

# Memorandum

**To:** ISO Board of Governors

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

**Date:** March 9, 2022

**Re:** **Decision on the ISO's 2021-2022 transmission plan**

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***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 2021-2022 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's approval of the ISO transmission plan for the 2021-2022 planning cycle, included as Attachment A.

The need for new generation over the next 10 ten years has escalated rapidly, driving an accelerated pace for new transmission development in this and future planning cycles. The 2020-2021 transmission plan was based on a requirement to add approximately 1,000 MW of new resources per year over the 10-year planning horizon, and next year's plan is expected to be based on over 4,000 MW of new resources per year. This year's 2021-2022 transmission plan is based on an intermediate level of approximately 2,700 MW of new resources per year, and it demonstrates a material step forward in meeting the emerging challenges facing the grid, while recognizing that growth will also be needed in future plans.

The combination of dramatically increasing the pace of renewable generation and load forecast growth are driving an increase in transmission requirements. The ISO found the need for 23 projects totaling \$2.964 billion, compared to the average over the last five years of \$217 million. The projects developed in this year's planning cycle represent a transition to expected additional growth in requirements in next year's transmission planning process

providing: reliability, access to renewable generation needed to meet state goals, and effective economic benefits into the future.

Reliability projects driven by load growth and evolving grid conditions as the generation fleet transitions to increased renewable generation represent 16 projects totaling \$1.412 billion. Most notable are two HVDC projects in the San Francisco South Bay region, primarily serving the San Jose-Silicon Valley Power area and the rebuild of the SCE Antelope 66 kV switchyard to mitigate anticipated increased in local fault current levels.

The ISO found the need for 6 policy-driven transmission projects totaling \$1.512 billion to meet the renewable generation requirements established in the CPUC developed renewable generation portfolios. The ISO also drew on other supporting information and comments to advance several low-risk projects to smooth out development activity expected to grow in next year's transmission planning process. The most notable are a substantial reinforcement project in the GridLiance/Valley Electric System service territory, a new 500/230 kV substation (Manning) proposed to access Westlands renewable generation, and a new 500/230 kV substation (Collinsville) in the East Bay area creating access for wind resources.

The ISO conducted several economic studies; the bulk of these helped support the need for the reliability-driven and policy-driven projects referred to above. One additional economic-driven project was found to be needed – a series reactor installation with a capital cost of \$40 million.

Other key findings and conclusions from the 2021-2022 transmission plan include:

- The ISO explored the implications of out-of-state transmission needed to bring the capacity in the portfolios of the base case and sensitivity to the ISO boundary for information purposes.
- Comparing the various alternatives for information purposes became more complex as some of the potential development alternatives are being proposed on the basis of receiving regulated, cost-of-service cost recovery as a participating transmission owner asset, while others are being developed on a subscriber basis, without the need for ISO transmission plan approval, to provide transmission service to resources seeking access to California markets. The different cost and cost recovery mechanisms make direct comparisons of benefits, need satisfaction, and benefit-to-cost ratios more challenging. The ISO therefore intends to engage further with industry participants to gauge interest in accessing out-of-state resources. This process will require more time and is not included in the 2021-2022 Transmission Plan for approval at this time. The ISO will consider this as an extension of the 2021-

2022 transmission planning cycle, rather than shifting it to the next 2022-2023 planning cycle. Any recommendations resulting from this effort will be considered for approval as an extension of this 2021-2022 Transmission Plan. The ISO expects this effort to take the form of an open season-type process to assess the market interest and level of competition that exists for accessing the out-of-state resources in support of the project.

This transmission plan was developed after extensive stakeholder engagement. We communicated preliminary results through stakeholder presentations on September 27 and 28, and on November 18, 2021. The ISO released a draft plan on January 31, 2022, and presented it to stakeholders on February 7, 2022. Based on stakeholder comments received, we conducted additional review and made further revisions, culminating in the revised draft ISO 2021-2022 transmission plan.

Management proposes the following motion:

***Moved, that the ISO Board of Governors approves the ISO 2021-2022 transmission plan attached to the memorandum dated March 9, 2022.***

## 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 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 2021-2022 transmission planning process were communicated via a decision in the CPUC’s Integrated Resource Plan Process. These assumptions were further vetted by stakeholders through the stakeholder process in developing the 2021-2022 transmission planning process study plan.

As in the past, the ISO has continued to explore with stakeholders cost-effective solutions to meeting long term needs and will continue to do so in the future.

## **KEY FINDINGS**

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

### ***Reliability-driven transmission projects***

Reliability projects driven by load growth and evolving grid conditions as the generation fleet transitions to increased renewable generation represent 16 projects totaling \$1,412 million. Most notable are two HVDC projects in the San Francisco South Bay region, primarily serving the San Jose-Silicon Valley Power area and the rebuild of the SCE Antelope 66 kV switchyard to mitigate the anticipated increase in local fault current levels.

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 two 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 2021-2022 policy-driven transmission planning purposes via the CPUC decision.<sup>1</sup> 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 found the need for 6 policy-driven transmission projects totaling \$1,512 million to meet the renewable generation requirements established in the CPUC developed renewable generation portfolios. The ISO also drew on other supporting information and comments to advance several low-risk projects to smooth out development activity expected to grow in next year’s transmission planning process. The most notable are a substantial reinforcement project in the GridLiance/Valley Electric System service territory, a new 500/230 kV substation (Manning) proposed to access Westlands renewable generation, and a new 500/230 kV substation (Collinsville) in the East Bay area creating access for wind resources.

### **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

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<sup>1</sup> <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M366/K426/366426300.PDF>

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.

The ISO conducted several economic studies; the bulk of these helped support the need for the reliability-driven and policy-driven projects referred to above. One additional economic-driven project was found to be needed -- a series reactor installation with a capital cost of \$20 million.

The ISO explored the implications of out-of-state transmission needed to bring the capacity in the portfolios of the base case and sensitivity to the ISO boundary for information purposes.

- Comparing the various alternatives for information purposes became more complex as some of the potential development alternatives are being proposed on the basis of receiving regulated, cost-of-service cost recovery as a participating transmission owner asset, while others are being developed on a subscriber basis, without the need for ISO transmission plan approval, to provide transmission service to resources seeking access to California markets. The different cost and cost recovery mechanisms make direct comparisons of benefits, need satisfaction, and benefit-to-cost ratios more challenging. The ISO therefore intends to engage further with industry participants to gauge interest in accessing out-of-state resources. This process will require more time and is not included in the 2021-2022 Transmission Plan for approval at this time. The ISO will consider this as an extension of the 2021-2022 transmission planning cycle, rather than shifting it to the next 2022-2023 planning cycle. Any recommendations resulting from this effort will be considered for approval as an extension of this 2021-2022 Transmission Plan. The ISO expects this effort to take the form of an open season-type process to assess the market interest and level of competition that exists for accessing the out-of-state resources in support of the project.



## Interregional Transmission Coordination Process

The ISO's 2021-2022 (annual 15-month process) transmission planning cycle marked the end 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 in the 2020-2021 transmission planning process 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 within the 2021-2022 transmission planning cycle.

## 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.

- **Wildfire Impact Assessment.** The ISO, as part of this planning cycle, conducted studies to assess the impact of various Public Safety Power Shutoff (PSPS) scenarios in the SCE and SDG&E area. The ISO conducted studies to assess the potential risks of de-energizing ISO-controlled facilities in the High Fire Risk Areas (HFRA) for SCE and SDG&E, should it become necessary for PSPS or wildfire events and potentially develop mitigation options to alleviate impacts. The ISO also updated the assessment of PSPS events in the North Coast and North Bay area of the PG&E system that were undertaken in the 2020-2021 transmission planning process. The ISO identified no opportunities for transmission projects to reasonably mitigate the impacts of PSPS events. The ISO will continue to coordinate with PG&E, SCE and SDG&E to evaluate mitigation options within the utilities' wildfire mitigation plans to be able to exclude the high-impact facilities identified from the future PSPS events and continue to assess the need for the similar assessment in other parts of the system in future planning cycles.



- **Frequency Response and Dynamic System Modeling.** Consistent with the 2018-2019 and 2019-2020 transmission planning cycles, 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.

## STAKEHOLDER FEEDBACK

Stakeholders have provided feedback on the draft ISO 2021-2022 transmission plan that was released on January 31, 2022, and presented at a stakeholder meeting on February 7, 2022. 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 concerning the 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. In particular, Public Advocates Office and the BA Area Municipal Transmission group (BAMx) expressed concern with the impact on the Transmission Access Charge as

a result of the recommended projects and consideration of the near-term solutions at lower costs should be pursued.

**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. In assessing the recommended projects, consideration is given to addressing the near-term need as well as effectively and efficiently meeting the longer-term needs in the areas.

- ***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 continuing to review the remedial action scheme guidelines in the ISO planning standards in 2022.

**In response to some comments about costs, we need to state:** “As in the past, the ISO has continued to explore with stakeholders cost-effective solutions to meeting long term needs and the ISO will continue to do so in the future. In each year’s transmission plan, the ISO provides an estimate of the impact on future regional (high voltage) transmission access rates of the ISO-approved transmission projects. In this analysis, the ISO noted that the high voltage transmission access charge for January 1, 2022, has increased by \$2.70 from last year’s projection for January 1, 2022. This reflected the increase in utility operating costs and capital maintenance costs above the historical average estimated projections for those non-ISO-approved costs used in the ISO model and vetted with the transmission owners.

## CONCLUSION

The 2021-2022 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. The combination of dramatically increasing the pace of renewable generation and load forecast growth are driving an increase in transmission requirements. The ISO found the need for

23 projects totaling \$2.964 billion, compared to the average over the last five years of \$217 million. The projects developed in this year's planning cycle represent a transition to expected additional growth in requirements in next year's transmission planning process, providing reliability, access to renewable generation needed to meet state goals, and providing effective economic benefits into the future. Further, the plan has identified two 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 2021-2022 transmission plan.

The ISO therefore intends to engage further with industry participants to gauge interest in accessing out-of-state resources. This process will require more time and is not included in the 2021-2022 Transmission Plan for approval at this time. The ISO will consider this as an extension of the 2021-2022 transmission planning cycle, rather than shifting it to the next 2022-2023 planning cycle. Any recommendations resulting from this effort will be considered for approval as an extension of this 2021-2022 Transmission Plan. The ISO expects this effort to take the form of an open season-type process to assess the market interest and level of competition that exists for accessing the out-of-state resources in support of the project.