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 Brown'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 economywide 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 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

A core function of transmission planning is developing the transmission system to meet the RPS mandate. 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.

The California ISO's 2015–2016 and 2016–2017 planning cycles 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 planning cycles will focus on moving beyond the 33 percent framework.

Renewable Energy Transmission Initiative 2.0

The Energy Commission conducts strategic transmission planning and corridor designation[4] in coordination with the California ISO, other California balancing authorities,[5] CPUC, federal agencies, and the Western Electricity Coordinating Council.

---

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

2 Information about the TPP and the Board-approved *2016-2017 ISO Transmission Plan*: https://www.caiso.com/planning/Pages/TransmissionPlanning/2016-2017TransmissionPlanningProcess.aspx.

3 In compliance with the 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.

4 For information about Energy Commission transmission corridor designation: http://www.energy.ca.gov/sb1059/ .

To simplify the long-range transmission planning, interagency coordination, and stakeholder engagement necessary to support California's 2030 climate and renewable energy goals, the California Natural Resources Agency, Energy Commission, CPUC, California ISO, and U.S. Bureau of Land Management California Office convened the Renewable Energy Transmission Initiative (RETI) 2.0 in September 2015.[6] RETI 2.0 promoted a proactive, statewide, nonregulatory planning forum intended to identify the constraints and opportunities for new transmission to access and integrate new renewable resources. RETI 2.0 developed insights, scenarios, and recommendations through open and transparent participation from tribal and local governments, public power entities, other western states, regional energy planning bodies, and energy, environmental, and agricultural stakeholders.

RETI 2.0 concluded with the posting of the *Final Plenary Report* and three supporting technical reports. The Transmission Technical Input Group (TTIG) released the *RETI 2.0 Transmission Capability and Requirements Final Report* on October 24, 2016.[7] The Environmental and Land Use Technical Group released the *Environmental and Land Use Information to Support the RETI 2.0 Process Final Report* on November 9, 2016.[8] Energy Strategies LLC, under contract with the Western Interstate Energy Board, released *Western Outreach Project Report* on October 28, 2016.[9] The RETI 2.0 Plenary Group released the *RETI 2.0 Public Review Draft Plenary Report* on December 16, 2016,[10] and the *RETI 2.0 Final Plenary Report* on February 23, 2017.[11]

The RETI 2.0 process examined the emerging transmission implications of accessing a diverse and balanced renewable energy portfolio and the transmission system needed to accommodate a future electricity system based predominately on renewable energy. RETI 2.0 assessed long-term, large-scale development scenarios in individual areas to test the capability of the system and identify potentially major new transmission needs. Several potential transmission

5 Eight balancing authorities serve loads in California: the Balancing Authority of Northern California (BANC), California ISO, Imperial Irrigation District (IID), Los Angeles Department of Water and Power (LADWP), Pacific-Corp West, Sierra Pacific Power (SPP), Turlock Irrigation District (TID), and Western Area Lower Colorado (WALC).

6 RETI 2.0 homepage: http://www.energy.ca.gov/reti/.

7 RETI 2.0 TTIG, *Transmission Capability and Requirements Final Report*, October 24, 2016: http://docketpublic.energy.ca.gov/PublicDocuments/15-RETI-02/TN214168_20161025T091645_Transmission_Capability_and_Requirements_Report.pdf.

8 RETI 2.0 Environmental and Land Use Technical Group, *Environmental and Land Use Information to Support the RETI 2.0 Process Final Report*, November 9, 2016: http://docketpublic.energy.ca.gov/PublicDocuments/15-RETI-02/TN214445_20161109T100524_Environmental_and_Land_Use_Information_to_Support_the_Renewable.pdf.

9 RETI 2.0 *Western Outreach Project Report*, October 28, 2016: http://docketpublic.energy.ca.gov/PublicDocuments/15-RETI-02/TN214339_20161102T083330_RETI_20_Western_Outreach_Project_Report.pdf.

10 RETI 2.0 Plenary Group, *Public Review Draft Plenary Report*, December 16, 2016: http://docketpublic.energy.ca.gov/PublicDocuments/15-RETI-02/TN214835_20161216T110654_Renewable_Energy_Transmission_Initiative_20.pdf.

11 RETI 2.0 Plenary Group, *Final Plenary Report*, February 23, 2017: http://docketpublic.energy.ca.gov/PublicDocuments/15-RETI-02/TN216198_20170223T095548_RETI_20_Final_Plenary_Report.pdf.

constraints were identified in California and along the major import-export paths that could limit the delivery of additional renewable energy. A number of conceptual options were considered to mitigate these constraints, including new transmission, advanced technologies, non-wire alternatives, and operational efficiencies.

For example, conversion of the N. Gila-Miguel 500 kV line from alternating current to direct current (also referred to as the Renewable Energy Express) was identified as a conceptual mitigation measure that could increase import capability into the San Diego area. For another example, the Colusa Sutter 500 kV transmission line (CoSu) was identified as a proposed project to provide Sacramento Municipal Utility District with full access to its current rights on the California Oregon Transmission Project (COTP), which it currently cannot fully utilize. The project would connect the COTP to a new 500/230 kV substation near the existing O'Banion substation.

The summaries, conclusions, and recommendations in the Final Plenary Report and supporting technical reports are intended to inform future state regulatory and policy proceedings and may be useful to renewable and transmission developers, environmental and community groups, and local, regional, and federal government entities. The large POUs and all load-serving entities under the jurisdiction of the CPUC will soon develop IRPs, which they will file with the Energy Commission and CPUC, respectively, for review. The POUs will file their IRPs to the Energy Commission by January 2019. The California ISO is working on its TPP to identify transmission needs. The Energy Commission has also initiated the *2017 IEPR* proceeding. The RETI 2.0 findings will be useful in each of these planning activities.

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.

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 previously approved and tracked by the California ISO in the TPP. The *2016-2017 ISO Transmission Plan* identifies two new transmission line upgrade projects for reliability purposes and no new transmission projects needed for economic or policy purposes. The plan identifies 32 previously approved transmission projects costing $50 million or more, including 3 recently completed transmission lines, 7 transmission lines in progress, 6 transmission lines on hold, and 1 reconductoring

project on hold. The plan identifies 145 previously approved transmission projects costing less than $50 million, including 4 transmission projects recently completed, 62 in progress, 4 on hold, and 10 canceled.

The California ISO also approves substation projects in TPP 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 of 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.[12] In a May 2, 2017, filing with the Securities Exchange Commission, Southern California Edison (SCE) indicated that the project would be delayed by six months, from the fall of 2021 to the spring of 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.[13] (For more information on OTC, see http://www.energy.ca.gov/renewables/tracking_progress/#otc.)

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

12 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

13 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.

Transmission Project	California ISO Status[1]	CPUC Status	Construction Status	Actual and Expected In-Service Date
3 – Colorado River-Valley 500 kV line	Approved	CPCN and PTC Approved	Operational	2013
4 – West of Devers 230 kV Reconductoring	LGIA	CPCN Approved[5]	Engineering/ Design	2021
5 – Eldorado-Ivanpah 230 kV line	LGIA	CPCN Approved	Operational	2013
6 – South of Contra Costa 230 kV Reconductoring	LGIA	CPCN Approved	On Hold	2017
7 – Pisgah-Lugo 500 kV line[6]	N/A	N/A	N/A	N/A
8 – Borden-Gregg 230 kV Reconductoring	LGIA	NOC/CPCN TBD	On Hold	2018
9 – Carrizo-Midway 230 kV Reconductoring	LGIA	NOC Approved	Operational	2013
10 – Cool Water-Lugo 230 kV line[7]	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[8]	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	2022
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[9]	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[10]	2020

Transmission Project	California ISO Status[1]	CPUC Status	Construction Status	Actual and Expected In-Service Date
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[11]	2020
21 – San Luis Transmission Project	N/A	Western/San Luis & Delta-Mendota Water Authority Joint Final EIS/EIR adopted[12]	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 prior to 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) on 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 On October 25, 2013, SCE filed an application for a CPCN and PEA with the CPUC. On September 11, 2014, the CPUC determined that the application and PEA were complete. The CPUC published the draft EIR/EIS on August 7, 2015, and the final EIR for CEQA compliance on December 11, 2015. The BLM requires additional time before releasing the final EIS for NEPA compliance. The final EIS is expected in 2016. On April 12, 2016, the CPUC released a final EIR addendum concurrently with its proposed decision granting a CPCN for the project. On August 18, 2016, the CPUC granted a CPCN for the project.

6 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.

7 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.

8 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's timeline for that process did not allow for this suspension to be taken into account in its studies. The California ISO is considering this in its 2016-2017 transmission planning cycle and will coordinate with IID to ensure the use of the best possible and current information at that time.

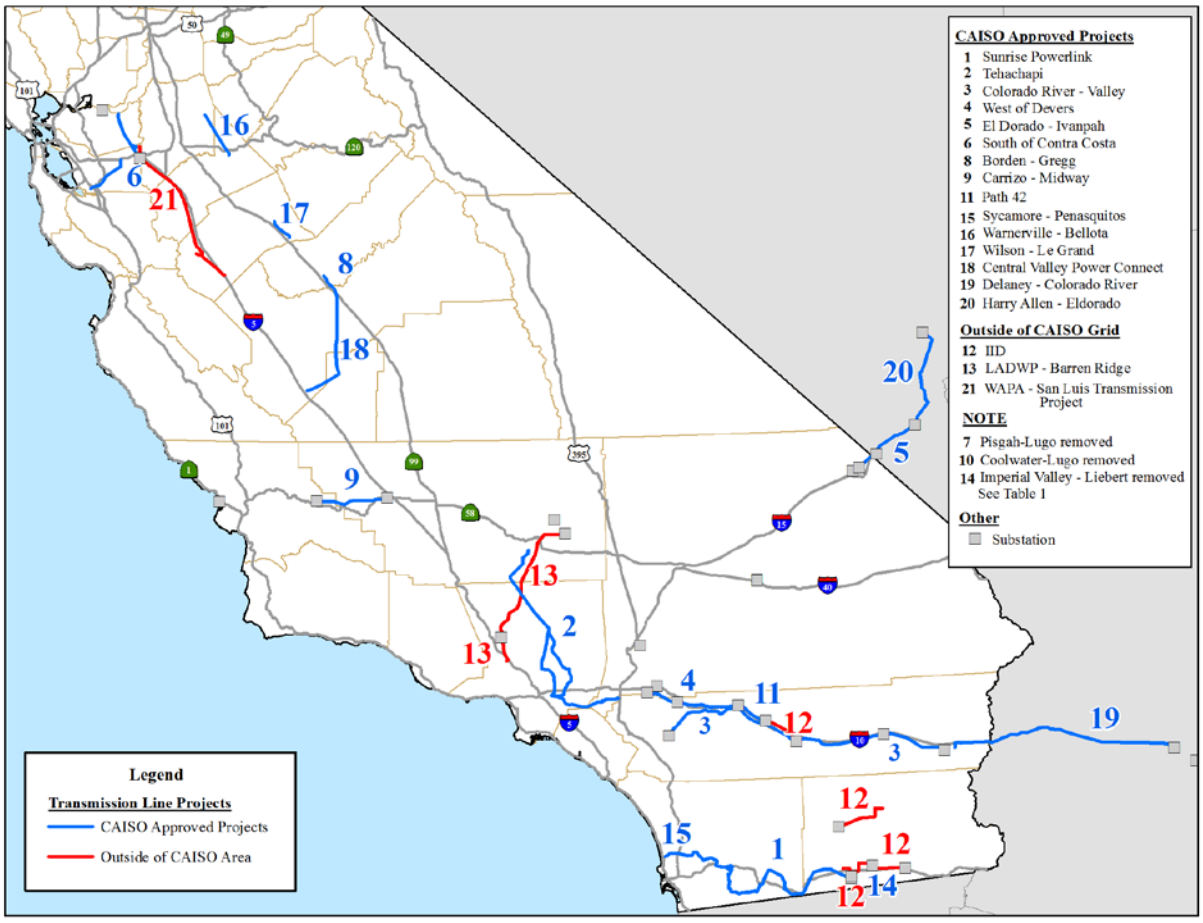
9 On November 6, 2013, the California ISO selected PG&E, MidAmerican Transmission, and Citizens Energy Corporation as project sponsors. The 2016-2017 California ISO Transmission Plan states that the Central Valley Power Connect project requires further evaluation in future planning cycles to reassess the need scope of the project and recommends putting the project on hold until a review is completed.

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

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

12 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 California ISO Transmission Planning Process and Transmission Plans: https://www.caiso.com/planning/Pages/TransmissionPlanning/2016-2017TransmissionPlanningProcess.aspx

For more information on California ISO Generator Interconnection and Deliverability Allocation Procedures (GIDAP):

1. GIDAP Process Outline and Roadmap with comparison with prior Generator Interconnection Procedures: http://www.caiso.com/Documents/GIDAP-ProcessOutline_Roadmap.pdf
2. FERC Order accepting California ISO's GIDAP tariff filing: http://www.caiso.com/Documents/July242012OrderConditionallyAcceptingTariffRevisions-DocketNoER12-1855-000.pdf

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

Links to specific transmission projects under CPUC environmental review:
Delaney Colorado River Transmission Ten West Link Project
http://www.cpuc.ca.gov/environment/info/dudek/tenwest/index.htm

Contact: Joseph Merrill, joseph.merrill@energy.ca.gov

Next update: May 2018