UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Managing Transmission Line Ratings **Docket No. RM 20-16-000**

COMMENTS OF WILLIAM TONG, ATTORNEY GENERAL FOR THE STATE OF CONNECTICUT, MAURA HEALEY, MASSACHUSETTS ATTORNEY GENERAL, CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION, CONNECTICUT OFFICE OF CONSUMER COUNSEL, MAINE OFFICE OF THE PUBLIC ADVOCATE, NEW HAMPSHIRE CONSUMER ADVOCATE, AND PETER F. NERONHA, RHODE ISLAND ATTORNEY GENERAL, AND THOMAS J. DONOVAN, JR., ATTORNEY GENERAL OF VERMONT

Pursuant to the November 19, 2020, Order of the Federal Energy Regulatory Commission (the Commission) in the above-captioned matter, Connecticut Attorney General William Tong, Massachusetts Attorney General Maura Healey, the Connecticut Department of Energy and Environmental Protection, the Connecticut Office of Consumer Counsel, the Maine Office of the Public Advocate, the New Hampshire Consumer Advocate, Peter F. Neronha, Rhode Island Attorney General, and Thomas J. Donovan, Jr., Attorney General of Vermont (together, New England State Agencies), hereby file these comments addressing the Commission's proposed reforms to the Open Access Transmission Tariff and the Commission's regulations under the Federal Power Act to improve the accuracy and transparency of transmission line ratings. In particular, the Commission is proposing to require transmission providers to implement near term ambient-adjusted ratings on transmission lines; and to require Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) to (a) establish the systems and procedures needed to allow transmission owners to electronically update transmission line ratings at least hourly; and (b) share transmission line ratings and methodologies with transmission providers and relevant RTOs/ISOs.

The New England State Agencies support measures that make more efficient use of existing transmission facilities, and favor building new facilities where necessary to ensure the transmission grid's reliability, efficiency, and its ability to integrate clean-energy resources. At the same time, however, it is essential to achieve these ends as efficiently and cost-effectively as possible. Ambient-adjusted and dynamic line ratings have significant potential to improve transmission line efficiency in a manner that will reduce consumer costs while simultaneously improving the ability of grid operators to effectively and fully integrate renewable and other clean energy resources in support of state public policy goals. In addition, the New England State Agencies support the proposed transparency reforms as they should measurably aid state officials in implementing state policies going forward. The New England State Agencies welcome the Commission's attention to these important matters that have the potential to improve transparency, reliability and reduce consumer costs. The New England State Agencies broadly support the Commission's proposals and offer the following comments.

I. The New England State Agencies

The Connecticut Attorney General is an elected Constitutional official and the chief legal officer of the State of Connecticut. The Connecticut Attorney General's responsibilities include intervening in various judicial and administrative proceedings to protect the interests of the citizens and natural resources of the State of Connecticut and in ensuring the enforcement of a variety of laws of the State of Connecticut, including Connecticut's Unfair Trade Practices Act and Antitrust Act, so as to promote the benefits of competition and to assure the protection of Connecticut's consumers from anti-competitive abuses.

The Massachusetts Attorney General is the chief legal officer of the Commonwealth of Massachusetts and is authorized by both state common law and by statute to institute proceedings before state and federal courts, tribunals and commissions as she may deem to be in the public

interest. The Massachusetts Attorney General is further authorized expressly by statute to intervene on behalf of public utility ratepayers in proceedings before the Commission.[1]

The Connecticut Department of Energy and Environmental Protection (Connecticut Department) has statutory authority over the state's energy and environmental policies and for ensuring that the state has adequate and reliable energy resources.[2] The Connecticut Department is tasked with interacting with the regional transmission operator in response to state and regional energy needs and policies and is actively engaging with its regional partners in addressing transmission and related issues.[3]

The Connecticut Office of Consumer Counsel is the statutorily designated ratepayer advocate in all utility matters concerning the provision of electric, natural gas, water, and telecommunications services. The Office of Consumer Counsel is authorized by statute to intervene and appear in any federal or state judicial and administrative proceedings where the interests of utility ratepayers are implicated.

The Maine Public Advocate is charged by Maine statue to represent the interests of consumers of utility services[4] and is authorized to intervene in federal proceedings "in which the subject matter of the action affects the consumers of any utility doing business in this State."[5]

The New Hampshire Office of the Consumer Advocate is tasked pursuant to N. H. Rev. Stat. Ann. 363:28 with representing the interests of the state's residential utility customers. The statute authorizes Office of the Consumer Advocate is to appear before any tribunal, including FERC, to advance the interests of its designated constituency.

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[1] MASS. GEN. LAWS ch. 12, § 11E.
[2] Conn. Gen. Stat. §§ 22a-2d; 16a-3a.
[3] See, e.g., www.newenglandenergyvision.com
[4] 35-A M.R.S.§ 1701 *et. seq*.
[5] 35-A M.R.S.§ 1702(5).

The Rhode Island Attorney General is a public officer charged by common law and by statute with representing the State of Rhode Island, the public interest, and the people of the State, including with respect to environmental, electric or gas industry matters, and consumer protection matters. Under common law and statute, he is authorized to institute proceedings before state and federal courts and commissions to address those matters he may deem to be in the public interest. Pursuant to § 42-9-6 of the General Laws of Rhode Island of 1956, as amended, the Attorney General is the "legal advisor of all state boards, divisions, departments, and commissions and the officers thereof. . ." Under state common law, he is the representative of the public, empowered to bring actions to redress grievances suffered by the public as a whole.

The STATE OF VERMONT is a sovereign state in the United States of America. The Vermont Attorney General is authorized to represent the state of Vermont in civil suits involving the state's interests, when, in his judgment, the interests of the state so require. Vt. Stat. Ann. tit. 3 ch. 7.

II. BACKGROUND

On November 19, 2020, the Commission issued a Notice of Proposed Rulemaking (NOPR) initiating a proceeding pursuant to Section 206 of the Federal Power Act (FPA) to reform the *pro forma* Open Access Transmission Tariff (OATT) and the Commission's regulations.[6] The Commission is proposing three major reforms.

First, the draft NOPR proposes to require transmission providers to implement ambient-adjusted ratings (AARs) and seasonal line ratings on the transmission lines over which they provide transmission service. These AARs will provide real time information concerning transmission line capacities and loads, allowing for more flexible and efficient dispatch and usage

[6] NOPR, P 15.

of the facilities. Transmission providers would use AARs for evaluating requests for near-term transmission service, and would use seasonal ratings for evaluating other, longer-term transmission service requests.[7]

Second, the draft NOPR proposes to require RTOs and ISOs to establish and implement the systems and procedures necessary to allow transmission owners to electronically update transmission line ratings at least hourly. The draft NOPR recognizes that there may be instances in which transmission owners may wish to implement transmission line ratings that may be more accurate than AARs, such as dynamic-line ratings (DLR), but are unable to have such ratings reflected in RTO/ISO markets under those markets' current capabilities. This proposed requirement seeks to remove this barrier to adoption of these more accurate line ratings.

Third, the draft NOPR proposes to require transmission owners to share transmission line ratings and transmission line rating methodologies with their respective transmission provider(s) and, in RTOs/ISOs, with their respective market monitor(s). Such information sharing would increase situational awareness and improve the ability to verify the accuracy of transmission line ratings.

III. COMMENTS

Section 219 of the FPA directs the Commission "to encourage deployment of transmission technologies to increase the capacity of and efficiency of existing transmission facilities and improve the operation of the facilities." As will be discussed below, AAR and DLR technologies both possess significant potential "to increase the capacity and efficiency of existing transmission" lines and therefore would further the goals and intent of the FPA. However, the adoption of DLR technology in the United States is in its infancy, and the costs and benefits are not well-established.

[7] NOPR, PP 3,4.

For these reasons, the New England State Agencies urge the Commission to require a study of the potential costs and benefits of DLR technology prior to instituting any mandatory DLR obligations.

The New England State Agencies have consistently and strongly supported transparency in grid operations generally as well as the implementation of cost-effective measures to improve electric system transmission operation and reliability and reduce consumer costs. As will be discussed below, there is a need for greater transparency into transmission systems power flow capabilities for operators and transmission providers and a clear need to improve the overall transmission capacity through more accurate understanding of the true transfer capability of grid assets paid for by ratepayers.

Electricity consumers have paid huge sums to develop and upgrade the nation's transmission system. For the last two decades, transmission investment has risen steadily, with the current transmission market reaching approximately $20 billion per year, driven in part by efforts to access low-cost renewable resources.[8] It is essential that the Commission ensure that RTOs and ISOs make the best use of the system that consumers have paid for. This is particularly true now because the nation's energy system is rapidly changing, and the grid will need to change with it. State public policy and decarbonization goals are driving profound changes in the generation mix. As the economy is increasingly electrified, particularly transportation and heating, there will be significant need for additional transmission development. The Brattle Group estimates that an average investment of $3-$7 billion per year through 2030 will be needed to meet economy-wide electrification, above the investments needed to maintain the existing system.[9]

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[8] The Brattle Group, *Improving Transmission Planning: Benefits, Risks, and Cost Allocation*. Presentation to Midwestern Governors Association & Organization of MISO States, at slide 3 (Nov. 2019) https://brattlefiles.blob.core.windows.net/files/17555_improving_transmission_planning_-_benefits_risks_and_cost_allocation.pdf.

[9] The Brattle Group, *The Coming Electrification of the North American Economy*, at ii (Mar. 2019) https://wiresgroup.com/wp-content/uploads/2019/03/Electrification_BrattleReport_WIRES_FINAL_03062019.pdf.

Part of the need for new upgrades is related to the thousands of megawatts of clean energy resources that are planned or already contracted for, which, along with energy efficiency, behind-the-meter solar installations, and other distributed energy resources (DERs), have reduced load and resulted in load profiles that are substantially different from those of even a few years ago. As a result, the grid of the future will have periods of very light load, significant amounts of inverter-based resources, and periods of steep ramping, all of which will require a flexible and responsive transmission network. The reforms proposed in the NOPR will help provide a more accurate understanding of the actual transfer capacity of the transmission system, with a corresponding improvement in the efficiency of actual power flows. These improvements will materially improve service and reliability in the grid of the future and will lower costs over the long term.

Line Ratings

Transmission line ratings represent the maximum permitted electric energy transfer capability of each transmission line. Transmission line ratings are based on the most limiting of three types of transmission line ratings/limits: thermal ratings, voltage limits, and stability limits.[10] Thermal ratings can change with ambient conditions, but voltage and stability limits are fixed values that limit the power flow on a transmission line from exceeding the point where there is a serious risk of a voltage or stability problem.

The electric current flowing through a transmission line heats the line due to the line's electrical resistance.[11] Weather conditions and other circumstances, especially solar irradiance, can increase heat on transmission lines. Conversely, other conditions, particularly wind, can cool transmission lines. Transmission line ratings are generally "negatively correlated to ambient

[10] NOPR, P 19
[11] U.S. Department of Energy Report to Congress, Dynamic Line Ratings, June 2019, .https://www.energy.gov/sites/prod/files/2019/08/f66/Congressional_DLR_Report_June2019_final_508_0.pdf

temperature and solar irradiance intensity, but positively correlated with wind speeds."[12] Of course, the impact of wind or sun on a line depends upon the line's physical attributes including conductor material properties, conductor diameters, and conductor surface conditions.

System operators rely on line ratings to control the flow of energy on electric power systems. Thus, line ratings affect the price of electric power and the reliability of the electric grid. Line ratings are also used by transmission providers, reliability coordinators, transmission system operators, planning authorities, transmission owners, and transmission planners in their reliability models.[13] Rating transmission lines more accurately has the potential "to increase transmission system efficiency; reduce production costs, congestion costs, curtailments, and reserve requirements; and help manage system disturbances."[14] RTOs/ISOs use transmission line ratings in their market models to establish commitment and dispatch. In these market models, transmission line ratings affect congestion, thereby affecting the prices of energy, operating reserves, and other ancillary services. As Commission staff have noted: "Improving the methods for determining thermal transmission line ratings could reduce costs, increase efficiency, and provide reliability benefits."[15]

Currently, transmission line ratings in the United States range from static and seasonal to fully dynamic. Static line ratings are the most conservative and are based on "worst-case ambient conditions that equipment might face (e.g., the hottest summer day) and are typically changed only when equipment is upgraded or ambient condition assumptions are updated. Thus, they often remain unchanged for years or even decades."[16] Some regional operators use seasonal line ratings, typically one for winter and another for summer, which again are based on

[12] FERC Staff Paper, *Managing Transmission Line Ratings*, August 2019, Docket AD19-15-000, p. 5.
[13] *Id*, p. 1.
[14] *Id*, p. 17.
[15] *Id*, p. 1.
[16] NOPR, P 22

conservative, worst-case temperature assumptions, generally the highest possible expected temperature predicted to occur over a long time period. Such long-term worst-case analysis might be appropriate in certain planning circumstances, for example in planning for storm hardening and climate resilience scenarios, but these assumptions simply do not reflect typical operating conditions and therefore, do not accurately reflect, and indeed understate, the true transfer capability of the transmission system.

As a consequence, static and seasonal line ratings are based on assumptions that do not accurately reflect the real time transfer capability of a given line and, as the Commission has noted: "ratings … based on seasonal or static assumptions may indicate less transmission system transfer capability than the transmission system can actually provide, leading to restricted flows and increased congestion costs."[17] In addition, as the NOPR notes, in RTO/ISO markets, inaccurate line ratings will limit the dispatch and unit commitment by grid operators by artificially constraining power flows creating congestion costs that would otherwise not exist.

Based on the information before it, the Commission has concluded preliminarily that transmission line ratings "are practices that directly affect the cost of wholesale energy, capacity and ancillary services, as well as the cost of delivering wholesale energy to transmission customers. Because of those relationships, inaccurate transmission line ratings may result in Commission-jurisdictional rates that are unjust and unreasonable."[18]

Consequently, the Commission has proposed to implement two new requirements for near-term transmission service, specifically that transmission operators use AARs[19] as the basis

[17] NOPR, P 2
[18] NOPR, P 38.
[19] The Commission defines an AAR as a line rating that: (1) applies to a time period of not greater than one hour; (2) reflects an up-to-date forecast of ambient air temperature across the time period to which the rating applies; and (3) is calculated at least each hour, if not more frequently. NOPR, fn 3.

for transmission service requests that will end within ten days of the request and that transmission owners also use AARs as the basis for determining the necessity of curtailment, interruption or re-dispatch of transmission service within ten days.[20]

The New England State Agencies strongly support the Commission's AAR proposals. As the New England State Agencies have long asserted, electric ratepayers are best served by a reliable and efficient grid at lowest cost. Improving transmission line ratings should reduce costs, increase efficiency, and provide reliability benefits. It cannot be forgotten that the transmission system was built on behalf of and paid for by the ratepayers. Artificially reducing power flows through outdated and inaccurate static and seasonal line ratings does nothing but reduce system throughput and increase costs.

The North American electric grid is large and complex with more than 100,000 miles of transmission lines operating at 345 kV or greater.[21] Development and maintenance of this system has cost ratepayers tens of billions of dollars.[22] The Commission should take all reasonable steps to protect ratepayers from excessive costs and use of AARs can be an important tool in this regard.

For example, one important way to protect ratepayers is to ensure that existing ratepayer funded transmission infrastructure is used to its fullest extent first before any consideration is given to building new and possibly unnecessary new projects and upgrades. A transmission system operated under AARs will permit more power to flow than a system operating under static

[20] NOPR, P 3.
[21] FERC Staff, *Report on Barriers and Opportunities for High Voltage Transmission*, report to the Appropriations Committees of Both Houses of Congress, June 2020, p.6.
[22] Johannes P. Pfeifenberger, et al., *Cost Savings Offered by Competition in Electric Transmission: Experience to Date and the Potential for Additional Customer Value* at 14-15 (2019), https://brattlefiles.blob.core.windows.net/files/15987_brattle_competitive_transmission_report_final_with_data_tables_04-09-2019.pdf (Brattle April 2019 Report).

or seasonal ratings. More efficient use of existing lines may obviate the need for new lines. Thus, deferred capital costs can be an important benefit from AARs.[23]

Interestingly, the recent CapX2050 study notes that retirements of dispatchable generation and the trend towards non-dispatchable wind and solar will change transmission congestion patterns and introduce more variability in power flows.[24] Similarly, the Independent System Operator, New England (ISO-NE) noted in its 2019 Regional System Plan (2019 RSP) that state policy directives are moving the grid to more renewable energy resources, and state mandated energy efficiency and demand reduction efforts have already had a material impact on regional load. These grid modernization steps have transmission system impacts.[25] These efforts, in turn, require updating the transmission grid.

One specific issue that is anticipated with the grid of the future is the late afternoon "duck curve" pattern when a large amount of widely distributed solar generation drops off and needs to be replaced, in a short period of time, with new generation. This will result in daily large spikes amounting to thousands of megawatts flowing through transmission lines in New England and anywhere there is significant deployment of PV and EE. Continued use of static and seasonal ratings will impede the efficient movement of power, causing congestion and increased costs Potomac Economics concluded that use of AARs in MISO by those not already doing so would have saved "approximately $94 million and $78 million" in 2017 and 2018, respectively.[26]

The Potomac Economics comment raises another issue. The cost described above were

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[23] FERC Staff Paper, *Managing Transmission Line Ratings*, August 2019, Docket AD19-15-000, p. 18. An additional benefit from AARs and DLRs is that they can function as a bridge solution in the event that siting and permitting of projects is delayed. *Id*.
[24] CapX2050, Transmission Vision Report, at 5 (March 2020).
[25] 2019 RSP, p. 2.
[26] NOPR, P 41

for those parts of MISO *not already using AARs*. This highlights the fact that parts of MISO, as well as most of ERCOT are already employing AARs.[27] Thus, there can be no serious argument that AARs are too difficult or costly to implement as was suggested by some transmission owners.[28] To the contrary, American Electric Power commented that it has used AARs in real-time operations for more than a decade.[29]

Finally, there is the simple fact that AARs are more accurate than static or seasonal ratings. Use of more accurate AARs will result, in turn, in more accurate understanding of system power flows and the real cost of delivering wholesale energy to customers, which is of value by itself. Likewise, the ability to increase the flow of power into load pockets and import constrained zones may reduce reliance on higher cost local reserves which will reduce costs and local reserve requirements.[30]

In sum, the mandatory replacement of static and seasonal line ratings with AARs will provide grid operators with more accurate information and with greater operational flexibility. They will aid with reducing congestion and local reserve and related issues and, as the grid transforms, will help with the integration of new clean energy resources. AARs are already in use and are not a novel or untested methodology. Finally, and most importantly, the use of AARs can save consumers significant costs in the near and long term. Forthese reasons, the New England State Agencies support the Commission's proposed implementation of AARs for the evaluation of transmission service requests that will end within ten days and for the determination of curtailment, interruption or re-dispatch of transmission service over the same period. The New England State Agencies support the Commissions' flexible approach of

[27] NOPR, P 29
[28] NOPR, P 49
[29] NOPR, P 51
[30] NOPR, P 42

requiring implementation of AARs, but not mandating that RTO/ISO utilize any specific approach.

Dynamic Line Ratings

The NOPR acknowledges that dynamic line ratings (DLRs) may be an even more accurate method of line rating. DLRs are defined by the Commission as:

> a transmission line rating that: (1) applies to a time period of not greater than one hour; (2) reflects up-to-date forecasts of inputs such as (but not limited to) ambient air temperature, wind solar irradiance intensity, transmission line tension, or transmission line sag; and (3) is calculated at least each hour, if not more frequently.[31]

DLRs thus are based not only on forecasted weather data, but on real-time actual data such as wind speed, sun intensity, and precipitation. These measurements come from sensors installed on or near the transmission line and/or photo-spatial sensors (3-D lasers) that can be used to identify line sag.[32]

The DLR process collects the sensor data, past and present, to create a very reliable short-term forecast for periods from as short as five minutes to an hour. These forecasts, in turn, allow for accurate and precise calculations of line transfer capability.[33] DLRs, therefore, offer many of the same benefits as AARs but with greater precision. DLRs can permit better utilization of existing systems, help mitigate impacts from generation or transmission outages and permit more efficient overall system use. According to the Commission, the transmission line data provided by DLRs "can also increase situational awareness, helping an RTO/ISO or transmission owner to monitor the condition/health of a line in real-time."[34]

DLRs have not been widely adopted in the United States.[35] As the Commission

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[31] NOPR, P 5, fn 5.
[32] NOPR, P 25
[33] NOPR, P 25
[34] FERC Staff Paper, *Managing Transmission Line Ratings*, August 2019, Docket AD19-15-000, p. 20.
[35] However, as the Commission notes, there have been some promising pilot projects in ERCOT, NYISO and PJM. NOPR, P 28.

recognizes, part of the reason for the delay in adoption of this technology is that the added data and necessary communications systems increase implementation costs and complexity.[36] In addition, the effective use of DLRs may require additional training for transmission owners and grid operators.

To take advantage of DLRs, it will first be necessary to develop the communications and software systems to accept the relevant data. The Commission is proposing to require RTOs/ISOs to establish and implement the systems and procedures needed to allow transmission providers to update transmission line ratings electronically at least hourly.[37] However, the costs and benefits of doing so are unknown at this time. The New England State Agencies urge the Commission to utilize an informed approach in reaching decisions about the adoption of DLR. Informed decisions will require more information. The Commission is seeking comment on whether to require ISOs and RTOs to conduct a one-time study on the cost effectiveness of DLR.[38] New England State Agencies support such a study by an independent third-party consultant. Using an independent outside consultant would ensure a neutral and objective analysis upon which all stakeholders can rely. In addition, RTO/ISO planning staffs are already overburdened with extensive interconnection study backlogs and additional extensive study and report obligations would not be helpful.[39] Such a study should be the first step before the Commission decides to order ISO-NE to implement DLR technology or to upgrade its systems to accept such data. Without this analysis, ISO-NE and other grid operators will expend effort and expense on implementation of DLR technology without certainty that it represents a cost-

[36] NOPR, P 27.
[37] NOPR, PP 5, 108.
[38] NOPR, P 110.
[39] In ISO-NE for example, interconnection initial Feasibility Studies (FS) are to be completed in 90 days and System Impact Studies (SYS) within 270 days. A recent filing by ISO-NE notes that the average FS takes 251.5 days. The average time for a SYS study is now 458.3 days. *See*, ISO-NE, *Interconnection Study Metrics Processing Time Exceedance Report Third Quarter 2020*, Docket ER19-1951, Nov. 13, 2020.

effective improvement and without knowledge of which parts of the transmission systems would most benefit from its adoption.

The Commission is also seeking comment as to whether transmission providers should be required to implement DLR across their entire system or only on those transmission lines that can demonstrate the most benefits from a dynamic rating.[40] It seems logical to deploy DLRs first on the most congested lines to obtain the greatest benefits as early as possible. Any inquiry into which lines can best benefit from DLR also should form a part of the RTO/ISO's cost benefit analysis before the Commission issues an order on this issue.

DLRs appear to have significant potential to improve the accuracy of transmission line ratings. For example, Commission staff report that "the results of the NYPA [DLR] pilot were calculations of DLRs, on average, in excess of 30 to 44 percent above static ratings."[41]

A 2019 report by the U.S. Department of Energy summarized eleven case studies of DLR pilot studies and commercial implementation in the U.S. and abroad since 1998, recognizing the operational challenges (such as operator training and control room integration) that have yet to be addressed.[42] The Report notes that DLR technology has significant promise. For example, a demonstration project by Oncor in Texas installed DLR and associated control systems on a transmission line before it could be upgraded, showing increases in transfer capability (a) between 6% and 14% over AARs that was available over 83% of the time and (b) between 30% and 70%

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[40] NOPR, P 100.

[41] FERC Staff Paper, *Managing Transmission Line Ratings*, August 2019, Docket AD19-15-000, p. 36, citing Wang, Warren and Pinter, Sarah, *Dynamic Line Rating Systems for Transmission Systems*, April 25, 2014 https://www.smartgrid.gov/files/SGDP_Transmission_DLR_Topical_Report_04-25-14_FINAL.pdf.

[42] United States Department of Energy, *Dynamic Line Rating*, June 2019, p. 25, https://www.energy.gov/sites/prod/files/2019/08/f66/Congressional_DLR_Report_June2019_final_508_0.pdf, see also, Balser et al., "Effective Grid Utilization: A Technical Assessment and Application Guide," National Renewable Energy Laboratory. April 2011-September 2012.

relative to static line ratings.[43] Outside of the U.S., there have also been positive experiences with DLRs.[44]

A particularly interesting benefit of DLRs may involve integration of wind generation. As wind speed rises, this increases turbine energy output while, at the same time, increasing wind speeds lower line temperature permitting greater transmission capacity.[45] This raises the possibility that "by conducting wind generator interconnection studies using higher wind speed assumptions, it may be possible to increase wind power deliverability assumptions and lower interconnection costs" in certain circumstances.[46] NYPA reports that a demonstration project there found a positive correlation between increased real-time capacity and increased wind generation with capacity increases of 30 to 44% over static ratings.[47] This might prove particularly important in places, like Maine, with significant wind potential but persistent congestion issues.

However, to date there is little experience with DLR technology. Costs and benefits may differ depending on actual conditions. DLR sensors can be expensive[48] and it would appear to make little sense to spend material amounts of money installing DLRs on lines that are not congested or are aging and may need to be replaced or upgraded in the near future.

As has been noted by the Commission and others, the grid is rapidly changing. Significant amounts of new clean energy resources are being developed and technologies like DLR that have the potential to improve transmission efficiency could be helpful to fully integrate distributed

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[43] *Id.*, at 25.
[44] Elia, the grid operator in Belgium, has used DLR for over a decade and now deploys DLR on a system-wide scale, involving 35 transmission lines. They have found DLR is more effective and more reliable than AAR and is capable of increasing transmission ratings above static ratings by 27-30% on average over a year. *See*, Joey Alexander, "Elia Large-Scale DLR Deployment", FERC Technical Conference on Managing Transmission Line Ratings, Docket No. AD19-15-000, September 10-11, 2019, https://ferc.gov/sites/default/files/2020-09/Alexander-ELIA.pdf
[45] FERC Staff Paper, *Managing Transmission Line Ratings*, August 2019, Docket AD19-15-000, p. 18.
[46] *Id.*
[47] *Id.*
[48] "While relatively inexpensive compared to other transmission-capacity expansion and utilization options, cost of DLR systems and their implementation are not insignificant." United States Department of Energy, *Dynamic Line Rating*, June 2019, p. 22.

and other resources and protect consumers from overbuilding expensive infrastructure. Various pilot studies also offer preliminary indications that DLR technology can be cost effective.[49] Nonetheless, a necessary next step in deciding whether and to what extent to adopt this technology must be to evaluate the costs and benefits of doing so in each RTO/ISO. If the results of these studies indicate that DLR technology lives up to its promise, the New England State Agencies will welcome its implementation.

Transparency

There is no standard Commission rule governing transparency with respect to transmission line ratings. Some transmission owners publicly disclose their line ratings or their ratings methodology and many others do not.[50] The New England State Agencies are concerned that this lack of transparency will adversely affect administration of AARs and possible future DLRs and urges the Commission to implement its proposed new rules requiring appropriate disclosure of line ratings.

The NOPR proposes to require transmission owners to provide both the transmission line ratings for each period for which the ratings are calculated and the transmission owner's line rating methodologies to their transmission providers or RTO/ISO and also with the relevant market monitor.[51] The Commission notes that providing this information will assist relevant system operators with enhanced operational and situational awareness.[52] In addition, it will allow operators to anticipate changes in line capability and act accordingly. As noted above, providing data to the RTO/ISO market monitor will allow the market monitor to verify the

[49] *Id. See also*, Wang, Warren and Pinter, Sarah, *Dynamic Line Rating Systems for Transmission Systems*, at 51, April 25, 2014 https://www.smartgrid.gov/files/SGDP_Transmission_DLR_Topical_Report_04-25-14_FINAL.pdf. https://www.energy.gov/sites/prod/files/2016/10/f34/SGDP_Transmission_DLR_Topical_Report_04-25-14.pdf
[50] NOPR, P 114
[51] NOPR, P 125.
[52] NOPR, P 126.

quality and accuracy of the information.[53] Finally, the Commission is seeking comment as to whether to require transmission owners to make line ratings and ratings methodologies available to other interested stakeholders beyond transmission providers, grid operators and market monitors.

The New England State Agencies note that some transmission owners commented during the September 2019 Technical Conference that they did not believe that any new transparency requirements were needed.[54] However, as one commentator noted, transmission owners may have an incentive to be overly conservative with transmission line ratings methodologies.[55] Typically, there is no financial incentive for more efficient operation of existing transmission assets and significant incentive to build new lines and substations and include these new assets into rate base.

A review of the information received at the conference supports the Commission's proposed transparency rules. Potomac Economics, for example, provided data demonstrating significant variation in transmission line ratings for essentially the same lines. Potomac Economics also was able to show that, in some cases, the same ratings were used for the same line for both summer and winter, something that is difficult to understand.[56] In addition, they were able to document instances in which lines had the same rating both for normal use and emergency use. For example, in MISO, 30% of transmission lines have identical summer and winter ratings and 63% of lines have the same ratings for winter emergency and normal use.[57] Finally, the 2019 Technical Conference provided abundant evidence of the complete lack of consistency in transparency rules nationwide. On the one hand, NYISO makes transmission

[53] NOPR, P 127.
[54] September 2019 Technical Conference, Day 1 Tr. at 281-82.
[55] *Id*. at 23 and 25.
[56] NOPR, P 116.
[57] *Id*.

line ratings information available on a designated basis to all interested parties and PJM notes that it posts ratings on its website every 15 minutes. On the other hand, elsewhere there is very little access to line ratings.[58] Interestingly, no evidence was provided to indicate any adverse impacts to security or system reliability in those regions with the greatest transparency in line rating data.

Some parties opposed greater rating transparency, primarily because it was thought to be unnecessary and was considered burdensome. On the other hand, many commentators advocated for full transparency. Potomac Economics stated simply that such transparency is "essential" for AAR implementation.[59] OMS and Industrial Customers also supported transparency. Intriguingly, DTE explained that transmission owners currently enjoy a monopoly over line rating information and that greater transparency could aid development of cost-effective congestion management solutions.[60] Finally, it appears that transparency would prove useful in ensuring that line ratings are accurate and correct. Several parties have noted that lax oversight of line ratings is pervasive.[61] If nothing else, transparency would measurably aid independent verification of posted line ratings.

The New England State Agencies agree with the reforms proposed in the NOPR with respect to, at a minimum, requiring disclosure of line ratings and methodologies to all grid operators and market monitors. At the very least, this will allow verification of the existing line ratings by independent authorities. As has been noted above, line ratings are a key element in determining safe power flows. Electric consumers deserve to have ratings that are accurate.

Beyond this, AARs and any future DLRs cannot be implemented without access to this

[58] NOPR, PP 117, 121.
[59] Potomac Comments at 14-16.
[60] DTE Comments at 4.
[61] Monitoring Analytics Comments at 4-5; Potomac Economics Comments at 8.

data. While some owners have complained that transparency is an administrative burden or may lead to litigation, the very fact that NYISO and PJM already require similar data disclosure indicates that transmission owners can comply without undue difficulty. Further, no commentator provided any actual evidence of any increased litigation in those regions where disclosure is common.

Finally, the New England State Agencies urge the Commission to require transmission owners to make line rating data available to a greater range of stakeholders than those required by the NOPR. Both Potomac Economics and Monitoring Analytics argued in favor of public availability. American Electric Power stated that it has shared details of its ratings methodologies and "that review of facility rating parameters and assumptions is common in competitive transmission development."[62] This is important to those states, like the New England State Agencies, that have relied on competitive procurements for certain types of energy development needs. Order 1000's public policy transmission upgrade programs would be materially aided by allowing open access to line ratings and similar data. To the extent there is concern about loss of confidential business information, password protections and non-disclosure agreements are often used in protecting confidential information in a wide variety of circumstances. In this regard, the New England State Agencies reiterate that no commentator pointed to a single circumstance of any misuse of data even in those regions with the greatest public transparency.

Emergency Line Ratings.

Finally, the Commission seeks comments on whether to require transmission providers to use special emergency line ratings. Some regions are already using emergency ratings but, as

[62] AEP Comments at 5.

noted by the Commission, having an emergency rating that is exactly the same as the normal rating does not accomplish much. The Commission noted that 63% of MISO's emergency ratings were the same as normal ratings but the Commission acknowledged that it does not have information as to what other RTOs/ISOs do.

Emergency ratings can avoid circumstances where system operators are forced to shift load to more expensive transmission routes due to a line failure or other emergency. In addition, emergency ratings can prevent unnecessary curtailment of generation. Emergency ratings can also be useful in extreme circumstances to avoid shedding load. In this regard, it is possible that accurate emergency line ratings could save ratepayers significant costs and help keep the system up under very difficult circumstances.

An example from ISO-NE is helpful to show the kind of system flexibility that an emergency rating could provide. During the 2018 "bomb cyclone" weather event, much of the grid in the northeastern United States was constrained because of an extended period of very cold weather between late December 2017 and January 2018.[63] During this period of extreme weather, ISO-NE issued an abnormal conditions alert to address the weather and supply issues. The ISO-NE then increased their transmission line ratings to allow for greater line capacity. One ISO-NE report stated: "At 16;00 on 1/3/18, the scheduling limit on the New York A.C. ties was increased from 1,400 to 1,600 MW. The increased limit was made possible by the cold conditions which helped to improve thermal transfer capability."[64] It appears that this was more like a form of ambient-adjusted line rating but the emergency increase in line rating gives an idea of the benefits that formalized and accurate emergency line ratings could provide.

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[63] United States Department of Energy, *Dynamic Line Rating*, June 2019, p. 13.
[64] ISO-NE "Cold Weather Operations, December 24, 2017- January 8, 2018" (http://www.nepoo0l.com/uploads/NPC_20180112_Cold_Weather_ops.pdf) slide 41.

Ultimately, the New England State Agencies agree with the Commission that emergency ratings may well provide important benefits, but more information is needed. The New England State Agencies, therefore, support the request in the NOPR for comment from RTOs/ISOs in regard to emergency ratings practices.

III. CONCLUSION

The New England State Agencies commend the Commission for this NOPR and support the planned implementation of cost effective AARs that increase efficiency and reliability and save ratepayer dollars. In addition, the New England State Agencies fully support the NOPR's planned improvements to transparency in line rating practices for the same reasons and the Commission's request for more information regarding emergency ratings and DLRs. A study of cost effectiveness should be the first step in any decision to implement DLRs.

Respectfully Submitted,

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CERTIFICATE OF SERVICE

I, Robert Snook, hereby certify that on this day I caused the foregoing to be served upon all parties identified on this agency's service list for this proceeding.

Robert Snook
Robert Snook

Dated: February 1, 2021