



Statement of Eric Hsia, Senior Manager, Applied Innovation, on the behalf of PJM Interconnection, L.L.C.

FERC Technical Conference Workshop on Shared Savings Incentives for Transmission Technologies

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Panel 5: Technical and Reliability Issues

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PJM Interconnection, L.L.C. (“PJM”) is pleased to share with the Federal Energy Regulatory Commission (“FERC”) and other interested parties our experience and thoughts on technical and reliability issues associated with the deployment of emerging transmission technologies while maintaining system reliability. My introductory remarks outline PJM’s current process for evaluating proposals that would deploy such technologies, and discusses some of the ways in which PJM has to date attempted to facilitate the deployment of such technologies within the PJM footprint.

As to PJM’s planning process, PJM performs studies that identify, evaluate, and analyze potential transmission expansions and enhancements, demand response programs, and other alternative technologies as required to maintain system reliability.¹ To the extent submitted as part of PJM’s competitive proposal process set forth in Operating Agreement, Schedule 6 or as a State Agreement Approach project,² PJM evaluates qualifying emerging technologies proposals in a manner that is not materially different than the way it evaluates other project proposals. PJM is technology agnostic when it reviews project proposals submitted as part of its planning process. Nonetheless, PJM evaluates the impact of a technology’s characteristics on the grid as part of its review. Among other things, PJM’s planning process evaluates whether a proposal offering an emerging technology solution solves or creates reliability criteria violations, and is a more efficient or cost effective solution to identified system planning needs. Further, PJM evaluates whether a proposal calling for the deployment of an emerging technology requires any changes to PJM’s communication and operating protocols to support and accommodate its integration from a markets and operations standpoint.

An example of this is where PJM received a smart wire technology proposal as part of an RTEP window in 2019 which led to the development of the PJM Emerging Technology Forum (“Forum”) in 2020. This forum is designed to accomplish several important objectives. First, it works to enhance the success of the PJM Advanced Technology Pilot Program (“Pilot Program”) as a testing ground for such technologies. The Forum offers additional transparency regarding the benefits and obstacles for implementing emerging technologies under the Pilot Program. The Forum gathers stakeholder feedback on the creation and periodic review of the Pilot Program’s efforts and procedure documentation. For context, the Pilot Program³ has existed for more than a decade to study the viability of integrating emerging technologies that enhance system reliability, operational and market efficiency, and resilience. To date, the Pilot Program has conducted around 30 different pilot projects. Of the total pilot projects, 25 pilot projects were completed and 9 projects transitioned from pilot to operations. An emerging technology does not have to proceed through the Pilot Program to be deployed on PJM’s system, although it is a helpful exercise for PJM and stakeholders to develop an understanding of and experience with the application and potential implementation of new

¹ Operating Agreement, Schedule 6, sections 1.3(c) and 1.5.7(i)(vi). In addition, PJM’s market efficiency planning process specifically considers non-transmission alternatives. See Operating Agreement, Schedule 6, section 1.5.8(b) (“Following identification of existing and projected limitations on the Transmission System’s physical, economic and/or operational capability or performance in the enhancement and expansion analysis process described in this Operating Agreement, Schedule 6 and the PJM Manuals, and after consideration of non-transmission solutions, and prior to evaluating potential enhancements and expansions to the Transmission System, the Office of the Interconnection shall publicly post on the PJM website all transmission need information, including violations, system conditions, and economic constraints, and Public Policy Requirements[.]”)

² Operating Agreement, Schedule 6, section 1.5.9.

³ <https://pjm.com/markets-and-operations/advanced-tech-pilots>.

technologies.⁴ New technologies require coordination with PJM and integration into PJM's operations and market systems regardless of participation in a pilot program. The Pilot Program nevertheless allows these emerging technologies to be evaluated so that their implementation challenges are identified and studied prior to widespread deployment. This incremental approach minimizes system-wide risk due to the targeted nature of a Pilot Program. It also provides an opportunity to identify efficiencies to consider when facilitating broader implementation of a new technology.

Second, the Forum provides a centralized, open forum for transparent consideration of issues related to the development and implementation of emerging technologies, including but not limited to: education on emerging transmission technologies; identification of issues and implementation necessities (system changes, governing documents and compliance and operation procedures) relating to operations, transmission planning, and markets; and the development of recommendations for addressing those impacts. The Forum also serves as an information sharing venue for technology vendors, academic institutions, and proponents of various technologies to discuss the characteristics and benefits of certain technologies. The Forum's meetings also afford PJM stakeholders the opportunity to ask questions and offer observations and concerns relating to the implementation of such technologies.

PJM's ongoing work relating to the implementation of Dynamic Line Ratings ("DLR") with PPL is a recent example of the Forum's work relating to the piloted deployment of emerging transmission technologies.⁵ In October 2020, PJM and PPL began to pilot the use of DLR sensors on two transmission lines. The goal of this effort is to determine if the DLR devices could alleviate congestion and provide PJM with real-time information to optimize the performance and increase actual power flow (not just static ratings). As part of the ongoing pilot, PJM and PPL are performing a full impact analysis, evaluating the technical, market efficiency, and reliability benefits, integration requirements (such as communication, system, operating protocols and governing documents), and a functional area impact assessment (including analyses of markets, operations, and planning and risk management impacts). PJM is also continuing to assess necessary data requirements, associated data volume, rating methodologies, and reliability compliance associated with DLR implementation. PJM is further assessing the interplay between NERC Standards and DLR implementation, and the impact DLR might have on the Transmission Operations ("TOP") and Interconnection Reliability Operations and Coordination ("IRO") standards for establishing, monitoring, and controlling system operating limits ("SOLs"). The results to date suggest that PPL's installation of DLR sensors are likely to mitigate significant congestion, warranting PJM's removal of a posted market efficiency driver from a competitive proposal window. Although work remains to be done, this is an example of a situation where a proposed transmission technology may have obviated the need for a new or rebuilt transmission line.

⁴ Emerging transmission technologies may also be tested in the field through other programs, such as through demonstration or pilot projects undertaken or administered by other grid operators, national laboratories, or the Electric Power Research Institute, among others. PJM would weigh the results of pilots administered by others in evaluating the deployment of emerging technologies in the PJM planning process. See Operating Agreement, Schedule 6, sections 1.5.8(a), 1.5.8(c)(2), and 1.5.8(f).

⁵ There are other examples of PJM pilots relating to dynamic line ratings. See also *Managing Transmission Line Ratings*, Prepared Remarks of Shaun Murphy, Sr. Engineer, PJM Interconnection (filed Sept. 17, 2019) (describing other PJM pilot project activity relating to dynamic line ratings).



PJM recognizes many changes on the horizon as part of decarbonization and planning the grid of the future. Optimizing existing transmission corridors and infrastructure with the application of new technology will assist the industry in achieving these goals while minimizing societal and environmental impacts. PJM looks forward to continued engagement with FERC and the industry on the deployment of emerging transmission technologies.