

Commission on February 7, 2018. The Commission has extended the time for Commission reconsideration of the Rehearing Request.⁴

Resilient Societies provided empirical evidence that households in the ISO-New England service territory paid up to \$100 per year in capacity market charges, these charges being substantially for “ghost capacity”—i.e., capacity: that is not truly resilient and may be unavailable during grid emergencies.⁵ Hence, while Resilient Society firmly supports the concept of “resilient capacity” auctions and resilient capacity pricing, we indicated actual pricing signals were at present inadequate to attain both the goals of grid resilience and the statutory fulfilment of a *reliable* Bulk Power System that can avoid the cascading outages for which Section 215 reliability standards are designed. Furthermore, while we concur that the organized markets for electricity generation may have produced consumer savings in the short run, we expressed the need to provide positive financial incentives for incremental levels of on-site fuel storage at electricity generating facilities, dual-fuel fuel capability, Liquid Natural Gas (LNG) and other energy storage capacity, firm fuel supply from interstate gas pipelines, and other resilience-enhancing measures.

⁴ *Order Granting Rehearing for Further Consideration*, in Dockets RM18-1-001 and AD18-7-001, issued March 8, 2018. Also see Comments and Reply Comments of Resilient Societies submitted in FERC Docket RM18-1-000, filed on October 23, 2017 and November 7, 2017, available in the RM18-1-000 Docket and at https://www.resilientsocieties.org/uploads/5/4/0/0/54008795/resilient_societies_ferc_docket_rm18-1-000_20171024.pdf. Our Reply Comments are available in the Docket and at https://www.resilientsocieties.org/uploads/5/4/0/0/54008795/resilient_societies_reply_comments_docket_rm18-1-000_final.pdf.

⁵ See *Request for Rehearing*, February 7, 2018, Table entitled “ ‘Ghost Capacity’ Scenario in ISO-New England under Forward Capacity Auction No. 11. Our analysis determined that “ghost capacity” constituted about 35 percent pf projected cleared capacity, and potentially 65 percent of net available capacity” for the winter 2020/21 capacity market in ISO-New England. See *Request for Rehearing*, Feb. 7, 2018, at p. 7.

About Resilient Societies

Resilient Societies is incorporated in the State of New Hampshire as a non-profit organization engaged in scientific research and education with the goal of protecting technologically-advanced societies from infrequently occurring natural and man-made disasters. Resilient Societies seeks a more robust and resilient Bulk Power System, in part because all other critical infrastructures depend upon the reliability and recovery of the Bulk Power System. Resilient Societies seeks to identify cost-effective opportunities to protect societies and then develop policy initiatives. Further information about Resilient Societies may be found at www.resilientsocieties.org.

Reply Comments

A. We provisionally accept the definitions of resilience in the FERC request for comments.

B. We recommend rejection of the concept of “resilience” as a distinct supplement to “Reliable Operation” as defined in Section 215 of the Federal Power Act. In fact, resilience is a prerequisite for Reliable Operation of the bulk power system. A resilient system can under most circumstances attain Reliable Operation. If risks to Reliable Operation are foreseen, then investment in resilience can provide a cost-effective increase in system reliability, and provide agile and adaptive responses that minimize potential economic losses and loss of life. Conversely, without design and implementation of a resilient Bulk Power System, Reliable Operation is at risk of catastrophic failure.

C. A resilient Bulk Power System will cost-effectively protect against multiple hazards. For example, protection against the E3 waveform from nuclear electromagnetic pulse will also protect against the less severe geoelectric field from naturally-occurring solar storms, also called geomagnetic disturbance (GMD). In contrast, piecemeal planning to achieve limited resilience may be a false economy.

D. In pricing of resilience for electricity markets, the Value of Lost Load (VOLL) times probability of events could be a useful metric. In determining the impact of lost load, studies such as the ISO New England Operational Fuel-Security Analysis dated January 17, 2018 and NEPOOL scenario enhancements dated May 8, 2018 are useful. When probabilities cannot be computed, deterministic modeling of major contingencies with scenario variants is a valuable technique.

E. At present, planning processes for generation capacity, transmission capacity, and distribution infrastructure do not sufficiently take into account potential societal losses from lost load—i.e., blackouts. Consideration of economic losses and harm to human populations during blackouts should be a specific part of RTO/ISO planning processes.

Recently Released EMP Commission Reports

On May 8, 2018, the Commission to Assess the Threat to the United States from Electromagnetic Pulse Attack (“EMP Commission”) released two reports. The first report is

titled “Assessing the Threat from Electromagnetic Pulse (EMP). Volume 1: Executive Report.”⁶

The Defense Technical Information Center (DTIC) abstract for this report reads:

The critical national infrastructure in the United States faces a present and continuing existential threat from combined-arms warfare, including cyber and manmade electromagnetic pulse (EMP) attack, as well as from natural EMP from a solar superstorm. During the Cold War, the U.S. was primarily concerned about an EMP attack generated by a high-altitude nuclear weapon as a tactic by which the Soviet Union could suppress the U.S. national command authority and the ability to respond to a nuclear attack--and thus negate the deterrence value of assured nuclear retaliation. Within the last decade, newly-armed adversaries, including North Korea, have been developing the ability and threatening to carry out an EMP attack against the United States. Such an attack would give countries that have only a small number of nuclear weapons the ability to cause widespread, long-lasting damage to critical national infrastructures, to the United States itself as a viable country, and to the survival of a majority of its population. Protecting and defending the national electric grid and other critical infrastructures from cyber and EMP could be accomplished at reasonable cost and minimal disruption to the present systems that comprise U.S. critical infrastructure. This is commensurate with Trump Administration plans to repair and improve U.S. infrastructures, increase their reliability, and strengthen homeland defense and military capability. Continued failure to address the U.S. vulnerability to EMP generated by a high-altitude nuclear weapon invites such an attack.

The second report is titled “Recommended E3 HEMP Heave Electric Field Waveform for the Critical Infrastructures. Volume 2.”⁷ The DTIC abstract for this report reads:

⁶ Commission to Assess the Threat to the United States from Electromagnetic Pulse Attack. “Assessing the Threat from Electromagnetic Pulse (EMP). Volume 1: Executive Report.” Report. July 31, 2017. Available at: <http://www.dtic.mil/dtic/tr/fulltext/u2/1051492.pdf>. Also available at: https://www.empcenter.org/storage/GeneralPublications/executive_report_on_assessing_the_threat_from_emp_-_final_april2018.pdf.

⁷ Commission to Assess the Threat to the United States from Electromagnetic Pulse Attack. “Recommended E3 HEMP Heave Electric Field Waveform for the Critical Infrastructures. Volume 2.” Report. July 31, 2017. Available at: <http://www.dtic.mil/dtic/tr/fulltext/u2/1051494.pdf>. Also available at: https://www.empcenter.org/storage/GeneralPublications/recommended_e3_waveform_for_critical_infrastructures_-_final_april2018.pdf.

This EMP Commission Report, utilizing unclassified data from Soviet-era nuclear tests, establishes that recent estimates by the Electric Power Research Institute (EPRI) and others that the low-frequency component of nuclear high-altitude EMP (E3 HEMP) are too low by at least a factor of 3. Moreover, this assessment disproves another claim-- often made by the U.S. Federal Energy Regulatory Commission (FERC), the North American Electric Reliability Corporation (NERC), EPRI and others--that the FERC-NERC Standard for solar storm protection against geo-magnetic disturbances (8 volts/kilometer, V/km) will also protect against nuclear E3 HEMP. A realistic unclassified peak level for E3 HEMP would be 85 V/km for CONUS as described in this report. New studies by EPRI and others are unnecessary since the Department of Defense has invested decades producing accurate assessments of the EMP threat environment and of technologies and techniques for cost-effective protection against EMP. The best solution is for DoD to share this information with industry to support near-term protection of electric grids and other national critical infrastructures that are vital both for DoD to perform its missions and for the survival of the American people.

These and other reports of the EMP Commission should be used as inputs to the resilience planning process for RTO/ISOs. Without including common-mode failure contingencies in auctions for resilient capacity, it is likely that the financial incentives to protect generation and transmission facilities, including relays and large power transformers that are vulnerable to man-made electromagnetic pulse hazards and solar storms, will be insufficient and facilities will remain under-protected. FERC and the RTOs/ISOs, and transmission system operators should develop metrics for resilient capacity. Better pricing signals plus cost recovery, if demonstrated to be prudent, can strengthen grid resilience and bolster deterrence of volitional harms.

Conclusions.


Planning for resilience should be an integral part of planning for Reliable Operation. Consideration of potential societal losses should be a component of resilience planning. In

resilience planning, FERC should use available studies from other elements of the federal government, including the reports of the EMP Commission.

Respectfully submitted by:

Handwritten signature of William R. Harris in black ink.

William R. Harris, Secretary

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Document Content(s)

Resilient Societies Reply Comments AD18-7-000_Final.PDF.....1-7