including through the development of a clear understanding of what each RTO/ISO currently does with respect to the assurance or strengthening of resilience and what more the RTOs/ISOs and the Commission could be doing on this issue. Accordingly, although we terminate the Proposed Rule proceeding as discussed below, we are not ending our work on the issue of resilience. To the contrary, we are initiating a new proceeding to address resilience in a broader context and are directing the RTOs/ISOs to provide information – followed by an opportunity for comment by any other interested entity – that will inform us as to whether additional actions by the Commission and the ISOs/RTOs are warranted with regard to resilience issues.

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*PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,208 (2015), *reh'g denied*, 155 FERC ¶ 61,157 (2016), *aff'd sub nom. Advanced Energy Mgmt. All. v. FERC*, 860 F.3d 656 (D.C. Cir. 2017).

<sup>19</sup> See *Physical Security Reliability Standard*, Order No. 802, 149 FERC ¶ 61,140 (2014); *Revised Critical Infrastructure Protection Reliability Standards*, Order No. 822, 154 FERC ¶ 61,037 (2016), *reh'g denied*, Order No. 822-A, 156 FERC ¶ 61,052 (2016); *Revised Critical Infrastructure Protection Reliability Standards*, Order No. 829, 156 FERC ¶ 61,050 (2016); *Cyber Systems in Control Centers*, Notice of Inquiry, FERC Stats. & Regs. ¶ 35,557 (2016); *Revised Critical Infrastructure Protection Reliability Standards CIP-003-7 – Cyber Security – Security Management Controls*, Notice of Proposed Rulemaking, 161 FERC ¶ 61,047 (2017).

<sup>20</sup> See *Reliability Standard for Transmission System Planned Performance for Geomagnetic Disturbance Events*, Order No. 830, 156 FERC ¶ 61,215 (2016).

**B. Termination of Docket No. RM18-1-000**

14. Having considered the Proposed Rule and the comments received in Docket No. RM18-1-000, we terminate the proceeding in Docket No. RM18-1-000. The FPA is clear: in order to require RTOs/ISOs to implement tariff changes as contemplated by the Proposed Rule, there must be a demonstration that the specific statutory standards of section 206 of the FPA are satisfied. Thus, there must first be a showing that the existing RTO/ISO tariffs are unjust, unreasonable, unduly discriminatory or preferential.<sup>21</sup> Then, any remedy proposed under FPA section 206 must be shown to be just, reasonable, and not unduly discriminatory or preferential.<sup>22</sup> For the reasons discussed below, the Proposed Rule did not satisfy those clear and fundamental legal requirements under section 206 of the FPA. Given those legal requirements, we have no choice but to terminate Docket No. RM18-1-000.

15. Neither the Proposed Rule nor the record in this proceeding has satisfied the threshold statutory requirement of demonstrating that the RTO/ISO tariffs are unjust and unreasonable. While some commenters allege grid resilience or reliability issues due to potential retirements of particular resources,<sup>23</sup> we find that these assertions do not demonstrate the unjustness or unreasonableness of the existing RTO/ISO tariffs. In addition, the extensive comments submitted by the RTOs/ISOs do not point to any past or planned generator retirements that may be a threat to grid resilience.<sup>24</sup> We also disagree

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<sup>21</sup> 16 U.S.C. § 824e(a) (2012). *See also, e.g., Emera Maine v. FERC*, 854 F.3d 9, 25 (D.C. Cir. 2017) (“Without a showing that the existing rate is unlawful, FERC has no authority to impose a new rate.”); *FirstEnergy Serv. Co. v. FERC*, 758 F.3d 346, 353 (D.C. Cir. 2014) (“Regardless of whether it is charged with completing step two, proposing new just and reasonable rates, [petitioner] still must complete step one, demonstrating that PJM’s existing rates are unjust and unreasonable.”).

<sup>22</sup> 16 U.S.C. § 824e(a) (2012).

<sup>23</sup> *See, e.g.,* PSEG Companies Initial Comments at 5-6; Exelon Corporation Initial Comments at 1, 25-26; FirstEnergy Service Company and its named affiliates (FirstEnergy) Initial Comments at 32-34.

<sup>24</sup> *See* New York Independent System Operator, Inc. Initial Comments at 4-5; PJM Initial Comments at 15; ISO-NE Initial Comments at 1-3; Midcontinent Independent System Operator, Inc. (MISO) Initial Comments at 5-11.



with assertions that an adequate record exists through the Commission's price formation efforts to support the Proposed Rule's action regarding bulk power system resilience.<sup>25</sup>

16. Turning to the second prong of the section 206 analysis, we note that the Proposed Rule would allow all eligible resources to receive a cost-of-service rate regardless of need or cost to the system.<sup>26</sup> The record, however, does not demonstrate that such an outcome would be just and reasonable.<sup>27</sup> It also has not been shown that the remedy in the Proposed Rule would not be unduly discriminatory or preferential.<sup>28</sup> For example, the Proposed Rule's on-site 90-day fuel supply requirement would appear to permit only

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<sup>25</sup> The goals of the price formation proceeding center largely on facilitating competition and ensuring that market prices reflect the marginal cost of production so that prices accurately reflect system conditions and operational constraints. *See Price Formation in Energy and Ancillary Services Markets Operated by Regional Transmission Organizations and Independent System Operators*, Notice Inviting Post-Technical Workshop Comments, Docket No. AD14-14-000, at 1 (Jan. 16, 2015) (Notice Inviting Comments); *Price Formation in Energy and Ancillary Services Markets Operated by Regional Transmission Organizations and Independent System Operators*, Notice, Docket No. AD14-14-000 (June 19, 2014) (Price Formation Notice). Thus, that proceeding does not include even an attempted nexus to bulk power system resilience, whereas in the Proposed Rule and in the proceeding we are newly establishing here, the resilience of the bulk power system is the principal focus. In addition, there is no evidence in other Commission proceedings indicating that any RTO/ISO tariffs are unjust and unreasonable because they do not adequately account for resilience.

<sup>26</sup> As noted above, the Commission typically has approved as just and reasonable cost-of-service rates through out-of-market arrangements in very limited circumstances and when there is a demonstrated reliability need. *See* note 14, *supra*.

<sup>27</sup> For example, the Proposed Rule proposes that RTOs/ISOs pay a cost-of-service rate to a resource that has a 90-day fuel supply on site to enable it to operate during an emergency, extreme weather conditions, or a natural or man-made disaster. However, neither the Proposed Rule nor the record demonstrate why the existence of an on-site 90-day fuel supply is a reasonable basis to find that rate to be just and reasonable and not unduly discriminatory or preferential. In addition, the Proposed Rule does not address the concern that an eligible resource located in a constrained area may not assist with the resilience of the bulk power system to warrant that rate.

<sup>28</sup> To be clear, notwithstanding our ruling under section 206 with regard to the Proposed Rule, if an RTO/ISO were to identify a specific threat to the resilience of its system, we would promptly consider an appropriate proposal from the RTO/ISO to address the issue.

certain resources to be eligible for the rate, thereby excluding other resources that may have resilience attributes.

**C. Initiating a New Proceeding and Establishing Additional Procedures on Resilience**

17. Even though we are terminating Docket No. RM18-1-000, the Commission concluded that it must remain vigilant with respect to resilience challenges. Although the Proposed Rule failed to satisfy the fundamental legal requirements of section 206 of the FPA, the Proposed Rule and the record developed to date have shed additional light on resilience more generally and on the need for further examination by the Commission and market participants of the risks that the bulk power system faces and possible ways to address those risks in the changing electric markets. As the DOE Grid Study documented, we have seen a variety of economic, environmental, and policy drivers that are changing the way electricity is procured and used.<sup>29</sup> These changes present new opportunities and challenges regarding the reliability, affordability, and environmental profile of each region's electric system. These changes may impact the resilience of the bulk power system. As we navigate these changes, the Commission's markets, transmission planning rules, and reliability standards should evolve as needed to address the bulk power system's continued reliability and resilience.<sup>30</sup>

18. Therefore, we are initiating a new proceeding, Docket No. AD18-7-000, to take additional steps to explore resilience issues in the RTOs/ISOs. The goal of this proceeding is: (1) to develop a common understanding among the Commission, industry, and others of what resilience of the bulk power system means and requires; (2) to understand how each RTO and ISO assesses resilience in its geographic footprint; and (3) to use this information to evaluate whether additional Commission action regarding resilience is appropriate at this time. This examination of the resilience of the bulk power system will be a priority of the Commission. Therefore, as described below, we direct each RTO and ISO to submit specific information regarding the resilience of its respective region within 60 days.

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<sup>29</sup> *Staff Report to the Secretary on Electricity Markets and Reliability*, United States Department of Energy (Aug. 2017), available at [https://energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability\\_0.pdf](https://energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability_0.pdf).

<sup>30</sup> On December 14, 2017, NERC issued its 2017 Long-term Reliability Assessment. That assessment reinforces the continuing need for the Commission to be vigilant and to make the resilience of the bulk power system a priority of the Commission.

19. We recognize that the RTOs/ISOs are well-suited to understand the needs of their respective regions and initially assess how to address resilience given their individual geographic needs. Although the Proposed Rule focuses on one possible aspect of grid resilience – secure onsite fuel – we conclude that a proper evaluation of grid resilience should not be limited to that single issue, and should instead encompass a broader consideration of resilience issues, including wholesale electric market rules, planning and coordination, and NERC standards. Indeed, the efforts of RTOs and ISOs on grid resilience encompass a range of activities, including wholesale electric market design, transmission planning, mandatory reliability standards, emergency action plan development, inventory management, and routine system maintenance. However, many of these activities are not unique to RTOs/ISOs and are performed by transmission providers in areas that do not have centralized wholesale electricity markets. Similarly, NERC and the regional entities tasked with implementation of mandatory reliability standards have a critical role to play in this area. Although hearing from the RTOs/ISOs on this topic is an appropriate place to begin, we will provide interested entities an opportunity to submit reply comments on the RTO/ISO submissions within 30 days of the due date of those submissions.<sup>31</sup>

20. We anticipate that the RTO/ISO submissions will explain how they currently address resilience of the bulk power system within their footprints, and will highlight any specific or unique resilience challenges faced by the regions. The submissions also will give the RTOs/ISOs the opportunity to discuss potential paths forward for addressing any identified gaps or exposure on the resilience of the bulk power system.

### **1. A Common Understanding of Resilience**

21. In order to appropriately study the resilience of the bulk power system in the RTO/ISO regions, we think it is appropriate to first achieve a common understanding of what resilience is in the context of the bulk power system.

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<sup>31</sup> Our focus on the RTOs/ISOs should not be understood to mean that we believe that those systems are less resilient than non-RTO/ISO regions. Rather, we conclude that a targeted proceeding focused on those regions is a prudent next step in our consideration of resilience of the bulk power system. We also note that the concept of resilience necessarily involves issues, topics, and questions that extend beyond the Commission's jurisdiction, such as distribution system reliability and modernization. The Commission encourages RTOs/ISOs and other interested entities to engage with state regulators and other stakeholders through Regional State Committees or other venues to address resilience at the distribution level.

22. According to comments on the Proposed Rule, there seems to be a general consensus that grid reliability and grid resilience are related but separate concepts, with the elements of grid reliability being better understood and defined. It also is evident that there is currently no uniform definition of resilience used across the electric industry. For example, the Proposed Rule states that certain natural and man-made disasters threaten the resilience of the grid, but does not set forth a clear definition for resilience. Commenters have cited various definitions of resilience, including from the National Infrastructure Advisory Council,<sup>32</sup> the National Academy of Sciences,<sup>33</sup> Argonne National Laboratory,<sup>34</sup> PJM,<sup>35</sup> and Presidential Policy Directive 21.<sup>36</sup> The Commission notes that commenters generally defined resilience similarly (i.e., as the ability of the bulk power system to withstand or recover from disruptive events).<sup>37</sup>

23. To help guide consideration of issues related to resilience of the bulk power system, the Commission understands resilience to mean:

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<sup>32</sup> National Infrastructure Advisory Council, *A Framework for Establishing Critical Infrastructure Resilience Goals: Final Report and Recommendations by the Council* at 15 (Oct. 2010).

<sup>33</sup> National Academy of Sciences, *Enhancing the Resilience of the Nation's Electricity System*, Washington, DC: National Academies Press (Sept. 2017), available at <https://www.nap.edu/catalog/24836/enhancing-the-resilience-of-the-nations-electricity-system>.

<sup>34</sup> Department of Energy, Argonne National Laboratory, *Front-Line Resilience Perspectives: The Electric Grid*, Executive Summary at xiii (Nov. 2016), available at <https://energy.gov/sites/prod/files/2017/01/f34/Front-Line%20Resilience%20Perspectives%20The%20Electric%20Grid.pdf>.

<sup>35</sup> PJM Interconnection, L.L.C., *PJM's Evolving Resource Mix and System Reliability* n.16 (March 30, 2017), available at <http://www.pjm.com/~media/library/reports-notice/special-reports/20170330-pjms-evolving-resource-mix-and-system-reliability.ashx>.

<sup>36</sup> Michael Moore, Independent Consultant, Comments at 2; Nuclear Energy Institute Comments at 19 (citing Nat'l Archives, Archived Obama White House Website, Presidential Policy Directive 21: Critical Infrastructure Security and Resilience (PPD-21) (Feb. 12, 2013)).

<sup>37</sup> See, e.g., Comments of Utility Workers Union of America, AFL-CIO (UWUA) at 5-6 (citing *PJM's Evolving Resource Mix and System Reliability*); FirstEnergy Initial Comments at 17.

The ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event.<sup>38</sup>

We seek comment from the RTOs and ISOs on our understanding of resilience as described above. We also ask for comments on whether any of the terms used above require further elaboration to ensure a common understanding (e.g., identification of the particular types of disruptive events).

24. Resilience could encompass a range of attributes, characteristics, and services that allow the grid to withstand, adapt to, and recover from both naturally occurring and man-made disruptive events. At the most basic level, ensuring resilience requires that we both (1) determine which risks to the grid we are going to protect against, and (2) identify the steps, if any, needed to ensure those risks are addressed.

## **2. How RTOs/ISOs Assess Threats to Resilience**

25. Next, the Commission seeks comment on how each RTO/ISO currently evaluates the resilience of its system. The Commission recognizes regional differences among the RTOs/ISOs, and appreciates that those differences likely impact how each RTO/ISO approaches resilience in its region. The Commission directs the RTOs/ISOs to address the following questions on this issue and, as needed, to highlight any unique resilience challenges that exist in their respective regions.<sup>39</sup>

(a) What are the primary risks to resilience in your region from both naturally occurring and man-made threats? How do you identify them? Are they short-, mid-, or long-term challenges?

(b) How do you assess the impact and likelihood of resilience risks?

(c) Please explain how you identify and plan for risks associated with high-impact, low-frequency events (e.g., physical and cyber attacks, accidents, extended fuel supply disruptions, or extreme weather events). Please discuss the challenges you face in trying to assess the impact and likelihood of high-impact, low-frequency risks. In addition, please describe what additional information, if any, would be helpful in assessing the impact and likelihood of such risks.

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<sup>38</sup> Generally based on the National Infrastructure Advisory Council's *Critical Infrastructure Resilience Final Report and Recommendations* at 8 (Sept. 8, 2009).

<sup>39</sup> The RTOs/ISOs should not include Critical Energy/Electric Infrastructure Information (CEII) in their submissions.

(d) Should each RTO/ISO be required to identify resilience needs by assessing its portfolio of resources against contingencies that could result in the loss or unavailability of key infrastructure and systems? For example, should RTOs/ISOs identify as a resilience threat the potential for multiple outages that are correlated with each other, such as if a group of generators share a common mode of failure (e.g., , a correlated generator outage event, such as a wide-scale disruption to fuel supply that could result in outages of a greater number of generating facilities)? The RTOs/ISOs should also discuss resilience threats other than through a correlated outage approach. Do RTOs/ISOs currently consider these types of possibilities, and if so, how is this information used?

(e) Identify any studies that have been conducted, are currently in progress, or are planned to be performed in the future to identify the ability of the bulk power system to withstand a high-impact, low-frequency event (e.g., physical and cyber-attacks, accidents, extended fuel supply disruptions, or extreme weather events). Please describe whether any such studies are conducted as part of a periodic review process or conducted on an as-needed basis.<sup>40</sup>

(f) In these studies, what specific events and contingencies are selected, modeled, and assessed? How are these events and contingencies selected?

(g) What criteria (e.g., load loss (MW)), duration of load loss, vulnerability of generator outages, duration of generator outages, etc.) are used in these studies to determine if the bulk power system will reasonably be able to withstand a high-impact, low-frequency event? Are the studies based on probabilistic analyses or deterministic analyses?

(h) Do any studies that you have conducted indicate whether the bulk power system is able to reasonably withstand a high-impact, low frequency event? If so, please describe any actions you have taken or are planning as mitigation, and whether additional actions are needed.

(i) How do you determine whether the threats from severe disturbances, such as those from low probability, high impact events require mitigation? Please describe any approaches or criteria you currently use or otherwise believe are useful in determining whether certain threats require mitigation.

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<sup>40</sup> The Commission is not directing that these studies be included in the RTO/ISO submissions filed in response to this order. Instead, the RTOs/ISOs are required to identify and describe such studies in their submissions.

- (j) How do you evaluate whether further steps are needed to ensure that the system is capable of withstanding or reducing the magnitude of these high-impact, low frequency events?
- (k) What attributes of the bulk power system contribute to resilience? How do you evaluate whether specific components of the bulk power system contribute to system resilience? What component-level characteristic, such as useful life or emergency ratings, support resilience at the system level?
- (l) If applicable, how do you determine the quantity and type of bulk power system physical asset attributes needed to support resilience? Please include, if applicable, what engineering and design requirements, and equipment standards you currently have in place to support resilience? Are those engineering and design requirements designed to address high-impact, low-frequency events? Do these requirements change by location or other factors?
- (m) To what extent do you consider whether specific challenges to resilience, such as extreme weather, drought, and physical or cyber threats, affect various generation technologies differently? If applicable, please explain how the different generation technologies used in your system perform in the face of these challenges.
- (n) To what extent are the challenges to the resilience of the bulk power system associated with the transmission system or distribution systems, rather than electric generation, and what could be done to further protect the transmission system from these challenges?
- (o) Over what time horizon should the resilience assessments discussed above be conducted, and how frequently should RTOs/ISOs conduct such an analysis? How could these studies inform planning or operations?
- (p) How do you coordinate with other RTOs/ISOs, Planning Coordinators, and other relevant stakeholders to identify potential resilience threats and mitigation needs?
- (q) Are there obstacles to obtaining the information necessary to assess threats to resilience? Is there a role for the Commission in addressing those obstacles?
- (r) Have you performed after-the-fact analyses of any high-impact, low-frequency events experienced in the past on your system? If so, please describe any recommendations in your analyses and whether they have or have not been implemented.

- (s) Please provide any other information that you believe the Commission would find helpful in its evaluation of the resilience of the RTO/ISO systems.

### **3. How RTOs/ISOs Mitigate Threats to Resilience**

26. Once an RTO/ISO identifies a particular need or threat to resilience, there could be various ways to mitigate such risk. For example, RTO and ISO resource adequacy programs require reserve margins necessary to ensure adequate generation capacity to meet peak load conditions throughout the year. Further, RTO and ISO day-ahead and real-time markets generally secure and operate the transmission system assuming the loss of the largest vulnerable element at any given time. RTOs/ISOs may take additional actions to address concerns beyond the largest vulnerable element, such as procuring additional operating reserves. In 2014, for example, PJM implemented shortage pricing for operating reserves procured to respond to risks that could reasonably materialize and for which PJM's normal reserve procurement processes would not otherwise account.<sup>41</sup> Further, all RTOs/ISOs have a residual unit commitment process to address regionally identified reliability considerations.<sup>42</sup> Finally, resources that provide ancillary services, such as those with black-start capability, help ensure recovery from power-loss events without the need for auxiliary power from the grid.

27. In the submissions, we seek comment on how RTOs/ISOs evaluate options to mitigate any risks to grid resilience. We direct the RTOs/ISOs to answer the following questions on this topic:

- (a) Describe any existing operational policies or procedures you have in place to address specific identified threats to bulk power system resilience within your region. Identify each resilience threat (e.g., the potential for correlated generator outage events) and any operational policies and procedures to address the threat. Describe how these policies or procedures were developed in order to ensure their effectiveness in mitigating the identified risks and also describe any historical circumstances where you implemented these policies or procedures.
- (b) How do existing market-based mechanisms (e.g., capacity markets, scarcity pricing, or ancillary services) currently address these risks and support resilience?

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<sup>41</sup> *PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,017 (2014).

<sup>42</sup> *Staff Analysis of Operator-Initiated Commitments in RTO and ISO Markets*, Docket No. AD14-14-000 at 10-14 (Dec. 2014), available at <https://www.ferc.gov/legal/staff-reports/2014/AD14-14-operator-actions.pdf>.



(c) Are there other generation or transmission services that support resilience? If yes, please describe the service, how it supports resilience, and how it is procured.

(d) How do existing operating procedures, reliability standards (e.g., N-1 NERC TPL contingencies), and RTO/ISO planning processes (e.g., resource adequacy programs or regional transmission planning) currently consider and address resilience?

(e) Are there any market-based constructs, operating procedures, NERC reliability standards, or planning processes that should be modified to better address resilience? If so, please describe the potential modifications.

#### **D. Conclusion**

28. Promoting the resilience of the bulk power system is an important issue for the Commission. Each RTO/ISO should take a proactive stance on addressing and ensuring resilience. We are encouraged by efforts underway in PJM<sup>43</sup> and ISO-NE<sup>44</sup> to better understand vulnerabilities in their systems, and support similar efforts in other regions where analyses of potential resilience issues could be helpful. We also are encouraged by the ongoing work in MISO<sup>45</sup> to develop a long-term plan to address changing system needs in light of an evolving resource mix. At the heart of each of these initiatives is collaboration between RTOs/ISOs and their stakeholders, and we look forward to receiving stakeholder input on the submissions. As noted above, the topic of the new proceeding - resilience of the bulk power system - will remain a priority of the Commission and we expect to review the additional material and promptly decide whether additional Commission action on this issue is warranted.

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<sup>43</sup> See *PJM's Evolving Resource Mix and System Reliability* *supra* note 35.

<sup>44</sup> See ISO-NE Initial Comments at 7 (“[T]he ISO has an upcoming process planned to quantify risks related to fuel security.”).

<sup>45</sup> See MISO Initial Comments at 8 (“MISO values discrete reliability attributes for generation resources through proven market-based mechanisms and continues to work with stakeholders on further market-based reliability improvements. Through its Market Roadmap, MISO is exploring several such initiatives...”).

The Commission orders:

(A) The RTOs/ISOs are hereby directed to provide responses to the Commission, as discussed in the body of this order, within 60 days of the date of this order. Interested entities may submit reply comments within 30 days of the due date of the RTO/ISO submissions.

(B) The proceeding in Docket No. RM18-1-000 is hereby terminated, as discussed in the body of this order.

By the Commission. Commissioners LaFleur, Chatterjee, and Glick are concurring with separate statements attached.

( S E A L )

Kimberly D. Bose,  
Secretary.

UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Grid Reliability and Resilience Pricing

Docket Nos. RM18-1-000

Grid Resilience in Regional Transmission Organizations  
and Independent System Operators

AD18-7-000

(Issued January 8, 2018)

LaFLEUR, Commissioner *concurring*:

Since I have been at the Commission, the reliability of the nation's electric system in serving customers has been my top priority. In my view, resilience — the ability to withstand or recover from disruptive events and keep serving customers — is unquestionably an element of reliability. Indeed, I believe it has already informed much of the Commission's work on both market rules and reliability standards.<sup>1</sup> As part of our continued work in this area, I support the Commission's action today to start a focused proceeding to explore how the RTOs/ISOs address the resilience of the grid in their respective regions, and whether there are additional steps the Commission should take to support resilience.

I also strongly support the decision not to adopt the rule proposed by the Secretary of Energy.<sup>2</sup> As explained below, as well as in Commissioner Glick's separate statement, I do not think the record demonstrates the need for the Proposed Rule to support resilience. Further, even had a resilience issue been demonstrated, I have serious concerns about the nature of the proposed remedy, which would address the issue not through market rules but through out-of-market payments to certain designated resources.

I write separately to expand on the larger context surrounding the issues in this docket, and how I believe the Commission should approach them going forward.

While the challenge of providing reliable energy is constant, the nature of the challenge has necessarily changed as the resources, infrastructure, and commercial and regulatory structures relied upon to meet that challenge have evolved. Even before the harnessing of electricity, the history of energy in this country has been one of continual

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<sup>1</sup> See *Grid Reliability and Resilience Pricing*, 162 FERC ¶ 61,012, at P 12 (2018).

<sup>2</sup> Proposed Rule on Grid Reliability and Resilience Pricing, Docket No. RM18-1-000 (2017) (Proposed Rule). The full text of the Proposed Rule can be found at: <https://energy.gov/downloads/notice-proposed-rulemaking-grid-resiliency-pricing-rule>.

change and progress. We have moved from reliance on wood and local waterworks in the 19<sup>th</sup> century to the development of coal-fired steam generators and large-scale hydro in the first half of the 20<sup>th</sup> century. The mid-20<sup>th</sup> century saw the commercialization of nuclear generation, followed later in the century by the large-scale introduction of combined cycle gas generation and early-stage non-hydro renewables.

None of these changes in where the nation gets its energy were driven by this Commission or its predecessors. However, the Commission has played a role in adapting to technological change, ensuring that rates remained just and reasonable and customers were served reliably through successive generations and technological changes. Thus, in the late 20<sup>th</sup> century, responding to customer demands for access to new technologies and new generation choices, FERC oversaw the introduction of competitive wholesale power markets, which have continued to spread over the past 20 years to cover more than two-thirds of the nation's population. I am a strong supporter of competitive markets, which benefit customers by reducing costs, improving efficiency and innovation, and strengthening reliability by deploying resources over a broader footprint.

In the 21<sup>st</sup> century, against the backdrop of wholesale markets, the pace of technological change in energy has accelerated, resulting in a rapid transformation of the nation's resource mix. This has been driven by (1) the growth in the availability and affordability of domestic natural gas and its increased use for electric generation, (2) the rapid development and deployment of wind, solar, storage, and demand-side technologies, both central and distributed, and (3) a changing understanding of the environmental consequences of energy use, especially climate change, driving state and federal policy and customer choices.

With these new technologies have come changes in the location and operation of energy resources, their cost patterns, and the way grid operators plan their systems and deploy resources to keep the lights on. As with all transitions, there have been market winners and losers as new technologies have brought competitive pressures to bear on existing resources. Resource turnover is a natural consequence of markets, and the reduced prices that result from greater competition are a benefit to customers, not a problem to solve, unless reliability is compromised. Keeping up with these changes by ensuring that market tariffs and reliability standards sustain both reliability and just and reasonable rates in a time of changing resources has been a major focus of the Commission, and must continue to be.

As the recent Department of Energy grid study<sup>3</sup> and numerous analyses by

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<sup>3</sup> *Staff Report to the Secretary on Electricity Markets and Reliability*, United States Department of Energy (August 2017), available at <https://energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%2>

NERC<sup>4</sup> have noted, the transformation of the resource mix to date has been accomplished without compromising reliability.<sup>5</sup> However, ensuring that this continues to be the case requires continued diligence, and the inquiry we begin in this docket will support that ongoing effort.

Where the Commission has seen evidence of the need for greater system resilience in a changing resource mix, it has acted to ensure that such resilience was provided. It has generally done so by overseeing changes to market design (defining needed resource performance, and using competition to obtain it),<sup>6</sup> interconnection agreements or other tariffs (requiring that certain essential reliability services be provided),<sup>7</sup> or mandatory reliability standards.<sup>8</sup> In each case, the Commission has recognized a customer need,

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[OMarkets%20and%20Reliability\\_0.pdf.](#)

<sup>4</sup> *E.g.*, 2017 Long-term Reliability Assessment, North American Electric Reliability Corporation (December 2017), available at [http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC\\_LTRA\\_12132017\\_Final.pdf](http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_12132017_Final.pdf).

<sup>5</sup> Indeed, as Commissioner Glick correctly notes in his concurrence, new resource additions have in some ways strengthened the resilience of the power system. For example, notwithstanding alleged concerns by some about the loss of fuel diversity, the resource mix in many regions of the country (such as that served by PJM Interconnection, L.L.C.) is more diverse than ever before as new technologies and resources are introduced.

<sup>6</sup> *E.g.*, *PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,208 (2015), *reh'g denied*, 155 FERC ¶ 61,157 (2016), *aff'd sub nom. Advanced Energy Mgmt. All. v. FERC*, 860 F.3d 656 (D.C. Cir. 2017) (approving market changes to compensate performance at times of system stress); *ISO New England Inc. and New England Pwr. Pool*, 147 FERC ¶ 61,172 (2014), *reh'g denied*, 153 FERC ¶ 61,223 (2015), *appeal pending sub nom. New England Power Generators Ass'n v. FERC*, No. 16-1023 (D.C. Cir. filed Jan. 19, 2016) (same); *Cal. Indep. Sys. Operator Corp.*, 156 FERC ¶ 61,226 (2016) (approving ramping products to complement increased variability and uncertainty); *Midcontinent Indep. Sys. Operator, Inc.*, 149 FERC ¶ 61,095 (2014) (same).

<sup>7</sup> *E.g.*, *Reactive Power Requirements for Non-Synchronous Generation*, Order No. 827, 81 Fed. Reg. 40,793 (June 23, 2016), FERC Stats. & Regs. ¶ 31,385 (2016); *Requirements for Frequency and Voltage Ride Through Capability of Small Generating Facilities*, Order No. 828, 81 Fed. Reg. 50,290 (Aug. 1, 2016), 156 FERC ¶ 61,062 (2016).

<sup>8</sup> *E.g.*, *Frequency Response and Frequency Bias Setting Reliability Standard*,

relied upon evidence to define it in a fuel-neutral way, and either allowed the market to transparently price it or established broad requirements to ensure that a needed service is provided. If the record that develops in this docket similarly demonstrates unmet resilience needs, I believe that the Commission should take a comparable approach.

Indeed, this preferred approach highlights one of my key objections to the Proposed Rule, which did not make a factual showing of a defined resilience need or allow a market or standards-based solution to solve that need. Rather, it presumed a resilience need and proposed a far-reaching out-of-market approach to “solve” it. This proposed remedy, which simply designated resources for support rather than determining what services needed to be provided, would be highly damaging to the ability of the market to meet customer needs—including any demonstrated resilience needs—fairly, efficiently, and transparently. In effect, it sought to freeze yesterday’s resources in place indefinitely, rather than adapting resilience to the resources that the market is selecting today or toward which it is trending in the future.

I believe the Commission should continue to focus its efforts not on slowing the transition from the past but on easing the transition to the future. We must continue to guide grid operators in sustaining reliability and resilience within a system that is likely to be cleaner, more dynamic, in some instances more distributed, and deployed by an efficient market for the benefit of customers. In this way, we can help the grid adapt to the transformations of the present, and best position the grid for the unknown future transformations that the history of our industry suggests are inevitable. For these reasons, I respectfully concur.

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Cheryl A. LaFleur  
Commissioner

UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Grid Reliability and Resilience Pricing

Docket Nos. RM18-1-000

Grid Resilience in Regional Transmission  
Organizations and Independent System Operators

AD18-7-000

(Issued January 8, 2018)

CHATTERJEE, Commissioner, *concurring*:

I concur in this order with the expectation that it is only the first step in a more systematic effort by the Commission, over both the near and long term, to ensure the resilience of the nation's bulk power system. The success of this effort will require the Commission's continued vigilance and willingness to take, within the bounds of its statutory authority, prompt, proactive, and decisive measures to safeguard resilience.

I applaud Secretary Perry's bold leadership in jump-starting a national conversation on this urgent challenge. Given the importance of the bulk power system to our nation's security, economic stability, and public health and safety, we must ensure its resilience amidst tremendous changes in our generation resource mix. My goal throughout this proceeding has been to ensure that we do not later come to regret failing to ask the difficult questions. I believe that the order we are issuing today is a positive step toward that goal. I look forward to receiving responses to the questions posed to the RTOs/ISOs, and comments from interested entities.

Nevertheless, I must voice my concerns regarding bulk power system resilience in the interim period prior to the conclusion of the proceeding we initiate today. Major regulatory reform efforts often can take several years to complete. But I believe that the record compiled in this proceeding speaks to the prudence of considering, as soon as practicable, whether interim measures may be needed to avoid near-term bulk power system resilience challenges that could result from the rapid, unprecedented changes in our generation resource mix.

The scale and pace of those changes are staggering. Between 2014 and 2015 alone, the U.S. added approximately 15,800 megawatts (MW) of natural gas, 13,000 MW of wind, 6,200 MW of utility scale solar photovoltaic, and 3,600 MW of distributed solar photovoltaic generating capacity.<sup>1</sup> Meanwhile, nearly 42,000 MW of synchronous

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<sup>1</sup> U.S. Energy Information Administration, Electricity, *available at*

generating capacity (e.g., coal, nuclear, and natural gas) retired between 2011 and 2014, with an additional seven nuclear units (representing 10,500 MW of nameplate capacity) planning retirement by 2025.<sup>2</sup> Commenters express an expectation that those trends will continue in the years ahead, with many nuclear and coal units particularly at risk of economic retirement despite their significant contribution to bulk power system resilience.<sup>3</sup>

The changing generation resource mix underscores the need to consider whether near-term measures are warranted notwithstanding the actions the Commission has taken in recent years that are outlined in today's order. Specifically, current RTO/ISO market design mechanisms are intended to incent generation resource owners to manage the fuel supply risks they can control -- not the spectrum of fuel supply risks beyond their control.<sup>4</sup> The record clearly suggests that the latter class of risks are increasingly significant due to shifts in the generation mix and the fast-evolving national security threat environment.<sup>5</sup> Neither current RTO/ISO tariffs nor the NERC Reliability

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<https://www.eia.gov/electricity/annual/backissues.html>.

<sup>2</sup> *Id.*; NERC Comments, Docket No. RM18-1-000, at 4-5 (filed Oct. 23, 2017).

<sup>3</sup> *See, e.g.*, Reply Comments of Peabody Energy Corporation, Docket No. RM18-1-000, at 10 (filed Nov. 7, 2017); Reply Comments of the Nuclear Energy Institute, Docket No. RM18-1-000, at 6-11 (filed Nov. 7, 2017); *see also* NERC Comments at 4-6 (noting the resilience contributions of coal and nuclear generation's dependable capacity, inertia and voltage control services, and fuel security).

<sup>4</sup> The Commission has approved market constructs providing financial incentives for resource owners to procure firm fuel arrangements either through firm pipeline capacity or dual fuel capability. *See, e.g., ISO New England Inc.*, 147 FERC ¶ 61,172, at P 36 (2014) (endorsing pay-for-performance program); *PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,208, at P 22 (2015) (approving PJM's capacity performance construct). *See also Wholesale Competition in Regions with Organized Electric Markets*, Order No. 719, FERC Stats. & Regs. ¶ 31,281 (2008), *order on reh'g*, Order No. 719-A, FERC Stats. & Regs. ¶ 31,292 (2009), *order on reh'g*, Order No. 719-B, 129 FERC ¶ 61,252 (2009) (requiring RTO/ISO scarcity pricing that incents firm fuel arrangements). But generation resource owners relying on fuels delivered "just-in-time" from offsite supplies are not capable of managing risks to (1) the infrastructure that transports these fuels (e.g., pipelines); and (2) the infrastructure that supplies these fuels (e.g., natural gas wellheads).

<sup>5</sup> *See, e.g.*, Exelon Corporation Comments, Docket No. RM18-1-000, Stockton Test. at 5-6, 13 (filed Oct. 23, 2017); *see also* Congressional Research Service, Pipeline Cybersecurity: Federal Policy (Apr. 19, 2016).



Standards require RTOs/ISOs to assess these fuel supply risks or other significant resilience risks and mitigate their potentially significant impact on the bulk-power system. This suggests that existing RTO/ISO tariffs may be unjust and unreasonable insofar as they may not adequately compensate resources for their contributions to bulk power system resilience.

Consequently, I believe it would have been prudent, in addition to establishing the proceeding in Docket No. AD18-7-000, for the Commission to issue an order to show cause pursuant to section 206 of the Federal Power Act directing each RTO/ISO to either (1) submit tariff revisions to provide interim compensation for existing generation resources that may provide necessary resilience attributes and are at risk of retirement before the conclusion of the proceeding established today or (2) show cause why it should not be required to do so.

Given the nascence of the Commission's effort to more systematically examine resilience, I believe that it would have been appropriate to provide the RTOs/ISOs with latitude in determining the implementation of any interim measures needed. In particular, I would have allowed RTOs/ISOs to define which resources provide necessary resilience attributes and are at risk of retirement before the conclusion of the proceeding initiated in Docket No. AD18-7-000. Because of their detailed knowledge of their own systems, the RTOs/ISOs are well-positioned to understand the specific resilience risks in their footprints, to identify the resilience attributes that would most effectively mitigate those risks, and to tailor appropriate tariff mechanisms to meet their needs. Such an approach would have struck an appropriate balance to remedy any potentially unjust and unreasonable compensation practices while minimizing the impact on consumers and markets as the Commission considered longer-term reforms. In addition, such an approach also would have reduced the probability of retirement of resources which subsequently were determined to be the most cost-effective means of providing necessary resilience attributes.

The Commission previously has stressed its preference for market-based mechanisms as a means to ensure just and reasonable rates in jurisdictional organized markets. I share this preference for market-based solutions and would have urged RTOs/ISOs to identify market mechanisms to address these concerns. However, the Commission also has recognized that interim, out-of-market solutions might be appropriate in certain circumstances.<sup>6</sup> Accordingly, I would have required that tariff

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<sup>6</sup> See *ISO New England Inc.*, 144 FERC ¶ 61,204 at P 21 (accepting ISO-NE tariff provisions to provide for short-term out-of-market payments to resources to ensure reliability in the 2013-2014 winter period); see also *N.Y. Indep. Sys. Operator, Inc.*, 150 FERC ¶ 61,116 at P 2 (“While the Commission has repeatedly stated that our jurisdictional markets should utilize market mechanisms to ensure that the resulting rates are just and reasonable, the Commission has also recognized that short-term remedies,

revisions proposed by the RTOs/ISOs endeavor to minimize the effect on the wholesale markets (in particular the energy markets). To this end, I would have stated an expectation that each RTO/ISO develop any out-of-market mechanisms only as a last resort.

As I explained consistently over the past few months, it was my goal that any effort with respect to an interim step would be legally defensible, would not distort markets, and would address the issues Secretary Perry raised. I believe an order as discussed above would have met that goal. And while I would have preferred such an order, I am nevertheless encouraged by today's order, which represents a positive step forward in addressing these critical issues.

For these reasons, I respectfully concur.

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Neil Chatterjee, Commissioner

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such as RMR agreements, may be appropriate in certain circumstances to address an immediate problem at hand.”).

UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Grid Reliability and Resilience Pricing

Docket Nos. RM18-1-000

Grid Resilience in Regional Transmission Organizations  
and Independent System Operators

AD18-7-000

(Issued January 8, 2018)

GLICK, Commissioner, *concurring*:

I fully support the Commission's action today to initiate a new proceeding examining the resilience of the bulk power system. I commend the Chairman for his leadership in guiding the Commission as it addresses this difficult, but important issue. I also support the Commission's decision to terminate Docket No. RM18-1-000, which addressed the Proposed Rule on Grid Reliability and Resilience Pricing (Proposed Rule) submitted to the Commission by the Secretary of the Department of Energy. The Proposed Rule had little, if anything, to do with resilience, and was instead aimed at subsidizing certain uncompetitive electric generation technologies. As my colleague Commissioner LaFleur explains, it is important to consider the resilience of the bulk power system in a larger context that accounts for the changing electricity industry rather than seeking to preserve the *status quo*.

I write separately to explain my rationale for concluding that the Proposed Rule is inconsistent with the Commission's statutory responsibilities. Although the Department had the authority under Section 403 of the Department of Energy Organization Act<sup>1</sup> to submit the Proposed Rule, the Commission could adopt the proposal only if it met the requirements of section 206<sup>2</sup> of the Federal Power Act. The Proposed Rule fails to meet that standard.

As today's order recognizes, the record in this proceeding—as well as the other proceedings referenced by the Department<sup>3</sup>—does not support the Department's

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<sup>1</sup> 42 U.S.C. § 7173 (2012).

<sup>2</sup> 16 U.S.C. § 824e (2012).

<sup>3</sup> *Grid Resiliency Pricing Rule*, 82 Fed. Reg. 46,940, 46,944-45 (2017).

contention that the tariffs of certain RTOs and ISOs are unjust and unreasonable or unduly discriminatory or preferential. The Department's own staff Grid Study concluded that changes in the generation mix, including the retirement of coal and nuclear generators, have not diminished the grid's reliability or otherwise posed a significant and immediate threat to the resilience of the electric grid.<sup>4</sup> To the contrary, the addition of a diverse array of generation resources, including natural gas, solar, wind, and geothermal, as well as maturing technologies, such as energy storage, distributed generation, and demand response, have in many respects contributed to the resilience of the bulk power system. The record in this proceeding does not demonstrate any need for the Commission to interfere with the continued evolution of the bulk power system.

Nor does the record support the Department's proposed remedy: A multi-billion dollar bailout targeted at coal and nuclear generating facilities.<sup>5</sup> There is no evidence in the record to suggest that temporarily delaying the retirement of uncompetitive coal and nuclear generators would meaningfully improve the resilience of the grid. Rather, the record demonstrates that, if a threat to grid resilience exists, the threat lies mostly with the transmission and distribution systems, where virtually all significant disruptions occur.<sup>6</sup> It is, after all, those systems that have faced the most significant challenges during extreme weather events.

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<sup>4</sup> *Staff Report to the Secretary on Electricity Markets and Reliability*, United States Department of Energy at 63, 100 (Aug. 2017), *available at* [https://energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability\\_0.pdf](https://energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability_0.pdf) (Department of Energy Grid Study).

<sup>5</sup> See, e.g., PJM Independent Market Monitor Comments at 5 (estimating that the Proposed Rule would have cost consumers in PJM an additional \$30 billion in 2015 and \$32 billion in 2016); Joint Industry Commenters, Attachment A at 2, 32 (Battle Group report estimating that the Proposed Rule would result in \$3.7 billion to \$11.2 billion in out-of-market payments annually in PJM, ISO-NE, and NYISO); see also Electricity Consumers Resource Council Reply Comments at 11-15 (summarizing cost estimates submitted to the record, all of which estimated that the Proposed Rule would cost consumers billions of dollars).

<sup>6</sup> See Joint Industry Commenters at 3 (citing a Rhodium Group study showing that "0.00007% of customer-hours lost to outage were caused by fuel supply emergencies between 2012-2016," a period that included the 2014 Polar Vortex); Department of Energy, Quadrennial Energy Review, Second Installment at 4-2 (2017) *available at* <https://energy.gov/sites/prod/files/2017/02/f34/Chapter%20IV--Ensuring%20Electricity%20System%20Reliability%2C%20Security%2C%20and%20Resilience.pdf> ("Electricity outages disproportionately stem from disruptions on the

In addition, coal and nuclear generators face resilience challenges of their own. As has been well-documented, many coal and nuclear plants with significant on-site fuel supplies have failed to function during extreme weather events because those fuel supplies froze, flooded, or were otherwise unavailable.<sup>7</sup> In fact, initial reports indicate that coal-fired facilities accounted for nearly half of all forced outages in PJM during last week's period of extreme temperatures. Similarly, during the same period, the Pilgrim Nuclear Power Station was manually removed from service complicating efforts to serve load within ISO-NE. And, even when fully operational, many coal and nuclear generators are incapable of providing all the NERC-defined essential reliability services.<sup>8</sup> It is perhaps for that reason that the Department's Grid Study recommended pursuing "wholesale market and product designs that recognize and complement resource diversity by compensating providers for the value of [essential reliability services] on a *technology-neutral* basis."<sup>9</sup>

Finally, I am sympathetic to the plight of coal miners, who have been disproportionately affected as coal's share of the generation mix has declined. These men and women went to work every day, at considerable risk to their health and safety, to supply coal when it was needed most. Many of those same considerations extend to individuals employed at recently or soon-to-be decommissioned nuclear power plants.

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distribution system (over 90 percent of electric power interruptions), both in terms of the duration and frequency of outages. . . . Damage to the transmission system, while infrequent, can result in more widespread major power outages that affect large numbers of customers with significant economic consequences.").

<sup>7</sup> For example, more than 15 gigawatts of coal and nuclear capacity were forced offline during the 2014 Polar Vortex as temperatures fell below those plants' operating thresholds. Electric Power Supply Association Comments, Attachment A at 17. Similarly, nuclear facilities lying in the path of hurricanes are routinely taken offline as a precaution and not returned to service until after the threat has passed.

<sup>8</sup> Department of Energy Grid Study at 71-72 (citing Joseph H. Eto *et al.*, Lawrence Berkeley National Laboratory, Use of Frequency Response Metrics to Assess the Planning and Operating Requirements for Reliable Integration of Variable Renewable Generation (2010), *available at* <https://www.ferc.gov/industries/electric/indus-act/reliability/frequencyresponsemetrics-report.pdf>). The cited report explains that when nuclear plants and large coal plants are operated at maximum output, as they frequently are, they will be incapable of providing primary frequency response, one of the essential reliability services identified by NERC.

<sup>9</sup> Department of Energy Grid Study at 100 (emphasis added).

We have a history in this country of helping those who, through no fault of their own, have been adversely affected by technological and market change. But that is the responsibility of Congress and the state legislatures. It is not a role that the Federal Power Act provides to the Commission.

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I agree with the Commission's decision to initiate a comprehensive examination of the resilience of the bulk power system in the form of today's order. Utilities face diverse challenges, including the threat of cyber or physical attacks and natural disasters, such as the extreme weather events that are occurring more frequently as a result of climate change. It is not without irony that the Department's Proposed Rule would exacerbate the intensity and frequency of these extreme weather events by helping to forestall the retirement of coal-fired generators, which emit significant quantities of greenhouse gases that contribute to anthropogenic climate change.<sup>10</sup> I encourage the RTOs and ISOs to use this opportunity to undertake a serious review of these challenges along with other concerns regarding the resilience of their system.

In addition, RTOs and ISOs should consider how best to mitigate these challenges *within* their markets and *without* prejudging what technology or fuel-type provides the best solution. In particular, I urge them to consider carefully the Commission's questions regarding how different generation technologies—both traditional technologies and newer, less widespread technologies—perform when faced with extreme weather, including droughts. I also believe that it is important to consider the advantages that newer technologies, such as distributed energy resources, energy storage, and micro-grids, may offer in addressing resilience challenges to the bulk power system. Similarly, I urge the RTOs and ISOs to consider carefully the Commission's question regarding the extent to which resilience challenges are associated with the transmission system or distribution systems, rather than electric generation. As I noted, the transmission and distribution systems have historically been the principal cause of virtually all significant disruptions and are, therefore, an important element of any examination into the resilience of the bulk power system. Finally, I agree with the Commission that is important to explore the concept of correlated outages and, in particular, the extent to

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<sup>10</sup> A research paper submitted to the record by Resources for the Future estimates that adopting the Proposed Rule would result in an additional 53 million tons of CO<sub>2</sub> emissions by 2045. Resources for the Future also estimates that the Proposed Rule would cause 27,000 premature deaths by 2045 by increasing the emissions of other air pollutants (NO<sub>x</sub> and SO<sub>x</sub>). *See* Daniel Shawhan and Paul Picciano, Resources for the Future, Costs and Benefits of Saving Unprofitable Generators: A Simulation Case Study for US Coal and Nuclear Power Plants at 11 (Nov. 2017).

which the cyber and physical security of natural gas pipelines threatens the resilience of the bulk power system and how the Commission should address this issue.

In conclusion, I am confident that the Commission will approach this new examination into the resilience of the bulk power system in the same manner it considers all other matters—with a non-partisan perspective and with a view solely on what the facts provide and the law requires. If the RTOs and ISOs demonstrate that the resilience of the bulk power system is threatened we should act. If not, we should move on.

For these reasons, I respectfully concur.

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Richard Glick  
Commissioner