July 2022

Energy and Telecommunications Interim Committee

Trevor Graff

FINAL REPORT TO THE 68TH MONTANA LEGISLATURE

A FUTURE ELECTRIC GRID: SJ33 STUDY OF ELECTRIC GRID MODERNIZATION

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This report is a summary of the work of the Energy and Telecommunications Interim Committee, study of Senate Joint Resolution 33 (2021). This report highlights key information from the study. Additional information, including audio minutes, exhibits, and a digital version of this report with links is available at the ETIC website: https://leg.mt.gov/committees/interim/etic/

INTRODUCTION AND COMMITTEE RECOMMENDATION

With the passage of Senate Joint Resolution 33 (SJ 33), the 2021 Montana Legislature directed the Energy and Telecommunications Interim Committee to conduct extensive research on electric transmission grid issues in Montana.

SJ 33 directed the committee to study the following:

1. future capacity requirements of our state energy grid, including but not limited to the role and contribution of regional markets to that state requirement;
2. expected in-state technological sources of that generation capacity, considering delivered price, environmental stewardship, flexibility, and cost benefit;
3. the impact of future electricity loads that may drive future capacity requirements, including electric transportation and increased electric water and space heating;
4. the contributions of nongeneration technologies to achieve a more efficient, lower-peak grid, including but not limited to utility-scale energy efficiency, demand side management, storage, and advanced meters; and
5. the role of the private sector, regulated utilities, and state government in the development of the future grid.

Committee members conducted extensive panel discussions to gather information on a range of grid topics. Members focused their work on information gathering to provide the following report aimed at informing legislators in advance of the 2023 session.

ETIC members acknowledged the dynamic changes to the organization and infrastructure of the grid, occurring both regionally and nationally. The committee did not recommend specific legislation during its interim session.

ELECTRICITY MARKETS AND TRANSMISSION ORGANIZATIONS

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.

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.

> 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.

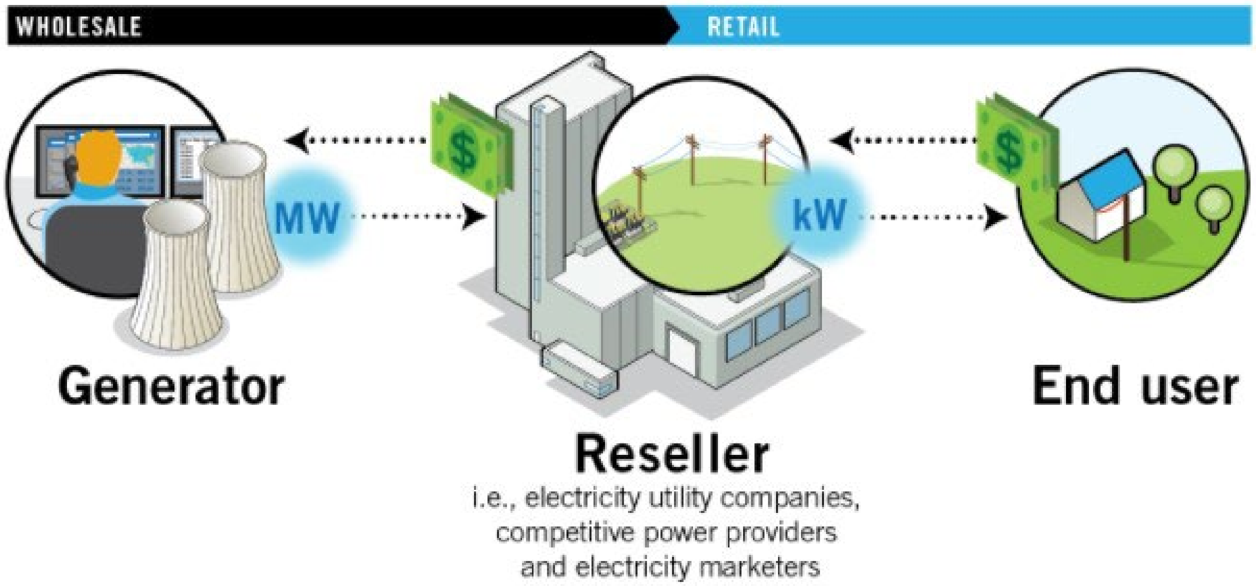
Both utilities receive retail prices set by the PSC and must gain approval for the purchase and deployment of generation assets. Although the companies operate as a traditional monopoly and generate their own electricity, they often trade with other utilities in times of peak demand or lower generation 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 where most utilities are regulated monopolies. [1]

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.

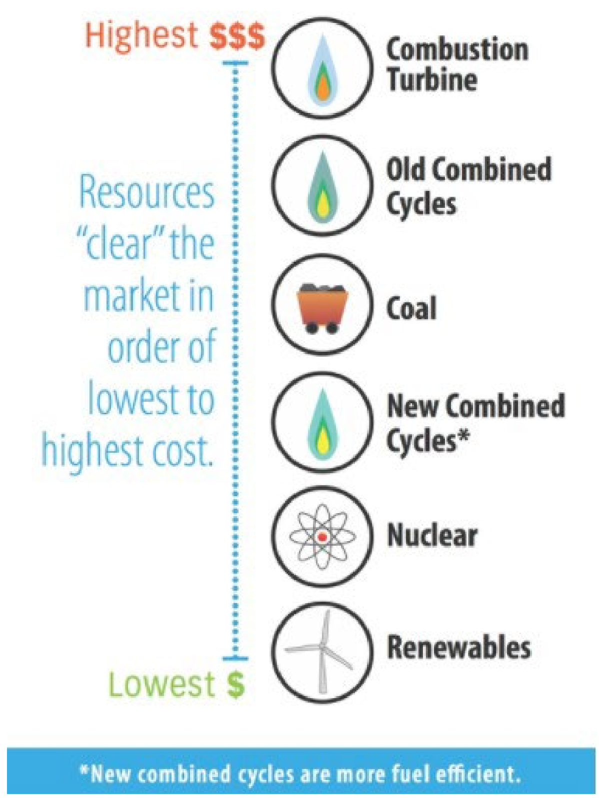
[1] Federal Energy Regulatory Commission, *Energy Primer: A Handbook of Energy Market Basics.*



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.

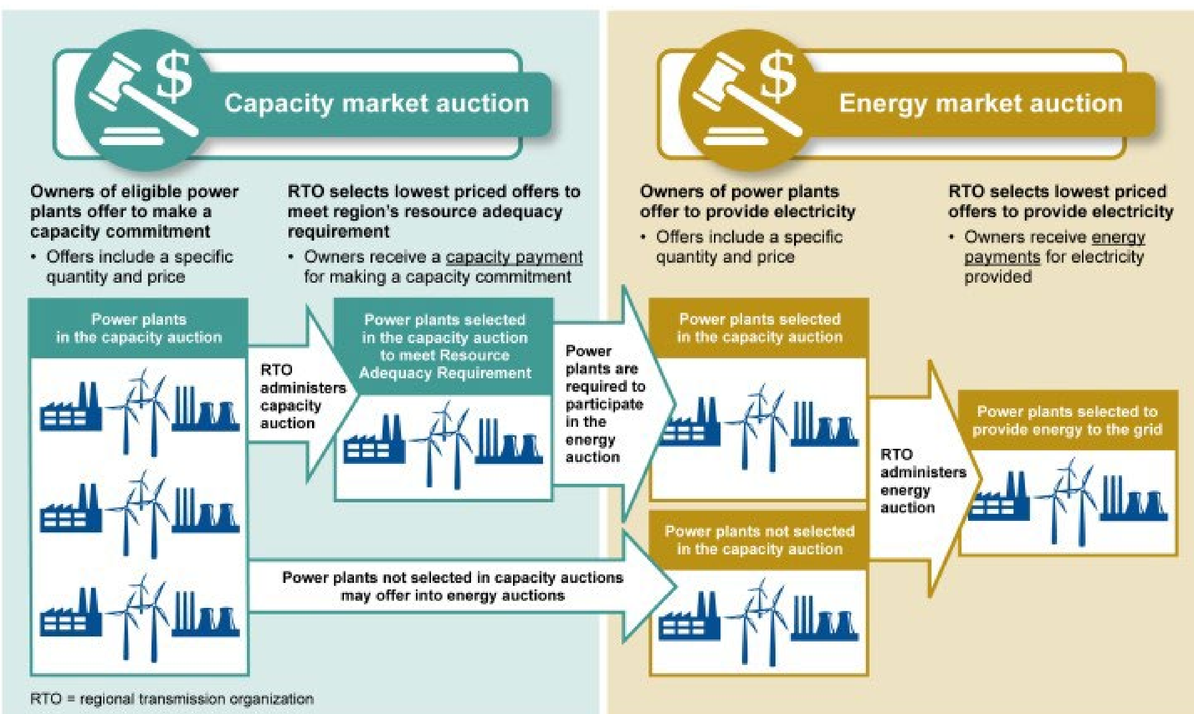
If a resource submits a successful bid and contributes its generation to meet demand, it “clears” the market. The cheapest resource will “clear” the market first, followed by the next cheapest option until demand is met. When supply matches demand, the market is “cleared,” and the price of the last resource 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



2 PJM Learning Center

market "clears", or supply meets demand. At this 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:

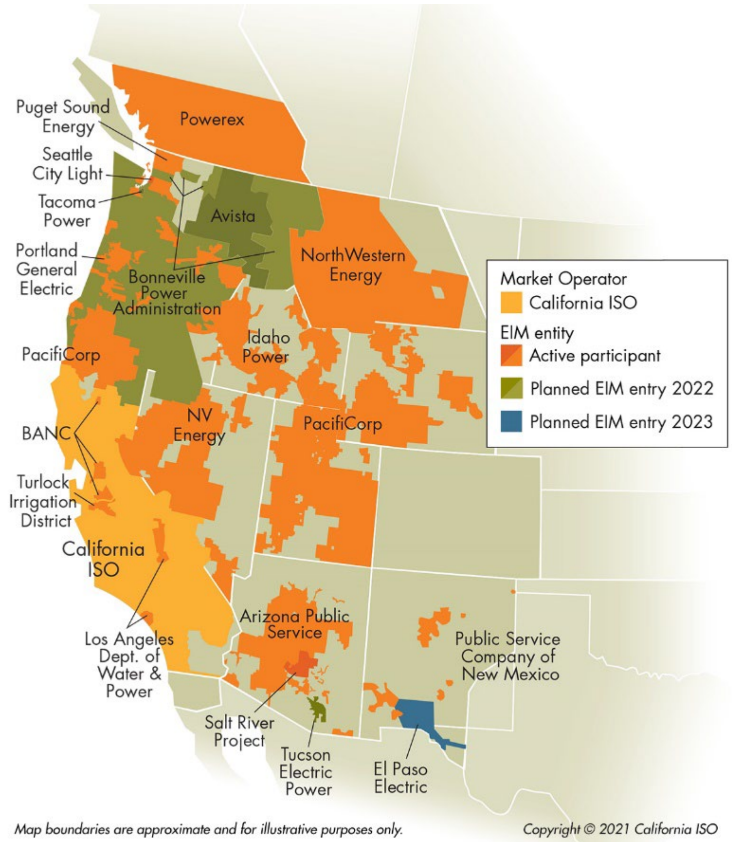
- Western Energy Imbalance Market (CAISO);
- Northwest Power Pool Resource Adequacy Program; and
- Southwest Power Pool Imbalance Service.

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:

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

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
- California ISO – entered 2014
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Pending

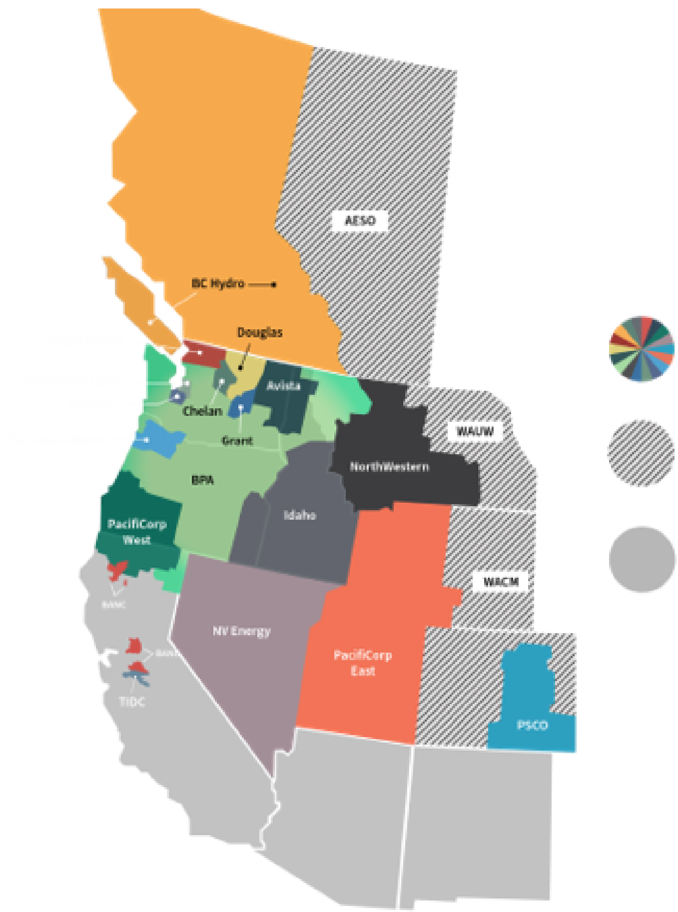
- Avista – entry 2022
- Tucson Electric Power – entry 2022
- Tacoma Power – entry 2022
- Bonneville Power Administration – entry 2022
- Avangrid – entry 2023
- El Paso Electric – entry 2023[4]

[4] CAISO, Western Energy Imbalance Market

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]

Regional Transmission Organizations and Independent system operators

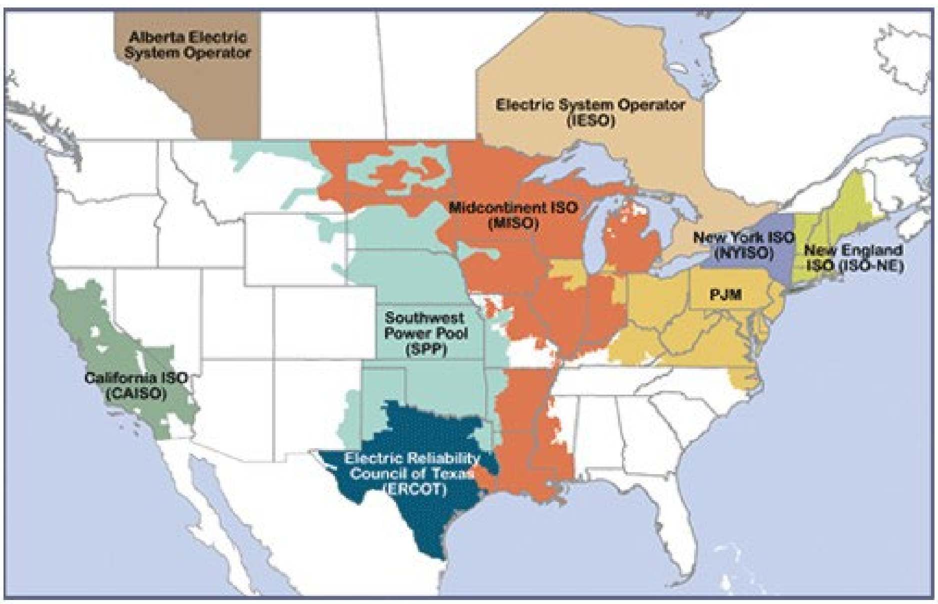
Regional transmission organizations and independent system operators (ISO) are essentially responsible for coordinating, operating, and monitoring a large regional grid system within their jurisdiction. RTOs and ISOs also operate markets within their systems. The major differences between an RTO or ISO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

[5] Northwest Power Pool
[6] Southwest Power Pool

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]

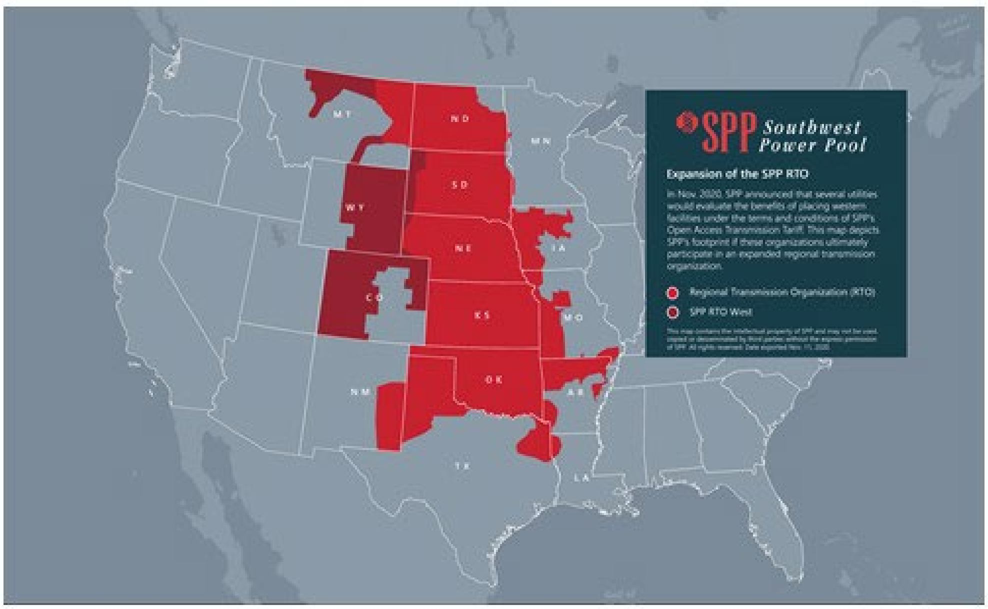
FERC tasked the RTOS with the following functions:

- 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]

Market 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

Grid Technology

ETIC convened several panels related to Grid technology during its interim work. The following are brief recaps of each.

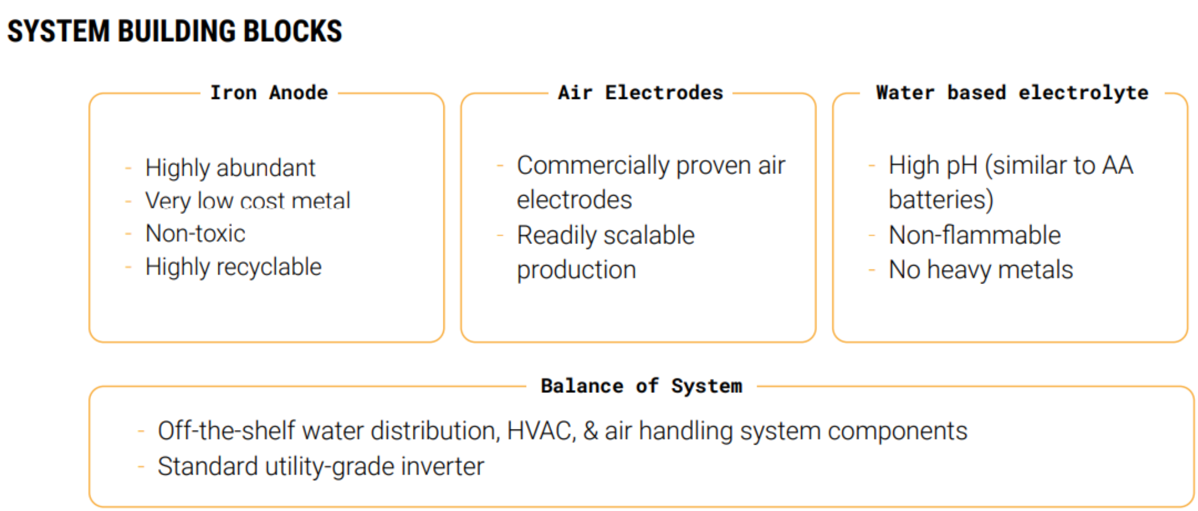
Battery Storage

At its May meeting, Form Energy, an energy storage developer, joined ETIC to discuss the future of long-duration batteries.

Rachel Wilson of Form Energy told the committee that the company is addressing the following grid challenges through the development of its approximately 100-hour duration battery system:

1. Retirement of existing generation resulting in firm capacity shortfalls;
2. Intermittency of renewable assets creating periods of undersupply;
3. Extreme weather events are more frequent and disruptive to customers; and
4. Increased transmission congestion and long interconnection queues.

The company's design relies on static, iron-air battery technology comprised of components found in the figure below.

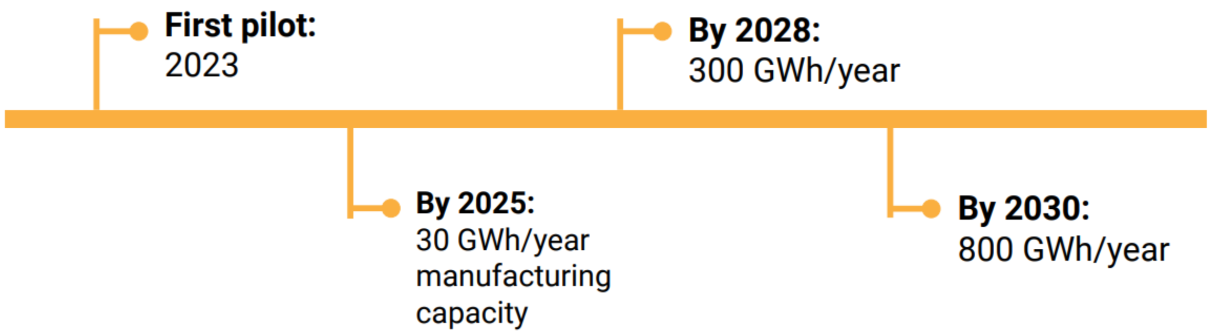


The technology would provide three key services to the current transmission system:

1. Firm Capacity
    a. Helps to react to intermittent renewables at both the asset- and system-level, including over multi-day generation lulls, and reduce uneconomic renewable energy curtailment
    b. Provides another option for dispatchable power on the system.
2. Flexibility

   a. Shapes portfolio output to meet any load profile and respond quickly enough to meet flexible and fast ramping needs.
3. Optimization
   a. Reduces transmission grid congestion, increase the total amount of low-cost renewable energy that flows across transmission boundaries, and reduce needs for new transmission lines. [10]

The company expect the technology to deployed on the following timeline:



Local Activity

At the same meeting, Brandon Wittman of Yellowstone Valley Electric Cooperative updated the committee on the company's effort to deploy batteries near Billings, Mont. Wittman said the project is near financial feasibility and would include deploying up to 1 megawatt of battery storage in order to save customers from paying for more expensive power in peak energy demand conditions.

The project is aimed at:

1. Reducing peak demand charges;
2. Increase local distribution reliability;
3. Providing power delivery during system maintenance; and
4. offsetting intermittent renewable generation and frequency response during voltage fluctuations.

The following is a representation of YVEC's economic modeling for the project.

[10] "Breakthrough Low-cost, multi-day energy storage" Rachel Wilson, Manager of Strategy & Market Development, Form Energy

			Company					
Battery System			Company A		Company B		Company C	
Battery Size	Time Frame	Rated Capacity	Cost	Yrs to Payoff	Cost	Yrs to Payoff	Cost	Yrs to Payoff
250 kW	4 hrs	1 MWh	$575,000.00	9.76	$682,005.00	11.58	$625,000.00	10.61
500 kW	4 hrs	2 MWh	$1,150,000.00	9.76	$1,064,689.00	9.04	$1,250,000.00	10.61
1 MW	4 hrs	4 MWh	$2,300,000.00	9.76	$1,766,598.00	7.50	$2,250,000.00	9.55

Ultimately, YVEC decided to wait a bit longer for the price of battery technology to decrease. Wittman said the cooperative is still actively considering deploying the systems in the near future.[11]

Advanced Metering

In the same meeting, the committee, examined the future of smart metering technology with energy consultant Chris Villarreal of Plugged In Strategies.

Introduction

Advanced metering infrastructure (AMI) is defined as an integrated system of smart meters, communications networks, and data management systems that enables two-way communication between utilities and customers. Customer systems include in-home displays, home area networks, energy management systems, and other customer-side-of-the-meter equipment that enable smart grid functions in residential, commercial, and industrial facilities.[12]

Data Collection

Depending on utility needs, digital meters collect and stores kWh readings recorded in 15 to 60 minute increments. The data is transmitted back to the utility multiple times per day. AMI equipped meters collect readings regarding the amount of power, current, and voltage.

Infrastructure

Advanced metering infrastructure typically includes two radios. The first communicates on the grid with the utilities. The second communicates with the home itself. The radios are capable of sending information every seven seconds, providing usage, rate and cost information to the utility.

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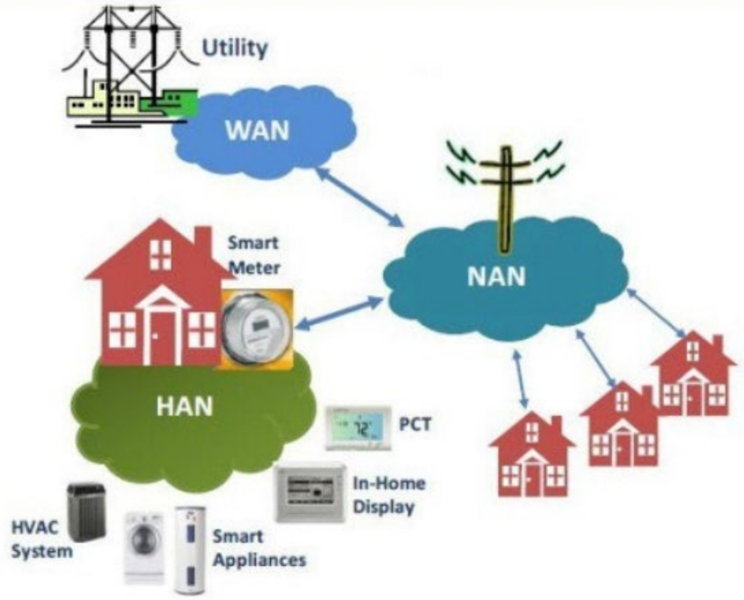
[11] "Battery Storage Systems," Brandon Wittman, Yellowstone Valley Electric Cooperative
[12] "Advanced Metering Technology Overview" Chris VIllareal, Plugged In Strategies, May 19, 2022



Advanced Metering Infrastructure with Home Area Networking

Energy Efficiency

Energy efficiency resource standards (EERS), adopted by 27 states over the past 20 years, are a tool for driving energy and cost savings, propelling more than 80% of utility-sector electricity savings in 2017. In that year, states with an EERS in effect achieved incremental electricity savings of 1.2% of retail sales, on average, compared with average savings of 0.3% in states without an EERS. The following figure provides a snapshot of potential and current savings related to energy efficiency programs.

State Approaches

Increased focus on emissions reductions, least-cost resource planning, and equity have caused states to look for new frameworks for setting energy savings goals.

States have taken three main approaches as they revise EERS policies: adopting resource-specific reduction targets, fuel-neutral reduction targets, and multiple-goal approaches that may combine these two strategies.

States have also chosen to work within existing EERS frameworks and steer efficiency investments using seven additional tools: carve-outs, tracking, performance incentives, cost-effectiveness rules, program design, spending, and separate portfolios.

Frameworks with multiple goals, especially where they include both fuel-neutral and resource-specific targets, are best positioned to meet long-term aims, including climate and clean energy objectives according to the American Council for an Energy Efficient Economy.[13] The following are case studies from five states that have adopted robust energy efficiency standards.

California

Structure of EERS

- Targets for IOUs are established through a rolling process every two years and cover a 10-year period.
- Separate targets exist for electricity, natural gas, and demand reduction.
- Program administrators develop business plans detailing how they expect to meet targets.
- Utilities are required to shift 60% of program delivery to third-party implementers by the end of 2022 through a competitive bidding process.

Drivers of change

- Push toward decarbonization driven by legislation and executive order (SB350, AB3232, SB1477, EO B-55-18)
- Market transformation linked to efforts to institutionalize decarbonization strategies
- Better integration of efficiency into integrated resource planning

Current status

- Traditional energy savings goals (kWh, therms, and MW) for IOUs set by the CPUC
- Energy savings targets including components for resource acquisition and savings from codes and standards.
- Layered approach to statewide energy savings goals. Nonutility energy savings are tracked by the California Energy Commission in order to assess progress toward state energy and climate goals.

[13] Next Generation Energy Efficiency Standards, Rachel Gold, Annie Gilleo, and Weston Berg, American Center for an Energy Efficient Economy.

Hawaii

Structure of Energy Efficiency Portfolio Standard (EEPS)

- 4,300 GWh of statewide electricity savings by 2030
- Annual cycles, cumulative performance measurement in three-year cycles, and five-year reports to legislature
- Most programs and savings (80%) delivered by third-party administrator Hawaii Energy, which is under contract to the Hawaii Public Utilities Commission (PUC)
- Hawaii achieved its 2015 interim reporting goal and appears on track to meet its 2020 interim goal (Hawaii PUC 2018).

Drivers of change

- High penetration of renewables, and desire for customer-side energy efficiency investments to provide additional time- and location-specific value to the grid
- Energy affordability challenges pushing stakeholders to ramp up equity achievement from energy efficiency, especially for low-income families and small businesses
- Focus of system energy efficiency on lighting has largely evolved to other end uses and sources of grid value.

Current status

- No changes have been made to the EEPS yet. In its report to the legislature in December 2018, the PUC indicated that it will consider changes to the EEPS framework, including goals and metrics (HI PUC 2018).
- The PUC has initiated an update of the 2014 Energy Efficiency Potential Study to help evaluate the long-term goals.
- Hawaii Energy has begun the process of revising those goals and has proposed goals that address three areas: (1) clean energy transition, (2) accessibility and affordability, and (3) economic development and market transformation.

Massachusetts

Past structure of EERS

- The state's Green Communities Act (GCA) of 2008 established the policy framework requiring electric and gas program administrators to develop statewide electric and gas efficiency investment plans.
- Efficiency programs also serve parallel goals for emissions reductions and clean energy job creation established by the state's 2008 Global Warming Solutions Act.

Drivers of change

- Anticipated reductions in claimable savings for lighting changes in industry standard baseline
- The need to more closely align energy efficiency with GHG reduction goals
- Emphasis on containing capacity cost and peak period energy costs as well as strengthening grid resilience
- Increased efforts to serve all customers, including income-eligible, moderate-income, and rental customers, as well as non-English-speaking customers

New structure of EERS

- An Act to Advance Clean Energy of 2018 amended the Green Communities Act, broadening the definition of efficiency to include:
  - Focus on reducing overall energy use through measures such as strategic electrification and fuel conversion to renewable energy sources and other clean energy technologies
  - Addition of new Active Demand Reduction Offerings including energy storage, and corresponding targets, to reduce summer and winter peak demand

Current status

- Savings targets continue to be based on the GCA's specified goal to attain all available cost-effective electric and gas savings and demand reduction, negotiated through collaboration between PAs, the Energy Efficiency Advisory Council, and the Department of Energy Resources and approved by the Department of Public Utilities.
- The recently approved 2019–2021 plan calls for electricity savings of 3,461,000 MWh (2.7% of retail sales). Natural gas targets are set at 1.25% of retail sales for 2019–2021.
- As PAs increasingly embrace strategic electrification, they will not specifically recommend one fuel over another, but they do intend to educate customers about the environmental and cost benefits of converting from heating fuels to electric heat or high-efficiency natural gas equipment.

Minnesota

Structure of EERS

- Energy efficiency spending requirements have been in place for utilities since 1991. However these have been overtaken by energy savings goals of 1.5% for electric and gas utilities established under the 2007 Next Generation Energy Act.
- Under the state's large customer opt-out provision, approximately 13% of electric load and gas sales are exempt from contributing to the Conservation Improvement Program's energy efficiency offerings.

Drivers of change

- Anticipated dip in potential savings from lighting upgrades beginning in 2022, due to EISA lighting standards scheduled to take effect in 2021
- Increasing interest in exploring opportunities to achieve greater carbon savings and grid optimization by enabling beneficial electrification. Minnesota's grid has grown cleaner through the ongoing replacement of fossil fuel–generated electricity in line with current state policies requiring a reduction of carbon emissions by 80% from 2005 levels by 2050.

Current status and next steps

- Utilities have proposed expanding eligible Conservation Improvement Program (CIP) offerings to measures that do not produce energy savings but do provide other clean energy benefits, such as reduced carbon emissions and load shifting.
- A 2020–2029 Energy Efficiency Potential Study led by the Center for Energy and Environment (CEE) found that declines in claimable lighting savings could be made up through transitioning programs to non-lighting technologies, particularly air source heat pumps, even with the current prohibition on fuel switching in place. Lifting this restriction would make available even greater levels of savings.
- Fuel switching is currently prohibited under a 2005 Minnesota Department of Commerce (DOC) order. A legislative proposal that would lift this prohibition did not pass in 2019.
- The DOC is also exploring other, non-legislative channels to pursue electrification, such as potentially rescinding the department rule prohibiting fuel switching. The DOC has received a US Department of Energy State Energy Program (SEP) grant for a two-year study to produce a statewide electrification plan.

New York

Past structure of Energy Efficiency Performance Standard (EEPS)

- Separate incremental annual savings targets for electricity and natural gas for investor-owned utilities
- Long-term (10-year) electricity and fuels savings targets for NYSERDA Clean Energy Fund (CEF)

Drivers of change

- Push toward decarbonization in Governor Andrew Cuomo's 2018 State of the State and New Efficiency New York goals, including desire to support beneficial electrification
- Market animation efforts in ongoing Reforming Energy Vision (REV) process, alongside ongoing pressure to improve resource acquisition performance
- Concerns about energy efficiency costs over time

New structure of EEPS

- Statewide all-fuels energy savings (TBtu) goal for buildings and industrial sectors, replacing separate resource-specific goals only
- Incremental annual savings targets for investor-owned utilities and long-term savings targets for NYSERDA CEF remain core commitments to deliver the statewide goal.
- Separate electricity savings annual sub-target of 3% of sales by 2025 (kWh), with investor-owned utilities responsible for 2% and the remainder through NYSERDA, codes and standards, and other state activities
- Savings carve-out for heat pumps in the targets for investor-owned utilities
- Spending carve-out on incremental new investments of 20% for low- and moderate-income (LMI) programs

Current status and next steps

- December 2018 order set new structure of EERS for 2021–2025. Utilities (in consultation with NYSERDA) filed a proposal for accelerated annual incremental targets in April 2019 and a revised proposal in May. Subsequent order is expected by the end of 2019.
- Investor-owned utilities will propose updated utility performance incentives in their individual rate cases to align with new policy direction in the December order.
- The utilities and NYSERDA will develop implementation plans and then effect those plans, which may include the creation of a statewide heat pump program, more uniform contractor requirements, and a statewide LMI platform (New York PSC 2019).

[14]

Transmission line technology

The committee heard in public testimony the potential benefits of upgrading often antiquated transmission lines with modern more conductive technologies like those of CTC Global Inc.

[14] Next Generation Energy Efficiency Standards, Rachel Gold, Annie Gilleo, and Weston Berg, American Center for an Energy Efficient Economy.

THE FUTURE GRID

At the committee's final SJ 33 panel discussion, members took a closer look at the future of the grid with a panel including the following grid national grid experts:

- Ben Serrurier of the Rocky Mountain Institute;
- Ric O'Connell of GridLab; and
- Rob Gramlich of Grid Strategies, LLC.

The group highlighted several points on grid topics including the following:

Future energy resources

- The cost of carbon free resources has fallen dramatically in the last decade and provided scalable, tailored solutions to provide further generation capacity to the grid.
- Clean technologies exhibit different capital structures with reduced exposure to fuel price spikes inherent in certain generation assets. This structure can lead to lower costs for consumers per kw/hr.
- The rapid development of communications and computing equipment makes it possible to monitor electricity use at a granular level to unlock the benefit of certain technologies like battery storage and solar generation.
- Utilities should avoid fixating on one resource and maintain transparent resource planning procedures that blend all of the available assets in a least-cost methodology for maintaining sufficient grid reliability and capacity.
- The group highlighted two studies that provide examples relevant to planning future resource and grid deployment decisions in the Pacific Northwest:
    - *The State-led Market Study* by Energy Strategies, https://static1.squarespace.com/static/59b97b188fd4d2645224448b/t/6148a012aa210300cbc4b863/1632149526416/Final+Roadmap+-+Technical+Report+210730.pdf
    - *Regional Transmission Organization Study: Oregon Perspectives* by the Oregon Department of Energy

Distributed Generation

- Distributed energy resources (DER) are hosted customer generation and intelligent load. The shift to DERs might mirror the shift exhibited in the telecommunications industry from one phone company to several companies providing exacting services specific to individual needs.
- Increasingly capable electronics, computing and communications technology has allowed for more specific grid monitoring and control allowing the deployment of distributed generation to better harden the grid in specific cases of need.
- Distributed resources can contribute to reliability in circumstances where remote customers or hard to service transmission lines create recurring outages.

- The electrification of the transport and building sectors will require more resilient grids. DERs and battery storage provide flexibility to the grid in times of local constraints.
- Barriers remain for the build out of distributed energy generation. Utilities are still learning the implications of the technology on their systems. Compensation models remain contentious among some utility companies and further deployment will require flexibility from monopoly utilities and potentially rethinking the current regulated business model of utilities.

Market development

- The west is currently exhibiting momentum in the formation of energy markets.
- Energy export states have the most to gain from regional markets. Montana can continue as a major export state with a healthy energy mix that includes renewable resources deployment.
- Markets provide a region with a more diverse supply of power resources providing benefits to both consumers and the transmission system.
- *The State-led Market Study* by Energy Strategies, found more than $50 million in benefits in the formation of a western regional transmission organization.

Appendix A:
Energy and Telecommunications Interim Committee Members

Before the close of each legislative session, the House and Senate leadership appoint lawmakers to interim committees. The members of the Energy and Telecommunications Interim Committee, like most other interim committees, serve one 20-month term. Members who are reelected to the Legislature, subject to overall term limits and if appointed, may serve again on an interim committee. This information is included in order to comply with 2-15-155, MCA.

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