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Renewable Energy Transmission Initiative v2.0

Update on Existing Transmission Capability for Renewable Resources

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Transmission Technical Input Group

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California Public
Utilities Commission



California Energy
Commission



Background

Goal is to characterize existing transmission system capacity and planned improvement/changes and the implications for accessing additional renewable resources

TTIG participants include all California Transmission Planning Entities

Sacramento Municipal Utility District	California Independent System Operator
Imperial Irrigation District	Los Angeles Department of Water and Power
Silicon Valley Power	Turlock Irrigation District
Modesto Irrigation District	Western Area Power Administration - SNR
San Francisco PUC	Transmission Agency of Northern California
City of Santa Clara	Pacific Gas & Electric
Southern California Edison	San Diego Gas & Electric

Data Sources and Input

TTIG assembled current transmission capabilities and proposed transmission. Contributors include:

- Information on existing capacity from previous studies performed by planning entities
- Western region information from Western Interstate Energy Board
- Developer-provided information on proposed transmission facilities

Methodology

- California Transmission Capability estimates provided by planning entities
 - California ISO footprint
 - Transmission capacity estimates developed in prior studies for transmission areas with commercial interest (not by RETI-defined CREZ)
 - “Energy-only” transmission estimates developed for transmission areas with commercial interest - Areas with limited commercial interest not studied.
 - Other California transmission planning entity input provided directly
- Out-of-State capability limited by import paths as well as by the capability of lines from the injection point in CA to the load centers
- Transmission expansion capacity from planning entity / utility / developer-provided input

California ISO Transmission Capability

Several new transmission lines have been constructed and several more under development. These are included in the current transfer capability values

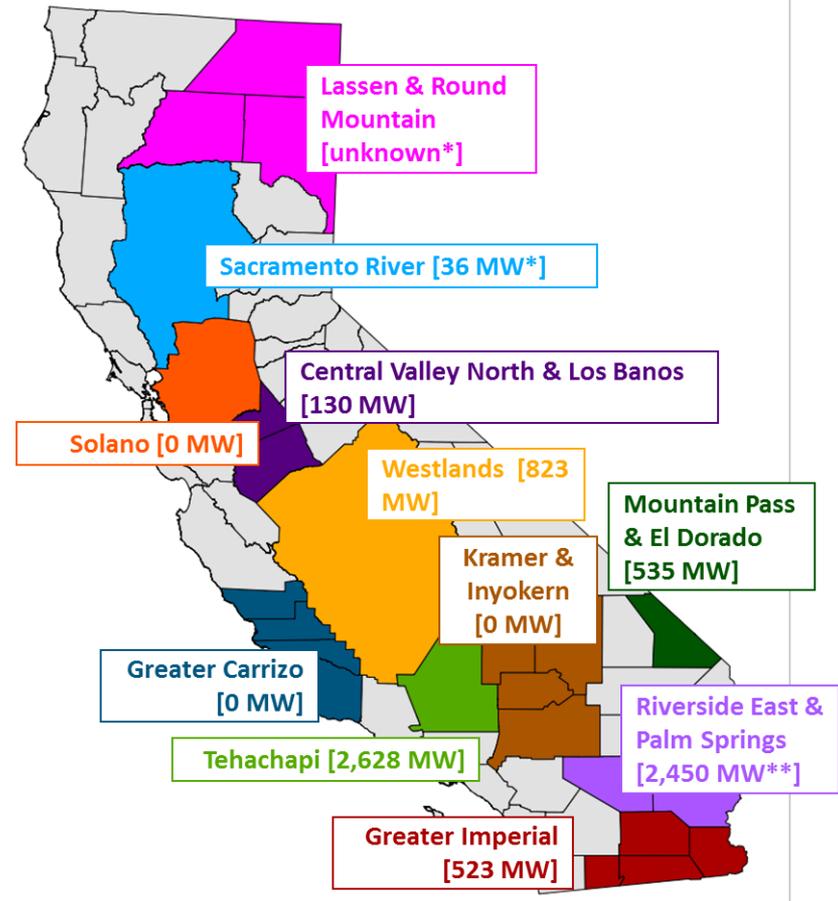


Transmission upgrade	Approval status		Online
	ISO	CPUC	
1 Carrizo-Midway	LGIA	NOC effective	energized
2 Sunrise Powerlink	Approved	Approved	energized
Suncrest dynamic reactive	Approved	Not needed	2017
3 Eldorado-Ivanpah	LGIA	Approved	energized
4 Valley-Colorado River	Approved	Approved	energized
5 West of Devers	LGIA	Pending	2021
6 Tehachapi (segments 1, 2 & 3a of 11 completed)	Approved	Approved	2016
7 Cancelled			
8 South Contra Costa	LGIA	In process	2016
9 Borden-Gregg	LGIA	Not yet filed	2018
10 Path 42 reconductoring	Approved	Not needed	2016
11 Sycamore-Penasquitos	Approved	Not yet filed	2017
12 Lugo-Eldorado line reroute	Approved	Not yet filed	2017
13 Lugo-Eldorado and Lugo-Mohave series caps	Approved	Not needed	2019
14 Wamerville-Bellota reconduct.	Approved	Not yet filed	2017
15 Wilson-Le Grand reconduct	Approved	Not yet filed	2020

California ISO Fully Deliverable Capability by Transmission Area

- Sufficient capacity to meet 33% RPS but not 50% RPS
- Additional capacity would be required to meet 50% RPS with all firm delivery resources

**Note: Not enough information available for transmission areas with little or no commercial interest*

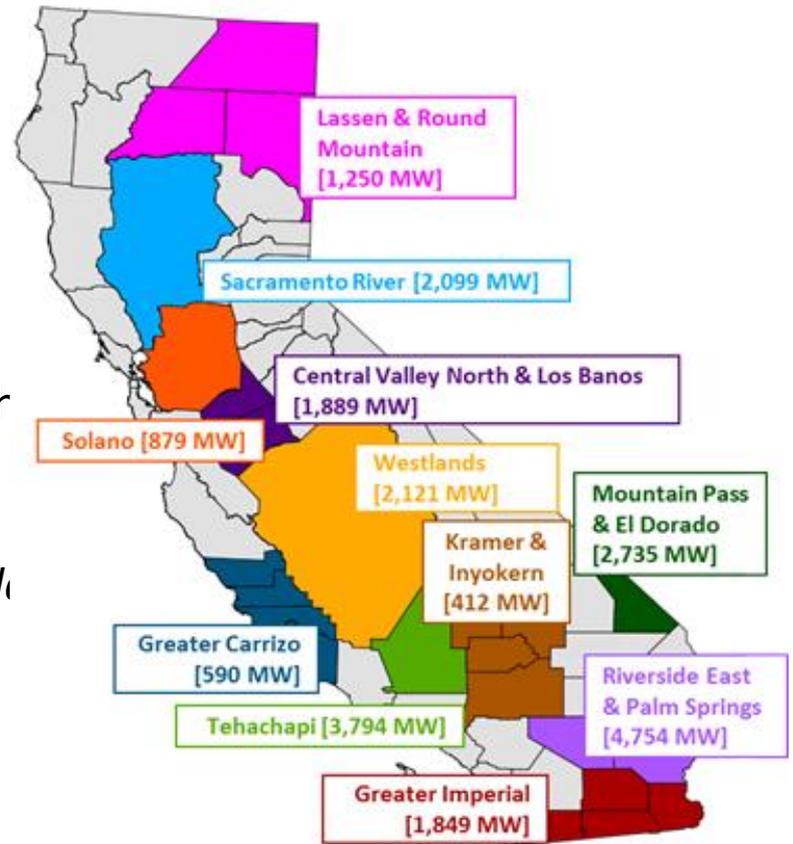


California ISO Energy-only Capability by Transmission Area

- There is sufficient transmission to accommodate resources beyond 33% on an “energy only” basis
- Will allow faster and less expensive resource interconnection
- EO capacity areas generally comport with commercial interests

“Energy-only resources in Sacramento Valley could interconnect to the COTP” - TANC

Estimated Energy-only capacity is over 22,000 MW subject to curtailment



Non- California ISO California Transmission Capability

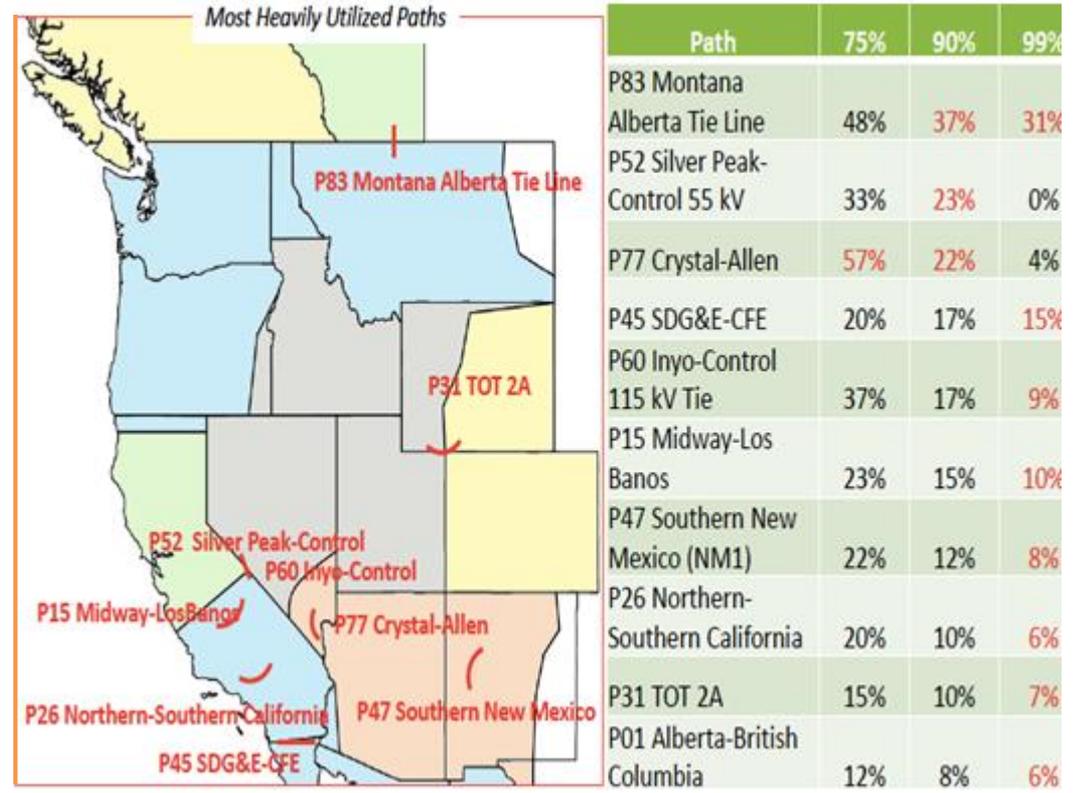
- Current California projects under development and proposed
- Projects that have not been approved are not included in current transmission capacity estimates

Proponent	Name
LADWP	Barren Ridge
LADWP	South of Haskell
LADWP	Victorville-LA
LADWP	IPP Replacement
SMUD/Western	Colusa Sutter 500 kV
Western	SLTP
IID	STEP Midway-Devers 55 kV
IID	Desert Southwest Project

Capacity on Out of State Transmission will limit renewable imports into California

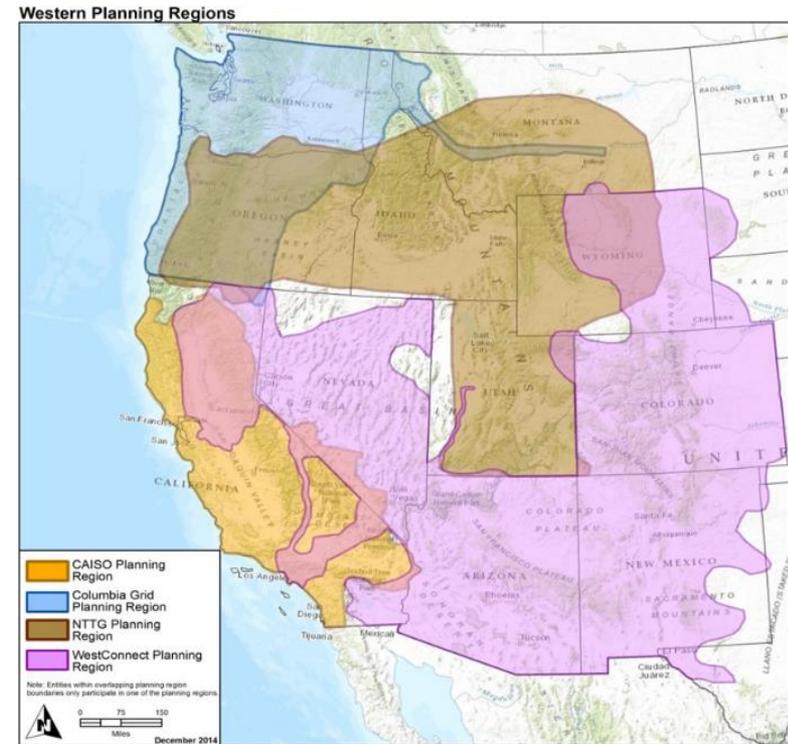
- Several of the most heavily used paths in the Western Interconnect deliver energy to California
- TTIG assumed capacity for OOS resources limited to capacity available at intertie transmission area

Example: NV capacity limited to the Mountain Pass & El Dorado capacity



Interregional Transmission Planning

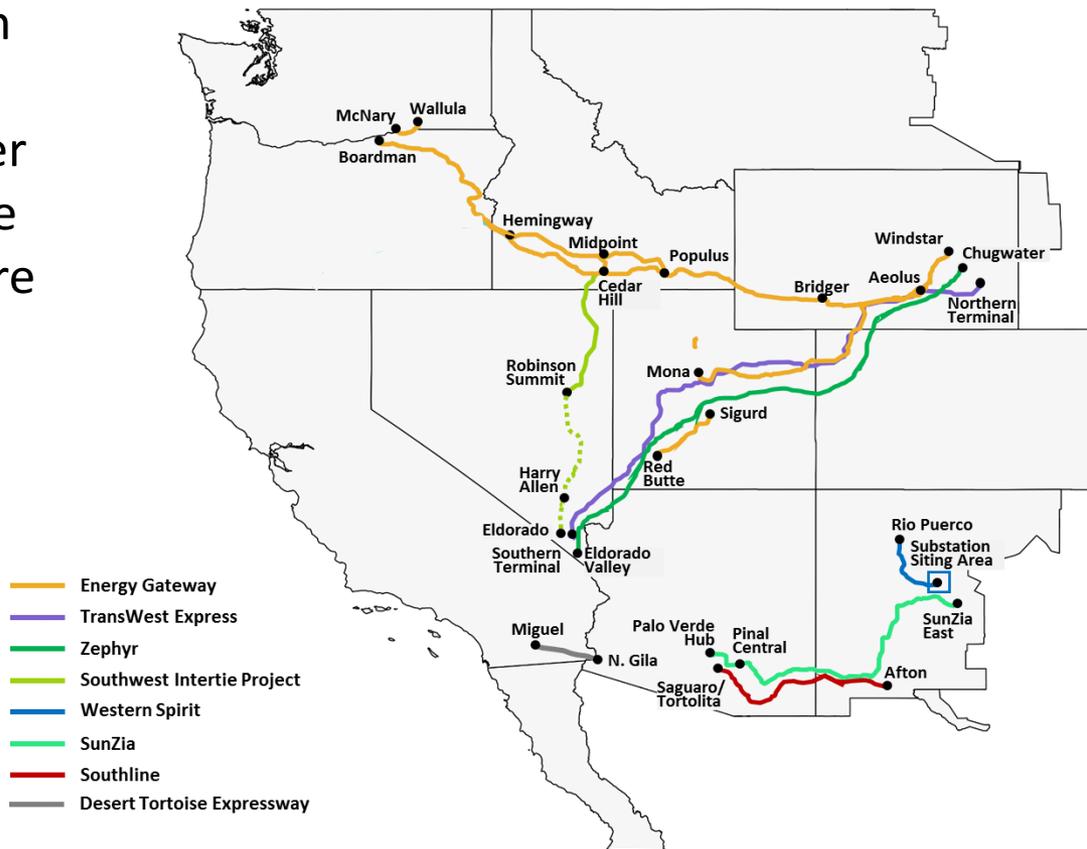
- FERC Order 1000 formed four planning regions in the western interconnection
- Planning regions are required to coordinate planning data, information, and interregional transmission proposals submitted into their regional processes
- Through interregional coordination the planning regions are well positioned to support RETI 2's goal to explore combinations of renewable generation resources in Wyoming, New Mexico and other areas
- The ISO is currently working with NTTG and WestConnect to consider the best approach to consider RETI's goals within their regional planning processes



Proposed Interregional Transmission

Several large transmission projects under development could deliver substantial capacity to the California grid in the future

- Gateway Projects
- SunZia
- Transwest Express
- Zephyr
- Southwest Intertie Project
- Western Spirit
- Southline
- Desert Tortoise



Summary conclusions

- Considerable transmission capacity is available for energy-only resources, but . . .
- Deliverability considerations are critical in considering actual transmission needs to achieve 50% RPS
- Out of state resources are technically viable to achieve – based on input received
- Out-of-State capability can be constrained by the transfer capability into California at the interconnection point – both in state and out of state capabilities need to be taken into account