

SUMMARY

According to Order No. 881,² the Commission determined that inaccurate transmission line ratings render wholesale electricity rates to be unjust and unreasonable. As DLRs provide the most accurate line ratings, it is logical to conclude that current wholesale rates are unjust and unreasonable until DLRs are implemented. DLRs reduce congestion on the transmission system, increase reliability, and provide consumers savings. Currently, transmission owners have little incentive to install DLR technology to increase transmission capacity on their systems as they earn a greater return on investment from building new infrastructure. Therefore, not only must the Commission determine that current rates are unjust and unreasonable, but also mandate DLR implementation to ensure customer rate savings.

Unless transmission owners demonstrate that the costs of DLR implementation exceed the benefit to customers, all transmission owners, regardless of whether in a regional transmission organization (RTO), independent system operator (ISO), or in a bilateral market, must install DLR technology on their entire transmission system to reduce congestion, improve reliability, and save customers billions each year.

I. THE COMMISSION SHOULD REQUIRE DLR(S) ON ALL TRANSMISSION LINES TO ENSURE JUST AND REASONABLE WHOLESale ELECTRICITY RATES

A. Inaccurate Transmission Line Ratings Result in Wholesale Rates That Are Unjust and Unreasonable

In Order No. 881, issued in December 2021, the Commission found that

² *Managing Transmission Line Ratings*, Order No. 881, 177 FERC ¶ 61,179 at P 3 (2021)

“transmission line ratings and the rules by which they are established 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; thus, we find that *inaccurate* transmission line ratings result in Commission-jurisdictional rates that are unjust and unreasonable.”³ As a result of this finding, the Commission ordered transmission providers RTOs and ISOs to implement procedures that electronically update transmission line ratings every hour using ambient-adjusted line ratings (AARs) for transmission requests ending within 10 days of the request.⁴ AARs, which take into consideration actual ambient-air temperatures rather than conservative static ratings “increase[] system transfer capability and, in turn, lower costs for customers.”⁵ As the Commission explained, “transmission line ratings directly affect wholesale rates because transmission line ratings and wholesale rates are inextricably linked... all else equal, as transfer capacity declines, wholesale rates increase.”⁶

The Commission now applies this observation to investigate whether the use of DLRs also should be implemented to further increase the accuracy of transmission line ratings to reflect the actual cost of delivering wholesale energy and perhaps provide even more cost savings for consumers in the form of reduced congestion charges. DLRs provide further accuracy in transmission facility capacity by incorporating additional

³ *Id.* (emphasis added).

⁴ *Id.* at P 4.

⁵ *Id.* at P 19.

⁶ NOI at P 8.

environmental factors such as real-time wind speed and direction, precipitation, cloud cover, solar heating intensity, and transmission line conditions that affect the safe operation of energy transfers. Following the logical conclusion from Order No. 881, the Commission must pursue implementation of more accurate line ratings in the form of DLRs. If “inaccurate” line ratings are indeed unjust and unreasonable, DLRs represent even more accuracy than AARs, therefore rendering AARs inaccurate and, thus, unjust and unreasonable.

B. DLRs Benefit Consumers Through Lower Transmission Rates and Increased Reliability

Implementing DLRs must be considered in the near term as the nation looks at an unprecedented need for transmission expansion to reach numerous zero carbon goals of this Administration, states, utilities, and large corporations.⁷ According to a Princeton study, in order to reach net zero by 2050, high voltage transmission capacity would need to expand approximately 60% by 2030 and triple through 2050 with total capital investment in transmission of \$360 billion through 2030 and \$2.4 trillion by

⁷ See e.g., The Biden-Harris Administration Immediate Priorities, available at: <https://www.whitehouse.gov/priorities/>, “President Biden will take swift action to tackle the climate crisis. To meet the demands of science, the President is mobilizing a whole-of-government effort to reduce climate pollution in every sector of the economy and increase resilience to climate impacts. The Biden Administration will create good-paying, union jobs to build a modern and sustainable infrastructure, deliver an equitable clean energy future, and put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050;” Michigan Governor Gretchen Whitmer Executive Directive No. 2020-10 - Building a Carbon-Neutral Michigan (Sep. 23, 2020), available at: https://content.govdelivery.com/attachments/MIEOG/2020/09/23/file_attachments/1553296/ED%202020-10%20Carbon_Neutral_Goal.pdf; Utilities’ path to a carbon-free energy system, available at: <https://sepapower.org/utility-transformation-challenge/utility-carbon-reduction-tracker/>; Disha Shetty, “A Fifth of World’s Largest Companies Committed to Net Zero Target, Forbes (Mar. 24, 2021), available at: <https://www.forbes.com/sites/dishashetty/2021/03/24/a-fifth-of-worlds-largest-companies-committed-to-net-zero-target/?sh=506d431d662f>.

2050.⁸ Such an investment would have an enormous impact on electricity customers. As increasing amounts of renewable resources seek to gain access to the grid to meet these environmental goals, existing transmission lines will begin to exceed their stated capacity and cause congestion. Congested lines cause the dispatch of higher-cost generation and congestion charges to accrue. By increasing the capacity on existing transmission infrastructure, consumer rate impacts could be abated through congestion cost reduction and deferral of investment in expensive new build. Another advantage of DLRs is that it can provide additional capacity using existing infrastructure and existing rights-of-way thereby minimizing cost, time, and environmental impacts.⁹

In addition to the economic benefits of fewer congestion charges, DLRs can have positive impacts on wholesale energy markets by incenting generation commitment. As noted by the U.S. Department of Energy (DOE), “[b]y forecasting the expected transmission capacity more accurately, a more favorable commitment of generators in day-ahead markets and more efficient dispatch within real-time markets will be possible, thus reducing congestion costs.”¹⁰ It could be argued that more accurate transmission line ratings could facilitate interconnection of new generation, including

⁸ Princeton University, *Net-Zero America: Potential Pathways, Infrastructure, and Impacts* at 108 (Dec. 15, 2020).

⁹ See J. C. McCall and B. Servatius, “Enhanced Economic and Operational Advantages of Next Generation Dynamic Line Rating Systems,” *CIGRE US National Committee 2016 Grid of the Future Symposium* at 2-3 (Oct. 2016); “DLR can provide 10 – 25% additional line capacity for a very small fraction of the \$1 million to \$8 million cost per mile of reconductoring. It can be deployed quickly and becomes fully operational within days of installation” (internal citation omitted).

¹⁰ U.S. Department of Energy, *Dynamic Line Rating: Report to Congress* at 13 (June 2019) (DOE Report to Congress).

renewables, and be less costly to the generator via reduced transmission upgrade costs resulting in lower power purchase agreement pricing for the consumer.

DLRs providing real-time data on transmission line conditions can also increase electric reliability. Transmission operators can be alerted to adverse weather conditions impacting the line or any other operational deficiencies or degradation. This allows transmission operators to address issues immediately by re-routing energy on other lines and avoiding further costly degradation or complete outage. By increasing capacity and reducing congestion, unnecessary load shedding or curtailment would be avoided, providing for more reliable service to all customers.

C. DLR Implementation Should Be Mandated Unless Demonstrated That Costs Exceed Benefits

The unjust and unreasonable nature of wholesale electricity prices under current transmission line ratings necessitates more accurate line ratings to ensure consumers are not paying unreasonable costs. Because widespread adoption of DLRs has been slow to non-existent, the Commission must mandate DLR implementation to ensure just and reasonable rates. As referenced in earlier comments:

A Final Rule should require the implementation of DLRs unless transmission owners can establish that the cost of implementing DLRs would exceed DLR-related benefits to consumers (via lower transmission rates and energy, capacity, and ancillary service prices). In almost all cases, the cost of installing DLRs pales in comparison to the benefits of reducing congestion, minimizing energy and capacity costs, and reducing the need for investment in new transmission system capability.¹¹

¹¹ Joint Comments of the Industrial Customer Organizations, Docket No. RM20-16-000 at 5 (Mar. 22, 2021) (Joint Industrial Customer Comments).

The reluctance of transmission owners to install DLRs on their systems under today's regulatory construct requires mandates for DLR implementation. As the DOE Report to Congress outlines, "under the current U.S. regulatory cost-of-service model, transmission owners receive a return on invested capital rather than a premium for delivering more power over existing lines or reducing transmission congestion."¹² Simply put, it is in the transmission owners' financial interests to continue to underrate their transmission facilities, rather than alleviate congestion, to justify building expensive new transmission facilities in order to increase their rate base and grow their overall return.

From the transmission owner's perspective, there is no compelling case to accommodate additional capacity:

In the case of transmission congestion, higher-cost generation is dispatched to meet load demand. Consequently, energy customers may experience an increase in electricity prices in the form of congestion charges. Therefore, the owner of the constrained transmission line is not directly affected by such circumstances and thus is not willing to remove the constraint.¹³

Without a clear financial case for transmission owners to act, it is necessary for the Commission to mandate DLR implementation to ensure customer rates are just and reasonable. For example, the NOI points out that the Midcontinent Independent

¹² DOE Report to Congress at 22; *see also* Joint Industrial Customer Comments at 30, Post-Technical Conference Comments of Industrial Customers, Docket No. AD19-15-000 at 6 "Because transmission owners earn a rate of return on the transmission assets they own, they have a financial incentive to construct additional transmission facilities and a disincentive to optimize existing facilities to relieve congestion or to upgrade their systems as efficiently as possible."

¹³ DOE Report to Congress at 23 citing S. Karimi, P. Musilek and A. Knight, "Dynamic thermal rating of transmission lines: A review," *Renewable and Sustainable Energy Reviews*, Elsevier, vol. 91, pp. 600-612 (2018).

System Operator (MISO) claims that DLR implementation costs are between \$100,000 and \$200,000 per transmission line equaling \$1.5 billion footprint-wide.¹⁴ Though the costs cited by MISO are not insignificant, MISO has currently projected in its Long Range Transmission Plan that the first tranche of new transmission projects in the MISO footprint will cost approximately \$10.4 billion.¹⁵ What is not known is how much of that \$10.4 billion investment could be deferred or eliminated by implementing DLRs on existing infrastructure. A return on equity of 10.02% on a \$10.4 billion investment, represents over \$1 billion that consumers must pay in addition to the initial investment. Currently, transmission owners in MISO have no clear business case for exploring DLRs absent a Commission mandate.

As with most mandates, off-ramps may be necessary for cost, reliability, impacts on neighboring systems, or other negative operational effects. If a transmission owner can prove that installing DLRs is more costly than the benefits provided to consumers or will cause reliability issues, a case can be made to exempt that transmission owner from implementing DLRs on the applicable parts of its system. However, the most thermally limited elements or congested lines should still require targeted DLR installation.

[I]f the costs associated with implementing [] DLRs on a very granular level with respect to every line and limiting element on every circuit are greater than any estimated systemwide savings, then [a] DLR requirement

¹⁴ NOI at P 11.

¹⁵ MISO LRTP Tranche 1 Portfolio Detailed Business Case, slides 13-14 (Mar. 29, 2022), available at <https://cdn.misoenergy.org/20220329%20LRTP%20Workshop%20Item%2002%20Detailed%20Business%20Case623731.pdf>.

should apply to select locations on the system, such as the most congested circuits and certain facilities where there is a higher likelihood that the capacity on that facility/circuit could be understated.¹⁶

Given that DLR implementation should be mandatory on all transmission facilities,¹⁷ outside a showing of any necessary exemptions, the Commission should establish uniformity in analytical models and assumptions to ensure similar measurement and analyses of transmission facility conditions. However, uniformity does not mean ignoring specific regional differences. Any methodology or analytical model determined by the Commission must incorporate all potential weather and line conditions experienced across the country.¹⁸ For any transmission owner requesting an exemption from the Commission regarding DLR installation, a filing at FERC with the accompanying methodology and results supporting the exemption should be made with an applicable period for third parties to review and comment.

D. The Commission Should Require Adoption of DLR in RTO and Non-RTO Regions

The potential cost savings to consumers when additional capacity is made available on the system, warrants DLR implementation requirements in both RTO regions and non-RTO regions. We see no difference in the physics of available transfer capability that would necessitate different treatment of transmission line ratings in RTO

¹⁶ Post-technical Conference Comments of Industrial Customers at 15.

¹⁷ As the application of DLRs for underground transmission facilities was not specifically referenced in the NOI, nor would the benefits of DLRs necessarily be applicable to underground transmission lines, further discussion is necessary before mandating DLRs on underground transmission facilities.

¹⁸ DOE Report to Congress at 21-22.

areas versus non-RTO areas. To narrowly apply DLRs to transmission owners in RTOs would disadvantage customers in non-RTO regions who will not benefit from additional capacity and lower costs. As noted above, if the Commission has determined that inaccurate line ratings result in rates that are unjust and unreasonable, DLRs should be deployed nation-wide to benefit all customers.

As utilities look towards forming organized markets in the west and southeast, such regulatory disparity and additional requirements discourages them from joining or forming RTOs. Moreover, the upgrade of communication and energy management system networks or the installation of additional data acquisition hardware/software in order to measure DLRs hourly would cause further divides between the seams of RTOs and non-RTOs. This regulatory disparity also would be counter to the Commission's goal to expand interregional and future scenario planning in a more integrated grid.¹⁹

Creating an unequal playing field between non-RTOs and RTOs also risks the reliable functioning of the transmission system. There is no question that an integrated grid is a more efficient and reliable grid. Picking and choosing lines or implementing DLRs in selected regions, rather than looking holistically, has impacts on neighboring regions and could cause overloading on neighboring lines.

Finally, as referenced in the Joint Industrial Customer Comments, equal oversight is the only way to ensure all customer rates are just and reasonable:

[T]he need for line ratings reforms may be *greater* in regions outside of RTO/ISO markets because the functional separation of transmission

¹⁹ See *Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection*, Notice of Proposed Rulemaking, Docket No. RM21-17-000 at PP 28-29 (2022).

operation and transmission ownership has not occurred, and no independent operator or independent monitor is involved with reviewing or administering transmission facility ratings. No basis exists to impose additional regulatory oversight in RTO/ISO regions and not impose the same or greater additional regulatory oversight in non-RTO/ISO regions.²⁰

II. DLR IMPLEMENTATION MUST INCLUDE INCREASED VISIBILITY AND PERIODIC COST/BENEFIT ANALYSES

A. Methodologies and Results for Determining the Cost/Benefit Ratio for DLR Implementation Must Be Publicly Posted

DLR implementation requires a determination of costs versus benefits to ensure customers are paying the least cost for delivered power. To justify waiver of DLR requirements, utilities must demonstrate that the costs of installing and maintaining DLRs on their equipment exceeds the benefits to consumers. Regulators, generators, and customers will need to be able to assess relevant data and determinations as to the appropriate line ratings in certain conditions to understand transmission line dynamics and ensure just and reasonable rates. Therefore, once the Commission establishes an analytical model or methodology, each transmission owner should post on their website or Open Access Same-Time Information System (OASIS) site the established formula along with the relevant inputs to explain how line ratings were defined. This is especially important since the weather conditions, topology, geography, and equipment age and condition differ between transmission systems. The methodology and results should be publicly posted even if a transmission owner is not seeking a waiver of DLR implementation.

²⁰ Joint Industrial Customer Comments at 18 (emphasis added).

B. Periodic DLR Reviews Will Ensure That Rates Remain Just and Reasonable

The dynamic nature of the power grid will require periodic evaluations of line ratings. As existing generation resources retire and new resources become interconnected, power flows can change causing congestion that had not existed previously. The Commission should require a restudy every three to five years in order to identify any previously exempt lines that now meet the cost/benefit threshold for DLR installation and measurement. Similarly, up to date line ratings will be necessary in regional and interregional transmission planning to ensure that all solutions for increased capacity have been exhausted before pursuing expensive new build.

Although DLRs should be implemented as soon as feasible in order to save consumers money, the Commission and transmission providers should gather additional data and experience from AAR implementation under Order No. 881. Lessons learned during the implementation phase and execution of AARs should provide valuable insight into what works and what to avoid when installing DLRs and acquiring additional data in real time. Therefore, it could make sense to delay DLR implementation until after AARs have been established and the Commission and transmission owners can reliably and accurately reflect real-world transmission system capacity. Again, the goal is to ensure just and reasonable rates, so the Commission's rules should mandate DLR best practices as soon as possible. To paraphrase a legal maxim, DLR savings delayed would be savings denied to all consumers.

CONCLUSION

ELCON appreciates the Commission's efforts to increase transmission system capacity and ensure just and reasonable rates for consumers. ELCON urges the Commission to require implementation of DLRs where cost-effective and provide for regular re-study to ensure benefits exceed costs and that there are no reliability impacts in changing congestion patterns. As such, ELCON looks forward to further engaging with the Commission on further improvements to transmission planning and operations.

Respectfully submitted,

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