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PROJECT NO. 52771

INVESTIGATION INTO USE OF DYNAMIC LINE RATINGS FOR TRANSMISSION LINES IN TEXAS	§ § §	**PUBLIC UTILITY COMMISSION OF TEXAS**

SHARYLAND UTILITIES, L.L.C.'S
COMMENTS ON DYNAMIC LINE RATINGS

Sharyland Utilities, L.L.C. ("Sharyland") hereby submits these Comments on Dynamic Line Ratings ("DLR"). Public Utility Commission of Texas ("Commission") Staff's memorandum filed in this project requested written comments on the questions contained therein by noon on December 30, 2021.[1] Therefore, these Comments are timely.

Introduction

Sharyland appreciates the Commission's interest in the installation and implementation of DLR technology on transmission lines operating in the Electric Reliability Council of Texas, Inc. ("ERCOT") system, and the important issues raised in Commissioner Glotfelty's and Commission Staff's memoranda filed in this project. Sharyland recognizes that DLR can provide benefits in certain situations, including those related to congestion reduction, reliability, and power flow maximization. However, Sharyland believes this technology should be a targeted solution to address specific congestion issues on certain parts of the grid where it is beneficial and cost effective and as a temporary means to address capacity concerns in advance of more permanent transmission expansion, rather than a global solution across the ERCOT system. Sharyland provides the reasoning for this position in the following Comments and attached Executive Summary.

Comments

Sharyland submits the following responses to the 11 questions contained in Commission Staff's November 17, 2021 memorandum.

[1] Project No. 52771, *Investigation into Use of Dynamic Line Ratings for Transmission Lines in Texas*, Commission Staff's Memorandum at 1 (Nov. 17, 2021).

1. ***Are you currently using DLR technology or a similar technology on any circuits? If so, how many? What is your experience on the cost, use, and value of these investments?***

Sharyland is not currently using DLR technology or a similar technology on its transmission circuits. To date, Sharyland has not identified a need to investigate the use of DLR on its transmission lines, as DLR is designed to address thermal capacity limits and Sharyland's transmission lines are not being constrained based on thermal limitations.

2. ***Does ERCOT have the appropriate system to take advantage of this real-time technology and is it utilizing this data to expand the use of the power system in a reliable manner?***

Sharyland defers to ERCOT on this question.

3. ***Where on your system could additional DLR systems be deployed and at what cost and value to the system and market?***

Although Sharyland's system is located in a region that has experienced serious congestion issues, Sharyland has not identified the need to install DLR equipment on its transmission system. DLR is designed to address thermal capacity limits, and Sharyland's transmission lines are not being constrained based on thermal limitations and are not nearing the verge of their thermal capabilities. Instead, the capacity issues Sharyland has identified are stability-related issues that are not resolved through the use of DLR.

If DLR were to be deployed on Sharyland's system (or any transmission system), it would require installation of multiple sensors to collect data, such as real-time conductor and ambient temperature information. Sharyland has not conducted an analysis of these DLR measures or costs, but Sharyland would likely need to install these devices on at least each phase of a transmission line.

With regard to the overall transmission grid and market in ERCOT, Sharyland believes the balancing of DLR costs and benefits is important. There are parts of the ERCOT grid subject to congested transmission lines. For facilities impacted by such congestion, DLR may be beneficial in reducing congestion costs and improving reliability through power flow maximization. The benefits of DLR may outweigh the costs in such situations. On less congested parts of the grid, however, that may not be the case. DLR is more likely to provide real value if installed on a transmission line that is at the edge of its thermal capacity, not a line that is meeting its capacity needs.

In addition, DLR generally provides benefits when the transmission conductor is the most thermally limiting element, which will not always be the case system-wide. In identifying where on the system DLR could be economically utilized, it is important to determine the next most limiting element on the system (e.g., a jumper or breaker), and whether increased thermal line capacity from DLR is partially (or mostly) offset by those other limitations. In such situations, those otherwise limiting elements, unless also addressed, would still experience congestion and DLR would result in less value, despite the increased cost. Costs may also increase if utilities upgrade those other limiting elements in an effort to accommodate increased thermal capacity on the line. Furthermore, as pointed out in the June 2019 U.S. Department of Energy report on DLR (attached to Commissioner Glotfelty's memorandum)[2] and consistent with Sharyland's experience, the maximum current carrying capability of a transmission line is not always determined by thermal limits, but may be based on voltage limits and stability constraints. In sum, Sharyland believes that DLR installations should be directed to congested transmission lines and generally where the conductor is the most limiting element based on its thermal capacity.

It may be appropriate, therefore, for ERCOT to identify congested facilities on the system and use DLR as a targeted solution where clearly beneficial and economic, rather than a global solution that may be more costly and provide less benefit elsewhere. However, Sharyland believes that installation of DLR, even as a targeted solution, should not supplant transmission planning that would result in more permanent solutions to capacity and congestion issues on the grid. The ERCOT Regional Planning Group could include consideration of DLR in its planning processes to alleviate congested facilities in the short-term to bridge the gap to more permanent long-term solutions, the latter of which may require more lead-time.

It may also be worth exploring whether there is benefit in expanding the use of less costly techniques, such as matrix-based methodologies, to determine line ratings based on real-time weather conditions. A matrix-based method could allow transmission lines to be rated with different loadability limits in real-time depending on current weather conditions, such as ambient temperature and average wind speeds and direction. While these loadability limits would be determined in advance, rather than in real-time based on analytics collected by installed DLR equipment, the predetermined limits could be used by ERCOT in real-time to increase power flows should weather conditions warrant. This would be a more conservative approach as compared to

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[2] *See* Project No. 52771, Commissioner Glotfelty's Memorandum, June 2019 U.S. Department of Energy Report on Dynamic Line Rating at 23 (filed in this project on Oct. 29, 2021).

installing DLR, but it could allow for more transmission capability than is achieved today and might have the right cost-to-benefit metrics to address certain congestion situations.

4. ***What are the challenges that a transmission and distribution utility ("TDU") may encounter when trying to install or implement this technology on a widespread basis?***

As stated above, Sharyland believes installations of DLR should not be widespread, and instead, should be targeted to congested transmission lines and generally where the conductor is the most limiting element based on its thermal capacity. A likely challenge for any installation of DLR would be the planned outages required. There are ways to install the devices while the transmission line remains energized ("hot installation"), and those costs would need to be taken into consideration.

Further, depending on the DLR technology selected, the installation of DLR equipment may require devices to be installed in remote locations, far away from the necessary low voltage power systems and wired or wireless communications systems they require to operate effectively. Power to remote locations can be provided via small, locally installed solar panels; however, these panels can be prone to interference from clouds or stormy weather. Additionally, the real-time nature of DLR equipment requires continuous data feeds and the remote nature of some of these systems would subject them to communication "drop-out," which could compromise the DLR system operation. While not technically insurmountable, the installation and operational costs of these aspects should be taken into consideration as part of developing any DLR deployment strategy.

5. ***Are there drawbacks or benefits to utilizing this technology in the ERCOT market?***

DLR can be beneficial in reducing system congestion and the related costs and reliability issues, particularly on highly congested parts of the grid where construction of new permanent capacity may take more time to complete. However, as discussed in response to Question No. 3, DLR installation for less congested facilities on the system may not provide additional benefits that justify the extra costs. Sharyland also believes, as described earlier, that the benefits of DLR are generally realized when the transmission conductor itself is the most limiting element based on its thermal capacity. Consideration should also be given to whether the next most limiting element might reduce any benefits of increased thermal capacity on the transmission line and result in residual congestion. These potential drawbacks support the position that DLR should apply to specific facilities in areas where needed and beneficial, but not across the whole transmission grid.

Further, if the transmission planning process relies on DLR to achieve needed transmission capacity, additional capacity that could provide more long-term, reliable solutions could be delayed. Sharyland believes transmission service providers ("TSPs") should be encouraged to design, engineer, and construct their systems to provide additional capacity and upgrade their facilities to increase power flow—so long as such measures are prudent. This practice enhances system reliability in long run.

6. ***Do the current rate structures in ERCOT reward/encourage grid investments such as DLR?***

The Commission's current ratemaking standards encourage TSPs to invest in their transmission systems only when such investments are prudent. Otherwise, the Commission may deny the return of and on those investments in rate base and order a refund of any amounts already recovered through Interim Transmission Cost of Service rates. The prudence standard obligates the utility to construct or upgrade transmission facilities, or otherwise invest in its system, when it is reasonable and necessary to incur such costs. As Sharyland discussed in response to previous questions, Sharyland believes DLR should be considered on a case-by-case basis for more congested parts of the system. The reasonableness and necessity under specific circumstances, including reliability and/or economic needs in certain areas, should continue to drive the issue of whether utilities are encouraged from a rate perspective to invest in their systems for such measures.

7. ***Is there unwarranted cybersecurity risk associated with this technology?***

Sharyland has not analyzed specific cybersecurity risks associated with installation of DLR. However, the most common types of DLR technology involve placement of sensors on conductors to read temperature and transfer that data to other devices or infrastructure using wireless communications. As wireless connections increase, so does exposure to hacks and other cyber threats.

8. ***Will widespread utilization of this technology exacerbate other constraints on the system?***

It is possible that widespread utilization of DLR could risk exacerbating other constraints on the system. DLR could increase the thermal capacity on some transmission lines but at the same time move (or "push") residual constraints to other lines or facilities that would not otherwise be approaching their capacity. As Sharyland discussed in response to previous questions, the benefits of DLR largely assume that the transmission line conductor is the most limiting element on the system based on its thermal capacity. However, stability or voltage issues could be the limiting factor, or other elements aside from the conductor may be thermally limited such that those elements become more constrained, which can also reduce the desired benefits of DLR to the system.

9. Should this technology be included in all new high voltage lines within ERCOT?

While potentially beneficial and cost effective on some parts of the grid, Sharyland does not believe that DLR should be included on all new high voltage lines within ERCOT. Again, inclusion of DLR on all transmission lines assumes that the line conductors are the most limiting element based on thermal capacity, which is not necessarily a system-wide scenario. It would also assume that all new transmission lines are designed to operate on the verge of their thermal capabilities. It may not be cost effective to include DLR on new lines in areas with less congestion, but identifying areas of concern and including DLR on lines built in those locations may be appropriate.

Consistent with its response to Question No. 5, Sharyland believes that relying on DLR for all new transmission lines could have an unintended consequence of reducing prudent investment in needed permanent capacity. Design and construction of new transmission lines to provide needed capacity and operate reliably on a long-term basis supports grid resiliency.

10. Are there system reliability, situational awareness benefits to utilizing this technology?

DLR can provide reliability and situational awareness by maximizing power flow and providing real-time data. However, based on Sharyland's responses to the previous questions, Sharyland believes applying this technology and achieving those benefits would be more cost effective on parts of the system with congestion and constraints, as opposed to implementing DLR on a widespread basis across the grid.

11. Please provide an overall cost-benefits analysis to addition of this technology.

Sharyland has not conducted a cost-benefit analysis related to DLR, given Sharyland has not determined a need for this technology on its transmission lines, as discussed earlier. Generally, Sharyland believes that DLR should be a targeted solution in parts of the grid where most needed and cost effective, but should not supplant transmission planning for more long-term solutions.

Conclusion

Sharyland appreciates the opportunity to file these Comments, and respectfully requests that the Commissioners and Commission Staff consider this filing in investigating DLR issues.

Respectfully Submitted,

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SHARYLAND UTILITIES, L.L.C.'S COMMENTS ON DYNAMIC LINE RATINGS: EXECUTIVE SUMMARY

Sharyland Utilities, L.L.C. ("Sharyland") appreciates the Commission's interest in the installation and implementation of dynamic line rating ("DLR") technology on transmission lines operating in the Electric Reliability Council of Texas, Inc. ("ERCOT") system, and the important issues raised in Commissioner Glotfelty's and Commission Staff's memoranda filed in this project. Sharyland recognizes that DLR on transmission facilities can provide benefits in certain situations, including those related to congestion reduction, reliability, and power flow maximization. However, Sharyland believes this technology should be a targeted solution to address specific congestion issues on certain parts of the grid where beneficial and cost effective and as a temporary means to address capacity concerns in advance of more permanent transmission expansion, rather than a global, long-term solution across the ERCOT system.

Sharyland's transmission system is located in the Lower Rio Grande Valley, which is a region that has experienced serious congestion issues. However, Sharyland has not identified the need to install DLR systems on its system. DLR is designed to help resolve short-term transmission congestion issues caused by thermal capacity limits, and Sharyland's transmission lines are not being constrained based on thermal limitations and are not nearing the edge of their thermal capabilities. Instead, the capacity issues Sharyland has identified are stability-related issues that are not resolved through the use of DLR.

There are several reasons why Sharyland believes targeted application of DLR would be more appropriate than widespread application. First, on many parts of the system, the benefits of DLR may not outweigh the costs. There are parts of the system negatively impacted by congestion—with transmission lines nearing the limits of their thermal capacity—and DLR may be a cost-effective solution in those places. That scenario may not be the case on parts of the grid with less congested lines. It may be appropriate for ERCOT to identify congested facilities on the system and use DLR as a spot solution where clearly beneficial and economic, rather than applying the technology across the board, including in areas where the benefits may not justify the expense. However, Sharyland believes that installation of DLR, even as a targeted solution, should not supplant transmission planning that would result in more permanent solutions to capacity and congestion issues on the grid. ERCOT could use DLR as a temporary solution in transmission planning for certain areas until the placement in service of more permanent transmission capacity.

Second, DLR generally provides benefits when the transmission conductor is the most limiting element based on its thermal capacity, which is not always the case system-wide. In identifying where on the grid DLR would be beneficial and economic, it is also important to determine the next most limiting element on the system, and whether those other limitations offset any thermal line capacity increases afforded from DLR. Increasing the thermal capacity of the conductor via deployment of DLR, without considering the limits of the next most limiting element in the electrical circuit, could simply move the location of the congestion, despite the cost to deploy the DLR platform.

Third, widespread reliance on DLR across the grid assumes that transmission lines are (or should be) operating near the edge of their thermal limitations, and it may dis-incentivize the pursuit of additional permanent capacity that could provide reliable solutions on a more long-term basis. Sharyland believes transmission service providers should be encouraged to prudently design, engineer, and construct their systems to provide needed capacity.

Finally, there are some potential challenges associated with DLR installation, the costs for which should be considered. Installation of DLR would likely require planned outages unless the devices are installed while the transmission line remains energized ("hot installation"), and any hot installation would increase costs. In addition, depending on the selected technology, DLR devices may have to be installed in remote locations that are far from the necessary low voltage power systems and communications systems required for efficient operations. Small, locally installed solar panels, for example, can provide power to these remote locations, but those panels can be prone to interference depending on weather conditions. The real-time nature of DLR equipment requires continuous data feeds and the remoteness of some of these systems would subject them to communication "drop-out," which could compromise the DLR system operation. The costs to mitigate these concerns would need to be taken into consideration as part of a DLR deployment strategy.

Sharyland appreciates the opportunity to file these comments, and respectfully requests that the Commissioners and Commission Staff consider this filing in investigating DLR issues.