LineVision Inc.
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October 28, 2022

LineVision Comments Re: New England States' Regional Transmission Initiative Request for Information (RFI)

INTRODUCTION:

LineVision is pleased to provide comments regarding the RFI for the New England States' Regional Transmission Initiative. LineVision is a Grid-Enhancing Technology (GET) company founded in 2018 that has developed an advanced non-contact sensor and analytics platform that continuously monitors the behavior of overhead transmission line conductors,[1] detecting anomalies and issuing real-time alerts on risks, while unlocking as much as 40% additional capacity on existing lines through dynamic line ratings (DLR).

A Massachusetts-based company, LineVision provides utilities with three applications which are all enabled by the company's non-contact equipment, which has no limitations on the line voltage, conductor size, type, or bundle configurations as a light detection and ranging technology (LiDAR) sensor is mounted to the tower structure, eliminating the need to schedule line outages and requiring no live line working techniques. The three solutions are: LineAware, LineRate, and LineHealth, each of which addresses a specific need of operators:

- LineAware provides utility and grid operators with situational awareness, which helps to inform operators with sag and horizontal motion data, triggering alerts on exceedances
- LineRate provides Dynamic Line Ratings (DLR) and AmbientAdjusted Ratings (AAR) which increase the capacity on transmission lines
- LineHealth provides planners and risk management teams with Asset Health Monitoring, which improves maintenance strategies by creating a digital twin to determine conductor health

GENERAL COMMENTS:

This response provides comments on the following questions in the RFI:

Comments on Changes and Upgrades to the Regional Electric Transmission System Needed to Integrate Renewable Energy Resources:

1.Comment on how individual states, Participating States, or the region can best position themselves to access U.S. DOE funding or other DOE project participation options relating to transmission, including but not limited to funding, financing,

[1] Applications are also possible on lower voltage distribution networks.

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technical support, and other opportunities available through the federal Infrastructure and Investment Jobs Act; and

LineVision believes that utilizing Infrastructure Investment and Jobs Act (IIJA) funding to help deploy GETs like DLR will demonstrate a commitment to creating a cleaner, more resilient, flexible grid all while prioritizing affordability for customers and commends the New England states for their efforts to learn about and possibly pursue such federal funding opportunities. Earlier this summer, the Secretary of Energy's Advisory Board released their recommendations regarding provisions of the IIJA. Noting the substantial development of the transmission system made possible by these IIJA provisions, the board recommends investing in GETs, particularly as it relates to their guiding criteria of maximizing use of the existing transmission grid to facilitate high volumes of zero carbon energy.[2]

In regard to transmission opportunities within IIJA, projects using GETs would be eligible to apply for federal funding under any of the programs in the new Grid Resilience and Innovation Partnerships (GRIP) program[3], which highlights technologies like DLR that increase transmission capacity.

States are also able to distribute IIJA funds from the Grid Resilience Formula Grant[4] program, which is designed to modernize grid infrastructure and increase grid resilience, including by focusing on "monitoring and control technologies" like DLR. LineVision believes that a resilient grid is enabled by seeing what's happening on critical infrastructure in real time. Right now, nearly every piece of equipment on the transmission grid is monitored – substations, breakers, industrial equipment components and facilities – but today, nearly all of the actual wires, what connects the dots of this equipment, are not monitored.

By monitoring phase to phase conductor motion, LineVision's patented LiDAR-based grid monitoring systems are uniquely suited to address a number of potentially hazardous conditions including galloping, sag, blowout, conductor fatigue, and ice accretion. When DLR systems are integrated into utility operations, real-time awareness can be routed directly into the utility's EMS system for real-time system awareness.

2.Comment on ways to minimize adverse impacts to ratepayers including, but not limited to, risk sharing, ownership and/or contracting structures including cost caps, modular designs, cost sharing, etc.

Recognizing the renewable energy resource potential in the New England region, a key benefit of DLR technology is its ability to increase transmission capacity, thereby serving as a reinforcement to existing grid infrastructure as new transmission is built while also

[2] https://www.energy.gov/sites/default/files/2022-06/SEAB_GridModernizationRecommendations_June2022.pdf
[3] https://www.energy.gov/gdo/grid-resilience-innovation-partnership-programs
[4] https://netl.doe.gov/bilhub/grid-resilience/formula-grants

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providing future benefits such as reducing congestion and expanding flexible capacity. An example of DLR creating critical grid capacity can be found in Massachusetts, where National Grid conducted a two-year pilot with LineVision's non-contact DLR system that aimed to verify the system's performance and ability to maximize the utilization of existing transmission line capacity for optimized operations and enable clean and affordable energy delivery to customers.[5] Recorded DLR data showed the following results:

- DLR exceeds the Static Rating for 94% to 97% of the time.
- Mean (average) increase of 31% in line's capacity above Ambient-Adjusted Rating (AAR).
- Mean (average) increase of 47% in line's capacity above Static Rating.

LineVision's LineRate DLR software and sensor platform is also being deployed by National Grid in the Northeast region on a select number of 115kV transmission lines in western New York.[6] This project, along with five miles of circuit rebuilds, is projected to reduce renewable energy curtailments by over 350 megawatts while increasing capacity by 190 megawatts and is key to helping meet state policy goals outlined in the State's Climate Leadership and Community Protection Act (CLCPA), which requires a renewable electric generation target of 70 percent by 2030 and a 100 percent emissions-free electric supply by 2040.[7]

The Department of Energy (DOE) also highlighted the unique near-term benefits of GETs in a recent report addressing GETs and ratepayer impact, noting that "GETs can be a beneficial intermediate point, where wind and solar are added to the system while longer-term transmission upgrades can be planned and deployed.[8] DOE further explained that, "GETs can be a key enabler to that transition and reduce and defer (but not eliminate) the need for new transmission."

The same report also concluded that finding the 'perfect' location for GETs is unnecessary. It explains that "GETs can be considered alongside traditional upgrades to optimize infrastructure investments in support of customer and policy interests today. Extensive study and over optimization could lead to increased ratepayer costs in the time required to decide upon an optimized deployment scheme. Analysis is required, but utilities and regulators should be motivated by the full suite of GETs benefits rather than intricate cost-benefit optimization Studies."[9]

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[5] CIGRE 2021 Next Generation Network Paper Competition; "An Empirical Analysis of the Operational Efficiencies and Risks Associated with Static, Ambient Adjusted, and Dynamic Line Rating Methodologies"; K.Engel, J.Marmillo, LineVision Inc; M.Amini, H.Elyas, B.Enayati, National Grid USA

[6] https://www.linevisioninc.com/news/national-grid-and-linevision-deploy-largest-dynamic-line-rating-project-in-the-united-states

[7] https://climate.ny.gov/

[8] U.S. Department of Energy, Grid-Enhancing Technologies: A Case Study on Ratepayer Impact, Feb 2022; pg71

[9] *Id*, at 70

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Regarding offshore wind generation, as is noted in the RFI, the number of easily accessible interconnection points along the southern New England coast are already at or beyond their full capacity with offshore wind projects under contract or review; significant upgrades to the onshore transmission system will be needed to integrate the additional amounts of renewable resources that are recognized as an important element in meeting state goals and requirements.

To minimize the cost impact to consumers, the use of GETs like DLR should be deployed to help make better use of existing rights of way by ensuring that existing conductors maximize their carrying capacity as a DLR is the transmission line's actual real-time or forecasted power carrying capacity. It is based on measurements of the conductors actual operating temperature using real-time line measurements of the conductor's sag and nearby ambient weather conditions. A US DOE report demonstrated that a 3 ft/sec increase in wind speed perpendicular to the conductor will increase its carrying capacity by 44%, indicating that significant increases in transmission capacity can be realized by utilizing DLR.[10] This increased transmission capacity is highly valuable in integrating clean energy generation as DLR allows operators to safely increase the speed limit of the power line so we can put more clean power generation onto existing assets.

Delivering the highest amount of new generation per dollar in the shortest amount of time, GETs can be deployed in weeks or months, rather than the 5-10+ years required for traditional projects, with payback periods of under 12 months, vs 14-16 years for traditional projects.[11] LineVision believes they are a critical tool to ensure that New England states' energy policy goals and requirements are met most cost-effectively.

8. Comment on any just-transition, environmental justice, equity, and workforce development considerations or opportunities presented by the transmission system buildout and how these policy priorities are centered in decisions to develop future infrastructure

In addition to their ability to quickly create capacity to integrate clean energy to the transmission grid and benefit consumers by way of financial savings from congestion reduction, GETs such as LineVision's platform are also able to create and support job creation. LineVision's equipment is installed by utility field crews with on-site supervision from LineVision. LineVision adheres to and supports strong utility labor standards and protections, while also noting the job creation associated with each sensor's deployment on the grid – for each 100 systems LineVision deploys, the company creates and/or retains between 375-610 jobs.

Furthermore, when deployed in strategic locations, the beneficial outcomes of LineVision's solutions can assist disadvantaged communities that have been historically marginalized

[10] U.S Department of Energy, "Dynamic Line Rating Systems for Transmission Lines Topical Report," in Smart Grid Demonstration Program, 2014.
[11] U.S. Department of Energy, Grid-Enhancing Technologies: A Case Study on Ratepayer Impact, Feb 2022

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and overburdened by fossil-fuel based pollution. LineVision's LineRate application increases capacity on existing lines, thereby reducing grid congestion and curtailments. When curtailments occur, generally renewable wind and solar generation are first to have their output reduced, while conventional coal or natural gas generation near load centers is ramped up to offset the curtailment. These dirty fossil resources are frequently located in or near frontline communities, which bear the heaviest burden in terms of negative air quality and health impacts. By reducing curtailments, LineVision's platform reduces the need for and output of these ramping fossil fuel-based power plants and benefits the residents in and around the communities where those plants are located.

CONCLUSION

LineVision stands ready to be a resource and looks forward to partnering with participating states on this opportunity to collectively develop and build the transmission grid infrastructure necessary to meet the New England region's clean energy needs. Thank you for consideration of this request.

Sincerely,

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