
**SENATE COMMITTEE ON ENERGY, UTILITIES AND
COMMUNICATIONS**

**Senator Steven Bradford, Chair
2023 - 2024 Regular**

Bill No:	AB 2779	Hearing Date:	6/4/2024
Author:	Petrie-Norris		
Version:	3/21/2024 Amended		
Urgency:	No	Fiscal:	Yes
Consultant:	Nidia Bautista		

SUBJECT: Independent System Operator: transmission planning

DIGEST: This bill requires the California Independent System Operator (CAISO), upon approval of the annual transmission plan, to report on any new use of any grid enhancing technology and its associated cost or efficiency savings.

ANALYSIS:

Existing law:

- 1) Establishes that U.S. Federal Energy Regulatory Commission (FERC) has exclusive jurisdiction over the transmission of electric energy in interstate commerce. Also establishes the process and procedures for establishing transmission of electric energy in interstate commerce by public utilities, i.e., the rates, terms & conditions of interstate electric transmission by public utilities. (Federal Power Act §§201, 205, 206 (16 USC 824, 824d, 824e))
- 2) Establishes and vests the California Public Utilities Commission (CPUC) with regulatory authority over public utilities, including electrical corporations. (Article XII of the California Constitution)
- 3) Establishes the CAISO as a nonprofit, public benefit corporation to manage the transmission grid and related energy markets, as provided. (Public Utilities Code §345 et seq.)
- 4) Provides that the CPUC may supervise and regulate every public utility in the state and may do all things, whether specifically designated or in addition, which are necessary and convenient in the exercise of such power and jurisdiction. (Public Utilities Code §701)
- 5) Prohibits an electrical corporation from beginning the construction of a line, plant, or system, or of any extension thereof, without having first obtained from the CPUC a certificate that the present or future public convenience and

necessity require or will require its construction. Provides that the extension, expansion, upgrade, or other modification of an existing electrical transmission facility, including transmission lines and substations, does not require a certificate that the present or future public convenience and necessity requires or will require its construction. (Public Utilities Code §1001)

This bill:

- 1) Requires the CAISO, upon approval of each transmission plan, to report to the CPUC and to the relevant policy committees of each house of the Legislature any new use of any grid enhancing technology that is deemed reasonable by the CAISO in that plan and the cost or efficiency savings of the deployment of that grid enhancing technology.
- 2) Requires the report to be submitted in accordance with requirements on reports submitted by agencies, including to submit to the Secretary of the Senate, the Chief Clerk of the Assembly, and the Legislative Counsel, as prescribed.
- 3) Provides that the requirement to provide the reports are not subject to a sunset.

Background

- 1) *Transmission projects.* Electric transmission lines are generally high voltage lines that move electricity from generation resources (power plants) to distribution lines in neighborhoods. Companies, usually electric investor-owned utilities (IOUs), proposing the construction of new transmission, are required to obtain a permit from the CPUC for construction of specified infrastructure listed under Public Utilities Code §1001, including transmission projects. In the case of interstate transmission lines, FERC has exclusive jurisdiction as to the costs and rates approved for the use of these lines.
- 2) *Need for expanded transmission capacity.* In order for the state to meet its clean energy goals, including achieving 100 percent clean energy by 2045, electric transmission capacity will likely need to grow significantly. The CAISO conducts its annual transmission planning process to identify potential transmission system limitations and opportunities for system reinforcements that improve reliability and efficiency. The CAISO identifies projects that address grid reliability requirements, identify upgrades needed to successfully meet California's policy goals, and explore projects that can bring economic benefits to consumers. In 2021, the CAISO created a 20-Year Transmission Outlook for the electric grid, in collaboration with the CPUC and the California Energy Commission (CEC), with the goal of exploring the longer-term grid

requirements and options for meeting the state's SB 100 clean energy goals reliably and cost-effectively. The 20-Year Transmission Outlook estimates a significant amount, about \$30 billion, to construct and expand transmission facilities. In subsequent transmission plans, the CAISO has approved over \$16 billion worth of about 100 transmission projects. Transmission owners recover the costs of CAISO-approved projects through the Transmission Access Charge (TAC). The transmission owner submits an application to FERC to recover project costs. FERC approves just and reasonable costs and rate of return. CAISO charges transmission customers based on FERC-approved costs. These costs are collected from electric utility customers as part of the transmission and distribution portion of the electric utility bill.

- 3) *Grid-enhancing technologies (GETs)*. GETs, generally, are a combination of hardware and software that can increase transmission capacity, decrease congestion, and improve reliability on transmission lines. An April 2023 Brattle Group white paper, *Building a Better Grid: How Grid-enhancing Technologies Complement Transmission Buildouts*, discusses how GETs can help improve transmission capacity and efficiency. The paper notes that transmission transfer capability depends on where and how new transmission lines are connected to the rest of the electrical grid system – the topology of the transmission network (including the points of injection and withdrawal of energy). Both the transfer capability of lines (and other components of the grid) and network topology determine how, where, and the quantity of the power flows. Many GETs are built on either of two applications to increase transfer capability: one that explores enhanced and flexible application of the pre-determined transfer capability, and the other that focuses on flexible and dynamic control of transmission systems.

Examples of GETs include dynamic line ratings, advanced power flow controls, and advanced topology control. Dynamic line ratings (DLRs) try to better address individual line transfer capability based on actual conditions. Advanced power flow controls (generally hardware) and advanced topology control (generally software) direct electricity away from overloaded lines and onto underutilized lines, such as by opening or closing circuit breakers. As noted in the Brattle Group paper: The comparative advantages of GETs include their portability and scalability, speed to deploy, and lower costs. Importantly, per the report, “GETs rarely replace transmission, rather, they enhance transmission...”

- 4) *Advanced reconductoring*. The CAISO also defines GETs to include advanced reconductoring which is the replacement of a transmission line's existing conductors with advanced conductors, essentially swapping out the Aluminum

Conductor Steel Reinforced (ACSR) for a smaller composite core conductors that enable higher operating temperatures. According to a November 2023 Energy Institute at Haas paper, “*Accelerating Transmission Expansion by Using Advanced Conductors in Existing Right-of-Way*” by Emilia Chojkiewicz, et al. (Energy Institute WP 343), reconductoring holds significant potential for rapid transmission expansion. The advanced conductors can carry approximately twice as much power as conventional conductors. Advanced conductors use existing transmission towers and rights of way, thereby circumventing the land acquisition and permitting processes that can impede construction of new transmission lines. However, replacing conventional conductors with advanced conductors requires taking circuits out of service during the replacement or conducting live-line work, which carries additional risks, especially safety risks for the workforce and surrounding areas. Either approach can be challenging, and in some cases infeasible, when transmission constraints exist.

Comments

- 1) *Need for this bill.* The author contends that the urgency for California to meet its clean energy and carbon reduction goals will require a rapid and costly expansion of the transmission system. The author states:

GETs encompasses a suite of technologies that can be deployed faster than building new transmission infrastructure and, as a result, increase the capacity and efficiency of the existing transmission system. AB 2779 can therefore help provide information on the frequency and best use of GETs under consideration in the CAISO transmission planning process by having the CAISO report on their usage.

- 2) *Current use of GETs and advanced conductors.* The two papers noted above, along with others, comment on the more prevalent use of GETs and advanced conductors in other countries, particularly in Europe and India. These papers generally state that the use of these technologies has not been as quickly embraced in the United States. In California, advanced conductors have been deployed, particularly by Southern California Edison (SCE) who has deployed reconductoring projects, including the Big Creek-Ventura 220kV network. Additionally, the CAISO shared that they have considered GETs in the annual transmission planning process for many years. Specifically, the CAISO shared they typically consider advanced conductors and power flow controllers as planning tools providing alternatives to capital expenditures, as well as, dynamic thermal line ratings, and topology optimizations to access operational benefits through additional capacity. In addition to the Big Creek-Ventura line, the CAISO approved a phase shifting transformer flow controller installation at

the Imperial Valley Substation. More recently, there are two projects under development in San Jose with flow controls. In its most recent transmission plan, the CAISO listed out 17 approved transmission projects since 2013-14 transmission plan to deploy GETS, particularly flow controllers, advanced conductors, and dynamic voltage controls.

- 3) *Federal efforts to encourage use of GETs and advanced conductors.* At the federal level, the FERC recently adopted (May 13, 2024) a transmission and cost allocation rule, Order No. 1920, “Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection” (RM21-17-000) which among its provisions requires public utility transmission providers to more fully consider the use of GETs, such as dynamic line ratings, advanced power flow control devices, advanced conductors and transmission switching, in their transmission planning. The CPUC has also shared that they, along with the CEC, CAISO, Pacific Gas & Electric, SCE, and Energy Institute at Haas are currently pursuing a Department of Energy Grid Resilience and Innovation Partnership program (GRIP) grant (eight years long) to deploy advanced conductors and two other GETs technologies: dynamic line rating and real-time short circuit duty monitoring. More recently, on May 28th, the White House announced the launch of a Federal-State Modern Grid Deployment Initiative to accelerate improvements to the electric transmission and distribution network to help meet “the country’s objectives for affordable, clean, reliable, and resilient power.” The Initiative involves a commitment from the Federal government and 21 states, including California, to work together to increase cooperation on transmission planning, including specific commitments to expand the use of GETS and advanced conductors. This Initiative is intended to build up last month’s Department of Energy announcement to expand a categorical exclusion under the National Environmental Policy Act for upgrading and rebuilding transmission lines, including for reconditioning.
- 4) *Impacts to ratepayers.* The actual savings benefits for the use of GETs and advanced conductors will vary by transmission line. Both the Brattle Group and Energy Institute papers cite opportunities for savings and efficiency benefits from the use of GETs and advanced conductors. With regards to GETs, these technologies can be deployed on existing transmission lines to enhance efficiency, with the potential to reduce congestion by 40 percent. Such level of efficiency can provide savings to ratepayers in the form of reducing the need to build additional transmission lines which can be very costly. Advanced conductors have a higher up-front cost as compared to conventional aluminum conductors – roughly two to three times the costs – though they have the potential for long-term savings given the potential to double the capacity of

conventional conductors. As stated in the Energy Institute paper, “Transmission networks are complex, and the actual increase in power transfer capacity offered by reconductoring is determined by a multitude of factors beyond the scope of this analysis. We recommend that transmission owners, ISOs, and RTOs perform more detailed studies...to evaluate the wide-scale deployment of advanced conductors in their networks.”

Need for amendments. In order to ensure the CAISO reports on both the cost savings and efficiency savings, *the author and committee may wish to amend this bill to replace the “or” with “and” in reference to reporting the “efficiency or cost savings” of the use of GETs.*

Prior/Related Legislation

SB 1006 (Padilla) requires electrical transmission utilities, by January 1, 2026, to develop a strategic plan for grid-enhancing technologies to cost-effectively increase transmission capacity and to complete an evaluation to identify which of its transmission and distribution lines can be reconducted with advanced reconductors. Requires these plans and evaluations are submitted to the CPUC and made publicly available. The bill is pending in the Assembly.

SB 319 (McGuire, Chapter 390, Statutes of 2023) required the CEC and the CPUC, in coordination with the CAISO, to better and regularly coordinate planning and permitting of energy transmission infrastructure to ensure the state meets its clean energy goals and to evaluate and report on that planning and related infrastructure development.

SB 529 (Hertzberg, Chapter 357, Statutes of 2022) exempted an extension, expansion, upgrade, or other modification of an existing transmission line or substations from the requirement of a CPCN and directed the CPUC to revise its GO, by January 1, 2024, to instead use its permit to construct process for these approvals.

SB 887 (Becker, Chapter 358, Statutes of 2022) required 15-year projections of energy resource portfolios and energy demand to inform transmission planning to achieve the state’s clean energy goals, and requires the CAISO to consider approval for specified transmission projects as part of the 2022-23 transmission planning process.

FISCAL EFFECT: Appropriation: No Fiscal Com.: Yes Local: No

SUPPORT:

Advanced Energy United
Ava Community Energy
California Community Choice Association
California Farm Bureau
California State Association of Electrical Workers
Coalition of California Utility Employees
Environment California
San José Clean Energy

OPPOSITION:

None received

ARGUMENTS IN SUPPORT: The entities in support of the bill general express enthusiasm for the opportunity to expand transmission capacity and efficiency by deploying GETs to help the state achieve its clean energy goals, particularly to help reduce transmission costs. Many supporters also acknowledge the use of GETs alone will not remedy all the state’s transmission needs, but can provide another effective tool to help the state meet its climate and clean energy goals. In support of this bill, the California State Association of Electrical Workers and Coalition of California Utility Employees state:

California must dramatically increase the total capacity of its transmission system to supply the vastly increased demand for electricity needed to meet our carbon neutrality goals. This will certainly require many new transmission lines. ... GETs can improve the reliability, safety, and efficiency of existing power lines. They are typically very low-cost enhancements to existing transmission lines that increase the capacity of the lines while reducing fire risk. ... This bill would establish a reporting process so that the CPUC and the Legislature can monitor the extent to which the CAISO is utilizing cost-effective GETs in its transmission planning process.

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