

BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

Katie J. Sieben  
Hwikwon Ham  
Audrey C. Partridge  
Joseph K. Sullivan  
John A. Tuma

Chair  
Commissioner  
Commissioner  
Commissioner  
Commissioner

In the Matter of the 2025 Biennial  
Transmission Projects Report

ISSUE DATE: September 10, 2025

DOCKET NO. E-999/M-25-99

ORDER ESTABLISHING  
REQUIREMENTS

**PROCEDURAL HISTORY**

On February 14, 2025, the Commission issued a notice in this docket seeking comments on the appropriate methodology for calculating the cost-effectiveness of grid enhancing technologies.

By April 11, 2025, the Commission received comments from the Minnesota Transmission Owners (MTO); the Department of Commerce, Division of Energy Resources (the Department); EDF Renewables; and WATT Coalition.

By May 9, 2025, the Commission received reply comments from MTO and WATT Coalition.

On July 1, 2025, the matter came before the Commission.

**FINDINGS AND CONCLUSIONS**

**I. Introduction**

In 2024, the legislature established requirements for determining the cost-effectiveness of grid enhancing technologies. The law defines “grid enhancing technologies” as “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. Grid enhancing technologies include but are not limited to dynamic line rating, advanced power flow controllers, and topology optimization.”<sup>1</sup>

---

<sup>1</sup> Minn. Laws, Ch. 127, Article 42, Section 52, subd. 1(e).

Entities that own more than 750 miles of transmission lines in the state must propose “an implementation plan, including a schedule and cost estimate, to install grid enhancing technologies at each congestion point identified in clause (1) at which the payback period is less than or equal to a value determined by the commission, in order to maximize transmission system capacity.” The plan is subject to Commission review.<sup>2</sup>

The entities subject to this requirement under the provision above that are also required to file a transmission report by November 1 of each odd-numbered year under Minn. Stat. § 216B.2425, must, by November 1, 2025, include in the transmission report analysis of “the cost-effectiveness of installing grid enhancing technologies to address each instance of congestion identified in clause (1) by using the information developed in clause (2) to calculate the payback period of each installation, using a methodology developed by the commission.”<sup>3</sup>

To facilitate the development of proposals, the Commission will take the following actions discussed below.

## **II. Proposed Plans**

To facilitate the development of plans filed under the new legislation, the Commission requested comments from affected entities on methods for determining the cost-effectiveness, or payback period, of grid enhancing technologies.

While the parties did not reach consensus on all methodology details, they essentially agreed that project costs and derived savings be taken into account. Approaches for determining how to measure costs and savings differed among the parties, but they offered the following costs and benefits for consideration.

### Costs

- Project capital cost
- Project operations and maintenance costs (O&M)
- Cost of design work and installation
- Cost of licensing
- Physical and cyber security capital costs
- Physical and cyber security O&M costs
- Cost of outages during construction
- Incremental wear and tear from reconfiguration, if applicable

---

<sup>2</sup> *Id.* at subd. 2 (6).

<sup>3</sup> *Id.* at subd. 2 (5). Clause (1) requires the report to include information that “identifies, during each of the last three years, locations that experienced 168 hours or more of congestion, or the ten locations at which the most costly congestion occurred, whichever measure produces the greater number of locations.” Clause (2), requires the report to include information that “estimates the frequency of congestion at each location and the increased cost to ratepayers resulting from the substitution of higher-priced electricity.”

## Benefits

- Avoided costs of energy
- Avoided costs of outages
- Ability to serve more load
- Ability to perform maintenance in opportune windows
- Reduced renewable curtailment
- Reduced transmission congestion
- Reduced price differentials
- New asset deferral
- Improved situational awareness
- Resilience and Contingency Support
- Asset health monitoring
- Reduced cost of new interconnection
- Improved transfer capability across regions
- Advancing state policy aims

Parties agreed that the value of avoided congestion is a primary consideration in evaluating cost-effectiveness but differed on how to quantify congestion cost for the purpose of determining the benefit (expected cost savings of the technology). For example, parties offered two primary options for quantifying congestion savings: a shadow price or congestion charge. A shadow price describes the incremental cost saving associated with relieving a binding constraint by one megawatt (MW), resulting in a dollar-per-MW value. Alternatively, a congestion charge is the shadow price of a constraint (dollars per MW), multiplied by the full rating of the constraint (in MW) resulting in a dollar value. Either of these calculations ultimately informs the congestion savings by calculating the value of relieving congestion through use of grid enhancing technology, but the shadow price quantifies the marginal benefit while the congestion charge estimates the aggregate value of the cost of relieving a constraint.

The parties also took varied approaches to calculating the threshold payback period value for determining the cost-effectiveness of grid enhancing technologies, including, for example, recommendations against setting specific values, as well as recommendations in favor of using a five-year payback period. WATT Coalition supported use of a five-year payback period, or the expected duration of the congestion, to the extent that can be determined, an approach that recognizes the difference between transmission projects that involve long-term resource planning and grid enhancing technologies that would more readily relieve near-term congestion patterns.

MTO recommended against setting a threshold value, stating that determining the payback period value threshold should be informed by use of a gradient scale that reflects specific technology and its application. For some technologies, such as dynamic line rating implementation, MTO stated that the payback period may be very short and almost immediate, while others could have a longer payback period for which the threshold value should be set at or near the expected life of the technology (such as new batteries or other capital-intensive projects).

The Department supported the use of a traditional benefit-cost ratio, reasoning that a payback period involves an inherently flawed approach that requires comparison of annual revenues (savings) to the solution's capital cost, which is a one-time payment. In other words, the flaw

stems from the lack of relation between the two amounts being compared; while production cost savings are realized by ratepayers, the solution's cost paid by the utility is not recovered from ratepayers in one installment, and therefore the actual cost to ratepayers would not be known at the time the payback period is determined (ratepayer cost is determined by factors such as the expected life of the project and the applicable rate of return).

While there was not consensus on prescriptive methods for making these calculations, the parties agreed that it would be reasonable to examine these issues more closely after the plans are filed in November under guidance from the Commission.

### **III. Commission Action**

Recognizing that differences among the parties remain, the Commission appreciates their efforts to coalesce around a methodology for calculating the cost-effectiveness of grid enhancing technologies and the usefulness of providing as much guidance as possible prior to the November 2025 filing deadline. But as the Department observed, the statute presents a relatively new approach to cost analysis with complexities that would benefit from continued record development.

The Commission will therefore, at this juncture, avoid attempting to set narrow parameters that could inadvertently constrain analyses that could lead to a better and fuller understanding of the value of grid enhancing technologies. Instead, the Commission will take the actions set forth below to establish a baseline from which the November filings may more clearly proceed, with the expectation that additional analysis and discussion will better inform the value and cost-effectiveness of technologies that are designed for the purposes of reducing congestion to increase the availability of the lowest-cost electricity.

First, the Commission will direct transmission owners to calculate the cost-effectiveness for each potential grid enhancing technology's deployment studied for the 2025 grid enhancing technology report using a payback period calculation comparing project costs to average annual savings.

Second, transmission owners will be required to provide an explanation of each cost and benefit factor included in a grid enhancing technology's payback period calculation and provide workpapers showing calculations and how each input was quantified.

Third, transmission owners will be required to calculate the cost of historical congestion using the congestion charge (\$) of the constraint after netting auction revenue rights/financial transmission rights revenue associated with the constraint.

Fourth, the Commission will set the following reporting requirements for the 2025 grid enhancing technology implementation plan.

Transmission owners will be required to include in the report the following information:

- for each location identified in the 2025 grid enhancing technology report as experiencing a high level of congestion during the past three years, an explanation by transmission owners of whether congestion is expected to be recurring, and why or why not;

- a schedule and cost estimate to install such technologies at each congestion point identified at which the payback period is less than or equal to five years;
- a schedule and cost estimate to install technologies at each congestion point identified at which the payback period is less than or equal to a value appropriate to the specific technology and potential application;
- an explanation of and rationale for each threshold value used to determine which projects are included in its proposed grid enhancing technology implementation plan;
- efforts to evaluate and compare:
  - i. combinations of grid enhancing technologies,
  - ii. combinations of grid enhancing technologies with traditional upgrades,
  - iii. traditional upgrades such as transformer or substation upgrades; and
  - iv. learnings from this effort that may inform future grid enhancing technologies evaluations;
- an explanation of whether equity, environmental justice, and workforce impacts were incorporated into the evaluation, and if so, a description of how and where in the process these factors were evaluated. And, in advance of filing the report, transmission owners shall consult with the Department and other stakeholders on how the evaluation can incorporate equity, environmental justice, and workforce impacts; and
- efforts to work with the Midcontinent Independent Transmission System Operator (MISO), other regional transmission operators (RTOs) and other transmission owners to reduce congestion and optimize transmission investment through regional processes. This discussion shall address at least the following topics: efforts to advance cost-effective GETs deployment, coordination to minimize costs of transmission outages, regional transmission planning, and financial strategies to reduce the cost to ratepayers of congestion or curtailment.

In developing the report, transmission owners must consult with grid enhancing technology vendors and other stakeholders during the modeling process to ensure that modeling best practices are considered and applied as appropriate, and to ensure that modeling results reflect probable and realistic outcomes. Transmission owners will be required to verify in the report that this consultation took place.

Transmission owners will be directed to share the underlying congestion and modeling assumptions used in their reports and associated filings to the extent possible.

## **ORDER**

1. Transmission owners shall calculate the cost-effectiveness for each potential grid enhancing technology deployment studied for the 2025 report using a payback period calculation comparing project costs to average annual savings.
2. Transmission owners shall provide an explanation of each cost and benefit factor included in grid enhancing technology payback period calculations and provide workpapers showing calculations and how each input was quantified.

3. Transmission owners shall calculate the cost of historical congestion using the congestion charge (\$) of the constraint after netting the revenue of auction revenue rights/financial transmission rights that are associated with the constraint.
4. Transmission owners will be required to include in their November 2025 reports the following information:
  - a. for each location identified in the 2025 grid enhancing technology report as experiencing a high level of congestion during the past three years, an explanation of whether congestion is expected to be recurring, and why or why not;
  - b. a schedule and cost estimate to install such grid enhancing technologies at each congestion point identified at which the payback period is less than or equal to five years;
  - c. a schedule and cost estimate to install grid enhancing technologies at each congestion point identified at which the payback period is less than or equal to a value appropriate to the specific technology and potential application;
  - d. an explanation of and rationale for each threshold value used to determine which projects are included in its proposed grid enhancing technology implementation plan;
  - e. a description of efforts to evaluate and compare:
    - i. combinations of grid enhancing technologies;
    - ii. combinations of grid enhancing technologies with traditional upgrades;
    - iii. traditional upgrades such as transformer or substation upgrades; and
    - iv. learnings from this effort that may inform future grid enhancing technologies evaluations;
  - f. an explanation of whether equity, environmental justice, and workforce impacts were incorporated into the evaluation, and if so, a description of how and where in the process these factors were evaluated. And, in advance of filing the report, transmission owners shall consult with the Department and other stakeholders on how the evaluation can incorporate equity, environmental justice, and workforce impacts;
  - g. a description of efforts to work with MISO, other RTOs and other transmission owners to reduce congestion and optimize transmission investment through regional processes. This discussion shall address at least the following topics:
    - i. efforts to advance cost-effective grid enhancing technology's deployment;
    - ii. coordination to minimize costs of transmission outages;
    - iii. regional transmission planning; and
    - iv. financial strategies to reduce the cost to ratepayers of congestion or curtailment;
  - h. verification that transmission owners consulted with grid enhancing technology vendors and other stakeholders during the modeling process to ensure that modeling best practices were considered and applied as appropriate and that modeling results reflect probably and realistic outcomes.
5. Transmission owners shall share the underlying congestion and grid enhancing technology modeling assumptions used in their 2025 reports and associated filings to the extent possible.

6. This order shall become effective immediately.

BY ORDER OF THE COMMISSION



Sasha Bergman  
Executive Secretary



This document can be made available in alternative formats (e.g., large print or audio) by calling 651.296.0406 (voice). Persons with hearing or speech impairment may call using their preferred Telecommunications Relay Service or email [consumer.puc@state.mn.us](mailto:consumer.puc@state.mn.us) for assistance.

## **CERTIFICATE OF SERVICE**

I, Anne Redmond, hereby certify that I have this day, served a true and correct copy of the following document to all persons at the addresses indicated below or on the attached list by electronic filing, electronic mail, courier, interoffice mail or by depositing the same enveloped with postage paid in the United States mail at St. Paul, Minnesota.

### **Minnesota Public Utilities Commission ORDER ESTABLISHING REQUIREMENTS**

Docket Number **E-999/M-25-99**

Dated this 10th day of September, 2025

/s/ Anne Redmond

#	First Name	Last Name	Email	Organization	Agency	Address	Delivery Method	Alternate Delivery Method	View Trade Secret	Service List Name
1	Sasha	Bergman	sasha.bergman@state.mn.us		Public Utilities Commission	121 7th PI E Ste 350 Saint Paul MN, 55101-2147 United States	Electronic Service		No	Official 25-99
2	Christina	Brusven	cbrusven@fredlaw.com	Fredrikson Byron		60 S 6th St Ste 1500 Minneapolis MN, 55402-4400 United States	Electronic Service		No	Official 25-99
3	Generic	Commerce Attorneys	commerce.attorneys@ag.state.mn.us		Office of the Attorney General - Department of Commerce	445 Minnesota Street Suite 1400 St. Paul MN, 55101 United States	Electronic Service		Yes	Official 25-99
4	Ian M.	Dobson	ian.m.dobson@xcelenergy.com	Xcel Energy		414 Nicollet Mall, 401-8 Minneapolis MN, 55401 United States	Electronic Service		No	Official 25-99
5	Sharon	Ferguson	sharon.ferguson@state.mn.us		Department of Commerce	85 7th Place E Ste 280 Saint Paul MN, 55101-2198 United States	Electronic Service		No	Official 25-99
6	David R.	Moeller	drmoeller@fredlaw.com	Fredrikson & Byron, P.A.		60 S 6th St Ste 1500 Minneapolis MN, 55402-4400 United States	Electronic Service		No	Official 25-99
7	Generic Notice	Residential Utilities Division	residential.utilities@ag.state.mn.us		Office of the Attorney General - Residential Utilities Division	1400 BRM Tower 445 Minnesota St St. Paul MN, 55101-2131 United States	Electronic Service		Yes	Official 25-99
8	Christine	Schwartz	regulatory.records@xcelenergy.com	Xcel Energy		414 Nicollet Mall, MN1180-07-MCA Minneapolis MN, 55401-1993 United States	Electronic Service		No	Official 25-99
9	Julia	Selker	jselker@gridstrategiesllc.com	WATT Coalition		110 Allen St Suite A&B Cumming GA, 30040 United States	Electronic Service		No	Official 25-99
10	Adam	Sokolski	adam.sokolski@edf-re.com	EDF Renewable Energy		10 Second Street NE Ste 400 Minneapolis MN, 55410 United States	Electronic Service		No	Official 25-99