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MEMORANDUM

To:	Andrew Strumfels, Hearing Officer, MA Department of Public Utilities (DPU)
From:	Sarah Cullinan, Senior Program Director, Net Zero Grid, MA Clean Energy Center (MassCEC)
CC:	DPU Electric Power Division (Tracy Dyke-Redmond, Director; Bill Anderson, Assistant Director; Vlad Zaietz, Energy Analyst); Department of Energy Resources (Aurora Edington, Deputy Director of Energy Policy & Grid Modernization; Lou Sahlu, Senior Economist)
Subject:	Summary of June 23, 2025 Grid Enhancing and Related Technologies Stakeholder Session

This memorandum provides a summary of a June 23, 2025 stakeholder session to submit to docket D.P.U. 25-69, "Investigation Into the Use of Advanced Conductors, Grid-Enhancing Technologies and Other Advanced Transmission Technologies to Enhance the Performance of the Commonwealth's Transmission System in Applications that are Subject to Federal Jurisdiction, Pursuant to St. 2024, c. 239, § 121." This memorandum is organized as follows:

I. Session Overview
II. Transmission Feedback Summary
III. Distribution Feedback Summary
IV. Appendix: Slides presented at the Stakeholder Session

I. Session Overview

In collaboration with the MA Department of Public Utilities (DPU) and the MA Department of Energy Resources (DOER), the MA Clean Energy Center (MassCEC) facilitated a Grid Enhancing and Related Technologies Stakeholder Session on June 23, 2025.

The objectives of the session were to: 1) complement the DPU's investigation in docket D.P.U. 25-69; 2) help inform stakeholders about the docket's motivating statute (St. 2024, c. 239, § 121); 3) inform stakeholders of the related work the State is conducting; and, 4) to gather stakeholder input on grid technologies applicable to the transmission and distribution systems.

After establishing the session's objectives, MassCEC provided an overview of technologies listed by the enabling statute, along with suggested definitions. The list of technologies and provided definitions is below:

Technology	Provided Definition
Grid-enhancing technologies (GETs)	A set of technologies that includes hardware or software technologies that enable enhanced or more efficient performance of the electric grid. GETs typically include advanced conductors, dynamic line rating, power flow controllers, topology optimization, among others.
Advanced transmission technologies (ATTs)	A set of technologies that increase the capacity, efficiency, or reliability of an existing or new transmission facility. ATTs typically

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	include advanced conductors, dynamic line rating, power flow controllers, topology optimization, and can include storage as a transmission asset.
Reconductoring	The process of replacing current conductors, lines, or wires with advanced conductors.
Advanced conductors	Conductors that can be more efficient and typically installed on existing infrastructure.
Dynamic line rating (DLR)	DLR is comprised of several technologies determining a conductor line thermal rating, typically based on real-time or forecasted data. DLR uses sensors, communication relays, analytical programs, and other control systems to allow lines to more accurately approach real time thermal limits – which can increase line capacity.
Advanced power flow	Refers to hardware and software technologies used to push or pull electric power in a manner that balances overloaded lines and underutilized corridors within the distribution or transmission systems.
Topology optimization software	Refers to software or controls, including by utilizing artificial intelligence (AI), to identify ways to reconfigure the grid – rerouting bottlenecks, reducing congestion, and optimizing grid capabilities.

While the statute lists several technologies, the stakeholder session encouraged conversation regarding a broader range of technologies, including those applicable to both the distribution and transmission systems.

MassCEC further provided an overview of some motivating factors and trends behind the development and further utilization of new and advanced grid technologies. These factors include: a period of rapid load growth, increasing grid complexity, and the resultant necessity of additional grid capacity and functionality:

- **Load growth** at a faster pace than recent history, driven by the electrification of fossil fuel end uses, and addition of other large loads.
- **The grid is becoming more complex** to operate, driven by proliferation of both variable and distributed sources of generation, such as solar and storage, and other distributed energy resources (DERs), in addition to more extreme weather.
- **The need for additional grid capacity**, typically met with the expansion of grid infrastructure. Meeting capacity needs by expanding infrastructure has challenges, including cost and permitting. Therefore, improvements to existing assets and their utilization can help meet capacity needs. Increasingly, newer and enhanced technologies, including hardware, materials, and software, are emerging. Many new technologies are likely to be cost effective and may meet load growth faster.
- **Additional grid functionality** is needed to address complexity and meet faster timelines.

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The session then provided an opportunity for attendees to participate in one of two breakout sessions, either focused on the transmission system or distribution system. Each room was provided with the same questions, covering: the universe of grid technologies, use cases and benefits of grid technologies, and barriers and solutions to adopting grid technologies.

The remainder of this memorandum summarizes the feedback heard from stakeholders in each of the two breakout rooms, first Transmission Feedback Summary, then Distribution Feedback Summary.

II. Transmission Feedback Summary

Topic 1: Universe of grid technologies

Question:
Which technologies fit in these categories? What technologies are missing from the legislation?

- *Advanced conductors*
- *Grid-enhancing technologies*
- *Advanced transmission technologies*
- *Reconductoring*
- *Dynamic line rating*
- *Advanced power flow*
- *Topology optimization software*

Summary of feedback:
The lack of a standardized definition of GETs and standard technology categorization in the industry introduced a challenge when addressing this question. Specific feedback included the following:

- It was suggested that technologies such as clean-air breakers, DERs, or energy storage should be identified as GETs, but there was also recognition that these were not included in some common definitions of GETs. Similarly, there was also the recognition that there should be an effort to avoid limiting what technologies are categorized as a GET.
- One participant suggested broadening "optimization software" to encompass all aspects of how the grid is managed.
- Should include technologies that can detect abnormalities (icing and related oscillating or "galloping") in transmission lines.
- Participants noted that GETs can include transmission and distribution technologies, with Flexible AC Transmission Systems (FACTS) devices and microgrids applying to both. While there are typically fewer technologies that apply to distribution, some technologies, such as DERMS (Distributed Energy Resource Management Systems), are exclusively distribution-related and simultaneously a GET.

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- One commenter noted that, in some cases, after surveying the use case, more advanced technologies do not always serve as the best option. The GETs definition should also be expansive enough to include older technologies, for instance non-advanced power controllers, when appropriate. The breakout room discussed that, due to at times contrasting priorities across stakeholder groups, there is a need for there to be clear communication amongst stakeholders concerning the purpose of deploying GETs. To incentivize the usage of GETs, the goals with respect to energy savings and expansion must be clear.

Topic 2: Use cases and benefits

Questions:

- *What are the best use cases for each grid technology? Under what conditions should they be considered?*
- *Can you give examples of grid technology deployments in MA, or deployments that are particularly relevant to MA?*
- *What evidence is there of the cost effectiveness of grid technologies? Do you have specific examples or case studies to share?*
- *What are the equity considerations related to grid technologies, for instance, equitable distribution of and access to the benefits?*

Summary of Feedback:

- The group discussed the concept that GETs are methods to allow for quicker deployment, and greater optimization and flexibility without traditional infrastructure expansion. There was a focus on a DLR technology case study that added 30MW of capacity in one day to reduce the peak, which cost significantly less than the alternative transmission upgrade.
- While grid needs and patterns will shift over the next decade, GETs provide a way to quickly address the changes. Other benefits mentioned included:
    - Relieving congestion,
    - Reducing impacts of outages,
    - Act as a bridge solution to larger transmission facilities, which take years to complete. GETs can also act as complementary to (rather than a replacement of) infrastructure solutions,
    - Providing accuracy, and
    - Providing economic benefit through allowing new loads to connect.
- Participants highlighted that the risk of GETs becoming a stranded asset in the case of acting as an interim or bridge solution is almost zero, given the potential for them to be low cost and have short payback periods. Expertise provided spoke specifically to DLR and topology optimization, commenting that the same could apply to other technologies.

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- With respect to equity considerations:
    - It was noted that with energy affordability in mind, some GETs technologies may not be the best fit. Stakeholders must look across all transmission technologies and consider costs.
    - It was noted that the extent to which a technology option is more benign (e.g., environmentally, or as it relates to siting) but results in a similar but not necessarily superior performance should be incorporated into any assessment. In addition, even if a technology option is slightly more expensive, but mitigates equity concerns, it may end up being the preferred solution.

Topic 3: Barriers and Solutions

Questions:

- *What are the barriers or challenges to deploying grid technologies?*
- *Do barriers or challenges differ by type of grid technology?*
- *What are the solutions to expanding the implementation of cost-effective grid technologies?*
- *What should the State team (DPU, DOER, and MassCEC) do to advance the development and deployment of grid technologies, including those that are existing/commercialized, and those that are emerging?*

Summary of Feedback:
The group discussed the lack of incentive to deploy grid technologies, scalability, and modeling as barriers.

- **Lack of incentive**: While GETs have benefits, those benefits are not reflected in the utility's business model.
- **Scalability**: There is too strong of a focus on customization. There needs to be an emphasis on creating more plug and play technologies.
- **Modeling**: GETs system modeling is sometimes not readily available or not robust enough to be adopted into a utility's approvals process. Different technologies have different modeling barriers. Utilities need to know how specific GETs will perform. They can sometimes leverage what has been done in other jurisdictions/deployments, but other times GETs designs and therefore modeling of them are bespoke.

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III. Distribution Feedback Summary

Topic 1: Universe of grid technologies

Question:
What technologies are relevant to the distribution system?

Summary of Feedback:
The group highlighted that the legislation was unclear, and there was a clear need to discuss the intersection of transmission and distribution technologies. Technologies relevant to the distribution system discussed were:

- Power flow control devices
- Flexible interconnection and self-performance
- Transformer monitoring, and sensing broadly, including grid-edge to substation
- Distribution circuit performance
- Software (for instance, much of the grid can be software-defined and have immense data-related questions (i.e., how to store data, how long do we store data, how to dispose of data, etc.)).

Topic 2: Use cases and benefits

Questions:

- *What are the best use cases for each grid technology? Under what conditions should they be considered?*
- *Can you give examples of grid technology deployments in MA, or deployments that are particularly relevant to MA?*
- *What evidence is there of the cost effectiveness of grid technologies? Do you have specific examples or case studies to share?*
- *What are the equity considerations related to grid technologies, for instance, equitable distribution of and access to the benefits?*

Summary of Feedback:
The group discussed that the benefits defined in the legislation are relevant alongside cost effectiveness. Specific pieces of feedback included that:

- Non-wires alternatives (NWAs) can benefit affordable housing developers.
- Equity considerations can have technical criteria and equitable impact criteria, and that there is a need to overlay maps of the distribution system and environmental justice communities (EJCs) to identify where GETs would have the best return and impact.
- Potential health benefits should be considered.

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- Doing benefit-cost analysis (BCA) for NWAs provides a potentially useful framework for valuing GETs. While this method might not accurately reflect aspects such as capacity and FLISR (Fault Location, Isolation, and Service Restoration) benefits, it provides a solid foundation. Further, defining the value of capacity when working with distribution utilities is valuable when aligning on the measurement of GETs and NWAs benefits.
- Speed of deployment should be considered as a benefit.
- Redeploy-ability is also not typically considered as a benefit, despite it having an important role in avoiding stranded assets.

Topic 3: Barriers and solutions

Questions:

- *What are the barriers or challenges to deploying grid technologies?*
- *Do barriers or challenges differ by type of grid technology?*
- *What are the solutions to expanding the implementation of cost-effective grid technologies?*
- *What should the State team (DPU, DOER, and MassCEC) do to advance the development and deployment of grid technologies, including those that are existing/commercialized, and those that are emerging?*

Summary of Feedback:

The barriers discussed in the breakout room were that technologies are difficult to fund and have outpaced policies, DER interconnection issues, and that there is a lack of information within the grid that is necessary for flexible interconnection. A member of the group expressed interest in cost sharing mechanisms for deployment to address difficulties funding projects.

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IV. Appendix

Slides from June 23 Grid Enhancing & Related Technologies Stakeholder Session

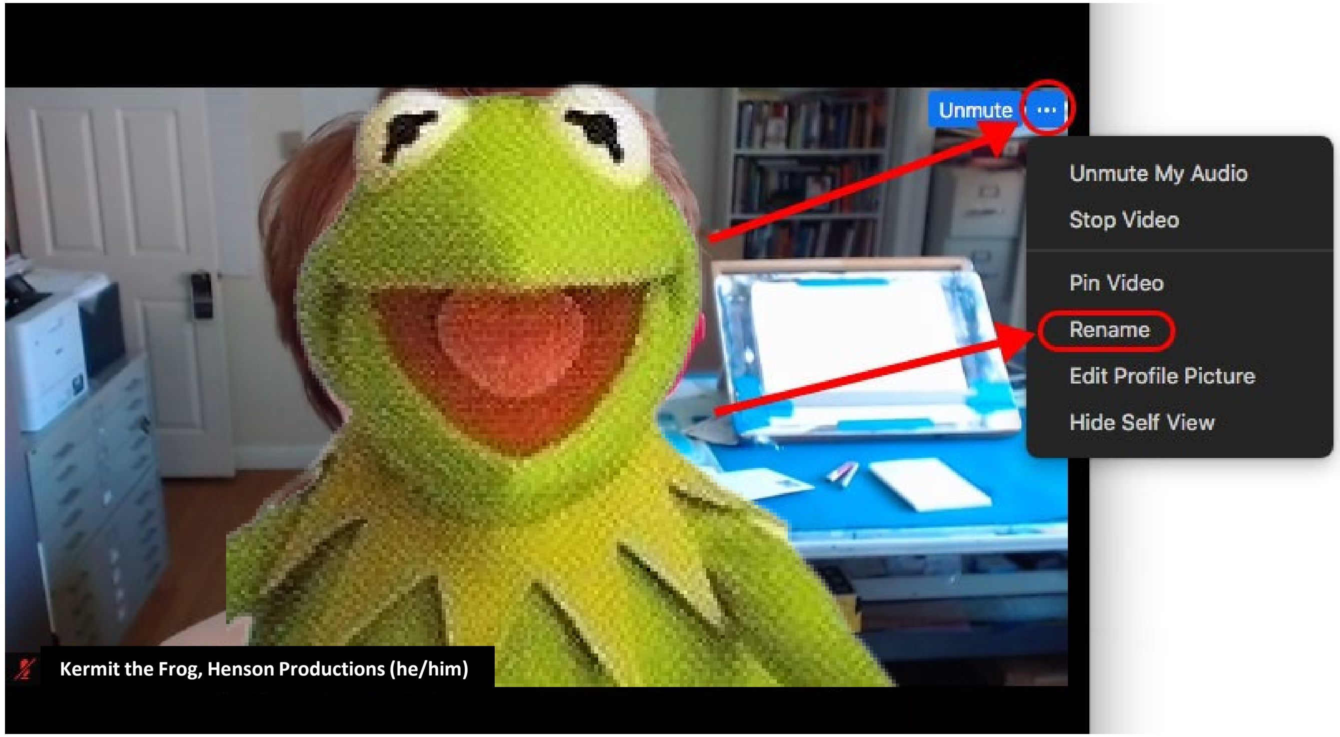
Grid Enhancing & Related Technologies Stakeholder Session

June 23, 2025

Welcome & Check-in

- Please use the “**rename**” function to add your **organizational affiliation** after your name, e.g., “Kermit the Frog, Henson Productions”
- **Check-in question** (please put your response in the chat)

Check-in question:
Do you work on or represent the:
Transmission grid,
Distribution grid,
both (or neither!)?



Remarks:
DPU Chair,
Jamie Van Nostrand

Guidelines

- Please mute yourself when not speaking
- We suggest minimizing distractions
- For questions:
  - Please post questions in **chat** as we move through materials
  - Please use the **chat** or **raise hand function** for any questions during the Q&A break
- Please identify yourself when speaking or commenting, including the organization or group you represent, if applicable

Introduction

- State team:
  - MA Clean Energy Center (MassCEC)
  - MA Department of Public Utilities (DPU)
  - MA Department of Energy Resources (DOER)
- Purpose: Complement the Investigation in D.P.U. 25-69
  - "Investigation Into the Use of Advanced Conductors, Grid-Enhancing Technologies and Other Advanced Transmission Technologies to Enhance the Performance of the Commonwealth's Transmission System in Applications that are Subject to Federal Jurisdiction, Pursuant to St. 2024, c. 239, § 121"
  - DPU must submit a report to joint committee on telecommunications, utilities and energy (TUE) not later than September 1, 2025
- **We are interested in gathering input on a broad range of grid technologies, applicable to both the distribution and transmission grids**

Agenda

- Opening Remarks from DPU Chair (5 min.)
- Welcome and Check-in (5 min.) **1:05-1:10**
  - Including Guidelines
- Introduction and Context (10 min.) **1:10-1:20**
  - Introduce State Team & Context
  - Agenda
  - Objectives of Session
  - Key Terms & Overview of Role of Grid Technology
- Clarifying questions & Breakout room poll (10 min.) **1:20-1:30**
- Breakout room discussion (55 min.) **1:30-2:25**
- Closing (5 min.) **2:25-2:30**

Objectives of this session

- Inform stakeholders about **motivating statute** (St. 2024, c. 239, § 121), its requirements, and the **work the State team is doing**
- **Gather information and understand stakeholders' perspectives** about:
  - different types of grid-enhancing and related technologies,
  - use cases and benefits,
  - the current landscape and uses in MA, and
  - the State's role in advancing and deploying them.
- Today is an opportunity to ask questions, discuss, and inform State team
  - **For any written material to be captured in the record in DPU's investigation, please submit it to Hearing Officer Andrew Strumfels at andrew.w.strumfels@mass.gov (D.P.U. 25-69) (see Concluding slide)**

Overview of listed technologies

The Act describes the relevant technologies as:

"Such advanced conductors, grid-enhancing technologies and other advanced transmission technologies may include, but shall not be limited to, reconductoring of transmission and distribution lines and the use of dynamic line ratings, advanced power flow control and topology optimization software."

- Grid-enhancing technologies
- Advanced transmission technologies
- Reconductoring
- Advanced conductors
- Dynamic line rating
- Advanced Power Flow
- Topology optimization software

As a reminder: we are, however, **interested in gathering information on a broader range of technologies, applicable to both the transmission and distribution grids**

Role of grid technologies

- **Load is growing**, driven by electrification of fossil fuel end uses, and addition of other large loads
- **The grid is getting more complex** and in a period of rapid change, driven in part by proliferation of solar, storage, and other distributed energy resources (DERs), in addition to more extreme weather
- **Additional grid capacity is needed**, typically met with expansion of and investment in grid infrastructure
  - Electric grid construction is difficult to site and permit, and it is costly
  - Improvements to existing assets and technology in the field can likely be used to help meet capacity. Increasingly, newer, enhanced technologies, including both hardware/materials and software are emerging that address grid needs
  - Likely to be more cost effective and meet load growth faster
- **Additional grid functionality is needed**, to address complexity, and meet faster timelines

Breakout Room Poll

- We have 55 minutes for breakout rooms
- Breakout rooms will either focus on
  - Distribution technologies
  - Transmission technologies
- Multiple rooms per focus as needed, to accommodate numbers
- Each room will have the same set of questions
- **We will open a poll with those two choices momentarily…**

Breakout rooms will each move through 3 topic areas:

- **Topic 1**: Universe of grid technologies (15 min)
- **Topic 2**: Use cases and benefits of grid technologies (20 min)
- **Topic 3**: Barriers and solutions to adoption (20 min)

Enter breakout rooms

Topic 1: Universe of grid technologies (15 min.)

- (focus for Tx room(s)) Which technologies fit in these categories? What technologies are missing from the legislation?
  - Advanced conductors
  - Grid-enhancing technologies
  - Advanced transmission technologies
  - Reconductoring
  - Dynamic line rating
  - Advanced Power Flow
  - Topology optimization software
- (focus for Dx (room(s)) What technologies are relevant to the distribution system?

Topic 2: Use cases and benefits (20 min.)

- What are the best use cases for each grid technology? Under what conditions should they be considered?
  - Technologies listed in legislation for reference: advanced conductors, grid-enhancing technologies, advanced transmission technologies, reconductoring, dynamic line rating, advanced power flow, topology optimization software
  - Others discussed (including distribution level): [facilitator to fill in]
- Can you give examples of grid technology deployments
  - in MA?
  - that are particularly relevant to MA?
- What evidence is there of the cost effectiveness of grid technologies? Do you have specific examples or case studies to share?
- What are the equity considerations related to grid technologies, for instance, equitable distribution of and access to the benefits?

Topic 3: Barriers and solutions (20 min.)

- What are the barriers or challenges to deploying grid technologies?
- Do barriers or challenges differ by type of grid technology?
- What are the solutions to expanding the implementation of cost-effective grid technologies?
- What should the State team (DPU, DOER, and MassCEC) do to advance the development and deployment of grid technologies?
  - Existing/commercialized
  - Emerging

Close breakout rooms

Closing and Communications

- Thank you!
- We will synthesize feedback from this session to inform the Report
- Continue to submit comments in D.P.U. 25-69
  - https://eeaonline.eea.state.ma.us/dpu/fileroom/#/dockets/docket/12586
  - See Vote & Order (June 2) with list of questions to respond to at pages 3-7
  - Response deadline: 5pm, July 3, 2025
  - Reminder: For information to be captured in the record, it needs to be submitted in D.P.U. 25-69. See instructions on pages 7-8 of the Order
- Monitor future opportunities from MassCEC!
  - https://www.masscec.com/grid-modernization-and-infrastructure-planning/research-development
  - MassCEC Newsletters (select "Net Zero Grid" for gridtech related opportunities): https://www.masscec.com/subscribe

Appendix: Full Bill Text (St. 2024, c. 239, § 121)

- (a) The department of public utilities, in coordination with the department of energy resources, shall conduct an independent investigation that examines the use of advanced conductors, grid-enhancing technologies and other advanced transmission technologies to enhance the performance of the commonwealth's transmission system in applications that are subject to federal jurisdiction. Such advanced conductors, grid-enhancing technologies and other advanced transmission technologies may include, but shall not be limited to, reconductoring of transmission and distribution lines and the use of dynamic line ratings, advanced power flow control and topology optimization software.
- (b) In conducting its investigation, the department shall: (i) review industry trends for the implementation and use of advanced conductors, grid-enhancing technologies, and other advanced transmission technologies and determine which technologies are cost-effective and in the public interest and under what conditions those technologies could be utilized for transmission and distribution infrastructure within the state; and (ii) for any technologies determined to be cost effective and in the public interest, identify any jurisdictional and cost-sharing issues related to requiring a transmission and distribution utility to implement such advanced transmission technologies. The investigation shall consider the costs of such technologies and consider their benefits including, but not limited to: (A) access to lower cost and zero carbon electricity; (B) acceleration of distributed energy resource interconnection; (C) reduced generator curtailment or congestion; (D) reduced environmental impacts; (E) maximization of the value of planned investments; (F) improved resilience; and (G) improved outage coordination and mitigation.
- (c) The department of public utilities shall submit is report to the joint committee on telecommunications, utilities and energy not later than September 1, 2025.

https://malegislature.gov/Laws/SessionLaws/Acts/2024/Chapter239