

OREGON ENERGY STORAGE POLICY

STORAGE POLICY SNAPSHOT

Does Oregon have a renewables mandate?	YES; 50 percent by 2040 for IOUs; between 5 and 25 percent by 2025 for other utilities
Does Oregon have a state mandate or target for storage?	YES, utilities under the Oregon PUC's jurisdiction must have a minimum of 5 MWh of energy storage in service by 1/1/2020.
Does Oregon offer financial incentives for energy storage development?	YES
Does Oregon have a policy for the strategic deployment of Non-Wires Alternatives or Distributed Energy Resources to defer, mitigate, or obviate need for certain T&D investments?	NO
Does Oregon have a policy addressing multiple use applications for storage?	NO
Does Oregon have a policy that allows for utility ownership of storage assets?	YES
Does Oregon allow or mandate the inclusion of energy storage in utility IRPs?	NO
Has Oregon modified its permitting or interconnection requirements specific to energy storage?	NO
Does Oregon allow customer-sited storage to be eligible for net metering compensation?	UNCLEAR
Has Oregon revised its rate structures to drive adoption of behind-the-meter storage	UNCLEAR
Approximate development of storage capacity in Oregon	?

STORAGE POLICY ASSESSMENT

Oregon deserves its place in the top tier of states that are defining new, precedent-setting energy storage policies that other states across the country are closely watching. Oregon's steps toward defining energy storage policy have received much attention from the energy sector as the state continues to wrestle with a number of unique market challenges. While mass deployment of energy storage solutions may still be several years or more away, Oregon continues to make progress to "get its house in order" for the expected, significant acceleration of both renewable energy and storage technologies within the state.

Let's first assess Oregon's policy-making progress to date. For starters, Oregon was one of the first states to follow in California's footsteps to implement a statewide energy storage mandate. By setting a mandate through legislative and regulatory policy directives, Oregon now requires that utilities under the jurisdiction of the Oregon Public Utilities Commission (Oregon PUC) must have a minimum of 5 MWh of energy storage in service by 1/1/2020. It is true that this mandate is rather small compared to mandates adopted in the four other states that at this time also have storage procurement targets (California, 1,825 MW by 2020; Massachusetts, 200 MW by 2020; New Jersey, 2,000 MW by 2030; and New York, 3,000 MW by 2030). However, despite this comparatively low storage target, it is hard to envision scenarios that would not involve storage if Oregon is to meet its broader clean energy objectives.

The two utilities that are impacted by this mandate are Portland General Electric, which serves most of the customers in and around the Portland metropolitan area, and Pacific Power (a subsidiary of PacifiCorp, which is part of the larger Berkshire Hathaway company's suite of utility assets), which serves the southern and eastern parts of Oregon. Both utilities are presently pursuing energy storage projects (details provided below). Together, Pacific Power and PGE provide 70 percent of Oregon's electricity, and a large portion of that electricity originates from coal power from both in-state and out-of-state facilities. Portland General Electric's Boardman facility is the only coal plant located in Oregon and it is scheduled to close by 2020. The utility, however, also imports coal power from Montana and Pacific Power imports 65 percent of its power from over 20 out-of-state coal plants located throughout the Western U.S.

Oregon has an aggressive renewables mandate, which requires the utilities to obtain 50 percent of the power sold to retail customers from renewable sources by 2040. This puts Oregon into an elite group of states that have set 50 percent or higher targets for renewable energy, which also include California and New York (both of which have set 50 percent targets by 2030; Vermont, which has set a 75-percent target by 2032; and Hawaii, which has a 100-percent target by 2045).

Oregon's RPS puts it on track to meet its aggressive greenhouse gas reduction goals, which call for reducing carbon emissions 75 percent below 1990 levels by 2050. The state also has a commitment to eliminate all coal-fired generation by 2035. This is a policy platform that has been embraced and advanced by Oregon's current governor Kate Brown (D), who has been in office since 2015. Gov. Brown campaigned on the issue of climate action, and along with

approving several key pieces of legislation that support clean energy initiatives she has also released an Oregon Climate Agenda, which would create an Oregon Climate Authority to be charged with coordinating statewide clean energy programs and decarbonization efforts.

These policy objectives are being pursued against a backdrop of market challenges that are unique to Oregon, or at least the Pacific Northwest region in which it operates. The first challenge is the extent to which Oregon remains dependent on fossil fuels, despite its reputation in the marketplace as a renewables-based state. As of September 2019, nearly 40 percent of Oregon's electricity consumption originates from coal-fired power plants in Wyoming and Montana, and about 15 percent of the state's power comes from natural gas. Thus, well over half of Oregon's electricity continues to come from fossil fuels. The reason for this is largely due to the availability of existing transmission lines that transport power from other states into Oregon, and how those transmission lines are currently consumed by low-cost coal and natural gas. Portland General Electric and Pacific Power continue to fulfill their power supply commitments in Oregon from coal facilities they own in Utah, Wyoming and Montana, the regulation of which is outside the jurisdiction of the Oregon PUC.

Oregon has an ambitious goal to reduce greenhouse gas levels by 75 percent below 1990 levels by 2050. Coal plant emissions alone reportedly account for about 25 percent of Oregon's total emissions, so reducing / removing coal from the state's energy mix, and transitioning to carbon-free resources such as renewables would both be necessary to enable the state to meet its climate change goals.

With regard to renewables, a key factor that may be a challenge for the development of energy storage solutions is that hydroelectric power dominates the power market in Oregon and the larger Northwest region. Recent data suggest that hydro provides nearly two-thirds of the electricity generated in Oregon. However, hydro accounts for less than half of the total electricity that is consumed in the state, due to Oregon's heavy reliance on power imported from other states, which largely still originates from coal. In fact, coal remains the second-largest energy source of Oregon's energy portfolio. As noted, most of Oregon's coal comes in the form of imported power, which mostly comes from Wyoming via the federal Bonneville Power Administration and from the state's one remaining coal-fired power plant (located in Boardman, Ore., which is scheduled to be closed down in 2020).

There are at least several barriers for energy storage that result from this market dynamic. First, Oregon's heavy reliance on power purchase agreements that are largely tied up in coal-fired generation from other states may be difficult to eradicate. Secondly, the fact that hydro is so prevalent in the region may remain a barrier for in-state energy storage development, particularly battery storage, as hydro electric power can also store energy in certain applications. Third, hydropower is a comparatively inexpensive resource, and as a result it could be the case that storage remains uneconomic in this region when compared to other resource options.

In addition, while there is a lot of news about renewable energy projects in Oregon, the reality is that the state continues to export much of the renewable energy that is generated within the state. To illustrate this point, let's consider wind energy as one example. Approximately 30 to 40 percent of the wind power that is generated in Oregon is exported to California to meet renewable mandates in that state. This includes power being sourced from one of the world's largest wind farms that is being built right there in the state of Oregon (Shepherds Flat Wind Farm in Gilliam and Morrow Counties, with 845 MW of capacity), all of which will be exported to California.

Another market barrier that is rather unique for Oregon is that the state does not participate in a regional wholesale market that would provide price signals for the variety of services that energy storage could provide. There is presently no RTO or ISO that serves the Pacific Northwest. In other regions (e.g., the Northeastern U.S.), wholesale markets have taken the lead in determining the multiple use applications for energy storage (e.g., energy arbitrage, resource adequacy, frequency regulation, voltage support, black starts, etc.). Without this market context that provides differential pricing based on locational and multiple use applications for storage, it may be difficult for the utilities in the Pacific Northwest to make long-term projections about the economic value of storage at the present time.

Without the reference point that participation in a wholesale market could provide for how to define storage, Oregon is taking matters into its own hands. In December 2016, the Oregon PUC provided guidance to the utilities under its jurisdiction that encourages them to propose multiple, differentiated projects that test varying storage technologies and applications. This is the first known example of a state specifically directing utilities to include multiple value streams for energy storage, touching upon various services such as:

- Energy shifting and arbitrage
- Ancillary services
- Renewable curtailment avoidance
- System peaking and capacity value
- Locational value

Moreover, the state's commitment to comprehensive climate action is clear. New legislation on carbon pricing has resulted from extensive hearings that have been held before the Oregon PUC over the last year. Further, even apart from the policy directives that are being developed in Oregon, Portland General and Pacific Power are implementing their own initiatives for energy storage.

In its integrated resource plan (IRP), filed with the Oregon PUC in November 2016, Portland General Electric said that it has already been working with outside consultants to analyze various value streams of energy storage systems. The utility also issued a request for information last year to solicit further insight from vendors, manufacturers and developers of energy storage. In the IRP, the utility said that its evaluation framework for energy storage

resources likely will include classes of value streams that are consistent with the Oregon PUC's guidelines.

One example is that Portland General Electric, in partnership with NextEra Energy, released plans to build the Wheatridge Energy Facility, the nation's first combined wind, solar, and electricity storage system, on a site in eastern Oregon. Of the facility's 380 megawatts of generating capacity, the shares of wind, solar, and storage will total 300 MW, 50 MW and 30 MW, respectively (bringing PGE's total wind generation contribution to more than 1,000 MW). NextEra will own the remaining 200 MW and sell the electricity to Portland General Electric under a 30-year power purchase agreement.

EXECUTIVE DIRECTIVES

On February 13, 2015, Governor John Kitzhaber (D) announced his pending resignation amid a public corruption scandal; Kate Brown (D) succeeded him on February 18, since the Constitution of Oregon identifies the secretary of state as the successor when the governor leaves office prematurely. Gov. Kate Brown was elected to a second term in with a comfortable margin and Democrats control both houses of the legislature, so she's in a strong position to spearhead clean energy policies.

On climate policy, Governor Brown has said, "Oregon can be the log that breaks the jam nationally." Throughout her campaign, the governor consistently pledged to focus on clean power initiatives and move the state to a carbon-free future.

The primary vehicle for Governor Brown's clean energy policy is the Oregon Climate Agenda, which lays out objectives for electric vehicle infrastructure; to incentivize the growth of the EV market; to increase energy efficiency investments; and to create a new state climate policy agency responsible for coordinating climate action. The Governor's strategies are intended to create new clean energy jobs across Oregon over the next five years and put Oregon on a trajectory to achieve the state's aggressive greenhouse gas reduction. The eight (8) specific provisions of the Oregon Climate Agenda as follows:

1. Implement a well-designed market-based program to achieve Oregon's state climate emissions reduction goals at the least possible cost, while protecting the manufacturing sector and mitigating impacts and providing opportunities for low-income and rural communities, communities of color, and Tribes.
2. Hasten the pace of electrification of vehicles in Oregon by expanding electric vehicle infrastructure and incentives to support 50,000 electric vehicles on Oregon roads by 2020.
3. Decarbonize the electricity sector by achieving the state's renewable energy targets and encouraging grid modernization, while maintaining affordable and competitive electricity rates.

4. Expand opportunities for residential, municipal, and commercial customers to access clean energy services from their utilities while ensuring utility regulation supports the utility system and does not preference new customers over existing ones.
5. Maintain and strengthen strong energy efficiency investments in residential, commercial, industrial and agricultural sectors, expand the reach of energy efficiency programs to ensure all communities benefit, and improve the energy efficiency of state building codes.
6. Support world-leading industrial efficiency initiatives by Oregon's large industrial utility customers.
7. Pursue climate solutions that benefit rural communities and Tribes, support working lands, and foster resilience to climate change.

Create the new Oregon Climate Authority to better align state programs and expertise to achieve the state's climate policy goals. However, a major climate-change bill (SB 2020, the Clean Energy Jobs bill) that the governor spearheaded essentially died in the summer of 2019 due to political maneuverings among opposing camps. The bill was framed around a policy goal to reduce statewide emissions by as much as 80 percent by 2050 by establishing a statewide carbon pricing program through a cap-and-trade market. The program would feature a declining emissions cap that would require the state's biggest contributors to greenhouse gas emissions (including the transportation sector) to purchase permits for emissions above the set cap. The program would also be linked to the California-Quebec carbon trading market. Gov. Brown has advocated this program through the legislative bill known as SB 2020. However, the bill has been very controversial in the state (for more details see the "Legislation" section) as and of September 2019 the bill is considered dead.

Criticism for the bill came from both sides of the aisle in Oregon. On the right, Republicans argued that the program would raise fuel prices and energy bills, a position that was supported by manufacturing, transportation and agricultural representatives. On the left, environmental groups argued that the program included loopholes that would allow polluters to fulfill their compliance obligations by purchasing offset credits but not significantly reducing greenhouse gas emissions.

SB 2020 was scheduled for a vote among the Oregon Senate, but 11 Republican state senators effectively derailed the legislation through a "walk out" intended to deny the rest of the Senate the necessary 20-person quorum required to move the bill to a vote. The main goal of the bill (see description under Legislation section) was to set up a cap-and-trade program that would dramatically and rapidly lower greenhouse-gas emissions across the entire economy, reaching an 80-percent reduction below 1990 target level by 2050.

The Senate walkout effectively killed the governor's cornerstone clean-energy policy vehicle. Governor Brown responded that she would use her executive powers to ensure that Oregon moves forward to address climate change. Under Oregon's Constitution, Oregon governors may issue executive orders directing state agencies to take certain actions.

Although we have seen any executive orders from the governor since the Senate walk-out killed SB 2020, it is possible that the governor could issue an executive order to keep the policy objectives associated with the failed bill along the following lines 1) Direct the Department of Environmental Quality to establish emissions caps and mandate all-source greenhouse gas emissions reductions to the fullest extent allowed by existing air quality laws; or 2) Limit specific levels of emissions from power plants, oil terminals, industrial facilities, and other industrial sources.

Another relevant executive order that Governor Brown issued came in 2017:

Executive Order No. 17-20 (“Accelerating Efficiency in Oregon’s Built Environment to Reduce Greenhouse Gas Emissions and Address Climate Change”) (November 2017)

- The goal of the executive order is for the state to achieve net-zero energy-ready buildings as standard practice across the state.
- “Net-zero energy” generally means that a building does not consume more energy than it generates through on-site, renewable energy. But “net zero” can be defined a variety of different ways, depending on whether the energy use is measured as source energy (i.e., the amount of raw fuel that’s required to operate the building) or the site energy (i.e., the amount of energy used to operate a building, as reflected on utility bills).

LEGISLATION

There are a number of key legislative actions that have framed Oregon’s pathway toward a carbon-free, clean energy environment that incorporates energy storage among other tools that the state plans to utilize.

SB 838 (“The Oregon Renewable Energy Act”) (2007)

- Mandated that at least 20 percent of all energy resources comes from renewable resources by 2020, and it raised the standard to 25 percent by 2025.

HB 2193-B (“Energy Storage Mandate”) (2015)

- Oregon followed California in implementing a statewide energy storage mandate with HB 2193, passed in June 2015. (California established its mandate in 2013)
- Under the new law, entities (except consumer-owned utilities) engaged in the business of distributing electricity to 25,000 or more retail electricity consumers in Oregon (“electric companies”) will need to submit a proposal to the Oregon PUC for a project

that includes the procurement of one or more qualified energy storage systems with the capacity to store at least 5 MWh electricity.

- The Oregon utilities that satisfy the 25,000-customer test are Portland General Electric and PacifiCorp. Requires regulated electric utilities to procure qualifying energy storage systems by January 1, 2020, subject to authorization by the Oregon PUC.
- The total capacity of the energy storage system or systems to be procured by any one electric company is capped at 1% of that company's 2014 peak load. A company's peak load is measured in megawatts ("MW"), as opposed to MWh, which measures both the capacity and discharge capability of an energy storage project.
- The utilities may recover in rates all costs prudently incurred in the procurement of the energy storage system(s), including any above-market costs associated with procurement.
- The legislation is "technology agnostic" and does not distinguish between energy storage technologies such as batteries, flywheels, compressed air energy storage, thermal and pumped storage hydropower.
- The utility projects must be subject to a competitive bidding process, unless the project may only be developed by a single vendor or contractor.
- The new law envisions that an energy company can procure energy storage by owning a qualifying system. Ownership models might include self-build or build-transfer options, or ownership could also result from the utility contracting to use the capacity or energy from a qualifying energy storage system, presumably under a long-term power purchase agreement.
- Requires the Oregon PUC to develop a multi-step process for evaluating projects' system-wide storage potential.

SB 1547B ("The Oregon Clean Electricity, Coal Transition Act") (2016)

- Intended to remove coal from Oregon's electricity mix by 2030 by requiring utilities to stop purchasing coal power completely by 2035, thus making Oregon the first state to end coal use through legislative action.
- Intended to double the state's Renewable Portfolio Standard to 50 percent by 2040. (Incremental goals require that utilities reach 27 percent renewable power by 2025; 35 percent by 2030; and 40 percent by 2035 before the 2040 goal).
- The legislation is a critical piece of Oregon's broader strategy to achieve a 75-percent reduction in greenhouse gases by mid-century that is intended to transform Oregon's electricity sector and deliver significant net reductions in greenhouse gas pollution. The renewable energy requirement stair steps up; utilities will have to reach 27 percent renewable power by 2025; 35 percent by 2030; 40 percent by 2035; and 50 percent by 2040.

- Passage of this act means that Oregon now has one of the highest renewable portfolio standards in the country.
- It is expected that the new, higher renewable energy requirements should redirect planned utility investments in baseload fossil gas toward investments toward investments in clean energy, because it would be uneconomical for the utilities to invest in both.
- Natural gas may still have a role to play in Oregon’s energy mix, but as an integrating resource alongside wind and solar, not as a source of baseload power.
- It is expected that passage of this legislation will impact how retiring coal plants in the state (e.g., Portland General Electric’s Act Boardman plant) will be replaced, presumably with some combination of clean energy resources.
- The law also established a community solar program for Oregon.
 - Requires that utilities compensate subscribers to a community solar program for the electricity the system produces according to the resource value of solar.
 - The Oregon PUC has the authority to determine the resource value of solar and establish specific rules and requirements for community solar program.

HB 2618 (“Solar Incentives”) 2019

- Creates a new rebate program for solar electric systems and paired solar and solar storage systems installed for residential customers and low-income service providers in Oregon.
- The Oregon Department of Energy has earmarked \$2 million to be allocated for rebates and program administration.
- Program funds will be used to issue solar and solar storage system rebates, which are paid to the installing contractor of the system. The rebate amount will be passed on to the customer as savings on the net cost of the system.
- The law states that 25 percent of the rebate budget is to be reserved for low- and moderate-income households and low-income service providers. No more than 50 percent of the rebate budget will be used for low-income service providers.
- Rebates may cover up to 40 percent of the net cost for a residential system installed for a customer that is not considered low- or moderate-income, and up to 60 percent of net cost for a low-income customer or low-income service provider.
- For residential projects, the maximum rebate is \$5,000 for a solar electric system and \$2,500 for an energy storage system. For low-income service providers, the caps are \$30,000 for solar electric and \$15,000 for an energy storage system.
- The program is expected to commence on 1/1/2020.

SB 98 (“Renewable Natural Gas”) (2019)

- Allows utilities to acquire renewable natural gas on behalf of customers.

- Renewable natural gas is a zero carbon resource produced from local organic materials like food, agricultural and forestry waste, wastewater, or landfills, which can be added into the existing natural gas system.
- The law outlines goals for adding as much as 30 percent renewable natural gas into the state’s pipeline system. There will be limits on the total amount paid for renewable natural gas that is overseen by regulators, protecting utilities and ratepayers from excessive costs as the market develops.
- The law sets voluntary renewable natural gas goals for Oregon’s natural gas utilities. Additionally, it:
 - Allows utility investment in the interconnection of renewable natural gas production
 - Supports targets of 15 percent by 2030, 20 percent by 2035 and 30 percent by 2050
 - Provides local communities a potential revenue source to turn their waste into energy.
- The law is the first of its kind in the U.S.

HB 2020B (“The Clean Energy Jobs Bill”) (2019)—failed to pass Oregon’s Senate; remains in Senate committee)

- *Background:* House Bill 2020 was introduced on February 4, 2019. The bill passed the Oregon House and then moved on the Oregon Senate. On June 20, 2019, eleven Republican senators announced their intention to leave the state in protest of House Bill 2020, preventing a quorum to vote on the senate floor. The bill remains in Senate committees and its future is presently unclear.
- If HB 2020 ultimately passes,
 - Oregon would be only the second U.S. state to mandate not just greenhouse gas emission reductions in the electricity sector, but across all sectors in the state, including transportation (which reportedly produces the largest share of Oregon’s greenhouse gas emissions).
 - Oregon will set a statewide cap on emissions. Every entity emitting more than 25,000 metric tons of carbon dioxide equivalent must purchase allowances equal to the tons of CO₂ they emit.
 - Over time, the number of allowances available steadily declines: the law would mandate that emissions decline 45 percent from 1990 levels by 2035 and 80 percent by 2050.
 - Oregon is following California’s lead, linking to the Western Climate Initiative (WCI), a regional carbon trading system that currently contains California and the Canadian provinces of British Columbia, Nova Scotia, and Quebec.

- Oregon would become part of the WCI, through which it would be able to buy and sell allowances with California and the Canadian provinces.
- Oregon’s auctions would have both a “price floor” (below which prices may not fall) and a “price ceiling” (above which prices may not rise)
- After they are auctioned, allowances would be tradeable. If an emitting entity buys more than it needs, it can sell them or bank them for use in future compliance periods.
- A carbon offset is an alternative means of complying with the cap. Instead of reducing its own emissions by a ton, a regulated entity can purchase an offset that represents a ton of emissions reduced in another sector (e.g., agriculture). In theory the program will produce the same total amount of emissions reductions, just not all within regulated sectors.

REGULATIONS

Order No. 16-504 (2016)

- Sets forth the guidelines and requirements for Portland General Electric and Pacific Power to follow in submitting their energy storage proposals in compliance with HB 2193
- The Order adopts project guidelines, proposal guidelines, storage evaluation requirements and competitive bidding requirements, defined as follows:
 - Project guidelines: Aimed at assisting the utilities to design and select projects;
 - Proposal guidelines: Provided for the utilities to use in submitting their formal implementation proposals to the Oregon PUC;
 - Storage evaluation requirements: Designed to assist the utilities in conducting system-wide storage potential evaluation mandated by HB 2193; and
 - Competitive bidding requirements: Intended to govern the competitive bidding process by which the utilities will acquire storage resources.
- The guidelines encourage Portland General Electric and Pacific Power to submit proposals for “multiple, differentiated projects that test varying technologies or applications.” Specifically, the guidelines require the utilities to submit a portfolio of projects that include various storage technology types and levels of maturity.
- The Order also encourages the utilities to consider strategically located projects, suggesting the differentiating values associated with energy storage based on specific locations on the grid.

THE FUTURE OF ENERGY STORAGE IN OREGON

Attention has now turned to how the Oregon PUC will evaluate and rule on the required energy storage proposals submitted by Portland General Electric and Pacific Power. Through these proceedings, it is expected that Oregon will examine the following five “high interest” applications for storage:

- T&D upgrade deferral / management of peak demand
- Service reliability and resiliency
- Power quality / voltage support
- Grid regulation
- Renewable energy firming, ramp control and energy shifts

Accordingly, Oregon is an important state that will stay on the radar in terms of developing energy storage policy. Particularly on the topic of energy storage valuation, Oregon could set important precedents on modeling and policies specific to multiple use applications, such as exploring:

- What value streams should be considered?
- Can the cost-benefit analysis for storage be based on market-price valuation?
- Are environmental costs and benefits included in the value of storage?
- Does the valuation include sub-hourly dispatches for storage?

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