BUILDING ON SB 1006

Scaling Advanced Transmission Technologies in California to Unlock Affordable Energy

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July 2026

Acknowledgments

This report was made stronger through the generous insights, feedback, and collaboration of several experts and partners working at the forefront of Advanced Transmission Technology policy and advocacy in California. We are especially grateful to the following contributors:

Bob Dean, International Brotherhood of Electrical Workers Local 1245

Dan Jacobson, Environment California

Maia Leroy, Lumenergy LLC

Micah Mitrosky, International Brotherhood of Electrical Workers

We also thank the many other advocates, policy experts, and stakeholders who contributed ideas and feedback throughout the development of this report and are committed to grid modernization in California.

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"California is a postcard from the future… we can go fast together."

— Chair David Hochschild, California Energy Commission
December 9, 2025 at *Unlocking Affordable Energy Abundance in California with Advanced Transmission Technologies*

Terms & Acronyms

Definition	Acronym
Advanced Power Flow Control	APFC
Advanced Transmission Technologies	ATTs
California Independent System Operator	CAISO
California Energy Commission	CEC
California Public Utilities Commission	CPUC
Dynamic Line Ratings	DLR
Electric Program Investment Charge	EPIC
Grid Enhancing Technologies	GETs
Gigawatt	GW
High Performance Conductors	HPCs
Investor-Owned Utilities	IOUs
Office of Public Advocates	OPA
Pacific Gas and Electric	PG&E
California Senate Bill 1006 (2024)	SB 1006
Southern California Edison	SCE
San Diego Gas & Electric	SDG&E
Transmission Planning Process	TPP
Transmission Topology Optimization	TTO

INTRODUCTION

Utility innovation is a slow and deliberate process, but California's grid needs new tools now. With electricity demand in California forecast to increase by 7.5% by 2030 due in part to data center demand,[1] and by 42% by 2045 as buildings and transportation electrify,[2] the grid will be carrying much more power. While grid hardening and expansion is critical for the long-term safety and reliability of the power system, utilities need to find cheaper, faster ways to increase capacity. Grid Enhancing Technologies (GETs) and High Performance Conductors (HPCs) get more capacity out of the existing transmission grid, and are crucial tools to meeting load growth and enabling cleaner energy before California's 100% clean electricity mandate comes due at the end of 2045. Advanced Transmission Technologies (or ATTs, covering both GETs and HPCs) have been commercialized worldwide for years, but the United States is only 10% of the global market.

This report describes how state and federal policy support utilities to accelerate their grid innovation and deliver power for California. It examines progress to date and discusses next steps to smooth the road to California's affordable and abundant energy future.

WHAT ARE ADVANCED TRANSMISSION TECHNOLOGIES?

Advanced Transmission Technologies (ATTs) include **Grid Enhancing Technologies (GETs)** and **High Performance Conductors (HPCs).** These technologies can cost-effectively increase the capacity, efficiency, reliability, and/or safety of power lines, faster than traditional grid infrastructure and at lower cost or with higher net benefits. GETs include **Dynamic Line Ratings (DLR)**, **Advanced Power Flow Control (APFC)**, and **Transmission Topology Optimization (TTO).** HPCs include **Carbon Core Conductors** and **Superconductors**.

1 California Energy Commission, *Item 6: Resolution Adopting the California Energy Demand Forecast, 2025-2045* (Jan. 2026), at 9, https://www.energy.ca.gov/filebrowser/download/9328?fid=9328.

2 *Id.*

Background

California's core grid challenge is straightforward to identify and difficult to solve: deliver reliable electricity at an affordable rate, fast enough to support accelerating load growth and 100% clean electricity targets.[3] The state is confronting three simultaneous pressures as it pursues this goal:

1. **Affordability** concerns are intensifying as wildfire mitigation investments, undergrounding, and grid hardening drive utility capital expenditures upward.
2. **Grid reliability** margins are tightening under extreme weather, resource variability, and shifting load profiles.
3. **Demand growth** from electrification and large new loads requires a pace of capacity expansion that outstrips traditional development timelines.

New transmission construction remains essential to meet California's long-term reliability, affordability, and clean energy goals. The California Independent System Operator (CAISO) recommended 31 transmission projects in their 2024-25 Transmission Plan, costing an estimated $4.8 billion, to help strengthen reliability, meet load growth, and integrate more than 41 GW of wind and solar energy across the state.[4] At the same time, many of these projects will take years to plan, permit, and build. California will also need faster, lower-cost tools that can increase grid capacity in the near-term as electricity demand rises from AI data centers and electrification.

SB 1006 requires utilities in California to study how Advanced Transmission Technologies can benefit the grid

California policymakers have increasingly focused on how ATTs can improve the performance of the existing grid. In 2024, Assemblymember Cottie Petrie-Norris introduced Assembly Bill 2779 (AB 2779), which required CAISO to report on new uses of GETs in transmission plans and quantify associated cost and efficiency savings. The bill helped elevate the importance of tracking and demonstrating the real-world benefits of these technologies within California's transmission planning process.

That same year, the California Legislature also passed Senate Bill 1006 (SB 1006) to require utilities to modernize California's grid. Instead of focusing solely on building new transmission lines to meet California's needs, the law asks utilities to examine how ATTs can increase the capacity and performance of the existing transmission system.

SB 1006 requires California's investor-owned utilities (IOUs) to prepare studies evaluating where GETs could help:

- Increase transmission capacity, which can be used by new or existing generators, or new loads.
- Reduce transmission system congestion, which occurs when the grid can't deliver the lowest-cost power.

3 Existing law establishes the policy of the state that eligible renewable energy resources and zero-carbon resources supply 100% of all retail sales of electricity to California end-use customers by December 31, 2045.

4 CAISO, California ISO releases 2024-2025 Draft Transmission Plan (Apr. 2025), https://www.caiso.com/about/news/news-releases/california-iso-releases-2024-2025-draft-transmission-plan.

- Reduce curtailment of renewable and zero-carbon resources due to transmission constraints.
- Increase grid reliability, which requires the transmission system to deliver power during plant outages or other disruptions.
- Reduce wildfire ignition risk, consistent with approved mitigation plans.
- Increase capacity to connect new renewable and zero-carbon resources.
- Increase flexibility and optionality amid technology and permitting uncertainty.

The law also requires utilities to evaluate where existing transmission lines could be reconductored with advanced conductors[5] to achieve these same goals. Utilities must then submit these studies to CAISO as part of its annual transmission planning process, where projects are evaluated for economic, reliability, and policy benefits.

SB 1006 required utilities to systematically evaluate ATTs within their planning workflows for the first time, creating a structured review of where these technologies could provide benefits for California's grid.

Stakeholders gather in Sacramento to review California's progress on ATTs

In December 2025, the WATT Coalition, the AMP Coalition, the International Brotherhood of Electrical Workers, Environment California, and the Macro Grid Initiative hosted a multi-stakeholder convening in Sacramento to review the state of ATTs deployment in California. The convening brought together CAISO, utilities, regulators, labor, environmental advocates, large loads, and vendors. The agenda for the convening is outlined below.

One shared conclusion was clear: **California must maximize the performance of its existing grid in the near term using ATTs, while continuing to build new infrastructure at scale.**

SB 1006 created the first structured process for utilities to evaluate GETs and HPCs in California's transmission planning. The resulting utility reports show that **these technologies work and are ready to deploy quickly to unlock reliability benefits and savings for consumers.** At the same time, insights from both the SB 1006 process and the December multi-stakeholder convening make clear that scaling these solutions will require **evolving planning approaches, better recognition of the system-wide value of these technologies, and alignment across utilities, regulators, and stakeholders** in order to translate the foundation into scaled deployment.

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5 This paper refers to advanced conductors as *High Performance Conductors,* which include carbon core conductors and superconductors.

December 2025 Convening Agenda

"Unlocking Affordable Energy Abundance in California with Advanced Transmission Technologies"

Presentations: Utility Case Studies of ATTs Deployments in California

- **Damian Inglin,** PG&E: Dynamic Line Rating Pilot
- **Kevin Galloway,** SDG&E: ACCC (Aluminum Conductor Composite Core) Case Study

Panel: The Public Interest Case for ATTs

- **[Moderator] Beth Vaughan,** CEO, California Community Choice Association
- **Marc Joseph,** Attorney, Adams Broadwell Joseph & Cardozo on behalf of International Brotherhood of Electrical Workers
- **Lara Ettenson,** Strategist, Western Equitable Infrastructure Solutions, Climate & Energy, Natural Resources Defense Council
- **Duncan Callaway,** Professor, UC Berkeley and Lawrence Berkeley National Laboratory

Panel: ATTs for Meeting Load Growth

- **[Moderator] Casey Baker,** Senior Program Manager, GridLab
- **Chad Dupuis,** Principal Electrical Engineer, Pacific Gas and Electric
- **Eusebio Arballo,** Associate Director, Regulatory & Legislative Affairs, EDF Renewable Energy
- **Kaitlin Savage,** Energy Market Development Lead, Google
- **Elliot Mainzer,** President and CEO, California Independent System Operator

Panel: State and Federal ATTs Policy Perspectives

- **[Moderator] Hunter Stern,** Assistant Business Manager, International Brotherhood of Electrical Workers (IBEW) Local 1245
- **Assemblywoman Cottie Petrie-Norris,** Chair of Assembly Utilities and Energy, California State Legislature
- **Commissioner Matthew Baker,** California Public Utilities Commission
- **Danielle Mills,** Principal of Infrastructure Policy Development, California Independent System Operator
- **Nate Hill,** Head of Energy Policy, Amazon

SECTION 1

REVIEW OF UTILITY SB 1006 REPORTS

SB 1006 asked utilities to think about the grid differently. Normally, transmission planning focuses on identifying individual projects that resolve specific reliability violations. For example, a "thermal overload"—when a transmission line is at risk of overheating—under a "contingency scenario"—meaning after another facility on the system has failed or gone out of service—might trigger a line upgrade. Current planning frameworks are designed to identify and justify discrete capital projects tied to specific assets and reliability scenarios.

SB 1006 asked a broader question. Instead of focusing on whether a specific line must be rebuilt, the law asked whether technologies could improve how the network operates by increasing capacity, utilization, dynamic control, and flexibility. The statute directs utilities to evaluate benefits including delivery of lower cost resources, delivery of cleaner resources, system flexibility, and wildfire risk. These system-level outcomes do not map neatly onto a single line segment. As a result, complying with SB 1006 ideally requires utilities to look at the grid more holistically.

This approach is similar to other recent system-level studies. For example, the *Unlocking the Queue*[6] study in the Southwest Power Pool examined how coordinated operational changes and grid technologies could increase the ability of the regional system to connect new generation and reduce costs. The analytic frame of the study is one of big picture, system-wide optimization, rather than looking at whether an ATT could replace a project addressing a specific reliability need on a specific line.

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6 The Brattle Group, *Unlocking the Queue with Grid-Enhancing Technologies: Case Study of the Southwest Power Pool* (Feb. 2021), https://watt-transmission.org/wp-content/uploads/2021/02/Brattle__Unlocking-the-Queue-with-Grid-Enhancing-Technologies__Final-Report_Public-Version.pdf90.pdf.

Many ATTs deliver their greatest value when viewed at the system level. Technologies such as APFC and TTO influence how power flows across multiple lines and substations. The true scale of their impact often appears when demand or generation patterns shift, or parts of the grid are out of service, rather than at a single constraint. In the *Unlocking the Queue* analysis, modeling across 24 historical operating conditions showed that the region could integrate more than twice as much additional new renewable generation in Kansas and Oklahoma after deploying GETs. Line-by-line screening would likely have missed this kind of "big picture" benefit that emerges upon examination of network effects and combining the value of multiple technologies.

For this reason, holistically evaluating ATTs means looking at system performance across different operating conditions and time periods, rather than only whether they solve a specific reliability violation. SB 1006 implicitly points toward this kind of whole-system evaluation oriented around overall grid performance and outcomes.

Utilities responded to SB 1006 by applying established planning frameworks to a new mandate

In practice, the first round of SB 1006 studies continued in the model of individual project feasibility screening, rather than seeking system-wide optimization. Utilities largely relied on existing transmission planning tools, which are designed primarily to identify and resolve reliability violations. However, this first round of reports did identify several concrete opportunities to deploy ATTs in the near term.

Southern California Edison (SCE) evaluated ATTs within future planning cases beginning in 2027 and beyond, anchoring analysis in standard Transmission Planning Process constructs.[7] SCE assessed TTO and APFC mainly for their abilities to address reliability issues,[8] while assessing DLR with an economic lens to investigate its potential to relieve congestion and curtailment.[9]

In their evaluation, SCE found value for DLR on nine of eleven studied lines, with estimated installation costs between $50,000 and $500,000 per line and deployment timelines of one to two years. Even without ongoing operations and maintenance costs, these figures clearly indicate that there are low-cost, rapid deployment options available today. Furthermore, SCE completed a comprehensive review of its system to identify 56 candidate lines for reconductoring with HPCs. The review applied a stepwise screening process, first looking at transmission lines already operating at SCE's highest circuit breaker rating and then those with series capacitor installations. Underground segments were excluded, as these elements limit potential capacity gains. Potential implementation time for HPCs on each of the 56 candidate lines spans five to ten years. SCE submitted two reliability-driven HPC reconductoring projects in the 2025-26 Transmission Planning Process as well.[10]

7 Southern California Edison, *A Study of the Feasibility of Projects using Grid Enhancing Technologies and Reconductoring with Advanced Conductors* (Nov. 2025), at 4, https://www.sce.com/sites/default/files/Regulatory/SB1006-FinalStudiesFor2025-PublicVersion.pdf (hereinafter, "SCE SB 1006 report").

8 *Id.* at 4, 5.

9 *Id.* at 7.

10 *Id.* at 9, 12.

Pacific Gas and Electric (PG&E) scoped its TTO and APFC screening around ten reliability-driven upgrades in the 2025–2026 CAISO planning cycle.[11] PG&E investigated whether these technologies could substitute for specific reliability projects that had already been identified. Within that scope, several projects were screened out as technically infeasible. For example, PG&E stated that APFC is most effective in meshed networks, while many of the studied lines were radial or became radial under contingency conditions.[12] At the same time, PG&E described TTO as a potential bridging solution to maintain service during construction outages or to defer upgrades while serving load reliably.[13] This framing suggests value beyond replacing reliability projects and points to the benefits of evaluating these technologies at the broader network level.

In their evaluation, PG&E identified 14 transmission lines as strong candidates for further DLR study by CAISO, signaling potential opportunity for congestion and curtailment reductions. However, their analysis did not mention several APFC deployments that PG&E has proposed and are included in CAISO's approved transmission plans, such as their deployment of APFC at the Los Esteros substation to address load-driven constraints.

PG&E also evaluated opportunities to reconductor with HPCs. For the study, PG&E used two screening criteria: circuits with 20-100% thermal overloads by 2035 and less than 20% of structures classified as aging or deteriorated. PG&E identified six transmission lines as strong candidates for advanced reconductoring and further study by CAISO.

San Diego Gas & Electric (SDG&E) similarly anchored analysis in Transmission Planning Process applications[14] and emphasized their use of "deviceless DLR" based on monitoring infrastructure already installed on transmission lines across their system.[15] SDG&E also recommended reconductoring three lines to address constraints identified during the 2025-2026 TPP by evaluating carbon core conductors as a potential conductor choice for already-identified reconductoring projects.[16] Energization for these reconductoring projects would not be for another six to nine years.

The good news is that the reports identified a total of 23 candidate DLR lines for further CAISO economic analysis and 62 potential HPC projects for further study by CAISO. While the report falls short of a full system analysis, this initial effort led to progress. Even a relatively small number of deployments on high-value corridors could increase capacity on those corridors to produce meaningful congestion savings for California customers. The fact that these opportunities emerged from the first cycle of SB 1006 reports underscores how much additional value could be uncovered through expanded analysis across the system.

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11 Pacific Gas and Electric, *PG&E SB 1006 Compliance Report* (Dec. 2025), at 12, 13, http://pgera.azurewebsites.net/Regulation/ValidateDocAccess?docID=858547 (hereinafter, PG&E SB 1006 report).

12 *Id.* at 12.

13 *Id.* at 13.

14 San Diego Gas & Electric, *A Study of the Feasibility of Projects Using Grid Enhancing Technologies and Reconductoring with Advanced Conductors* (Jan. 2026), at 3, https://www.sdge.com/sites/default/files/documents/2025-12/SDGE_SB-1006_12292025_Clean.pdf (hereinafter, "SDG&E SB 1006 report").

15 *Id.* at 7.

16 *Id.* at 8.

SECTION 2

LESSONS LEARNED FROM UTILITY SB 1006 REPORTS

Lesson 1: Reliability and economics should be evaluated together

Transmission planning has historically treated reliability and economics as separate reasons to upgrade the grid. Reliability violations, such as violations under contingency conditions, usually trigger upgrades first. Economic congestion is typically evaluated through separate planning processes and often on a different timeline.

In the utility SB 1006 reports, utilities often evaluated different ATTs through only one lens at a time: for example, SCE examined APFC, TTO, and HPCs mainly for their ability to address reliability issues. SCE evaluated DLR primarily for economic congestion reduction and curtailment reduction. This separation understates total value at stake: "reliability-driven" ATTs deployments can unlock deliverability and reduce congestion, while "economic" ATTs deployments can strengthen reliability margins by increasing available headroom on the grid and giving operators better visibility into system conditions.

Future evaluation should combine reliability and economic needs for all ATTs. Economic analysis should include APFC, TTO, and HPCs, where operational flexibility and / or upgrades can reduce congestion or accelerate interconnection of low-cost generation. Reliability and resilience analysis should include DLR, particularly in wildfire-prone areas where improved asset awareness can help mitigate ignition risk. Existing power flow modeling is generally designed to identify where reliability violations occur, but not to determine whether ATTs could cost-effectively resolve those violations. Expanding planning frameworks to evaluate ATTs as potential reliability and economic solutions would help utilities identify lower-cost and more flexible options. The grid is one physical system. Planning frameworks should evaluate technologies in a way that reflects that reality.

Lesson 2: Coordination across utility teams is necessary to identify ATTs value

Evaluating ATTs often requires input from several parts of a utility, including planning, operations, markets, protection and controls, and regulatory affairs teams. These functions may use different models, data sets, and success metrics when evaluating the grid.

The SB 1006 reports show how this division of responsibilities can affect how technologies are studied. PG&E noted that they do not yet formally assess TTO in transmission planning, even though the technology has been explored at the operations level.[17] Realizing the benefits of TTO requires cross-functional coordination across different teams to validate models and integrate results. Improving these connections can help utilities better capture the full value of ATTs. Operational experience can inform planning assumptions, and planning studies can help identify where operational tools may deliver the greatest benefits.

The SB 1006 reports also illustrate how information developed in one part of a utility may not always appear in another context. For example, PG&E's report does not mention its existing APFC deployment at the Los Esteros electric substation.[18] This suggests that information may get lost in translation across siloed utility departments.

Lesson 3: Whole-system thinking is important because line-by-line screening can miss network benefits

Many ATTs deliver their greatest value by influencing power flows across the broader network. For example, an APFC device installed on one corridor can redistribute flows across multiple parallel paths. Similarly, TTO can reconfigure switching configurations in ways that relieve constraints at multiple locations on the system.

Traditional line-by-line analysis works well for evaluating conventional upgrades, such as rebuilding a specific transmission line. For example, targeting limiting elements for reconductoring across a system can add capacity and help stem congestion.[19] It is less effective for technologies whose benefits emerge from optimizing broader system topology. For example, PG&E evaluated APFC and TTO within the context of ten reliability-driven projects. Within that scope, the analysis focused on whether the technologies could address those specific reliability needs. This approach may have been reasonable for evaluating those projects, but it did not examine where these technologies might deliver the greatest value across the broader system.

Future evaluations could build on this work by pairing project-level analysis with system-wide scans that look for opportunities to reduce congestion, accelerate interconnection, or improve reliability across

17 PG&E SB 1006 report, at 8.

18 PG&E Corporation, *PG&E and Smart Wires Enhance Grid Reliability, Capacity for Data Centers in San Jose* (May 2025), https://investor.pgecorp.com/news-events/press-releases/press-release-details/2025/PGE-and-Smart-Wires-Enhance-Grid-Reliability-Capacity-for-Data-Centers-in-San-Jose/default.aspx.

19 PoyntEnergy, GridLab, *Advanced Conductors Reliability and Stability Study of the BPA System* (Oct. 2025), https://gridlab.org/wp-content/uploads/2025/10/2025-10-16-BPA-Advanced-Conductors-with-cover.pdf .

the network. SCE took a step in this direction for HPCs by conducting a broader review of its system to identify candidate lines where reconductoring could be cost-effective, rather than limiting the analysis to a small number of specific projects. However, even that review was still largely based on identifying line-specific needs, rather than modeling how multiple deployments could interact across the broader network. Danielle Mills, Principal of Infrastructure Policy Development at CAISO, raised that regional optimization would be a valuable additional layer of analysis during the December stakeholder convening.

Lesson 4: Utilities should screen projects for greatest net-benefits, not just lowest upfront cost

Current transmission planning processes often focus on upfront capital costs when evaluating cost-effectiveness, rather than considering whether a project could deliver greater savings over its lifetime. Proper evaluation should consider both total project costs and total lifetime benefits.

CAISO already uses the Transmission Economic Assessment Methodology[20] (TEAM) to quantify a broad set of economic benefits in its economic planning studies, but relatively few projects are evaluated during the economic planning stage. Applying a similar framework to the projects identified in the SB 1006 reports would help utilities and regulators better understand where ATTs provide the greatest value. Utilities should evaluate the economic benefits of all ATT types in their SB 1006 reports using production cost modeling, ideally in coordination with CAISO through the annual Transmission Planning Process.

20 CAISO, *Transmission Economic Assessment Methodology* (Nov. 2017), https://www.caiso.com/documents/transmissioneconomicassessmentmethodology-nov2_2017.pdf.

SECTION 3

NEXT STEPS

Identified projects show how ATTs can support cost-effective grid modernization

California's grid investments must balance several challenges at once, including wildfire hardening, interconnection demand, electrification, and reliability. At the same time, keeping electricity affordable for ratepayers remains a major concern. As IBEW attorney Marc Joseph noted during the December convening, "there is not unlimited money coming from ratepayers." Similarly, PG&E CEO Patti Poppe framed the issue well during the convening: "the best capital is capital that lowers customer bills."

ATTs can help address these pressures by providing relatively low-cost and fast ways to increase transmission capacity. They can create additional near-term headroom on the grid while larger transmission projects move through permitting and construction. They can also help to relieve congestion and improve deliverability without requiring new rights-of-way. These technologies also give planners more flexibility when demand and generation forecasts are uncertain. Instead of committing immediately to large new projects, ATTs can provide incremental capacity and help utilities better target future investments.

Assembly member Cottie Petrie-Norris summarized the challenge clearly during the convening, stating that it is "impossible to meet California's goals without using existing assets more efficiently." The findings from SB 1006 help identify where California can use limited capital to make the most effective upgrades to the grid.

Scaling deployment requires updating planning frameworks, valuation methods, and perceptions of technology readiness

The main barrier to scaling ATTs deployment in California is not technical readiness. ATTs have been deployed globally for more than a decade. The major hurdle for ATTs is updating processes and mindsets at utilities and system operators to include and value lower-cost, flexible, fast solutions.

DLR, for example, is often evaluated narrowly as a congestion-reduction tool or limited to pilot programs. This approach can overlook the broader benefits this mature technology can provide. This dynamic shows up not only in the utility SB 1006 reports, but also in how regulators and other stakeholders interpret readiness and risk. The SCE SB 1006 report illustrates this issue. The utility identified value for DLR on nine of eleven transmission lines studied, with relatively low installation costs and short deployment timelines. However, in its most recent rate case, the California Public Utilities Commission (CPUC) did not approve funding for broader deployment and instead encouraged a pilot through the California Energy Commission (CEC) EPIC program. As a result, the SCE SB 1006 report shifted toward describing DLR as a pilot opportunity,[21] despite (1) having proposed a broader DLR deployment and (2) DLR being commercially deployed for more than a decade.

Conservatism on grid technology innovation from regulators and stakeholders will cost California ratepayers and put state climate goals in jeopardy. The pivot from proposed deployment back to pilot program suggests lingering uncertainty about whether ATTs are "ready" to be treated as standard grid infrastructure. Comments from the Office of Public Advocates, for example, raised ATTs cost-effectiveness and prudence questions that have been well addressed in studies going back several years.[22] Recognition of the multidimensional value of ATTs is often missing from these conversations between regulators and utilities. Independent studies in other regions, including analyses conducted in Maine by Energy and Environmental Economics, have documented benefit-cost ratios approaching 9:1 for DLR when considering stacked benefits.[23] While California must conduct its own analysis, these studies highlight how narrow valuation lenses can underestimate the value of these technologies and constrain utilities who might be ready to move forward with ATTs.

Clear regulatory guidance will help utilities accelerate progress on ATTs. If mature ATTs are consistently evaluated as deployable infrastructure—and if benefit-cost frameworks include their monitoring, reliability, and optionality benefits—utilities will have clearer pathways to deploy them where they provide value.

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21 SCE SB 1006 report, at 13.

22 U.S. Department of Energy, *Dynamic Line Ratings* (Jun. 2019), at 14, https://www.energy.gov/oe/articles/dynamic-line-rating-report-congress-june-2019.

23 Energy and Environmental Economics, *Cost and Benefits Assessment of Grid-Enhancing Technologies in Maine: Prepared for the Maine Public Utilities Commission* (Aug. 2025), at 43, https://www.maine.gov/mpuc/sites/maine.gov.mpuc/files/inline-files/2025.08.26_MPUC_GETs_Assessment_final.pdf.

Practical "no-regrets" actions

Several practical steps could help California move from evaluating ATTs to deploying them more consistently.

1. **Expand economic evaluation to all ATTs.** CAISO should evaluate economic needs and benefits for all technologies across the CAISO footprint in their production cost modeling as part of the Transmission Planning Process, and utilities should investigate economic benefits of ATTs in outage planning.
2. **Move at least one cost-effective project for each technology through the full deployment process to build experience.** Each utility should identify candidate projects through benefit-cost analysis, procure equipment, integrate the technology into their planning system, and operate the technology. Working through a full deployment process builds familiarity and comfort with the technology more effectively than isolated pilot projects.
3. **Develop a shared CAISO–IOU ATT opportunity rubric.** This tool would link common system constraint types with the technologies best suited to address them. For example, different tools may be appropriate for radial versus meshed configurations, thermal versus voltage or stability limits, load-driven versus curtailment-driven constraints, or areas with high wildfire risk.
4. **Create cross-functional working groups within utilities.** ATTs evaluation requires input from planning, operations, protection and controls, and markets teams. Regular coordination within each utility could help translate operational experience into planning studies and improve how these technologies are evaluated, and vice versa: help operators understand how new technologies identified in planning processes will integrate with their work.
5. **Enable structured load co-investment pathways.** Large electricity users that benefit from faster interconnection can help fund ATTs upgrades that increase transmission capacity. Well-designed co-investment models can accelerate improvements while protecting existing ratepayers.

CONCLUSION

SB 1006 succeeded in bringing ATTs into California's formal grid planning processes and requiring utilities to evaluate them in a structured manner. The resulting reports identified feasible applications with relatively low costs and short deployment timelines. These findings make clear that ATTs are deployable on California's grid today.

Across the three SB 1006 reports, utilities identified 23 candidate transmission lines for further DLR study by CAISO and 62 potential HPC reconductoring opportunities for further study by CAISO. These findings suggest that even a relatively small number of deployments on high-value corridors could deliver meaningful congestion relief, improve renewable integration, and increase grid flexibility.

At the same time, the first round of SB 1006 reports also highlighted several lessons for California moving forward. Utilities generally evaluated ATTs through traditional planning frameworks focused on individual projects and reliability violations, which can miss the broader system-wide value of the technologies. The reports also showed that reliability and economic benefits are often analyzed separately, even though ATTs can improve both at the same time. The reports underscored the need for stronger coordination across planning, operations, and regulatory teams so that utilities can more consistently identify where ATTs can provide the greatest value across the broader network. Finally, the reports showed the importance of evaluating projects based on lifetime net benefits, rather than only upfront costs, so that technologies with significant long-term value are not overlooked.

The next step is aligning planning and regulatory processes so these technologies can move from pilots to routine deployment. Clear expectations that mature ATTs are ready for broader use, combined with benefit-cost frameworks that recognize their full range of benefits, can help ensure that low-cost, fast-to-deploy options are not left on the table.

California is well positioned to lead the country in deploying ATTs. The state has ambitious clean energy goals, growing electricity demand, and a strong ecosystem of institutions in California capable of moving these technologies forward. California policymakers have already begun building this foundation through efforts such as Assemblymember Cottie Petrie-Norris's AB 2779, which helped elevate the importance of tracking and demonstrating the cost and efficiency benefits of GETs in transmission planning, and SB 1006, which established the first structured utility evaluation process for ATTs. By building on this momentum and the alignment demonstrated at the December convening, California can accelerate ATT deployment to support affordability, reliability, and energy abundance. On December 4, Assembly member Petrie-Norris called on the electricity industry and stakeholders to rise to the challenge: "California is behind Europe today, but within two years, I want to hear that California is leading the way."