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 THE R STREET INSTITUTE

Pursuant to the Federal Energy Regulatory Commission (the "Commission" or "FERC") order issued on January 8, 2018,[1] the R Street Institute ("RSI") respectfully submits these comments in reply to the filings of the Commission-approved regional transmission organizations (RTOs) and independent system operators (ISOs) regarding resilience issues and concerns in their regions and whether additional Commission action is warranted.

Resilience policy decisions should stem from a customer-centric perspective, as the central objective is to maximize the benefits less the costs of mitigating customer outages. Specifically, end-use outages should only occur if the cost of providing service exceeds what consumers are willing to pay for it. Economic objectives should guide the stages of resilience evaluation, including conceptual advancement, system assessment, and establishing an economic framework for bulk power resilience.

I. Conceptual Advancement

In the Commission's proposed understanding of resilience, the emphasis on the *magnitude* and *duration* of disruptive events is well-founded, as sometimes the conventional reliability focus overemphasizes the *frequency* of events (e.g., probabilistic assessments of loss of load expectations). However, prevailing reliability concepts still address the magnitude and duration of outages to varying degrees. As such, one may consider the resilience inquiry as a more holistic view of reliability.

Regardless of semantics, to pursue resilience or a more holistic approach to reliability in an economically efficient manner comes down to maximizing the net benefits of electricity service. This requires better representation of consumers' value of lost load (VOLL) in planning and operating processes, as well as market design. Planning processes and markets that reflect VOLL over time will accurately value the magnitude, duration, and frequency of system reliability and resilience. For example, real-time prices that accurately reflect VOLL serve as the best instrument for the valuation of "rapidity," in other words, the swiftness of recovery after a loss of load event.

[1] Federal Energy Regulatory Commission, *Grid Resilience in Regional Transmission Organizations and Independent System Operators,* Docket No. AD18-7-000, January 8, 2018, p. 1. https://www.ferc.gov/CalendarFiles/20180108161614-RM18-1-000.pdf.

One combination of VOLL elements has emerged with particular respect to the resilience conversation: low frequency events with high magnitude and extended duration. Most RTO/ISO comments in the resilience docket pertain to such high-impact, low frequency (HILF) events. As such, the economic treatment of HILF events requires special attention in the Commission's resilience initiative.

II. System Assessment

The Commission should endeavor to improve understanding of HILF event causes, resilience diagnostics, and evaluation of end-use customer consequences on all interstate generation and transmission systems. This will provide value for system planning and operating purposes. Additionally, a better understanding of what resources do and are capable of improves operational awareness and evaluation of transmission planning and market design. In particular, improved reporting of the causes of resource outages and fluctuations in economic minimum offers during HILF events would provide a better data set for resilience diagnostics.

It is important for system assessments to determine the degree of coincidence among resilience threats to generation, transmission and distribution (T&D). To the extent that coincident resilience threats cause T&D system failure that exceeds those of the generation system, the improvement of generation resilience with respect to these threats would not improve end-use resilience.

To-date, current assessments reveal that the dominant causes of customer outage frequency is routine events and weather, the duration of outages is primarily driven by extreme weather and distribution level problems, and that bulk generation shortfalls cause only a tiny share of customer outages, including extended outages.[2] T&D improvements, along with potential increases in distributed energy resource (DER) deployment, have far greater potential to affect end-user resilience than bulk generation changes. As such, metrics for bulk generation reliability and resilience alone may provide very limited value. For example, end-use reliability and resilience could easily be greater in a bulk power system with a single digit operating reserve margin than one exceeding 20 percent.

No evidence exists of severe flaws in current transmission planning or market design that could cause extensive under-procurement of bulk resilience services in the near-term. However, without better definition, modeling, and metrics of resilience, it is not possible to determine with high confidence whether current transmission processes incorporate all cost-effective resilience measures, nor if market design provides for full incentive compatibility with respect to resilience.

[2] Alison Silverstein, Rob Gramlich, and Michael Goggin, "A Customer-focused Framework for Electric System Resilience," May 2018, p. 14-18. https://gridprogress.files.wordpress.com/2018/05/customer-focused-resilience-final-050118.pdf.

System assessments of future resource configurations should account for the incentive structures that determine actual resource decisions (e.g., net revenue and equilibrium analyses), rather than hypothetical scenarios that create false positives of potential resilience threats. For example, faulty analyses of coal retirements have already led to inaccurate conclusions about system resilience.[3] Similarly, hypothetical exercises that simulate the loss of entire resource classes do not appear to hold predictive value.[4]

Modeling exercises should be used for informative purposes to identify flaws in incentive compatibility. The role of market design is to align incentives, not guide behavior towards a pre-determined list of "acceptable" generation portfolios. Some RTOs, including PJM, noted potential market design reforms as a way to shape fuel and generation choices to avoid service disruptions. This could risk the implicit compromise of the fuel-neutral stance the Commission has long upheld, while driving up costs to load without providing substantial benefits to consumers.

III. Establishing an Economic Framework for Bulk Power Resilience

If the Commission seeks further examination of generation and transmission resilience, it should encourage RTO/ISOs to provide evaluations through a robust economic framework. This begins with identifying whether market failures associated with generation resilience are distinct from those associated with reliability. To the extent they are the same, current market design should already remunerate resilience services under existing constructs.

If generation resilience poses a distinct market failure, it may warrant the creation of an organized market product(s), a refinement to an existing product(s), or no action at all. Real-time prices that reflect VOLL may provide sufficient incentive for generators and load to engage in bilateral contracts and distributed self-supply in response to anticipated HILF events. This would require no change to organized market products.

Some HILF events stem from common mode failure that may justify refinements to existing organized products. For example, the adjustment of forced outage rate methodology in capacity accreditation processes is one option to account for correlated generator outages.

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[3] Karen Palmer, Devin Hartman, and Daniel Shawhan, "Understanding grid resilience implications for market design: Beyond the NETL study," *Utility Dive*, April 24, 2018. https://www.utilitydive.com/news/understanding-grid-resilience-implications-for-market-design-beyond-the-ne/522052/.

[4] Despite extensive turnover in the generation fleet, there is no apparent evidence of imminent loss of entire resource classes. For example, see the net revenues analysis of PJM's fleet by Monitoring Analytics in the 2017 PJM State of the Market Report: http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2017/2017-som-pjm-sec7.pdf.

A subset of HILF events may have exceptionally unlikely and unknown probabilities of occurrence but carry extreme impact potential. This could create an information deficiency where private actors do not efficiently procure resilience services. It would also raise questions of instrument choice (i.e., role of standards, central planning, or creation of organized market product) and how best to determine a "socially acceptable" risk level. In transmission planning, it raises questions of contingency definitions, among other planning parameters.

Conventional economic metrics may have limited applicability to evaluate such extreme HILF events (i.e., fat tail events). They would limit the ability to use cost-benefit and risk analyses that produce expected values. One alternative approach is the use of break-even analysis, which is more hypothetical in nature.[5] This raises concerns over unintended consequences of error-prone central planning, especially as decentralized networks may offer a more cost-effective alternative to mitigate extreme HILF event consequences.

The Commission should encourage the examination of the economic literature on risk allocation and management in other industries to see whether extreme HILF events constitute a unique market failure that justifies a "social insurance" policy. Many other industries face the same threats as those identified by the RTO/ISOs and may provide insight. For example, private insurers efficiently mitigate market risk from extreme weather events (e.g., flood and drought insurance for agriculture, hurricane insurance for buildings), while socialized insurance distorts resource allocation. However, some threats may create severe information asymmetries or have extreme capital requirements to back massive liabilities that create inefficiencies in private markets. Private markets already efficiently account for many of the HILF causes identified by the RTO/ISOs (e.g., extreme weather and cybersecurity), which suggests that ensuring real-time markets accurately reflect VOLL would provide sufficient incentive for private actors to physically or financially hedge against many or most HILF events.

IV. Recommendations

1. *Prioritize improvement of conceptual understanding and diagnostics of bulk power resilience as it relates to end-use customer resilience*. Devising and interpreting metrics for bulk system resilience should account for coincidence with distribution-level outages. The relationship between bulk generation resilience and end-use customer resilience is tenuous in many cases. The vast majority of resilience

[5] William Zarakas, "Investing in Electric Reliability and Resiliency," The Brattle Group, July 15, 2014, p. 6. http://files.brattle.com/files/6040_investing_in_electric_reliability_and_resiliency.pdf.

vulnerabilities occur at the T&D level, while prospects for distributed resources to mitigate customer outages continues to grow.

2. *Advance an economic framework for the evaluation of bulk power resilience*. This begins with a process to identify whether market failures associated with resilience exacerbate or are unique from those associated with the conventional definition of reliability. The Commission should clarify that any proposed resilience reforms must be consistent with economic objectives, including the principle of incentive compatibility in market design and the use of cost-benefit analysis and risk management in transmission planning.
3. *Avoid ad hoc, premature reforms to avoid unintended consequences*. If reforms precede the development of an economic framework for resilience, they are likely to stray from economic principles. A rushed resilience policy agenda could create a path dependency toward overly prescriptive market design and costly transmission planning reforms. The market monitors and RTO/ISOs have not identified imminent short-term resilience failures that justify interim interventions.
4. *Determine next steps based on the degree of regional heterogeneity in resilience threats and system conditions*. The RTO/ISO comments emphasized region-specific concerns that pertained to differences in infrastructure and the nature of threats. This suggests that policy commonality lies more with conceptual development than specific reforms.

I. CONCLUSION

RSI respectfully requests the Commission consider the comments contained herein.

Respectfully submitted,

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