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

Senator Steven Bradford, Chair

2023 - 2024 Regular

Bill No:	SB 1006	Hearing Date:	4/16/2024
Author:	Padilla		
Version:	3/18/2024 Amended		
Urgency:	No	Fiscal:	Yes
Consultant:	Nidia Bautista		

SUBJECT: Electricity: transmission capacity: reconductoring and grid-enhancing technologies

DIGEST: This bill requires 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 reconductored with advanced reductors. Requires these plans and evaluations are submitted to the California Public Utilities Commission (CPUC) and made publicly available.

ANALYSIS:

Existing law:

- 1) Establishes and vests the CPUC with jurisdiction over public utilities, including electrical corporations. (Article XII of the California Constitution)
- 2) Establishes the policy of the state that eligible renewable energy resources and zero-carbon resources supply 90 percent of all retail sales of electricity to California end-use customers by December 31, 2035, 95 percent of all retail sales of electricity to California end-use customers by December 31, 2040, 100 percent of all retail sales of electricity to California end-use customers by December 31, 2045, and 100 percent of electricity procured to serve all state agencies by December 31, 2035. (Public Utilities Code §454.53)
- 3) 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)
- 4) 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. (Public Utilities Code §1001(a))

- 5) 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(b))
- 6) Requires the CPUC, by January 1, 2024, to update General Order (GO)131-D to authorize each public utility electrical corporation to use the permit-to-construct process or claim an exemption under Section III(B) of that general order to seek approval to construct an extension, expansion, upgrade, or other modification to its existing electrical transmission facilities, including electric transmission lines and substations within existing transmission easements, rights of way, or franchise agreements, irrespective of whether the electrical transmission facility is above a 200-kilovolt voltage (kV) level. (Public Utilities Code §564)

This bill:

- 1) Makes several findings and declarations regarding the potential of grid-enhancing technologies and advanced conductors to quickly and cost-effectively increase transmission capacity.
- 2) Requires transmission utilities, defined as electrical corporations that are participating transmission owners, on or before January 1, 2026, to jointly prepare a grid-enhancing technologies strategic plan that is designed to cost-effectively increase transmission capacity and increase capacity to connect new renewable energy and zero-carbon resources, reduce transmission system congestion, reduce curtailment of renewable and zero-carbon resources, increase reliability, and reduce the risk of igniting wildfires.
- 3) Requires each transmission utility, on or before January 1, 2026, and at least every four years thereafter, to complete an evaluation of which of its transmission and distribution lines can be reconducted with advanced conductors in a cost-effective manner to, among other things, increase transmission or distribution capacity and increase capacity to connect new renewable energy and zero-carbon resources.
- 4) Requires, upon completion of the plan and the evaluation, the transmission utilities to submit the plan and evaluation to the CPUC and to make the plan and evaluation publicly available.

- 5) Authorizes the CPUC to redact portions of the plan and evaluation if the redaction is necessary to protect electrical system security.
- 6) Requires the plan and evaluation to include a timeline for implementation. Requires transmission utilities to report on their progress in implementing the plan as part of each subsequent integrated resources plan. Requires the evaluation to include a plan for proposing to the California Independent System Operator (CAISO) projects for approval where that approval is required.
- 7) Makes legislative findings that it is the interest of the state to prevent the public disclosure of information that may compromise security of electrical transmission and distribution systems.

Background

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 certain specified infrastructure listed under Public Utilities Code §1001, including transmission projects. The CPUC reviews permit applications under two concurrent processes: (1) an environmental review pursuant to California Environmental Quality Act (CEQA), and (2) the review of project need and costs pursuant to Public Utilities Code §1001 and GO 131-D (Certificate of Public Convenience and Necessity (CPCN)).

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 transmission planning process to identify potential transmission system limitations as well as opportunities for system reinforcements that improve reliability and efficiency. The annual transmission plan fulfills the CAISO's core responsibility to identify and plan the development of solutions, transmission or otherwise, to meet the future needs of the electricity grid. 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 objectives reliably and cost-effectively. The 20-Year Transmission Outlook

estimates a significant amount, and expense, to construct and expand transmission facilities, including an estimated \$10.74 billion in upgrades to existing facilities.

Grid-enhancing technologies (GETs). GETs, generally, are a combination of hardware and software that can increase transmission capacity, decrease congestion, and improve reliability. 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 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 (i.e., they can be added in phases without committing to a larger project), speed to deploy (i.e., they can be put into service much faster), and lower costs (i.e., they can be deployed often for a small fraction of the cost). GETs rarely replace transmission, rather, they enhance transmission...”

Advanced reconductoring. Reconductoring 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. Yet, 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. Either approach can be challenging, and in some cases infeasible, when transmission constraints exist.

Comments

Need for this bill. Supporters of this bill note the need for the state to upgrade and expand its electric transmission infrastructure to meet its clean energy goals. They state there will be increasing demand placed on California's electric grid as more vehicles and homes are powered by electricity. They express concerns that the transmission grid is not keeping pace with demand, as transmission lines can take more than a decade to site, permit, and build. In this regard, they point to the opportunities with GETs and advanced conductors to help the state "enhance the existing transmission infrastructure to its maximum potential and make it more efficient, resilient, and cost-effective."

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, and others, 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 more than two dozen 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 that 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.

At the federal level, the Federal Energy Regulatory Commission (FERC) issued a Notice of Proposed Rulemaking ("NOPR") in April 2022 titled "Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection" (RM21-17-000) which proposes to require that public utility transmission providers more fully consider GETs in their 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 GRIP grant (eight years long) to deploy advanced conductors and two other GETs technologies: dynamic line rating and real-time short circuit duty monitoring.

Impacts to ratepayers. Both the Brattle Group and Energy Institute papers cite opportunities for savings from the use of GETs and advanced conductors. With regards to GETs, these technologies can be deployed on existing transmission lines to enhance efficiency and the potential to reduce congestion by 40 percent. Such level of efficiency can provide savings to ratepayers in the form of reducing the need for additional lines. However, the benefits of GETs will vary by transmission line. In the case of advanced conductors, these 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. However, here again, the savings will vary by transmission line. 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.”

Is a strategic plan and evaluation necessary? This bill proposes to require electrical corporations who have turned over operation of their transmission to the CAISO to prepare a strategic plan for GETs and an evaluation of the use of advanced conductors. Given the need for increased transmission capacity, the desire to explore further opportunities with GETs and advanced conductors in order to optimize existing transmission is generally prudent. However, as noted in a just released Energy Innovation and GridLab report, “*Supporting Advanced Conductor Deployment: Barriers and Policy Solutions*,” reconductoring is not a panacea, and one may add neither are GETs. As this bill moves forward, the author may wish to consider how more flexibility can be retained in the development of the strategic plan and evaluation while helping to overcome barriers that will achieve the goal of more efficient and cost-effective transmission – and ultimately savings for ratepayers.

Need for amendments. Currently, the CPUC and CAISO have the ability to limit disclosure of information that could pose security risks to the electrical system. *As such, the author and committee may wish to delete sections of this bill in Section 454.58(c)(2) and (d)(4) that authorize the CPUC to redact information from public disclosure in the required reports.* Additionally, while wildfire risk reduction is an important consideration, it should be considered within the framework of the electric utilities’ wildfire mitigation plans. *In this regard, the author and committee may wish to add clarifying language to this effect. Lastly, the author and committee may wish to make clarifying changes to the findings and declarations regarding the potential and use of GETs and advanced conductors.*

Re-referral. Should this bill be approved by this committee, it will be re-referred to the Senate Committee on Rules.

Prior/Related Legislation

SB 1165 (Padilla, 2024) authorizes an electrical corporation that applies to the CPUC to authorize construction of a high voltage electrical transmission line, rated at 138kV or greater, to apply to the CEC for certification of the facility pursuant to the CEQA, instead of the CPUC conducting the CEQA review. This bill provides that the CEC certification authorizes the project to be eligible for the CEQA judicial streamlining afforded to Environmental Leadership Development Projects and the CEC's "Opt-in" permitting process.

SB 619 (Padilla, 2023) would have authorized an electrical corporation that applies to the CPUC to authorize construction of a high voltage electrical transmission line, rated at 138 kV or greater, to apply to the CEC for certification of the facility pursuant to the CEQA, instead of the CPUC conducting the CEQA review. The bill provides that the CEC certification authorizes the project to be eligible for the CEQA judicial streamlining afforded to Environmental Leadership Development Projects (ELDPs) and the CEC's "Opt-in" permitting process. The bill was vetoed.

SB 149 (Caballero, Chapter 60, Statutes of 2023) among its provisions, revised the procedures regarding CEQA administrative records and expedited administrative and judicial review procedures for ELDPs for specified projects, including transmission projects, that required the courts to resolve CEQA litigation within 270 days to the extent feasible and extends the ELDP sunset to January 1, 2034.

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. The bill also required these state energy agencies to jointly develop an electrical transmission infrastructure development guidebook.

SB 420 (Becker, 2023) would have exempted construction of certain low-voltage electrical lines and associated equipment from the need to receive a discretionary permit from the CPUC. The bill was vetoed.

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) requires 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.

AB 205 (Committee on Budget, Chapter 21, Statutes of 2022) allowed certain energy projects, including electric transmission lines between certain non-fossil fuel energy generation facilities to become certified leadership projects under the Jobs and Economic Improvement Through Environmental Leadership Act of 2021 through a certification process through the CEC. With this certification, actions or proceedings related to the certification of an environmental impact report need to be resolved within 270 days to the extent feasible.

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

SUPPORT:

Advanced Energy Economy
California Energy Storage Alliance
California Environmental Voters
California Farm Bureau Federation
California State Association of Electrical Workers
California Wind Energy Association
Center for Energy Efficiency and Renewable Technologies
Clean Power Campaign
Citizens' Climate Lobby California
Coalition of California Utility Employees
Environment California
Fission Transition
Independent Energy Producers Association
Large-scale Solar Association
Natural Resources Defense Council
Solar Energy Industries Association
Union of Concerned Scientists
WATT Coalition

OPPOSITION:

None received

ARGUMENTS IN SUPPORT: In support of this bill, the Coalition of California Utility Employees and the California State Association of Electrical Workers 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. But in addition to new lines, new technology can enable us to get much more capacity out of existing transmission lines and transmission corridors, and to get that capacity much more quickly. „Fully evaluating opportunities to deploy GETS and advanced conductors is a no-regrets policy which could yield lower costs for consumers while increasing California’s ability to meet its carbon reduction goals.

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