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Energy and Telecommunications Interim Committee

ELECTRICITY MARKETS AND TRANSMISSION ORGANIZATIONS: MONTANA CONSIDERATIONS

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MARKETING WESTERN POWER

The sale of electricity and related services in the United States varies distinctly from region to region. Utilities in the west and existing regional transmission organizations (RTO) are quickly developing market products to leverage the efficiency in generation and transmission deployment found in a regional power marketing approach. The regional approach to energy deployment, grid development, and energy marketing comes in several forms administered by several entities. The following report provides a baseline knowledge of the concepts surrounding energy markets and transmission organizations, and an understanding of the recent developments concerning Montana.

ELECTRICITY MARKETS

Electricity markets come in several forms ranging from traditional vertically integrated systems to deregulated wholesale markets. Market mechanisms can impact both retail and wholesale market prices and the procurement of generation assets.

Although vertically integrated utilities generate their own electricity, they often trade with other utilities in times of peak demand or lower generation output within their systems.

INVESTOR OWNED UTILITIES IN THE MARKETS

Most investor-owned utilities, prior to the 1990s, operated as vertically integrated monopolies regulated by the relevant public service commission. In Montana, NorthWestern Energy and Montana Dakota Utilities (MDU) operate in a traditional regulatory scheme. Both NorthWestern Energy and MDU operate the grid within the companies' balancing authority.

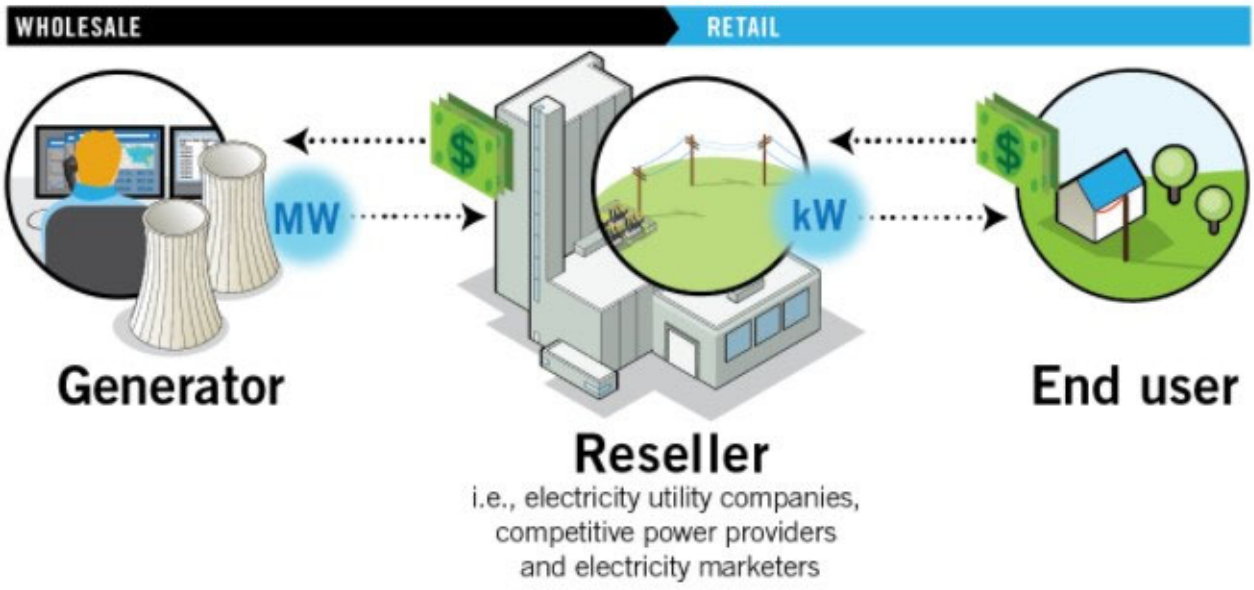
Both utilities receive retail prices set by the PSC and must gain approval for the purchase and deployment of generation assets. Although the companies operate as a traditional monopoly and generate their own electricity, they often trade with other utilities in times of peak demand or lower generation output within their systems.

The resulting wholesale market transactions are subject to Federal Energy Regulatory Commission (FERC) regulation and are still common in the west and southeast were most utilities are regulated monopolies. [1]

[1] Federal Energy Regulatory Commission, *Energy Primer: A Handbook of Energy Market Basics.*

MARKET FORMS

Electricity is traded in both the wholesale and retail markets. Montana utilities own their own generation assets, but may also buy power on the wholesale market to meet needs in their balancing authority. The following graphic illustrates the typical relationship between the wholesale and retail markets.



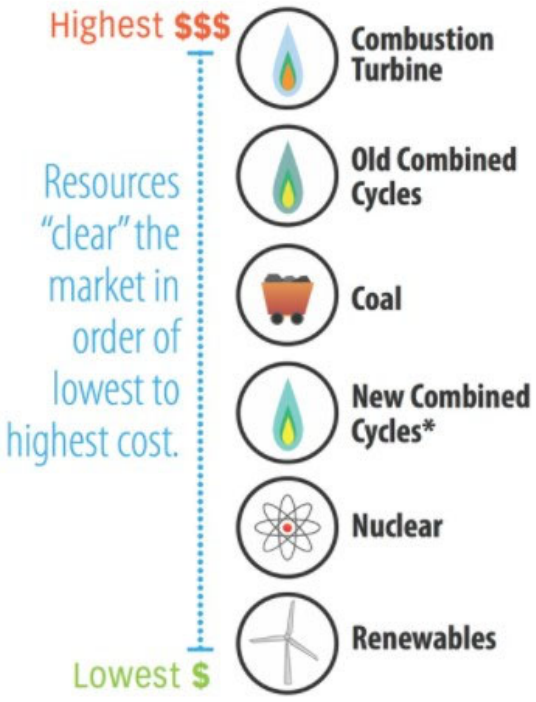
Source: PJM

WHOLESALE ELECTRICITY MARKETS

The wholesale market includes the buying and selling of power between generators and resellers including utility companies, merchant generators and electricity marketers. Most of these markets are regulated by FERC.

The wholesale market starts with generators. The electricity produced by generators is bought by an entity that will buy power for resale to meet demand. Sales typically take place in a market setting or through contracts between individual buyers or sellers. In Montana, utilities own their own generating assets and supplement their portfolio with wholesale power.

The price for wholesale electricity can be predetermined by a buyer and seller through contract or it can be set by organized wholesale markets. The clearing price for electricity in these wholesale markets is determined by an auction in which generation resources offer in a price at which they can supply a specific number of megawatt-hours of power.



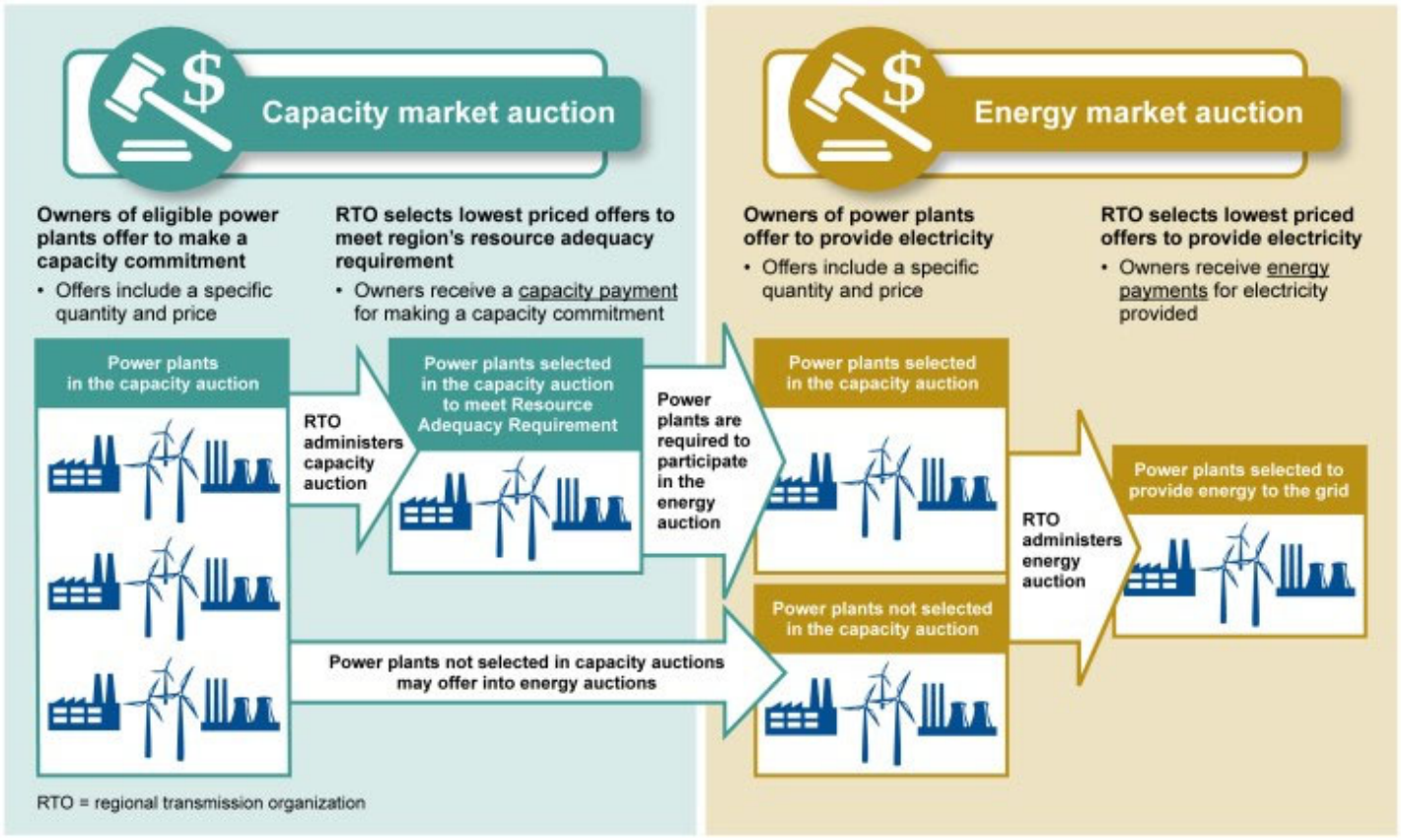
If a resource submits a successful bid and contributes its generation to meet demand, it "clears" the market. The cheapest resource will "clear" the market first, followed by the next cheapest option until demand is met. When supply matches demand, the market is "cleared," and the price of the last resource to offer in (plus other market operation charges) becomes the wholesale price of power.[2]

The California Independent System Operator's (CAISO) Western Energy Imbalance Market is one example of a wholesale electricity market.

CAPACITY MARKETS

Electricity retailers are required by the North American Electric Reliability Corporation (NERC), to support enough generating capacity to meet forecasted load plus a reserve margin to maintain grid reliability. Some RTOs run a capacity auction to provide retailers with a way to procure their capacity requirements while also enabling generators to recover fixed costs, or costs that do not vary with electricity production, that may not be covered in the energy markets alone.

The capacity market auction works as follows: generators set their bid price at an amount equal to the cost of keeping their plant available to operate if needed. Similar to the energy market, these bids are arranged from lowest to highest. Once the bids reach the required quantity that all the retailers collectively must acquire in order to adequately meet expected peak demand plus a reserve margin, the market "clears", or supply meets demand. At this



[2] PJM Learning Center

point, generators that "cleared" the market, or were chosen to provide capacity, all receive the same clearing price which is determined by the bid price of the last generator used to meet demand.

Payments to generators in the capacity market are essentially a reward for that generator being available to operate and provide electricity if needed. If generators are unavailable to operate during a time when they are called upon, they may face penalties under capacity performance requirements.[3]

ANCILLARY SERVICES MARKETS

RTOs also employ ancillary services markets to account for attributes that are not covered in the energy or capacity markets. These typically include functions that maintain grid frequency and provide short-term reserve power.

MONTANA MARKET DEVELOPMENTS

Several entities are developing or expanding wholesale energy markets in the west. These include the following:

- Western Energy Imbalance Market (CAISO);
- Northwest Power Pool Resource Adequacy Program; and
- Southwest Power Pool Imbalance Service.

WESTERN ENERGY IMBALANCE MARKET (CAISO)

The Western Energy Imbalance Market (EIM) began operations in 2014 allowing for market sales of excess energy generation in five-minute intervals. NorthWestern Energy entered the market in 2021. The EIM includes the following participants:

Active

- NorthWestern Energy – entered 2021
- Los Angeles Department of Water & Power – entered 2021
- Public Service Company of New Mexico – entered 2021
- Turlock Irrigation District – entered 2021
- Salt River Project – entered 2020
- Seattle City Light – entered 2020
- Balancing Authority of Northern California – entered 2019
- Idaho Power Company – entered 2018
- Powerex – entered 2018
- Portland General Electric – entered 2017
- Puget Sound – entered 2016
- Arizona Public Service – entered 2016
- NV Energy – entered 2015
- PacifiCorp – entered 2014

[3] Government Accountability Office, *Electricity Markets: Four Regions Use Capacity Markets to Help Ensure Adequate Resources*

- California ISO – entered 2014

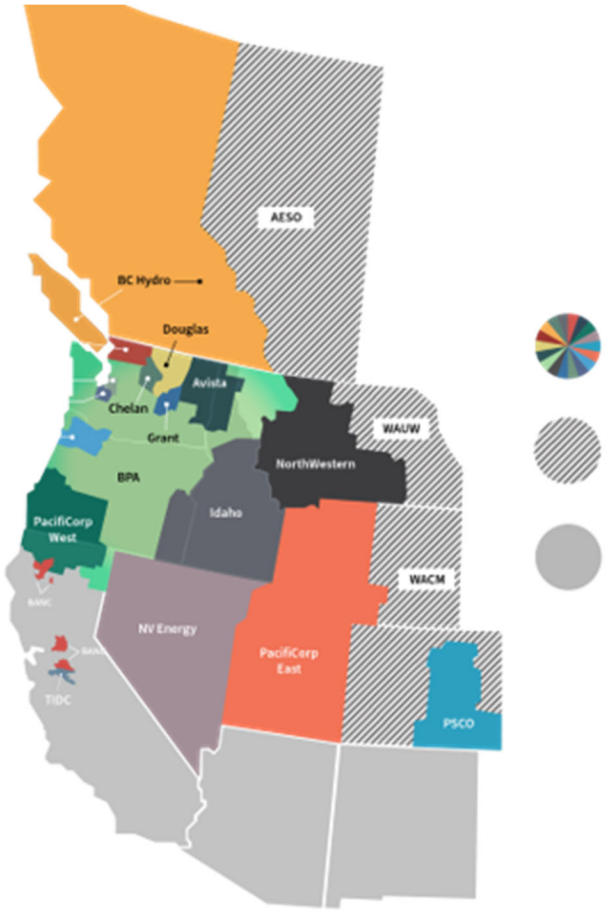
Pending

- Avista – entry 2022
- Tucson Electric Power – entry 2022
- Tacoma Power – entry 2022
- Bonneville Power Administration – entry 2022
- Avangrid – entry 2023
- El Paso Electric – entry 2023[4]

NORTHWEST POWER POOL RESOURCE ADEQUACY PROGRAM

The Northwest Power Pool (NWPP) and its members began developing a Western Resource Adequacy Program (WRAP) in 2019. The NWPP operates programs to improve electric sector coordination in the Northwest. The group announced in August the hiring of the Southwest Power Pool (SPP) for administration of the program.

The program is currently voluntary and aims to assist participating members during extreme grid events. WRAP is seeking utility commitments ahead of the expected operational start of the program in 2024.[5]



SPP WESTERN ENERGY IMBALANCE SERVICE

The Western Energy Imbalance Service (WEIS) began operation in February 2021. It dispatches power in five-minute intervals and includes portions of Arizona, Colorado, Montana, Nebraska, South Dakota, and Wyoming. [6]

[4] CAISO, Western Energy Imbalance Market
[5] Northwest Power Pool
[6] Southwest Power Pool

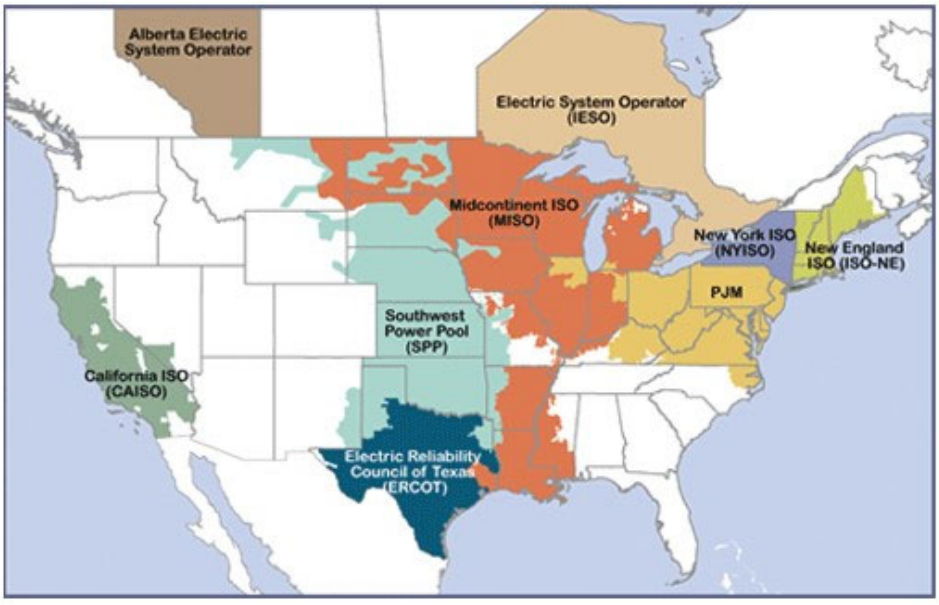
REGIONAL TRANSMISSION ORGANIZATIONS AND INDEPENDENT SYSTEM OPERATORS

Regional transmission organizations and independent system operators (ISO) are essentially responsible for coordinating, operating, and monitoring a large regional grid system within their jurisdiction. RTOs and ISOs also operate markets within their systems. The major differences between an RTO or ISO and an energy market program are found in the following chart.

RTOs/ISOs	Markets
RTOs/ISOs maintain transmission grid reliability, conduct long-term transmission planning, and operate the grid	Only trades excess energy, capacity, or ancillary services
Schedules least-cost generation resources through markets	Participants commit to ensuring capacity resources to meet demand on their own systems
Controls the operation of the regional transmission system	Transmission owners retain operational control of the company's individual system.
Provides the platform for energy markets	

Regional organizations exist in seven regions of the United States and include the:

- New England ISO;
- New York ISO;
- PJM ;
- Midcontinent ISO;
- Southwest Power Pool;
- Electric Reliability Council of Texas; and
- California ISO



Each of the ISOs and RTOs have energy and ancillary services markets in which buyers and sellers can bid for or offer generation. The ISOs and RTOs use bid-based markets to determine economic dispatch.[7]

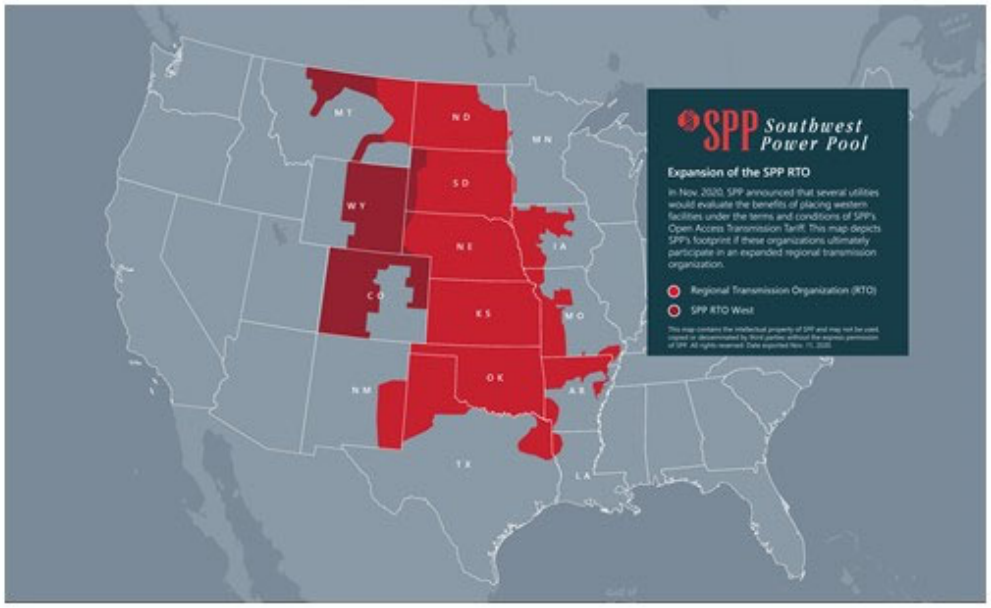
FERC tasked the RTOS with the following functions:

- Regional coordination

[7] Federal Energy Regulatory Commission, *RTO and ISOs overview*

- Planning and expansion of the transmission system
- Market monitoring
- Ancillary services provider
- Grid congestion management; and
- Tariff administration and design.[8]

MONTANA RTO DEVELOPMENT



SPP is currently working on the expansion of its RTO into the Western interconnection including Colorado, Montana, and Wyoming. The RTO plans to file with FERC in October 2022 with plans to be operational in 2024.[9]

POLICY CONSIDERATIONS

As utilities across the west explore potential efficiencies in regional market approaches or potential RTO development, several western states including Arizona, New Mexico, and Oregon are beginning to formally study the potential benefits of RTO and market participation. In 2021, both Colorado and Nevada passed laws requiring wholesale market membership for utilities in those states.

[8] FERC Orders 888 & 889
[9] SPP RTO West Overview