March 2, 2026
Via E-Filing

Ms. Sasha Bergman
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place E, Suite 350
St. Paul, MN 55101

In the Matter of the 2025 Minnesota Biennial Transmission Projects Report
RE: Grid Enhancing Technologies Report

PUC Docket Number: E999/M-25-99

I. Introduction

The Advancing Modern Powerlines (AMP) Coalition appreciates the opportunity to provide initial comments to the Minnesota Public Utilities Commission ("MNPUC" or "the Commission") on the 2025 Grid Enhancing Technologies (GETs) Report contained within the 2025 Biennial Transmission Projects Report. Our comments address the following question identified in the Commission's Notice of Comment issued on November 12, 2025[1]: *For future GETs Reports: should the Commission add or modify the filing requirements?*

As a high-level summary of the positions outlined these comments, the AMP Coalition respectfully recommends that:

- The Commission should expand the scope of the Biennial Transmission Projects Report and the GETs Report to include consideration of reconductoring with High Performance Conductors (HPCs).
- The Commission should require the GETs Report to be conducted on a biennial basis aligned with the Biennial Transmission Projects Report.

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[1] Minnesota Public Utilities Commission, *Notice of Comment Period – Grid Enhancing Technologies Report* (Nov. 12, 2025), at 1, https://efiling.web.commerce.state.mn.us/documents/%7B90C2799A-0000-C31B-ABDA-594F9FA2A123%7D/download?contentSequence=0&rowIndex=28.

- The Commission should require the Minnesota Transmission Owners (MTO) to consult with HPC technology vendors as a part of the GETs Report.
- For the expanded study scope, the Commission should consider allowing technology-specific or project-specific payback methodologies.

II. About the AMP Coalition

The AMP Coalition is an ad hoc coalition of High Performance Conductor (HPC) technology vendors. AMP's goal is to further the use of HPCs as a tool for modernizing and increasing grid capacity, as well as improving the overall resilience, reliability, and energy efficiency of the grid. The coalition includes vendors of both types of HPC technologies: carbon core conductors and superconductors. Learn more at ampcoalition.org.

III. About High Performance Conductors

HPCs are modern conductor technologies that have greater performance characteristics when compared to traditional conductors, including increased capacity, higher efficiency, and less thermal sag.

- Carbon Core Conductors, also known as Advanced Conductors, are overhead, bare conductors that use a trapezoid-shaped wire of annealed aluminum to carry electrical current and use a carbon core for support. Used commercially for 20 years, these conductors are deployed in over 60 countries across 5 continents.[2] Carbon core conductors have three key advantages over traditional conductors: 1) stronger and lighter-weight cores, which allows for more aluminum to be added to the conductor, doubling the capacity; 2) 20% or greater efficiency; and 3) half as much thermal sag.[3]

- Superconductors use a class of metallic compounds that exhibit negligible resistance when cooled using liquid nitrogen, enabling very low line losses and very high power flow capacities. Initially developed in the 1980s, this technology has been deployed over the past 20 years in Europe and Asia, as well as in different states in the U.S.[4] Superconductors have three key advantages over traditional conductors: 1) increased capacity by 5-10 times at lower voltages, reducing substation build and cost; 2) no thermal sag and lines do not vary with ambient weather conditions because there is no exposure to elements and they

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[2] See ACORE & Grid Strategies, *Unlocking the Grid: A Playbook on High Performance Conductors for State and Regional Regulators and Policymakers* (Oct. 2024), at 2, https://acore.org/wp-content/uploads/2024/10/Unlockingthe-Grid-A-Playbook-on-High-PerformanceConductors-for-State-and-Regional-Regulators-andPolicymakers.pdf.

[3] Id.

[4] Id.

can be undergrounded in small rights-of-way (ROWs); and 3) they are at least 50% more energy-efficient.[5]

IV. *For Future GETs Reports: Should the Commission Add or Modify the Filing Requirements?*

a. The Commission should expand the scope of the Biennial Transmission Projects Report and the GETs Report to include consideration of reconductoring with High Performance Conductors (HPCs)

The AMP Coalition recommends that transmission owners should be required to report on and evaluate the applicability of High Performance Conductors for relevant constraints and planned upgrades, in both a recurring GETs report and in the Biennial Transmission Projects Report.

As written, Minnesota Session Laws, 2024, Chapter 127, Article 42 allows for technologies that meet the requirements defined in Section 20, Subdivision 1a and Section 52, Subdivision 1e: "hardware or software that reduces congestion or enhances the flexibility of the transmission system by increasing the capacity of a high-voltage transmission line or rerouting electricity from overloaded to uncongested lines, while maintaining industry safety standards."

While the AMP Coalition does not classify High Performance Conductors as a type of Grid Enhancing Technology—rather, the Coalition considers High Performance Conductors and Grid Enhancing Technologies to jointly fall under the umbrella category of Advanced Transmission Technologies—High Performance Conductors do meet the definition outlined in the statute above, as they can increase capacity of high-voltage transmission lines and reduce congestion within existing transmission corridors.

i. High Performance Conductors increase transmission capacity within existing corridors

HPCs are modern conductor technologies that have greater performance characteristics when compared to traditional conductors, including increased capacity, higher efficiency, and less thermal sag. HPCs can significantly increase transmission capacity within an existing corridor, often without requiring structure replacement or expansion of right-of-way.

There are two types of HPCs: carbon core conductors and superconductors. Carbon core conductors can be used to reconductor transmission lines, doubling capacity compared to traditional conductors without having to replace existing transmission structures. Superconductors are able to increase capacity up to 5-10 times compared to traditional

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[5] ENTSO-E, *Technopedia: High Temperature Superconducting (HTS) Cables* (Mar. 2025), https://www.entsoe.eu//technopedia/techsheets/high-temperature-superconducting-cables/.

conductors and can do so at lower voltages or underground, thereby providing additional flexibility in constrained or urban environments.

Examples of recent deployments demonstrate real-world capacity increases from HPCs:

1. Montana-Dakota Utilities increased capacity of a line by 50% by reconductoring using HPCs, unlocking 40% cost savings when compared to rebuilding with an ACSS conductor.
2. AEP West doubled line capacity in Texas by reconductoring the line using HPCs, helping the utility address significant load growth and saving customers $15 million annually through a reduction in line losses.
3. SCE in California reconductored a line using HPCs, increasing ROW capacity by 40% and reducing line losses by 30%.
4. Arizona Public Service Company almost doubled the capacity of a line (~850 to 1600 amps) in Tempe, AZ without needing to modify or replace the existing structures by reconductoring with a HPC.
5. Dominion Energy increased capacity on a line by 90% using HPCs to complete a line near Dulles International Airport in Loudoun County, VA, an area of the country experiencing significant load growth.

ii. High Performance Conductors can reduce transmission congestion

The ability to reconductor existing structures or construct new lines with High Performance Conductors provides a faster way to address grid congestion by adding firm capacity additions at critical points on the grid, rather than rebuilding or building a new transmission facility. Because HPCs can substantially increase ampacity within existing corridors, and often without transmission tower replacement, they can relieve binding constraints while minimizing permitting risk and capital intensity.

Importantly, HPCs and other GETs are often complementary tools and should be studied together. For example, in Indiana and Ohio, AES deployed 42 Dynamic Line Rating sensors across five transmission lines. In one case, DLR analysis revealed that only a half-mile segment of a line was the limiting constraint on transmission capacity. The study was informational only, but in practice, rather than reconductor the entire line, AES could use the information to target the limiting segment for reconductoring, helping to save over $1 million for a single line.[6]

b. The Commission should require the GETs Report to be conducted on a biennial basis aligned with the Biennial Transmission Projects Report

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[6] AES, *Lessons from first deployment of Dynamic Line Ratings* (Apr. 2024), at 17, 18, https://www.aes.com/sites/vault/files/2025-07/AES-LineVision-Case-Study-2024.pdf

The AMP Coalition proposes that the GETs report[7] be required as a recurring study conducted every two years alongside the Biennial Transmission Projects Report. Both GETs and reconductoring with High Performance Conductors can be deployed within a two-year timeframe, and aligning future GETs Reports with the Biennial Transmission Projects Report could allow for additional efficiency, such as identification of GETs or HPC deployments that alleviate congestion and also resolve another identified need (or replace or defer a proposed project) in the Biennial Transmission Projects Report.

c. The Commission should require the MTO to consult with HPC technology vendors as a part of the GETs Report

In its *Order Establishing Requirements* from September 10, 2025, the Commission required verification that transmission owners consulted with GETs vendors and stakeholders during modeling to ensure that best practices were applied and results reflected probable and realistic outcomes. AMP recommends that the Commission should similarly require verification that transmission owners consulted with HPC vendors when evaluating reconductoring or capacity expansion options. This will improve modeling accuracy for HPCs while ensuring realistic assumptions regarding capacity, cost, and deployment timelines.

d. For the expanded study scope, the Commission should consider allowing technology-specific or project-specific payback methodologies

In a scenario where the scope of the GETs Report has been expanded to include HPCs, the AMP Coalition recommends that decision-making on whether or not a project is beneficial should be based on maximization of the life-cycle net benefits, which can also be translated into a payback period. A payback period can serve as a useful screening tool, but AMP believes the underlying objective should be maximizing the total net benefits over the asset's useful life.

In addition, the Commission should consider technology-specific payback periods that take into account the different benefits that different technologies can provide. Ideally, the methodology should reflect realistic capital costs and economic and reliability planning and operational benefits over the lifetime of the project. Where a project demonstrates material long-term benefits beyond congestion reduction, the Commission should allow for a longer payback period, provided the MTO can substantiate those additional system-wide benefits.

While we agree with previous commentors[8] that shorter payback periods are helpful for identifying and prioritizing high-value targets, reconductoring with HPCs can require a larger upfront investment, and represent long-term infrastructure upgrades. A methodology that relies exclusively

[7] *See* GETs report required by Minnesota Session Laws, 2024, Chapter 127, Article 42, Section 52.
[8] WATT Coalition, *Reply Comments of the WATT Coalition* (May 2025), Docket. E999/M-25-99, https://watt-transmission.org/wp-content/uploads/2025/07/WATT-Reply-Comments-MN-E999-M-25-99-final.pdf.

on short payback thresholds risks missing the full value of longer-lived, capital-intensive upgrades that can provide many system benefits beyond adding capacity to relieve congestion. For example, reconductoring with HPCs can improve asset health, reduce losses and thermal overload risk, enhance reliability margins, and support load growth and generation interconnection. Therefore, where reconductoring with HPCs is evaluated, the AMP Coalition recommends that the benefit-cost analysis should, at a minimum, include avoided or deferred infrastructure costs and reduced line loss savings rather than congestion costs alone. Comparing HPC reconductoring solely to congestion costs savings may undervalue its benefits relative to the realistic infrastructure alternative that would otherwise be required and may not incentivize more holistic planning that considers the benefits described above.

Ideally, evaluation should consider a broader suite of total net benefits, including congestion reduction, lifetime loss reductions, reliability improvements, including avoided or deferred capital expenditures (e.g., rebuilds), and reduced outage hours. While HPCs may have higher upfront costs than traditional infrastructure, calculating the total lifecycle cost savings from HPCs under a broader net benefit framework like this almost always reveals HPCs to be the lower-cost option over the lifetime of an asset. Because of these additional benefits, a uniform payback threshold, based solely on congestion savings that are applied across fundamentally different technologies, may not fully capture the benefits to ratepayers over the lifecycle of a project.

It is also important to note that current planning processes often separately address asset health, reliability, interconnection, and many of the other issues mentioned above. In particular, asset condition work to address aging assets is often completely separate from the planning needed to add new transmission capacity. Evaluating HPCs and specifically reconductoring with HPCs in an integrated, holistic transmission planning framework allows planners to maximize total system value rather than treating congestion, reliability, and growth needs as separate and unrelated objectives.

Finally, given increasing load growth and interconnection pressures, AMP recommends that evaluation should incorporate deployment timelines as a material value driver. Projects that deliver the needed capacity sooner reduce the present value of near-term congestion and reliability risks. Speed to deployment is itself a consumer protection consideration. AMP therefore recommends that the Commission require transmission owners to include time-to-complete as an explicit parameter and to present a sensitivity that values earlier capacity delivery.

V. Conclusion

The AMP Coalition appreciates the opportunity to comment on the 2025 GETs Report. We look forward to engaging in a productive and collaborative dialogue with the Commission and stakeholders on cost-effective HPC solutions in future supplemental comments.

Respectfully submitted,

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