Oregon
Kate Brown, Governor

OREGON DEPARTMENT OF ENERGY

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MEMORANDUM

To: Energy Advisory Work Group Members

From: Janine Benner, Director, Oregon Department of Energy

Date: January 14, 2020

Re: Materials for Jan 21, 2020 Meeting

I am looking forward to our Energy Advisory Work Group meeting on January 21. We will be covering a number of topics during our three-hour meeting (which includes a coffee break!).

A large portion of our meeting will be devoted to strategic planning again. This is a topic we've been focused on over the past several months and we have appreciated your input through the survey and the focus group discussion. At Tuesday's meeting, Coraggio Group will be presenting the insights and themes that they learned from the survey, interviews, and focus groups. Coraggio Group will then lead ODOE and EAWG in a Q&A and discussion about these insights as well as draft strategic planning concepts. In the packet, we have provided a summary of the strategic planning process, more about what you can expect at the meeting, and next steps.

At the meeting you will also hear about rulemakings ODOE is undertaking to implement legislation passed in 2019, ODOE's presentations during this month's legislative days, an update on our budget, and a few other recent activities.

We will also be seeking your input on three white papers that ODOE staff are developing. The drafts are still in process, but ODOE staff will present on the elements of the papers and seek your feedback on these as well as any topics for future consideration.

As always, I'm looking forward to hearing from you during the roundtable. I hope you come prepared to share information about current and upcoming projects you're working on that ODOE and fellow EAWG members should know about.

In this meeting packet, we have included the following materials:

- Meeting Agenda
- Materials from some recent ODOE activities that will be discussed at the meeting:
    - Policy Briefs that were developed for the recent CUB Conference
    - Presentations provided during January Legislative Days
    - Oregon comments to House Select Committee on Climate Change
    - Factsheet on Solar + Storage Rebate Program
    - Factsheet on Green Energy Technologies (GET) program
    - Factsheet on Biennial ZEV Report (SB 1044)
    - Factsheet on Stakeholder Input Phase of Biennial ZEV Report (SB 1044)
- Update to EAWG on Budget Note
- Feedback from EAWG: Strategic Planning summary
- Feedback from EAWG: ODOE White Papers

Please don't hesitate to reach out with questions. See you next week.

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AGENDA

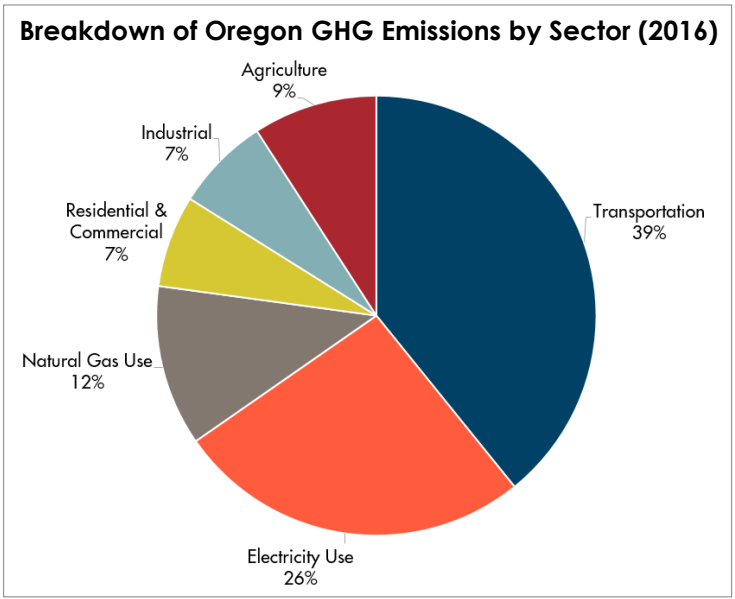
Energy Advisory Work Group
January 21, 2020
9 a.m. to 12 p.m.
Meitner Conference Room, Oregon Department of Energy

Time	Topic	Lead
15 min	**Welcome and Director's Update**	Janine Benner, ODOE Director
25 min	**EAWG Roundtable**	EAWG Members
25 min	**ODOE Updates** • Rulemaking updates: Solar + Storage Rebate Program (HB 2618) and 1.5% Green Energy Technology program (HB 2496) • EV-related activities, including SB 1044 update • Interagency Statewide Transportation Strategy Work	ODOE Staff
15 min	**Budget Update**	Cathy Connolly, Assistant Director for Central Services
10 min	*Break and networking*	
60 min	**Strategic Planning** • Presentation on Coraggio's insights & themes and initial strategic planning concepts • Feedback from EAWG members	Colin Stoetzel, Coraggio Group Ruchi Sadhir, Associate Director for Strategic Engagement & Development
20 min	**Energy Policy/Topic White Papers** • Overview of Topics • Feedback from EAWG members	Energy Technology & Policy Section Staff
10 min	**Closing comments and discussion**	EAWG Members and ODOE Staff

Policy Landscape/Background

Complementary State and Community-Wide Renewable Energy and Climate Goals

Because nearly 80 percent of greenhouse gas emissions come from the way and the type of energy Oregonians use every day (transportation, electricity, and natural gas), state and local climate and renewable energy policies are inextricably linked. Oregon has a statewide goal to reduce GHG emissions to 75 percent below 1990 levels by 2050. Local governments and communities have also adopted or are considering various types of climate and clean energy goals (see back page). Local actions contribute to state GHG emissions trends, though they are not quantified or tracked separately. Because GHGs accumulate over time and mix globally in Earth's atmosphere, any emissions (e.g., from an individual, community, company, country) contribute to the collective problem and reductions anywhere contribute to the solution.



Oregon's largest source of GHG emissions is from transportation, followed by electricity and natural gas for residential, commercial, and industrial uses. There are opportunities to drive the local transition to clean, decarbonized energy in each of these sectors. The following sections highlight examples of policies and programs that are supporting the local transition to a clean, low-carbon energy future.

Local Transition to Decarbonizing Residential, Commercial, and Industrial Fuels and Buildings

Energy efficiency is a cornerstone of Oregon energy and climate policy, and regionally is the second largest electricity resource after hydropower. Customer-funded energy efficiency programs (from utilities, Bonneville Power Administration, and Energy Trust of Oregon) are the largest sources of energy efficiency in the Northwest. Efficiency programs are increasingly focused on addressing historically underserved populations, such as those residing in multi-family homes (especially rentals).

Building codes also play an important part in ensuring energy efficiency in local residential and commercial buildings and in contributing to reducing local GHG emissions from the built environment. Oregon has a uniform building code that applies to all municipalities and jurisdictions throughout the state (ORS 455.040). Governor Brown's Executive Order 17-20 set specific targets to boost efficiency in commercial and residential codes, including for solar-ready buildings, electric vehicle-ready parking lots, zero-energy ready homes, and high-performance commercial buildings, making Oregon's building codes among the most efficient in the nation.

Home energy scoring is valuable consumer information that can spur retrofits of homes on the market, improve efficiency, and contribute to local climate goals through reduced energy use. In 2010, Oregon was the first state to develop administrative rules that specify how home energy scores can be created and deployed. The Eugene Water and Electric Board was the first utility to provide Home Energy Scores, and City of Portland was the first city to mandate Home Energy Scores for all homes listed for sale.

Voluntary Green Power Programs allow local utility customers to voluntarily subscribe to purchase renewable energy beyond what the utility normally provides. These purchases contribute to reducing local GHG emissions from electricity generation and meeting local climate goals (e.g., Multnomah County 2017 Carbon Emissions and Trends

Report). PGE and PacifiCorp have the two most successful voluntary green power programs in the country – more than 200,000 residential and small commercial green power program participants were responsible for purchasing over two million megawatt hours of renewable power in Oregon in 2016. Large Oregon commercial and industrial customers like Apple, Facebook, Google, Nike, and Intel have pledged to buy 100 percent renewable energy.

Community Solar programs allow local utility customers to buy a share of the solar electricity generated by a community solar project and receive a credit on their monthly utility bill. This enables the solar system owners and subscribers to share the costs and benefits associated with developing the project. In Oregon, community solar subscriptions have been offered by Ashland Electric, Central Electric Cooperative, and Emerald People's Utility District. In 2016, SB 1547 established a community solar program for customers of Oregon's investor-owned utilities. Implementation of this program is underway, with the first projects expected to be developed in 2020.

Renewable Natural Gas (RNG). Five locations in Oregon are currently taking steps to eventually produce an estimated 1.6 billion cubic feet of RNG per year and inject it into the natural gas pipeline system to be used as a stationary fuel in buildings or as a transportation fuel. ODOE's 2018 RNG Inventory report found that the gross potential for RNG production when using anaerobic digestion technology could be about 4.6 percent of Oregon's total yearly use of natural gas. When using thermal gasification technology, the gross potential represents up to 20 percent of Oregon's total yearly use of natural gas, including power generation.

Trending Topics

Energy Efficiency & Renewable Energy

State and local governments are increasingly seeking to design decarbonization programs to achieve multiple community benefits, especially for underserved populations. Benefits include lower GHG and air pollutant emissions, workforce development, and clean energy job opportunities.

→ One local example of this is the Portland Clean Energy Community Benefits Fund created by local ballot Measure 26-201. The Fund is anticipated to bring $54 to $71 million annually in new revenue for community-driven clean energy solutions and jobs to help Portlanders that need them the most.

Other local options to procure more renewable energy:

→ Large customers, including municipalities, who want renewables can sign their own power purchase agreements using the Direct Access program. PGE's new "Green Future Impact" product launched in August 2019, and the 300 megawatts made available by the program sold out in about three minutes. Participants include the cities of Beaverton, Hillsboro, Lake Oswego, Milwaukie, Portland, Salem, West Linn, and Wilsonville, as well as Multnomah and Washington counties.

→ Some municipalities, such as Salt Lake City and Park City in Utah, are launching new community renewable energy programs that automatically enroll utility customers in new renewables service agreements with the choice to opt-out (see Utah's House Bill 411, "Community Renewable Energy Act").

→ Seven states have authorized community choice aggregation programs (CCAs) that enable local governments to exercise greater choice over electricity procurement to serve customers within their jurisdiction. Many CCA programs are set up so the incumbent utility still provides billing, distribution, and transmission services. Some states, such as California, have struggled with how to ensure CCAs fairly contribute to meeting resource adequacy and avoid shifting costs to utility ratepayers not participating in a CCA program. Additionally, CCA authorization in a state without an organized energy market, like Oregon, would potentially require unique electricity procurement strategies and program design compared to CCAs in other states.

Transportation

Pathways to reduce transportation GHG emissions can be categorized into three broad categories. Multiple policies and programs have been implemented at the local, regional, and state levels that support the three

categories; examples follow.

→ Lower vehicle miles traveled (VMT) and increased transportation choices: reduce drive alone trips and VMT.

- Oregon's integration of land use planning and transportation investments, in addition to a growth strategy that emphasizes more compact, pedestrian- and transit-friendly development within existing urban areas, have kept VMT lower than they might otherwise have been.
- The State of Oregon has set light-duty vehicle GHG reduction targets for metropolitan areas, though only Portland Metro is required to implement a strategy to achieve its target. Three Metropolitan Planning Organizations (Portland Metro, Central Lane, and Corvallis) have conducted scenario-planning efforts to evaluate the GHG emission reduction potential associated with their regional plans, which generally focus on a combination of increased transit, transportation options, and compact mixed-use development.

→ Cleaner Fuels: transition to no- or low-emission fuels and technologies.

- The Oregon Department of Environmental Quality's Clean Fuels Program (CFP) has established a market for lower carbon intensity fuels in Oregon. Local businesses and governments can supplement the cost to install or operate alternative fueling infrastructure for fuels such as electricity, natural gas, RNG, propane, and hydrogen through the sale of CFP credits obtained by the sale of those fuels.
- Cities around the country are shifting away from diesel to primarily electric alternatives, but are also considering hydrogen fuel cells, propane, and RNG. TriMet has committed to replacing its diesel bus fleet with alternative fuel buses by 2040.

→ Cleaner Vehicles: transition to vehicle technologies that are more fuel efficient and have fewer emissions.

- Governor Brown's Executive Order 17-21 sets a goal of 50,000 registered Zero Emission Vehicles in Oregon by the end of 2020. As of October 1, 2019, there were 27,729 EVs on the road in Oregon.
- Oregon DEQ's Clean Vehicle Rebate Program offers a cash rebate for Oregon drivers who purchase or lease electric vehicles. Low- or moderate-income households can qualify for an additional rebate on the purchase or lease of a new or used battery electric or plug-in hybrid vehicle.
- While many local governments are focusing on multimodal forms of transportation such as transit, biking, and walking, cities and utilities are also pursuing strategies to increase Oregonians' access to EVs and EV chargers.
- Electrify America is funding installation of charging stations throughout the state, including the Portland metro area, I-84 corridor, and I-5 corridor. Oregon's investor-owned utilities have transportation electrification programs, and many consumer-owned utilities have EV-related pilots or programs as well.

Other Transportation Trends

→ Oregon established an Employee Payroll Transit Tax that helps to improve and expand transportation service, especially in underserved areas.

→ At local and state levels in Oregon, there is a need to better understand gaps in EV charging infrastructure to encourage equitable access to EV charging—for example, at public buildings, private workplaces, and in rental and multifamily housing.

→ There is also a need to develop clear local and state policy frameworks to guide deployment of Autonomous (or Automated) Vehicle technologies. To meet local climate and transportation decarbonization goals, AV policies must address how AVs can safely contribute to (1) reduced VMT and drive alone trips, especially in congested areas; (2) greater fleet turnover to EVs; and (3) reduced GHG and air pollutant emissions.

→ With growing deployment of smart grid technology, EVs can be used as distributed energy resources in local communities. Oregon's utilities are interested in how localized energy resources, such as EVs, can be used to make the grid more reliable and reduce overall costs for ratepayers.

Jurisdictions in Oregon Taking Climate Change Actions

Information current as of November 2018 and published in ODOE's *2018 Biennial Energy Report*.

✓ = complete → = in progress	GHG Inventory	GHG Mitigation Goal	Climate Adaptation Goal	Focus Areas for GHG Mitigation: Renewable Energy	Transportation & Land Use	Buildings	Materials Management	Carbon Sequestration
Ashland	✓	✓	✓	✓	✓	✓	✓	
Beaverton	✓	Carbon neutral by 2050; 1.5°C goal	→	✓	✓	✓	✓	
Bend	✓	✓	→	→	→	→	→	
Clackamas County	✓	80% reduction by 2050		✓	✓	✓	✓	
Corvallis	✓	✓	✓	✓	✓	✓	✓	
Eugene	✓	Carbon budget for city residents consistent with 350 ppm in atmosphere by 2100, requiring an annual average emission reduction of 7.6%		✓	✓	✓	✓	
Forest Grove					✓	✓	✓	
Gresham	✓	→					✓	
Hillsboro	✓	✓		✓	✓	✓		
Hood River County	✓	Replace 30%, 50%, and 80% of fossil fuel power with renewable energy by 2030, 2040, and 2050 compared to 2016	✓	✓	✓			
Lake Oswego	✓		→	✓	✓	✓	✓	
Milwaukie	✓	Carbon neutral by 2050	✓	✓	✓	✓	✓	✓
Portland and Multnomah County	✓	80% reduction from 1990 levels by 2050	✓	✓	✓	✓	✓	✓
Salem	→	✓			✓	✓		
Washington County	✓			✓	✓	✓	✓	

OREGON DEPARTMENT OF ENERGY

This policy brief was produced by the Oregon Department of Energy for the 2019 CUB Conference.

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Policy Landscape/Background

Resource Adequacy

Resource adequacy (RA) refers to an evaluation of whether a particular utility, area of the grid, or region has sufficient electric generating resources to meet future demand for electricity at different times (such as times of day, seasons, or years) and under different conditions (such as temperatures or water conditions). In many states, this evaluation is undertaken by an Independent System Operator with a wide geographic view of the electric grid that may also involve individual utilities and their regulators. Because of other constraints on the system, such as transmission congestion, some states evaluate RA on both a system-wide and a locational basis.

In the Pacific Northwest, the Northwest Power and Conservation Council (NWPCC) conducts an annual regional assessment of RA. The goal of the NWPCC's RA standard is to "establish a resource adequacy framework for the Pacific Northwest to provide a clear, consistent, and unambiguous means of answering the question of whether the region has adequate deliverable resources to meet its load reliably and to develop an effective implementation framework" (*Seventh Power Plan*). Meanwhile, individual utilities and their regulators in the Northwest evaluate utility-specific RA requirements and often will incorporate the NWPCC's analysis as an input to that process.

Measuring Resource Adequacy

Historically, many utilities measured RA by evaluating their individual load-resource balance at some future point in time. Would the utility have enough of its own generating capacity available to meet its expected future electric demand? Utilities would then plan for a surplus amount of capacity — often 15 percent or more — as a planning target to err on the side of caution and to ensure that sufficient generating capacity would be available even if loads were unexpectedly high, or if there were an unplanned outage of a generating resource. This adjusted metric is often referred to as a *Planning Reserve Margin*.

GENESYS Model: The NWPCC developed the GENESYS Model in 1999 to evaluate the adequacy of the power supply in the Pacific Northwest to meet expected future loads. It is a probabilistic model that assesses adequacy under a range of future uncertainties, such as temperature-sensitive demand, economic load growth, wind and solar output, forced outages of generating resources, and river flow conditions. It also takes into account the availability of in-region generation owned by independent power producers and other sources of generation, such as the availability of out-of-region imports.

Resource Adequacy Assessment: Annually, the NWPCC performs a regional assessment of RA five years into the future. The assessment includes existing resources, expected future energy efficiency savings and only those planned resources that are sited and licensed. This is intended to provide a signal to the region of the status of RA with sufficient lead time that new capacity resources could be built ahead of any forecasted shortfalls. The Executive Summary of the *Pacific Northwest Power Supply Adequacy Assessment for 2024* is available on the Council's website and the full report is expected to be published by the end of October 2019.

Loss of Load Probability: The NWPCC uses Loss of Load Probability (LOLP) as the metric for evaluating the resource adequacy of the region. To develop the LOLP, the NWPCC runs the GENESYS model several thousands of times to assess the adequacy of the Northwest power system under a wide range of possible future conditions and identifies how often generating capacity is insufficient to meet demand. The RA standard that the NWPCC has adopted is a 5.0 percent LOLP, meaning that the regional power supply is deemed to be adequate if 5.0 percent or fewer of the GENESYS Model simulations show insufficient generating capacity any time during the operating year. If the LOLP exceeds 5.0 percent, the Council will estimate the additional amount of new generating capacity needed to comply with its adequacy standard but warns that the amount of new capacity required is highly sensitive to replacement resource type and that its RA assessment is not a substitute for an integrated resource plan.

Snapshot of Resource Adequacy in the Pacific Northwest

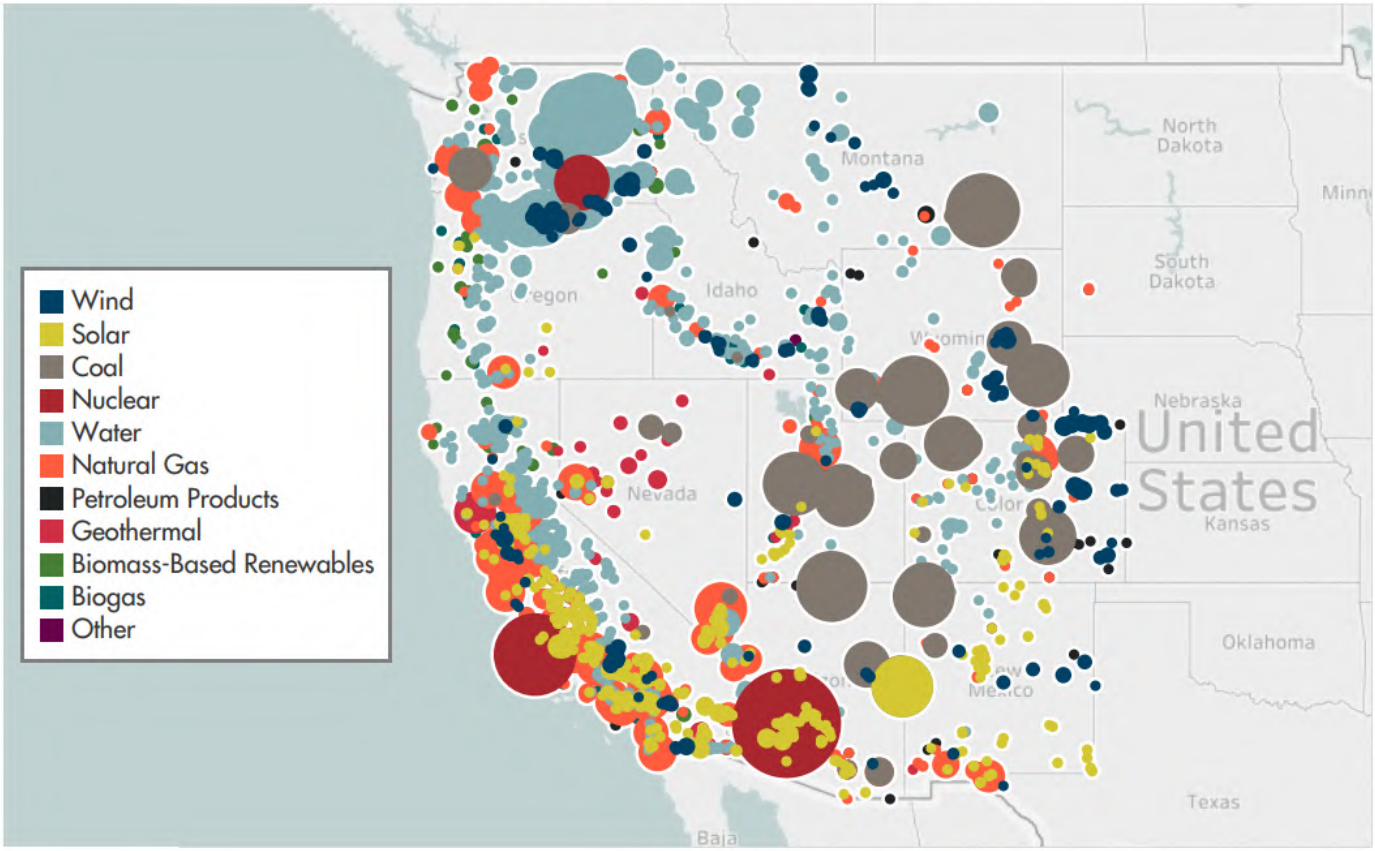
Each utility in the region has its own approach to monitoring RA and addressing any projected shortfalls in coordination with their regulators or boards. The Northwest as a region, however, fails to meet the 5.0 percent LOLP standard by 2021 according to the Executive Summary of the NWPCC's *Pacific Northwest Power Supply Adequacy Assessment for 2024*. The primary driver of the region failing to meet the Council's RA standard in 2021 stems from the retirements of the Centralia 1 and Boardman coal plants, with a combined 1,190 MW of capacity dedicated to serving regional load. See more on the back page.

Tools to Maintain Resource Adequacy

When a utility or region expects that it may fail to maintain a prescribed level of RA, it has a range of tools to address the issue, including:

New Generating Resources: Building a new generation resource can provide additional incremental capacity to the system. Historically, hydropower or thermal plants were used to provide the bulk of capacity needed to maintain RA. Solar and wind generators can also contribute to meeting a utility's or region's capacity deficits, however the variability of their output constrains the amount of capacity they can contribute.

Electric Generation Sources in the Western Electric Coordinating Council Region
Average 2014-2016 Net Generation in Megawatt Hour by Plant



Flexible Loads: In many cases, RA shortfalls occur due to high demand over a relatively short time duration (e.g., several hours during a hot summer afternoon or during a cold winter morning). In these cases, the deployment of flexible loads can be a valuable tool. Grid operators can use time-of-use pricing mechanisms, direct load controls, or other price incentives to encourage (or in some cases, require) a curtailment in electric demand in response to these conditions.

Targeted Efficiency: Investments in energy efficiency can also be targeted to achieve maximum capacity contribution and help to maintain RA. For example, investments in high efficiency electric heat pumps in areas facing summer capacity deficits could help to address those shortfalls. Similarly, replacing electric resistance heaters with more efficient heating technologies can help to address winter capacity deficits.

Imports: Different regions can have peak demands or peak generation output at different times of year. For example, southern regions of the West have their highest demand for power in the summer, while many areas of the Northwest have their highest peak demands in winter. As a result, there can often be significant advantages to sharing resources across western regions to more efficiently use existing resources and keep costs down.

Storage: Increasingly, the deployment of energy storage technologies (e.g., battery storage or pumped hydro storage) could be utilized to help meet RA needs. Storage helps grid operators to smooth out the "peakiness" of either demand or supply, and thus help to address RA concerns.

Trending Topics

As the region considers the prospect of capacity shortfalls on the horizon, there are a number of topics that are being discussed in the Northwest utility sector:

→ **Do we need a Regional RA Program?** Instead of having each utility in the region evaluate its own RA, a more regionalized approach could be developed that imposes coordinated obligations on the region's utilities.

→ **What's the right RA standard?** The NWPCC's current RA standard (which, while indirectly binding on BPA, is non-binding for the region's utilities) is based on a probability of curtailment events due to resource insufficiency. Other standards could include a consideration of shortfall duration (e.g., how long an outage is likely to occur) and/or magnitude (e.g. how much load is not served or how many customers are affected) and/or frequency (e.g. how often a curtailment event may occur).

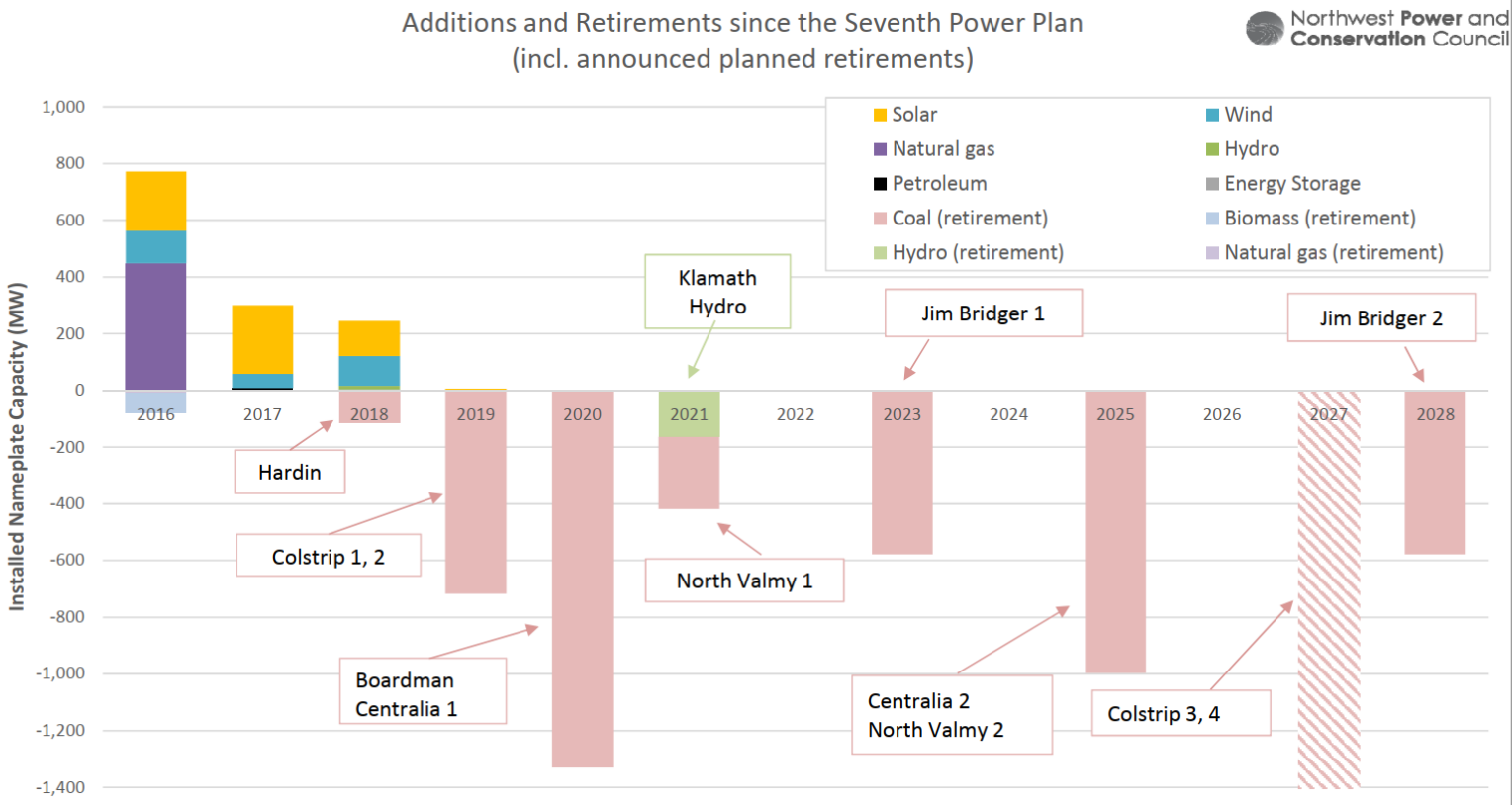
→ **Interdependencies between gas and electric sector:** Wholesale electric prices spiked in February-March 2019 across much of the West, including prices of nearly $900/MWh in the Northwest. In this instance, unusual constraints on the natural gas transmission system were driven by the rupture of the Enbridge gas pipeline in Canada, loss of regional gas storage at Aliso Canyon in southern California, and unusually cold temperatures in California that led to a spike in demand for gas for space heating. Are current RA planning mechanisms in the Northwest doing enough to account for these types of constraints on natural gas supply and transmission?

→ **The role of flexible loads:** The NWPCC's *Seventh Power Plan* highlighted the value of deploying significant amounts of demand response in the region, and PGE is now pursuing an innovative multi-year Smart Grid Test Bed pilot to test the capabilities of demand response and other flexible loads in meeting the utility's needs. What more could the region do to incentivize and deploy flexible loads?

Additions and Retirements of Energy Facilities

The graph below from the NWPCC illustrates the timing and scale of planned coal retirements in the region over the coming decade, while also highlighting the uncertainty of specific retirement dates. The dates shown below for the retirement of Jim Bridger 1 (2023) and Jim Bridger 2 (2028) are recently announced accelerated retirement dates, as is the potential early retirement of Colstrip 3 and 4 in 2027.

According to the Executive Summary of the Council's *2024 Assessment*, the Northwest is expected to have a 7.5 percent LOLP by 2021, which exceeds the Council's 5.0 percent standard. In the Reference Case for 2024, the LOLP is 8.2 percent but grows to 12.8 percent if Jim Bridger 1 retires in 2023. In the Reference Case for 2026, the LOLP is 17 percent but would increase to 26 percent if Jim Bridger 1 retires in 2023. The Council's most recent adequacy assessment does not go beyond 2026 but, as can be seen from the graph below, the Bridger 2 plant and the Colstrip 3 and 4 plants may be retired by the end of 2028, removing yet an additional 1,729 MW of capacity from the regional power supply.



Planned retirements subject to change; based on agreements, announcements, utility integrated resource plans.
Colstrip units 3-4 should be considered ***very tentative****.*
Hardin Generating Station was sold to an out-of-region cryptocurrency company, therefore no longer "counts" toward the region.

Policy Landscape/Background

Renewable energy is generally defined as energy generated from sources that are naturally replenishing on a relatively short time horizon, including solar, wind, geothermal, hydropower, biomass, and marine energy.

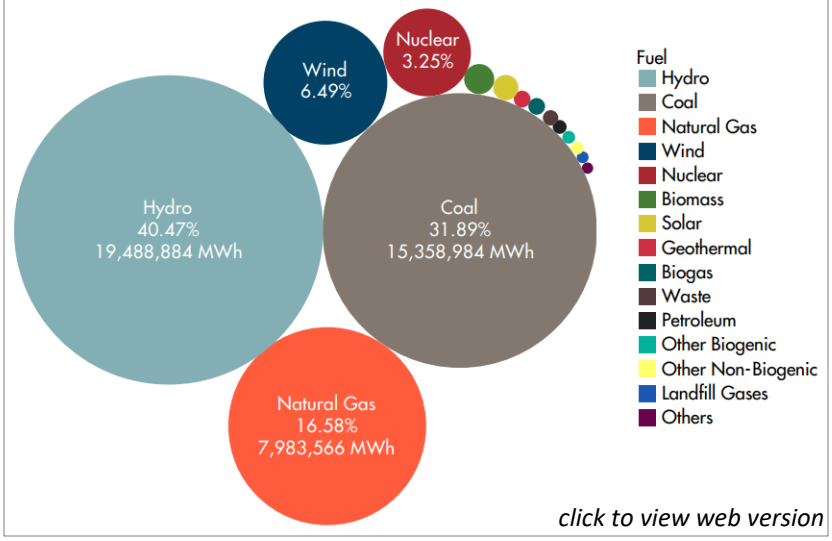
Examples of Current Policies and Pledges

Renewable Portfolio Standard. Oregon's RPS requires that a certain percent of the electricity consumed in the state must come from eligible renewable sources. Investor-owned utilities PGE and PacifiCorp have an end target of 50 percent renewable by 2040. Consumer-owned utilities' (COUs) targets are based on the size of the COU's share of the state's retail electricity consumption – targets are either 5, 10, or 25 percent by 2025. Because Idaho Power, an investor-owned utility, has less than 3 percent of Oregon's total retail electric sales, the Oregon RPS categorizes it with smaller COUs.

SB 1547, the Oregon Clean Electricity and Coal Transition bill. IOUs must eliminate all coal-fired resources from the electricity they provide to Oregon retail customers by 2035.

Resources Used to Generate Oregon's Electricity

Based on a three-year average (2014 to 2016), this chart shows the energy resources used to generate the electricity that is sold to Oregon's utility customers.



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SB 98. Allows natural gas utilities in Oregon to buy renewable natural gas (RNG), sell it to their customers, and to recoup investments in RNG infrastructure in Oregon through customer rates. In its 2018 RNG Inventory, ODOE found that the gross potential for RNG production when using anaerobic digestion technology could be about 4.6 percent of Oregon's total yearly use of natural gas. When using thermal gasification technology, the gross potential represents up to 20 percent of Oregon's total yearly use of natural gas, including power generation.

Integrated Resource Planning. Oregon requires IOUs to develop integrated resource plans (IRPs) every two years, a process that identifies the most cost-effective path for a utility to meet its projected future demand. In its 2019 IRP, PGE called for 150 MWa* of new renewable resources by 2023. PacifiCorp has indicated that its 2019 IRP will include approximately 2,000 MW of new wind, 1,800 MW of new solar, and 600 MW of storage to be sited with the new solar by the end of 2023. Idaho Power's 2019 IRP is also in progress but currently shows 200 MW of new solar over the next four years.

Emerging Opportunities for Integrating Low/Zero Carbon Electricity

To increase renewable energy in Oregon while maintaining reliability and low costs, the state will need to understand and address a wide web of interrelated considerations. There are a number of innovations in the electric sector that can help to address the challenges of integrating high levels of renewable electricity into the state's resource mix:

* An **average megawatt** (aMW) represents 1 megawatt (MW) of energy delivered continuously 24 hours/day for one year. A power plant with 50 MW capacity that operates at full output for 50 percent of the hours in a year delivers 25 aMW of energy.

Demand Response (DR). Tools and programs that allow grid operators to send signals to retail customers that will incentivize them to shift their demand for electricity to lower peak demands on the system (reducing the need for fossil-fuel "peaker" plants), or to take advantage of otherwise surplus renewable output, or to provide other services that can help stabilize the grid when needed.

Distributed Energy Resources (DER). Energy resources located on the distribution system (e.g. rooftop solar), rather than a large electricity generator that is not located within the distribution system (e.g., a natural gas power plant).

Smart Grid. Refers to new devices and technologies that allow two-way communication between the grid and electricity consumers, which enables better management of the grid and reduces costs.

Energy Storage. Storage technologies (i.e., batteries, pumped hydro, flywheels, etc.) may be a critical component to integrating higher levels of variable renewable energy.

Renewable Natural Gas. RNG is biogas that has been processed to be interchangeable with conventional natural gas and its production prevents methane from being directly emitted to the atmosphere. It can be used as a transportation fuel, a stationary fuel for heating, cooking, electricity generation, etc. or as a feedstock for some chemical manufacturing.

Energy Markets. Participation in regional energy markets can support integration of renewable energy by enabling utilities to access electricity generation across large geographic areas.

Trending Topics

States are developing 100 percent clean electricity pledges that include sources previously ineligible for renewable energy policies, like legacy hydropower and nuclear power. The language has shifted from "renewable" to "carbon-free" or "clean" energy.

- → Washington requires utilities to provide 100 percent "GHG neutral" electricity by 2030. This target can be met using both renewable (i.e., RPS-eligible) and "non-emitting" electricity sources (i.e., non-RPS-eligible hydropower) (SB 5116, 2019).
- → California increased its RPS target from 50 percent by 2030 to 60 percent by 2030 and set a 100 percent "carbon-free" electricity target for 2045 (SB 100, 2018).
- → New Mexico increased its current RPS target of 20 percent by 2020 to 80 percent by 2040, with a 100 "zero carbon" target by 2045 (SB 489, 2019).
- → Nevada increased its current RPS of 25 percent by 2025 to 50 percent by 2030 and set a non-binding goal of 100 "zero carbon" by 2050 (SB 358, 2019).

A clean electricity grid is one part of decarbonizing the economy, but Oregon is also considering policies around the built environment and the transportation sector. Cap-and-trade programs can be economy-wide, thus addressing home heating and cooling as well as transportation fuels. HB 2020, introduced but not passed during Oregon's 2019 legislative session, would have required economy-wide decarbonization.

Utility-scale renewable energy facilities often require more land than fossil fuel plants of similar electrical capacity, leading to concerns about effects of energy development on the landscape and natural resources.

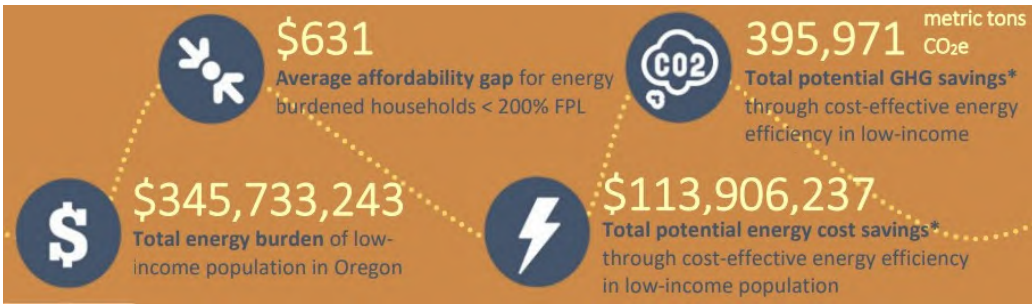
Regional energy markets can support integration of high levels of renewable energy but may require more transmission and regional coordination among utilities that own transmission and generation.

Policy Landscape/Background

Access to New Technologies

The electricity system of the future will likely have greater two-way flow capabilities, where customers both receive and supply electricity from and to the grid. For example, wi-fi enabled or networked sensors and controls enhance information-sharing across the grid to manage and optimize generation, consumption, and efficient flow of electricity. As technology continues to evolve, consumers will have more options for clean energy and distributed energy resources as utilities and state policymakers seek additional ways of increasing system flexibility, reliability, and resilience while also meeting environmental and climate change goals. To maximize benefits across Oregon, deployment of emerging technologies should be equitable and accessible to all customers. Achieving many of these benefits requires comprehensive and reliable broadband internet access.

Energy Burden



Energy burden is defined as the percent of household income spent on energy bills. An Oregonian is considered energy-burdened if they spend more than six percent of their household's income on energy expenditures. The average energy burden of low-income households and of communities of color far exceeds the average energy burden on median-income households. Oregon Housing & Community Services reports that about 25 percent of Oregon households are considered energy-burdened. Governor Brown signed Executive Order 17-20 in 2017, directing agencies to conduct an Energy Burden Assessment and establish a 10-Year Energy Burden Plan with the goal to reduce energy burden on low-income populations in Oregon, while prioritizing energy efficiency to achieve that reduction. The Energy Burden Assessment (key calculations summarized in the graphic above) is available online as a mapping tool with data layers that can inform efforts in reducing the energy burden: http://bit.ly/OHCS_AHA

Key Definitions in the 10-Year Energy Burden Plan

- *Affordable housing*. A home is considered affordable if the housing expenditures are 30 percent or less of the household income. These housing expenditures include not only rent or mortgage payments, but also utility bills and, for homeowners, costs such as property taxes.
- *Low-income housing*. Housing occupied by a household with income less than or equal to 80 percent of the area median income (AMI). Per this definition, 41 percent of Oregon households (~ 634,000 households) are considered low-income. Extremely low-income households, per U.S. Department of Housing and Urban Development's definition (households with incomes less than or equal to 30 percent of the AMI), account for about 14.5 percent of Oregon households (~ 222,000 households).

Trending Topics

Opportunities for Customers

"The grid" refers to the electric grid, which is a network of transmission lines, substations, and transformers that delivers electricity from a power plant to you. A smart grid allows for two-way communication between a utility and customers through controls, computers, automation, and new technologies and equipment

working together to digitally respond to quickly changing electric demand. Customers often opt-in to a program or purchase the appropriate type of thermostats, appliances, or other equipment for the utility to be able to control and shift electricity demand. Electricity demand is highly variable – the demand for electricity on a utility's system can be twice as large during the peak hour of demand in a day as it is during the lowest hour of demand on the very same day. Similarly, the peak demand over an entire year can be several times greater than the lowest point of demand in the same year. As technologies and processes change with smart grids, customers will have more options to participate by being paid for behavior changes or using distributed energy resources (DERs). However, the multiple benefits of these emerging technologies will not be realized without participation from customers, and low-income customers may have financial or technology barriers that need to be overcome so that they are not left behind in the smart-grid future.

WHAT'S A DER?

Energy resources located on the distribution system (e.g. rooftop solar), rather than a large electricity generator that is not located within the distribution system (e.g., a natural gas power plant).

Grid-Interactive Efficient Buildings are energy efficient and use smart technologies and DERs to both manage electricity demand and optimize building operations to meet occupant needs and reduce costs. These technologies and processes have several co-benefits (see USDOE chart at right). Advanced controls and communications enable buildings to adjust power consumption to meet grid needs through a variety of control strategies applied to existing equipment, such as lighting and heating, ventilating, and air conditioning, along with on-site assets like solar photovoltaics, electric vehicle charging, and electrical storage. These control strategies can change the way a building schedules energy use to avoid high demand (peak load) costs and make building operations more resilient.

Benefit	Utility System	Building Owners/ Operators	Society
Reduced operation & maintenance costs	✓	-	-
Reduced generation capacity costs	✓	-	-
Reduced energy costs	✓	-	-
Reduced T&D costs	✓	-	-
Reduced T&D losses	✓	-	-
Reduced ancillary services costs	✓	-	-
Increased resilience	✓	✓	✓
Increased DER integration	✓	✓	-
Improved power quality	-	✓	-
Reduced customer utility bills	-	✓	-
Increased customer satisfaction	-	✓	-
Increased customer flexibility & choice	-	✓	-
Environmental benefits	-	-	✓

Adapted from U.S. Department of Energy

Demand Response programs allow retail customers to know when system costs are high, typically due to high demand, and then shift their building demand to lower-cost off-peak times. Utility time-of-use rates are one example of a demand response mechanism that accomplishes this by charging higher or lower rates at different times of the day or year based on system conditions. Alternatively, customers may opt in to allow a utility (or a third-party aggregator) to have direct control over their demand for electricity from some processes or appliances, especially those related to heating and cooling, based on market signals or grid conditions (such as voltage controls). For example, PGE has an innovative multi-year pilot called the Smart Grid Test Bed that is preparing more than 20,000 PGE customers in three Oregon cities — Hillsboro, Milwaukie, and Portland — to take advantage of special demand-response signals as well as incentives for using smart-home technologies, giving them greater control over their energy use.

Policy Landscape/Background

Resilience vs. Reliability

The Federal Energy Regulatory Commission (FERC) regulates the development and enforcement of reliability standards to ensure the reliable operation of the bulk electric system. Much of this work occurs through the North American Electric Reliability Corporation (NERC) and its seven regional entities, including the Western Electricity Coordinating Council, which encompasses much of the western United States (including Oregon).

Reliable Operation (FERC Definition): Operating the elements of the bulk power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance or unanticipated failure of system elements.

There is increasing interest in resilience as a concept separate and distinct from the reliable operation of the bulk electric system. While the term resilience has become commonly used in the energy sector, there is no widely agreed upon definition. The Oregon Department of Energy has adopted the following definitions:

Energy Resilience: The ability of energy systems, from production through delivery to end-users, to withstand and rapidly restore energy delivery following non-routine disruptions of severe impact or duration.

Community Energy Resilience: The ability of a specific community to maintain the availability of energy needed to support the provision of energy-dependent critical public services to the community following non-routine disruptions of severe impact or duration to the state's broader energy systems.

A related term, climate resilience (also called climate adaptation), in this context refers to preparing energy systems to adapt to new climate conditions in ways that reduce the risk of non-routine disruptions.

Threats to the Resilience of Oregon's Energy Sector

Electric utilities are familiar with system reliability standards, metrics for defining and maintaining adequate levels of reliability, and the types of events that can trigger reliability events (e.g., routine severe weather events, downed trees, or the insufficiency of available generating resources to meet electricity demand). Generally, the electric industry has long been focused on reducing the frequency and duration of unplanned service outages that occur from such reliability events.

Other events can pose threats to the resilience of the electric system — while uncommon, these types of events can result in severe effects in terms of the extent of damage or disruption, or in terms of the duration. In Oregon, these types of threats include:

Seismic: There are several active seismic faults in Oregon. The Cascadia Subduction Zone parallels Oregon's coastline and is capable of a 9.0 earthquake that would severely affect energy infrastructure, especially west of the Cascades. Other fault lines (e.g., the Portland Hills Fault) pose more localized threats.

Severe storms: While utilities have long planned for routine storm events, climate change is expected to increase the frequency of extremely severe storms (e.g., 1-in-500 year events). The wind and ice associated with these types of events can pose significant threats to the electric system, as evidenced by recent storms in Lane and Douglas counties.

Catastrophic wildfire: Climate change will result in snowpack loss, water scarcity, drought, and insect and disease damage to forests, likely increasing the frequency of catastrophic wildfires. These conditions may increase the risk of wildfires caused by electric infrastructure.

Cyber or Physical Attack: Increasingly sophisticated computer systems combined with a proliferation of digital grid controls and grid-connected end-user devices (such as smart thermostats and electric vehicle chargers) may increase the risk of attacks that could affect the electric system.

Trending Topics

Recent events such as wildfires in California, combined with an increased awareness of threats and new opportunities presented from advances in technology, have created heightened interest in energy resilience in Oregon.

State Actions

→ **Oregon Resilience Plan:** Evaluates the resilience of different sectors (including energy) of the economy in a Cascadia earthquake. It also includes high-level recommendations to improve energy resilience over 50 years.

→ **Governor's Resiliency Vision:** A policy agenda with six strategies to improve Oregon's resilience to Cascadia, including plan development for the state's liquid fuel hub.

→ **Oregon Fuel Action Plan:** ODOE-developed plan to ensure that adequate fuel supplies will be provided to the state's emergency and essential service providers in the event of severe or long-term fuel disruption or shortage.

→ **Oregon Guidebook for Local Energy Resilience:** A centralized resource developed by ODOE for small and medium electric utilities to identify actions to improve business continuity planning and evaluate strategic opportunities to deploy distributed energy resources to improve community energy resilience.

→ **Governor's Wildfire Council:** The Governor's Council on Wildfire Response was created by Governor Brown in 2019. The Council is tasked with reviewing the state's current model for wildfire prevention, preparedness, and response, and analyzing whether the current model is sustainable given our increasing wildfire risks.

Local Planning

Consistent with state-level planning, many local governments and utilities are making investments designed to improve energy resilience at the local level. These actions vary, from evaluating whether buildings and energy infrastructure are seismically sound, to relocating key assets, to deploying advanced energy technologies.

Examples of Utility Actions

→ **Eugene Water & Electric Board:** Built a microgrid at an elementary school that can support the utility during regular conditions, but also provide community resilience benefits following a major grid disruption.

→ **Central Lincoln PUD:** Relocated their Northern Operations Center from within the tsunami zone to higher elevation outside of the tsunami zone.

→ **Harney Electric Coop:** Secured FEMA pre-disaster mitigation funding to improve the resilience of several power lines to critical mountaintop communication sites.

→ **Bonneville Power Administration:** Working to bolt transformers to foundations, retrofit control houses, and install flexible components at substations across its territory to improve seismic resilience.

→ **Portland General Electric:** Partnered with the City of Portland to deploy a solar and storage microgrid at Fire Station No. 1 in downtown Portland to improve community energy resilience.

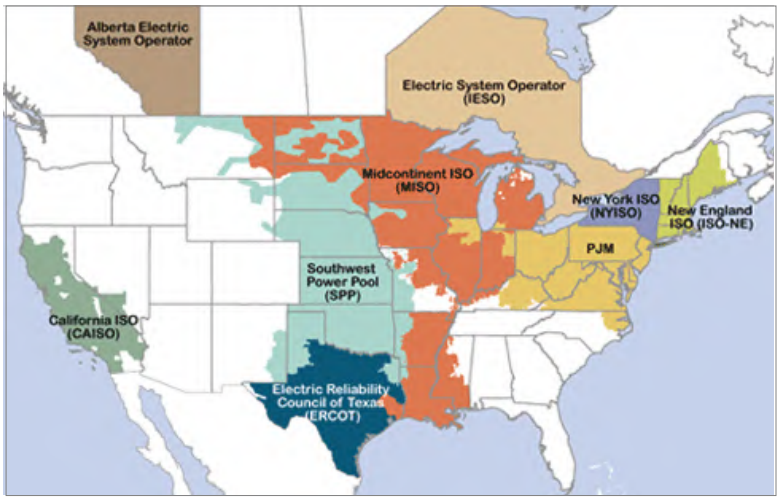
Policy Landscape/Background

All electric utilities must pair electricity supply with demand in real time. This is accomplished as far in advance as 20 years for long-term planning, down to 15-minute and 5-minute intervals for short-term balancing. To meet demand in the short-term, utilities buy and sell electricity as needed in wholesale markets.

Wholesale Markets: Organized vs. Bilaterial Markets

Organized Markets. Most areas of the U.S. are served by organized markets (administered by Independent System Operators, or ISOs) that centrally manage the least-cost economic dispatch of available electric generating resources on day-ahead and real-time intervals. California's ISO, CAISO, is the only ISO in the Western region of the U.S.

Bilateral Markets. Most transactions for power in the Northwest occur via utility-to-utility bilateral transactions, but this is beginning to change with the growth of the Energy Imbalance Market.



Both bilateral and organized wholesale markets have distinct day-ahead and real-time processes:

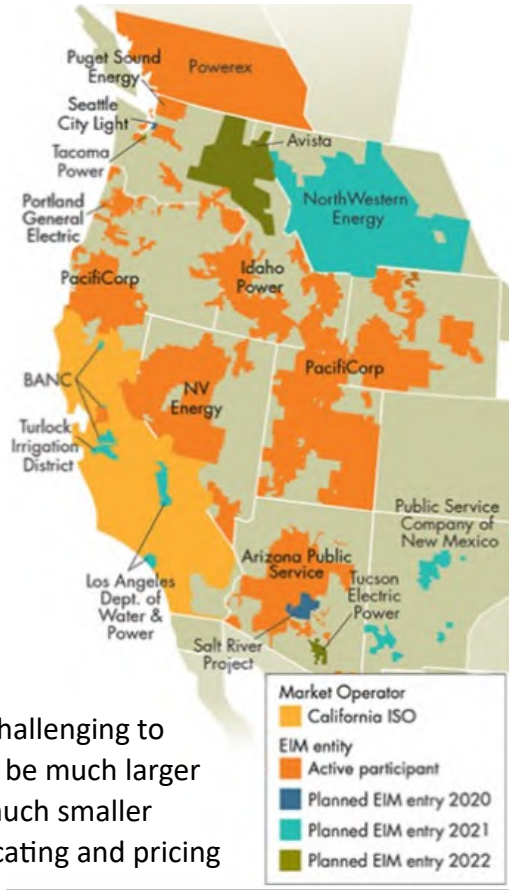
Day-ahead: Utilities forecast demand for each hour of the following day and then will schedule resources (utility-owned, utility-contracted, or via an organized market) on a day-ahead basis to meet that demand.

Intra-hour (Real-time): Utilities continually revise their expected load forecasts as they approach the hour. If utilities own generation, they may be able to ramp their generators up or down incrementally to match expected variations in demand. If utilities are short on available generation, they may look to buy energy in the real-time markets. In contrast, if utilities have excess generation going into the hour, they may look to sell that energy in the real-time markets.

What is the Energy Imbalance Market (EIM)?	Oregon EIM Participants
A real-time market that dispatches resources on the basis of least-cost to meet participant needs for resources within the hour. The EIM dispatches resources across 15-minute and 5-minute intervals. • The EIM is governed by a five-member body and is operated by the CAISO out of its real-time dispatch center. • EIM launched in 2014 with PacifiCorp and CAISO as its founding members. • See map on next page for current participants.	**PacifiCorp (joined 11/2014)** • $214.43M in total gross benefits reported through Q2 2019 **Portland General Electric (joined 10/2017)** • $53.03M in total gross benefits reported through Q2 2019 **Idaho Power Company (joined 04/2018)** • $43.66M in total gross benefits reported through Q2 2019 **Bonneville Power Administration** • BPA signed the EIM Implementation Agreement in September 2019 to work toward joining in March 2022

CAISO's Day-Ahead Market

- Generators submit bids into CAISO's Day-Ahead Market identifying the price ($/MWh) at which they are willing to buy or sell a defined amount of energy (measured in MWh) for each hour of the next day.
- The market identifies a single clearing price necessary to dispatch those generators to meet forecasted day-ahead demand, and then commits resources to meet the load of bids received to buy power.
- There's an ongoing process to evaluate extending CAISO's Day-Ahead Market to the Western EIM (implementation not expected until 2022).



Extended Day-Ahead Market (EDAM) vs. Existing EIM

- The EIM is an intra-hour real-time market that allows participants to more efficiently manage imbalances between actual levels of load and generation, and what had been forecasted the previous day *for that hour*. The EIM's economic dispatch helps to lower the costs of managing these imbalances but does not provide longer-term price signals.
- Adding day-ahead market capabilities to the existing EIM would be more challenging to implement than the current intra-hour real-time EIM market. There would be much larger volumes of transactions (90%+ of energy scheduled day-ahead, whereas much smaller quantities move in the imbalance market) and there are challenges to allocating and pricing transmission not currently addressed in the EIM.
- The EIM and EDAM are designed to minimize costs through the economic dispatch of generators that already exist. These markets are not intended, however, to incentivize building new capacity. These decisions are considered separately on a utility-specific basis, in collaboration with stakeholders and regulators, and informed by regional analysis from the Northwest Power and Conservation Council.

Trending Topics

Rapidly changing electric sector. Utilities are increasingly looking for more flexible tools to balance the system due to, for example: significant new coal retirements, increasing environmental and climate pressures on the hydropower system, continued expansion of variable output renewable generating capacity, continued low natural gas prices, indications of slowing uptake on efficiency savings, slower adoption of demand response, and natural gas transmission constraints.

Ongoing discussions about potential ISO formation. Formation of a regional ISO (or Regional Transmission Organization) or expansion of the CAISO beyond California would result in significant changes to transmission planning and operation. A regional ISO in the Northwest would likely be designed to coordinate transmission planning and open access across its footprint, and to operate a centralized energy market to dispatch generation. In addition, a regional ISO would likely play a central role in monitoring and assessing long-term capacity needs.

→ Previous attempts at ISO formation in the Northwest failed for a variety of reasons, including concerns about cost-shifting. Also, the region's surplus of capacity and energy from the hydropower system have historically kept power costs low, and therefore removed a key driver for ISO formation in other parts of the country.

→ Current drivers for renewed discussions around ISO formation include: 1) the steep reductions in the costs of renewables have led to large-scale deployment of renewables across the West, increasing the value of flexibility elsewhere in the system; and 2) forecasted capacity constraints in the Northwest due to retirements of fossil fuel units.

Energy Efficiency in the Built Environment

House Interim Committee on Energy and Environment

January 15, 2020

OREGON DEPARTMENT OF ENERGY

Executive Order 17-20

Signed by Governor Brown November 6, 2017

Three key sections with directives:

1. State-owned Buildings
2. New Construction
3. Existing Buildings

About **30% of Oregon's greenhouse gas emissions** can be traced to how much and what type of energy we use in buildings

Office of the Governor
State of Oregon

EXECUTIVE ORDER NO. 17-20

ACCELERATING EFFICIENCY IN OREGON'S BUILT ENVIRONMENT TO REDUCE GREENHOUSE GAS EMISSIONS AND ADDRESS CLIMATE CHANGE

WHEREAS, climate change presents a significant threat to our livelihoods, economic security, environment, health, and well-being.

WHEREAS, there has been an increase in extreme weather events, including more frequent and intense heat waves and wildfires. According to the Oregon Climate Change Research Institute and other regional studies, the best available science indicates Oregon is at risk of serious impacts to its natural resources due to climate change.

- Water resources are being affected by decreased winter snowpack, changes to seasonal runoff patterns, decreased precipitation in Eastern Oregon, and increased intensity and occurrence of flooding.
- Agricultural resources are being affected by increases in temperatures.
- Ocean acidification is increasing and there are changes in ocean currents.
- Significant parts of the Oregon coastal region, stretching 363 miles, will be impacted by an expected rise in sea level up to 1 to 4 feet by 2100, incurring billions of dollars of damages and losses to roadways and structures.
- Climate change impacts threaten the State's agricultural, fishing, timber, recreation, and tourism industries, thereby threatening the livelihood of the State's residents and an important source of Gross State Product for the state.

WHEREAS, energy efficiency leads to significant greenhouse gas reductions that are essential to meeting our state greenhouse gas reduction goals and addressing climate change.

WHEREAS, Oregon is committed to meeting the international Paris Agreement targets to reduce greenhouse gas emissions by 26 to 28 percent below 2005 levels by 2025.

WHEREAS, Oregon has adopted goals to reduce greenhouse gas emissions to 10 percent below 1990 levels by 2020 and at least 75 percent below 1990 levels by 2050 as described in ORS 468A.20.

BUILT ENVIRONMENT EFFICIENCY WORKING GROUP

EO 17-20 established the "BEEWG," a collaborative of State of Oregon agencies working to implement EO directives.

- Hold regular agency work group meetings to coordinate and identify any barriers to implementation of directives
- Created an online presence with meeting materials and opportunities for stakeholder feedback
- To date, the BEEWG has held three public meetings to discuss EO implementation progress, share analysis from reports, and gather stakeholder input on equitable access to energy efficiency
- Published a progress chart of directives and dashboard of completed action items online: www.oregon.gov/energy/Get-Involved/Pages/BEEWG.aspx

EO 17-20 DIRECTIVES

State Buildings

- High performance energy targets
- Carbon-neutral operations
- Statewide plug-load strategy
- Energy efficient equipment
- Lifecycle cost analysis

New Construction

- Solar-ready buildings
- Electric vehicle-ready buildings
- Zero-energy homes
- Energy efficiency in commercial construction
- Help expanding industries reduce energy footprint
- Improve appliance standards
- High-efficiency water fixtures
- On-site water reuse

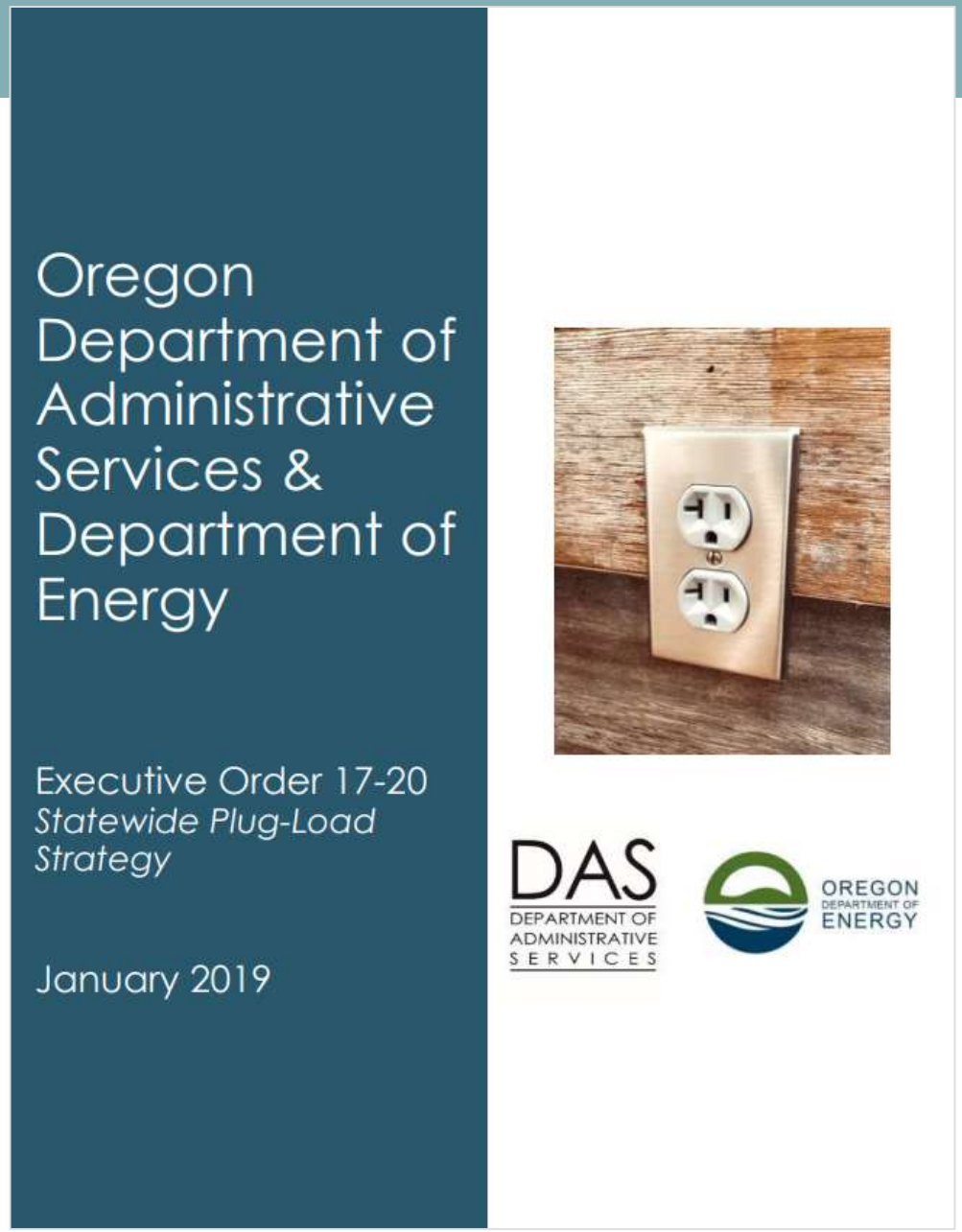
Existing Buildings

- Energy Trust of Oregon pilot programs
- Prioritize energy efficiency in affordable housing
- Coordinate energy data to inform policy
- Evaluate energy and resilience efforts

Plug-Load Strategy

Develop a plug-load strategy for reducing energy use in state buildings.

- Outlined recommendations for reducing energy use for different types of equipment, including: computers, server rooms/data centers, personal devices, communal appliances, and others
- Held a Plug Load Strategy workshop in October 2019 to help state agencies learn how to reduce energy consumption

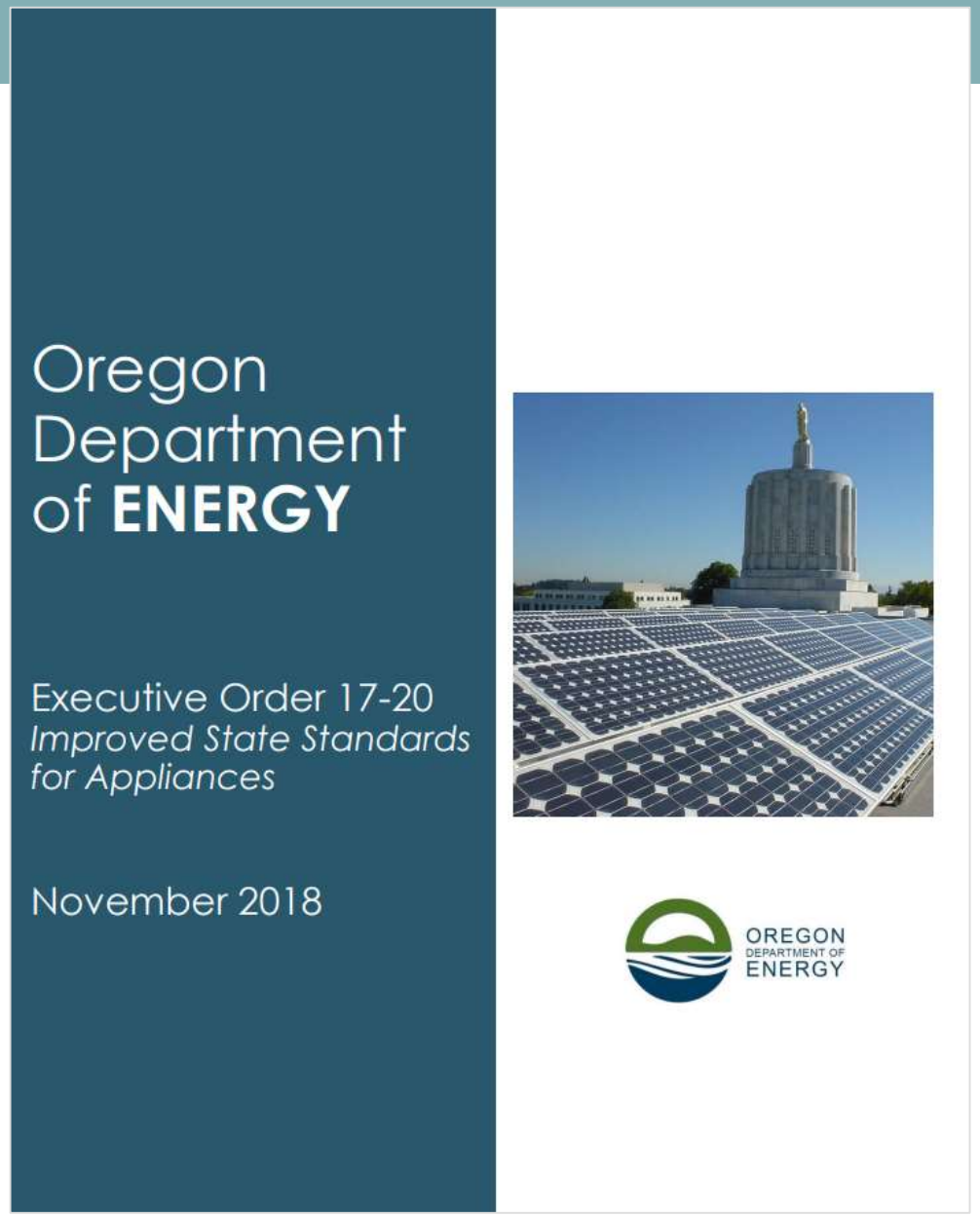


www.oregon.gov/energy/Get-Involved/Pages/BEEWG.aspx

Appliance Standards

Develop a plan for adopting appliance standards that align with other leading states.

- Outlined history of appliance standards in Oregon and reviewed federal and other state-level appliance standards activities
- Identified potential future appliance standards Oregon could consider

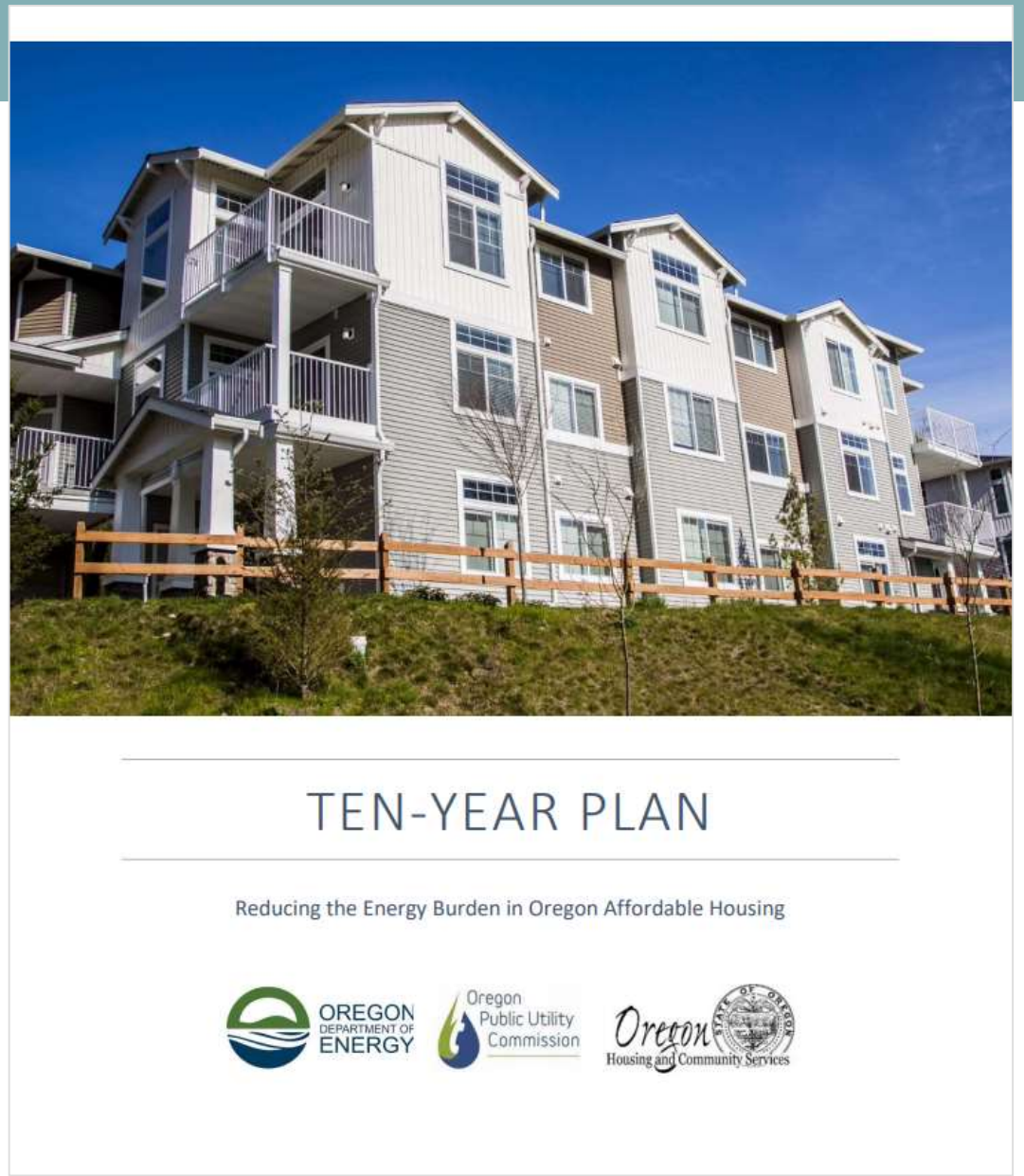


www.oregon.gov/energy/Get-Involved/Pages/BEEWG.aspx

10-Year Plan

Reduce the energy burden on low-income Oregonians, while prioritizing energy efficiency to achieve the reduction.

- Published GIS assessment tool of affordable housing stock: bit.ly/OHCS_AHA
- Outlined recommendations for achieving the goal
- OHCS and other BEEWG agencies will continue work to achieve actions in the 10-Year Plan



www.oregon.gov/energy/Get-Involved/Pages/BEEWG.aspx

2018

- Developed **database of eligible state-owned buildings**
- Identified opportunities for energy efficient **appliance standards** to continue Oregon's leadership
- Established tool to inform **high performance energy use targets and carbon neutral requirements** for state buildings
- Worked with Energy Trust of Oregon to evaluate **meter-based savings pilot programs**
- Published the *Ten-Year Plan: **Reducing the Energy Burden** in Oregon Affordable Housing*
- Developed a **plug-load strategy** for state building operations
- Completed *Expanding Industries & Building Code Amendments* report to **identify industries** with potential to realize significant cost and energy savings
- Evaluated how **distributed energy resources** could improve Oregon's recovery from a disaster

2019

- Completed *Efficient Building Equipment Procurement Requirements Report* to support state-purchased equipment meeting **high-efficiency water and energy use** specifications
- Completed draft update for **state behavior-based efficiency policy**
- Updated **2019 Oregon Zero Energy Ready Commercial Code** to become one of the nation's most efficient building codes
- Developed **cost analysis tool** to help inform BEEWG agency work
- Worked with partners to **coordinate data-sharing** of projected energy use reductions in the region

2020

- Adoption of the next cycle of leading **residential and commercial energy codes** is expected October 1, 2020

NEXT STEPS

- The BEEWG will continue to hold meetings
- Coming 2020-2025: Code work to further water, solar-ready, EV-ready, and energy efficiency requirements
- BEEWG progress chart of directives and the dashboard of completed action items will be updated online: www.oregon.gov/energy/Get-Involved/Pages/BEEWG.aspx

Oregon Department of **ENERGY**

House Interim Committee on Energy and Environment

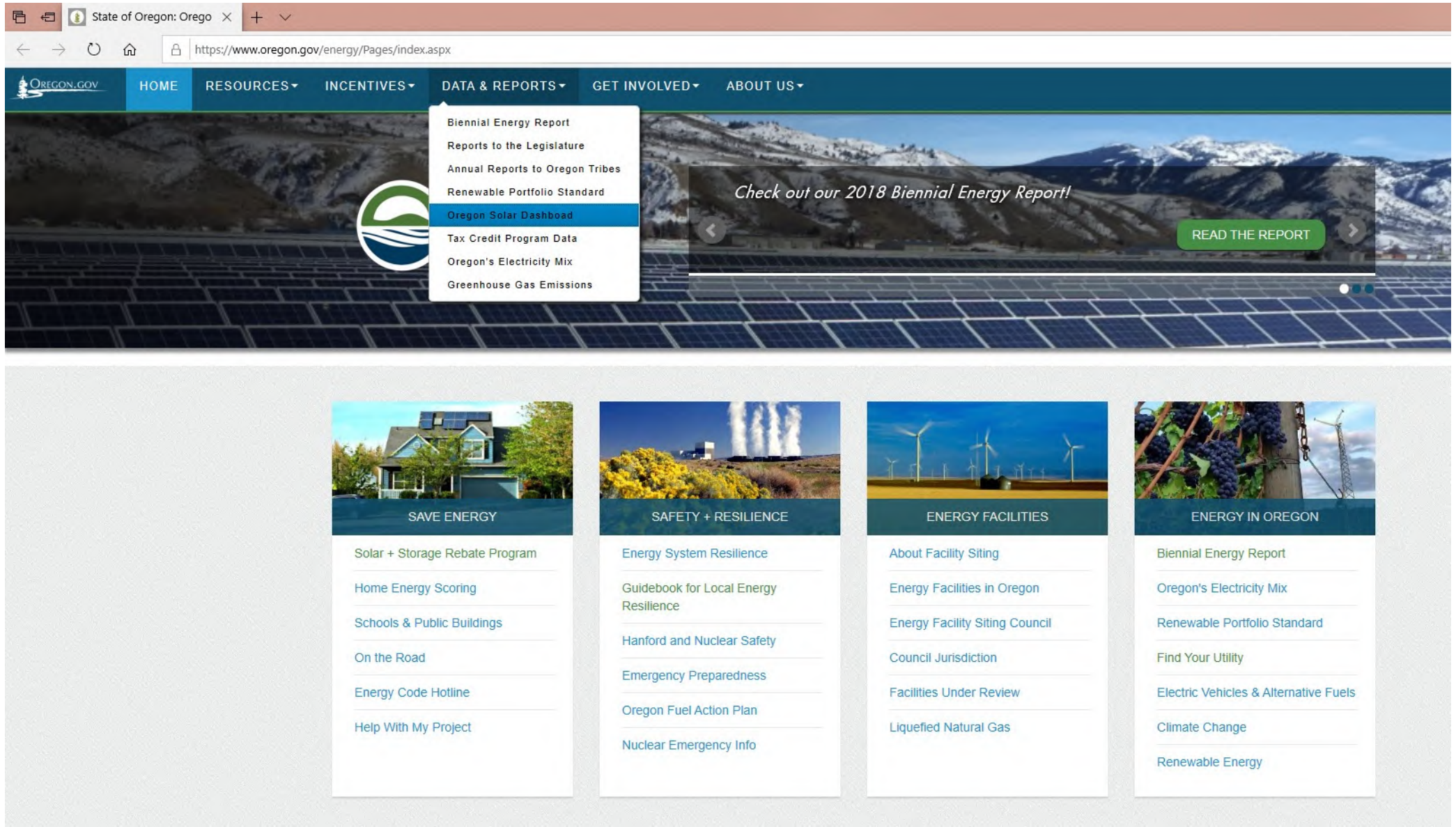
Oregon Solar Dashboard

Janine Benner
Rob Del Mar
January 15, 2020

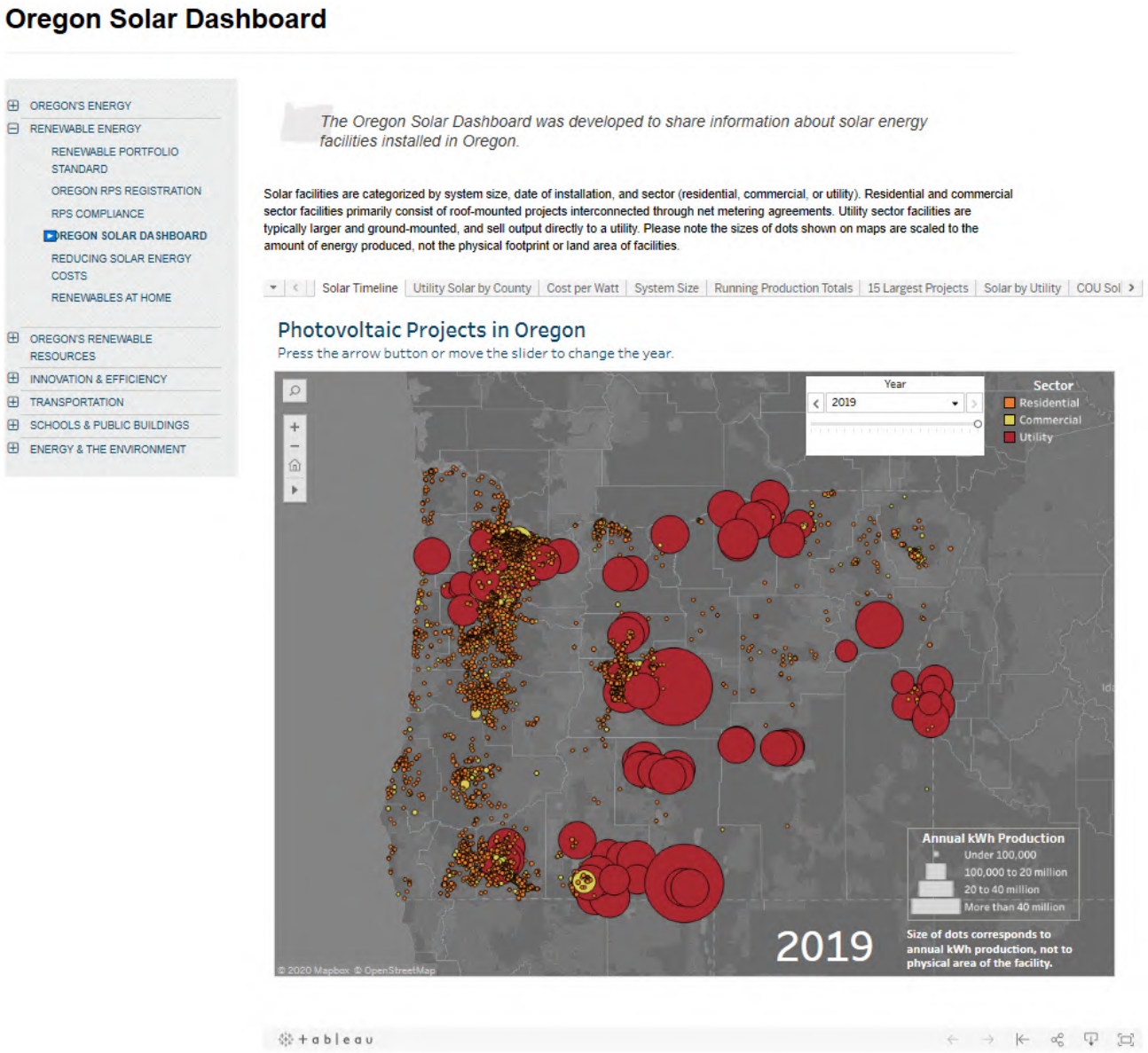


OREGON DEPARTMENT OF ENERGY

OREGON SOLAR DASHBOARD



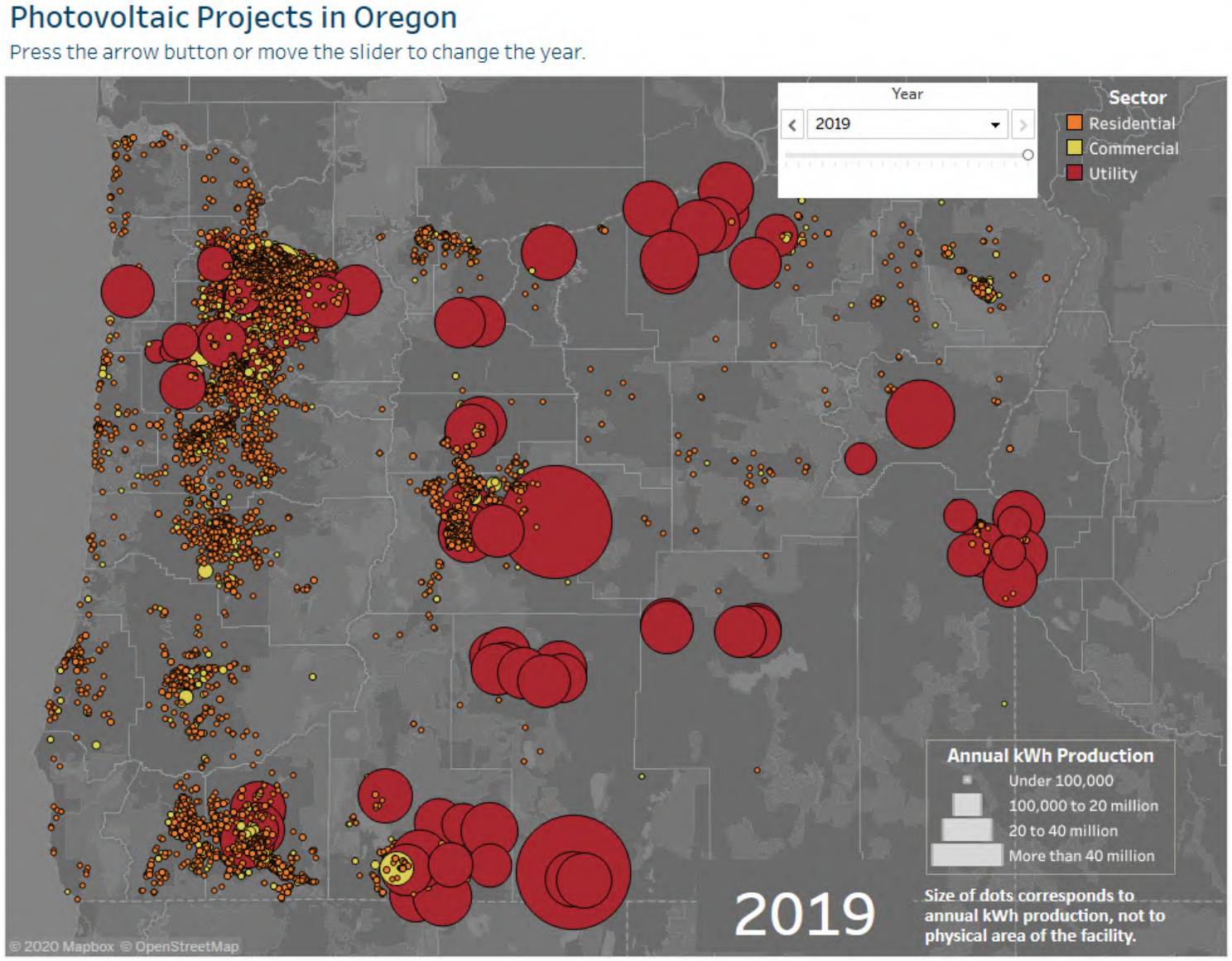
OREGON SOLAR DASHBOARD



OREGON SOLAR DASHBOARD

- Created in 2018 utilizing federal grant funds.
- Database contains more than 15,000 solar facilities from every county in Oregon and 37 different utilities
- Data provided by utilities and from RETC and other financial incentive programs
- Dots are scaled based on annual energy generation at each facility
- Available at:

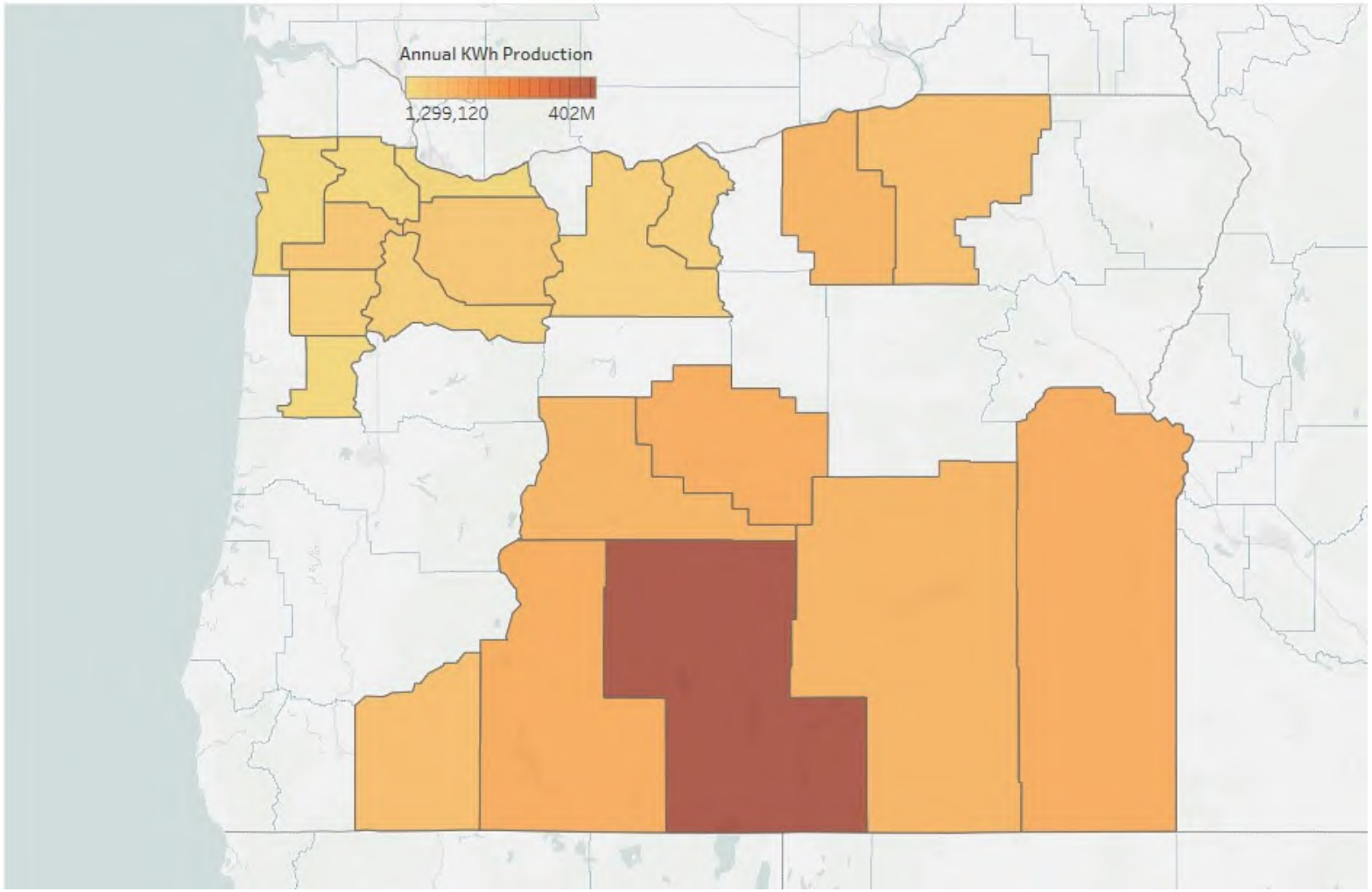
https://www.oregon.gov/energy/energy-oregon/Pages/Oregon-Solar-Dashboard.aspx



OREGON SOLAR DASHBOARD

Utility Solar by County

This map shows electricity generated by utility-scale solar facilities. To see solar electricity generated by all sources, click the tab "S Timeline."



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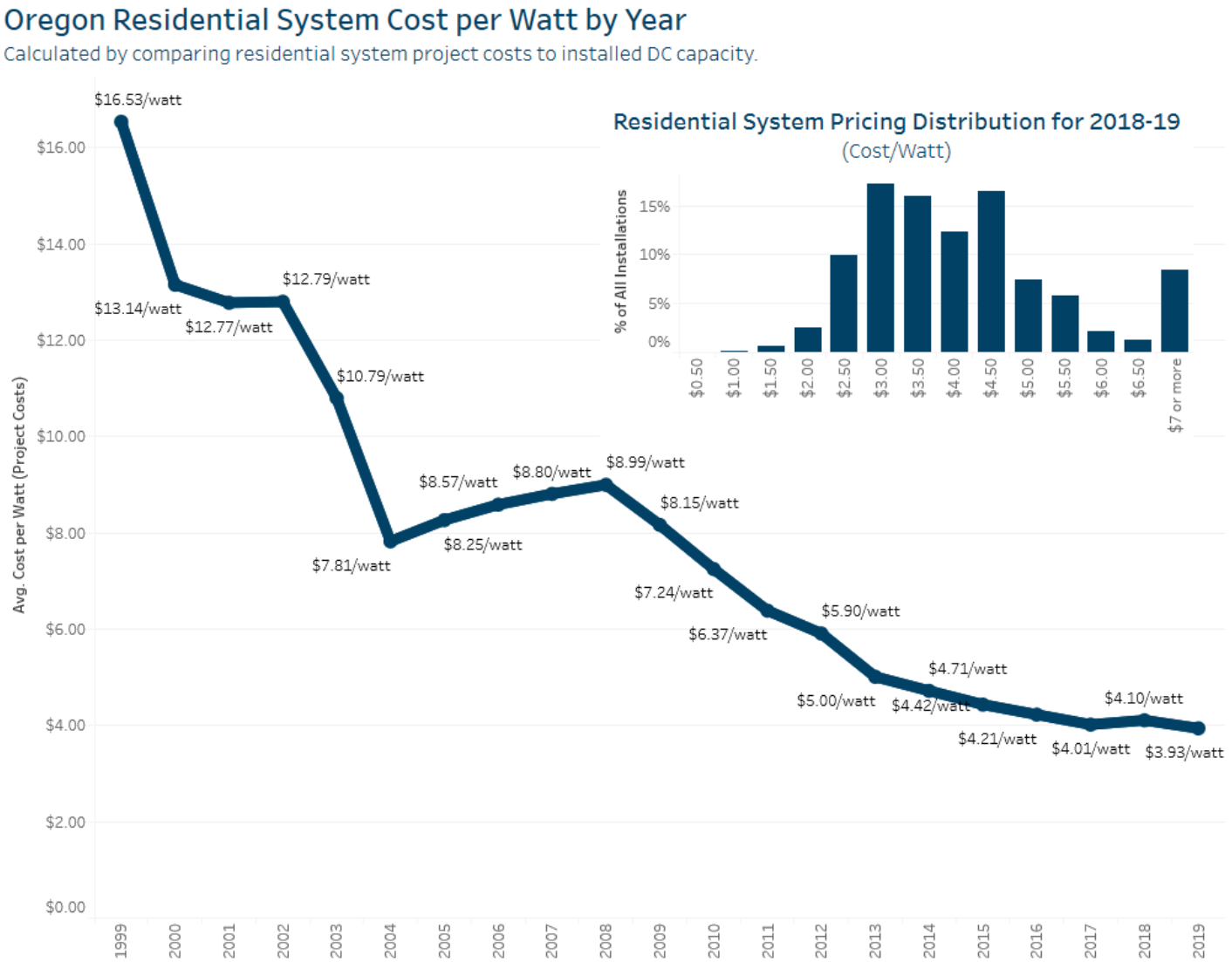

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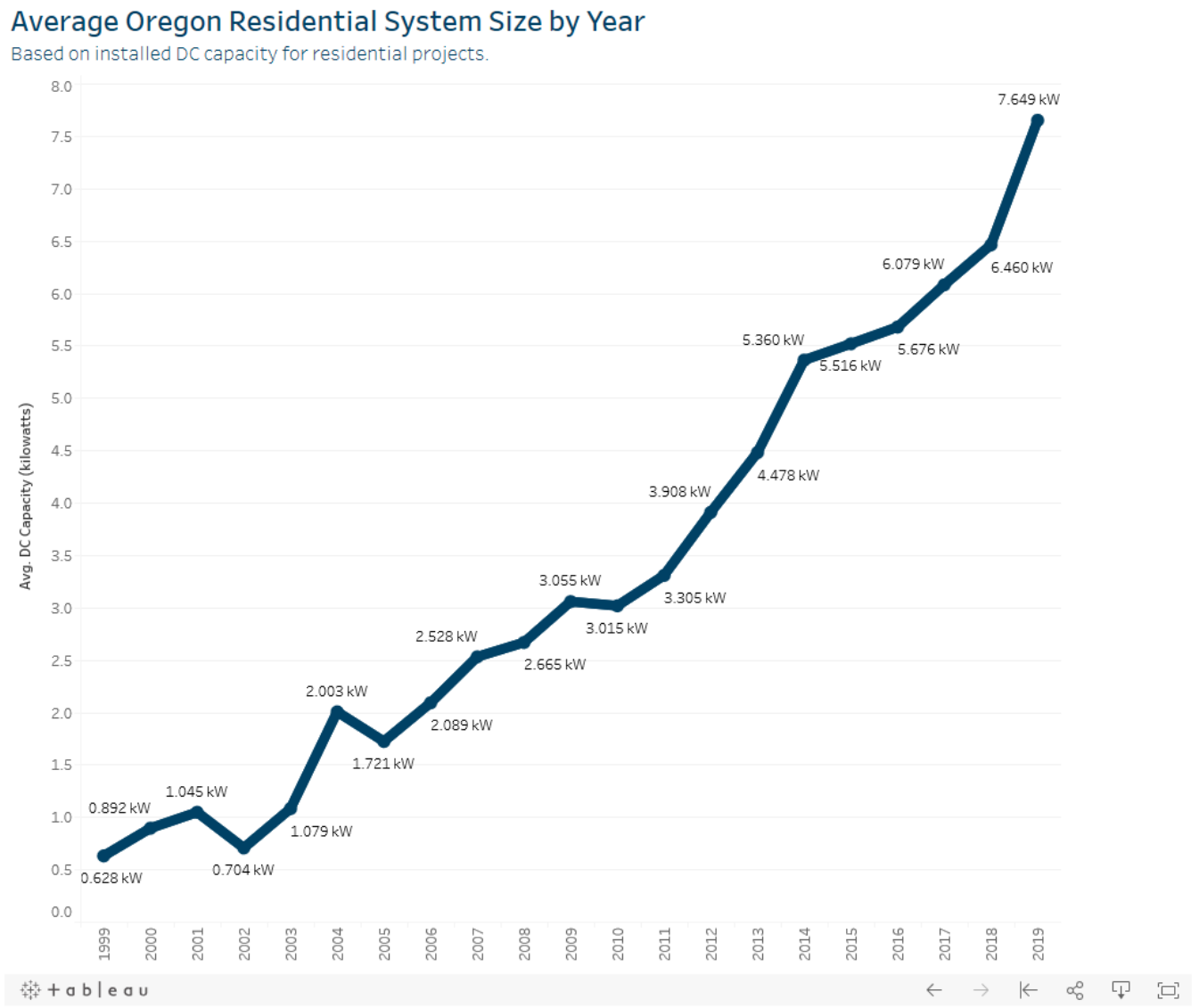

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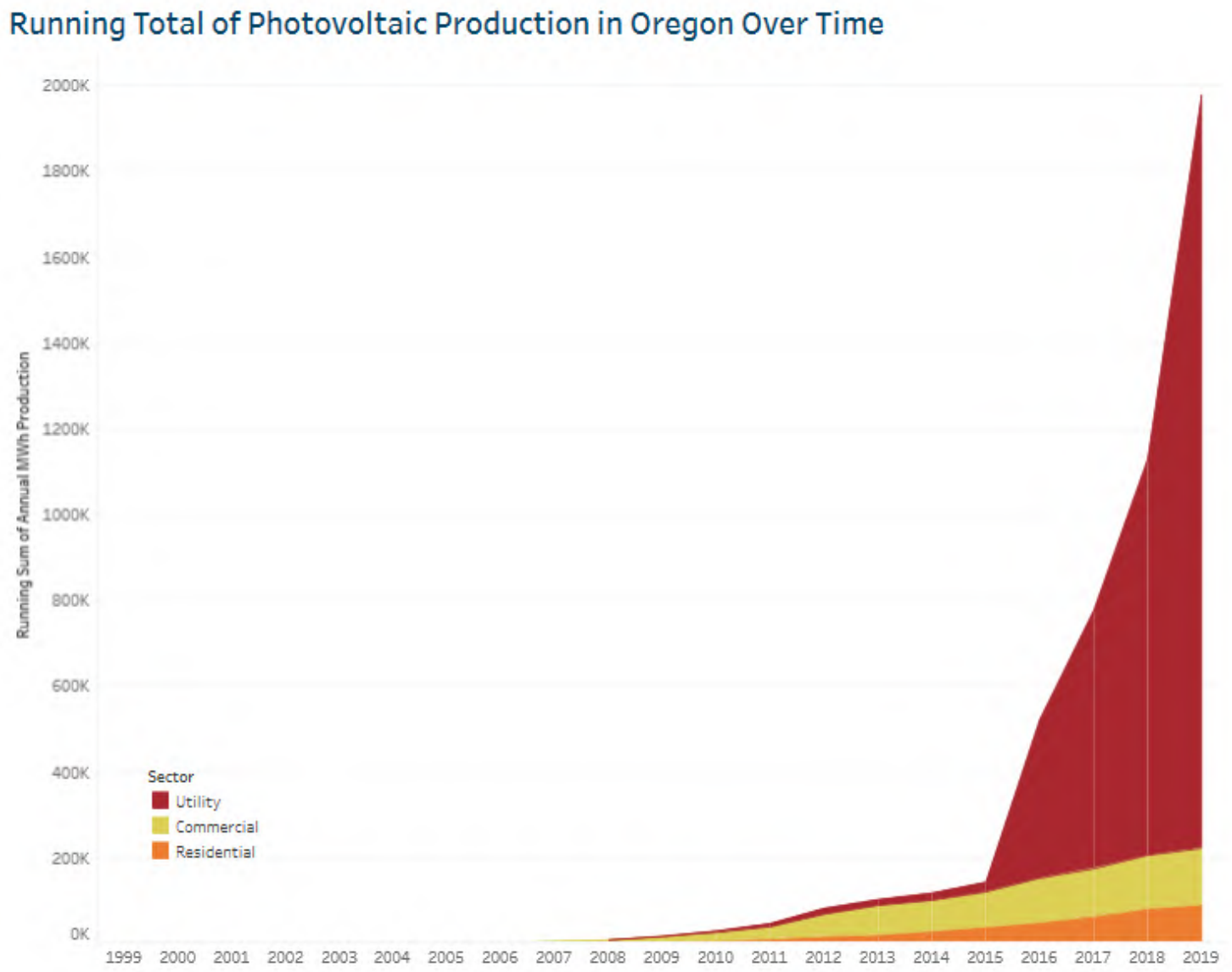

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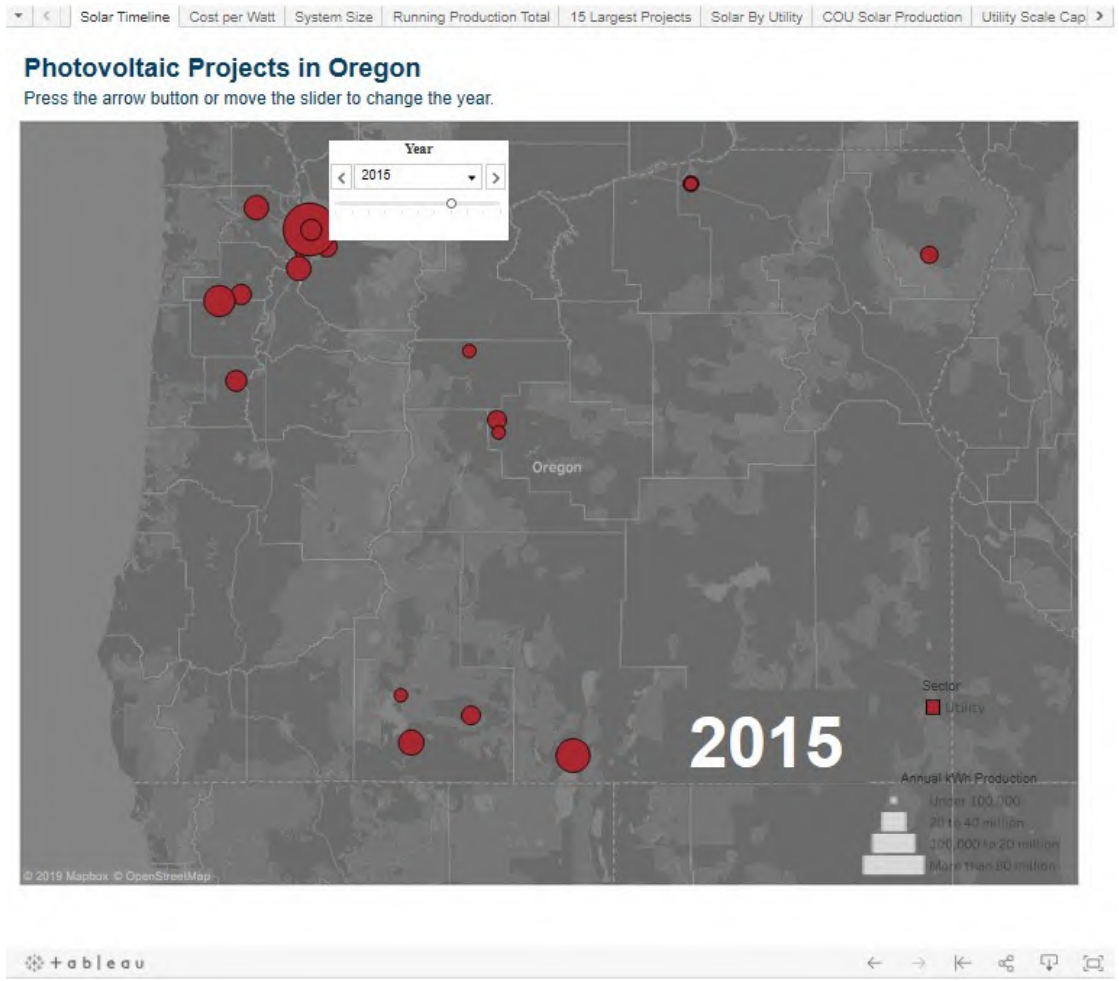

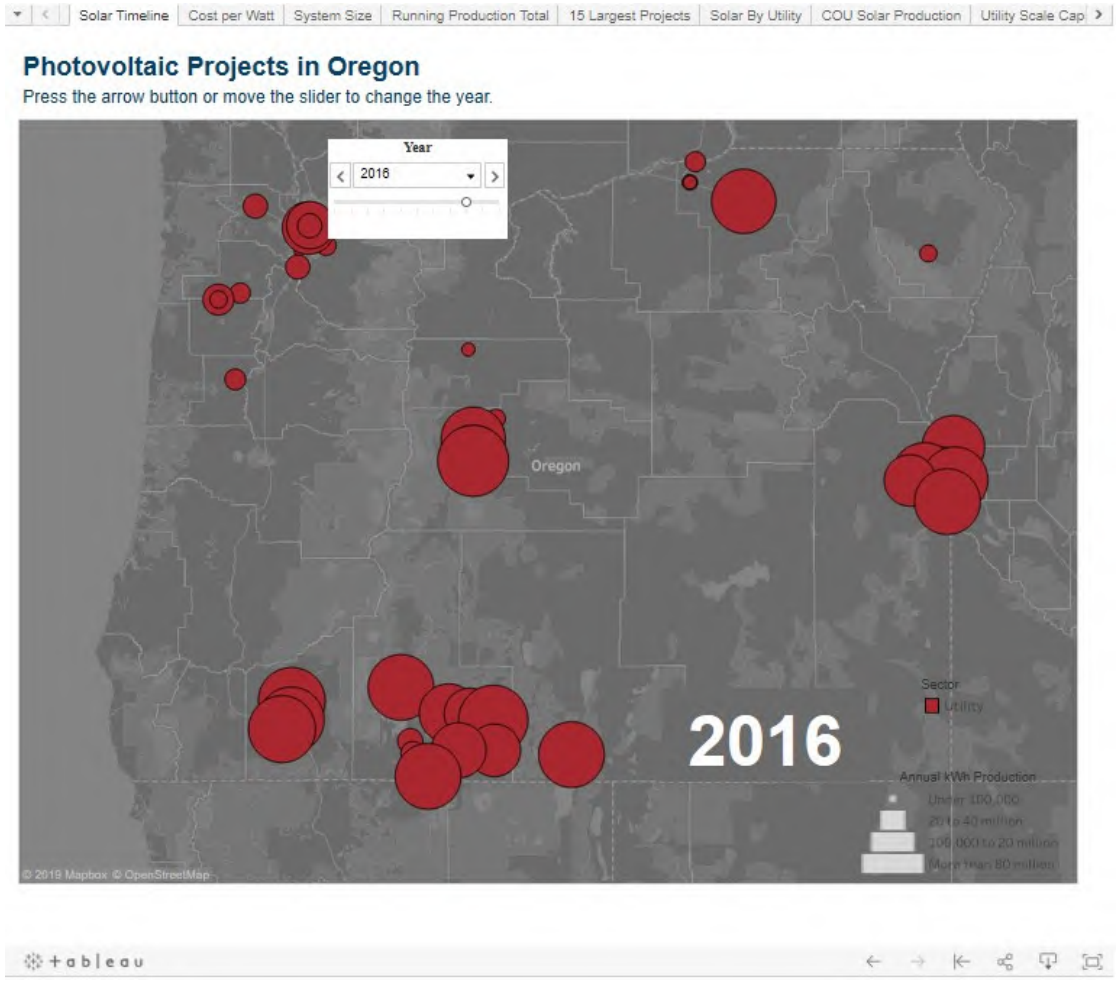

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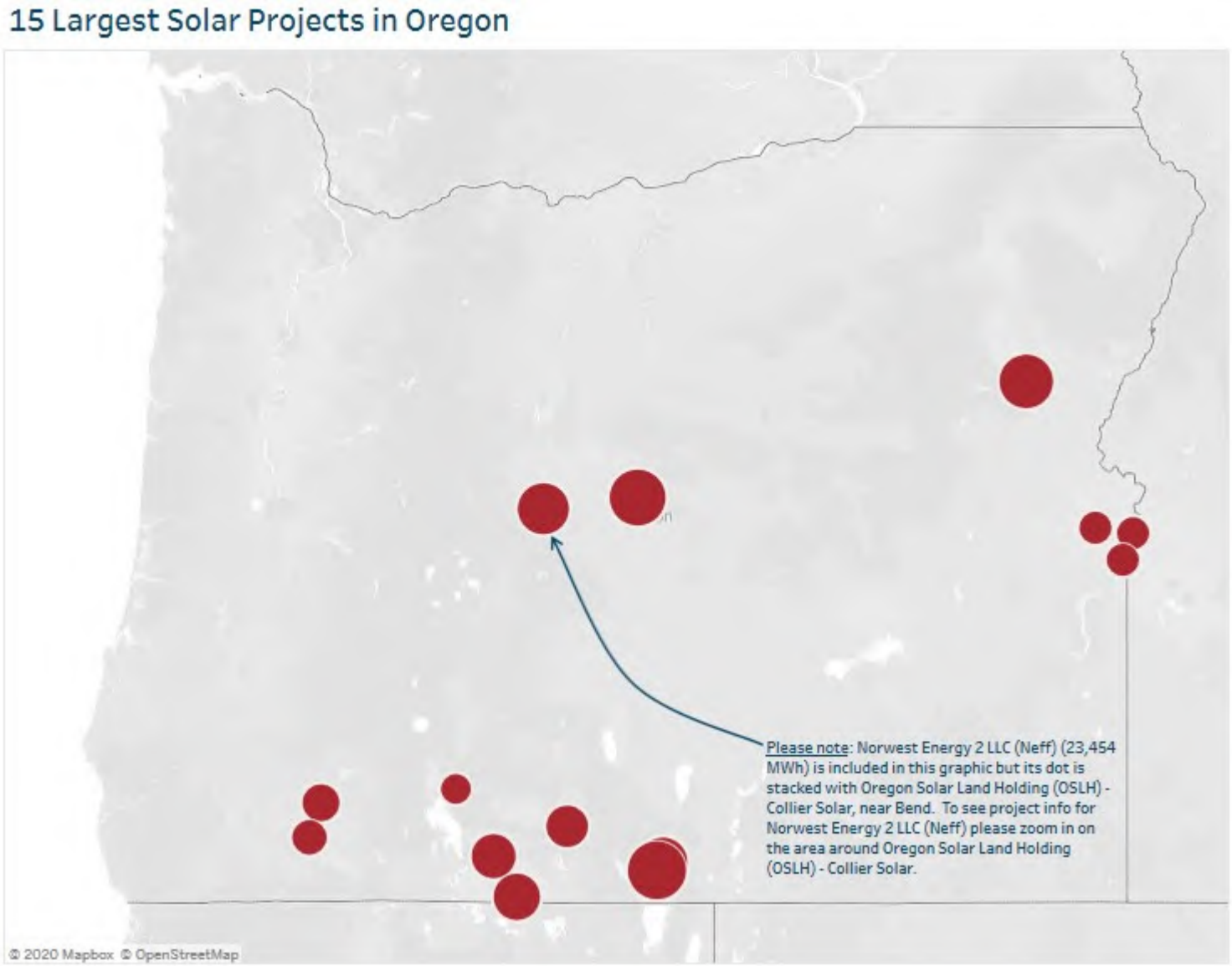
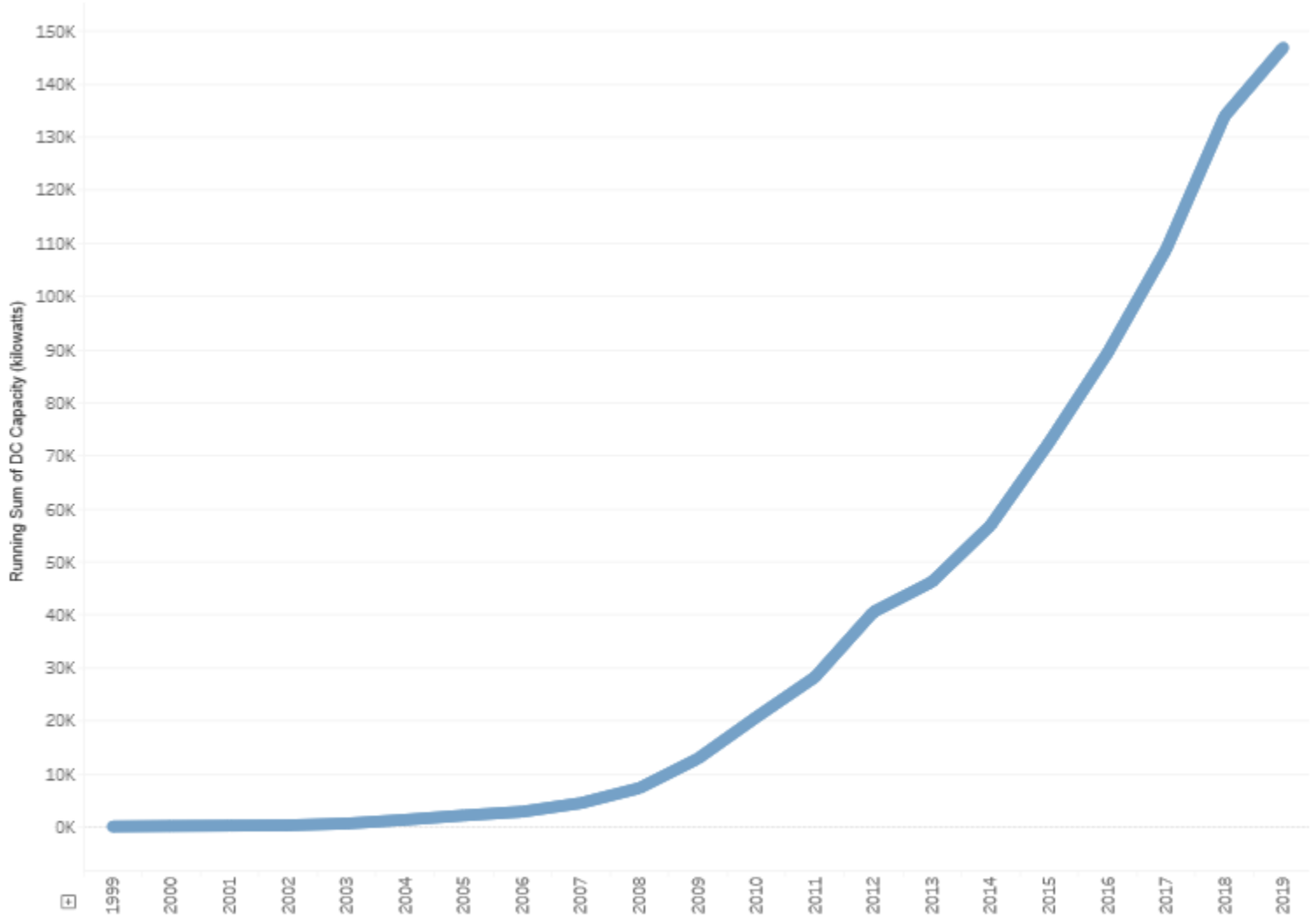


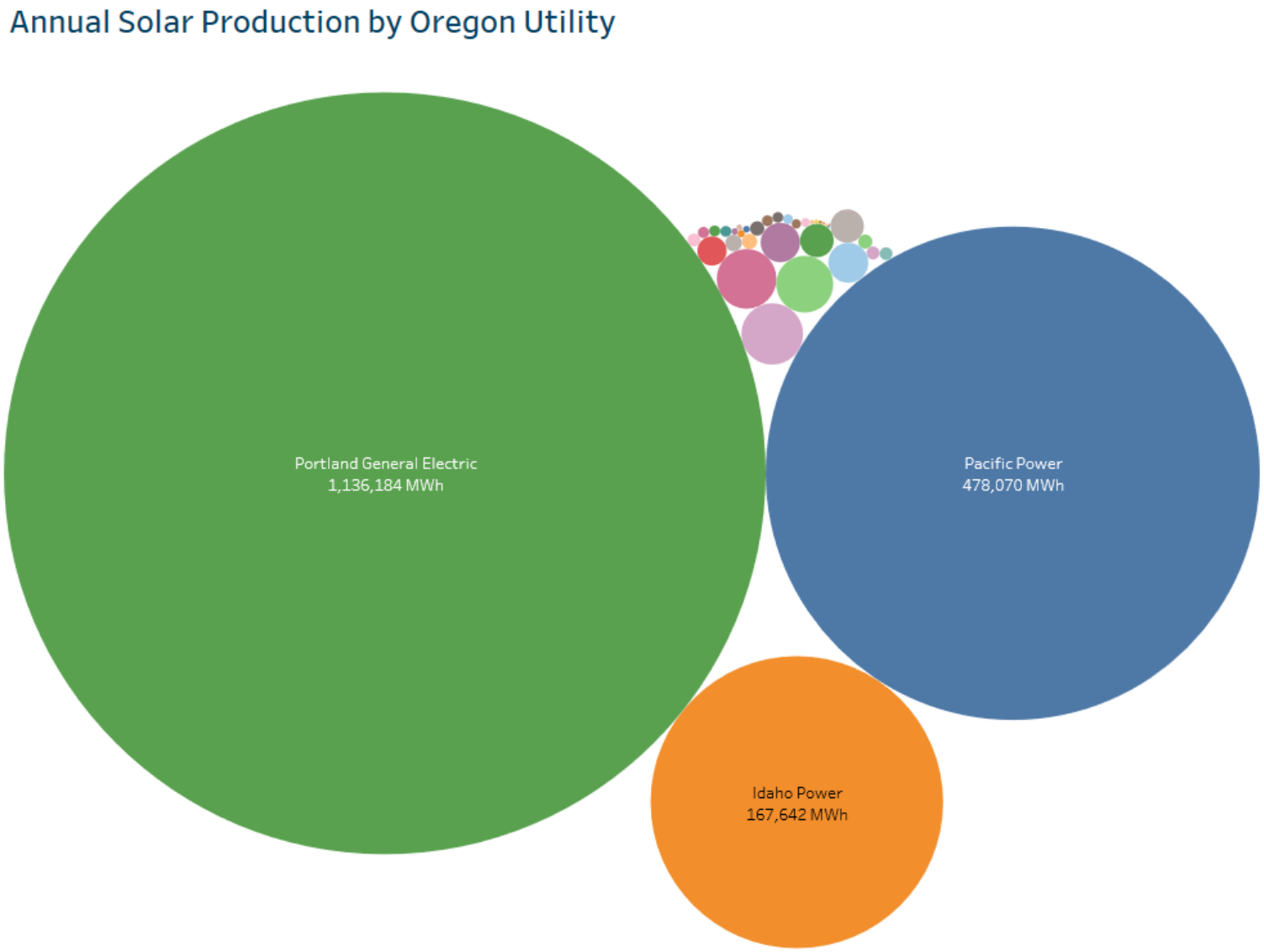
OREGON SOLAR DASHBOARD

Total Nameplate Capacity (DC) of Commercial and Residential Projects in Oregon



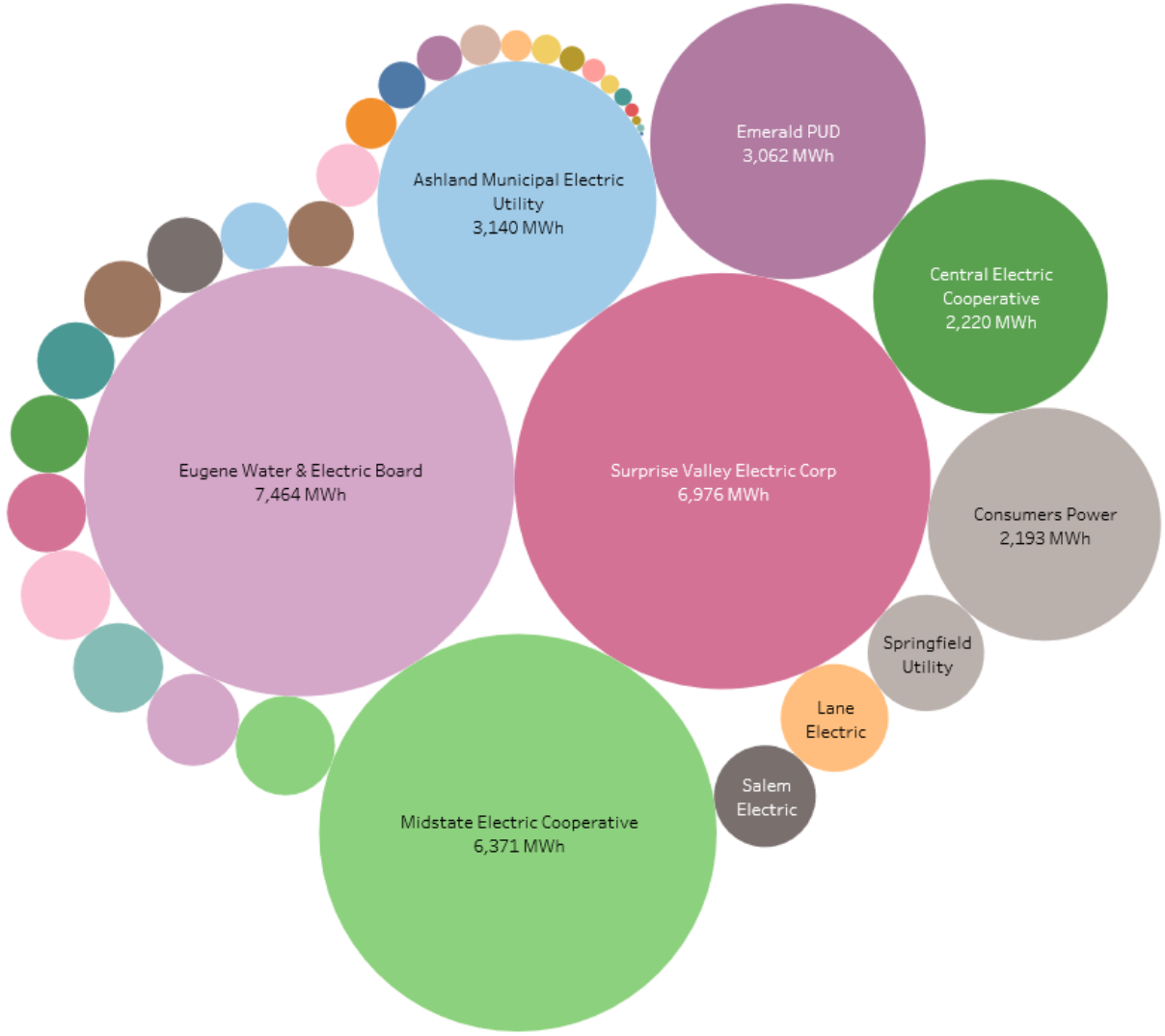
Nameplate capacity (DC) refers to the manufacturers PV module size rating and does not reflect the output of solar facilities under all conditions.

OREGON SOLAR DASHBOARD

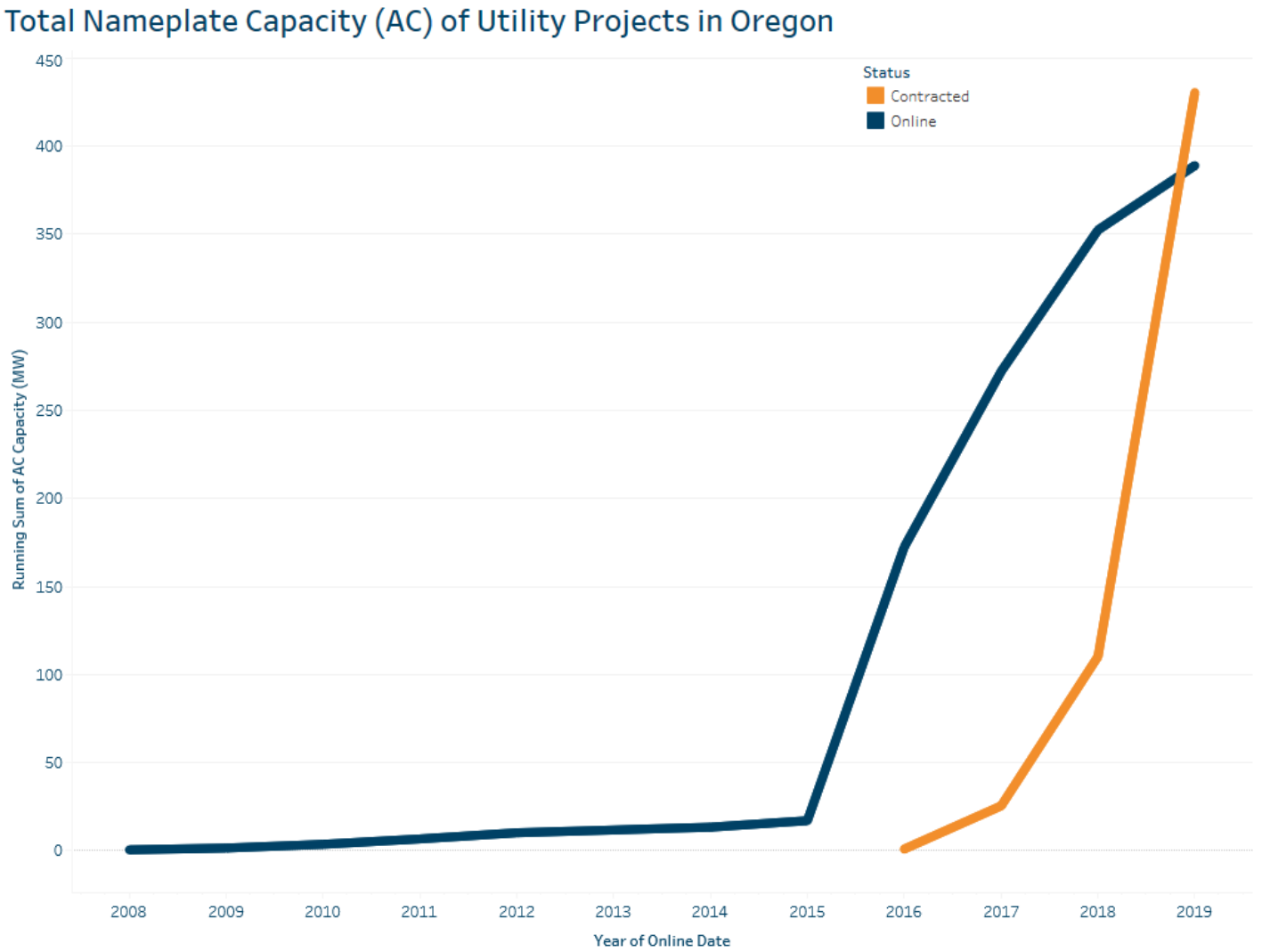


OREGON SOLAR DASHBOARD

Annual Solar Production by Consumer-Owned Utilities in Oregon



OREGON SOLAR DASHBOARD



Nameplate capacity (AC) refers to the manufacturers inverter size rating and does not reflect the output of solar facilities under all conditions.

OREGON SUBMITS COMMENTS TO THE HOUSE SELECT COMMITTEE ON THE CLIMATE CRISIS

November 26, 2019

Oregon Department of Energy Director Janine Benner and Robin Freeman, our Associate Director for Government Relations, traveled to Washington, D.C. in September to meet with Oregon's Congressional delegation and others about the work ODOE is doing for the state.

When they met with Congresswoman Suzanne Bonamici, who sits on the House Select Committee on the Climate Crisis, she shared that the Committee was requesting public input about what the U.S. should be doing to fight climate change – including actions the U.S. could take around transportation, electricity, agriculture, and resilience, among others. The Committee will use the feedback to develop recommendations for policies, strategies, and innovations to reduce harmful greenhouse gas emissions that contribute to the climate crisis.

The Oregon Department of Energy developed a coordinated response with 15 fellow State of Oregon agencies and the Governor's Office to respond to these important questions. Among Oregon's recommendations: expand and continue

federal incentives for adoption of electric vehicles and alternative fuels, reverse the rollback of fuel economy standards, support renewable natural gas development, develop a national renewable portfolio standard, encourage thermal decarbonization in buildings, design national smart thermostat programs, invest in new renewable technologies, and more.

READ **OREGON'S COMPLETE COMMENTS**, WHICH WERE SUBMITTED TO THE HOUSE SELECT COMMITTEE ON NOVEMBER 22.

COMMENTS (0)

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OREGON SOLAR + STORAGE REBATE PROGRAM

Save on Solar!

- Residential customers across Oregon can save up to $5,000 for solar and up to $2,500 for battery storage paired with solar
- Low-income service providers can save up to $30,000 for solar and up to $15,000 for paired storage

How it Works

Rebates are issued to ODOE-approved contractors who install the systems, and the full rebate amount will be passed on to the customer as savings on the net cost of the system.

A list of approved contractors is available on ODOE's website.

Expanding Access to Solar

The Oregon Solar + Storage Rebate Program is designed to help expand access to renewable energy for low- and moderate-income Oregonians — at least 25% of available rebate dollars will be reserved for low- and moderate-income residential customers and low-income service providers each year.

Learn More

Learn more about low-income program eligibility and rebate caps, find contractors, or become an approved contractor on ODOE's website:

https://tinyurl.com/SolarOR

OREGON DEPARTMENT OF ENERGY

www.oregon.gov/energy | 503-378-4040 | ODOE.SolarRebates@oregon.gov

1.5% Green Energy Technology

HB 2496 Program Updates

Oregon state law requires that public entities spend 1.5% of public building construction costs on green energy technology.

HB 2496 (2019) made several amendments to the program, including the addition of battery storage and certain energy efficiency projects that can now qualify as green energy technology or eligible alternatives.

HB 2496 Program Updates

- Inclusion of battery storage as an eligible green energy technology
- Inclusion of certain energy use efficiency improvements as eligible alternatives to GET
- Providing a definition for "energy use efficiency" and performance requirements within the context of 1.5% GET eligibility
- Clarification for project consolidation and technical review requirements
- Increase of minimum total contract price threshold for buildings from $1 million to $5 million
- Clean-up and clarification of total contract price definition, with seismic-retrofit costs now excluded from total contract price
- Clarifications on the process for a public agency to determine and document project appropriateness
- For passive solar and daylight systems, the required whole-building energy use reduction changed from 20% to 10%
- Other clean-up language to make the program easier to implement

Eligible Green Energy Technology Now Includes:

- Solar technologies like photovoltaic and solar thermal systems
- Passive solar and day lighting systems that reduce whole building energy use by 10 percent or more *(new)*
- Geothermal systems that use temperatures of 140 degree or more (or 128 degrees or more for schools) for space or water heating or to generate electricity
- Battery storage equipment and technology paired with solar or geothermal systems that generate electricity *(new)*

Eligible Alternative Energy Technology Now Includes:

- A space or water heating system or combined heat and power system that uses fuel material from trees and woody plants
- Certain on-site energy efficiency improvements that reduce or offset energy consumption by 20 percent below baseline code *(new)*

SB 1044 Biennial Zero Emission Vehicle Report

In 2019, Oregon passed SB 1044 into law requiring the Oregon Department of Energy to develop a report on zero emission vehicle adoption and the state's progress towards achieving its ZEV adoption goals.

The new law contains specific reporting requirements, including:

1. Whether the transportation sector is on course to reduce its share of greenhouse gas emissions commensurate with state GHG reduction goals
2. Sales figures and progress on specific ZEV adoption targets established in SB 1044
   -50,000 registered ZEVs by 2020
   -250,000 registered ZEVs by 2025
   -25% of registered ZEVs and 50% of new motor vehicles by 2030
   -90% of new motor vehicle sales by 2035
3. Distribution of ZEVs by demographic groups
4. Availability and reliability of ZEV charging infrastructure
5. Cost differences between ZEVs and fossil-fueled vehicles
6. ZEV platforms available in all sectors
7. Oregonians' awareness of ZEV options and benefits
8. Carbon intensity of Oregon's transportation emissions
9. General state of electrification for all transportation modes
10. Opportunities to manage impacts to the electrical grid
11. Assessment of impacts on revenues to the Highway Trust Fund

In the event the state is not on target to achieve the ZEV adoption goals listed in second reporting requirement, ODOE shall include recommendations in the report that will help promote and reduce barriers to ZEV adoption, including recommendations for legislation.

The inaugural report is due on September 15, 2021, and every odd year thereafter. ODOE is beginning the process of developing the report, including seeking stakeholder input on features of the report.

Report Development Schedule:

July – August 2019 - Bill Implementation Development: Internal development of a project plan and budget to accomplish the report.

July 2019 – February 2020 - Data Source Identification: Review of reporting requirements, internal identification of potential data resources, and outreach to stakeholders for input and potential collaboration.

September 2019 – December 2020 - Research and Data Collection: Research, physical collection of data, internal analysis, and stakeholder engagement.

September 2019 – June 2021 - Data Governance and Validation: Review data sets, ensure data completeness and accuracy, and ensure data storage and security protocols are followed.

December 2020 – August 2021 - Report Drafting and Review: Report drafting, internal review, peer review, and stakeholder engagement.

November 2020 – August 2021 - Recommendations Drafting and Review: Internal assessment of report findings and development of key recommendations, including external engagement and input.

July – September 2021 - Report Publication: Internal finalization, reviews, and publication.

ODOE staff is happy to discuss your input or receive it via email: Jessica.Reichers@oregon.gov.

Oregon ZEV Report Project

Scoping and Stakeholder Input Phase

In 2019, Oregon passed a law (SB 1044) requiring ODOE to develop a report on zero emission vehicle adoption and the state's progress towards achieving ZEV adoption goals.

Stakeholder Input Requested on Straw Proposal Framework of the Report

ODOE is seeking stakeholder input on features of the Oregon ZEV Report. Below is a description of the statutory requirements of the report, known data sources, and questions for stakeholder input.

Statutory Requirements:

The date on which the state is predicted to meet the goals.

ODOE has developed a model as a part of work for the Biennial Energy Report that considers population, vehicle type, vehicle miles traveled, and efficiency trends to predict Oregon's light duty fleet emissions through 2035. This tool will be adjusted to predict the date in this statutory requirement as it relates to the light-duty sector. The first iteration of the report is likely to focus on the light-duty sector where adoption is making significant strides. Medium- and heavy-duty vehicle adoption are minimal at this time, and the focus of the report is likely to be on vehicle availability and costs for these sectors. ODOE looks forward to working with our stakeholders to collect and analyze data on MD/HD impacts as adoption of these vehicles being to increase.

Assess the state's progress toward goal.

Is the transportation sector on course to reduce the share of GHG emissions from motor vehicles?

> **Source:** For light-duty fleet ODOE has a model that uses data collected regarding registered vehicles from ODOT, and sales estimates of ZEV and PHEV from EIA's Annual Energy Outlook, and Certified Population Estimates from Portland State University, and Gasoline Consumption from DEQ's Clean Fuels Program. ODOE will compare this to the states GHG emission reduction goals.
>
> **Source:** Use EIA Annual Energy Outlook projections of fuel use for other sectors (diesel, CNG jet fuel, etc).
>
> **Stakeholder Input Requested:** These would be only rough estimates based on fuel use; suggestions would be appreciated.

Sales figures and numbers of ZEVs owned in Oregon - including forecasts comparing to goals.

> **Source:** For light-duty fleet, the auto alliance has sales data for BEV and PHEV which will be compared to the goals set forth above.
>
> **Stakeholder Input Requested:** Oregon sales data may be skewed by a number of high volume Vancouver WA dealerships.
>
> **Source:** For medium and heavy-duty fleet, data is limited. ODOT Transit might have ZEV busses.

Sales figures and numbers of ZEVs that are owned in Oregon differentiated by demographic.

Source: For light-duty fleet, ODOE will collect data regarding registered vehicles from ODOT and compare it with income data from the US Census. Additional ideas such as comparing registered vehicles in urban and rural parts of the state may be considered.

Source: For medium and heavy-duty fleet, not aware of data sources at this point.

Stakeholder Input Requested: Suggestions (especially medium- and heavy-duty) would be appreciated.

The ZEV vehicles that are available for purchase in all market segments.

Source: For light-duty fleet, data will be collected from US AFDC and verified on sites such as Edmunds.com.

Source: For medium and heavy-duty fleet, data is limited. ODOT Transit might have ZEV bus data. ODOE will research other sources (i.e.: Daimler).

Stakeholder Input Requested: Suggestions on data sources (especially medium- and heavy-duty fleet) would be appreciated.

Availability and reliability of public and private ZEV charging infrastructure compared to goals.

Source: ODOE will collect data from the West Coast Electric Highway through ODOT, and intends to work with other operators for data about their charging infrastructure. Unsure of the quality and type of data that will come from operators to inform whether charging infrastructure is available or reliable.

Stakeholder Input Requested: Availability and reliability are different concepts - what do these terms mean to you and what sources of data would inform whether charging infrastructure is available or reliable?

Incremental purchase cost difference before and after federal and state incentives of ICE and EV.

Source: ODOE will perform calculations using MSRP, state, and Federal Incentives. Note that assumptions will need to be made about applicant income level for applicability of incentives such as federal tax credits and Charge Ahead program qualifications.

Stakeholder Input Requested: Suggestions for income level assumptions. What inputs, such as which incentives, should be included in these purchase cost difference calculations?

Oregonians' awareness of motor vehicle options, benefits of ZEVs, and the true costs of ownership.

Source: ODOE will review existing studies regarding awareness, as well as, communicate with Forth Mobility, automobile dealers, and other ZEV advocates for additional surveys or case studies. ODOE expects to calculate the 'true cost of ownership' using MSRP, financial incentives, fuel costs (such as gas and electricity), maintenance costs, fees, and additional costs of purchase such as amortization costs like loans and leases. These calculations would be performed for comparable internal combustion engine vehicles and electric vehicles.

Stakeholder Input Requested: Are you aware of existing surveys of Oregonians that may inform the question of awareness? Do you have suggestions on who ODOE can partner with for conducting surveys of Oregonians?

Carbon intensity of fuel consumed by Oregon's transportation sector.

Source: ODOE intends to determine this by combining Oregon's annual transportation fuel use with each fuel's Carbon Index as determined by DEQ's Clean Fuels Program. ODOE currently collects fuel use annually [Gasoline, Ethanol, Biodiesel, Renewable Diesel, LPG, CNG, Bio-CNG, LNG (Landfill), and Electricity from DEQ's Clean Fuels Program; Diesel from ODOT fuels tax; with some data support from US Dept. of Energy, Alternative Fuels Data Center; and Columbia-Willamette Clean Cities].

The general progress toward electrification of all fossil fuel-based transportation modes.

Source: This will be based on research through various sources. Currently there are little or no known examples of electrification of marine, rail (beyond PDX light rail), or aircraft in Oregon. However, there are pilots in other areas. There are four transit agencies starting to try electric busses.

Stakeholder Input Requested: Suggestions would be appreciated.

Opportunities to minimize impacts to the electric grid from transportation electrification, including rate design, managed charging, vehicle-to-grid services and electricity conservation techniques.

Source: This will be based on research through various sources and particularly with our local electric utilities. ODOE has staff working with utilities regarding resiliency and smart grid technologies that will be key in this area.

Stakeholder Input Requested: Suggestions would be appreciated.

Impact of the sales and ownership of ZEVs on revenues that would otherwise accrue to Highway Fund.

Source: ODOE will work closely with ODOT in this work who has been studying this and completed studies in the past. They may also have data from the OreGo pilot program. Current data would include tax data, vehicle miles traveled, and DMV records (for Oregon's fleet efficiency) all sourced from ODOT. These results would also need to consider changes put forth by HB 2017.

Make recommendations if the state is not on course to meet the goals.

Source: This will be a broader discussion to occur later in the report production process, based on results of the aforementioned reporting. However, ODOE is continually collecting information regarding barriers to ZEV adoption from the perspective of various stakeholders through its work with the Zero Emission Vehicle Interagency Working Group.

Project Timeline & How to Provide Input

January 2020 – February 2020: Stakeholder Input and Scoping [Current Phase]

December 2020 – August 2021: ODOE Staff Develops Draft Report

August 2021 – September 2021: Share Draft Report and Seek Stakeholder Feedback

September 2021: Revise Report and Publish

ODOE staff is happy to discuss your input or receive it via email: Jessica.Reichers@oregon.gov.

Energy Advisory Work Group
January 21, 2020
Update to EAWG on Legislative Budget Note

Introduction: The Oregon Legislature passed House Bill 5545 during the 2019 legislative session that contained a budget note about Oregon Department of Energy. ODOE staff has been working on this budget note and is in the process of preparing a presentation about it.

Budget Note Language:

> **2019 House Bill 5545**
>
> **2019-21 Budget Report**
>
> **Budget Note:** The Department of Energy is directed to report back to the Joint Committee on Ways and Means during the 2020 session, as the Governor did not propose a 2019-21 budget for the agency. Additionally, many of the Department's long-standing programs have sunset or are no longer active. The report should include an analysis of existing programs, the Department's key performance measures, a review of agency administration, the level of internal support versus services that could be provided through the Department of Administrative Services, and review of the agency's indirect rate and usage of the Energy Supplier Assessment.

Next Steps:

- ODOE will be providing a presentation to the Joint Committee on Ways and Means, Natural Resource Subcommittee during the February 2020 Session on the Budget Note contained in the Budget Report for House Bill 5545 (ODOE's 2019-21 budget bill).

Energy Advisory Work Group
January 21, 2020
EAWG Feedback on ODOE Strategic Planning

Introduction: ODOE has been working on strategic planning with Coraggio Group over the past several months. At the January 21st meeting, Coraggio Group and ODOE will be sharing information about what was learned through the process and draft language for the "clarity" elements of the Strategic Plan. ODOE is seeking initial feedback, questions, and discussion from EAWG members about the process and the draft.

Background: The strategic plan process was initiated to help our agency define our work and build stronger collaboration with stakeholders. It will also help ODOE prioritize our work, measure progress, and strengthen alignment between agency goals, programs, and budget. The agency kicked off strategic planning in the fall of 2018; the process was put on hold during the 2019 legislative session and re-initiated in fall 2019.

Process: ODOE's strategic planning process is divided into two phases. The first phase involves stakeholder outreach, secondary research, and work sessions to develop position and values and draft strategic imperatives. This phase will help us to define ODOE's unique position and areas to add value in a complex landscape of energy programs and policies in the state. In the second phase, we'll develop objectives and initiatives, affirm vision/mission/values, review additional stakeholder feedback, and operationalize the strategic plan.

Strategic Plan Elements (courtesy of Coraggio Group)

Clarity

- Vision: What is the ideal future state we are trying to create? [Drafted in Phase 1]
- Mission: What is our purpose? What are we here to make happen? [Drafted in Phase 1]
- Values: What are the fundamental beliefs that shape how we work together and serve our mission? [Drafted in Phase 1]
- Reputation: What do we want to be known for? What is the enduring perception or emotion that describes the total experience of our organization? [Drafted in Phase 1]
- Position: What unique and sustainable value do we deliver, where do we deliver, and for whom? [Drafted in Phase 1]

Focus

- Strategic Imperatives: What must be accomplished over the planning horizon? [Drafted in Phase 1]
- Objectives: How will we measure success? [TBD – Phase 2]

Action

- Initiatives: What collective actions do we need to take that are transformative in nature? [TBD – Phase 2]

Next Steps in Process

- Gathering stakeholder input on draft concepts developed during Phase 1.
- Phase 2 to begin after legislative session, which will refine concepts and develop language for the Strategic Plan.

Feedback from EAWG:

- Coraggio Group will be presenting information about insights and themes from data collected through 30 one-on-one interviews, 12 focus groups, and 1052 survey respondents. *EAWG members will be invited to engage in Q&A and feedback on Coraggio's insights and themes, as well as initial strategic planning concepts.*

Energy Advisory Work Group
January 21, 2020
EAWG Feedback on ODOE Policy White Papers

Introduction: A central part of ODOE's work is to provide information, analysis, technical assistance, and project management for energy in the state. The agency's authorizing statutes direct ODOE to be the central repository for energy data within state government, serve as a clearinghouse for energy research, and educate the public about energy (among other things). When ODOE staff works with stakeholders or the public, they look for areas where ODOE could provide data and analysis to help inform discussions around current energy policy topics. This external engagement helps to feed into content that may be helpful in the development of energy policy white papers, which in turn, helps to inform development of timely and relevant energy policy content for the Biennial Energy Report.

Process:

ODOE selected white paper topics through a process of staff submitting abstracts internally based on input received through in-person communications with stakeholders and participating in policy conferences and workshops. ODOE's leadership team members reviewed and ranked the topics and abstracts for relevance and need, ultimately selecting the top three. Each white paper will cover background data, history related to policy topic, and trending issues. Staff will be sharing a brief overview of each topic to EAWG for feedback.

White Paper Topics:

1. ***Emerging Trends in Renewable and Zero-Emissions Electricity Standards***

   Several states have increased their Renewable Portfolio Standards to help states achieve higher adoption rates of clean energy. This white paper will provide an overview of those recent trends in RPS policies and includes a review of multiple clean energy policy options that are being implemented and discussed throughout the country. Included are summaries of emerging clean energy policies such as clean peak standards, 100 percent clean energy standards, and 100 percent clean electricity standards along with the opportunities and challenges associated with them. The paper will conclude with an overview of other energy policy areas that will interact with Oregon's RPS and its administration and outcomes.

2. ***Resource Adequacy 101***

   Driven primarily by coal retirements across the west, there is a growing concern that the Pacific Northwest could soon face an increased risk of having insufficient electric generating capacity to meet demands by the mid-2020s. This white paper will describe the challenges involved in planning for adequate capacity to meet that demand for

electricity. The white paper will provide a high-level overview of the differences between the production of electricity compared with the production of liquid fuels and natural gas. It will also discuss the build out of the electric grid so that it can deliver power instantaneously to meet peak demands. An overview of how utilities and regulators plan for and procure energy and capacity to meet demands for electricity is also explored, including a discussion of how markets can be utilized to optimize the dispatch of existing capacity resources to meet energy needs but are typically not relied upon to send price signals to build new capacity resources. After introducing these concepts, the paper frames the key policy questions involved in evaluating whether there is sufficient generating capacity available (to a particular utility, to a state, or to a region), including an identification of different risk metrics used to make this evaluation, and then concludes with an exploration of the diversity of resources that can be deployed to meet any identified capacity deficit (i.e., demand-side resources, transmission, storage, and renewables in addition to traditional dispatchable generating resources).

3. ***Emerging Opportunities with Electricity Storage***

   The ability to locate cost-effective storage anywhere on the electric grid is increasing as storage technology steadily improves. For example, automotive industry investments in battery development and large-scale battery manufacturing are rapidly improving battery efficiencies (size and scalability) and rapidly lowering battery costs. At the same time storage technology is becoming more efficient and cost-competitive, wholesale power rates (in real dollars) are also historically low and are likely to experience further declines so long as domestic natural gas remains in high-supply and low-cost renewables continue to be added to the grid. The confluence of these phenomena is increasingly presenting a "virtuous cycle" opportunity for more storage to be added to the grid. This paper will present a summary of the fundamental physics of grid operations; documents how storage is increasingly becoming a tool for grid operators to balance supply and demand at any and all times, including peak events. It will also explore key considerations involved with determining the optimal locations of storage assets on the grid and will explore the concept of long-duration storage. The paper will conclude with a summary of state and federal policies aimed at advancing storage.

Next Steps:

- With input from EAWG, ODOE staff will finalize these draft white papers in Winter/Spring 2020.
- ODOE will share the final white papers and will offer educational briefings on the topics.

Feedback requested from EAWG:

- Are white papers on these topics helpful to your program planning or policy discussions?
- Are there specific issues within these topics that would be helpful to cover more specifically?
- How might you use these white papers in your own work?
- What other policy topics would be helpful to cover in a future white paper? Why?
- What other data or policy analysis-focused resources could be helpful to your work?