Markets 101

The importance of regional electricity markets

February 15, 2023
About the NW Energy Coalition & Renewable Northwest

The NW Energy Coalition advances clean, equitable, and affordable energy policies by leveraging our analytic expertise and convening a broad alliance of people and organizations.

Renewable Northwest’s mission is to decarbonize the region by accelerating the transition to renewable electricity.
Panelists

Robin Arnold
Markets & Transmission Director
Renewable Northwest

Kathleen Staks
Executive Director
Western Freedom

Caitlin Liotiris
Principal
Energy Strategies

Michael Milligan
Consultant
Milligan Grid Solutions, Inc.
Regional Transmission Organizations

- Alberta Electric System Operator
- Midwest ISO
- Ontario Independent Electricity System Operator
- New Brunswick System Operator
- ISO New England
- New York ISO
- PJM Interconnection
- California ISO
- Electric Reliability Council of Texas
- Southwest Power Pool

IRC
ISO/RTO Council
RENEWABLE NORTHWEST
Current Balancing Authorities in West
What is problematic with 38 BAs in the West?
# Example of Transmission Rates Across BAs

<table>
<thead>
<tr>
<th>2020 Tariff Rates</th>
<th>Transmission Rate ($/kw-mo)</th>
<th>Losses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPA Network Transmission</td>
<td>1.771</td>
<td>1.9</td>
</tr>
<tr>
<td>PSE</td>
<td>2.0151</td>
<td>2.7</td>
</tr>
<tr>
<td>Avista</td>
<td>1.37</td>
<td>3</td>
</tr>
<tr>
<td>NWE PTP &amp; Network Transmission</td>
<td>4.831</td>
<td>2.8</td>
</tr>
<tr>
<td>MT Int</td>
<td>0.506</td>
<td>5</td>
</tr>
</tbody>
</table>
## Example of Transmission Rates Across BAs

### Total Tx Cost to Reach PNW Markets

<table>
<thead>
<tr>
<th></th>
<th>Transmission Rate ($/kw-mo)</th>
<th>Losses (%)</th>
<th>Total Cost ($/MWh)*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BPA</strong></td>
<td>1.771</td>
<td>1.9</td>
<td>$5.96</td>
</tr>
<tr>
<td><strong>PSE CTS + MT Int + BPA</strong></td>
<td>4.2921</td>
<td>4.6</td>
<td>$14.45</td>
</tr>
<tr>
<td><strong>NWE + BPA</strong></td>
<td>6.602</td>
<td>4.7</td>
<td>$21.48</td>
</tr>
<tr>
<td><strong>NWE + AVA</strong></td>
<td>6.201</td>
<td>5.8</td>
<td>$20.62</td>
</tr>
<tr>
<td><strong>NWE + AVA + BPA</strong></td>
<td>7.972</td>
<td>7.7</td>
<td>$26.58</td>
</tr>
</tbody>
</table>

*45% capacity factor and losses valued at $30/MWh
Example of Rates in RTO vs. Northwest

# PJM Versus PNW New Wind Math

<table>
<thead>
<tr>
<th></th>
<th>PJM</th>
<th>PNW</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate Cap. Factor</td>
<td>35%</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>Levelized Cost of Energy</td>
<td>$40.00</td>
<td>$40.00</td>
<td>Total amount needed for 15-years.</td>
</tr>
<tr>
<td>Capacity Revenue Basis</td>
<td>-$5.21</td>
<td>$0.00</td>
<td>$ paid by PJM per EGPS capacity market wind modeling.</td>
</tr>
<tr>
<td>Transmission and Integration</td>
<td>$1.00</td>
<td>$12.00</td>
<td>Typical price difference from node to hub in PJM. NA in PNW.</td>
</tr>
<tr>
<td>Other Costs/Revenue</td>
<td>-$3.71</td>
<td>$12.00</td>
<td>Various PJM costs. BPA transmission and integration charges.</td>
</tr>
<tr>
<td>Required PPA Price</td>
<td>$36.29</td>
<td>$52.00</td>
<td>Price required for intermittent power at market hub.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-$15.71</td>
<td>Cost premium required for PNW deal.</td>
</tr>
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Existing Markets in the Region
CAISO vs. SPP Energy Imbalance Markets
RTO Services

- RTOs responsible for transmission grid reliability, planning, and operation
- Schedule generation resources that are least-cost a day in advance, and dispatch over five-minute intervals
- RTO has functional control of transmission system and engages in coordinated regional planning for transmission within footprint
- Typically, high entry/exit fees

EIM/EIS

- Imbalance Markets only trade excess generation available in real time for five-minute intervals
- Available transmission capacity is voluntarily “donated” for use in the Imbalance Market

Both EIM/EIS and RA:

- Transmission owners retain individual operational control of systems, including authority over balancing authorities
  - Transmission needs to be arranged separately for each BA to move power from distant points, leads to “rate pancaking”
- Easier to enter & exit, less binding than RTO
State Activities Related to Regional Market Expansion
ARIZONA

- On July 23, 2021, the AZ Corporation Commission opened docket E-00000A-21-0271 to investigate regional planning in the West.
  - No schedule has been set yet for the docket.

NEW MEXICO

- In December 2021, the NM Public Regulation Commission rejected a merger between AVANGRID and PNM Resources in docket 20-00222-UT. The rejected stipulation would have required PNM to convene an RTO initiative group to explore RTO development.
- PNM and AVANGRID extended the merger agreement through April 2023 while they appeal the NM PRC decision at the NM Supreme Court.
COLORADO

- SB 72 (2021) requires utilities to join an organized wholesale market by January 1, 2030, absent a waiver from the PUC
- Creates the CO Electric Transmission Authority and creates new rules for CO PUC certification for new transmission lines.

NEVADA

- SB 448 (2021) also requires utilities to join an organized wholesale market by January 1, 2030, absent the granting of waivers.
- Creates a Regional Transmission Coordination Task Force to study opportunities to promote regional transmission development.
- Requires NV Energy to file a transmission infrastructure plan with the Nevada PUC.
OREGON

• **SB 589 (2021)** requires the Oregon Department of Energy to identify the benefits, costs, and barriers to Oregon entities participating in an RTO.
  - The final study was released in December 2021.

• **HB 2021 (2021)** requires retail electricity providers to reduce electricity greenhouse gas emissions to 80% below baseline emission levels by 2030 and 100% by 2040.
  - The bill acknowledges that regional markets play a critical role in achieving 100% zero carbon emissions.
SB 5116 (2019-2020), the “Clean Energy Transformation Act” (“CETA”) requires utilities to be 100% greenhouse neutral by 2030 (allowing for natural gas offsets) and 100% renewable or non-emitting by 2045.

- WUTC established a Carbon and Electricity Markets working group to examine CETA’s integration with electricity markets outside the state and its compatibility with cap-and-trade programs (such as in California).
Federal Activities Related to Regional Market Expansion
FERC

- FERC opened docket RM21-17-000, an advanced notice of proposed rulemaking on transmission planning and cost allocation and generation interconnection processes.

- FERC and NARUC established a Joint Federal-State Task Force on Electric Transmission.
The DOE funded a study led by the Utah Office of Energy Development, the “State-led Markets Options Study,” which looks at the costs and benefits of different market expansion options in the West.

HR 3684, “INVEST in America Act,” includes a $10 billion increase in spending authority for BPA; federal backstop provisions for transmission siting, and authority for the federal government to be an “anchor tenant” for up to 50% capacity on new transmission lines or line upgrades. The bill includes up to $65 billion total to upgrade the electric transmission grid.

- The bill became law on November 15, 2021.
- DOE launched its “Building a Better Grid” initiative in January 2022 to identify national transmission needs.
ADDITIONAL RESOURCES

- FERC RTOs and ISOs: https://www.ferc.gov/electric/power-sales-and-markets/rtos-and-isos
- AEE RTO Study: https://www.aee.net/western-rto
Markets 101
Benefits Markets Can Provide for the West

February 15, 2023
Contents

1. Context for Benefits Quantified in Market Studies & Studies by Energy Strategies
2. Types of Energy Market Benefits
3. Forecasted Electricity System Benefits for Western States
4. Broader Economic Impacts for Western States
5. Appendices (References)
Context for Benefits Quantified in Market Studies

• The potential benefits of organized electricity markets have long been recognized and many studies have been conducted that seek to quantify one or more types of benefits that may be achieved.

• It is critical to understand what is generally meant by “benefits” or “savings” results produced by these studies:
  - Note – benefits or savings are not intended to imply that electricity prices will go down, but rather compare a future “business as usual” case to a future with a market case.

\[
\text{Costs under business as usual} - \text{Costs under market scenario} = \text{Market savings/benefits}
\]

Savings/benefits do not imply overall costs of electricity will decrease but that there will be savings relative to a future scenario in which new markets are not created.
Energy Market Benefits: Related Studies by Energy Strategies

- Materials from these studies were used to inform today’s comments and discussion on market services, benefits, and implications

Other important and relevant regional work covered in ACR 188

Draft ACR 188 Report

CAISO ACR 188 Study List
Types of Energy Market Benefits

- **Energy markets produce efficiencies (and savings) by changing the way we operate and plan electricity resources and transmission systems**
  - Not all such savings are quantifiable and some of the largest are commonly overlooked
  - Some of the easiest to quantify, such as operational savings, may actually be a relatively small portion of total benefits that markets can achieve

<table>
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<th>Market Benefit Categories</th>
<th>Description</th>
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<tr>
<td>Operational Savings</td>
<td>Savings due to more efficient dispatch (via a security constrained economic dispatch), more efficient management of transmission capacity, lower operating reserve requirements, removal of transmission wheeling costs within market footprint, decrease in trading friction</td>
</tr>
<tr>
<td>Capacity Savings</td>
<td>Savings due to lower and regionally shared planning reserve requirements caused by geographical diversity of loads (and generation), which generally result in having to build fewer generating resources</td>
</tr>
<tr>
<td>Other Energy Related Savings</td>
<td>Savings due to more efficient planning of the transmission system, access to lower-cost public policy resources, environmental benefits of reduced emissions, new market products (e.g., hourly vs. block), increased automation of system operations</td>
</tr>
<tr>
<td>Non-Energy Savings</td>
<td>Savings due to lower electricity prices causing indirect economy-wide benefits such as new jobs, changes to household spending, and economic growth</td>
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Focus of the State-Led Market Study and EDAM Benefits Study

Focus of Western RTO Economic Impact Study

Difficult to quantify
Forecasted Electricity System Benefits for Western States

### Annual Savings for Western States due to Market Formation ($M/year)

<table>
<thead>
<tr>
<th>Market</th>
<th>Operational Savings</th>
<th>Capacity Savings</th>
<th>Total annual benefits</th>
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<tbody>
<tr>
<td>Status Quo Day-ahead</td>
<td>$643</td>
<td></td>
<td>$643</td>
</tr>
<tr>
<td>One Market Day-ahead</td>
<td>$747</td>
<td></td>
<td>$747</td>
</tr>
<tr>
<td>One Market RTO Day-ahead</td>
<td>$501</td>
<td></td>
<td>$501</td>
</tr>
<tr>
<td>Two Market A Day-ahead</td>
<td>$1,430</td>
<td></td>
<td>$1,998</td>
</tr>
<tr>
<td>Two Market A RTO</td>
<td>$1,811</td>
<td></td>
<td>$1,811</td>
</tr>
<tr>
<td>Two Market B RTO</td>
<td>$1,195</td>
<td></td>
<td>$1,195</td>
</tr>
<tr>
<td>One Market EDAM</td>
<td>$858</td>
<td></td>
<td>$858</td>
</tr>
</tbody>
</table>

Footprint: % reduction in annual operating costs:
- Status Quo Day-ahead: 0.4%
- One Market Day-ahead: 0.9%
- One Market RTO Day-ahead: 6.3%
- Two Market A Day-ahead: 0.8%
- Two Market A RTO: 5.4%
- Two Market B RTO: 5.4%
- One Market EDAM: 5.0%
- One Market EDAM No Imbalance Res.: 1.9%
Benefits from a Comprehensive West-Wide Market

- **State-Led Market Study** found that the quantified operational and capacity savings were maximized in a West-wide Regional Transmission Organization (RTO), the most comprehensive of the market structures:
  - This doesn't capture other, more expansive, categories of non-quantified benefits that could be furthered by an RTO.
  - The Pacific Northwest (Oregon and Washington), were found to have significant benefits under a West-Wide RTO as compared to Business as Usual.

- **Other benefits of a West-wide RTO** the study captured, but didn’t monetize, include:
  - Reduction in renewable curtailments of 2.9 million MWh (system-wide curtailments dropped from 2.9% to 1.6%).
  - Reduction in CO₂ emissions in the West of 3.2 million tons/year (a 2% reduction) without changing any policies.

### 2030 One Market RTO Annual Benefits

<table>
<thead>
<tr>
<th>State</th>
<th>APC Benefit ($)</th>
<th>Capacity Benefit ($)</th>
<th>Total Benefit ($)</th>
</tr>
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<tr>
<td>AZ</td>
<td>$59</td>
<td>$117</td>
<td>$176</td>
</tr>
<tr>
<td>CA</td>
<td>$288</td>
<td>$190</td>
<td>$478</td>
</tr>
<tr>
<td>CO</td>
<td>$62</td>
<td>$98</td>
<td>$160</td>
</tr>
<tr>
<td>ID</td>
<td>($8)</td>
<td>$88</td>
<td>$80</td>
</tr>
<tr>
<td>MT</td>
<td>$10</td>
<td>$36</td>
<td>$46</td>
</tr>
<tr>
<td>NM</td>
<td>$43</td>
<td>$70</td>
<td>$113</td>
</tr>
<tr>
<td>NV</td>
<td>($5)</td>
<td>$50</td>
<td>$45</td>
</tr>
<tr>
<td>OR</td>
<td>$80</td>
<td>$127</td>
<td>$207</td>
</tr>
<tr>
<td>UT</td>
<td>$43</td>
<td>$56</td>
<td>$99</td>
</tr>
<tr>
<td>WA</td>
<td>$102</td>
<td>$449</td>
<td>$552</td>
</tr>
<tr>
<td>WY</td>
<td>$19</td>
<td>$23</td>
<td>$43</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$694</td>
<td>$1,305</td>
<td>$1,998</td>
</tr>
</tbody>
</table>

*Calculated relative to Status Quo EIM scenario*
Economic Impact Study Evaluated Economic Implications from Electricity Savings due to Market Formation

• Study aimed to look at how the electricity system benefits offered by formation of a comprehensive, West-Wide market might trickle into the Western economy and provide broader economic benefits, such as jobs and increased gross state product

• Included three pieces of economic impact analysis, reflecting a range where the greatest uncertainty in economic response exists

1. Energy cost savings impacts on households

2. Increased business activity

3. Increased investment in clean energy (to meet corporate demand)
Economic Impacts from Market Formation are Expected to be Positive & Significant

- **Electricity-system benefits offered by a West-Wide RTO** will create a positive impact for the Western states

- **Between $18 billion and $79 billion in increased Gross Regional Product/year**
  - Equivalent to 0.4% to 1.6% of the region total

- **Create between 159,000 and 657,000 permanent jobs**
  - Paying $73,000 per job in average compensation

- **Result in between $619 million and $2.4 billion in increased tax contributions per year**
  - Stemming from increase state sales, excise and property taxes

- **Could spur additional clean energy investments (to meet corporate sustainability goals)**
  - Up to 4,400 MW in 2030 (as shown on the graphic) and up to 9,400 MW over a ten-year period considered in the study
Thank You!

Disclaimer: This work product utilizes information obtained from publicly available sources and in some cases has relied upon subscription data and other information available to Energy Strategies or generated by the firm. While the sources and methods are considered reliable, Energy Strategies does not represent the information and its interpretation as accurate or complete. Energy Strategies does not recommend that the information contained herein be the sole source of information for decision-making purposes.
Appendices
State-Led Market Study made possible through DOE grant

• The last several years have featured numerous discussions and initiatives related to the formation of coordinated wholesale trading markets in the West

• The Utah Governor’s Office of Energy Development, in partnership with State Energy Offices of Idaho, Colorado, and Montana, applied for and received a grant from the US DOE to facilitate a 2+year state-led assessment of organized market options

• The project is called Exploring Western Organized Market Configurations: A Western States’ Study of Coordinated Market Options to Advance State Energy Policies
  
  ❖ Or “State-Led Market Study”

• The project provides Western States with a neutral forum, and neutral analysis, to independently and jointly evaluate the options and impacts associated with new or more centralized wholesale energy markets and potential footprints

• Stakeholder meetings held throughout multi-year study process, with issuance of final reports on July 30, 2021
### Rough History of Western Market Development Efforts

**Active markets:**

|----------|------|------|------|------|

- Still responsible for bulk of DA trading in West today
- Controlled by CAISO BOD
- >75% of Western load will join (22 BAAs total)
- Contains entities within two WAPA BAAs
- Considering Markets+ (day-ahead)
- Contains entities within two WAPA BAAs
- Non-binding showings in 2021-2022

**Prior or ongoing market proposals:**

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<td>INDEGO</td>
<td>NWPP MC Initiative</td>
<td>Mountain West Transmission Group</td>
<td>CAISO EDAM</td>
<td>SPP Markets+</td>
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<tr>
<td>RTO West/Grid West</td>
<td>2015-2018 CAISO Regionalization</td>
<td>2017-2018 Peak/PJM RTO</td>
<td>2020-present SPP/RTO West</td>
<td></td>
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**Active markets:**

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- >75% of Western load will join (22 BAAs total)
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- Contains entities within two WAPA BAAs
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**Prior or ongoing market proposals:**

- NWPP MC Initiative (2012-2016)
- CAISO EDAM (2018-present)
- SPP Markets+ (2021-present)
# Energy Market Services: A Generic Reference Sheet

<table>
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<tr>
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</tr>
<tr>
<td>Transmission planning</td>
<td>Local planning by individual transmission providers, except transmission planning and regional coordination under Order 1000 remain as they are today</td>
<td>Joint transmission planning by RTO; some lower voltage transmission planning remains at the local level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tariffs and Operational Control of Transmission</td>
<td>Individual transmission providers retain control and have tariffs</td>
<td>RTO controls system, joint tariff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability Obligations and Balancing Authority Boundaries</td>
<td>BAs are retained, have primary reliability obligations</td>
<td>RTO has primary reliability obligations; BAs consolidated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ancillary Services and Co-Optimization</td>
<td>No optimization, reserve sharing groups</td>
<td>Can have optimization and ancillary service products</td>
<td>Ancillary service co-optimization and provision in the market</td>
<td></td>
</tr>
<tr>
<td>Resource Adequacy Function</td>
<td>Addressed by individual regulators; no market requirement</td>
<td>Market addresses intra-hour resource sufficiency, but does not impact long-term resource adequacy planning and processes</td>
<td>Market addresses day-ahead resource sufficiency. Depending on design, could impact long-term resource adequacy planning</td>
<td>Market can include its own longer-term resource adequacy requirements that must be achieved</td>
</tr>
<tr>
<td>Transparent Access to Market &amp; Operational Information</td>
<td>Very little access to information, what is available is generally aggregated</td>
<td>Transparent access to pricing information for real-time transactions and transmission in the market</td>
<td>Transparent access to pricing information for day-ahead and real-time transactions and transmission in the market</td>
<td></td>
</tr>
</tbody>
</table>

**What incremental benefits can we expect from adding market services?**
Drivers of Operational Benefits By Market Feature

- Technically Achievable Savings for Western RTO
  - 100%
  - 14%
  - +2%
  - Add 100% transmission capacity
  - +14%
  - Remove $3 wheeling rate

Building more transmission further increases savings

WECC-wide EDAM scenario from recent CAISO study achieved 78% of operational efficiencies of RTO

Important Notes:
- Results will vary by state – data presented is for combined Western States
- Data based on results from various WECC studies over the last two years
- “Planning efficiencies” not included, such as capacity benefits, access to public policy resources, etc.
- All comparisons are relative to status quo (real-time markets only)
Markets 101: How can markets promote reliability and resilience?

Michael Milligan, Ph.D.
Consultant
Milligangridsolutions.com
Outline

• Characteristics of efficient markets
  o Principles: Technology agnostic, performance based

• Electricity market principles and the Sumo Wrestler principle

• Reliability and resilience: To successfully ride thru severe weather, the grid must be larger than the storm
Smart grids require smart markets

• The power system is made up of two critical systems
  o Physical power system – generators, transmission...
  o Institutional system, including markets, reliability rules, general operating practice

• Efficient markets should allow “putting the pedal to the metal”
Electricity Markets

- Primary market is electricity – energy measured in kWh (MWh, GWh)
- Ancillary markets and services are various technical requirements to keep the grid balanced and in “good health”
- Key services include
  - Ramping service
  - Frequency regulation (primary, secondary)
  - Voltage support
  - Spinning and non-spinning reserves (extra available resources, just in case)
Market principles

- Technology neutral
- Performance based
- Clear definition of the product
  - What
  - When
  - How much
  - How often
  - Notification period
  - Clear incentives
- Larger is better
- Faster dispatch (economic re-balancing) is better
- Transmission enables markets
  - (conversely, transmission constraints prevent market efficiency)

Geographic diversity results in “smoothing” of demand, wind, solar generation. It is accomplished by combining balancing areas, usually via a market, and can delivery significant economies of scale.
Example of resource “pooling” in market

- WACM’s demand increasing by 200 MW at the same time PSCO’s demand decreasing by 200 MW.
- Pooling: the ramps “cancel” to 0 MW.
Example of resource “pooling” in market

- WACM’s demand increasing by 200 MW at the same time PSCO’s demand decreasing by 100 MW
- Pooling: the ramps net to +100 MW
Overview: Sumo-wrestler Theory of Effective Markets

• Electricity markets should be as **big** and **fast** as possible to achieve efficiency

![Graph showing average total regulation for 6 dispatch/lead schedules by aggregation (dispatch interval - forecast lead time).](image)

- Faster
- Faster
- Faster

• Reserves can be reduced, freeing more generation to serve load, increasing reliability and efficiency

Large/fast energy markets help reliability

- Provide better visibility of system conditions to operators in both normal and abnormal conditions
- System is “re-balanced” every 5 minutes in U.S. wholesale markets
  - Provides faster restoration of grid after large disturbance and larger resource pool with which to respond


Large planning areas/markets can reduce need for installed generation

• Ibanez and Milligan (2012) developed reliability model of the Western Interconnection

• Objective: evaluate the reduction possible in installed capacity with extensive transmission and regional coordination

• Used typical reliability target: Loss of load expectation 1 day/10 years

• Found that up to 60 GW (peak system of 244 GW) of capacity could be replaced if a “perfect” transmission grid were built

• We’ll never get to perfection, but this demonstrates how transmission and coordinate regional planning and markets could result in more cost-effective reliability

The digital revolution and the power system

• Digital revolution* at the same time as technology revolution
  o Power electronics/software coupling from DC devices to AC grid: wind, solar, battery, ...
  o Within physical limits we can now specify responses, which can be fast and accurate
  o An inverter “translates” the DC signal into a synchronous AC signal, under the direction of software

• Wind, solar, and battery storage all operate with an inverter, and can therefore supply many grid services required for reliability

*Thanks to Mark Ahlstrom for this interesting perspective.
The supply of grid services will change

- Grid services (balancing, frequency regulation, etc.) historically provided by thermal resources
- Many of these resources have retired, or announced future retirement
- Renewables can provide most of these services, in most cases more accurately and faster than conventional resources
- However, in some markets, rules prevent renewables/storage from providing these services
- This prohibition, if left unchecked, could threaten reliability

The supply of grid services should not be artificially constrained by rules that discriminate based upon resource type and are not based upon performance.
## Sources of grid services

<table>
<thead>
<tr>
<th></th>
<th>Inverter-Based</th>
<th>Synchronous</th>
<th>Demand Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wind</td>
<td>Solar PV</td>
<td>Storage/Battery</td>
</tr>
<tr>
<td>Disturbance ride-through</td>
<td><img src="image" alt="Circle" /></td>
<td><img src="image" alt="Circle" /></td>
<td><img src="image" alt="Limited" /></td>
</tr>
<tr>
<td>Reactive and Voltage Support</td>
<td><img src="image" alt="Circle" /></td>
<td><img src="image" alt="Circle" /></td>
<td><img src="image" alt="Excellent" /></td>
</tr>
<tr>
<td>Slow and arrest frequency decline (arresting period)</td>
<td><img src="image" alt="Limited" /></td>
<td><img src="image" alt="Limited" /></td>
<td><img src="image" alt="Limited" /></td>
</tr>
<tr>
<td>Stabilize frequency (rebound period)</td>
<td><img src="image" alt="Limited" /></td>
<td><img src="image" alt="Limited" /></td>
<td><img src="image" alt="Limited" /></td>
</tr>
<tr>
<td>Restore frequency (recovery period)</td>
<td><img src="image" alt="Incapable" /></td>
<td><img src="image" alt="Incapable" /></td>
<td><img src="image" alt="Incapable" /></td>
</tr>
<tr>
<td>Frequency Regulation (AGC)</td>
<td><img src="image" alt="Excellent" /></td>
<td><img src="image" alt="Excellent" /></td>
<td><img src="image" alt="Excellent" /></td>
</tr>
<tr>
<td>Dispatchability/Flexibility</td>
<td><img src="image" alt="Limited" /></td>
<td><img src="image" alt="Limited" /></td>
<td><img src="image" alt="Limited" /></td>
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</tbody>
</table>

Legend:
- **Excellent**
- **Very Good**
- **Good**
- **Limited**
- **Incapable**

Resilience

- Example from MISO during winter storm Elliot (Operations Report to Entergy Regional State Committee, Feb 13, 2023)

MISO consistently exported power to southern neighbors with a maximum value of nearly 5 GW


*Image represents average flows into and out of MISO December 23, 2022

RDT = Regional Directional Transfer, which has a North-South limit of 3.0 GW and South-North limit of 2.5 GW
Energy prices during Uri

Markets greater than storm footprints help

- Energy exports into shortage regions were stranded
- Regions in blue/purple have excess generation
- Red/orange are experiencing shortages
- A single, large market with significant new transmission would help

SPP, MISO, and others have, or are in process of, revising emergency procedures that include resource sharing during extreme weather
Recommendations

• Large markets have significant benefits to cost, reliability, and resilience
• Market products should be well-defined
• Any resource that is capable of providing a service should be able to compete to provide it
• Transmission is necessary to enable markets to unlock their potential benefits

Numerous studies have confirmed
Questions?
Western Freedom is a broad coalition of large customers working with a diverse set of partners - energy experts, nonprofits, and thousands of grassroots supporters advocating for a more affordable, reliable and cleaner energy future made possible through a Western RTO. Western Freedom is a single-purpose organization focused solely on supporting a Western RTO that holds the largest benefits for customers, while also recognizing the unique needs and makeup of all Western states and utilities.
WHY A WESTERN RTO

Stronger, more reliable grid
Using the latest technology, an RTO will balance supply and demand on the grid across the West – creating a more reliable system, particularly in periods of extreme weather and increased demand.

Low-cost energy
Designed to automatically dispatch the lowest-cost electricity available. Industrial and large commercial customers poised to save a meaningful amount.

Diverse energy resources
A west-wide approach to balancing our grid makes it easier to integrate the variable output of renewable power and new resources like hydrogen. This makes it easier to reach corporate, government, and utility climate and sustainability goals.
Why it matters to large customers?

**Greater reliability:** An RTO enables power-sharing across large regions when subregions are short on generation.

**Low-cost resources:** An RTO provides greater access to low-cost, more diverse resources across the Western region.

**Transparency and data:** An RTO will create more transparency and access to data.

**Regional planning:** Transmission and capacity planning will be more efficient and cost-effective.
Evolving movement

- **Day-ahead markets**
  California ISO EDAM and Southwest Power Pool’s Markets+ competing for participants

- **California governance bill**
  Critical legislation needed in California to open the CAISO market and create equal playing field for all Western states

- **New leadership in some western states**
  2022 elections creating the opportunity to educate and engage new policy makers

- **FERC regulatory dockets**
  Federal action impacted resource adequacy, transmission and markets
CAISO: Extended Day Ahead Market

**FERC process**
- Likely to begin in late Spring 2023
- Likely be extensive stakeholder engagement
- Once FERC approves the application, expected to take 12-18 months for implementation and full launch of EDAM

**Adoption**
- PacifiCorp is the only utility to have committed to EDAM
- Expect several other utilities will commit within the next few months
- Western Freedom signed onto a coalition letter of support to CAISO board and WEIM Governing Body
- EDAM expected to be operational by 2025
- 22 entities participate or committed to participate in Western Energy Imbalance Market
  - 6-month notice requirement to leave WEIM, which has not yet been exercised by any utility
SPP: Markets+

**Stakeholder engagement**
- Detailed service offering issued Nov. 30, 2022
- Next phase of development funded by stakeholders and utilities

**Timeline**
- Phase 1 to begin April 2023, lasting between 12-21 months
- Expect Markets+ to be operational in early 2026

**Adoption**
- BPA, Northwest public power utilities, Arizona utilities committed to fund Phase 1
- Powerex only entity to have committed to Markets+ upon implementation
- 10 entities participating in Western Energy Imbalance Services market
SPP: RTO West

Structure
- SPP’s RTO West is an expansion of SPP’s RTO into the Western Interconnection
- Will be governed by the same body/oversight as currently exists
- The implementation of SPP’s RTO West will happen in parallel with Markets+

Adoption
- Potential market participants who have already proposed to join SPP’s RTO West must officially commit to join by March 1, 2023
- 2-year timeline to fully integrate
- Ability to join depends on whether the Balancing Authority is committing to join
Western Power Pool’s Western Resource Adequacy Program

Program
• Establishes consistent metrics for reliability across the region and all participants must show they have the required capacity to meet those metrics
• When weather conditions or other factors result in different resources in real time than what was forecast, the WRAP can pool resources and enable participants with shortages to obtain resources from those with surplus
• SPP program operator
• PacifiCorp’s announcement committing to both EDAM and WRAP will serve as a forcing mechanism to ensure these programs are compatible

Approval process
• Tariff proposal filed with FERC on Aug. 31, 2022
• FERC issued a deficiency letter requesting more information
• Expect FERC order as soon as this week

Adoption
• 11 utilities announced a formal commitment to participate in the WRAP on Dec. 8, 2022
AB 538: Multistate regional transmission system organization: membership

- Assemblymember Holden introduced AB 538 on Feb. 8, 2023
- Would change CAISO’s governance structure and enable CAISO to transition into a regional transmission organization
- At least 30 days until first hearing
- California has a 2-year legislative session; we are in the first year of the 2023-24 session

Lights On California

- Initial phase: socializing RTO issues (Fall 2022 - Spring 2023)
- Message Development, Communications Infrastructure, Materials
- Coalition-building
- Next phase: Advocacy and active campaigning (March 2023 - end of 2023-24 Session)
- Member Education and Outreach, Coalition Management
- Earned, Social, Paid Media
2023-2024 CAMPAIGN PLAN
Campaign plan assumptions

Core assumptions

• Successful launch and implementation of CAISO’s EDAM is essential.
• Appetite for a Western RTO varies across the western states.
  • Commissioners from several states are still publicly vocal about not wanting to join an RTO with California and are skeptical of RTOs generally.
• Day-ahead market is predicted to build upon benefits already demonstrated by real time markets and build trust across states in regional collaboration.
• The passage of the governance bill in California (2023-2024 session) is a critical milestone to the path toward a Western RTO that includes California.
Campaign goals

**Primary:**
- Secure governance legislation in California in the 2023-24 legislative session
- Amplify customer perspective in SPP’s Markets+ and CAISO’s EDAM
- Develop public benefit narrative to create political cover to secure critical utility support for CAISO’s EDAM

**Secondary:**
- Be known as the voice of customers in the West on RTO matters
- Build partnerships/coalition with utilities in support of a western RTO
- Drive collaboration to achieve faster RTO development
- Shape favorable RTO policy in select states; prevent unfavorable policy from passing that would discourage utility participation in a day-ahead market
- Enable more utilities to participate in day-ahead market by creating political cover and support
- Garner support from select commissions around day-ahead market
- Garner support from rural co-op utility associations
- Build awareness with BPA of the large customers’ position
Target audiences

**Primary**
- Utility executives and decision makers
- Regulators / commissioners in the 11 Western states
- Energy policy makers at the state and, to a lesser extent, federal level in the 11 Western states
- Executives and decision makers at BPA and public power
- Industry influencers
- Labor union leaders
- Residential, commercial and industrial customer advocates

**Secondary:**
- Select western tribal leaders
- Select national energy reporters
- Environmental groups and Environmental and Social Justice influencers
Thank you!

• Lauren McCloy, NW Energy Coalition, lauren@nwenergy.org

• Robin Arnold, Renewable Northwest, robin@renewablenw.org