UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Transmission System Planning Performance Requirements for Extreme Weather	**)**	**RM22-10-000**

WATT COALITION COMMENTS
August 26, 2022

The Working for Advanced Transmission Technologies ("WATT") Coalition appreciates the opportunity to provide perspectives on the Federal Energy Regulatory Commission's (the "Commission") June 16, 2022 Notice of Proposed Rule Making (NOPR) in the above-captioned proceeding. In this response, the WATT Coalition details the resilience value of Grid Enhancing Technologies (GETs) in extreme weather and requirements that would unlock system-wide value from deployments of these technologies. The WATT Coalition urges the Commission to require planners to consider dynamic line ratings, advanced power flow control and topology optimization in their planning processes, and specifically in Corrective Action Plans**.**

I. The WATT Coalition

The WATT Coalition is a trade association supporting wide deployment of GETs to accelerate the clean energy transition and lower energy costs. Our members include grid technology, renewable energy, a transmission utility, and investment companies. Dynamic Line Ratings determine the true, real-time capacity of power lines. Advanced Power Flow Control allows operators to reroute power to lines with available capacity. Topology Optimization identifies the best grid reconfigurations to reroute flow around bottlenecks. In operations, these technologies reduce congestion costs and improve economic dispatch, situational awareness and reliability. In planning, they reduce the time, cost and complexity of integrating new generation and load. More information about the WATT Coalition is available at watt-transmission.org.

II. Comments

The WATT Coalition supports the FERC's work in the NOPR to modify the Reliability Standards to address extreme weather. Grid Enhancing Technologies are important tools in maintaining grid reliability in the face of transmission or generation outages and have unique value in the case of extreme heat or cold. **FERC should require planners to evaluate dynamic line ratings, advanced power flow control and topology optimization in their Corrective Action Plans for both steady state and stability planning events.**

Only one GET is explicitly required to be evaluated in Corrective Action Plans under NERC TPL-001-5: power flow control is evaluated for stability enhancement.[1]

[1] See Transmission System Planning Performance Requirements, P 9

GETs are implicitly[2] included but should be named to ensure that they are being evaluated. These technologies are likely to provide greatest net benefit for economics and reliability due to their low upfront cost, fast installation time, and system-wide benefits for congestion reduction under normal operation, and grid flexibility in severe weather.

1. How Grid Enhancing Technologies support reliability in extreme weather

GETs allow grid operators to monitor and respond to conditions on the grid. Individual technologies each contribute to safer and more flexible grid operations and can mitigate reliability risks during severe weather.

A. Dynamic Line Ratings (DLR)

DLR monitors real-time ambient conditions, such as wind speed and temperature, which cool or heat transmission lines. These factors are used to calculate the true capacity of transmission lines, based on their thermal limits. In cold or windy conditions, DLR allows significantly more power flow than a static rating, which is based conservatively on hot and still conditions. FERC's order to use Ambient Adjusted Ratings will support greater line capacity in standard conditions, but DLR is especially helpful in extreme scenarios when multiple weather conditions should be factored into line rating. Basing line ratings on real-time data also detects when flows should be reduced to continue safe and reliable operation in extreme heat. In addition, DLR technologies are also helpful in identifying damaged or aging infrastructure, thereby allowing operators to respond more quickly to outages, including those caused by extreme weather.

GETs such as DLR can be a critical tool to improve grid reliability since DLR sensors can also evaluate conductor health and detect adverse phenomenon like galloping, conductor creep, excessive sag, blowout, conductor fatigue, ice accretion and wildfires. When DLR systems are integrated into utility operations, real-time awareness can be routed directly into the utility's EMS system for real-time system awareness.

B. Advanced Power Flow Control (APFC)

Power flow control technologies are uniquely able to actively balance electrical flows on transmission lines. The hardware can intelligently raise or lower the impedance, or the opposition to current, in real time to ensure that power is delivered on lines that have available capacity. APFC technology expands on this function with enhancements such

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[2] TPL-001-5, available at https://www.nerc.com/pa/Stand/Reliability%20Standards/TPL-001-5.pdf, provides the following list of examples of actions that can be used to achieve required system performance after a deficiency has been identified (section 2.7.1 on P 5):
"Examples of such actions include:
-Installation, modification, retirement, or removal of Transmission and generation Facilities and any associated equipment.
-Installation, modification, or removal of Protection Systems or Remedial Action Schemes.
-Installation or modification of automatic generation tripping as a response to a single or multiple Contingency to mitigate Stability performance violations.
-Installation or modification of manual and automatic generation runback/tripping as a response to a single or multiple Contingency to mitigate steady state performance violations.
-Use of Operating Procedures specifying how long they will be needed as part of the Corrective Action Plan.
-Use of rate applications, DSM, new technologies, or other initiatives."

as faster and more flexible deployment options, easy scaling to meet the size of the need, and ability to relocate when needed elsewhere on the grid.

During extreme weather events, outages, shifts in resource mix availability, and even increased customer demand, APFC can alter the flow of power on the grid, ensuring that lines are not overloaded and rerouting power along underutilized transmission corridors to ensure delivery.

Destructive natural disaster events—such as Superstorm Sandy[3]— underscore the importance of planning in ways that build optionality into grid operations. APFC allows operators to rapidly respond to changes in available generation and transmission to reduce the length and scale of outages and facilitate optimal system recovery.

C. Topology Optimization

Transmission topology optimization software models the grid's network and power flow conditions to identify ways to reroute power flow around congested, overloaded, or compromised transmission elements. These "reconfigurations" are implemented through switching on or off existing high voltage circuit breakers.

In normal operations, topology control increases the transfer capacity of the grid by distributing flow more evenly over the network. When extreme weather causes outages or other changes to power flow, topology optimization can identify a suite of operational changes to stabilize the grid and deliver as much power as possible. The feasibility and benefits of optimally reconfiguring the transmission grid under extreme event conditions has been showcased in studies of Corrective Action Plans in SPP (see presentation by Ruiz et al in FERC Docket AD10-12-009, slides 23 and 24),[4] where in all three existing Corrective Action Plans studied, the use of load shedding was avoided by using one or two optimal grid reconfigurations.

2. Value of Grid Enhancing Technologies in Corrective Action Plans

Corrective Action Plans must be implemented on relatively short time scales. GETs can generally be deployed in less than one year and can also be redeployed to a higher-value location once a longer-term solution, such as new transmission infrastructure, has been completed.

It is also important that the development of Corrective Action Plans under TPL-001 account for correlated conventional generator outages and derates. This will properly account for the reliability risks of Corrective Action Plans that rely on building more generation that is subject to the same correlated outage risks as existing generation. For example, building more gas generators supplied from the same gas field or from the same interstate pipeline that supplies existing gas generators may not be an effective tool for mitigating risk after accounting for the risk of correlated outages. As the Commission noted in the NOPR, widespread thermal

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[3] Carl Zichella, "DOE Advisory Committee's Grid Modernization Recommendations: Evolving to an Integrated Grid". The Electricity Journal, Volume 27, Issue 10, 2014, Pages 64-71, ISSN 1040-6190, https://doi.org/10.1016/j.tej.2014.11.012.

4 Available at: https://www.ferc.gov/sites/default/files/2020-08/T4-2_Ruiz.pdf

generation outages were the primary factor causing the blackouts in Texas in February 2021,[5] as well as other recent severe weather events. Transmission-based corrective actions such as GETs will not exacerbate risk from correlated outages and will be complementary to other solutions.

GETs also increase the value of existing transmission assets and decrease reliance on particular contingencies. The use of GETs to maximize transmission grid capacity and flexibility will allow all available grid assets to fully contribute to maintaining reliability in extreme weather.

III. Conclusion

The WATT Collation's recommendations will make rates just and reasonable and improve reliable service by appropriately incorporating Grid-Enhancing Technologies into transmission planning. Grid flexibility is crucial to transmission reliability during extreme weather. We appreciate the opportunity to provide comment on the NOPR.

August 26, 2022

Signed,

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[5] The One-Year Anniversary of Winter Storm Uri: Lessons Learned and the Continued Need for Large-Scale Transmission, Michael Goggin and Jesse Schneider: https://gridprogress.files.wordpress.com/2022/02/the-one-year-anniversary-of-winter-storm-uri-lessons-learned-and-the-continued-need-for-large-scale-transmission.pdf