UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Managing Transmission Line Ratings	**)**	**Docket No. RM20-16-000**

COMMENTS
OF POTOMAC ECONOMICS, LTD.

On November 19, 2020 in the above-captioned proceeding the Federal Energy Regulatory Commission (the "Commission" or "FERC") issued a Notice of Proposed Rulemaking ("NOPR") to require transmission providers to implement ambient-adjusted ratings ("AARs") for use in near-term operations and transmission service and curtailment of transmission service. Regional Transmission Organizations ("RTOs") and Independent System Operators ("ISOs") would be required to implement systems and procedures to allow transmission owners to electronically update transmission line ratings at least hourly and transmission owners would be required to share transmission line ratings and methodologies with transmission providers and relevant RTOs/ISOs and their respective market monitor(s).

Potomac Economics submitted comments and participated in both the Workshop on Managing Line Ratings[1], the NOPR and NOI on Transmission Incentives[2] and the proceeding on

[1] Managing Transmission Line Ratings, Docket AD19-15-000.

[2] Notice of Proposed Rulemaking Electric Transmission Incentives Policy, Docket RM20-10-000, and Inquiry Regarding the Commission's Electric Transmission Incentives Policy, Docket PL19-3-000.

Grid Enhancing Technologies[3]. Potomac Economics' comments in those proceedings addressed many of the objectives of this NOPR, and provided useful insight on the potential for efficiency gains through increased transmission utilization and improved market incentives for new investment. We provide these comments to the Commission to help further the development of the Commission's proposed requirements.

Potomac Economics hereby submits these comments in support of the proposed requirements to provide AARs. We note, however, that such a requirement will not be clear or fully effective in achieving the benefits the Commission seeks unless it specifies the required initial rating to be adjusted. In this regard, we recommend that the Commission specify that the initial rating to be adjusted for ambient temperatures:

- Be the emergency rating for the transmission facility for all contingent constraints except in certain cases; and
- Recognize the predictable differences in solar radiance between daytime and nighttime.

Potomac Economics also provides submits comments on questions raised by the Commission in its NOPR and on the proposed implementation requirements.

Potomac Economics is the Independent Market Monitor ("IMM") for Midcontinent ISO ("MISO") and ERCOT, the Market Monitoring Unit for the New York ISO ("NYISO"), and the External Market Monitoring Unit ("EMMU") for ISO New England. In these roles, we are responsible for monitoring and evaluating the performance of each RTO's energy and operating reserve markets. We also recommend market design changes to improve the performance of the markets and evaluate design changes proposed by the RTOs or market participants.

[3] Grid-Enhancing Technologies, Docket No. AD19-19-000.

I. NOTICE AND COMMUNICATIONS

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II. INTRODUCTION AND SUMMARY

Potomac Economics is encouraged by the steps the Commission has taken to examine the current policies and practices among Transmission Owners ("TOs") and Transmission Providers ("TPs") on adjusting transmission line ratings for ambient conditions. We believe this is one of the most important issues before the Commission and one of the best opportunities to make significant improvements to the efficiency of wholesale markets in the U.S.

We continue to be strongly supportive of the Commission's efforts to implement policies on transmission line ratings because of the potential to significantly increase transmission utilization and thereby reduce overall market production costs.

We believe this NOPR provides a clear record and ample justification for the proposed requirements. Based on our experience estimating the benefits of AARs and emergency ratings and working with TOs to implement programs to provide them, we provide comments and suggested modifications to the proposed rule. Most importantly, we emphasize the critical need to clarify that the required adjustments be applied to Emergency Ratings for contingent constraints as we describe in our comments below. The requirement to adjust transmission ratings for ambient temperatures is not a clear requirement unless the Commission specifies the initial rating to be adjusted. In the case of contingent constraints, which constitute the vast majority of binding transmission constraints, the initial rating should be the emergency rating.

This flow level would only occur *after* the contingency has occurred and the system operator would have a defined period of time, as much as two to four hours, to dispatch the system to bring the flow below the continuous Normal rating. Our analysis shows that without such a clarification of the requirement to specify that the adjustment should be applied to emergency ratings for contingent constraints, approximately half of the potential benefits and reduced production costs will be lost.

Additionally, since transmission ratings will predictably vary from daytime to nighttime because of the effects of solar irradiance, we also encourage the Commission to clarify that the starting rating to be adjusted should recognize the distinction between daytime and nighttime differences in solar irradiance.

In summary, we believe the record from the previous Technical Conference (AD19-15) and our own experience with multiple RTOs strongly supports the need for the requirement that TOs provide AARs and emergency ratings. Specifically, the record shows that AARs and Emergency ratings[4] can and indeed have been implemented reliably while enhancing grid and market efficiency. But critically, the record and our experience both show that without a requirement, AARs and Emergency ratings will not be voluntarily adopted broadly or consistently. This is largely due to fact that transmission owners generally do not have an incentive to provide such ratings. In fact, increasing transmission ratings can result in lower future transmission investment and revenues. Therefore, we strongly support the Commission's proposed requirements and respectfully recommend the modifications described in these comments.

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[4] We appreciate the NOPR's clarity on terminology and in these comments have adopted FERC's definitions of both Ambient-Adjusted and emergency ratings. In prior comments we have referred to Ambient-Adjusted Ratings in a manner consistent with FERC's definition, however, we have referred to emergency ratings as Short-Term Emergency (STEs) ratings.

III. COMMISSIONS JUSTIFICATION FOR REQUIREMENT

In issuing the NOPR to require TOs to provide AARs, the Commission has recognized that understated transmission ratings substantially increase the costs of serving load and satisfying the requirements of the system. The Commission has noted that transmission line ratings:

> "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."[5]

We concur with the Commission's findings. From our work in a number of RTO/ISOs, we understand that facility ratings are used in virtually every aspect of electricity market and system operations, from the planning horizon to real-time operations. Ratings are the basis for the transmission limits used as inputs to the RTO market models that ultimately determine the resources committed and dispatched to meet satisfy load and manage congestion (keep flows at or below transmission limits). Using ratings that are understated will cause the RTO to operate inefficiently and lead to:

- Higher congestion costs for RTO customers;
- Reduced the availability of transmission service within and outside of RTO areas;
- Higher costs associated with local resource adequacy and transmission security requirements;
- Higher curtailments of intermittent renewable energy resources, resulting in higher carbon and other emissions; and
- Increased perceived need to invest in new transmission facilities.

[5] NOPR, at 38.

The Commission has proposed to require AARs and has also requested comments on whether to require emergency ratings. In this section we comment on the expected economic and reliability benefits from AARs and emergency ratings.

A. Economic Benefits of a Requirement

For most transmission facilities, the ability to flow power is limited by the heat caused by the power flow. When temperatures are cooler than the typical assumption used for rating the facilities, additional power flows can be accommodated, favoring the development of temperature-adjusted AARs.[6]

Additionally, Emergency ratings, used to prepare for contingency events, should correspond to the short-term emergency rating level (i.e., the flow level that the monitored facility could reliably accommodate in the maximum timeframe evaluated for return to normal rating levels, nominally 2-4 hours, if the contingency occurs).[7]

Potomac Economics has been evaluating issues relating to transmission line ratings for many years. This work has mainly been in MISO and some of our key analyses of AARs on the MISO system have demonstrated that improved calculation of line ratings can achieve substantial benefits. Ratings in MISO generally do not reflect changes in ambient conditions or short-term flexibility. Only 8% of the ratings in MISO are adjusted for changes in ambient

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[6] Temperature is one common dynamic factor. In some regions, ratings are more dependent on other factors, such as ambient wind speed and humidity.

[7] In MISO, most transmission owners provide both normal and emergency limits as called for under the Transmission Owner's Agreement. The Transmission Owners Agreement calls for transmission owners to submit normal transmission ratings on base (non-contingency) constraints and emergency ratings on contingency constraints ("temporary" flow levels that can be reliably accommodated for two to four hours). Because most constraints are contingency constraints (i.e., the limit is less than the rating to prepare for additional flows that will occur if the contingency happens), it is generally safe to use the emergency ratings.

temperatures and the vast majority of these adjusted ratings are submitted by only two Transmission owners in MISO.[8]

Additionally, only roughly one third of the ratings provided for contingency constraints (also referred to often as N-1 conditions[9]) are emergency ratings, i.e., roughly two-thirds of these ratings are "normal" ratings. Emergency ratings are appropriate for most contingency constraints because the flow will only reach this level after the contingency occurs, in which case the RTO will then take actions to quickly reduce the flow. Hence, the use of normal ratings significantly reduces the utilization of the network.

We have estimated the value of operating to higher transmission limits that would result from consistent use of temperature-adjusted and emergency ratings for MISO's transmission facilities. To estimate the congestion savings of using temperature-adjusted ratings, we performed a study using NERC/IEEE estimates of ambient temperature effects on transmission ratings. Using the formulae and data from IEEE Standards (IEEE Std C37.30.1™-2011), we derived ratios of allowable continuous facility current (flow) at prevailing ambient temperatures to the Rated Continuous Current for different classes of transmission elements (e.g., Forced Air-Cooled Transformers and Transmission Lines).

We used the most conservative class of permissible ratings increase under the Standard for the type of element (Line or Transformer). We then used the ambient temperatures prevailing in the transmission area to estimate the temperature-adjusted rating. The value of increasing the transmission limits was then calculated by multiplying the increase in the

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8 MISO Transmission Line Rating Workshop, Item 4, pp 14.

9 Reliability standards in the Eastern Interconnect require monitoring and securing the system for the loss of any one system component (i.e. N-1) conditions. Local reliability requirements may include additional requirements (i.e. N-2 etc.).

temperature-adjusted limit by the real-time shadow price of the constraint. To estimate the effects of using emergency ratings for facilities for which only normal rates have been provided, we assume that the Emergency ratings are 10 percent higher than the Normal ratings. This is consistent with the data for other facilities for which TOs submit Emergency ratings. We then estimate the value of these increases (both the temperature-based increases and the Emergency rating increases) based on the shadow prices of the constraints. Our findings are summarized in Table 1.

Table 1: Benefits of Temperature-Adjusted and Emergency Ratings 2019-2020

		Savings ($ Millions)			# of Facilites for 2/3 of Savings	Share of Congestion
		Ambient Adj. Ratings	Emergency Ratings	Total		
Total Estimated Benefits						
2019	**Midwest**	$62.5	$37.02	$99.5	21	14.7%
	South	$4.0	$11.12	$15.1	3	7.6%
	Total	**$66.5**	**$48.1**	**$114.6**	**24**	**13.1%**
2020	**Midwest**	$44.6	$40.65	$85.2	18	9.2%
	South	$4.0	$8.85	$12.9	2	9.0%
	Total	**$48.6**	**$49.5**	**$98.1**	**20**	**9.2%**

The results across the two years show consistent benefits equal between 9 and 13 percent of the real-time congestion value. In years with relatively low congestion, such as 2020, the benefits will be lower. However, the benefits of improved ratings will increase substantially in periods, such as February 2021, and extreme congestion. The share of benefits has also remained roughly even between temperature-adjusting the ratings and using emergency ratings. The benefits of temperature adjustments accrue primarily outside the summer months when static ratings are most understated as well as significant benefits during the morning summer peak ramping periods.

We verified the results above by analyzing a subset of MISO under a 2015 MISO pilot program where Entergy employed temperature-adjusted, short-term emergency ratings on several key facilities. Over time, the program has expanded to include additional Entergy facilities and has yielded clear benefits without causing reliability issues. Further expansion of the program to other transmission operators would generate considerable congestion management savings throughout MISO. In addition to Entergy, we evaluated the benefits of another transmission owner who currently utilizes temperature-adjusted ratings on many of their transmission facilities. Neither transmission owner adjusts their ratings on an hourly basis to maximize the benefits, but the benefits are still substantial, as shown in Table 2. These benefits are estimated by multiplying the rating increases (from the static rating level) by the prevailing shadow prices. This methodology is a conservative estimate of savings, given that the shadow price would increase if the market was controlling to a lower, non-adjusted rating.

Table 2: Estimated Achieved Savings by Two Transmission Owners
2019 through 2020

	Savings ($ Millions)	Share of Congestion	Facilities in Program
Midwest	$10.2	4.8%	48
South	$14.2	4.7%	122
Total	**$24.4**	**4.7%**	**170**

From 2019 to 2020, the actual savings totaled almost $24 million – almost 5 percent of the congestion on the transmission facilities. Over $14 million of the savings were on Entergy's transmission facilities in the South – 5 percent of congestion on those facilities. These savings estimates are conservative because the costs of managing to a lower limit would increase.

Our estimates were based on two utility owners because TOs have little or no economic incentive to provide temperature-adjusted ratings. One means to address this issue is to provide

an economic incentive to the TOs that is related to the benefits of the additional transmission capability.

Our estimated benefits support the Commission proposed requirement to provide AARs to reduce real-time congestion management costs, reliability, and transparency. It also supports clarify the requirement to apply the adjustments to emergency ratings for contingency constraints, which we recommend and discuss in the next section.

B. Reliability Benefits

In addition to the economic benefits through more efficient use of the transmission system, a requirement to develop and provide AARs/emergency ratings and the related processes will enhance reliability increasing the operational awareness of the RTOs and other Transmission Providers regarding the capability of the transmission facilities. As described in more detail in Section V below, these Transmission Operators rarely verify or validate rating methodologies or rating calculations. Developing these procedures and the accompanying databases of methodologies and limiting elements will improve Transmission Operators' operational awareness and ability to maintain the reliability of the system in the short-run, and their ability to identify economic transmission upgrades that will improve reliability in the long run.

IV. THE COMMISSION SHOULD REQUIRE REASONABLE INITIAL RATINGS BE USED AS THE BASIS FOR THE AARS

A. The Commission should clarify that emergency ratings be the basis for the AAR on most contingent constraints

The NOPR seeks comment on whether to extend the requirements to require that the AARs be based on emergency ratings. We believe requiring TOs to calculate their AARs based on emergency ratings is essential for achieving the full benefits of the NOPR. In our extensive work on transmission ratings over multiple RTO systems, we have found no reason to not require

TOs to provide ambient-adjusted emergency ratings for contingent constraint and sacrificing approximately 50 percent the potential benefits.

MISO reports that 90 percent of binding constraints in MISO are contingent constraints based on N-1 conditions that *should* be based on emergency ratings.[10] Emergency ratings therefore are not just important, they should in fact be the dominant type of rating used in MISO. Unfortunately, this is not the case because as MISO where both MISO and the IMM have documented that continuous normal ratings are used for two-thirds of all constraints rather than emergency ratings.[11, 12] Were this to continue to be allowed permissible under the Final Rule, a large share of the benefits of improving line ratings would be lose. Emergency ratings are frequently 10 percent higher or more than continuous normal ratings. Allowing that capability to go unutilized for no legitimate reason raises costs to RTOs' consumers and can cause MISO to take emergency actions that are costly and unnecessary, including potentially shedding load.

We recognize that there may be circumstances or areas where RTOs may not have sufficient post-contingency actions to reduce the flow sufficiently within two to four hours. However, these circumstances are rare for most RTOs and, to the extent they exist, such circumstances can be established through studies or analysis that would justify the decision to not employ emergency ratings for a particular constraint.

The balance of this section of our comments provides additional clarification and explanation of why emergency ratings appropriate for contingent constraints and how they should be used.

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10 MISO staff presentation at the Transmission Ratings Workshop, January 15, 2021, p 8.

11 MISO staff presentation at the Transmission Ratings Workshop, January 15, 2021, p 14.

12 NOPR, Para 32.

i. Clarification of the Use of Emergency Ratings

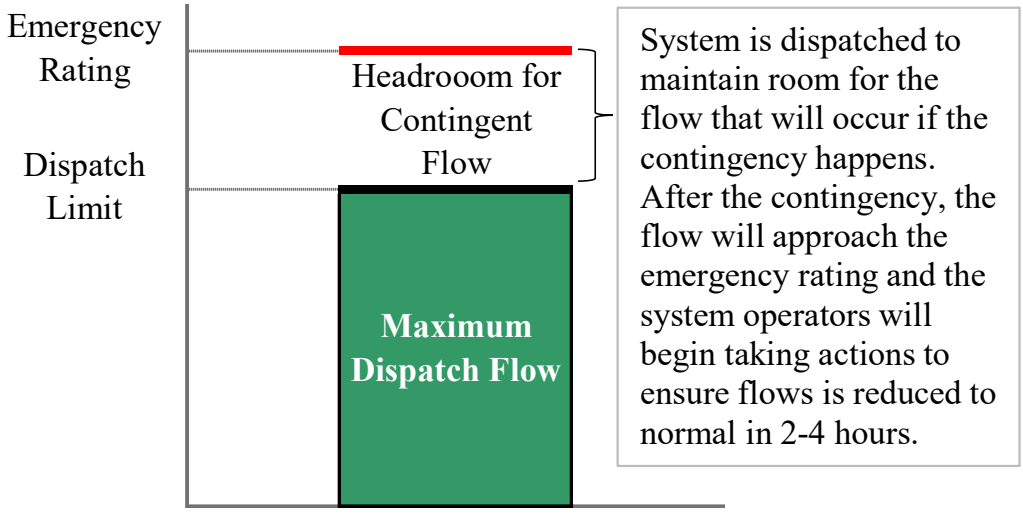
At the workshop and based on our discussions with MISO TOs we have observed some confusion on how N-1 constraints are managed and how emergency ratings are used. Emergency ratings *are primarily* used during normal (pre-contingency) operations to manage the N-1 conditions.[13] In fact, given relative infrequency of forced transmission outages, post-contingent use of emergency ratings is relatively rare. To understand why requires an understanding of how contingencies are managed.

A contingency constraint (i.e. and N-1 condition) involves a "Monitored" facility and a "Contingent" facility. These constraints are managed with limits that allow for the additional flows on the Monitored facility that will result if the Contingent facility fails (or is taken out of service). Contingency analysis enables Reliability Coordinators to identify the most significant contingency, and to manage flows so that if it occurs the flow on the Monitored facility will not exceed its post-contingency limits. Emergency ratings are appropriate for Monitored elements when modeling contingencies because the additional flow will only occur after the contingency occurs, and the real-time dispatch and additional RTO actions that can be taken after the contingency will reduce the flow back down to the normal rating.

When a contingency (e.g., parallel line trips) actually does occur, this will result in instantaneous additional flow on the monitored element. In response, MISO will immediately begin to redispatch the system to return the flow on the monitored element to the normal continuous rating. In addition, MISO will identify and prepare for the next most severe N-1 condition. MISO's reliability procedures are to return the post-contingent flow to within the

[13] In Para 6, FERC says "The proposed reforms noted above are intended to improve the accuracy of transmission line ratings used during normal (pre-contingency) operations. We also seek comment on whether to require transmission providers to implement unique emergency ratings that would be used during post-contingency operations. "

Normal continuous rating and to prepare for the next N-1 condition within 30 minutes. The following figure illustrates this approach, showing that the dispatch limit employed by the system operators will be set well below the emergency rating level to ensure that the flows that will occur after the contingency do not exceed the emergency rating. Many have mistakenly assumed that using the emergency rating to operate the system means allowing power flows to regularly rise to this emergency rating level and place undue stress on the facility. This is clearly not the case as the flow should only raise to this level for brief periods after a contingency has occurred.



While RTO/ISOs procedures and information on the time (permissible duration) associated with emergency ratings differs, the emergency rating flow duration typically vary between 1 and 4 hours. Any requirement to submit emergency ratings in the Final rule should specify the maximum permissible duration. The submission of this information would enhance RTOs' situational awareness and reliability.[14]

[14] Potomac Economics made this recommendation in our 2019 SOM and it has been incorporated into the MISO Roadmap process in IR054 as a high priority.

ii. Comments on concerns raised regarding the use of Emergency ratings

The Commission requested comment on whether and how a requirement to implement emergency ratings would impact the useful life of transmission equipment, as well as on the feasibility of calculating emergency ratings on transmission equipment other than conductors and transformers.[15] Emergency ratings are designed to permit temporary use (following N-1 conditions) without equipment damage, such as significant annealing. If post-contingent responses and response times are in question, RTOs can and do develop special operating guides to specify the operating conditions required to reliably use the emergency ratings and to provide post-contingent action plans. The type of facility, limiting elements, age of facility, and other factors are considered in determining appropriate emergency ratings and operating guides. TOs will continue to have the authority and responsibility to determine reliable emergency ratings and we are not recommending that TOs lose this responsibility. However, vague or general concerns should not forestall the requirement to provide emergency ratings for most facilities.

B. AARs should be based on an initial rating that recognizes the difference in solar irradiance between daytime and nighttime.

The NOPR contemplates a requirement on TOs and TPs to provide and implement AARs. The NOPR is based on a robust record and we support the Commissions conclusion which appears to be based on two important principles:

1) AARs may be necessary requirement to ensure Just and Reasonable Rates. This is true given that importance of ratings and outsized impact on wholesale markets.
2) AARs can be achieved based on accurate forecasts of input parameters that can be obtained and implemented without additional DLR technology.

[15] NOPR, at Para 113.

However, the NOPR requirement does not clearly specify the initial ratings to be adjusted. While temperature is amongst the most important factors in determining a reliable rating for most transmission facilities, solar irradiance can also be an important factor and does not require sophisticated monitoring or forecasting. Solar irradiance at night is zero, and under cloudless conditions will be lower during morning and evenings than at peak day times.[16] Therefore, it would be reasonable for the Commission to require that TOs separately calculate day and night ratings to capture the ratings benefits of the lack of solar radiation at night.

We estimated the average size of this benefit for nighttime ratings to be an 11 percent increase in the nighttime. To estimate this, we reviewed solar irradiance assumptions reported in the rating methodologies of several TOs. There is significant variance in this assumption among the TOs sampled, but a simple average is 72 w/ft^2 (774 w/m^2). We then performed rating calculations for several conductors using both the 72 w/ft^2 assumption and 0 w/ft^2 to reflect nighttime conditions and found an average increase in ratings of 11 percent. Applying this rating increase congestion events at night in MISO related to line ratings (excluding transformers) for 2019 and 2020 showed an estimated benefit in MISO of nearly $60 million ($30 Million/year).

This is an estimate that could be applied more precisely for each TO, but the estimate shows that the potential savings of day/night rating adjustments are significant. Since it can be achieved without adding monitoring equipment or elaborate forecasting capabilities, it would almost certainly be cost effective. We find that the record and the NOPR principles would support extending the requirement for AARs to be based on day and night ratings that reflect the predictable differences in solar irradiance, which we respectfully recommend.

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[16] Peak load winter conditions in MISO typically occur after sunset in the North and Central regions as well as system wide. For example, MISO's current all-time winter peak was set after sunset (January 6, 2014 at 18:45 CST).

V. THE COMMISSION SHOULD EXPAND THE REQUIREMENTS OF THE NOPR TO ACHIEVE THE TRANSPARENCY IT SEEKS

A. Recommended Improvements in Transparency and Verification by RTOs

We support the NOPR proposed requirements to require TOs to share ratings and rating methodologies with their transmission providers and with market monitors(s).

Additional information is needed to achieve the transparency the Commission seeks and to administer the AAR requirements. Although MISO has limited authority to request more information on Facility Rating Methodologies (FRMs), very little information is provided to MISO on TO rating methodologies or calculations.

To meet the objectives of the NOPR requirements, the Final Rule should specify that the submission of rating methodologies and relevant data to the RTO, beginning with the limiting element for each rating. For a given facility, the ratings (AAR or Emergency) will be based on the most limiting element associated with the facility, which makes it critical information for any verification or evaluation of the transmission ratings. The most limiting element may change over time due to operating conditions or equipment changes. Therefore, the required information to be provided with the ratings should include the limiting element or factor. The limiting factor in rating a transmission facility is varied. For example, it may be one of the following:

- Maximum design conductor operating temperature (70-140 ºC) depending on the type of conductor,
- Conductor sag limitations,
- Substation equipment, or
- Voltage or stability (rather than thermal limits).

In addition to the limiting element information, the other inputs and assumptions used to verify the calculation of the ratings should be provided by the TOs. Such information includes

all information and assumptions necessary to replicate the rating calculation. At a minimum, RTOs should be required to collect and verify such information, and maintain a database that would be accessible by market monitors or others that have a role in monitoring, operating, or planning the system. In our role as the Independent Market Monitor for MISO and other RTOs, such information will be essential for enabling us to effectively monitor for transmission withholding.

B. Improving Transparency and Verification in Non-RTO/ISO Areas

The NOPR inclusion of non-RTO/ISO markets is vitally important. The Eastern Interconnect continues to operate with substantial areas outside of RTO/ISOs. To enhance efficiency and reliability to the greatest degree possible, the requirements rightly apply to TOs and TPs in non-RTO/ISO areas. However, the NOPR is silent on requirements for non-RTO/ISOs to report similar information to market monitors and/or any other independent parties. While TOs will continue to be responsible for calculating AARs and emergency ratings, the Commission should consider how its requirements will be monitored and enforced. Absent some form of independent oversight in the non-RTO areas, it is likely that the benefits of the NOPR requirements will not be fully realized.

A Commission requirement to produce this information and have it verified by an independent entity would allow for comparable monitoring of transmission ratings in non-RTO/ISO areas that are used for transmission service and curtailment. We believe that effective monitoring will facilitate benefits of requiring AARs and emergency ratings in non-RTO/ISO areas that would be comparable to the benefits in the RTO areas.

Such a requirement will also improve transparency for the transmission customers that rely on the transmission capability made available by the transmission providers in these areas. We have served as an independent monitor of transmission service for five transmission

providers over the past twenty years. In each of these cases, we were able to identify issues and improvements that would make additional transmission capability available to the market. Even during periods when no significant issues or improvements were identified, this function increased the transparence of the transmission function and confidence of the transmission customers. Therefore, we recommend that the Commission require some form of independent oversight, verification, and monitoring of the ratings calculated and used in non-RTO areas.

VI. COMMENTS ON THE IMPLEMENTATION REQUIREMENTS

As we have discussed we support the NOPR's overall conclusions on the justifications for AARs and we strongly urge the Commission to include emergency ratings in this requirement. In this section, we comment on the specific NOPRs implementation requirements. Based on experience with rating implementation both in RTO/ISO markets and non-RTO/ISO areas, we believe additional implementation and transparency requirements are needed.

A. The scope of requirements should include TLRs and RTO market flows

Limitations to transmission service and the basis for ratings on facilities associated with curtailment (Transmission Loading Relief or "TLR") are often opaque, even to other transmission operators. The costs associated with TLR may be greatly reduced by the Commission's proposal to require AARs on transmission service and transmission management of point-to-point ("PTP") and network transmission service. While the NOPR describes use of AARs for PTP and Networks service, it is important to clarify that transmission rating information that underlies curtailments under TLRs or Joint Operating Agreements ("JOAs") be available to other TPs, Reliability Coordinators, or RTOs that are affected by the curtailments.

B. Comments on the 10-day demarcation

Ideally, the AARs should be established for both the day-ahead and real-time markets and we advocate for the implementation of AARs in both timeframes. However, implementing the processes needed to calculate and use AARs for the day-ahead market may be more difficult and time-consuming. If this is true in some areas, we recommend that TOs move forward to implement AARs in the real-time horizon while the additional work necessary to calculated expected AARs for the day-ahead market is undertaken.

In RTO areas, the value of AARs in advance of the day-ahead timeframe falls sharply and the uncertainty regarding temperature forecasts increases substantially. Temperature forecasts made 10-days in advance or even multiple days in advance will be much less accurate than updates made just prior to an hour. Since the usefulness of AARs in advance of the day-ahead market is relatively limited for RTOs, we recommend that the Commission initially only require AARs be calculated for the day-ahead and real-time markets. This will allow the RTOs to focus their resources on improving the ratings that will generate almost all of the savings.

C. Comments on automation

We generally support automation and believe it supports reliability, efficiency, and transparency. Clarification may be needed whether the requirements for automation are on the rating submission process and use of AARs or the entire rating process. We assume the Commissions primary focus is on managing the workload on TPs and Reliability Coordination staff. Automation requirements should not delay initial implementation. Requiring full automation may delay initial implementation and may not be reasonable for all TOs.

D. Comments on the first and second-year requirements

Within the first year of the final rule, the NOPR would require implementation of hourly AARs on historically congested transmission lines, along with sharing transmission line rating

methodologies. In the second year, transmission providers would be required to implement AARs on all other transmission lines.

Overall, we believe the Commissions proposed first and second year requirements strike a reasonable balance. Historically congested facilities should be the priority and we believe one year is a reasonable time frame for implementation. However, we do not believe it is reasonable to require AARs on all transmission facilities in year two or any future year. TOs have thousands of transmission facilities that will never be associated with a binding transmission constraint. It would be far more reasonable to require that TOs and TPs establish processes that will allow AARs to be initiated very quickly for new constraints begin to bind, and/or based on the results of planned outage studies or other forward studies.

E. Comments on requirements related to Dynamic Line Ratings

The NOPR seeks comments on whether to require transmission providers to implement of DLRs across their systems or on certain transmission lines that would benefit most.[17] The Commission has recognized that unlike AARs and emergency ratings, which can be achieved with little or no cost, DLRs may require substantial costs that would need to be evaluated relative to benefits at a facility level. We do not recommend that the Commission impose such a requirement at this time. Implement AARs based on emergency ratings should be the priority for RTOs/ISOs and their TOs in the near term. DLRs could be studied and considered for future action. We therefore concur the Commission's focus on AARs (and urge more focus emergency ratings) that can be provided without new DLR technology and investment.

[17] NOPR, at para 100. Note, in most cases it would Transmission Owners that would implement DLR.

VII. CONCLUSIONS AND RECOMMENDATIONS

We appreciate the Commission's focus on these issues. Increasing the utilization of the transmission system through widespread adoption of AARs based on emergency ratings will achieve sizable economic savings and improve the performance of the nation's wholesale electricity markets. In these comments, we respectfully recommend clarifications or extensions of the Commission's requirements, and certain modifications to the implementation requirements. These recommendations are intended to improve the effectiveness and benefits Final Rule. Finally, we also believe the NOPR's requirements to promote transparency, subject to the extensions we recommend in these comments, will promote compliance, improved situational awareness and reliability.

Respectfully submitted,

/s/ David B. Patton

David Patton
President
Potomac Economics, Ltd.

March 22, 2021

CERTIFICATE OF SERVICE

I hereby certify that I have this day e-served a copy of this document upon all parties listed on the official service list compiled by the Secretary in the above-captioned proceeding, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated this 22nd day of March 2021 in Fairfax, VA.

/s/ David B. Patton