

Memorandum

To: ISO Board of Governors

From: Neil Millar, Vice President of Infrastructure and Operations Planning

Date: March 17, 2021

Re: Decision on the ISO's 2020-2021 transmission plan

This memorandum requires Board action.

EXECUTIVE SUMMARY

Each year the California Independent System Operator Corporation undertakes a comprehensive assessment of the transmission needs of the system over a 10-year planning horizon and produces an annual transmission plan. The ISO's 2020-2021 transmission plan provides a comprehensive evaluation of the ISO's transmission grid to identify upgrades needed to successfully meet California's policy goals, in addition to examining conventional grid reliability requirements and transmission projects that can bring economic benefits to consumers. As per the ISO tariff, Management seeks the Board approval of the ISO's transmission plan for the 2020-2021 planning cycle, included as Attachment A.

The number and capital costs of recommended transmission projects in the 2020-2021 transmission plan is relatively low compared to recent previous transmission plans. This is due to the considerable progress made in earlier planning cycles in identifying and approving a wide array of transmission projects, emerging issues and evolving economic opportunities. Given the significant amount of policy-driven transmission projects approved in past planning cycles appear to be adequate for meeting a 60% renewable portfolio standard, as set out in California Senate Bill 100, the 100 Percent Clean Energy Act of 2018, no policy-driven transmission is being recommended for approval in this year's transmission plan. While the CPUC is also focused on achieving greenhouse gas reductions from the electricity sector taking into account input from the California Air Resources Board that may drive to even higher reliance on renewable generation, the implementation details for achieving those goal are not sufficiently developed to inform whether any additional transmission infrastructure is needed.

The reliability assessment identified three reliability-driven projects needed to maintain the reliability of the ISO's transmission system estimated to cost less than \$5 million. Through the 2020-2021 transmission process, ISO Management approved the three projects, each under \$50 million dollars, with an estimated total cost of less than \$5 million. None of the projects are eligible for competitive solicitation.

Other key findings and conclusions from the 2020-2021 transmission plan include:

- No economic-driven transmission projects were identified.
- The ISO identified two previously approved transmission projects that can be wholly or largely replaced by appropriately procured and sited battery storage.
- Three previously approved projects will be on hold pending reassessment in future cycles.

This transmission plan was developed after extensive stakeholder engagement. We communicated preliminary results through stakeholder presentations on September 23 and 24, and on November 17, 2020. The ISO released a draft plan on February 1, 2021 and presented it to stakeholders on February 9, 2021. Based on stakeholder comments received, we conducted additional review and made further revisions, culminating in the revised draft ISO 2020-2021 transmission plan.

Management proposes the following motion:

Moved, that the ISO Board of Governors approves the ISO 2020-2021 transmission plan attached to the memorandum dated March 17, 2021.

BACKGROUND

A core responsibility of the ISO is to plan and approve additions and upgrades to transmission infrastructure so that as conditions and requirements evolve over time, we can continue to provide a well-functioning wholesale power market through reliable, safe and efficient electric transmission service. Since it began operation in 1998, the ISO has fulfilled this responsibility through its annual transmission planning process.

Board approval of the transmission plan is required. Specifically, section 24.4.10 of the tariff states:

The revised draft comprehensive Transmission Plan, along with the stakeholder comments, will be presented to the CAISO Governing Board for consideration and approval. Upon approval of the plan, all needed transmission addition and upgrade projects and elements, net of all transmission and non-transmission alternatives considered in developing the comprehensive Transmission Plan, will be deemed approved by the CAISO Governing Board. Transmission upgrade and addition projects with capital costs of \$50 million or less can be approved by CAISO management and may proceed to permitting and construction prior to Governing Board approval of the plan. Following Governing Board approval, the CAISO will post the final comprehensive Transmission Plan to the CAISO website.

Advancing preferred resources

Increased opportunity for non-transmission alternatives, particularly preferred resources and storage, continues to be a key focus of the transmission planning analysis. In this regard, the ISO's transmission planning efforts focus on not only reliability and on meeting the state's policy objectives through advancing policy-driven transmission, but also on helping transform the electric grid in an environmentally responsible way. The focus on a cleaner, lower-emission future governs not only policy-driven transmission, but also our path for meeting other electric system needs. Of course, opportunities are based on the identified needs.

Further, preferred resource assumptions are also incorporated into the load forecasts adopted through state energy agency activities that the ISO supports, and provide an additional opportunity for preferred resources to address transmission needs.

The ISO's reliance on preferred resources to address specific reliability needs has been summarized in section 8.3 of the transmission plan, in addition to being discussed throughout the plan on an area-by-area study basis. The ISO has identified two previously approved transmission projects that can be wholly or largely replaced by appropriately

procured and sited battery storage. The ISO is also continuing to work with local utilities to fine-tune preferred resource requirements identified in earlier transmission plans, including battery storage, which in conjunction with conventional transmission upgrades will meet reliability needs in several areas – Moorpark and Oakland in particular.

Collaborative planning efforts

The ISO, utilities, the California Energy Commission, the California Public Utilities Commission and other stakeholders worked closely together to ensure alignment of key planning assumptions within the three core planning processes, in particular a single “managed” load forecast, and to assess how to meet the environmental goals established by state policy.

The three core planning processes are the:

- Long-term forecast of energy demand produced by the CEC as part of its biennial Integrated Energy Policy Report (IEPR),
- Biennial integrated resource plan proceedings (IRP) conducted by the CPUC, and
- Annual transmission planning process (TPP) performed by the ISO.

The results of the CPUC’s annual process feeding into this 2020-2021 transmission planning process were communicated via a decision in the CPUC’s Integrated Resource Plan Process.¹ These assumptions were further vetted by stakeholders through the stakeholder process in developing the 2020-2021 study plan.

KEY FINDINGS

Our comprehensive evaluation of the areas listed above is discussed in the following sections.

Reliability-driven transmission projects

Three reliability-driven transmission projects were identified as needed in this planning cycle to ensure compliance with NERC and ISO planning standards, representing an investment of less than \$5 million in infrastructure additions to the ISO-controlled grid. All of the projects are located in the PG&E service territory. Through the 2020-2021 transmission planning process, ISO Management approved the three projects, each under \$50 million dollars, with an estimated total cost of less than \$5 million. None of the projects are eligible for competitive solicitation.

The ISO has also identified two previously-approved transmission projects that can be wholly or largely replaced by appropriately procured and sited battery storage.

In arriving at these projects, the ISO and transmission owners performed power system studies to measure system performance against the NERC reliability standards and ISO planning standards, as well as to identify reliability concerns that included, among other things, facility overloads and voltage excursions. The ISO then evaluated mitigation measures and identified cost-effective solutions.

The reliability assessment also identified three previously-approved projects to be on hold pending reassessment in future cycles.

Transmission elements supporting renewable energy goals

The CPUC and CEC provided policy direction to the ISO regarding renewable generation portfolios for 2020-2021 policy-driven transmission planning purposes via the CPUC decision.¹ The CPUC communicated a base portfolio based on its “42 MMT scenario” that results in approximately a 60 percent RPS, and sensitivity portfolios for policy-driven planning efforts.

The ISO has accordingly performed policy-driven study assessments of the 42 MMT scenario and did not identify any new Category 1 policy-driven transmission needs. The ISO is not recommending any new transmission solutions at this time for policy purposes.

Elements of 2020-2021 ISO Transmission Plan Supporting 60 Percent Renewable Energy Goals

Transmission Facility	In-Service Date
<i>Transmission Facilities Approved, Permitted and Under Construction</i>	
West of Devers Reconductoring	2021
Lugo – Eldorado series cap and terminal equipment upgrade	2022
Lugo-Mohave series capacitors	2022
Wilson-Le Grand 115 kV line reconductoring	2022

¹ <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M331/K772/331772681.PDF>

<i>Additional Major Network Transmission Identified as Needed in CAISO Interconnection Agreements but not Permitted</i>	
None at this time	
<i>Policy-Driven Transmission Elements Approved but not Permitted</i>	
Warnerville-Bellota 230 kV line reconductoring	2023
<i>Additional Policy-Driven Transmission Elements Recommend for Approval</i>	
None identified in 2019-2020 Transmission Plan	

Economically-driven transmission projects

The objective of the ISO’s economic studies is to identify transmission congestion and analyze if the congestion can be cost-effectively mitigated by network upgrades. Generally speaking, transmission congestion increases consumer costs because it prevents lower-priced electricity from serving load. Resolving congestion bottlenecks is cost-effective when projected ratepayer savings are greater than the cost of the project. In such cases, the transmission upgrade can be justified as an economic project. Further, the ISO’s tariff and Transmission Economic Assessment Methodology enables review of other economic benefits, including the reduction of local capacity costs, as a consideration in assessing the benefits of potential transmission upgrades.

In the economic planning analysis performed as part of this transmission planning cycle in accordance with the unified planning assumptions and study plan, approved reliability and policy network upgrades and those recommended for approval in this plan were modeled in the economic planning database. This ensured that the results of the analysis would be based on a transmission configuration consistent with the reliability and public policy results documented in this year’s transmission plan.

Beyond screening congestion results to select key focus areas for detailed economic studies, the ISO:

- Received a number of economic study requests, which included projects that would more reasonably be categorized as interregional transmission projects;
- Received several proposed reliability projects that cited material economic benefits;

- Continued the expanded 10-year local capacity technical study, as initiated in the 2018-2019 planning cycle, examining not only the need and the characteristics of the need but alternatives to reduce local gas-fired generation capacity requirements, and selected a subset of local capacity areas for detailed economic analysis where options appeared potentially viable. The study also identified the characteristics and capability of storage in local capacity areas to satisfy the local capacity requirements.

The ISO's studies were impacted by certain conditions existing in this planning cycle:

- The longer-term requirements for gas-fired generation for system and flexible capacity requirements continues to be examined, both in the CPUC integrated resource planning process as well as in the ISO's studies – studies conducted outside of the annual transmission planning process for purposes of supporting CPUC efforts. As no actionable direction has yet been set regarding the future of the existing gas-fired generation fleet beyond known retirements, the uncertainty necessitated taking a conservative approach in this planning cycle in assigning a value to upgrades potentially reducing local gas-fired generation capacity requirements;
- A number of project sponsors requesting economic studies proposed projects that were proposed and considered in previous transmission planning cycles.

While the ISO tariff allows the ISO to limit the number of economic evaluations to five, the ISO studied proposals in 12 study areas in this year's planning cycle.

In summary, no new projects were found to be needed as economic-driven projects in the 2020-2021 planning cycle.

Interregional Transmission Coordination Process

The ISO's 2020-2021 (annual 15-month process) transmission planning cycle marked the beginning of the third biennial cycle since these coordination processes were put in place addressing the interregional requirements of FERC Order No. 1000.

Four interregional transmission projects were submitted to the ISO in this "intake" year for new interregional transmission projects to be proposed. Following the submission and successful screening of the Interregional transmission project submittals, the ISO coordinated its Interregional transmission project evaluations with the other relevant planning regions; NorthernGrid and WestConnect. None of the projects were selected through the interregional coordination process with the ISO's neighboring planning regions for further review in the second year of the biennial process.

Informational Studies

As in past transmission planning cycles, the ISO undertook additional informational studies to help inform future transmission planning or resource procurement processes. The ISO has identified the need to perform a number of these studies on an ongoing basis, at least for the foreseeable future, and has therefore documented these studies in the “other studies” in chapter 6, instead of categorizing them as “special studies.” Noteworthy changes are set out below.

- **Frequency Response and Dynamic System Modeling.** Consistent with the 2019-2020 transmission planning cycle, the ISO undertook frequency response studies and reported on associated modeling improvement efforts as an ongoing study process inside the annual planning cycle despite not being a tariff-based obligation. Within this cycle, the ISO has also examined the benefits of potential modifications to frequency response settings for grid-connected inverter-based resources.
- **Reliance on Gas-fired Generation in Local Capacity Areas.** The ISO conducted additional analysis of local capacity requirements in local capacity areas expanding on the analysis conducted in the 2018-2019 and 2019-2020 transmission planning cycles, to help inform resource planning issues. The 10-Year Local Capacity Study conducted as part of the 2020-2021 planning cycle was expanded to include detailed information regarding the characteristics of the local capacity area needs that are the basis for assessing non-transmission and preferred resource solutions. Second, transmission or other hybrid alternatives were developed for half of the area and sub-area needs, selected on a prioritized basis. These first two steps were considered to be of use in future resource procurement processes. Third, a subset of those areas and sub-areas were fed into the ISO’s economic study process to assess the viability of moving forward with some level of local capacity requirement reduction on the economic basis used to assess transmission development. The study also identified the characteristics and capability of storage in local capacity areas to satisfy the requirements.
- **Flexible Capacity Deliverability Requirements.** The ISO developed a methodology and tested the deliverability of flexible capacity in the 2019-2020 transmission planning cycle, recognizing that the tests applied to ensure deliverability of system capacity may not reflect the conditions and limitations that could constrain the ability of flexible capacity resources to provide ramping when most needed.

The flexible deliverability test relies on the deliverability assessment and adds new tests to address scenarios not already covered in the deliverability assessment. A

testing procedure was developed to monitor the generation pockets for flexible deliverability. However, no study and requirements will be proposed to be considered for enforcement on new generators in the generation interconnection study procedure until 1) it becomes clear how the flexible capacity will be counted, especially for the wind and solar capacity through the Flexible Resource Adequacy Criteria and Must Offer Obligation – Phase 2 (FRACMOO2) or follow-up initiative, 2) the revised on-peak and off-peak deliverability methodologies are approved and adopted, and 3) the transmission planning process analysis identifies flexible deliverability constraints. The assessment did not identify any flexible deliverability concerns. However, future work is needed to improve the assessment methodology.

STAKEHOLDER FEEDBACK

Stakeholders have provided feedback on the draft ISO 2020-2021 transmission plan that was released on February 1, 2021, and presented at a stakeholder meeting on February 9, 2021. The ISO has reviewed all of the stakeholder comments carefully, and has concluded that the recommendations made in the transmission plan are appropriate. The more significant stakeholder concerns, and our response to those concerns, are summarized below.

- **General support for the transmission plan** – Stakeholders generally provided complimentary feedback on the transmission plan itself and the scope of the ISO’s analysis, and in particular, the additional analysis conducted to extend the scope of the 10-year Local Capacity Technical Study.

ISO response: The ISO appreciated the positive feedback, has reviewed all of the stakeholder comments carefully, and has concluded that the recommendations made in the transmission plan are appropriate.

- **Dissatisfaction with CPUC-coordinated study assumptions** – A number of stakeholder comments expressed dissatisfaction with the transmission plan study assumptions, particularly concern with CPUC portfolios including “energy only” resources instead of requiring all additional renewable generation to achieve full capacity deliverability status.

ISO response: The ISO does not believe it would be reasonable or practical to act contrary to the coordinated efforts with the CPUC and CEC. The ISO has shared these concerns with CPUC staff, and encourages stakeholders to raise their concerns within the CPUC’s Integrated Resource Planning proceedings, where they may be addressed more appropriately.

- ***Further consideration of alternatives submitted*** – A number of stakeholder comments expressed concerns that further consideration of alternatives submitted should have further consideration for approval in this year’s planning cycle.

ISO response: The ISO appreciated the alternatives submitted by stakeholders to address identified needs in the planning cycle, has reviewed all of the stakeholder comments carefully, and has concluded that the recommendations made in the transmission plan are appropriate.

- ***Concerns with reliance on remedial action schemes in lieu of transmission upgrades*** – Stakeholder comments expressed concerns with the continued growth of and reliance on remedial action schemes to address reliability constraints instead of recommending transmission upgrades.

ISO response: The ISO applies the current ISO planning standards which includes guidelines for the application of remedial action schemes when considering mitigation for the reliability constraints. Furthermore, the ISO is initiating a review of the remedial action scheme guidelines in the ISO planning standards in 2021.

CONCLUSION

The 2020-2021 ISO transmission plan provides a comprehensive evaluation of the ISO’s transmission grid to identify upgrades needed to adequately meet California’s policy goals, address grid reliability requirements and bring economic benefits to consumers. This year’s plan identified three transmission projects, having an estimated cost of less than \$5 million, as needed to maintain the reliability of the ISO’s transmission system and provide for the economic operation of the grid. Through the 2020-2021 transmission process, ISO management approved the three projects, each under \$50 million dollars, with an estimated total cost less than \$5 million. The ISO has also identified two previously approved transmission projects that can be wholly or largely replaced by appropriately procured and sited battery storage. Further, the plan has identified three previously approved projects to be on hold requiring further review.

Based on the findings that the transmission solutions listed above are the most cost-effective, feasible solutions for meeting the identified transmission needs in the ISO’s system, Management recommends that the Board approve the attached ISO 2020-2021 transmission plan.