UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Reliability Technical Conference	Docket No. AD18-11-000

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ON BEHALF OF
FLORIDA MUNCIPAL POWER AGENCY AND THE
TRANSMISSION ACCESS POLICY STUDY GROUP
FOR THE JULY 31 TECHNICAL CONFERENCE

Thank you for the invitation to participate in today's technical conference, particularly this panel on Advancing Reliability and Resilience of the Grid.

I am here representing Florida Municipal Power Agency ("FMPA") and TAPS—the Transmission Access Policy Study Group, an association of transmission-dependent utilities in more than thirty-five states. As FMPA's Chief Information and Compliance Officer, I am acutely aware of both the importance of a reliable and secure Bulk Electric System ("BES"), as well as the heavy compliance burden borne by registered entities, even if they are small systems with limited impact on BES reliability.

As a member and past chairman of North American Electric Reliability Corporation's ("NERC") Member Representatives Committee ("MRC"), I am actively engaged in NERC policy issues. The Electric Reliability Organization ("ERO") Reliability Issues Steering Committee ("RISC"), of which I am a member, has been grappling with issues as to the line between reliability and resilience. My participation as a member of the Standards Efficiency Review Advisory Group and the MRC Business Plan and Budget Input Group enhance my awareness of issues pertaining to the scope of reliability standards and NERC's responsibilities.

I also have the unique perspective of having had the opportunity to work in the then newly created FERC Division of Reliability shortly after passage of the Energy Policy Act of 2005.

I. RESILIENCE VERSUS RELIABILITY

The questions posed to this panel focus on how resilience and reliability are related, how entities currently plan and operate the grid considering both reliability and resilience, and what steps can be taken to advance both. A number of the Commission's questions address whether reliability standards should be expanded to enhance resilience.

Let me say first that TAPS supports the Commission's effort to rigorously define resilience and to consider the appropriate role for regional transmission organizations with respect to evaluating and achieving appropriate levels of resilience, as described in TAPS comments in the Resilience Proceeding (Docket No. AD18-7).[1] TAPS comments also recognized that if defined as broadly as suggested by the Commission's January 8, 2018 Order in Docket Nos. RM18-1 and AD18-7,[2] "resilience" extends beyond the Commission's jurisdiction, and particularly, beyond the scope of reliability standards authorized under Federal Power Act ("FPA") Section 215. Thus, while NERC can play an important role with regard to supporting resilience, and reliability standards can and do address some aspects of resilience, reliability standards are not an all-purpose tool to achieve everything that might be encompassed within that term.

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[1] Comments of Transmission Access Policy Group, *Grid Resilience in Reg'l Transmission Orgs. & Indep. Sys. Operators*, Docket No. AD18-7-000 (May 9, 2018), eLibrary No. 20180509-5081.

[2] Grid Reliability and Resilience Pricing and Grid Resilience in Regional Transmission Organizations and Independent System Operators, 162 FERC ¶ 61,012, P 23 (2018) ("Resilience Proceeding Order").

FERC's Resilience Proceeding Order,[3] defines resilience as

> 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.

That definition, which remains under consideration in that proceeding, sweeps wider than NERC and Commission authority with regard to reliability standards in a number of significant respects.

There is some overlap between resilience and reliability. NERC standards clearly address some aspects of resilience, as NERC observes in its comments in the Resilience Proceeding.[4] For example, EOP-006-2 requires that plans and personnel be prepared to support system restoration after specified events.[5] Thus, some aspects of resilience are currently and appropriately addressed in reliability standards. In addition, elements of resilience may be relevant to NERC Bulk-Power System ("BPS") adequacy assessments.[6]

However, FPA Section 215 does not give the Commission jurisdiction to regulate, particularly through the mechanism of reliability standards, everything that might be considered to fall within the term "resilience," if defined as broadly as Paragraph 23 of the Resilience Proceeding Order. The statute limits reliability standards to "provid[ing]

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[3] *Id.* P 23. The Resilience Proceeding Order (at n.38) describes this definition as generally based on the National Infrastructure Advisory Council's *Critical Infrastructure Resilience Final Report and Recommendations* at 8 (Sept. 8, 2009).

[4] Comments of the North American Electric Reliability Corporation 8, *Grid Resilience in Reg'l Transmission Orgs. & Indep. Sys. Operators*, Docket No. AD18-7 (May 9, 2018), eLibrary No. 20180509-5072.

[5] NERC, Standard EOP-006-2, System Restoration Coordination, https://www.nerc.com/_layouts/15/PrintStandard.aspx?standardnumber=EOP-006-2&title=System%20Restoration%20Coordination&jurisdiction=United%20States (currently effective).

[6] FPA § 215(g), 16 U.S.C. § 824o(g).

for reliable operation of bulk-power system."[7] Neither the Commission nor NERC may require the construction of additional generation or transmission capacity under Section 215.[8] Section 215 jurisdiction also explicitly excludes any authority to set or enforce compliance with standards for adequacy or safety of electric facilities or services. And it expressly preserves without preempting state action to ensure safety, adequacy, and reliability within its state (so long as the action is not inconsistent with a reliability standard).[9]

In addition, FPA Section 215(a)(1) defines "Bulk-Power System" to focus on the interconnected transmission network and generation needed to maintain transmission system reliability; it expressly excludes distribution.[10] This exclusion of facilities used in local distribution is confirmed and amplified by Section 215(i)(2) and (3)'s state savings clauses.[11] Therefore, to the extent the Commission retains a broad definition of "resilience," along the lines of the definition that appears in Paragraph 23 of the Resilience Proceeding Order, it should also continue to recognize (as it did in that Order[12]) that the concept of resilience encompasses areas outside the Commission's jurisdiction.

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[7] FPA § 215(a)(3), 16 U.S.C. § 824o(a)(3).

[8] FPA § 215(a)(3), (i)(1), 16 U.S.C. § 824o(a)(3), (i)(1).

[9] FPA § 215(i)(2)-(3), 16 U.S.C. § 824o(i)(2)-(3).

[10] FPA § 215(a)(1), 16 U.S.C. § 824o(a)(1) ("The term [BPS] does not include facilities used in the local distribution of electric energy.").

[11] FPA Sections 215(a)(3)'s and (i)(2)'s express bar against FERC or NERC ordering construction of additional generation or transmission capacity similarly confirms the intended exclusion of distribution from Section 215's scope; because distribution is excluded, there was no need to expressly include distribution facilities in the list of facilities to which FERC cannot order additions.

[12] Resilience Proceeding Order P 19 n.31.

Congress also made clear that Section 215 authority to establish and enforce reliability standards to provide for reliable operation of the Bulk-Power System does not sweep in elimination of all BPS outages, much less all distribution-level outages. Reliable operation is defined with a focus on avoiding "instability, uncontrolled separation, or cascading failures . . . as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements."[13] The statute further described the objective of reliability standards as "provid[ing] for an adequate level of reliability of the bulk-power system."[14] This *Adequate* Level of Reliability objective is consistent with FPA Section 217(b)(4)'s directive to the Commission to exercise its authority under the Act to facilitate planning for the *reasonable* needs of load-serving entities.[15]

The NERC definition[16] of "Adequate Level of Reliability" is instructive: it distinguishes (at 1) between predetermined Disturbances ("the more probable Disturbances to which the power system is planned, designed, and operated") and "low probability Disturbances," and recognizes that it may be appropriate to treat them differently. In defining Adequate Level of Reliability, NERC explains:[17]

> BES owners and operators may not be able to apply any economically justifiable or practical measures to prevent or mitigate [the] Adverse Reliability Impact on the BES [of

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[13] FPA § 215(a)(4), 16 U.S.C. § 824o(a)(4).

[14] FPA § 215(c)(1), 16 U.S.C. § 824o(c)(1) (A criterion for being certified as the ERO is "the ability to develop and enforce . . . reliability standards that provide for an adequate level of reliability of the bulk-power system.").

[15] FPA § 217(b)(4), 16 U.S.C. §824q(b)(4).

[16] N. Am. Elec. Reliability Corp., Informational Filing on the Definition of "Adequate Level of Reliability," *N. Am. Elec. Reliability Council*, Docket No. RR06-1-000 (May 10, 2013), eLibrary No. 20130510-5126.

[17] *Id.* at 2.

> low probability Disturbances] despite the fact that these events can result in Cascading, uncontrolled separation or voltage collapse. For this reason, these events generally fall outside of the design and operating criteria for BES owners and operators.

NERC's "Adequate Level of Reliability" definition thus rightly focuses standards on addressing routine, predetermined disturbances. It recognizes (as Congress implicitly did by including the word "adequate" in the statute) that a requirement of "zero disturbances," without regard to their probability, is neither economically justifiable nor practically feasible.

In contrast, the resilience definition that appears in Paragraph 23 of the Resilience Proceeding Order contains no criteria or metrics to evaluate the resilience of the existing grid. Nor does it answer fundamental questions such as: What is resilient enough? For which risks, which will differ in different parts of the country? And at what cost? Decisions about the degree of resilience entail judgments as to the risks, priorities, and costs that consumers should bear. Moreover, such decisions will have ramifications for matters outside the Commission's jurisdiction (e.g., retail service reliability and local distribution facilities); and the strategies available to achieve resilience may well require close collaboration with local utilities and state and local regulatory authorities. To the extent resilience considerations go beyond providing for an Adequate Level of Reliability of the Bulk-Power System, they should *not* be addressed through reliability standards.

With this framework in mind, I caution the Commission against seeking to use reliability standards as the tool to "enhance resilience" or achieve a particular "level of resilience" as suggested in question (a) for this panel. Nor do I think it appropriate for the Commission to direct NERC to "expand the definition of an adequate level of

reliability, used as basis for reliability standards, to include resilience" as asked in question (b). Nor should reliability standards be "modified to define and require minimum parameters for system resilience," as question (c) poses. Rather, reliability standards should continue to be designed to provide an Adequate Level of Reliability, as that term has been defined by NERC. By doing so, standards will continue to enhance aspects of resilience, while respecting Section 215's boundaries.

To be clear, I am not saying that NERC standards are perfect in all respects and cannot be improved to better provide for an Adequate Level of Reliability. To the contrary, as a member of the RISC and the Standards Efficiency Review Advisory Group, I am keenly aware of the need to streamline and better focus standards to achieve their crucial reliability purpose on a risk-informed basis, so that our limited resources are properly targeted at compliance efforts to mitigate risk to the BPS. But reliability standards should *not* be modified to also address resilience.

II. NERC CAN SUPPORT RESILIENCE THROUGH ACTIONS OTHER THAN RELIABILITY STANDARDS

While I urge against expanding reliability standards to address resilience, that doesn't mean NERC has no role with regard to resilience. As question (c) for this panel rightly recognizes, there are ample opportunities outside the development and enforcement of reliability standards for NERC to work collaboratively with states and other jurisdictions to enhance resilience. And there is much NERC can achieve in this regard by working with registered entities and other stakeholders outside the scope of the domain of reliability standards.

For example, NERC assessments of the "reliability and adequacy of the bulk-power system"[18] play an important role in informing this Commission, state and local regulators, and the industry about issues, such as BPS adequacy, that go beyond the scope of reliability standards but are important to resilience.

NERC also conducts Event Analyses to determine the causes of events and provide lessons-learned to the industry, which support continued reliability improvement as well as provide valuable input for training and education and reliability trend analysis efforts. The results of NERC's Event Analysis findings, lessons learned, and other analysis and information not only help guide its Reliability Assessment Program, but can also be disseminated through issuance of three levels of Alerts that can place industry on notice of any findings, analysis, or recommendations related to BPS reliability. Level 1 (Advisories) are purely informational and can educate industry about reliability issues; Level 2 (Recommendations) are specific actions that NERC could recommend industry consider; and Level 3 (Essential Actions) are specific actions that NERC determines are essential to take to ensure reliability.[19]

For example, based on NERC's analysis of the Blue Cut Fire, NERC issued an Event Analysis report[20] that identified the cause of the sudden loss of 1,200 MW of solar power and recommended that inverter manufacturers change their inverter settings to

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[18] FPA § 215(g), 16 U.S.C. 824o(g).

[19] NERC Rules of Procedure, Rule 810, at 71-72 (May 4, 2016), http://www.nerc.com/FilingsOrders/us/RuleofProcedureDL/NERC_ROP_Effective_20160504.pdf.

[20] NERC, *1,200 MW Fault Induced Solar Photovoltaic Resource Interruption Disturbance Report* (June 2017), https://www.nerc.com/pa/rrm/ea/1200_MW_Fault_Induced_Solar_Photovoltaic_Resource_/1200_MW_Fault_Induced_Solar_Photovoltaic_Resource_Interruption_Final.pdf.

avoid this erroneous tripping, as well two Level 2 alerts.[21] In doing so, NERC explicitly recognized that its recommendation reached beyond BES generators:[22]

> Although this NERC Alert pertains specifically to BES solar PV resources, the same characteristics may exist for non-BES solar PV resources connected to the BPS regardless of installed generating capacity or interconnection voltage. Owners and operators of those facilities are encouraged to consult their inverter manufacturers, review inverter settings, and implement the recommendations described herein

NERC's role in supporting the Electricity Information Sharing and Analysis Center ("E-ISAC") and conducting exercises such as GridEx play an important role in fostering resilience. E-ISAC provides a critical foundation for the Electricity Subsector Coordinating Council ("ESCC"), which serves as the principal liaison between the federal government and the electric power industry, with the mission of coordinating efforts to prepare for, and respond to, national-level disasters or threats to critical infrastructure. GridEx is a biennial exercise, conducted beginning 2011, designed to simulate a cyber/physical attack on electric and other critical infrastructures across North America, to strengthen utilities' crisis response functions, and to provide input for lessons-learned.

As an outgrowth of the GridEx experience, the ESSC directed the formation of the Cyber Mutual Assistance ("CMA") Program, an important new form of mutual assistance that could significantly enhance our resilience. The program has marshalled

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[21] *See* NERC, *Industry Recommendation* (June 20, 2017), https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/NERC%20Alert%20Loss%20of%20Solar%20Resources%20during%20Transmission%20Disturbance.pdf, and NERC, *Industry Recommendation* (May 1, 2018), https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/NERC_Alert_Loss_of_Solar_Resources_during_Transmission_Disturbance-II_2018.pdf ("May 1, 2018 Industry Recommendation").

[22] May 1, 2018 Industry Recommendation at 1.

more than 145 industry cyber experts who are able to provide voluntary assistance to each other in advance of, or in the event of, a disruption of electric or natural gas service, systems, and/or IT infrastructure due to a cyber emergency.

Through efforts of this nature, NERC can support the efforts of state and local regulators that already actively address transmission and distribution system resilience issues and the reliability of retail service provided. And state and local regulators already have well-developed systems to assess and achieve reliability and resilience. Standardized Institute of Electrical and Electronics Engineers ("IEEE") metrics are used to measure system outages and utility performance.[23] Local utilities are expected to achieve performance benchmarks; and if they fail to do so, they are accountable to state and local regulators—who, in turn, are accountable to retail customers.

NERC's support of state and local resilience efforts is illustrated by NERC's most recent State of Reliability Report.[24] For example, the Report's "Key Finding 1" is that "BPS Showed Improved Resilience during two NERC Category 5 Events"—Hurricanes Harvey and Irma in 2017. While wind and water damage were record setting, the restoration efforts and subsequent recovery times were improved from historical benchmarks. Specifically, system hardening increased resiliency and reduced restoration time from 18 days for Wilma to 10 days for Irma. These hardening expenditures are regulated and approved by the state and local regulators. Significantly, NERC's

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[23] IEEE outage metrics include: System average interruption frequency index ("SAIFI"); Customer average interruption duration index ("CAIDI"); System average interruption duration index ("SAIDI"); Momentary average interruption frequency index ("MAIFI").

[24] NERC, *State of Reliability Report 2018* (June 2018), https://www.nerc.com/pa/RAPA/PA/Performance%20Analysis%20DL/NERC_2018_SOR_06202018_Final.pdf.

recommendations for this key finding regarding resilience are not focused on reliability standards. Instead, they are focused on state and industry efforts that can be supported by NERC through the existing lessons-learned and Event Analysis program, as well as NERC information sharing.[25]

One of the Report's specific recommendations for "Key Finding 1" highlighted the benefits of Mutual Assistance programs, and suggested that NERC "encourage participation with assistance from government and non-governmental authorities where applicable."[26] Utilities and their state and local regulators have developed tools and relationships to support both transmission and distribution system resilience, including standing mutual aid agreements among utilities (so that agreements do not need to be made on the fly for each incident); a system of designated utility, network, and national coordinators to ensure coordinated response among utilities and with state and federal governmental officials;[27] and other programs to expedite system restoration through shared resources. National and state-wide trade associations, such as the American Public Power Association and the Florida Municipal Electric Association, as well as municipal joint actions, also play important roles in facilitating effective and prompt mutual assistance.

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[25] The three recommendations are to emphasize participation in mutual assistance, to expand use of drones, and for NERC to amplify information-sharing. *See id.* at vii.

[26] *Id.*

[27] *See*, *e.g.*, Edison Electric Institute, *Understanding the Electric Power Industry's Response and Restoration Process* (2016), http://www.eei.org/issuesandpolicy/electricreliability/mutualassistance/Documents/MA_101FINAL.pdf; American Public Power Association, *Mutual Aid*, https://www.publicpower.org/mutual-aid (last visited July 11, 2018).

In Florida, for example, municipal utilities coordinate with and offer mutual assistance to investor-owned and cooperative utilities as well as one another.[28] Line crews from neighboring regions also convene to assist when there are widespread outages. Individual utilities have invested significant time and resources in developing, maintaining, and training their staff with respect to the storm response and restoration plans they have developed for their own systems. These actions leverage the inherent incentives of the industry to take actions to minimize disruption and expedite restoration, so they meet public expectations of electric service and sell electricity.

It is striking that many of the recommendations in NERC's 2018 State of Reliability Report are supportive of resilience, but are not targeted at reliability standards. The Report's recommendations also highlight the need for enhanced coordination with other organizations that are well-positioned to enhance resilience, such as the North American Transmission Forum and the North American Generator Forum, as well as governmental bodies.

Nor do NERC's ongoing efforts to support resilience stop there. In response to the heightened focus on resilience, NERC's RISC is currently developing a resilience framework to develop a common understanding and definition of the key elements of BPS resilience, understand how these fit in the existing ERO framework, and evaluate whether there is a need for NERC as the ERO to undertake additional steps. The framework relies on the National Infrastructure Advisory Council framework that

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[28] *See, e.g.*, Florida Electric Utilities' Mutual Aid and Assistance Compact (June 29, 2017); Florida Municipal Electric Association Hurricane/Storm/Disaster Response Information and Mutual Aid Procedures, http://publicpower.com/mutual-aid-hurricanestormdisaster-response-information/ (last visited May 8, 2018); *see also supra* note 24.

includes four outcome-focused abilities: (1) robustness; (2) resourcefulness; (3) rapid recovery; and (4) adaptability. The RISC is developing an inventory of existing NERC/ERO programs and activities along with specific efforts/tools. In addition to the NERC efforts mentioned above, many more ongoing activities that already support resilience are being identified through the development of this framework.

Thus, as I explained above, reliability standards should *not* be expanded to address "resilience," but should remain targeted—as Congress instructed—at maintaining an Adequate Level of Reliability. However, there is much that NERC can and should do to inform, collaborate with, and leverage actions of state and local regulators, other organizations, and the industry to enhance resilience.

Once again, I would like to thank the Commission for this opportunity and look forward to your questions and the panel's discussion of these important issues.

July 13, 2018