Transmission Expansion for Delivering Renewable Energy

Transmission expansion plays a vital role in enabling the interconnection and deliverability of renewable energy to meet the state's Renewables Portfolio Standard (RPS). Advancing renewable energy is a central part of the state's efforts to achieve Governor Edmund G. Brown Jr.'s Executive Order B-30-15,[1] establishing a statewide goal to reduce greenhouse gas (GHG) emissions 40 percent below 1990 levels by 2030. This economy-wide target was codified by Senate Bill 32 (Pavley, Chapter 249, Statutes of 2016).

The Clean Energy and Pollution Reduction Act of 2015, Senate Bill 350 (De León, Chapter 547, Statutes of 2015), requires large publicly owned utilities (POUs) and all load-serving entities under the jurisdiction of the California Public Utilities Commission (CPUC) to file integrated resource plans (IRPs) with the California Energy Commission and CPUC, respectively. Through their IRPs, filing entities will demonstrate how they will meet the electricity sector's share of the 2030 GHG reduction target and other goals, including achieving 50 percent RPS and ensuring reliability. Going forward, the system information developed in the IRPs will be used in transmission planning.

Transmission Planning Process

The California Independent System Operator (California ISO) conducts its transmission planning process (TPP) annually to identify system upgrades needed to meet grid reliability requirements, projects that could bring economic benefits to consumers, and projects needed for policy reasons, such as to meet California's 33 percent renewables target by 2020.[2, 3] The POUs in other California balancing authorities prepare generation and transmission plans that are approved by their governing boards.

In its last three transmission planning cycles (2015-2016, 2016-2017 and 2017-2018), the California ISO did not identify new projects necessary to meet California's 33 percent RPS, as many previously identified projects have been approved or are in the permitting process. Future California ISO TPP cycles will focus on moving beyond the 33 percent framework when new generation portfolios are developed under the resource planning processes. The next target set by SB 350 is achieving 50 percent of electricity sales from eligible renewable resources by 2030.

1 Executive Order B-30-15, http://gov.ca.gov/news.php?id=18938.

2 Information about the TPP and the board-approved *2017-2018 ISO Transmission Plan*: http://www.caiso.com/planning/Pages/TransmissionPlanning/2017-2018TransmissionPlanningProcess.aspx.

3 In compliance with the Federal Energy Regulatory Commission (FERC) Order 1000, the California ISO revised its transmission planning process to consider policy requirements as a potential driver for transmission facilities and to ensure access for all potential developers to compete for opportunities to build new transmission facilities for reliability, policy, or economic reasons.

Regulatory Process to Approve Transmission

The first step in the regulatory process to develop a new transmission project is an approval based on a finding of need by the California ISO in its annual TPP, or by another balancing authority in a similar planning process. For projects sponsored by IOUs, the CPUC next considers the California ISO's approved projects and reviews them for California Environmental Quality Act (CEQA) compliance. The CPUC issues certificates of public convenience and necessity (CPCNs) for transmission lines at 200 kilovolts (kV) and above or permits to construct (PTC) for projects between 50 kV and 200 kV. The CPUC issues a notice of exempt construction (NOC) for the replacement of existing transmission lines, which are exempt from CPUC CEQA review under CPUC General Order 131-D, Section III, Subsections A or B.1. For a project sponsored by a POU, the POU board of directors can act as CEQA lead agency.

Planning for the Timely Shutdown of Aliso Canyon Natural Gas Storage Facility

On February 15, 2018, the CPUC and Energy Commission issued a joint letter to the California ISO requesting the California ISO add a sensitivity case for the 2018-2019 TPP cycle to study options for increasing transfer of low-carbon electricity between the Pacific Northwest and California.[4] The agencies also requested and invited the Los Angeles Department of Water and Power (LADWP) to participate. The study is planning for the timely phaseout of the Aliso Canyon natural gas storage facility within 10 years while maintaining system reliability. The study request specifically highlights the need for considering bulk transmission solutions with a focus on reliability in Southern California in general and the Greater Los Angeles Area in particular.

The letters to the California ISO and LADWP have been well received, generating considerable stakeholder interest. The California ISO has confirmed the importance of the issue by incorporating the matter into the study plan for the recently launched 2018-2019 TPP. LADWP has pledged resources to the effort. The Bonneville Power Administration and Southern California Edison (SCE) will join staff from California ISO, LADWP, CPUC, and Energy Commission as the core team scoping the study. Discussions have begun in parallel with other parties interested in the Pacific AC intertie system, including the Transmission Agency of Northern California, Sacramento Municipal Utility District, Balancing Area of Northern California, Western Area Power Administration, and the California Municipal Utilities Association.

Approved Transmission Projects

Transmission projects tracked for the potential to support the state's renewable energy goals are a small subset of the reliability, economic, and policy projects approved and assessed by the California ISO in the TPP. The *2017-2018 ISO Transmission Plan* identifies 13 new

4 February 15, 2018, joint letter from Chair Robert B. Weisenmiller (Energy Commission) and President Michael Picker (CPUC) to Chief Executive Officer Steve Berberich (California ISO) on planning the timely phaseout of Aliso Canyon natural gas storage: http://docketpublic.energy.ca.gov/PublicDocuments/18-IEPR-06/TN222908_20180306T160251_021518_Letter_to_CAISO.pdf.

transmission projects needed for reliability and 4 new transmission projects needed for economic purposes. All but one of the newly approved transmission projects are expected to cost less than $50 million (each). One newly approved economic transmission project is expected to cost $50 million. The plan identifies no new transmission projects needed to meet the current transmission planning cycle target for achieving 33 percent RPS by 2020.

The plan identifies 28 previously approved transmission projects costing $50 million or more (each), including 9 lines in progress and 4 lines on hold. The plan identifies 122 previously approved transmission projects costing less than $50 million (each), including 10 lines in progress, 1 line on hold, and 10 lines canceled.

The California ISO-approved transmission projects include new substations and substation upgrades, and the timing for constructing some projects is important for maintaining system reliability in different regions. For example, the Mesa Loop-in Project (Mesa Substation) was approved by the CPUC in February 2017. The California ISO, in testimony before the CPUC, indicated that the Mesa Substation must be operational by the summer of 2020 to allow for the retirement of the once-through cooled (OTC) generators.[5] In a May 2, 2017, filing with the U.S. Securities and Exchange Commission (SEC), SCE indicated that the project would be delayed by six months, from the fall of 2021 to the spring of 2022. SCE's recent annual filing to the SEC, covering the fiscal year ending December 31, 2017, again reported expected Mesa Substation operation beginning in 2022. This delay may affect the scheduled retirement of the Redondo Beach or Alamitos generators. According to the California ISO, the schedule, phasing, and mitigation options are being examined and reviewed in lieu of need for OTC compliance extensions. SCE is evaluating options to accelerate construction.[6] (For more information on OTC, see http://www.energy.ca.gov/renewables/tracking_progress/#otc.)

With the completion of its 2017-2018 TPP cycle, the California ISO has concluded its three-year, in-depth review of previously approved projects. For the third consecutive cycle, the California ISO has canceled a significant number of previously approved transmission projects at significant cost savings.

- In the 2015-2016 TPP, 13 projects were canceled, savings not stated.
- In the 2016-2017 TPP, 13 projects were canceled, savings not stated.
- In the 2017-2018 TPP, 20 projects were canceled, saving at least $2.6 billion.

The 2017-2018 review has been the most comprehensive to date, resulting in cancelations of projects no longer needed and modifications of projects to better match changing expectations about need. The project cancellations and modifications involve mostly smaller projects that

5 Testimony of Robert Sparks on Behalf of the California Independent System Operator Corporation, November 18, 2016, http://www.caiso.com/Documents/Nov18_2016_MesaLoop-inProject_Testimony_RobertSparks_A15-03-003.pdf.

6 Discussion at the May 22, 2017, Joint Agency Workshop on Energy Reliability in Southern California as part of the 2017 Integrated Energy Policy Report proceeding.

were not moving forward. The reassessment was initiated in response to changing peak load forecasts. The California ISO concludes that decreased demand has been compounded by greater-than-expected growth of behind-the-meter solar photovoltaic generation, which has shifted the traditional peak demand hour later in the day in some parts of the state.

The California ISO and other entities have identified and approved many transmission projects that have the potential to support the interconnection of renewable generation. The 21 transmission projects on **Table 1** and **Figure 1** below are the subset of projects approved by the California ISO or other balancing authorities that Energy Commission staff has tracked due to the potential of these projects to expand the state's capabilities to integrate and deliver renewable energy. Some of these projects have been completed, canceled, or put on hold, as indicated by the status fields.

Table 1: Status of California ISO-Approved and Other California Transmission Projects

Transmission Project	California ISO Status[1]	CPUC Status	Construction Status	Actual and Expected In-Service Date
1 – Sunrise Powerlink 500 kV line	Approved	CPCN Approved	Operational	2012
14 – Imperial Valley-Liebert (formerly Collector) 230 kV line[2]	Approved Policy	N/A	N/A	N/A
15 – Sycamore Canyon-Peñasquitos 230 kV Line	Approved Policy with Reliability Benefits	CPCN Approved[3]	Planning/Design	2018
2 – Tehachapi 500 kV line	Approved	CPCN Approved	Operational[4]	2016
3 – Colorado River-Valley 500 kV line	Approved	CPCN and PTC Approved	Operational	2013
4 – West of Devers 230 kV Reconductoring[5]	LGIA	CPCN Approved	Under Construction[6]	2022
5 – Eldorado-Ivanpah 230 kV line	LGIA	CPCN Approved	Operational	2013
6 – South of Contra Costa 230 kV Reconductoring	LGIA	CPCN Approved	Operational	2012
7 – Pisgah-Lugo 500 kV line[7]	N/A	N/A	N/A	N/A
8 – Borden-Gregg 230 kV Reconductoring	LGIA	NOC/CPCN TBD	On Hold	Unknown
9 – Carrizo-Midway 230 kV Reconductoring	LGIA	NOC Approved	Operational	2013

Transmission Project	California ISO Status[1]	CPUC Status	Construction Status	Actual and Expected In-Service Date
10 – Cool Water-Lugo 230 kV line[8]	LGIA	N/A	N/A	N/A
11 – Path 42 230 kV Reconductoring	Approved Policy	N/A	Operational	2016
12 – IID: Path 42 230 kV Reconductoring and additional upgrades (Outside CAISO Grid)	N/A	IID/SCE/BLM Joint Final Mitigated Negative Declaration Adopted	Construction suspended[9]	N/A
13 – LADWP: Barren Ridge 230 kV line (Outside CAISO Grid)	N/A	LADWP/U.S. Forest Service/BLM Joint Final EIS/EIR Adopted	Operational	2016
16 – Warnerville-Bellota 230 kV Reconductoring	Approved Policy	NOC Approved	Engineering/ Design	2024
17 – Wilson-Le Grand 115 kV Reconductoring	Approved Policy	NOC Approved	Engineering/ Design	2020
18 – Central Valley Power Connect (formerly Gates-Gregg 230 kV line)	Approved Reliability With Policy Benefits	CPCN to be Filed	On Hold[10]	2022
19 – Ten West Link 500 kV Transmission Line Project (Delaney-Colorado River 500 kV line)	Approved Economic With Reliability and Policy Benefits	CPCN Filed	Competitive Solicitation Process[11]	2020
20 – Harry Allen- Eldorado 500 kV line	Approved Economic With Reliability and Policy Benefits	N/A (line is located entirely in Nevada)	Competitive Solicitation Process[12]	2020
21 – San Luis Transmission Project	N/A	Western/San Luis & Delta-Mendota Water Authority Joint Final EIS/EIR adopted[13]	Engineering/ Design	2022

Source: California Energy Commission – Siting, Transmission and Environmental Protection Division, Transmission Evaluation/ Planning Unit

Table 1 Notes:

1 In 2012, the Federal Energy Regulatory Commission (FERC) approved the California ISO's revised generator interconnection procedures known as the *Generator Interconnection and Deliverability Allocation Procedures (GIDAP)*. Prior to the GIDAP, both the Generator Interconnection Procedures and the TPP identified large-scale network upgrades. With FERC's approval of the GIDAP, the TPP is now the primary vehicle for identifying the large-scale network upgrades associated with the interconnection of renewable generation necessary to achieve the RPS. The Large Generator Interconnection Agreement (LGIA) projects were approved by the California ISO through the Generator Interconnection Procedures before the GIDAP.

2 California ISO selected Imperial Irrigation District (IID) as project sponsor. IID is the lead agency for CEQA since the project resides within IID's service area. On July 8, 2014, the IID Board of Directors adopted the final mitigated negative declaration. The California ISO received notice from IID on November 24, 2015, exercising its right to terminate the approved project sponsor agreement. As the project depended on IID's participation, the project has been cancelled.

3 California ISO selected San Diego Gas & Electric (SDG&E) and Citizens Energy Corporation as project sponsors. On April 7, 2014, SDG&E filed with the CPUC an application for a CPCN and proponent's environmental assessment (PEA).The CPUC released the draft environmental impact report (EIR) September 17, 2015, and the final EIR on March 7, 2016. On October 13, 2016, the CPUC granted a CPCN for the project.

4 On July 11, 2013, the CPUC ordered SCE to underground a portion of transmission lines in Chino Hills. In August 2014, SCE began underground trenching and cable installation with completion slated for 2016. On October 31, 2014, the City of Ontario filed a petition to stop the construction of the overhead lines through Ontario and install them underground instead. On March 6, 2015, the CPUC-assigned administrative law judge (ALJ) issued a proposed decision denying the City of Ontario's petition. On May 7, 2015, the CPUC Commissioners, without the concurrence of President Michael Picker, approved the ALJ proposed decision. On May 15, 2015, President Picker mailed his concurrence approving the ALJ proposed decision. The Tehachapi 500 kV line began operation in the fourth quarter of 2016.

5 Reconductoring a transmission line means replacing the conductor (wire or cable) with new conductor, usually to enhance the electric capacity of the line.

6 On October 25, 2013, SCE filed an application for a CPCN and PEA with the CPUC. On August 18, 2016, the CPUC granted a CPCN for the project. On December 27, 2016, the U.S. Bureau of Land Management (BLM) issued its record of decision approving the project. Construction on the West of Devers Upgrade Project began October 2, 2017.

7 SCE's Pisgah-Lugo project was identified by the California ISO as being needed for the interconnection of the 850 MW K Road Calico Solar Project. On June 20, 2013, K Road, LLC filed a request with the Energy Commission to terminate the Calico Solar Project. At this time, the Pisgah-Lugo project is not moving forward.

8 On August 28, 2013, SCE filed an application for a CPCN and PEA with the CPUC and BLM. On October 24, 2014, NRG notified the CPUC of its intent to shut down the Coolwater Generating Station on January 1, 2015. On March 17, 2015, the California ISO submitted supplemental comments with the CPUC stating that the Coolwater-Lugo project is no longer needed to interconnect Mojave Solar with full capacity deliverability status. On April 20, 2015, the CPUC-assigned ALJ issued a proposed decision to dismiss SCE's CPCN application (A.13-08-023) without prejudice, or without any loss of rights or privileges. The significant material changes in grid conditions on SCE's application for a CPCN for the Coolwater-Lugo project necessitated this action. On May 21, 2015, the CPUC Commissioners approved the ALJ proposed decision. SCE's application was closed.

9 IID notified the California ISO of its intent to suspend its portion of the Path 42 upgrades (Imperial Valley-Dixieland 230 kV line and the S Line 230 kV transmission line project) in its response to comments from the September 21-22, 2015, California ISO 2015-2016 Transmission Planning Process stakeholder meeting. The California ISO approved in the *2017-2018 ISO Transmission Plan* the El Centro-Imperial Valley segment of this project, known as the S- Line, as a new stand-alone project that will likely be sponsored and owned by SDG&E.

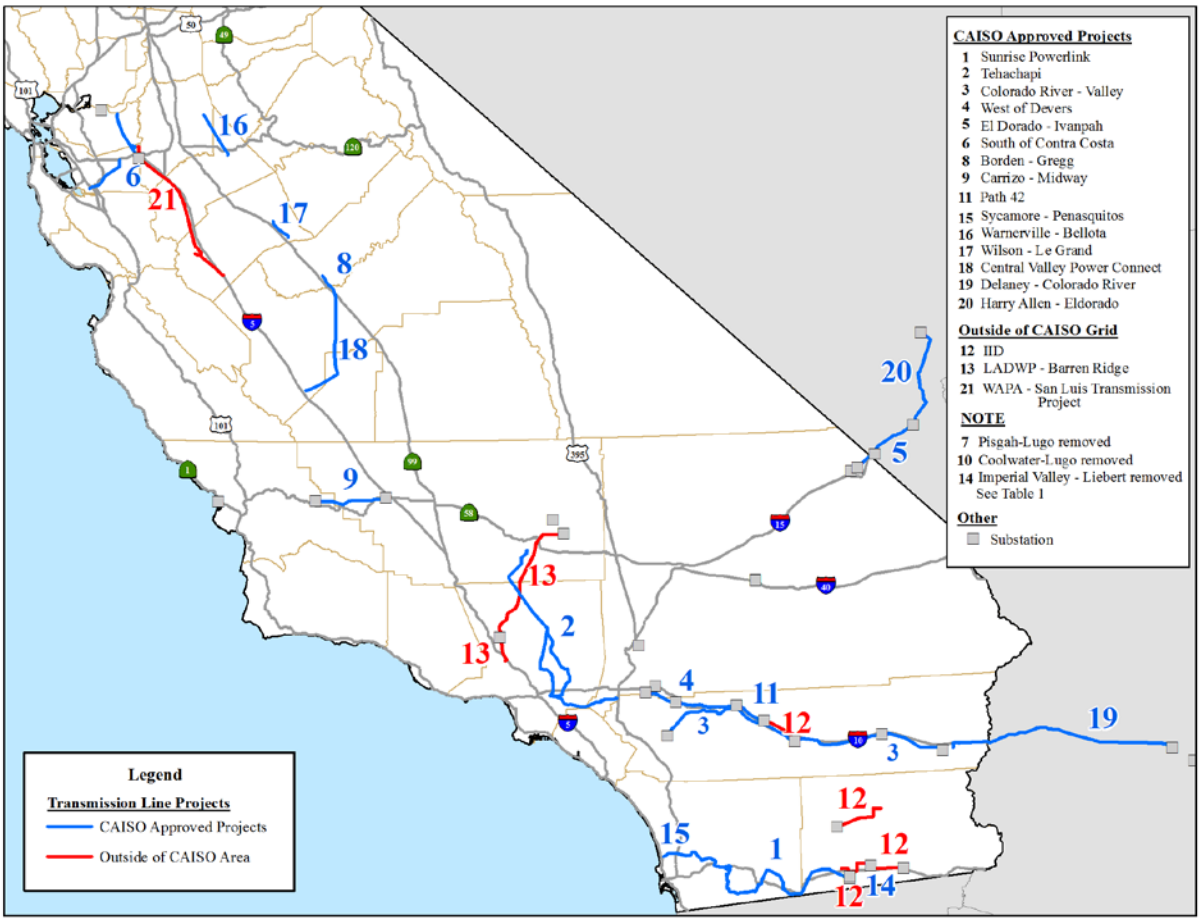
10 The Gates-Gregg project was approved in the 2012-2013 TPP and later put on hold during the 2016-2017 TPP. The *2017-2018 ISO Transmission Plan* states the project will remain on hold, and a detailed renewable integration assessment will be conducted in the 2018-2019 TPP.

11 On July 10, 2015, the California ISO selected DCR Transmission, LLC as the project sponsor.

12 On January 11, 2016, the California ISO selected DesertLink LLC as the project sponsor.

13 On May 9, 2016, the Western Area Power Administration (Western) issued its record of decision to construct, operate, and maintain the transmission line and other project components within the corridors identified as the "agency preferred alternative" in the final EIS/EIR. Western is the federal lead agency under NEPA, while the San Luis & Delta-Mendota Water Authority is the lead agency under CEQA.

Figure 1: Map of California ISO and Outside California ISO Grid-Approved Transmission Projects



Source: California Energy Commission – Siting, Transmission and Environmental Protection Division, Cartography Unit

Additional References:

For more information on the California ISO 2017-2018 Transmission Planning Process and Plan: https://www.caiso.com/planning/Pages/TransmissionPlanning/2017-2018TransmissionPlanningProcess.aspx.

For more information on the California ISO 2018-2019 Transmission Planning Process: https://www.caiso.com/planning/Pages/TransmissionPlanning/2018-2019TransmissionPlanningProcess.aspx.

For more information on the California Public Utilities Commission's permitting process: http://www.cpuc.ca.gov/CEQA

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