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April 11, 2025

VIA E-FILING
Mr. William Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
Saint Paul, MN 55101-2147

Re: In the Matter of the 2025 Biennial Transmission Projects Report Docket No. E999/M-25-99

Dear Mr. Seuffert:

The WATT Coalition respectfully submits these initial comments, which have been e-filed through www.edocket.state.mn.us.

Please let me know if you have any questions.

Sincerely,

Julia Selker
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BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

IN THE MATTER OF THE 2025 BIENNIAL TRANSMISSION	**)**	
PROJECTS REPORT	**)**	**E999/M-25-99**
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INITIAL COMMENTS OF THE WATT COALITION

April 11, 2025

I. Introduction

The Working for Advanced Transmission Technologies (WATT) Coalition appreciates the opportunity to provide comments to the Minnesota Public Utilities Commission on the 2025 Biennial Transmission Projects Report. These comments address the specific questions around the key issue identified in the Commission's notice: *What methodology is appropriate for calculating the payback period of Grid Enhancing Technologies (GETs) as directed by Minnesota Session Laws, 2024, Chapter 127, Article 42, Section 52?*

This law made Minnesota a leader on grid modernization, requiring transmission owners to evaluate GETs and report on their cost-effectiveness in reducing congestion. The Commission's efforts to establish a clear, consistent methodology for calculating the payback period of GETs will be critical to realizing the full potential of this law. In the sections that follow, the WATT Coalition offers recommendations for how to structure that methodology – including what costs and benefits should be considered – how to account for forecasted congestion, and what payback period thresholds are appropriate to ensure GETs projects are advanced in a timely and equitable manner.

II. About the WATT Coalition

The WATT Coalition is a trade association focused on facilitating the adoption of advanced technologies on the US electric transmission system that improve reliability, lower costs, and enable economic development. WATT includes generation owners and developers, clean energy finance interests, and transmission owners; and technology vendors, offering expertise in Advanced Power Flow Control, Dynamic Line Ratings, and Topology Optimization. The views and opinions expressed in this filing do not necessarily reflect the official position of each of WATT's individual members.

III. About Grid Enhancing Technologies

Grid Enhancing Technologies (GETs) optimize how power can be delivered over existing infrastructure. This includes Dynamic Line Ratings (DLR), which adjust transmission capacity in real time based on environmental conditions rather than relying on static limits that often unnecessarily restrict power delivery; Advanced Power Flow Controllers (APFC), which actively manage power flows to alleviate congestion and improve system flexibility; and Transmission Topology Optimization (TTO), which uses software-driven network reconfiguration to maximize grid efficiency. These technologies have been successfully deployed around the world to unlock additional grid capacity, lower congestion costs, and improve overall system reliability.

IV. In addition to the frequency of congestion and increased costs to ratepayers (as required by Subd 2, clause 2), what, if any, issues, costs, and benefits are relevant to calculating the payback period of GETs installed to reduce transmission system congestion?

Utilities need to upgrade systems, train team members and adjust processes to use GETs in grid planning and operations. This transformation is overdue. For example, DLR has been deployed to great value in Belgium since before 2012,[1] but most U.S. utilities are not able to process DLR today. Any costs associated with internal modernization of the utility should not be included in a benefit-cost analysis for singular GETs deployments, as they enable all future use of each technology. Instead, utilities should proactively make these investments so that they can use GETs where they will be cost-effective in all future cases. GETs have been broadly deployed in Europe (see case studies for DLR,[2] APFC[3]) and are gaining traction in the US (see case studies for GETs,[4] and TTO[5]). Regulation should help utilities prepare to use these modern grid technologies, rather than allowing needed modernization of utility systems to stand in the way of specific deployments.

The cost of owning, operating and maintaining the specific GETs deployment should be considered as part of the benefit-cost analysis for any GETs deployment. Noting that while different vendors have different technologies and business models, APFC and DLR will generally have hardware costs for each installation. DLR systems may have yearly software costs as well for ratings forecasting services, a portion of which may be an incremental cost for a specific installation. TTO software will likely have subscription costs and

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[1] Elia, Dynamic Line Rating, https://www.elia.be/en/infrastructure-and-projects/our-infrastructure/dynamic-line-rating

[2] ENTSO-E Technopedia, Dynamic Line Ratings, 25 March 2025, https://www.entsoe.eu/technopedia/techsheets/dynamic-line-rating-dlr/

[3] ENTSO-E Technopedia, Static Synchronous Series Compensators (SSSC), 25 March 2025, https://www.entsoe.eu//technopedia/techsheets/static-synchronous-series-compensator-sssc/

[4] Unlocking Power: A Playbook on Grid Enhancing Technologies for State and Regional Regulators and Policymakers, American Council on Renewable Energy, October 2024 https://acore.org/wp-content/uploads/2024/10/Unlocking-Power-A-Playbook-on-Grid-Enhancing-Technologies-for-State-and-Regional-Regulators-and-Policymakers-1.pdf

[5] Topology Optimization Case Studies, May 28, 2024, NewGrid Inc., https://newgridinc.com/wp-content/uploads/2024/05/topology-optimization-case-studies.pdf

reconfiguration solutions may or may not create appreciable wear and tear on substation equipment, which could be considered in the benefit-cost analysis.

GETs systems have additional benefits beyond addressing congestion. For instance, certain types of DLR sensors provide data about asset health based on the line behavior, including conductor aging and other potential reliability risks. When a utility estimates the cost of DLR, they should consider what resilience and reliability benefits they can procure within the same monitoring system to maximize the value of the investment. Utilities can quantify the value of these other benefits on a case-by-case basis. Similarly, APFC has been deployed to reduce wear and tear on expensive grid assets such as Phase Shifting Transformers.[6] TTO evaluates the full system for optimization under various system conditions and can identify mitigation strategies for reliability needs. Finally, GETs can enable faster and cheaper interconnection of new low-cost resources, which can also reduce production costs. These resilience, reliability and cost-reduction benefits should all be able to be included in benefit-cost analysis, even if the project was initiated to address congestion.

V. What methodology should the Commission direct affected transmission owners to use in calculating the payback period of GETs in reducing congestion?

We recommend the Commission adopt a Benefit-Cost Ratio framework that focuses on savings from congestion relief. The following steps outline an example methodology:

Step 1: Quantify both historic and forecasted congestion.

While congestion costs can vary significantly year-to-year, many congestion costs repeat with seasonal weather and demand patterns. We recommend looking at historical congestion over three years as the law requires, and calculating the total congestion costs based on the MISO market shadow prices multiplied by the flow (or the limit as the proxy for the flow) over the constraint to capture the costs over the time period. The backwards-looking analysis over three years is one useful indication where congestion is likely to recur. Transmission owners should report on whether past congestion is expected not to recur due to unique circumstances such as an outage that is unlikely to be taken again, or where it is likely to be recurring due to generation and load patterns.

For forecasted congestion, utilities should study the impacts of planned outages on power flows, and estimate the grid congestion impacts. By testing outages in production cost modeling, utilities should get a picture of the cost of anticipated constraints. This is an area where transmission owners and system operators could significantly improve their

[6] See more from VELCO's presentation on the Sand Bar Phase Shifting Transformer Asset Condition presented to the Vermont System Planning Committee, April 17, 2024: https://www.vermontspc.com/sites/default/files/2024-04/Sand_Bar_PST_Asset_Condition_VSPC_V1.pdf

capabilities–past exercises have demonstrated that this analysis identified only a small fraction of actual congestion,[7] but MISO is showing leadership by studying congestion impacts of outages associated with transmission expansion plans.[8] Utilities and system operators should improve these models with benchmarking based on historical system data and other strategies. The quantification of future congestion should look at least over the next five years as the law requires. For extended outages or other foreseeable constraints, the analysis should evaluate the total congestion cost over the expected duration of the constraint if it is longer than five years.

GETs can be cost-effective to mitigate the impacts of temporary outages, since the systems are so inexpensive and the value of congestion relief can be in the 10s of millions of dollars in a single month. In only one year, MISO reports that 5 reconfigurations saved $21 million in congestion.[9] DLR on two constraints in the PPL Electric Utilities service area in Pennsylvania reduced congestion by $60 million year-over-year.[10] APFC was used to mitigate a 3+ year outage in Colombia for net savings of over $70 million.[11]

There are many highly congested lines in Minnesota that could benefit from GETs deployment. In January 2025, the MISO Reliability Subcommittee presented the top 10 congestion constraints from November 6, 2024 to January 13, 2025.[12] Four of these facilities fell within Minnesota:

- [$20.7 million] Helena – Scott County 345kV FLO Chub Lake – Helena 345kV
- [$12.9 million] Wilmarth 345/115kV XFRMR FLO Crandall – Wilmarth 345kV
- [$11.5 million] Mud Lake – Benton 230kV FLO Forbes – Chisago 500kV
- [$9.0 million] Chub Lake 345/115kV XFRMR FLO Scott County – Helena 345kV

Note that the Helena – Scott County and Chub Lake facilities had previously been in the list of top 10 constraints at least once over the past 12 months. For example, at the MISO

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[7] MISO Economic Planning Team, Update on MTEP23 Near Term Congestion Study, MISO Planning Subcommittee, August 9, 2023 https://cdn.misoenergy.org/20230809%20PSC%20Item%2007%20Near-Term%20Congestion%20Studies629799.pdf

[8] MISO, 2024 Near-Term Congestion Study Report, October 2024, https://cdn.misoenergy.org/MTEP24%20Near-Term%20Congestion%20Study%20Report657728.pdf.

[9] Jordan Cole, Topology Optimization: Reconfiguration for Congestion Cost Update, Midcontinent ISO Reliability Subcommittee (RSC), February 27, 2025, https://cdn.misoenergy.org/20250227%20RSC%20Item%2005%20Reconfiguration%20for%20Congestion%20Cost%20Update681229.pdf

[10] Eric Rosenberg, PPL Electric's Dynamic Line Ratings (DLR), 2024 EAP Conference10/8/2024, https://www.energypa.org/wp-content/uploads/2024/10/Dynamic-Line-Ratings-E-Rosenberger.pdf

[11] WATT Coalition, Case Studies and Modeling on the Value of Grid Enhancing Technologies, January 2024, https://watt-transmission.org/wp-content/uploads/2024/01/Case-Studies-and-Modeling-on-the-Value-of-Grid-Enhancing-Technologies-%E2%80%93-January-2024-.pdf

[12] MISO, Top 10 Congestion Cost Constraints, January 2025, https://cdn.misoenergy.org/20250123%20RSC%20Item%2002d%20Top%2010%20Congestion%20Constraints673238.pdf

Reliability Subcommittee Meeting on November 14, 2024, meeting materials[13] indicate that from October 10, 2024 to November 5, 2024, the Helena – Scott County facility was a constraint at $10 million in congestion, and the Chub Lake facility was a constraint at $2.8 million in congestion.

Most recently in February 2025, the MISO Reliability Subcommittee presented the top 10 congestion constraints from January 14, 2025 to February 18, 2025.[14] One of the four Minnesota constraints listed above showed up again: Wilmarth 345/115kV XFRMR FLO Crandall - Wilmarth 345kV, at $22.5 million in congestion.

Step 2: Estimate how much of identified congestion GETs could relieve based on production cost modeling and weather inputs.

Utilities should conduct power flow simulations and production cost modeling with and without GETs in service, over 8760 hours in all relevant years to determine the total likely cost savings. Some technologies' performance depends on external variables like weather or real-time system conditions. Utilities should apply sensitivity analysis to account for uncertainty, including extreme weather and commodity prices.

Utilities should partner with vendors and other stakeholders to ensure that this modeling reflects the likely outcomes of a GETs deployments. DLR vendors are able to estimate the value of DLR over a line based on weather and local geography very quickly, and APFC, TTO and utility software platform vendors are able to support modeling efforts. Additionally, EPRI, ESIG, national labs, industry groups and utilities are regularly publishing updated results and methods for evaluating GETs that can support utilities in developing best-practice analysis.

VI. What payback period value should the Commission set as the threshold at which a GETs project must be included in the implementation plan portion of a GETs Report?

With models of production cost savings in hand, utilities should work with vendors to establish the cost of a GETs deployment and then calculate payback periods. If the production cost savings from a GETs deployment exceed the cost of the deployment within the five-year period evaluated (or the expected duration of the congestion pattern, if it is due to planned outage, for example), the GET should be installed. Benefit-cost analysis for transmission projects generally are done on much longer timescales, but because GETs are

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[13] MISO, Top 10 Congestion Cost Constraints, November 2024, https://cdn.misoenergy.org/20241114%20RSC%20Item%2005%20Reconfiguration%20for%20Congestion%20Cost%20Update660436.pdf.

[14] MISO, Top 10 Congestion Constraints, February 2025, https://cdn.misoenergy.org/20250227%20RSC%20Item%2005%20Reconfiguration%20for%20Congestion%20Cost%20Update681229.pdf.

lower cost and congestion patterns change, this higher bar will help identify high-value deployments.

According to MISO transmission owner estimates, DLR costs typically range from $100,000 to $200,000 per line.[15] Costs can vary based on line length and terrain complexity, but this estimate suggests that lines with as little as $10,000 of yearly congestion could benefit from cost-effective DLR deployments.

Lines with moderate, but meaningful, congestion often are often not considered for traditional economic or reliability upgrades. For these lines, GETs may be the only cost-effective solution to unlock additional transfer capacity. Deploying GETs on these lines would save ratepayers millions every month by enabling more efficient economic dispatch.

VII. Should the Commission request or require transmission owners to evaluate the cost effectiveness or payback periods of GETs projects addressing locations likely to experience high levels of congestion during the next five years (Subd. 2, clause 3), in addition to those with existing congestion (Subd. 2, clause 1)?

Yes, see Section V and VI.

VIII. Are there equity, workforce, or environmental justice factors the Commission should consider when developing a GETs payback period methodology?

By reducing congestion on the grid, GETs enable the delivery of lower-cost, renewable energy — decreasing reliance on fossil fuel "peaker" plants, which are often sited in or near environmental justice communities.[16] This can reduce harmful air pollution and improve public health outcomes in vulnerable populations.

Growth in Grid Enhancing Technologies also grows the skilled technical labor force that designs, builds and deploys these tools. Other workers will develop new skills to bring their jobs into the future–grid operators, modelers and technicians and linemen will prepare to serve the grid as FERC Orders 881, 2023 and 1920 all require them to use GETs in the coming years.

With additional grid capacity comes additional jobs in energy generation and industry. The Brattle Group estimated that deploying GETs nationwide would lead to at least 330,000

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[15] FERC, Implementation of Dynamic Line Ratings, Notice of Inquiry, 178 FERC ¶ 61,110, Docket No. AD22-5-000, 87 Fed. Reg. 10,349 (Feb. 24, 2022), at 10.

[16] US Department of Energy, Transmission Impact Assessment, September 2024, at 11, https://www.energy.gov/sites/default/files/2024-10/DOE_OP_2024_Report-Transmission_Impact_Assessment.pdf.

short-term construction jobs and 20,000 long-term jobs in energy generation.[17] Expanding grid capacity is critical to meeting the expected load growth of 7 GW in MISO by 2030.[18] The electrification and industry behind this load growth will bring local jobs, if there is grid capacity to support it.

IX. Are there other issues or concerns related to this matter?

Yes, there are three additional issues that warrant the Commission's attention related to this matter. First, we encourage the Commission to prioritize transparency by requiring transmission owners to share the underlying congestion and GETs modeling assumptions used in public filings, to the extent possible. This will support meaningful stakeholder engagement through data transparency for all parties, and allow for more robust oversight in implementing the law. Additionally, the information about planned outages will be helpful to generators in utilizing MISO's congestion reconfiguration request process to address outages with topology optimization if this study is not sufficient to identify those opportunities.

Second, it is important that any methodology developed be technology-neutral, enabling the fair evaluation of all GETs – including Dynamic Line Ratings, Advanced Power Flow Control, and Transmission Topology Optimization – with the goal of maximizing net system benefits and reducing costs to consumers.

Finally, we recommend the Commission consider the deployment timeline of GETs. Many GETs can be installed and operational in a matter of months, not years, offering near term congestion relief and cost savings. The Commission should encourage fast-track deployment of GETs with short payback periods, even prior to the completion of the broader 2025 reporting and implementation process.

Respectfully submitted,

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[17] The Brattle Group, Unlocking the Queue with Grid Enhancing Technologies, February 2021, at 11, https://watt-transmission.org/wp-content/uploads/2021/02/Brattle__Unlocking-the-Queue-with-Grid-Enhancing-Technologies__Final-Report_Public-Version.pdf90.pdf.

[18] John D. Wilson, Zach Zimmerman, and Rob Gramlich, Strategic Industries Surging – Midcontinent Power Sector Collaborative, February 2025, https://gridstrategiesllc.com/wp-content/uploads/National-Load-Growth-Report-2024-MPSC-Presentation.pdf

CERTIFICATE OF SERVICE

Julia Selker certifies that on the 11th day of April, 2025, she e-filed a true and correct copy of the initial comments on behalf of WATT Coalition via eDockets (www.edockets.state.mn.us) in Docket No. E999/M-25-99.

Executed on: April 11, 2025

Signed:

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