TRANSWEST EXPRESS LLC

Working to Ensure Grid Flexibility and Reliability

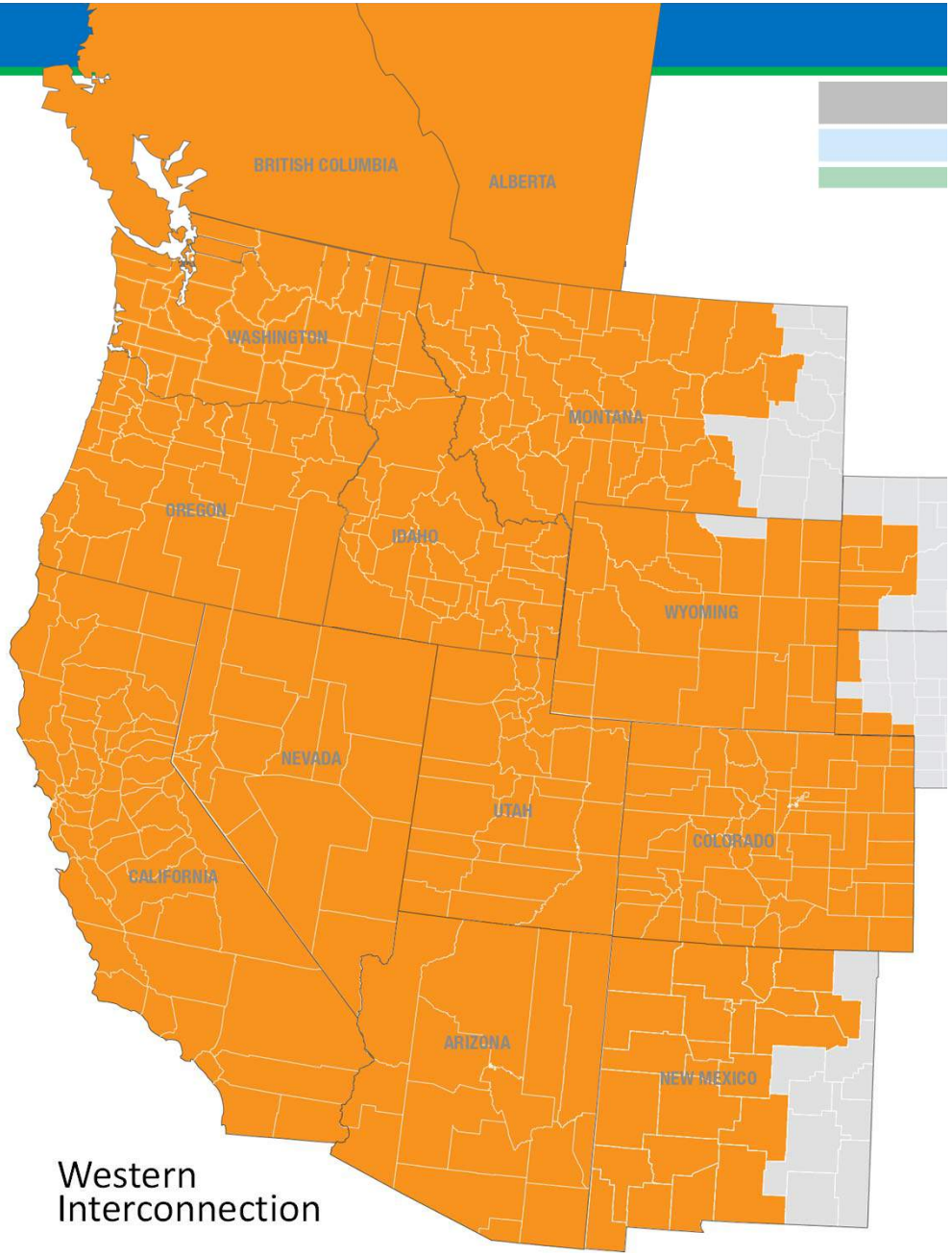
May 21, 2015

The Governor's Utah Energy Development Summit

Salt Lake City

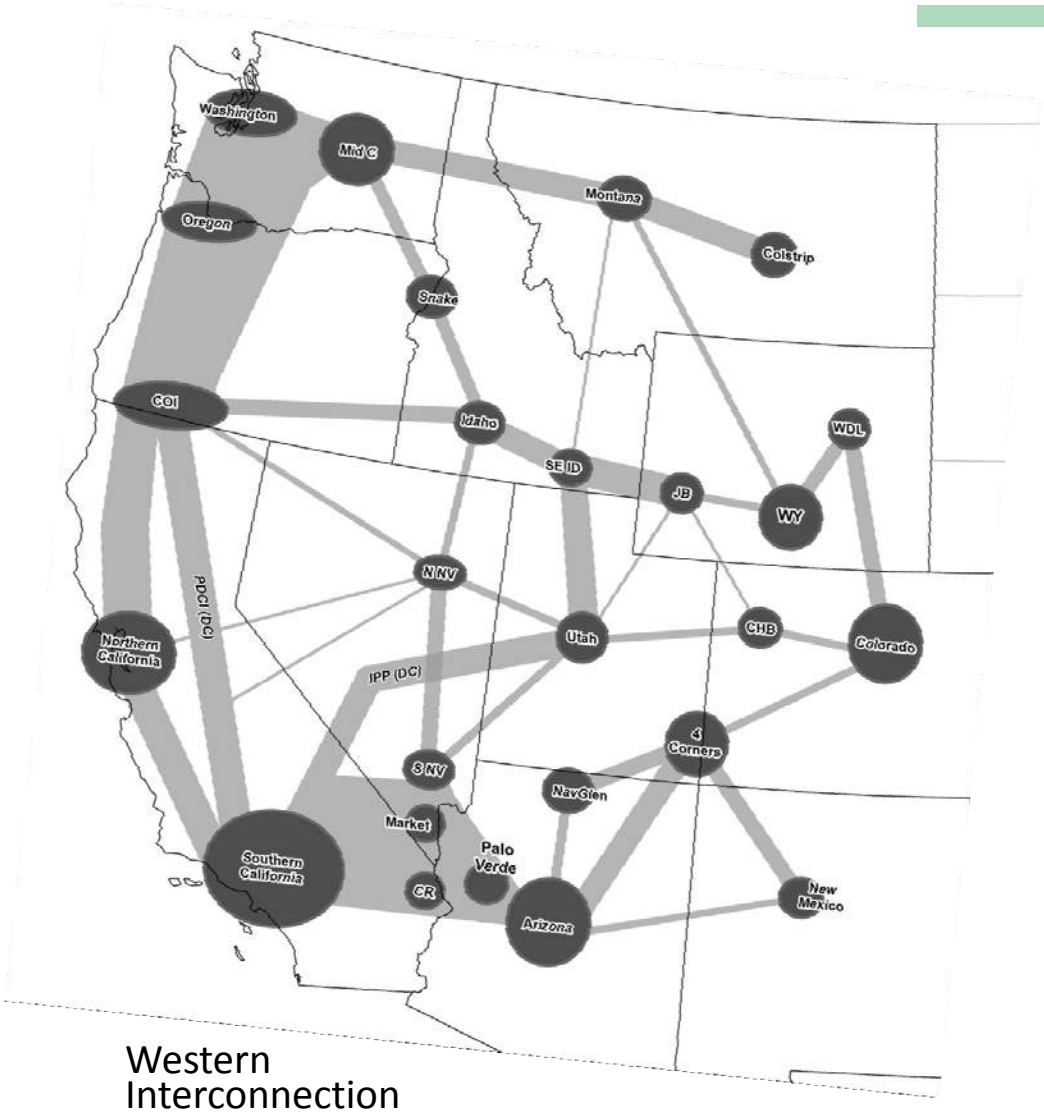
The West's Transmission Conundrum

- Geographically expansive: Nearly 2 million square miles
- 85 million people across widely distributed population centers
- Well over half federal land
- Tribal / sovereign nation land
- No Regional Transmission Organization
- Best renewable resources often located far outside densely-populated areas
- Four Regional Transmission Planning Groups and 38 Balancing Areas



The West's Transmission Grid

- Largest population centers on West Coast and in Southwest
- Bulk of transmission capacity built along coast in a "C"
- Inter-Mountain region has limited transmission capacity with other western markets
- TransWest Express Project and Gateway Transmission Projects focused on increasing transmission capacity within the Rocky Mountains and between regions



Western Interconnection Markets and Transmission Capacity

TWE Project Connects Renewable Demand to Supply

- 730-mile route, 66% on federal land
- 3,000 MW, 600 kV HVDC
  - Connections to AC system in Wyoming and Nevada
  - Potential interconnection near Delta, Utah
  - Potential use of AC included in permitting
- Accesses renewable energy from 45%+ capacity factor Wyoming wind farms

Western Area Power Administration

Joint development partner since 2011

Proposing to participate as a joint project owner

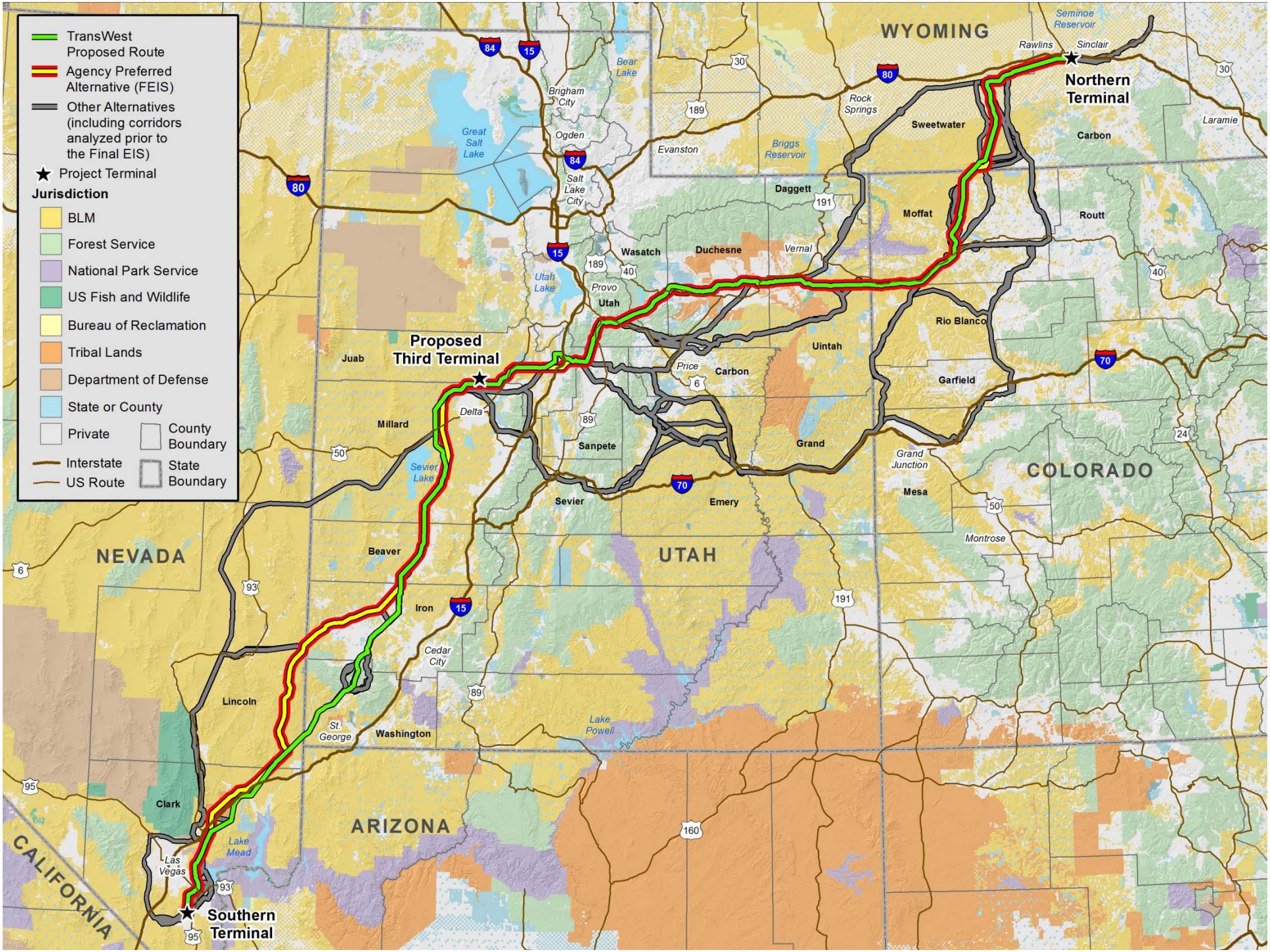
Rapid Response Team for Transmission

TWE Project selected for special focus under new federal interagency program in 2011

Federal Approval Process Nearly Complete

Environmental Impact Statement, prepared by BLM and Western as joint lead agencies, with USFS and dozens of state/local/federal cooperating agencies

- **Nov. 30, 2007:** Original ROW application filed
- **Jan. 4, 2011:** Notice of Intent published
- **April 4, 2011:** Public scoping completed
- **July 3, 2013:** Draft EIS published
- **Sept. 30, 2013:** Public comment completed
- **May 1, 2015:** Final EIS published
- **2015:** Records of Decision anticipated


TransWest Proposed Route
Agency Preferred Alternative (FEIS)
Other Alternatives (including corridors analyzed prior to the Final EIS)
Project Terminal
Jurisdiction
BLM
Forest Service
National Park Service
US Fish and Wildlife
Bureau of Reclamation
Tribal Lands
Department of Defense
State or County
Private
County Boundary
Interstate
US Route
State Boundary
WYOMING
Northern Terminal
Proposed Third Terminal
Southern Terminal
NEVADA
UTAH
COLORADO
ARIZONA
CALIFORNIA
Seminoe Reservoir
Rawlins
Sinclair
Rock Springs
Sweetwater
Carbon
Laramie
Evanston
Briggs Reservoir
Bear Lake
Brigham City
Great Salt Lake
Ogden
Salt Lake City
Daggett
Moffat
Routt
Wasatch
Duchesne
Vernal
Utah Lake
Provo
Utah
Rio Blanco
Uintah
Juab
Price
Carbon
Garfield
Millard
Delta
Sanpete
Grand
Grand Junction
Sevier Lake
Sevier
Emery
Mesa
Beaver
Montrose
Iron
Cedar City
Lincoln
St. George
Washington
Lake Powell
Clark
Las Vegas
Lake Mead
Juab
Millard
Beaver
Iron
Lincoln
Washington
Clark
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Seminoe Reservoir
Evanston
Briggs Reservoir
Bear Lake
Brigham City
Ogden
Salt Lake City
Great Salt Lake
Utah Lake
Provo
Sevier Lake
Cedar City
St. George
Lake Powell
Lake Mead
Las Vegas
80
84
15
189
30
191
40
70
6
89
50
24
93
95
160

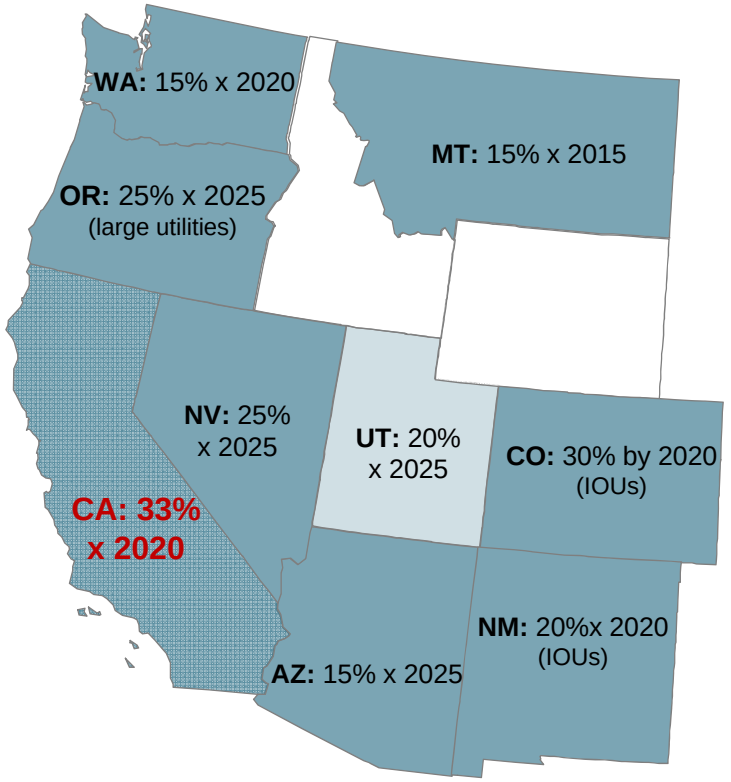
Era of Uncertainties?

- Generation Fleet Replacement
  - Drivers: Environmental policies, aging infrastructure, technology advancements
  - Outcomes: New resource types and locations, change fleet operations
- Regionalization
  - Drivers: Operating benefits with larger resource pool, access to low cost resources
  - Outcomes: Increased real-time market footprint and products, increased transmission capacity between regions
- Customer Side Changes
  - Drivers: technology advancements, rate structure changes, load level changes
  - Outcomes: Some impacts on Bulk Power System flexibility/reliability
- Laws of Physics and System Economies of Scale
  - Drivers: No changes
  - Outcomes: Need to continue to use system investment decision and operating frameworks

Growth of Renewables

- In January 2015, California Governor Brown announced a 50% renewable energy goal by 2030, up from 33% by 2020
- To keep customers' energy prices reasonable, California needs to reach outside its borders to secure low-cost renewable resources
- **Transmission linking these resources to load centers will be critical to achieving this policy target in a cost-effective manner**

Western Renewable Portfolio Standards

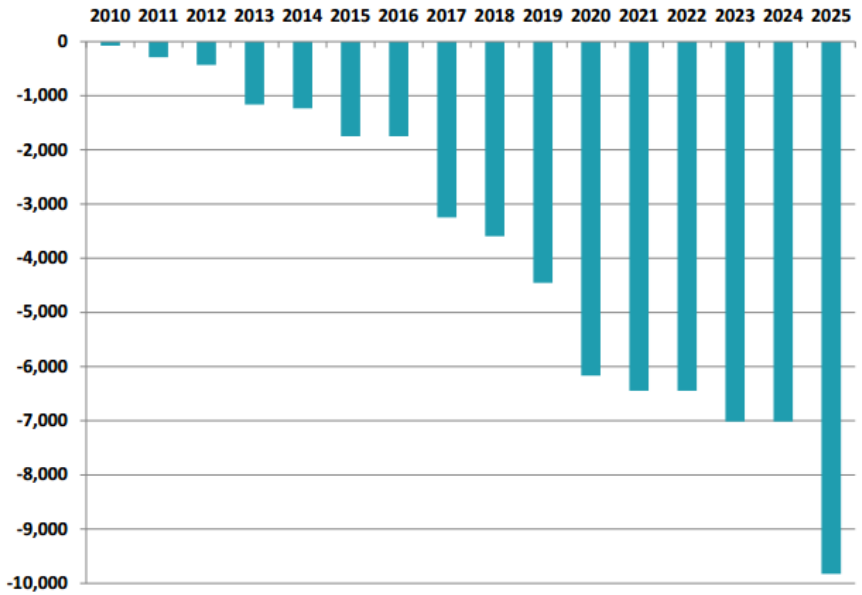


Source: DSIRE

EPA Clean Power Plan

- Under the proposed regulation, power plant carbon emissions collectively will be reduced 30% below 2005 levels by 2030
- 6,000 MW of coal retirements have already been announced
  - This number will go up as a result of the rule
- Low-cost renewable energy needs to take its place
- **Transmission linking low-cost renewables to load centers will be key to meeting clean energy goals**

Cumulative coal retirements (in MW) between 2010 and 2025

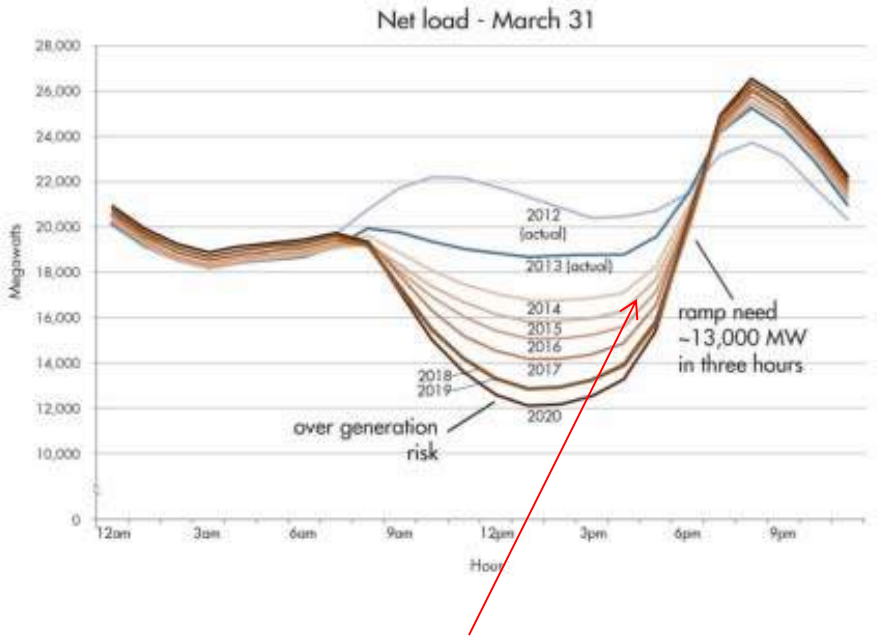


Source: WECC

Integration and Flexibility

- Proliferation of “all the same” solar power located in the southwest is causing more operations challenges
- A technology-diverse and geography-diverse resource profile (Solar AND Wind) will mitigate these operations challenges
- **Transmission expansion is required to connect diverse resources in the west, with the benefit of providing a “route to export” excess energy**
- **Expansion of western energy markets (EIM, etc.) requires new transmission to capture additional benefits**

California ISO “Duck Curve”



Too much same-profile solar makes the transmission and generation system more difficult to operate

Inter-Regional Transmission Allows Access for Integrating Renewables With Renewables

"A number of peer-reviewed studies have documented that the aggregate output of wind and solar plants spread over a large geographic area is much less variable than the output of plants clustered into a small area. Thus, a more robust grid can significantly reduce the cost of integrating wind and solar power with the grid by allowing larger power flows between regions as well as making it possible to access renewable resources from a greater diversity of areas."

- *AWEA/SEIA Green Power Superhighways report, February 2009*



For More Information

www.transwestexpress.net

TRANSWEST EXPRESS LLC