**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

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| **Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection** | **)** | **RM21-17-000** |

# WATT COALITION COMMENTS
**October 12, 2021**

The WATT Coalition ("WATT") appreciates the opportunity to submit comments on the Federal Energy Regulatory Commission's ("the Commission") July 15, 2021 Advanced Notice of Proposed Rule Making (ANOPR) in the above-captioned proceeding. WATT commends FERC for its engagement in the topics of transmission planning and cost allocation, and generator interconnection, specifically in reforms designed to encourage the adoption of Grid Enhancing Technologies (GETs). In these comments, we address aspects of the ANOPR related to reforms that will lead to more efficient operation of the existing grid, which is a primary focus of WATT.

## 1. WATT Coalition description

The WATT Coalition started in 2017 and is made up of technology providers who support greater deployment and use of grid operating technologies such as Dynamic Line Ratings, Power Flow Control, and Topology Optimization. WATT includes the following seven members:

- *Ampacimon*, a global leader in grid monitoring solutions that utilize patented sensors and software to increase the capacity of transmission and distribution assets. Their dynamic line rating systems have been deployed worldwide with grid monitoring sensors and software installed on over 100 transmission lines across 15 different countries.
- *Heimdall Power* provides cost-efficient dynamic line rating-based solutions to support data-driven decision-making for operations and planning of high-voltage overhead power lines. Their sensors and software optimize power grid utilization by maximizing power line capacity, control, and uptime. Real-time and forecast insights allow for swift detection of issues & predictive maintenance, and increased flexibility through energy flow & bottleneck analysis.
- *Lindsey Manufacturing Company* which provides innovative and cost saving products to the global electric utility industry. Lindsey is an industry leader in transmission line monitors and software for measuring and forecasting dynamic line ratings and line capacity. They produce a variety of other systems designed to enhance grid resiliency and optimize distribution networks.
- *LineVision* which provides utility solutions that leverage advanced sensors and analytics to increase the capacity, flexibility, and reliability of overhead lines. Their non-contact monitoring systems provide real-time situational awareness and anomaly detection, unlock additional capacity on existing lines, and provide condition-based health analysis to optimize asset management and grid reliability.
- *NewGrid*, a software firm that provides transmission topology optimization tools and services. NewGrid's software automatically identifies grid reconfigurations to route power flow around congested or overloaded transmission facilities (it is, in a sense, a "Waze" for the grid), increasing the transfer capability of the grid and delivering savings and increased reliability and resilience.

- *Smart Wires* which develops and implements technologies that advance the delivery of electricity around the world. With their technology, electric utilities can maximize transfer capacity on their grids, creating a more flexible and efficient network. Their power flow control technology dynamically controls transmission line reactance to direct power away from overloaded lines onto lines with spare capacity.
- *WindSim* which has developed a wind farm design software based on computational fluid dynamics that optimizes wind turbine placement. Using accurate simulations, WindSim software can more realistically capture terrain effects on wind conditions than many traditional technologies.

## 2. WATT Supports the Reform of Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection

Across the country, customers pay $6 billion worth of extra costs annually due to transmission congestion.[1] Generation developers also face grid-related issues, with less than 20% of renewable energy projects in Generation Interconnection (GI) queues reaching commercial operation[2]. New and expanded transmission facilities will help alleviate grid congestion and enable renewables integration, but these facilities take time and face cost allocation and permitting difficulties. Thus, reforming transmission planning to encourage optimization of the existing network is key to reducing congestion. Collectively, network optimization technologies (also known as Grid Enhancing Technologies, or GETs) could save billions of dollars per year by reducing congestion.[3]

When included in the regional transmission planning process, GETs provide additional network benefits, including significantly improved reliability and resilience due to more granular asset control and data acquisition, yielding better feedback for near and long-term planning studies alike. WATT is pleased to offer the following suggestions to help the Commission effectively implement GETs in Transmission Planning and Generator Interconnection processes.

### 2.1 Grid Enhancing Technologies to Include in Transmission Planning and Generation Interconnection Processes

The transmission grid is typically operated in a static and passive fashion. Transmission operators traditionally use fixed ratings, based on conservative planning calculations; fixed settings, without power flow controls; and fixed topology/configuration, using normal (planning) open/close breaker status. This fixed grid topology was appropriate to deliver power from large central power plants to load, but greater grid flexibility is required as the generation mix shifts to variable and renewable sources.

GETs can increase the flexibility, reliability, and utilization of the transmission grid. These technologies are commercially available today, and have benefitted from the extraordinary increase in computing power and data collection and management systems that are transforming most other sectors of the economy. GETs have also all benefitted from learning-by-doing – various GETs projects have been completed in the US and abroad. Leading GETs technologies include:

*Dynamic Line Rating (DLR)*

[1] See Appendix A of Grid Strategies White Paper

[2] Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2020 LBNL - PowerPoint Presentation (lbl.gov)

[3] See Appendix A of Grid Strategies White Paper

DLR technologies monitor ambient conditions that heat or cool transmission lines to calculate the true capacity of transmission lines based on their thermal limits. In windy regions where transmission capacity is critical for wind power development, DLR often allows significantly more power flow than a static rating over the course of the year. DLR technologies also detect when flows should be reduced to continue safe and reliable operation in extreme heat or other conditions.

*Advanced Power Flow Control*

Power flow control technologies actively balance the flow on transmission lines, thereby optimizing the capacity of the existing grid. The hardware can intelligently raise or lower the impedance (the opposition to current) in real time to ensure that power is delivered on lines that have the capacity to carry it. Advanced power flow control expands on this function with enhancements such as faster and more flexible deployment options, easy scaling to meet the size of the need, and the ability to relocate when needed elsewhere on the grid.

*Topology Optimization*

Transmission topology optimization software models the grid's network and power conditions to identify ways to reroute power flow around congested or overloaded transmission elements. These "reconfigurations" are implemented by switching on or off existing high voltage circuit breakers. By more evenly distributing flow over the network, topology control increases the transfer capacity of the grid.

## 2.2 Value of Including GETs in Transmission Planning and Generation Interconnection Processes

*GETs Value in Transmission Planning*

GETs are low-cost, modular, rapidly deployable, and non-binary transmission solutions that can be scaled throughout study phases as assumptions change. These flexible solutions can:

- Address issues caused by uncertainties and sensitivities in planning models
- Meet short-term/urgent needs (<6 months) that cannot be addressed by legacy transmission solutions, including system recovery after extreme events
- Facilitate outage windows and enable faster construction and project delivery (e.g., for voltage uprating)
- Offset economic and reliability impacts from transmission outages
- Reduce or defer capital investment (e.g., either reconductoring or new line construction)
- Enable faster connection of major new load pockets (e.g., data centers, mining, etc.)
- Reduce production costs/uneconomic dispatch by relieving congested paths
- Avoid building lines in sensitive or densely populated urban areas
- Prevent voltage collapse and provide voltage support on long lines, including radial lines
- Enhance series compensation with negligible SSR or SSCI risk
- Enable more interregional power transfer across seams or borders
- Improve asset utilization by lowering the system’s overall cost of delivered energy and capacity
- Provide asset health data to better inform maintenance schedules and rebuilds
- Provide data on operating conditions to refine parameters used in planning assumptions as well as design criteria used for planning purposes

*GETs Impact on Congestion Costs*

U.S. electricity customers are spending more than $6 billion per year on grid congestion charges. By extrapolating on the results of regional congestion cost studies, the WATT Coalition conservatively estimates that GETs could eliminate about 1/3 of these congestion costs.[4] These savings sum to $2 billion per year or $20 billion over ten years. This estimate understates the GETs value because there is a very large amount of new generation that will need transmission delivery service in the future as much of the best renewable energy sites are remote from population centers.

*GETs Impact on Generation Interconnection*

In 2020, The Brattle Group conducted an extensive study to quantify the benefits of the three GETs for integrating renewable resources using Kansas and Oklahoma (SPP) as a testbed. The study showed that, if deployed across the Kansas and Oklahoma grids, GETs would enable more than twice the amount of additional new renewables to be integrated without requiring transmission reinforcements while maintaining system reliability standards (2.6 GW in the status quo case increased to 5.3 GW with GETs). This increase in renewable integration resulted in annual production cost savings of $175M/year, leading to an estimated payback of 6 months. Extrapolating these results to the national level, GETs can enable annual benefits of over $5 billion in production cost savings due to the increased renewable installations and enough carbon emission reductions to offset all new automobiles sold in the U.S. in a year.

*Ancillary benefits*

Reliability – GETs improve situational awareness of grid conditions and allow for more rapid implementation of critical short and long-term solutions.

Flexibility – GETs deployments can be scaled and easily redeployed on the network as needs change.

Disaster Response – GETs enable greater intelligence, more rapid deployability, and improved control to allow for quicker, wider system recovery.

Network visibility - GETs increase the granularity and frequency of line and flow data to provide system operators and market participants' clearer understanding of grid conditions.

## 3. Recommendations for the Transmission Planning Process

WATT recommends that FERC implement the following transmission planning processes, requirements, and incentive structures:

### 3.1 'Optimize, Rebuild, Expand' Framework for Transmission Planning

WATT recommends that FERC implement the "optimize, rebuild, expand" transmission planning framework which encourages optimization of existing transmission assets, then rebuild of existing assets, and finally expansion of the transmission network in a sequential loading order. WATT recommends that all Planning Authority (PA) portfolio plans study, include where appropriate, and report on GETs transmission constraint solutions. For proposed transmission projects with an initial cost estimate above $10M, FERC should require the PA to show documentation of their evaluation of alternative solutions utilizing GETs. Documentation could include power flow study results, asset condition/performance data, and any other materials that provide validation of the requirement for transmission line upgrade or expansion as the preferred network upgrade. Absent adequate documentation, the portfolio plan would be

[4] See Appendix A of Grid Strategies White Paper

obliged to include the more rapid, cost-effective network upgrade leveraging GETs. Implementing this policy would greatly reduce the cost of transmission solutions and annual congestion costs for customers.

GETs can also serve as bridging solutions to TOs and PAs as infrastructure solutions that take longer to plan, permit, construct, and commission (ex. new lines) are in development. Once these more time-consuming solutions are in place, the flexibility of GETs deployments enable optimization of the new transmission asset or relocation to a new constrained area of the system. This scheme may even improve the benefit-to-cost ratio for the new transmission asset, as GETs can ensure the asset is utilized to its fullest potential.

### 3.2 Stakeholder Proposals for Transmission Alternatives

WATT recommends that FERC require TOs also demonstrate a first-pass evaluation of GETs transmission solutions in their transmission expansion plans. Some regions have established open submission windows for qualified market participants to submit alternative solutions to TO transmission plans, however the TO inherently has the best data stream to generate efficient solutions, and thus the burden of proof for GETs implementation should be on them.[5] WATT believes that this requirement would improve the solutions identified to solve grid constraints by spurring TOs to work with GETs experts and better leverage the industry knowledge base.

### 3.3 Performance-Based Ratemaking

WATT recommends that FERC implement a version of the shared savings incentive proposal submitted under RM20-10-000 as a form of performance-based ralemaking (PBR).[6] The shared savings structure would ease the transition toward the "optimize, rebuild, expand" transmission planning framework by encouraging wider implementation of GETs, while ensuring significant customer benefit and establishing a competitive market for transmission upgrades. This PBR also facilitates the TO stated interest in gaining familiarity with GETs and identifying new applications for their use.

### 3.4 Transmission Outage Operational Impacts

TOs and PAs should include GETs during their operational planning processes that aim to minimize the operational impact (both reliability and economic) of constructing and commissioning transmission upgrades specified in the planning process. Most upgrades are associated with multi-month or even multi-year outages. WATT suggests that FERC require TOs and PAs to propose solutions that minimize the impacts of such long duration outages, possibly using GETs – which are low-cost, rapidly deployable, and redeployable to address planned outages around the system. Familiarity with GETs used for outage management can pay significant dividends for reliability, market efficiency, and resiliency given the increased frequency of extreme weather-driven system outage that happen across all seasons.

## 4. Recommendations for the Generator Interconnection Process

### 4.1 Optimize, Rebuild, Expand Framework for Generation Interconnection (GI)

WATT recommends that FERC implement the "optimize, rebuild, expand" transmission planning framework as it relates to GI-related network upgrades. WATT recommends that TOs and/or PAs be similarly required to demonstrate a first-pass evaluation of GETs transmission alternative solutions to constraints identified in the GI study process, when recommended rebuilds or system expansions exceed

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[5] CAISO has included this step in their transmission planning process (CAISO business practice manual section 3.2.1). CAISO states that "interested parties may submit recommendations and proposals for possible consideration in the development of the draft unified planning assumptions and study plan."

[6] See, e.g., WATT Coalition and Advanced Energy Economy July 1, 2020 Comments.

$10M. During the steady-state power flow study phase (generally Phase 1 of a system operator's interconnection study process), system operators must provide documentation to FERC that demonstrates GETs were assessed as described in Section 2.1. Implementing this policy would greatly reduce the cost of network upgrades, reduce the time renewable projects are in interconnection queues through increased cost allocation certainty, and reduce the cost of power delivered to customers by facilitating a faster transition to increased penetration of low-cost renewable generation.

### 4.2 Stakeholder Proposals for GI-related Network Upgrades

WATT recommends that following the initial completion of the PA or TO steady-state power flow study phase (generally the first phase of the interconnection study process), FERC adjust the existing comment window to include a formal call for qualified market participants to challenge and propose alternatives to TO or PA-identified GI-related network upgrades. Opening the solution identification process to sector stakeholders will encourage development of the lowest-cost, fastest-to-deploy network upgrades that ensure continued system reliability. These solutions can be evaluated on a benefit-to-cost basis according to the existing solution selection criteria.

## 5. Other Recommendations

### 5.1 Grid Utilization Report

The Commission sought comment on transparency measures, specifically whether FERC should consider new transparency measures, beyond what is currently utilized within ISO/RTO regions.[7] WATT encourages the Commission to require periodic publication on grid utilization, to show how one of the most expensive assets in the U.S. is currently being used. A study commissioned by Western Electricity Coordinating Council (WECC) provides a strong example that can be standardized across regions.[8] The study included hourly power flow, operating limits, hourly firm and non-firm schedules, and Available Transfer Capacity. Transmission usage data will provide planners with a more holistic profile of their system capacity, establishing a new dataset for targeted GETs deployment and associated consumer savings. WATT asks that the Commission require similar reporting for the top 25% most constrained transmission lines (>138 kV). As grid utilization clearly falls within the interest and purview of the Market Monitor functionary, this report could be housed within individual ISO/RTO Market Monitor State of the Market (SoM) reports. The WECC report provided valuable information in a public document and WECC did not need to limit access to ensure data security. Therefore inclusion in the public SoM reports could provide significant insight to companies looking to address constraints with GETs.

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Signed,

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[7] ANOPR at para. 172

[8] Western Interconnection Transmission Path Utilization Study: Path Flows, Schedules and OASIS ATC Offerings WECC Transmission System 2008 & 2009, Including 10 Year History. WECC Transmission Expansion Planning Policy Committee. June, 2010. https://www.wecc.org/Reliability/2009_WI_TransPath_UtilizationStudy.pdf