



and market rules the CAISO oversees, but they also occur in the transmission planning context. Each ISO/RTO should be able to utilize its own Order No. 1000 compliant transmission planning process to identify and approve those projects, including grid enhancing technologies, that meet identified needs in the most cost-effective manner. The CAISO believes greater focus on how transmission providers consider grid enhancing technologies in the transmission planning process may help identify opportunities to pilot and deploy grid enhancing technologies. For example, transmission providers could publish within their transmission plans a summary of efforts to deploy grid enhancing technologies and the barriers or challenges that exist to such deployment. This information would provide transparency regarding how grid enhancing technologies might increase the capacity, efficiency, or reliability of transmission facilities. This transparency could help identify new applications for grid enhancing technologies occurring in one region that might have an application in another region, thereby fostering opportunities for transmission owners to pursue these applications at a commercial scale.

The CAISO does not believe that a shared savings mechanism is necessary to incentivize grid enhancing technologies, and estimated benefits from planning studies should not be used to support specific shared cost savings between transmission owners and ratepayers. Although estimated benefits can support the decision to proceed with a capital addition to the transmission system, grid changes that will occur due to load growth, resource development, congestion, and numerous other factors do not make these modeling estimates a good source for rate recovery purposes in future years.

The CAISO recognizes that action by the Commission may help facilitate pilots or commercial deployment of grid enhancing technologies and is not opposed to the use of ratemaking mechanisms to do so, as long as they do not involve a shared savings approach. With this in mind, the CAISO offers the following comments in response to select questions identified in the Commission's notice.

**Question 3:** In discussion at the workshop of the “shared savings” approach for the deployment of GETs to existing transmission assets, workshop participants expressed general ratemaking concerns, and identified implementation issues, such as the measurement of benefits and distribution of payments. Please provide comment on the proposed ratemaking structure and any implementation challenges.

**CAISO Response**

The CAISO does not support a shared savings approach for the deployment of grid enhancing technologies. Under the CAISO tariff, the CAISO uses its transmission planning process to evaluate and approve needed reliability and economic transmission facilities at all voltage levels. Transmission operators and developers have opportunities to present grid enhancing technologies to address these needs. The CAISO's transmission planning process is open to all stakeholders and interested persons and benefits from widespread participation by current and prospective transmission owners, developers, equipment and technology vendors, and ratepayer and environmental representatives. If grid enhancing technologies meet an identified transmission need and are more cost effective or efficient than other alternatives, the CAISO will select them. As such, transmission owner ratemaking incentives are not necessary to identify and adopt grid enhancing technology proposals.

The shared savings approach discussed at the Commission's workshop anticipates that RTOs/ISOs would use existing transmission planning processes to evaluate the cost benefit ratio for a proposed project in order to inform the savings that would be shared between a transmission owner and transmission ratepayers. The CAISO conducts production simulation modeling to assess the estimated economic benefits of projects and uses those modeling results to determine whether to pursue a project in the first instance. The CAISO does not use the modeling results to calculate rates or determine how costs should be "shared," nor are they designed for that purpose.<sup>2</sup> Utilizing the modeling results to authorize rate recovery creates the risk that transmission ratepayers will pay for benefits that may not materialize at the level projected. Alternatively, the modeling results might understate the benefits that actually accrue on the transmission system and under-compensate the project sponsor.

The CAISO cautions that use of *ex ante* modeling results from the transmission planning process may not provide an accurate assessment of actual savings that would result on a year-to-year basis from implementing a grid enhancing technology. Stated differently, it is unlikely that actually implementing the grid enhancing technologies will produce levelized benefits over the course of its operation. For instance, if there are limitations on the system, such as stability or voltage concerns, that prevent utilization of an approved grid enhancing technology, the annualized modeled benefits of the technology may not in all cases materialize. Grid conditions are constantly changing, especially in this era of rapid transformation of the electricity industry and more extreme

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<sup>2</sup> These models are available to stakeholders in the CAISO's transmission planning process.

weather conditions. Any number of factors can affect the yearly (and long-term) efficacy of any grid enhancing technology, including, among others, generation and transmission additions (and retirements), natural gas prices, generation and transmission outages, rapid growth of variable energy resources and distributed energy resources, changes in load, new weather patterns, drought, and fires. All of these factors can impact flows on the transmission system and change the effectiveness of grid enhancing technologies. For these reasons, distributing incentive payments under a shared savings approach using *ex ante* modeling approach would create an inaccurate payment stream over a period of time.

Measuring the benefits of deploying grid enhancing technologies may be far more challenging to calculate on a system that is under rapid transformation than in the past where changes on the electric system occurred more gradually. Even determining the general benefit of the technology would likely require an *ex post* assessment of benefits and performing some type of counterfactual analysis to assess the benefits the grid enhancing technology -- and no other factor -- provided to increase the capacity efficiency, reliability or economic benefits of transmission facilities. In any event as discussed above, a shared savings regime is unnecessary to implement these technologies and even adopting an upfront shared savings percentage of an *ex post* benefit calculation is unjustified and would reflect an arbitrary allocation of benefits as between transmission providers and customers. Transmission planners already have the authority to approve these technologies as part of their Order No. 1000 transmission planning processes. The Commission should encourage adherence to existing Order No. 1000 tariffs, not require adoption of new, complex, unreliable, and unnecessary

processes to facilitate grid enhancing technologies. In this context, the Commission could adopt ratemaking incentives such as an adder to a project sponsor's return on equity for capital investments in transmission or related transmission technologies.

**Question 4:** Referring to the technologies mentioned in Question 1 (power flow control and transmission switching technologies, dynamic line ratings, and storage as transmission) some workshop participants indicated that RTOs/ISOs consider qualitative benefits, including certain reliability and flexibility attributes, in the regional transmission planning process. How do RTOs/ISOs currently measure or consider these benefits? Please provide examples.

### **CAISO Response**

The CAISO's transmission planning process includes three phases: (1) development of unified planning assumptions; (2) application of reliability, economic, policy screens, and project identification; and (3) competitive solicitations for applicable projects. During the second phase of the transmission planning process, the CAISO assesses reliability needs under mandatory reliability standards as well as the CAISO's own planning standards and identifies projects to meet these needs. As part of the CAISO's regional planning process, the CAISO utilizes a Transmission Economic Assessment Methodology.<sup>3</sup> This methodology outlines benefits that can be categorized into the following categories:

- **Production benefits:** Benefits resulting from changes in the net ratepayer payment based on production cost simulation as a consequence of the proposed transmission upgrade.

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<sup>3</sup> A copy of a document explaining this methodology is on the CAISO's website: [http://www.caiso.com/Documents/TransmissionEconomicAssessmentMethodology-Nov2\\_2017.pdf](http://www.caiso.com/Documents/TransmissionEconomicAssessmentMethodology-Nov2_2017.pdf)

- **Capacity benefits:** Benefits resulting from increased importing capability into the CAISO Balancing Authority Area (BAA) or into a Local Capacity Requirement (LCR) area. Decreased transmission losses and increased generator deliverability contribute to capacity benefits as well.
- **Public-policy benefit:** Transmission projects can help to reduce the cost of reaching renewable energy targets by facilitating the integration of lower cost renewable resources located in remote area, or by avoiding over-build.
- **Renewable integration benefit:** Interregional transmission upgrades help mitigate integration challenges, such as over-supply and curtailment, by allowing sharing energy and ancillary services (A/S) among multiple BAAs.
- **Avoided cost of other projects:** If a reliability or policy project can be avoided because of the economic project under study, then the avoided cost contributes to the benefit of the economic project.

In terms of reliability, the CAISO regional transmission planning process adheres to Applicable Reliability Criteria, which includes NERC/WECC planning standards as well as the CAISO's own planning standards. Beyond these criteria, the CAISO has not published metrics for qualitative benefits for how to consider additional reliability and flexibility attributes of proposed projects in the regional transmission planning process.

**Question 5:** What software or other changes would an RTO/ISO need to make to implement GETs? As more of these technologies come onto the system, what challenges exist for coordinating their control in terms of analytics, automation, and optimization?

**CAISO Response**

The CAISO or its participating transmission owners would need to have the capability to operationalize any grid enhancing technology selected as a transmission project, *i.e.*, the technology must be feasible to integrate into grid operations.

Regarding the CAISO's market systems, the CAISO has already integrated some grid enhancing technologies, but the CAISO would need to assess the impacts of operationalizing a large number of grid enhancing technologies within its markets. In order to justify using software capability that may be available to support grid enhancing technologies, the CAISO would need to determine the benefits outweigh other uses that could increase the efficiency of the optimization to help achieve a security constrained least cost dispatch. Some technologies, when deployed, may only result in limited optimization benefits but may involve significant implementation time and costs. An additional issue involving operationalizing grid enhancing technologies occurs if multiple devices affect flows on the same constrained transmission path. Among other things, that raises the issue of what portion of any benefit each grid enhancing technology produced. Grid enhancing technologies that have less dynamic operation, *e.g.*, seasonal, may not involve the same level of optimization challenges.

Another challenge associated with integrating large volumes of grid enhancing technologies involves the possibility that these technologies may create a more dynamic transmission system in the day-ahead timeframe and in real-time. Such changes may

create variances in how the CAISO has modeled its system for purposes of issuing congestion revenue rights and could also give rise to variances between Total Transfer Capability used in the CAISO's hour-ahead scheduling process for intertie transactions and the CAISO's 15-minute market or 5-minute real-time dispatch. These variances may result in pricing impacts that create unexpected market outcomes. Significant real-time changes to transmission facilities may also impact a look-ahead optimization in which the transmission provider is modeling supply and demand not just in a binding market interval but based on forecasted system needs in subsequent market intervals. These challenges are not reasons to not deploy grid enhancing technologies, but they merit consideration as transmission providers assess increased efficiency and reliability benefits associated with operationalizing large numbers of grid enhancing technologies.

**Question 6:** Workshop participants discussed the benefits of pilot programs. Should the Commission encourage the testing and deployment of technologies that increase the capacity, efficiency, or reliability of transmission facilities through pilot programs and demonstration projects? If so, is there regulatory support that the Commission could provide to support and encourage such efforts? Could the Commission use its transmission incentives policy to encourage such pilot programs and demonstration projects? If so, please describe how the Commission could do so.

**CAISO Response**

The CAISO encourages the Commission to explore measures to facilitate or incentivize pilot programs or demonstration projects to test and deploy technologies that increase the capacity, efficiency, or reliability of transmission facilities. Such programs may help identify opportunities to deploy grid enhancing technologies on a broader scale. To this end, the Commission could help increase awareness of pilot projects or demonstration projects that are occurring in various regions through technical workshops, presentations, or reports. Transmission providers could support this effort

by including a discussion of the deployment of grid enhancing technologies as well as barriers or challenges that exist to such deployment within their transmission plans. These efforts might encourage other regions to explore similar efforts. In addition, the Commission could provide guidance with respect to transmission provider cost recovery for pilot programs. Such action might encourage transmission owners or developers to submit additional proposals into transmission planning processes.

February 14, 2020

Respectfully submitted,

**By: /s/ Andrew Ulmer**

Roger E. Collanton

General Counsel

Anthony Ivancovich

Deputy General Counsel, Regulatory

Andrew Ulmer

Director, Federal Regulatory Affairs

California Independent System

Operator Corporation

250 Outcropping Way

Folsom, CA 95630

Tel. (916) 608-7209

Fax. (916) 608-7222

Email: [aulmer@caiso.com](mailto:aulmer@caiso.com)

*Attorneys for the California Independent  
System Operator Corporation*

## CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon all of the parties listed on the official service list for the above-referenced proceeding, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, CA this 14<sup>th</sup> day of February, 2020.

*/s/ Martha Sedgley*

Martha Sedgley