Understanding the Western Grid

Building a Renewable-Ready Western Grid
Sponsored by National Caucus of Environmental Legislators

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What is the Western Grid and Who are the Players?
Electricity Service includes Wholesale and Retail Services

1. Generating Station
   Electricity is typically generated by a steam- or hydro-driven turbine at the power plant.

2. Step-Up Transformer
   The power is then ramped up to high voltage for long-distance transmission.

3. Transmission
   Next, a series of high voltage lines transmit the electricity through the power grid.

4. Step-Down Transformer
   Power is then reduced to a lower voltage for use in homes and businesses.

5. Subtransmission
   Customer
   The electricity then passes through a series of switches to distribution lines.

6. Customers
   Power is then delivered to customers via local lines.
Western Electric Coordinating Council - Reliability Assurance

- Eastern Interconnection, covering the region east of the Rockies, excluding most of Texas, but including adjacent Canadian provinces except Québec;
- Western Interconnection, from the Rockies to the Pacific Coast, again including adjacent Canadian provinces; and
- Electric Reliability Council of Texas (ERCOT), covering most of Texas
Balancing Control Areas – 38 in the West

• Some grid areas are managed by individual utilities, mostly large investor-owned ones, and some by the federal power marketing agencies.

• These are called control areas or balancing authorities.

• In the Western interconnection, there is no region-wide RTO or ISO, so the individual control-area operators must coordinate with each other to ensure region-wide reliability of service.
Utilities Manage Distribution Planning

Illustrative modern electric system

- **Processors**: Execute special protection schemes in microseconds.
- **Smart appliances**: Can shut off in response to frequency fluctuations.
- **Demand management**: Use can be shifted to off-peak times to save money.
- **Sensors**: Detect fluctuations and disturbances, and can signal for areas to be isolated.
- **Storage**: Energy generated at off-peak times could be stored in batteries for later use.
- **Generators**: Energy from small generators and solar panels can reduce overall demand on the grid.

Within the reliability regions, several types of entities coordinate supply with demand:

- Regional transmission organizations (RTOs),
- Independent system operators (ISOs), and
- Individual utility balancing control areas.
Existing and Emerging Multi-state Collaborative Efforts in the West

- California Independent System Operator (CAISO):
  - Reliability Coordinator for most balancing authorities
  - Runs the Energy Imbalance Market (EIM)
  - Developing a day ahead market option (EDAM)

- Southwest Power Pool (SPP):
  - Developing the Western Energy Imbalance Service (WEIS)
  - Developing a day ahead option (Markets +)
  - Developing an RTO option

- Western Power Pool (WPP):
  - Establishing a common resource adequacy framework for participating utilities
Benefits of Regional Collaboration
NREL Interconnection Seams Study, Brinkman, et al, October 2020
Downloaded from: https://www.nrel.gov/docs/fy21osti/78161.pdf
Wind Resources and Solar Resources Profiles Show How Different Resources Complement

Combined, They Produce a Smoother Profile that Approximates System Needs
Transmission and Regional Markets Help States Meet Their Renewable and Decarbonization Goals

• By bringing least cost resources to customers from all over the region
• By combining resources beneficially to save customers money and improve reliability
• By sharing the cost of new resources among states that can serve the whole region
• By bringing a source of regional flexibility to complement the local flexibility that will be needed
• By creating a larger market for state resources in the region
Economic Benefits of Regional Collaboration

Western RTO Economic Impact Study – Region-wide Analysis

Advanced Energy Economy
July 26, 2022
What Can Legislators Do?
Improve Your Transmission Planning by Supporting Resource Planning Improvements

- Consider resource planning changes that explicitly recognize all the benefits of regional collaboration
- Authorize your regulator to consider the benefits of regional transmission projects in resource planning decisions
Establish a Transmission Authority to Support In-state Transmission that Complements Local and Regional Investments

- Authorize the assessment of potential in-state corridors
- Support viable in-state corridors that emerge
- Establish funding mechanisms for projects that meet your State’s highest priority goals
Authorize Progress Toward Regional Collaboration and Markets

• Immediate steps produce benefits (like EIM, reduced RC cost)
• Support progress toward an ultimate solution that will deliver all the regional transmission and regional market benefits
About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org