UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Grid Resilience in Regional Transmission Organizations and Independent System Operators	**)** **)** **)**	**Docket No. AD18-7-000**

REPLY COMMENTS OF ADVANCED ENERGY MANAGEMENT ALLIANCE REGARDING NOTICE OF PROPOSED RULEMAKING ON GRID RELIABILITY AND RESILIENCE PRICING

The Advanced Energy Management Alliance ("AEMA")[1] hereby submits its reply comments and responses ("Comments") to the resilience issues and inquiries identified in the Federal Energy Regulatory Commission's ("Commission" or "FERC") Order Terminating Rulemaking Proceeding, Initiating New Proceeding, and Establishing Additional Procedures issued on January 8, 2018.[2]

AEMA is a trade association under Section 501(c)(6) of the Federal tax code whose members include national distributed energy resource companies and advanced energy management service and technology providers, including some of the nation's largest demand response ("DR") and distributed energy resource ("DER") providers. AEMA members develop and deploy resources focused on resilience at the customer level that have simultaneous grid resilience benefits. AEMA members strongly support continued efforts to monitor and reinforce the resilience of the Bulk Electric System ("BES"), in particular taking advantage of the improvements in resilience advanced energy management solutions afford. AEMA supports

[1] Advanced Energy Management Alliance website: http://aem-alliance.org.
[2] *Grid Resilience in Reg'l Transmission Orgs. and Indep. Sys. Operators*, 162 FERC ¶ 61,012 (2018) (providing for reply comments within thirty days of the RTO/ISO submission).
[3] Fuel Security Initiative available: http://www.pjm.com/-/media/library/reports-notices/special-
[2] *Grid Resilience in Reg'l Transmission Orgs. and Indep. Sys. Operators*, 162 FERC ¶ 61,012 (2018) (providing for reply comments within thirty days of the RTO/ISO submission).

much of the work accomplished by the Independent System Operators ("ISOs") and Regional Transmission Organizations ("RTOs"), both completed and ongoing, and believes that regional approaches to ensuring resilience is the correct course of action. However, AEMA recommends the Commission not use the objective of reinforcing resilience of the BES to justify market rule changes not actually tied to resilience. AEMA supports ongoing RTO focus and stakeholder work in the area of resilience, some of which is highlighted below, but does not believe a record has been developed that provides just and reasonable grounds to require any additional market rule changes in the pursuit of resilience at this time. This filing represents the collective consensus of AEMA as an organization, although it does not necessarily represent the individual positions of the full diversity of AEMA member companies.

I. Executive Summary

In these Comments, AEMA highlights that all of the RTOs have made, and continue to make, strides in many aspects of resilience for the BES. Multiple active discussions and dockets are already functionally addressing areas needed to reinforce resilience. These efforts should be allowed to proceed without the Commission ordering immediate changes, other than perhaps reporting updates on how these efforts will impact resilience. Some of these proceedings include: PJM Interconnection's ("PJM") Fuel Security Initiative announced April 30, 2018;[3] implementation of Order 841;[4] implementation of Order 842;[5] and, integration of DERs in the

[3] Fuel Security Initiative available: http://www.pjm.com/-/media/library/reports-notices/special-reports/2018/20180430-valuing-fuel-security.ashx

[4] *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Final Rule,18 CFR Part 35 (February 15, 2018), 162 FERC ¶ 61,127 (2018). Docket Nos. RM16-23-000; AD16-20-000. Available: https://www.ferc.gov/whats-new/comm-meet/2018/021518/E-1.pdf

[5] *Essential Reliability Services and the Evolving Bulk-Power System—Primary Frequency Response*, Final Rule, 18 CFR Part 35 (February 15, 2018), 162 FERC ¶ 61,128 (2018), Docket No. RM16-6-000. Available: https://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=14823757

wholesale market and improved coordination with the States.[6] DERs are becoming increasingly integral to the resilience of the BES; successful action under Docket AD18-10-000 will provide increased resilience benefits to the system that can supplement improvements made in any other areas for protecting life and public safety during high impact, low frequency events.

In addition, AEMA discusses herein our position that the Commission should not direct or require any energy or ancillary market reforms with secondary resilience benefits under this Docket, including, but not limited to, energy market price formation, shortage pricing rules, and Operating Reserves changes referenced and under consideration at PJM.[7] Any ISO/RTO that believes changes to their existing rules are necessary must follow required procedures and protocols to satisfy the standards of justness and reasonableness of a 205 or 206 FERC filing after proper stakeholder consideration.

Finally, AEMA recommends that the Commission seek specific input on the value of DERs toward resilience. AEMA appreciates the successful Technical Conference on Distributed Energy Resources in April and the Commission's continuing initiative to ensure that markets are fairly valuing DERs. The Commission could seek additional input through hosting a technical conference and soliciting input on the value of DERs toward resilience.

II. Comments

AEMA agrees with the Commission's statement, "we must remain vigilant with respect to resilience challenges, because affordable and reliable electricity is vital to the country's economic and national security."[8] That vigilance drives the members of AEMA to work toward development and deployment of distributed and advanced energy solutions at the customer level

[6] FERC Docket AD18-10-000 available: https://www.ferc.gov/CalendarFiles/20180108161614-RM18-1-000.pdf
[7] PJM Filing Available: http://pjm.com/-/media/documents/ferc/filings/2018/20180309-ad18-7-000.ashx
[8] Grid Resilience in Regional Transmission Organizations and Independent System Operators, 162 FERC ¶ 61,012 (2018), Docket No. AD18-7-000, P 1. Available: https://www.ferc.gov/CalendarFiles/20180108161614-RM18-1-000.pdf, paragraph 1.

on a daily basis. As highlighted by real world examples discussed herein, distributed and demand side resources have played, and will continue to play, an increasing role in reinforcing the reliability and resilience of the BES. As such, AEMA appreciates the Commission's responsiveness to comments from many organizations, including AEMA, to move the discussion of resilience to this new proceeding that allows for regional discussions of well structured, effective, documented, and cost efficient solutions addressing the resilience of the BES. This allows for the important step of stakeholder discussions to address the matter of resilience through what FERC describes as "the heart of each of these initiatives," specifically the "collaboration between RTOs/ISOs and their stakeholders."[9] Specific areas of reform, or requests for directives to develop certain reforms, proposed under this docket have not had the benefit of this collaboration, and as such should not be ordered under this docket.

Additionally, the key component of the stakeholder initiatives referenced here by FERC is the link to resilience. As highlighted by most RTOs, there is a distinction between reliability and resilience. While certainly overlapping, solutions for each should not be improperly conflated, potentially causing unreasonably high costs and inefficient market rules. For example, AEMA has argued elsewhere[10] that PJM's Capacity Performance rules attempt to address resilience concerns in a reliability construct, resulting in unjust costs and exclusion of some capacity resources. It is for this reason, as discussed in more detail below, AEMA has concerns about proposals prematurely submitted to the Commission in this docket under the name of resilience, without proper consideration of, or evidence demonstrating, the need for such changes.

[9] Ibid, paragraph 28, page 16.
[10] *See, e.g.,* Complaint and Motion for Consolidation of the Advanced Energy Management Alliance, FERC Docket No. EL17-36-000, pages 15-18. *See also* AEMA Comments at FERC Technical Conference, April 24, 2018, *transcript pending.*

However, AEMA recognizes the value of highlighting and of remaining vigilant about driving action on this important topic. There is a significant amount of work already underway that will yield innumerable benefits to the resilience of the BES. These efforts, in various stages of progress, should be allowed to move forward as planned or proposed without any additional obligations or time limits imposed.

A. RTO/ISO Filings

AEMA agrees with points made by many of the FERC as well as non-FERC jurisdictional RTO/ISOs regarding resilience.

ISO New England Inc. ("ISO-NE") states that the most significant challenge to resilience for the region is fuel security, specifically the ability of natural gas-fired generators to procure natural gas supply during winter months when retail use of natural gas, such as heating, peaks.[11] ISO-NE also points out that it has recently conducted its Operational Fuel-Security Analysis ("OFSA") study, is actively engaged with stakeholders on the risk, and has established a process to discuss market-based solutions to address the risk.[12] ISO-NE argues that, because each region is unique, each RTO/ISO should be left to determine what, if any, assessments are needed.[13]

ISO-NE's OFSA found that energy shortfalls due to inadequate natural gas fuel supply would occur in winter of 2024/2025 with almost every fuel-mix scenario, but that a more diverse resource mix of LNG, imports, and renewables can help minimize system stress and maintain reliability. The study points out that on August 11, 2016, when nearly 4,300 megawatts ("MW") of resources dropped off line unexpectedly as demand increased over the course of the day,

[11] ISO New England Inc. (March 9, 2018), "Response of ISO New England Inc.," FERC Docket No. AD18-7-000, pages 5-6.
[12] *Ibid*, pages 1-2.
[13] *Ibid*, page 44.

system operators were able to dispatch 190 MW of demand response resources and operate with fewer 30-minute reserves.[14] The demand response resources had a response rate of 96% and no system outage occurred.[15] However, while the OFSA did incorporate "the demand-reducing effects of projected energy efficiency measures and distributed solar power,"[16] ISO-NE did not specifically assess the potential benefits of increased market participation of distributed energy resources.

California Independent System Operator ("CAISO")[17] recognizes that each region is different and that their own system events manifest differently than others, often as a result of earthquakes, fires and droughts. CAISO has no baseload of coal generation and only one nuclear unit, scheduled to retire in 2024. CAISO believes that the answer to resilience should be flexible enough to meet each RTO/ISO unique needs, stating that the "Commission should take a holistic approach that also considers the unique circumstances and conditions facing each region."[18] CAISO sees the FERC definition of resilience definition as "general and somewhat vague,"[19] and that CAISO has already undertaken a number of reliability efforts in its Resource Adequacy and transmission planning processes. As generators have retired and been decommissioned throughout the state, CAISO has assessed non-wires alternatives to reduce cost and increase reliability.[20] Despite an increase in renewable energy resources and closure of "baseload", CAISO does not believe that FERC action is warranted for resilience purposes.

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[14] *Ibid*, page 82.
[15] ISO NEWSWIRE (October 16, 2016), "Summer 2016 recap: Uneventful, until August," http://isonewswire.com/updates/2016/10/19/summer-2016-recap-uneventful-until-august.html
[16] ISO New England, page 69.
[17] CAISO filing at FERC available: http://www.caiso.com/Documents/Mar9_2018_Comments-GridResilience_AD18-7.pdf
[18] CAISO filing, page 5.
[19] *Ibid*, page 8.
[20] *Ibid*, page 45.

Electric Reliability Council of Texas ("ERCOT"),[21] in conjunction with the Public Utility Commission of Texas, while not in FERC jurisdiction, filed comments since the resilience process could impact NERC standards, which do apply to ERCOT. ERCOT agrees with the FERC resilience definition but does not believe that its region has issues relative to that definition, stating that it has "robust processes in place to ensure the ERCOT system will be operated in a way that can resist and recover from a variety of foreseeable disturbances."[22] ERCOT cites its load forecasting, outage coordination, operations, training, and physical and cybersecurity initiatives as contributing to its resilient system.

New York Independent System Operator ("NYISO") responded[23] to the Commission in its filing by summarizing the NYISO's current practices for addressing reliability and resilience of the NYCA and describing initiatives that are being discussed to ensure continued reliable operation and to bolster resiliency in New York City. NYISO supports the proposed definition of resilience. Particularly, it is stated that the NYISO is poised to meet the challenges brought about by technological developments, economics, environmental considerations, and public policies; and that "the NYISO remains confident in the ability to work collaboratively with its stakeholders to develop and implement the necessary market and procedural enhancements to continue to efficiently and reliably serve New York's energy needs."[24]

Unlike PJM (see below), NYISO does not report any resilience or reliability concerns. On contrary, due to a robust pricing engine, assessment and planning processes, coordination with neighbors, and future integration of distributed resources, NYISO believes it operates a

[21] ERCOT filing at FERC available: https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14648820
[22] *Ibid*, page 20.
[23] NYISO filing at FERC available: https://nyisoviewer.etariff.biz/ViewerDocLibrary/Filing/Filing1356/Attachments/20180309%20NYISO%20Rspns%20Grd%20Rslnc%20AD18-7-000.pdf
[24] NYISO filing, page 2.

resilient system.[25] In conclusion, NYISO asks the Commission "to continue to work with its stakeholders in assessing and developing the enhancements necessary to ensure that the wholesale markets, in serving the evolving needs of the electric system, continue to provide significant benefits to the State and its electricity consumers".[26] It is this final point that AEMA stresses as one of the most important components of assessing resilience: consumers. In events that require resilience, consumers are the most impacted and, potentially, the best able to respond quickly and efficiently to recover from the event.

PJM Interconnection[27] responded as well, noting that their system is reliable, but that further changes are needed to ensure that the PJM system is resilient. PJM also recommends a refined definition of resiliency to reflect what they are capable and incapable of doing to plan and protect the grid. AEMA appreciates that PJM discusses the value of DERs in their filing, and supports PJM's ongoing initiatives to value DERs in the market. PJM acknowledges the potential resiliency benefits of DERs in their filing: "Finally, emerging technologies such as microgrids, advanced storage and DER could also help to mitigate resilience challenges on the BES. Based on the NERC Distributed Energy Resource Task Force recommendations, there are several ways DER and microgrids can be better integrated with transmission systems to gain a resilience benefit, including: Requiring data sharing across the transmission-distribution interface; Requiring DER owners to provide real-time data for modeling; Coordination between distribution and transmission providers for DER capabilities such as inverter settings; and Improved ability to model DER in system planning studies."[28] AEMA supports PJM's initiatives

[25] *Ibid*, page 28.
[26] *Ibid*, page 3.
[27] PJM filing available: http://www.pjm.com/-/media/documents/ferc/filings/2018/20180309-ad18-7-000.ashx "Resilience Comments".
[28] *Grid Resilience in Regional Transmission Organizations and Independent System Operators Comments and Response of PJM Interconnection, LLC*, p 50 Docket No. AD18-7-000. Available: http://pjm.com/-/media/documents/ferc/filings/2018/20180309-ad18-7-000.ashx

to require data sharing across the Transmission/Distribution interface, data sharing and coordination between distribution and transmission providers for DER capabilities, such as inverter settings and the ability model DER in system planning. Finally, AEMA also supports PJM in efforts to coordinate with distribution system operators to enable distribution-level wholesale market resources for resilience on the bulk power system.

While PJM is working on several initiatives that incorporate DERs into the market, PJM could prioritize valuing the specific resiliency benefits of DERs further. There are already examples of PJM resiliency benefiting from distributed energy resources. For instance, an oft-cited example in PJM is in the summer of 2013, PJM suffered two days of load shedding in the Sturgis, Michigan area.[29] After identifying and dispatching a municipal behind-the-meter generator, PJM was able to balance the system. It was only through the support of this DER that load shedding ended. If DERs had been mapped and modeled already, PJM could have immediately called on this resource to balance the system. In addition, if DER owners had an economic incentive to share information about their units and offer them into a formal market for such a "resiliency event", PJM could call on these resources. PJM recognizes the benefits of DERs in these scenarios and has begun an effort to map and model behind meter resources that do not currently participate in the organized market. However, more than five years after the event in Sturgis, the Commission can take this larger opportunity to review such events to examine the specific planning, operational and market tools that could best incorporate such resources for support of the BES. Asking resources such as these to voluntarily share generator data may not be sufficient for their support in a resiliency role.

[29] PJM Interconnection, *Technical Analysis of Operational Events and Market Impacts during the September 2013 Heat Wave,* December 23, 2013. Available: https://www.pjm.com/-/media/library/reports-notices/weather-related/20131223-technical-analysis-of-operational-events-and-market-impacts-during-the-september-2013-heat-wave.ashx?la=en

Many types of DERs are particularly well suited for this type of low frequency, high impact events, but may need additional market incentives or make whole payments to support an RTO/ISO. For example, during the polar vortex of 2014, the Princeton University Microgrid was curtailed on natural gas, as were many Commercial and Industrial gas customers with Microgrid capabilities in the region. However, due to dual fuel capability incorporated into the design, the Microgrid was able to run around the clock, reducing the loads needed to be met by PJM in a constrained zone during times when PJM was soliciting emergency energy purchases. While this dual fuel capability in distributed resources provides an added layer of resilience to the bulk electric system in addition to providing areas of shelter to local communities, there are no mechanisms that incent this design configuration. As a result, smaller distributed resources, such as reciprocating engines – which are unique in that they require no electricity to start – often are not designed to consume multiple fuels. The Commission risks missing an important opportunity should it not investigate the oft-overlooked resiliency benefits of DERs and how incentives for resilient design configurations could impact investments.

The Commission could explore what changes, if any, should be made to market design to best incorporate the resiliency value of DERs in general, and this subset of behind meter non-wholesale DERs, in particular. PJM's statement that "the penetration of these technologies is not significant enough today to have any impact on system resilience"[30] appears false based even on this limited analysis of Sturgis and, at best, threatens to be self-fulfilling. Clearly, with public information on the Sturgis experience and many other recent situations, the public deserves a broad review of DER participation in resiliency.

Midcontinent Independent System Operator ("MISO") believes that its system is already resilient, stating that, "through the collective efforts and investments of MISO, MISO

[30] PJM Resilience Comments, page 50.

Transmission Owners, Load Serving Entities, States, and other stakeholders, MISO's grid is resilient."[31] MISO points to the Stakeholder Processes, Transmission Planning (MTEP), multiple Preparation Drills, Strategic Plans, Gas-Electric Coordination Enhancements, Reliability Initiatives, and other ongoing Market System Enhancements as the key elements of ensuring resilience in the MISO system. MISO urges the Commission to focus on the following resiliency enhancements: enabling industry adoption of Best in Class Technologies with CIP flexibility in implementation; valuing resilience in transmission planning processes; distribution system resilience; and enhanced Inter-Regional operations to increase event response capabilities.[32] MISO mentions the need to assess benefits and costs, stating, "future resilience endeavors must balance risk with costs to consumers."[33] MISO does not overtly recommend distributed energy resources or demand response, however, which AEMA believes FERC should require as part of the toolkit for any overarching resilience strategy.

Southwest Power Pool ("SPP") like MISO, asserts that its system is already resilient. SPP points as well to their robust Stakeholder Engagement, Transmission Planning, Preparation Drills, Strategic Plans, Reliability Initiatives, and other ongoing Market System Enhancements as the key elements of ensuring resilience. SPP urges FERC to trust to the ongoing development of resiliency efforts at NERC, stating, "SPP believes the current NERC construct for continually monitoring and enhancing the NERC reliability standards is sufficient to address current and future needs with regards to enhancing resilience for the BPS. …the NERC Board of Trustees has adopted a 'framework' for discussing resilience (based, in part, on the NIAC's recommendations) that will begin a NERC effort to assess what activities, including any proposed reliability standards, may be appropriate to address areas where the industry can

[31] MISO filing available: https://www.misoenergy.org/api/documents/getbymediaid/137477, pages 1-2.
[32] MISO filing, pages 7-8.
[33] *Ibid*, page 6.

improve resilience of the BPS. SPP supports NERC's Resilience Framework."[34] SPP suggests the potential need for, "… cold standby generation capacity (i.e., not in maintenance) that can be called on within a reasonable amount of time to mitigate unforeseen events."[35] Distributed Energy Resources including Demand Response might be candidates to support the bridge to cold standby generation. SPP does discuss the need to assess benefits and costs to consumers, although AEMA recommends that FERC should ensure SPP include all types of resources, including consumer-sited, as part of any overarching resilience solution.

A. Fuel Security Initiative

PJM's Fuel Security Initiative, announced April 30, 2018,[36] could be an important effort addressing the resilience of their system and one which has not been undertaken previously. In particular, any capacity resources that do not face fuel security challenges, including DERs, should be eligible for any adder payments under a potential new capacity model design. Through this initiative "PJM now seeks to isolate one type of resilience risk: fuel security."[37] As long as this initiative is both technology and fuel neutral in its assessment and development of rules, this is one of the most practical and focused efforts on ensuring future resilience of the grid. While this recently announced initiative is clearly linked to resilience, it is unclear what the overlap or distinction is with this initiative and the energy and ancillary market changes that may have secondary resilience benefits proposed by PJM in this docket.[38] As such, AEMA respectfully reinforces its request that the Commission dismiss any market rule changes with self-imposed deadlines requested by PJM.

[34] SPP filing available: https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14648872, pages 18-19.
[35] SPP filing, page 11.
[36] PJM Interconnection, *Valuing Fuel Security* (Apr. 30, 2018) *available at* http://www.pjm.com/-/media/library/reports-notices/special-reports/2018/20180430-valuing-fuel-security.ashx.
[37] *Ibid*, page 1.
[38] *Ibid*, page 2.

B. Order 841 Compliance

Order 841, recently issued by the Commission, and the improved integration of storage into the wholesale system, should lead to increased resilience in the BES. Among other things, the Order establishes that storage is eligible to provide all capacity, energy, and ancillary services that the resource is technically capable of providing. As properly noted by the Commission in that Order, "due to electric storage resources' unique physical and operational characteristics—including their ability to both inject energy into the grid and receive energy from it—our actions here will help support the resilience of the bulk power system." [39] The rule also requires RTOs/ISOs to adopt minimum size requirements no greater than 100 kW. Among other important elements, the rule also establishes that charging energy for wholesale transactions should be charged at locational marginal pricing ("LMP"). While this rule is a positive step in total, we continue to have concerns that this rule does not clarify that energy storage resources have attributes that are distinct from traditional generators, for instance, by charging or discharging.[40] The range of time it will take to ensure compliance with this Order across ISO/RTOs varies, but it is clear time is needed for implementation and to realize the benefit of electric storage resources. As such, AEMA respectfully submits that the Commission should not prematurely take unnecessary and potentially expensive steps addressing resilience of the BES under this docket until the resilience benefits of major actions such as Order 841 are better understood.

C. Order 842 Compliance

FERC Order 842 and the resulting compliance proceedings will enhance requirements on generators for primary frequency response, resulting in greater resiliency. On February 15, 2018,

[39] FERC Order 841, page 7.
[40] *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Final Rule,162 FERC ¶ 61,127 (2018).

FERC issued Order No. 842 on "Essential Reliability Services and the Evolving Bulk-Power System – Primary Frequency Response." Primary frequency response has been studied extensively as a key component of maintaining a resilient grid. This Final Rule addresses impacts of the evolving generation resource mix and is focused on protecting the bulk power system from disturbances to frequency occurring from sudden changes in supply or load. The rule requires newly interconnecting large and small generating units to "install, maintain, and operate a functioning governor or equivalent controls capable of providing primary frequency response."[41] This is expected to benefit resilience by reducing the likelihood of significant frequency deviations, which "could potentially result in under frequency load shedding (UFLS), generation tripping or cascading outages".[42] Under system restoration conditions, frequency control also becomes critical. Thus, this rulemaking will give RTOs added tools to improve resiliency.

D. Distributed Energy Resource Proceeding

Perhaps most importantly for AEMA members, including consumers, in terms of reinforcing the BES is the improved integration of DERs, and inevitable increased penetration of DERs. When the integration of DER resources in the wholesale market increases as is planned under Docket AD18-10-000, this can yield the greatest reinforcement of the BES in protecting "affordable and reliable electricity [that] is vital to the country's economic and national security."[43] One need look no further than the major outages suffered from severe weather in the past twelve months, and the role the DERs have played in bringing those systems back on line.

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[41] *Essential Reliability Services and the Evolving Bulk-Power System—Primary Frequency Response*, Final Rule, , at P 19162 FERC ¶ 61,128 (2018).
[42] *Essential Reliability Services and the Evolving Bulk-Power System—Primary Frequency Response*, Final Rule, 18 CFR Part 35 (February 15, 2018), 162 FERC ¶ 61,128 (2018), Docket No. RM16-6-000, at P 4. Available: https://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=14823757
[43] FERC press release issued January 8, 2018: https://www.ferc.gov/media/news-releases/2018/2018-1/01-08-18.asp#.WusrWcaZOu4

Failure to take into consideration the increasing role that DERs play in the BES, both in terms of overall impact and resilience, could lead to unnecessary and costly actions in the name of resilience.

AEMA has provided several concrete examples of how DERs can enhance resilience in our previous filings on resilience, specifically regarding the Department of Energy's resilience Notice of Proposed Rulemaking ("NOPR"),[44] and in a microgrid proceeding in Puerto Rico.[45] One example of DERs directly contributing to the resilience of the BES was the reliance on DERs during the widespread outages in Houston caused by severe storms and floods. After Hurricane Harvey struck the Houston area, the local utility deployed DER investments on their network in order to bring their customers online faster through distributed intelligence, saving an estimated 45 million outage minutes as it restored power across its service territory. Similarly, in Florida, where Hurricane Irma knocked out power to 4.4 million residents, the local utility was able to leverage distribution-level investments to restore power to 2.7 million customers within 48 hours and all 4.4 million customers within a week. By our calculation, this is the fastest large-scale restoration in history.

DERs and microgrids also hold the promise of targeted resilience that protects vital services during outages. For example, during the blackouts following Hurricane Sandy in 2012, Princeton University's microgrid powered the campus, allowing the University to serve "as 'a place of refuge,' with police, firefighters, paramedics and other emergency-services workers from the area using Princeton as a staging ground and charging station for phones and

[44] AEMA comments on DOE Resilience NOPR available: http://aem-alliance.org/aema-files-comments-doe-nopr-ferc/
[45] AEMA comments on Puerto Rico microgrid docket available: http://aem-alliance.org/aema-makes-resilience-recommendations-puerto-rico-commission/

equipment."[46] Building upon this success, New Jersey created the Energy Resilience Bank, providing $25 million in financial assistance to projects developing DERs at critical facilities such as hospitals, 911 call centers, and wastewater treatment.[47] These results highlight that DERs can be located where power is most needed during emergencies, suggesting an efficient, cost-effective approach to resilience.

As CAISO states in its filing, "a robust transmission system, state energy efficiency mandates, access to imports from neighboring balancing authority areas, increasing storage levels, increasing distribution-side resources, demand response, and the Flex Alert program can also help maintain a reliable and resilient system."[48] NYISO, too, highlights the benefits of DER, stating "effective integration of DER can assist grid operations by improving system resilience and efficiency, energy security, and fuel diversity."[49] NYISO also notes the importance of consumer engagement[50] in changing the way the grid is operated. AEMA asserts that consumers are the biggest beneficiaries of a resilient grid (as well as the victims of an unreliable grid) and, as such, should have choices and control to ensure that they can directly enable as well as reap the benefits of resilience.

A recently released paper titled "A Customer-Focused Framework for Electric System Resilience"[51] by Alison Silverstein Consulting and Grid Strategies, noted several measures to increase resilience. The paper asserts that "measures that protect customer survivability, such as more energy efficient building shells and distributed generation with smart inverters (to keep

[46] *Two years after Hurricane Sandy, recognition of Princeton's microgrid still surges*, (2014). Available at https://www.princeton.edu/news/2014/10/23/two-years-after-hurricane-sandy-recognition-princetons-microgrid-still-surges .
[47] See generally New Jersey Energy Resilience Bank website, http://www.njeda.com/erb/erb-(1).
[48] CAISO filing, page 166.
[49] NYISO filing, page 33.
[50] *Ibid*, page 28.
[51] "A Customer-Focused Framework for Electric System Resilience" by Alison Silverstein Consulting and Grid Strategies, LLC, May 2018 https://gridprogress.files.wordpress.com/2018/05/customer-focused-resilience-final-050118.pdf

providing energy to the host after the surrounding grid is out of service), help customers under many adverse threats and offer multiple benefits (such as customer bill savings and comfort)."[52] Throughout the paper, the authors argue that a combination of generation, transmission and consumer-sited resources offset any outage risk from specific plants, stating that "because the marginal benefit for customers of protecting generation is quite low (particularly when reserve margins are high), generation-related solutions are generally not the most cost-effective means of reducing customer outages on power systems today." [53] The authors stress the need to have access to current information about all resources, including distributed energy resources. They recommend that policy makers and the industry use "forward-looking portfolio analyses of energy and reliability service requirements under different stressors to understand supply system resilience needs and how to meet them in a variety of cost-effective ways."[54] AEMA fully agrees with the authors' statement that "markets best support reliability and resilience when they allow all sources to contribute, including distributed energy resources (DER) – distributed generation, demand response and distributed storage" and that "distributed storage systems in particular offer a great source of flexibility for grid operators, if they can be accessed and used in constructive ways."[55]

F. Overarching Market Reform

AEMA believes the Commission should take care not to direct or require any market reforms with secondary resilience benefits under this docket. For example, the energy market price formation, shortage pricing rules, and Operating Reserves changes referenced and being

[52] Silverstein et al, page 6.
[53] *Ibid*, page 7.
[54] Silverstein et al, page 37.
[55] *Ibid*, page 51.

considered at PJM,[56] have been touted as providing resilience benefits. NYISO[57] also intends to evaluate opportunities to leverage competitive wholesale market products and services to bolster the resiliency by means of re-evaluating its current suite of Ancillary Services products and shortage pricing, and integrating energy storage and distributed energy resources. Any changes considered, however, and then approved by stakeholders and the ISO Board, cannot circumvent the existing 205 and 206 requirements. Any ISOs/RTOs that believe changes to their existing rules are necessary must follow required procedures and protocols to satisfy the standards of justness and reasonableness of a 205 or 206 FERC filing.[58] PJM's explanation of the need for changes to certain energy and ancillary market rules is helpful to inform the Commission as to areas PJM is working on, but PJM cannot ask FERC to require rule changes to be filed in preemption of the stakeholder process or development of an evidentiary record that change is necessary.

III. Conclusion

In summary, AEMA agrees that resilience is an important topic for discussion and evidentiary collection. We are confident that current and pending proceedings will in many ways address resilience and we recommend the Commission complete those Dockets accordingly. We have seen evidence of DERs and consumer engagement providing significant resilience benefits and do not want those services lost in an effort to focus on supply side fuel security in isolation.

Given the rapid pace of initiatives on resilience before the Commission, AEMA asks the Commission to take up a new technical conference initiative to uncover the benefits of Distributed Energy Resources toward increasing resilience. This technical conference would

[56] See PJM filing available: http://pjm.com/-/media/documents/ferc/filings/2018/20180309-ad18-7-000.ashx
[57] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14838201, pages 2-3.
[58] In its filing, NYISO respectfully requests that the Commission allow the NYISO to continue to work with its stakeholders in assessing and developing the enhancements necessary to ensure that the wholesale markets, in serving the evolving needs of the electric system, continue to provide significant benefits to the State and its electricity consumers.

provide an opportunity for interested stakeholders to share planning, operations, and market approaches that either currently or potentially value the resiliency benefits of DERs. AEMA remains committed to the FERC processes and appreciates FERC consideration of these comments. Please do not hesitate to reach out should the Commission have any questions or comments regarding this filing.

Respectfully Submitted,

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