REGIONAL TRANSMISSION ORGANIZATION STUDY: OREGON PERSPECTIVES

Submitted to the

OREGON LEGISLATURE

by the

OREGON DEPARTMENT OF ENERGY

December 2021

This report has been prepared by the Oregon Department of Energy, in consultation with the Oregon Public Utility Commission, for submission to the Oregon Legislature consistent with the requirements of Senate Bill 589 (2021). ODOE's objective with this study was to gather and synthesize the range of perspectives on the benefits, costs, opportunities, challenges, and risks of regional transmission organization (RTO) formation that exist among diverse Oregon stakeholders to inform the State Legislature and other interested parties. The views and perspectives represented in this report are not intended to reflect the endorsement of the Oregon Department of Energy, the Oregon Public Utility Commission, or of any individual member of the Oregon RTO Advisory Committee.

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Oregon RTO Advisory Committee: This work was informed by the Oregon RTO Advisory Committee, which was formed by the Oregon Department of Energy pursuant to SB 589:

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Additional Acknowledgments:
In preparation of this report, ODOE staff also consulted with numerous industry experts beyond the members of the Oregon RTO Advisory Committee to better understand key issues involved in RTO formation. The Department thanks the following contributors for their time:

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EXECUTIVE SUMMARY

The electric sector is in a period of rapid transformation as Oregon and many other states pursue aggressive decarbonization goals to mitigate the effects of climate change. This has led to revisiting old assumptions and confronting substantive barriers to increased regional collaboration and coordination. As directed in SB 589 (2021), this report presents the Oregon Department of Energy's (ODOE or Department) findings from reviewing recent literature and engaging with a diverse range of stakeholders on the perspectives in the state on the opportunities, barriers, and challenges to the potential development of a Regional Transmission Organization, known as an RTO, that can benefit Oregonians. The Department has identified widespread, though certainly not universal, agreement among stakeholders on the value of increased regional coordination and collaboration, but it also identified a need to delicately balance competing interests—across different types of utilities, state and federal entities, various states, and other interested stakeholders—in order to forge solutions that achieve the common objectives of stakeholders inside and outside of Oregon.

Regional Collaboration to Achieve Clean Energy Goals. There is urgency among Oregon stakeholders to continue working collaboratively to improve regional coordination in the electric sector to integrate more clean energy while maintaining a reliable and affordable power system. There is also broad agreement among many stakeholders that building on current momentum to expand regionalization can help to achieve Oregon's climate policy goals.

Building on Momentum. Serious consideration of RTO formation has occurred multiple times over the last several decades in the northwest, but the current momentum toward increased regionalization has a unique sense of drive and urgency. This momentum is driven by transformational changes in the electric sector—from the rapid deployment of increasingly cost-effective wind and solar energy, to the retirement of coal plants in Oregon and across the west, to the adoption of state clean energy mandates.

The momentum toward increased regionalization has been marked by several milestone events in recent years, with more anticipated in the years ahead. These milestones began with the formation of the Energy Imbalance Market (EIM) by PacifiCorp and the California Independent System Operator (CAISO) in 2014, followed by the subsequent significant expansion of the EIM, ongoing efforts to develop regional compliance frameworks for ensuring resource adequacy, and looking ahead to Bonneville Power Administration joining the EIM in 2022. As a result, it is important to acknowledge that—even though consideration of RTO formation is the specific focus of this report—this conversation is occurring in the context of these ongoing efforts to increase regional collaboration and cooperation in the power sector.

Governance and Market Design Challenges. As detailed in this report, the careful and intentional design of market and governance structures for these regional efforts is likely to be the most consequential issue. There is no one-size-fits-all design for RTO markets or governance – RTO formation would require balancing diverse interests, mitigation of risks, and ensuring benefits for Oregonians in the pursuit of achieving the state's clean energy goals. As explored in the report, stakeholders identified a number of important questions that would need to be addressed through RTO design, including: how would diverse voices be assured a meaningful role? How would unique statutory considerations affecting the Bonneville Power Administration be handled? How would the RTO interact with existing regulatory mechanisms and policy requirements? How would state objectives around equity, environmental justice, and resilience be affected by an RTO?

Senate Bill (SB) 589 Requirements

SB 589 required ODOE to gather and synthesize the range of perspectives on the benefits, costs, opportunities, challenges, and risks of RTO formation that exist among a diverse range of Oregon stakeholders. To accomplish this, the Department was required to: (a) identify key findings from recent

technical studies and reports relevant to RTO formation, (b) develop scoping questions based on those key findings, (c) form a stakeholder advisory committee, (d) gather written feedback from the committee on the scoping questions, and (e) hold a minimum of two meetings of the committee.

A bibliography of the technical studies and reports reviewed by the Department, along with the key findings identified from its review of that literature, can be found in **Appendix A**. ODOE developed scoping questions based on those findings that covered the following key topics: legal barriers to RTO formation; Oregon-specific costs and benefits; impacts on Oregon retail customers; over-arching principles; transmission rates; transmission planning and operations; renewables; environmental impacts; climate resilience; governance; and market design optionality.

The full text of the scoping questions can be found in **Appendix B**, and the full text of the written comments filed by members of the Oregon RTO Advisory Committee can be found on ODOE's website. In addition to written comments filed by members of the Oregon RTO Advisory Committee, the following entities also submitted comments, which are also available on ODOE's website: Alliance of Western Energy Consumers, Oregon Solar & Storage Industries Association, NewSun Energy, Western Power Trading Forum, Advanced Energy Economy, and Pacific Northwest Generating Cooperative. In synthesizing the feedback received, the Department sought to accurately represent the generalized views of stakeholders, and to share that in this report without attribution. To explore the perspectives of specific stakeholders, please refer to the comments that were filed as part of this process or the recordings of the meetings of the Oregon RTO Advisory Committee.

The Department convened the Oregon RTO Advisory Committee for two public meetings to gather and synthesize the range of perspectives on the benefits, costs, opportunities, challenges, and risks of RTO formation:

- **September 20, 2021:** Meeting of the Oregon RTO Advisory Committee
  - Full video recording, agenda, and presentation materials available online
- **October 6, 2021:** Meeting of the Oregon RTO Advisory Committee
  - Full video recording, agenda, and presentation materials available online

The Oregon RTO Advisory Committee was comprised of the following members:

Senator Kathleen Taylor
Commissioner Letha Tawney, OPUC
Scott Coe, Emerald People's Utility District
Robert Echenrode, Umatilla Electric Cooperative
Sarah Edmonds, Portland General Electric
Travis Eri, IBEW Local 125
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Ben Kujala, Northwest Power Council
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The complete RTO Study is available on ODOE's website: https://www.oregon.gov/energy/Data-and-Reports/Pages/Reports-to-the-Legislature.aspx

FOUNDATIONAL BACKGROUND

In service of the Oregon Department of Energy's mission to help Oregonians make informed decisions and maintain a resilient and affordable energy system, this section provides background material on the core concepts involved in consideration of RTO formation. This information is intended as foundational material so readers of all levels of expertise have the same basic knowledge to support their participation in energy-related discussions and activities. Given the range of familiarity that stakeholders have with these issues, the Department has provided the foundational background information below with the expectation that more engagement and continued information sharing may be necessary.

What is a Regional Transmission Organization or RTO?

An RTO is an independent, nonprofit organization that operates and ensures reliability of the bulk power system and optimizes supply and demand for wholesale electricity. In Oregon today, utilities individually perform these functions for their service territories, limiting the scale of optimization that is currently possible. As the name would suggest, one of the primary functions of an RTO is operation of the electric transmission grid across a large, often multi-state geographic region. As of 2021, there are seven RTOs operating in the United States, covering most of the country east of the Rocky Mountains, except for the southeast and Florida. In the western part of the country, the California ISO (or CAISO) is the only RTO. Notably, of the seven RTOs operating in the country, only the CAISO has been established by a state legislature. The other RTOs have been formed through negotiation and voluntary agreements among participating utilities. For more background information on RTOs, visit the RTO 101 section of ODOE's SB 589 website.

It may be helpful to think about potential RTO formation in the context of three substantive areas that RTOs can affect: energy, capacity, and transmission.

Energy: Buying and selling electricity to meet customer demand

Buying and selling energy today. In Oregon and the northwest today, most transactions to buy or sell wholesale electricity[ii] occur through bilateral transactions. That is, one utility with a surplus of power over a defined time period (at minimum, one hour) will enter into an agreement with a willing buyer who needs power at the same time. Many utilities, including several utilities operating in Oregon (such as the Eugene Water & Electric Board, Portland General Electric, Pacific Power, and Idaho Power), also own their own generation and generally will rely upon these

WHEN DID RTOs START FORMING?

During the 1990s, there was increasing national interest in reimagining the structure of the electric power sector to encourage competition and, ultimately, reduce costs for retail customers. One of the outcomes of this interest was a reconsideration of some of the monopoly functions of vertically-integrated electric utilities.

Federal Energy Regulatory Commission[i] **Orders 888 and 889**, both issued in 1996, were instrumental in this effort and required transmission owners to provide open access to their transmission networks and defined standards for how utilities and customers would share information about the transmission system. In 1999, **FERC Order 2000** built upon these previous orders to encourage (but notably, not require) the formation of independent regional transmission organizations to manage this newly-required open access to the transmission system.

[i] The Federal Energy Regulatory Commission, or FERC, is an independent federal agency that regulates the interstate transmission of electricity, natural gas, and oil.

[ii] Electricity—or in the context of electricity markets, often referred to as energy—is bought and sold in volumetric units, typically measured either in kilowatt-hours (kWh) at the small-scale or megawatt-hours (MWh) at the scale of regional markets.

resources first to meet their customer demand before they buy power from another entity.

How would an RTO affect this? RTOs operate centralized markets that serve as a clearinghouse for all the electricity needed to serve customer demand. Typically, these markets are operated over day-ahead and real-time (typically in 5-minute or 15-minute intervals) timeframes. All generators in the market will offer to sell a defined volume of electricity at a minimum price. Similarly, all load-serving entities (e.g., utilities, electricity service suppliers) will submit demand schedules to the RTO that define the volume of electricity they need to serve customer demand. The RTO will use complex computer models of the transmission system to send enough electricity to meet all the demand on the system, choosing the lowest cost offers from the entire market footprint. The RTO allows for the optimization of this matching of lowest cost resources with demand across a large geographic region, at a scale not possible with the current bilateral approach used in the northwest.

View ODOE's April 2021 presentation on the "Overview of Regional Power Markets" to the Oregon House Committee on Energy & Environment to learn more about evolving energy markets.

Capacity: Ensuring adequate resources will be available to serve future demand

Capacity Planning and Procurement Today. Energy markets, as described above, are concerned with matching buyers and sellers of wholesale power in real-time or on a day-ahead timeframe. Planning for capacity,[iii] however, concerns meeting customer needs over a longer time horizon, typically several years in the future to as long as 20 years into the future in the case of long-term planning efforts such as utility integrated resource plans. This requires the electric sector to attempt to predict the future: how much customer demand for power will be there at different times of the year? Are there reasons to expect demand to increase (e.g., due to climate change, adoption of electric vehicles, etc.)? What resources will be online and available, and at what cost, to meet that demand? How much surplus will neighboring utilities have available to sell?

Similar to energy transactions, most transactions to buy or sell capacity in the region today occur through bilateral transactions. For example, a utility may purchase 100 MW of capacity over a defined time period (certain hours of the day, or certain months of the year) for several years into the future to ensure they have sufficient resources available when they expect to need it. Alternatively, a utility may determine there is a need to develop a new resource that can meet its capacity needs (e.g., demand-side resources—like energy efficiency, demand response, or customer-sited solar and storage—that can reduce system peaks, or a new power plant that can provide power when needed) or may look to the market or to another wholesale provider (e.g., another utility or BPA) to procure capacity.

How would an RTO affect this? Unlike energy markets, where most RTOs operate similar types of centralized markets, the involvement of RTOs in capacity planning and procurement varies widely. Resource adequacy frameworks can be facilitated by RTOs and are typically focused on timeframes to support operations (e.g., one-year in advance or less). There have been and continue to be debates about the effectiveness of each approach, particularly as the levels of renewable energy on the grid increase. Regardless, RTOs can provide valuable information and operational capability for capacity planning and procurement mechanisms, particularly because their larger footprint allows for more optimization than an individual utility or even an entire state can do alone. Although timeframes vary, it is possible that an RTO framework for resource adequacy can be designed to complement or be compatible with existing capacity planning and procurement mechanisms while adding value through better regional optimization of resources. In Oregon today, for

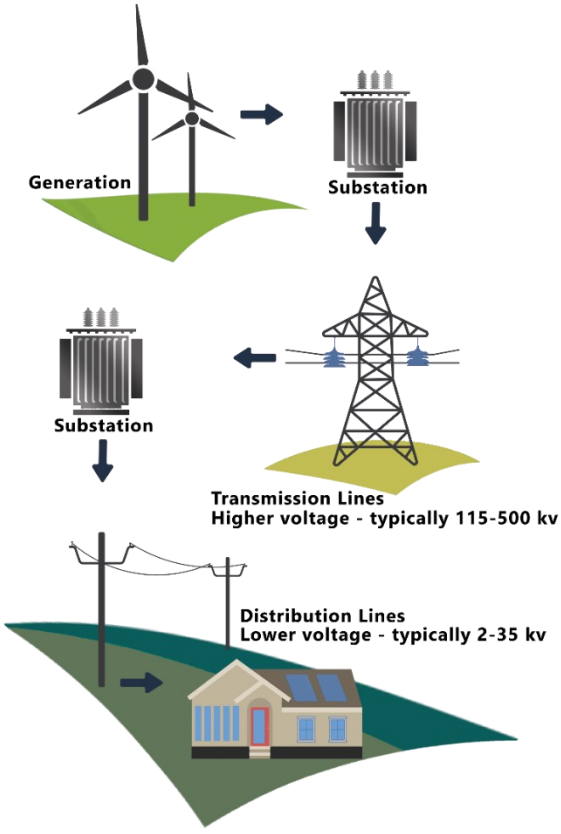
[iii] In contrast to electricity or energy, capacity in this context refers to the rated power output potential of a generating unit or power plant and is measured in kilowatts (kW) at the small-scale or megawatts (MW) at the scale of regional markets. As an example, a power plant with a capacity of 1 MW operating at full output for one hour will generate 1 MWh of electricity.

example, vertically integrated utilities evaluate these issues as part of their integrated resource planning focused on near-term actions 2-5 years in the future while evaluating a 20-year planning horizon, with the oversight of the Oregon Public Utility Commission in the case of investor-owned utilities. An RTO resource adequacy framework could be designed to operate in a manner compatible with longer-term capacity planning in Oregon and with the Western Resource Adequacy Program in which many Oregon utilities are participating. However, taking steps toward increased regional planning to capture incremental cost savings will modify the state's oversight role to some degree. State engagement would need to shift to ensure continued oversight for long-term capacity planning at the state level, particularly so load-service resource selection is in line with state policy goals. States would also need to engage and participate in RTO governance structures, which are stood up to provide states with opportunities for meaningful input at the RTO level.

View ODOE's December 2020 presentation on "Resource Adequacy Fundamentals" to the Oregon House Committee on Energy & Environment to learn more about capacity planning.

Transmission: How do utilities ensure sufficient transmission exists to maintain the reliable delivery of energy to meet customer demand, and how do they manage open access to the transmission network as required by FERC?

Transmission Planning and Operation Today. The electric delivery system is traditionally divided into two major components: the transmission system and the distribution system. While transmission voltages can vary, most of the transmission system consists of the high-voltage lines that comprise the bulk power system used in the exchange of wholesale power in interstate commerce. The large metal towers that one might see paralleling Interstate-5 through the Willamette Valley are an example of transmission lines. Meanwhile, the wood utility poles in residential neighborhoods are an example of the lower-voltage distribution lines that provide that "final mile" of delivery of electricity from the transmission system to the end-use retail customer. It is important to understand that the primary distinguishing feature between transmission and distribution lines is less a function of its voltage level and more a function of how the line operates in relation to the bulk electric system.



Electric system: generation to delivery

While dozens of utilities in Oregon own and operate distribution systems to serve their retail customers, the transmission system in the state is primarily owned and operated by a handful of entities, with the Bonneville Power Administration (BPA) and PacifiCorp operating the majority. FERC Orders 890 and 1000 require jurisdictional transmission providers to participate in regional transmission planning to ensure compliance with reliability standards. In the northwest, NorthernGrid has recently been formed (a consolidation of ColumbiaGrid and Northern Tier Transmission Group members) to facilitate this planning among its members, including BPA and numerous investor-owned and consumer-owned utilities across seven states. Because BPA is not subject to FERC jurisdiction, its participation in

NorthernGrid is carefully defined so as to preserve its non-jurisdictional status. Additionally, individual transmission owners also perform their own local transmission planning and have varying mechanisms to identify the need for new transmission investments and various funding approaches.

In addition, as noted above (see FERC Orders 888 and 889), FERC jurisdictional transmission providers are required to provide "open access" to their transmission system. In Oregon and the northwest, individual jurisdictional transmission providers comply with this requirement through the development of an Open Access Transmission Tariff (OATT), which requires transmission providers to provide access to transmission in a manner that is not unduly preferential or discriminatory. While BPA is not FERC jurisdictional, it does provide transmission through an OATT.

WHAT IS A BALANCING AUTHORITY (BA)?

A Balancing Authority is an entity responsible for reliably planning and operating the high-voltage grid across a defined geographic area, referred to as the Balancing Authority Area, while balancing supply and demand for power in real-time, including managing imports and exports with neighboring BAs.

In Oregon, the largest BA is the Bonneville Power Administration—which owns and operates 15,000 circuit miles of transmission, or approximately 75 percent of the region's high-voltage transmission system and is not subject to the jurisdiction of FERC or the State of Oregon—followed by PacifiCorp and Portland General Electric. Both PacifiCorp and PGE are subject to the jurisdiction of FERC and the State of Oregon.

How would an RTO affect this? Formation of an RTO would consolidate member Balancing Authority Areas across its footprint for those BAs that chose to join, and those that were approved to join by their respective regulatory authorities. The RTO would consolidate operation of the transmission system and would typically transition from contract path operations of the transmission system to a flow-based approach, with appropriate accommodations made to preserve existing contractual transmission commitments. Individual transmission owners would retain ownership and revenue of their transmission assets, even though they would cease to operate them in most cases. An important consideration for these transmission owners would be ensuring that joining an RTO would not jeopardize their ability to maintain sufficient transmission revenues to maintain their existing system. An RTO would also maintain compliance with FERC's open access requirements to the consolidated transmission system. In addition, the RTO would become the regional planning organization responsible for developing an integrated transmission plan for its footprint and for selecting which transmission projects would move forward toward construction and cost allocation.

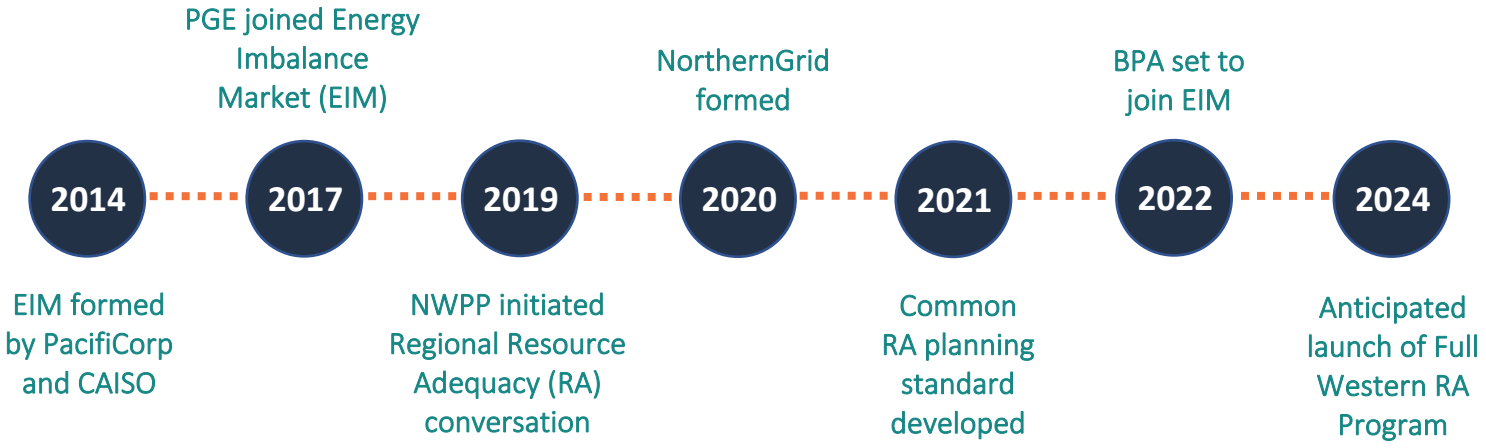
Depending on RTO design, individual transmission owners may still develop and file their own local plans with the RTO, similar to how it is done under NorthernGrid today. In any case, the RTO's regional transmission planning would be informed by transparent price data and visibility into congestion[iv] on the bulk transmission system provided by the RTO's operation of energy markets to dispatch generators across its footprint.

Building Momentum: Increasing Regionalization in the Power Sector

While there is not an RTO currently serving the electric sector in Oregon or the northwest as of 2021, significant steps have been taken in recent years to advance regionalization in all three of the core areas just reviewed. Given recent industry trends, including coal plant retirements and the need for flexible capacity that

[iv] Transmission congestion occurs when one or more constraints—which could be contractual or physical—limits or prevents the RTO energy markets from dispatching the least cost generating resources available to meet system demand.

can integrate increasing amounts of variable wind and solar generation, significant momentum has built in recent years to increase regional cooperation, as marked by several key milestones:



Energy. Historically, Oregon utilities have predominantly engaged in bilateral transactions to buy and sell power, including for balancing in the day-ahead and real-time operations timeframes. Developments in recent years have begun to change this.

Western Energy Imbalance Market (EIM): Launched in 2014 by the CAISO and PacifiCorp, the EIM offers a centralized, real-time energy market to utilities across the west for balancing real-time deviations in supply and demand. Portland General Electric and Idaho Power have also joined the EIM in recent years, and BPA announced that it will be joining in 2022. It is important to note, however, that entities participating in the EIM are required to come to the market with sufficient resources secured (through a combination of owned resources or bilateral transactions) before they can participate and take advantage of the dispatch savings that the EIM can deliver.

Active and Pending Western EIM Participants

Extended Day-Ahead Market (EDAM): The CAISO is also actively engaging with regional stakeholders—including Oregon utilities that are members of EIM—to develop an approach to extend its day-ahead energy market functionality to participants in the EIM footprint. While the EIM enables participants to exchange imbalance energy across sub-hourly time intervals in real-time, the EDAM would allow participants to optimize their day-ahead resource plans to exchange larger volumes of energy on a day-ahead basis. While the stakeholder process for EDAM is ongoing, CAISO is targeting 2024 to launch this market.

SPP Markets +: The Southwest Power Pool[v] (SPP) is also actively engaging with stakeholders in the northwest to develop and offer day-ahead and real-time market services (Markets+) to participants in the Western Resource Adequacy Program (see below for more information on WRAP) footprint. No load-serving entities that operate in Oregon are currently members of SPP Markets +.

Capacity. Individual utilities, working with their regulators, are responsible for maintaining adequate available capacity (or Resource Adequacy) to meet customer demand for power in the future.

Western Resource Adequacy Program: The Northwest Power Pool (NWPP) initially convened a group of utilities in the northwest in 2019 to identify paths for increased regional cooperation around capacity planning to ensure resource adequacy. The result has been the roll-out of the Western Resource Adequacy Program (WRAP) in 2021, in which participating load-serving entities commit to meet a common resource adequacy planning standard or else be subject to compliance penalties. Stakeholders anticipate launching the full operational program in 2024. The WRAP requires all participating load-serving entities to contribute to regional reliability of the power system and would provide the ability to share in the diversity of pooled capacity resources to maintain reliability of the transmission system in the event of a shortfall event. The WRAP could operate within a future RTO to provide these services, but it is being designed to operate without one.

Transmission. From the mid-2000s until 2020, two separate FERC-approved transmission planning organizations (Columbia Grid and Northern Tier Transmission Group) operated to coordinate the operational efficiency, reliability, and planned expansion of transmission across the northwest and inter-mountain region.

NorthernGrid: In 2020, Columbia Grid and Northern Tier Transmission Group members merged to form NorthernGrid. The recently formed organization facilitates regional transmission planning with one common set of data and assumptions, a single stakeholder forum, and opportunities to identify regional transmission projects. NorthernGrid also facilitates FERC-compliance for jurisdictional entities. While BPA is not subject to FERC jurisdiction, it is an active participant in the Members Regional Planning process at NorthernGrid. In sum, NorthernGrid provides some of the aggregated transmission planning function that an RTO might perform but lacks a market and congestion data-based regional optimization of those plans or cost allocation requirements for transmission providers.

[v] SPP operates an RTO that serves customers across portions of 17 states, including the majority of the Great Plains states from the Dakotas south through Oklahoma. Their headquarters is located in Little Rock, Arkansas.

PERSPECTIVES OF THE OREGON RTO ADVISORY COMMITTEE

SB 589 required the Oregon Department of Energy to convene the Oregon RTO Advisory Committee, comprised of a diverse group of stakeholders, to gather advice on the benefits, costs, opportunities, and challenges posed by the development or expansion of an RTO in this state. This section of the report provides a summary of this information, as provided both through written comments from committee members to the Department and over the course of two half-day meetings.

Throughout this section, the Department has synthesized perspectives and accordingly does not attribute specific statements to individual parties. What follows are statements that reflect the generalized views of committee members, even though in some cases one or more members may have offered a different perspective than the one ultimately presented here. Complete written comments received and recordings of Oregon RTO Advisory Committee meetings are available online.

(1) Balance Required: Realizing the potential benefits of RTO formation for Oregonians is dependent upon addressing substantive challenges around governance and market design to balance competing interests.

Most of the studies and reports reviewed as part of this effort focused on modeling the technical, quantifiable benefits to the power system from RTO formation. These types of modeling efforts often necessarily rely on several key technical assumptions that do not adequately convey the real substantive challenges involved in designing a multi-state market with an appropriately balanced governance structure. The Department sought to identify the perspectives of committee members on these overarching issues.

- **Balancing Trade-Offs:** One of the key perspectives shared by committee members was the criticality of negotiating the details of market design and governance structures to weigh trade-offs, balance multiple interests, and identify pathways to achieve optimal outcomes.
- **Diversity of Stakeholders:** Committee members identified the range of stakeholders involved in RTO formation that can make this balancing of trade-offs so challenging, including:
    - *States*: Multiple states, each with their own set of policy priorities and regulatory requirements, would be involved and seeking to ensure their own interests are met.
    - *Utilities/Load-Serving Entities*: While the Oregon PUC has regulatory authority over investor-owned utilities and electric service suppliers, two of the utilities it regulates (PacifiCorp and Idaho Power) are multi-state utilities subject to regulation in other states. Meanwhile, Oregonians are also served by 38 consumer-owned utilities that are governed by their own boards.
    - *Bonneville Power Administration*: BPA, as a federal entity, is not subject to the jurisdiction of the Oregon Legislature or the PUC and owns and operates 15,000 circuit miles of transmission or approximately 75 percent of the region's high-voltage transmission system. This makes BPA a critical but largely voluntary participant in regional conversations around RTO formation, although the actions of neighboring utilities in the region or of other parts of the federal government (e.g., USDOE, FERC, or Congress) can affect the decisions of BPA.

  - *Independent power producers, power marketers, and transmission owners*: Third-party (non-utility) owners and operators of power plants and transmission, and power marketers, have distinct interests that vary from utilities, and sometimes are in tension with the interests of utilities.
  - *Retail Customers*: The development of an RTO can have varying impacts on the retail customers of Oregon utilities. The increased importance of regional drivers could require the development of new mechanisms to protect the interests of retail customers.
  - *Advocacy Organizations and Other Non-Governmental Organizations:* There are also advocacy organizations and NGOs that represent the interests of a wide range of diverse stakeholders, including residential and industrial power customers, environmental justice communities, organized labor, renewable energy developers, and other environmental organizations.

- **Key Elements:** In response to the need to balance trade-offs among this diverse range of stakeholders, committee members identified several key elements that should be foundational to the development of RTO market design and governance:
  - *Diversity of Representation:* Diversity of representation—across different geographies, including state and tribal governments and stakeholder groups—is important to both negotiation over market design elements and to RTO governance itself. This representation must include opportunities to provide meaningful input. For example, a member of the committee identified the importance of involving specific communities that might benefit from or be affected by the development of generation or transmission resources resulting from RTO formation.
  - *Non-participants:* Ensure a meaningful role in RTO governance is established for non-participants in the market, including states, independent power producers, customers, and NGOs. Models of non-participant engagement cited by committee members include the EIM's Body of State Regulators and nominating committees where multiple industry sectors and stakeholders in the market have influence over the nomination of RTO governing board members.
  - *Transparent and Inclusive Decision-Making:* Provide for transparent, inclusive decision-making that is open and accessible to a diverse range of stakeholders. This should be inclusive of a program review committee or regional issues forum where stakeholders can provide ongoing and meaningful input.
  - *Independence:* Require RTO governing board members to be independent from market participants, including utilities and independent power producers, and from state policymakers.
- **Multiple Options:** There is no one-size-fits-all formula when it comes to RTO market design (e.g., would there be a market for ancillary services?) and governance structure. While there are existing RTOs that might serve as an example on governance, several members of the committee identified the collaborative regional process to develop governance for the emerging Western Resource Adequacy Program as a best practice.
- **Increasing Complexity:** There was general agreement among committee members with a key finding from the literature that a bigger geographic footprint for an RTO would bring more resource, load, and transmission diversity and would generally generate larger benefits. But a countervailing perspective on this issue was shared that increasing the geographic footprint involves a more diverse set of states and political perspectives, thus making negotiating market design and governance more complex. A

larger footprint may also make it more challenging to appropriately consider equity and social justice issues in the formation and operation of an RTO.

- **CAISO Expansion:** Multiple members of the committee expressed concern about an RTO being led by the California Independent System Operator on account of its current governance structure. The governing board of CAISO is appointed by the California Governor with confirmation by the California State Senate and has a fiduciary responsibility to benefit California ratepayers and further California environmental policy. Any regional model that could be dominated by a single participant or class of market participants (e.g., investor-owned utilities), by a block of states, or by another narrow interest group would be unacceptable.

(2) Expectation of Benefits: While there is an expectation that RTO formation could economically benefit Oregon retail customers, substantive barriers would first need to be addressed.

The studies and reports reviewed by the Department identified significant quantifiable economic benefits for the regional power system from RTO formation. The Department sought to identify the perspectives of the Committee members on whether they agreed with these general findings.

- **Overall:** There was broad agreement among committee members that Oregon retail customers, on average, would likely see a reduction in net power costs if electric service providers in Oregon participate in an RTO. While RTO formation would incur costs, the general expectation is that the aggregated benefits of a well-designed RTO would outweigh overall costs. The overall size and geographic diversity of the proposed footprint directly affects the projected benefits. Roughly speaking, bigger markets deliver more benefits for less overall cost. In addition, there are economic benefits associated with the ability to more efficiently integrate clean, renewable energy that might otherwise need to be curtailed but for the ability of the RTO to integrate that energy.
- **Drivers of Retail Benefits:** Committee members generally agreed with the literature in their identification of the drivers of benefits to Oregon retail customers, including:
    - Least-cost dispatch of generators across the RTO footprint
    - Seamless access to a more diverse pool of generating resources to serve Oregon load
    - Reduction in the amount of reserves necessary to maintain reliability standards
    - Elimination of pancaked transmission rates and wheeling charges to move power across multiple transmission systems
    - Optimized use of existing physical transmission capacity
    - Diversified risk exposure to the costs of regionally identified need for transmission development
    - More efficiently managed imbalances and lower cost to integrate renewables in pursuit of achieving decarbonization objectives

- **Barriers to Realizing Retail Benefits:**
    - *RTO Design and Governance*: As described above, careful consideration of market design and governance are pre-requisites to realizing these benefits.
    - *Administrative Costs*: The economic benefits of RTO formation would be partially offset by start-up costs incurred in establishing the RTO and ongoing operational costs.
    - *Transmission Costs*: Some members of the committee expressed caution that some Oregon customers (such as BPA preference customers with NT, or network integration, transmission contracts) currently have some of the lowest cost transmission in the west and that transmission costs in certain cases could increase as a result of RTO formation and regional cost allocation. An evaluation of revenue sufficiency to maintain current transmission assets is an additional consideration. In both cases, these issues would need to be balanced against expected benefits. There is also a need in the region to address potential transmission solutions required to achieve the state and the region's clean energy goals; an RTO could potentially bring efficiencies to identifying such solutions.
    - *Benefit Flow Through*: Several members of the committee recommended that an automatic cost recovery mechanism could be established to ensure that wholesale benefits accrued by utilities from participating in an RTO would flow through to Oregon retail customers.

(3) Additional Analysis: Oregon-specific technical analysis is unnecessary (at this time).

Most of the existing technical studies and reports reviewed evaluate the costs and benefits of RTO formation broadly across a multi-state region. The Department sought to identify whether the Committee believed it was necessary to engage in additional Oregon-specific technical analysis to evaluate the potential costs and benefits of RTO formation specifically to Oregonians.

- **Lack of a specific proposal:** As noted above, the findings from the literature and the general feedback from the Committee were consistent about a general expectation that RTO formation could result in reduced power costs for Oregon retail customers. That said, a view was broadly shared that it would be challenging to evaluate specific potential impacts to Oregon without having an actual detailed proposed market design and governance structure to evaluate.
- **State-specific analysis:** Unless or until a specific proposed market design and governance structure is on the table, additional Oregon-specific analysis of costs and benefits is likely unnecessary.

(4) State Role: The state can play an important role to support the interests of Oregon stakeholders by representing their perspectives in regional forums.

While the modeled quantitative benefits of RTO formation are widely accepted, there are significant design and implementation challenges that would first need to be addressed. Oregon stakeholders hold differing, often nuanced views of the optimal solutions to some of these challenges.

- **Regionalization conversations:** The state government—from the Governor, to the Legislature, to state agencies—has an important role to play in understanding and representing the different perspectives of the state's stakeholders as these challenges are addressed in regional forums. This is particularly the case when state perspectives differ in a proposed market, requiring deliberate negotiations to craft an optimal solution that is acceptable to both states.
- **Inform state perspectives:** Ongoing feedback from efforts like the implementation of SB 589 can help the state to remain informed of the interests and perspectives of Oregon stakeholders on key issues around market design and governance, in particular.

(5) Legal Barriers: The committee identified no legal prohibitions to RTO formation.

The studies and reports reviewed necessarily make broad assumptions to be able to reasonably model how the power system across a multi-state region would operate within an RTO construct. The Department sought the committee's perspective on whether there are any legal barriers to entities operating in Oregon participating in an RTO.

- **Legal Requirements:** The committee did not identify any legal *prohibition* on any entities operating in Oregon—such as utilities or BPA—from joining an RTO. However, committee members did identify several existing legal mechanisms that would be implicated, including:
    - *Oregon PUC*: The PUC has existing regulatory authority to review a decision by an investor-owned utility to participate in an RTO, which would include a utility-specific robust analysis of customer benefit.
    - *Federal Energy Regulatory Commission***:** Transfer of operational control of transmission from one entity (e.g., a utility transmission provider) to an RTO would require the approval of FERC pursuant to the Federal Power Act.
    - *Bonneville Power Administration***:** Pursuant to federal law,[vi] BPA is authorized to join an RTO so long as doing so is "consistent with its statutory obligations" including its regional and public power preference obligations, and its obligation to set performance standards for operation and use of its transmission system.
- **Legacy transmission contracts:** Many utilities in Oregon and the northwest have longstanding, legally binding, long-term contracts ensuring they have access to available transmission. Converting these contract path transmission rights to financial rights compatible with the centralized flow-based operation of the regional transmission system by an RTO was identified as a significant legal challenge, but one that has been successfully mitigated in similar circumstances by other RTOs.

[vi] Stakeholders identified the Energy Policy Act of 2005 as addressing this issue.

(6) Incremental Regionalization: Momentum toward increased regional cooperation has been building, but different perspectives exist on the sufficiency and endgame of these efforts.

While most of the literature quantifies the benefits of RTO formation compared to the status quo, some studies attempt to quantify some of the key incremental steps (e.g. EIM, EDAM) being taken short of RTO formation. The Department sought to understand the perspective of committee members on these incremental steps toward increased regionalization of the power system.

- **Not a blank slate:** An important foundational perspective shared is the acknowledgment that Oregon and the northwest are not starting from a blank slate. Pre-existing institutions and constraints have shaped the incremental expansion of regional cooperation that has been occurring in recent years.
    - *BPA's role*: The role of BPA in the region, in particular, is unique compared to most other parts of the country that have formed RTOs. As an independent federal agency, BPA is not subject to the jurisdiction of the Oregon Legislature or state regulators. Meanwhile, BPA owns and operates the vast majority (approximately 75 percent) of the high-voltage transmission system in the northwest. Notably, one region of the Western Area Power Administration—another federal power marketing administration, like BPA—has joined an RTO.
    - *CAISO EIM*: Significant economic and greenhouse gas emission reductions are achieved for Oregonians through seamless real-time dispatch with California today, however the CAISO helps to administer a resource adequacy program promulgated by the California PUC but only within California. An RTO built on the EIM market footprint (presuming reformed CAISO governance) would likely still require a resource adequacy framework, for example through the NWPP's Western Resource Adequacy Program (WRAP).
    - *WRAP Footprint*: An RTO could also be built on the geographic footprint of participants in the WRAP. This may require current EIM participants to leave the EIM and take real-time market services from another entity (such as Southwest Power Pool, or a newly formed RTO), depending on how such an RTO would be designed.
- **Divergent Perspectives:** As described above, several steps have been taken in recent years to evolve and expand regional coordination and collaboration in the power sector. Divergent perspectives were shared by committee members over the ultimate outcome of these incremental steps, including:
    - *Path to an RTO*: Some committee members believe that the incremental steps to increase regionalization could lead the region to formation of an RTO. The incremental approach may be helpful and necessary to build the trust required among a diverse set of stakeholders to make formation of a sufficiently large and well-governed RTO possible.
    - *Benefits in Lieu of an RTO*: Other committee members suggested that the incremental steps taken, and those currently planned for the coming years, could provide a substantial share of the benefits that an RTO would provide.
    - *A la Carte Approach*: Some committee members suggested that this incremental approach could present entities across the region with an a la carte approach to regionalization—participating only up to their comfort level up to and including membership in an RTO. It was

noted, however, that this is has not been tried elsewhere, would likely result in seams issues, and that there could be complications of such an approach with market design and governance.

- *Limits of Incremental Regionalization*: Multiple committee members argued that this incremental approach to regionalization—while it can deliver real benefits—will fail to deliver the full scale of benefits that an RTO makes possible by coordinating so many core functions in a single entity. The region may also be approaching the limits of how many additional incremental steps (and therefore additional benefits) can be bolted-on to the status quo.

(7) Transmission: RTO formation could bring operational benefits to the transmission system but would not necessarily solve cost allocation, siting, and permitting challenges.

Increased regional coordination and optimization of the high-voltage electric transmission system are important objectives of RTO formation. The Department sought to identify the committee's perspectives on the potential implications of RTO formation on the transmission system in Oregon and the northwest.

- **Optimizing existing transmission:** One of the key benefits identified in the literature and reinforced by several members of the committee is the potential for RTO formation to optimize the utilization of existing transmission, which may alleviate near-term pressure to develop new transmission. An RTO would apply a flow-based approach to transmission operations which may yield additional transmission capability than what can be achieved with a contract path-based approach like the one currently used in the northwest today.
- **Transparency:** An RTO can offer coordination of transmission across a multi-state region combined with transmission congestion pricing[vii] to provide significant transparency to market participants and non-participants (e.g., regulators and NGOs) about physical congestion on the system. This helps transmission customers (e.g., utilities, independent power producers, corporate purchasers of renewable energy, etc.) to better understand real transmission costs and can help the region to identify optimal new transmission investments.
- **State role:** The Oregon PUC's current role in reviewing needs for and the cost allocation of new transmission investments by investor-owned utilities may be altered by RTO formation, as the RTO establishes regional processes for identifying transmission investment needs and cost allocation mechanisms. States would need to engage and participate in RTO governance structures, which are stood up to provide states with opportunities for meaningful input at the RTO level, especially for matters such as transmission cost allocation.
- **New transmission:** An RTO can create new mechanisms to identify optimal new transmission investments necessary to meet regional needs and can allocate the costs for those investments across its footprint. This may make it less challenging to develop regional transmission solutions than the status quo, which is driven by state regulators and the rate case proceedings of individual utilities.

[vii] CAISO, for example, has created Congestion Revenue Rights as a financial instrument to allow entities to manage the variability in congestion costs that occur on the transmission system to move power on a forward basis.

- **Key transmission challenges that an RTO will <u>not</u> necessarily solve:**
    - *Timeline for transmission development*: Multiple members of the committee noted the development timelines for major new transmission projects can often be in the 10- to 20-year range due primarily to challenges around siting and permitting. An RTO would not necessarily resolve these timeline challenges.
    - *Cost allocation*: Existing RTOs employ a variety of mechanisms to allocate the costs for existing transmission assets (pre-RTO formation) and for new transmission investments (post-RTO formation). While an RTO can provide new mechanisms for addressing these issues, RTOs still face significant challenges negotiating equitable cost allocation for transmission development.
    - *Benefits*: FERC Order 1000 requires that transmission cost allocation be based upon the benefits received from the transmission investment. Defining those benefits is a challenge that would still exist within an RTO framework.
    - *Legacy transmission rights*: As described above, the conversion of existing contractual transmission rights could be a challenge. Importantly, pursuant to federal law, the owners of these rights cannot be compelled to convert them and must instead agree to do so voluntarily. Members of the committee, however, identified that these types of issues have been successfully mitigated in the formation of other RTOs.

(8) Renewable Energy: Significant renewable energy development is expected to occur in Oregon and the region with or without an RTO, but an RTO may create new low-cost opportunities.

The studies and reports reviewed by the Department found that RTO formation would make it easier for retail customers to benefit from access to the least-cost renewable resources. The Department engaged with the committee to better understand perspectives on how an RTO might affect the operation of renewable energy projects in Oregon and the patterns of renewable energy development.

- **Status quo trajectory:** There was widespread agreement among the committee that existing state policies (such as HB 2021), combined with reductions in technology costs, will drive significant development of renewable energy projects with or without an RTO in the years ahead.
- **Access to low-cost resources:** One of the benefits of RTO formation would be to make it easier for Oregon retail customers to benefit from access to low-cost wind and solar resources across a large, multi-state region. For example, an RTO could provide access to high-value, low-cost wind power in the Rocky Mountain states, or southwest solar, depending on the market footprint.
- **Market access to renewables:** Members of the committee noted the increasing national interest in corporate buyers seeking to procure renewable energy and how an RTO can help to facilitate this type of procurement by creating uniform market access to new renewables across its footprint.
- **More efficient utilization of existing renewables:** Another key benefit of RTO formation would be the expected reduction in curtailments (e.g., turning off solar power during mid-day hours when there is a surplus of power available on the grid) of renewables.

- **Impact on distributed renewables:** Committee members identified a need for RTO markets to be resource agnostic to avoid creating markets that disadvantage renewable energy projects, which members of the committee noted has occurred in some other markets, particularly with distributed renewables. On the other hand, FERC Order 2222,[viii] combined with a well-designed RTO, has the potential to create significant new revenue mechanisms to support the development of distributed renewables across a multi-state RTO footprint.
- **Shifting patterns of renewable development:** RTO formation may increase access to low-cost renewable resources outside of Oregon, but at the same time may also shift patterns of renewable development in the state. One example discussed by the committee was the potential for RTO formation to make the types of significant investments required (in transmission and generation) to develop the state's offshore wind resource more likely because market participants beyond Oregon could benefit and thus share the cost.

(9) State Policy: Careful design of an RTO is necessary to prevent an undesirable erosion of state authority while helping Oregon to more cost-effectively achieve its state policy objectives.

The Department's review of recent literature found an expectation that RTO formation would reduce the cost to comply with state clean energy policies, such as Oregon's HB 2021. Other interactions of RTO formation with state policies—such as GHG accounting, composition of the in-state resource mix, and resource adequacy—were also identified. The erosion of state authority in these areas was identified by the committee as a potential concern.

- **HB 2021:** There was general agreement among the committee that the continued expansion of regional energy markets, up to and including RTO formation, would be an additional tool to lower the cost to achieve Oregon's HB 2021's clean energy targets. Several members of the committee went even further to suggest that RTO formation may be *necessary* to achieve those targets.
- **GHG accounting:** Members of the committee also identified the potential interaction of an RTO with GHG accounting mechanisms. While harmonization of GHG policies and accounting practices across a multi-state RTO footprint was identified as ideal, there was a general perspective that an RTO should reflect existing state GHG policies and practices (e.g., records retention, transparency in GHG accounting, and GHG emissions tracking). These issues could present a challenge to RTO formation, and regional conversations are ongoing to better align differences among states in the west with regard to these types of GHG policies and practices.
- **Resource adequacy:** Oregon currently has varying levels of oversight and authority over resource adequacy planning and procurement decisions. Meanwhile, there is variation in the way that RTOs address resource adequacy. Careful consideration of how an RTO is designed can ensure that Oregon preserves a meaningful role in maintaining resource adequacy.

[viii] FERC Order 2222, adopted in September 2020, requires RTOs to develop market rules that allow for aggregated distributed energy resources to bid into RTO run energy markets.

- **Oregon's resource mix:** Oregon currently has strong influence over the mix of generating resources that serve Oregon customers. SB 1547 (2016),[ix] for example, eliminated coal costs in Oregon customer bills, to signal that Oregonians would no longer financially support coal power plants. While an RTO would introduce transparent price signals and new market forces, an RTO would not override these types of state policies. One member suggested, however, that an RTO may create complications for any state policies that attach specific generating resources to specific load-serving entities as an RTO would not allocate specific resources to loads in this manner.

(10) Non-Traditional Elements: Equity, environmental justice, and resilience are among the important issues that RTOs traditionally have not addressed, but that could be considered during RTO design.

The literature reviewed by the Department generally did not consider the implications of RTO formation on equity, environmental justice, or resilience objectives that states, like Oregon, might have. In ODOE's engagement with the committee, it sought to identify perspectives on the extent to which these types of considerations—which are not traditionally addressed by RTOs—could or should be addressed in the development of an RTO in which entities operating in Oregon might join.

- **Equity and Environmental Justice:** Some committee members expressed that the development of an RTO is a significant undertaking that presents a commensurate opportunity to address equity and environmental justice concerns. If these considerations are *not* incorporated into the design of an RTO, then the RTO is not likely to provide tools that can help to address these areas of concern and risks exacerbating historic injustices. An example given was the need to ensure meaningful input from Tribes and underrepresented communities in the processes through which an RTO would identify the need to develop major new transmission projects that might affect these communities.
- **Climate Resilience:** While some members of the committee suggested that an RTO would have limited impact on the ability of the power sector to improve climate resilience, others offered different perspectives, including:
    - *Transmission*: An RTO could make it easier to optimize re-routing power flows over the transmission system in the event of an unplanned transmission outage, such as the one that occurred in July 2021 as a result of the dense smoke from the Bootleg Fire affecting lines.
    - *Distributed Energy Resources*: FERC Order 2222, recently adopted in September 2020, requires RTOs to develop rules to allow for the aggregation of distributed energy resources (e.g., resilient community microgrids) to bid into RTO energy markets. Multiple members of the committee identified this mechanism as an important new pathway that could help to support the development of distributed energy resources in Oregon communities to improve the resilience of those communities.
- **Not Relevant to RTO Formation:** In response to this discussion, other members of the committee shared the perspective that these types of state policy objectives are better advanced in other venues (e.g., state legislation, PUC programs, etc.) and should not be considerations in RTO formation.

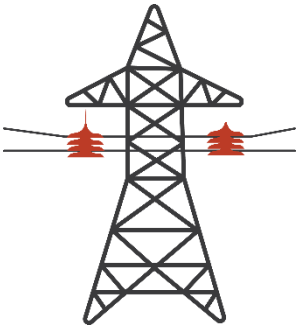
[ix] SB 1547 was a major piece of clean energy legislation in Oregon that required the elimination of coal costs from customer rates by 2030 and adopted a 50% renewable portfolio standard for the state's investor-owned utilities by 2040.

(11) RTOs Are Not a Universal Problem-solver: While RTO formation would have significant impacts on Oregon's electric sector, it is important to acknowledge the challenges that an RTO would not solve.

As described in this report, RTO formation would have significant impacts on the operation of the regional power system. The literature review and the comments of several members of the committee identified several issues that RTOs in other parts of the country have failed to solve. The Department sought to identify the perspective of committee members on the types of issues that an RTO likely would not solve, and in some cases, should not be expected to solve.

- **Increasing Complexity:** A view shared by some members of the committee is that RTO markets should focus on the primary objective of identifying the most economic solutions to reliably serve customer demand across a wide geographic region. Layering additional objectives (e.g., carbon pricing or resource adequacy) onto RTO markets increases practical and political complexity and could jeopardize the ability to develop the multi-state consensus necessary to establish an RTO.
- **Siting and Permitting:** As described in the transmission portion of this report, the long development timelines for major transmission projects have been identified by many committee members as a challenge. Even with an RTO, more regional engagement may be required to address these challenges, and it should not be assumed that RTO formation can solve these issues.
- **Capacity Procurement:** RTO markets are designed to identify the lowest marginal cost energy resources available to serve customer demand in the near-term. In some cases, particularly as more renewable energy comes online, capacity resources that are needed to maintain a reliable power system over longer time horizons find that the revenues from these markets are insufficient. Given the necessity of these resources to maintaining an adequate power system, this issue is commonly referred to as the "missing money" problem (i.e., there is insufficient money coming to these generators through the RTO energy markets to justify keeping existing plants operating or to incentivize building new capacity resources) and it is frequently cited as a shortcoming of RTOs. While this was flagged as a potential concern to be addressed in RTO formation by some committee members, others noted that RTO energy markets are rarely relied upon as the primary mechanism to incentivize the development of new capacity resources to maintain system reliability. Most RTOs have created a separate, explicit capacity or resource adequacy mechanism to address this issue. Oregon's vertically integrated utility model, with integrated resource planning overseen by regulators, helps to mitigate these concerns. Additionally, the emerging WRAP developed by the NWPP is already building out the institutional infrastructure to address these issues across much of the west, including Oregon, and could certainly operate within a future RTO but is being designed to operate without one.
- **Interconnection Queues:** Members of the committee identified that an RTO may provide more certainty and efficiency around processes to interconnect generation to the transmission system but cautioned that this alone would not resolve some of the long timelines for interconnection driven by the volume of projects seeking to interconnect and the requirement for transmission providers to evaluate projects in the queue on a first-come, first-served basis. There has been recent significant national attention directed to long interconnection waits in RTOs around the country.

CONCLUSION



From the rapid deployment of wind and solar generation, to the retirement of coal plants and the adoption of aggressive decarbonization policies, the electric sector is undergoing significant transformation. As a result, momentum has built in recent years in Oregon and the northwest to increase regional collaboration and cooperation in the electric sector. Significant steps have been taken, and more are planned for the coming years, in pursuit of identifying optimal solutions to maintain an affordable and reliable power system while meeting aggressive carbon reduction goals.

It is within this context that the Department engaged with Oregon stakeholders to understand current perspectives on the benefits, costs, opportunities, challenges, and risks of potentially extending that collaboration further to include the formation of a Regional Transmission Organization. While there are seven RTOs currently operating in the United States, each has unique elements, rules, and governance structures. There is no one-size-fits-all design, and every additional condition or rule imposed upon an RTO has the potential to constrain its operation and ultimately the benefits derived therefrom. And in some instances, certain conditions or rules run the risk of jeopardizing the stability of the type of broad regional political coalition that would be necessary to form a practical, multi-state RTO.

In conclusion, the Department has identified broad common interest among Oregon stakeholders in building on current momentum to explore increased regional collaboration and coordination in the electric sector. The Department has also identified a range of nuanced perspectives that exist among different stakeholders that would need to be carefully considered in designing an RTO that could deliver benefits to Oregon retail customers. The deliberate balancing of these stakeholder interests—in addition to the interests of stakeholders in other states across the region—is paramount to identifying a path forward for increased regional collaboration and coordination. There is no pre-existing, multi-state forum designed to address these important issues to identify an optimal path forward. But it is also clear that no single state—nor a single entity or small collection of utilities—could reconcile these challenges on its own.

APPENDIX A: LITERATURE REVIEW

Statutory Direction

Senate Bill 589 requires the Department to review "studies and reports relevant to the development or expansion" of an RTO in Oregon that were published between January 1, 2019 and July 1, 2021 and "other existing studies and reports" relevant to RTO development in the western United States. ODOE acknowledges that there are likely dozens—if not more—studies and reports that might align with this statutory direction.

Given the timeline for implementation of the bill, it was not feasible to review every study and report about RTOs. For practical reasons, ODOE focused its review on frequently used studies and reports from the last two years that were primarily techno-economic analyses reporting quantitative findings. ODOE also included other pre-2019 studies that were particularly relevant or frequently cited.

These types of quantitative modeling efforts, however, while certainly valuable, often fall short in comprehensively addressing important qualitative issues – both positive and negative – implicated by potential RTO formation. The Department structured the Oregon RTO Advisory Committee process to focus more on these types of qualitative issues. Within the parameters of developing this study, ODOE did not engage in separate technical analysis to either confirm or challenge the quantitative findings of these existing studies and reports.

This literature review was used to "prepare a summary of the reviews and a set of scoping questions informed by those reviews" consistent with Section 1(4) of Senate Bill 589. **Importantly, ODOE does not intend for the summary of the key findings identified from this literature review to convey the endorsement of the Oregon Department of Energy, the State of Oregon, or the Oregon RTO Advisory Committee of those findings.**

Literature Review: Introduction

Several recent technical studies have evaluated expanded market constructs across the west. These studies generally find that significant economic benefits accrue from the formation of RTOs that provide transmission coordination and unified day-ahead and real-time energy markets in areas currently operating without them (such as Oregon and the northwest).[1] Cost savings associated with RTO formation tend to be driven primarily by a reduction in total production costs for the energy needed to meet demand and a reduction in the total capacity investment necessary to maintain resource adequacy.[2] A common finding throughout these studies is that the benefits increase over time, and that realizing the greatest benefits requires taking a long-term perspective that considers high-value, long-term investment decisions.[3]

While the modeled economic benefits identified are numerous, there are also substantive barriers and challenges to implementation of an RTO, some of which have been identified in these studies, and others not. For example, challenges have been identified around how to develop independent governance for a western RTO that equitably balances the interests of individual states. Existing RTOs have also struggled over how to balance the market price signals established by optimized economic dispatch with the need to maintain adequate financial support for investments in new capacity builds. Some RTOs have also encountered challenges around transmission congestion and transmission costs. In some instances, organized markets are not the solution to solving these challenges, and in other cases, thoughtful design of governance structure and markets within an RTO can help to address these concerns. These types of more qualitative issues were the

focus of the Department's engagement with the Oregon RTO Advisory Committee, the feedback from which was summarized in the body of this report.

The following literature review is a high-level distillation, organized by topic, of the key findings from ODOE's review of the following technical analyses, studies, and reports:

- **State-led Market Study (Technical):** Energy Strategies, *The State-led Market Options Study: Technical Report*. July 30, 2021. Available online.
- **State-led Market Study (Regulatory):** Energy Strategies, *The State-led Market Options Study: Market and Regulatory Review Report*. July 30, 2021. Available online.
- **Colorado Study:** Colorado Public Utilities Commission, *Colorado Transmission Coordination Act: Investigation of Wholesale Market Alternatives for the State of Colorado*. December 1, 2021. Available online.
- **Power Council:** Kujala, B. and Ollis, J., *Scenario Findings and Further Modeling Results.* Presentation to the Power Committee of the Northwest Power and Conservation Council. June 8, 2021. Available online.
- **SPP Study:** Brattle Group, *Western Energy Imbalance Service and SPP Western RTO Participation Benefits.* Prepared for Southwest Power Pool. December 2, 2020. Available online.
- **Southeast Study:** Energy Innovation, *Summary Report: Economic and Clean Energy Benefits of Establishing a Southeast U.S. Competitive Wholesale Electricity Market.* August 2020. Available online.
- **Western Flexibility Study:** Energy Strategies, *Western Flexibility Assessment Investigating the West's Changing Resource Mix and Implications for System Flexibility.* Prepared for the Western Energy Interstate Board. December 10, 2019. Available online.
- **Next10:** Next10, *A Regional Power Market for the West: Risks and Benefits.* July 2018. Available online.
- **Mountain West Study:** Brattle Group, *Production Cost Savings Offered by Regional Transmission and a Regional Market in the Mountain West Transmission Group Footprint.* December 1, 2016. Available online.
- **SB 350 Study:** Brattle Group, et al., *SB 350 Study: The Impacts of a Regional ISO-Operated Power Market on California.* Prepared for the California Independent System Operator. July 8, 2016. Available online.
- **PacifiCorp Integration:** Energy + Environmental Economics (E3), *Regional Coordination in the West: Benefits of PacifiCorp and CAISO Integration*. October 2015. Available online.

In many cases, key findings that ODOE identifies in its literature review can be cited to several of these studies. To make it easier to track the citations for particular findings, the full citations above are not repeated in the endnotes but instead short-form citations are used along with page numbers at the end of this appendix.

Given the diversity of these analyses and studies, there may be some inconsistencies across the findings presented. However, ODOE has identified highlights and themes from these analyses and studies and has sought to transparently reproduce the summaries of those highlights and themes here. These highlights and themes are not ODOE's assertions or perspectives, but rather a reflection of the literature that ODOE reviewed. For a more comprehensive understanding of the findings presented here, readers are encouraged to access and review the analyses and studies themselves.

The findings below are organized by major topic with high-level findings for each. Following each major topic area, several sub-topics are called out that highlight more detailed findings:

- **Reliability**
  - Peak reduction through load diversity
  - Capacity savings
  - Operational improvements
  - Optimized dispatch
  - Long-term reliability
- **Climate change**
  - Carbon emissions
  - Coal
  - Efficient use of existing fossil plants
- **Renewable energy**
  - Development
  - Reduced curtailments
  - Integration
  - Storage need
  - Effective load carrying capability
  - Distributed renewables
- **Transmission**
  - Optimize existing transmission
  - Transmission coordination
  - Reduced congestion
  - De-pancaked rates
  - Transmission expansion
- **Other environmental impacts**
  - Land use impacts
- **Economic development**
  - Economic growth
  - Manufacturing
- **Governance**
  - Independent board
  - FERC authority
- **State policy**
  - Clean energy policy
  - Resource adequacy
  - General authority
  - Other state issues: resource mix, retail rates, resilience, self-committed plants

Literature Review: Key Findings

Reliability

RTO formation can maintain regional reliability at lower cost than the status quo by sharing resources and optimizing the dispatch of existing capacity across a wide area. Challenges have arisen in some RTOs, though, over the so-called "missing money" problem where firm capacity resources needed to maintain long-term resource adequacy are unable to recover adequate revenues in the RTO energy markets. This may necessitate out-of-market actions to incentivize or otherwise order the procurement of new capacity resources to be developed.

- **Peak Reduction through Load Diversity.** Aggregating Balancing Authorities (BAs) results in a lower coincident peak demand than the sum of individual peaks across BAs due to variations in demand for electricity across different geographies (i.e., load diversity).[4]
- **Capacity Savings.** A significant share of the benefits[5] are often derived from being able to share capacity resources (i.e., less capacity investment overall[6]) to maintain resource adequacy and to meet load-following, flexibility, and other reserve requirements.[7] According to the most recent study ODOE reviewed, there is very little risk that an RTO market *not* achieve capacity benefits, especially for winter peaking states in the northwest.[8]
- **Operational Improvements.** Improved operational reliability through increased transparency for grid operators, better real-time situational awareness of system conditions, monitoring system stability and security, and management of unscheduled power flows and outages.[9]

- **Optimized Dispatch.** Stronger exposure to market forces and security-constrained economic dispatch optimizes thermal unit commitment and improves the availability and efficiency of existing power plants.[10]
- **Long-term Reliability.** Unified transmission planning and coordinated operations can identify the most efficient transmission upgrades to address long-term reliability challenges.[11]

Climate Change

Aggressive carbon reduction policies already in place in many western states may limit the incremental carbon reductions resulting from RTO formation.

- **Carbon Emissions.** In regions of the country with large coal fleets and less aggressive carbon policies, RTO formation can drive significant carbon reductions by accelerating coal retirements.[12] Studies of the west, however, only find a marginal reduction in CO2 emissions from RTO formation due to existing carbon policies.[13]
- **Coal.** Some contend that RTO markets could result in an increased dispatch of coal plants. Most studies found that the low marginal cost of renewables combined with increased market transparency puts enormous economic pressure on coal plants to retire.[14] This accelerated retirement of coal plants, however, could have adverse impacts on system reliability in the near-term.
- **Efficient Use of Existing Fossil Plants.** RTO energy markets typically promote the most efficient operation of existing fossil plants,[15] which can drive marginal carbon reductions and alleviate the need to invest in additional flexible gas units for system balancing. On the other hand, one study identified that some utilities participating in an RTO may "self-commit" uneconomic resources into the market because they can pass the true costs on to captive ratepayers, and state regulators may be slow to respond.[16]

Renewable Energy

Studies find multiple benefits from RTO formation can support the increased deployment of renewable energy compared to the status quo.[17]

- **Development.** Some of the studies assert that renewable development can occur at a faster rate than in a bilateral market[18] for several reasons, including:
    - Improved access to low-cost renewables across a larger geographic area[19]
    - Increased market liquidity and price transparency[20]
    - Reduction of integration and balancing costs[21]
    - Regional uniformity in interconnection standards[22]
- **Reduced Curtailments.** The coincidence of the generation profile of renewables, notably solar, can result in a significant amount of output needing to be curtailed (i.e., shutoff) during certain conditions. Relative to the status quo, an RTO can reduce renewable curtailments in the near-term and enable states to meet energy-based clean energy targets with less investment in renewable capacity.[23] At least one study, however, noted that this dynamic could shift post-2030 as the scale

of renewables increases substantially across western states to meet policy targets, potentially saturating the market, and reducing the ability to export renewable output to neighbors.[24]

- **Integration.** Lowers the cost to integrate additional renewable generation through:
    - Coordinated dispatch across a large geographic footprint;[25]
    - More accurate and uniform forecasting of renewable output;[26]
    - Reduction in the need for reserves due to the benefits of resource diversity (i.e., aggregating renewables over large area minimizes the cumulative variability);[27]
    - Reduction in cost of necessary reserves facilitated by sharing capacity resources;[28]
    - Transparent and consistent interconnection procedures and transmission planning.[29]
- **Storage Need.** At least one study found that RTO formation reduced costs specifically by reducing the need for grid-connected storage to integrate renewables.[30]
- **Distributed Renewables.** An RTO can create new market-driven revenue streams (e.g., for grid services) that can help to finance DERs.[31] Multiple studies have also highlighted the potential tension, however, that can be created by RTO design if favoring transmission-based solutions with large-scale renewables by not fully capturing the value of benefits that DERs can deliver.[32]

Transmission

All studies reviewed identified multiple region-wide benefits to the coordinated operation of the transmission system compared to the status quo.

- **Optimize Existing Transmission.** The current system of allocating transmission through bilateral contracts can result in an underutilization of the physical capabilities of the transmission system (or 'contractual congestion').[33] RTO formation would centralize the operation of the regional transmission system so that it could be better coordinated and operated up to its rated physical capability rather than its contractually available capacity.[34] Multiple studies have found that this alone can increase the effective transmission transfer capacity anywhere from 5 to 25 percent without investing in new lines. [35] [36]
- **Transmission Coordination:** A unified, less time-consuming, and coordinated regional transmission planning process will lower costs and reduce the need for capital investments to deliver region-wide benefits, including:[37]
    - Minimize "seams" issues between BAs[38]
    - Facilitate efficient access to more low-cost generating resources[39]
    - Provide better coordination of inter-regional transmission investments[40]
    - Reduce transmission-related interconnection costs[41]
    - Provides tools to better avoid building duplicative transmission[42]
- **Reduced Congestion.** RTO formation can also provide more accurate forecasting and scheduling that reduces physical congestion on the transmission system.[43]

- **De-Pancaked Rates.** RTO formation eliminates "pancaked" transmission rates that occur from stacking wheeling charges each time contracted power moves across a different utility's transmission system. This generates significant cumulative regional production cost savings but the impacts may vary across individual transmission owners and customers.[44] [45]
- **Transmission Expansion.** Some models indicate a need for regional transmission expansion beyond 2030 to access renewables and facilitate regional transfers.[46] When such investments are necessary, an RTO can help to facilitate cost-optimal, inter-regional transmission projects by equitably allocating the costs across RTO participants more efficiently than a bilateral system that lacks a unified cost allocation mechanism.[47] [48] As a result, RTO formation could lower the barriers to more transmission investment over the long-term, even after accounting for its optimization of the existing system.[49]

Other Environmental Impacts

RTO formation could have implications for the land use and other associated environmental impacts of electricity production.

- **Land Use Impacts:**
  - **Reduced Land Use Impacts.** Less land may need to be developed for renewables overall as a result of RTO formation reducing curtailments and enabling the production of more usable energy for the same capacity build.[50]
  - **Increased Land Use Impacts.** Multiple studies found that RTO formation in the west would have an impact on *where* in the west renewable resources are developed. This could result in more renewable development in Oregon and similarly result in more associated adverse biological impacts (e.g., impacts to sensitive habitat).[51]
- **Water Usage.** Thermal plants consume significant volumes of water for cooling. To the extent that an RTO would maximize the efficient operation of remaining thermal plants, there would be a commensurate reduction in the amount of water used in power production.[52]

Economic Development

Multiple studies identify indirect economic benefits from RTO formation.

- **Economic Growth.** Economic growth from RTO formation would be driven primarily by the impact of reduced retail electricity costs, which has the potential to increase household disposable income.[53] [54] Note, however, that economic benefits accrued by a utility from participating in an RTO would not automatically flow through to Oregon retail customers and is an issue that can be addressed through RTO design.
- **Manufacturing.** One study highlighted the potential undercounting of the economic benefits of RTO formation by not capturing the potential for new manufacturing jobs associated with the deployment clean energy technologies.[55]

Governance

There exist a variety of different governance models for RTOs across the country, with varying levels of involvement from state policymakers and other stakeholders.

- **Independent Board.** There are multiple models of RTO governance across the country, but CAISO is unique in that its board is appointed by the Governor and confirmed by the state legislature. Other RTOs tend to have boards independent from elected officials with members instead selected or approved by RTO participants. Some contend, however, that vesting governing authority in the participating utilities themselves results in RTO decisions that favor incumbent utilities and make change more difficult.[56]
- **FERC Authority.** Whether operating in a bilateral market or an RTO, FERC already has exclusive jurisdiction to regulate wholesale rates for power involved in interstate commerce and rates for transmission access used in the provision of wholesale power. Meanwhile, FERC has ordered RTOs to take state climate and clean energy policies into account in their decision making.[57] While some challenges have arisen between FERC and RTOs in recent years, one study asserted that most legal challenges to state clean energy policies are rooted in constitutional interstate commerce claims, not FERC rules.[58]

State Policy

The ability of states to maintain influence and control over certain state policy objectives can be impacted by the particular design of an RTO.

- **Clean Energy Policy.** Multiple studies find that, particularly as clean energy targets accelerate beyond 2030, an RTO can "substantially reduce the capital cost needed to achieve policy goals."[59] And at least one study found that *absent* the type of increased flexibility provided by an RTO, states might be incapable of achieving policy targets.[60]
- **Resource Adequacy.** States operating under a bilateral construct currently have varying levels of authority over planning and procurement for resource adequacy, particularly for multi-state utilities. While choices about RTO design can help to ensure a continued role for state involvement in planning and procurement for resource adequacy, the formation of a regional RTO would likely add constraints to state authority over resource adequacy.[61]
- **General Authority.** States have an opportunity to exercise significant authority by imposing conditions upon utilities before they are authorized to join an RTO (e.g., prohibiting a utility from joining an RTO unless the RTO provides a mechanism for the utility to later withdraw its membership).[62]
- **Other State Issues.**
    - *Resource Mix*: Transparent price signals and market forces may erode state authority over shaping utility resource mixes.[63] However, others have noted that the Supreme Court's decision in *Hughes v. Talen* combined with other controlling FERC orders reinforces the authority of states "to dictate the generation resources from which utilities may procure electric energy."[64]
    - *Retail Rates*: RTO formation will generate new market-based inputs into the ratemaking process that may make it more difficult for state regulators to challenge costs that utilities

seek to include in rates. Thoughtful RTO design can help to preserve continued state influence on these issues.[65]

- *Resilience*: A potential concern that has been identified, but not quantified, involves the potential for RTO formation to increase the reliance of distribution utilities on long-distance transmission and generators sited far away from the loads they serve. While this may lower costs under normal conditions, this strategy could make customers more vulnerable to outages from weather, wildfires, and other catastrophic events.[66] Alternatively, an RTO could also make it easier to re-route power flows around areas of the grid damaged by catastrophic events.
- *Self-Committed Plants*: One study found that there are concerns with RTO formation if some utilities participating in an RTO may "self-commit" uneconomic resources into the market because they can pass the true costs on to captive ratepayers, and state regulators may be slow to respond.[67]

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APPENDIX B: SCOPING QUESTIONS

The Oregon Department of Energy developed the following scoping questions based on the key findings identified in the technical studies and reports reviewed by the department. Feedback from the Oregon RTO Advisory Committee to these questions, both in written comments and over the course of two committee meetings, provided the foundation for the summary of advice gathered that was presented in the main portion of this report.

ODOE distributed these questions to the Oregon RTO Advisory Committee on August 13, 2021 and sought written feedback by September 13, 2021 ahead of two meetings of the committee. To provide guidance to members of the committee, ODOE shared the following objective of this effort with the committee.

> **ODOE's Objective:** To gather and synthesize the range of perspectives on the benefits, costs, opportunities, challenges, and risks of Regional Transmission Organization formation that exist among a diverse range of Oregon stakeholders to inform the State Legislature and other interested parties.

In addition, to support the participation of a diverse range of stakeholders, with varying levels of technical understanding of these issues, the Department provided foundational background materials on its website.

On the pages ahead, you will find three categories of questions with several topics per category. Given the technical nature of some of these issues, and again in recognition that some stakeholders have more resources available to address these questions than others, the Department anticipated that some stakeholders would not be able to answer every question.

- **Foundational Questions:**
  - Legal barriers
  - Oregon-specific net benefits
  - Oregon retail customers
  - Overarching principles
- **Technical Questions:**
  - Transmission rates
  - Transmission planning and operation
  - Renewables
  - Environmental impacts
  - Climate resilience
- **Governance and Design:**
  - Governance
  - Market design optionality

Foundational Questions:

(1) Legal Barriers: Oregon's retail electricity customers are served by a complex arrangement of private and public distribution utilities, with the majority of the state's transmission owned and operated by a federal entity. These entities operate under different governing laws, with different types of regulatory and governing oversight.

- Are you aware of any legal barriers to Oregon entities joining a Regional Transmission Organization?

(2) Oregon-Specific Net Benefits: Technical analyses of RTO formation in the West, inclusive of Oregon, have identified significant quantifiable net economic benefits for the regional power system. There would likely be some variation, however, in the distribution of these net benefits across individual states and utilities.

What are your perspectives on Oregon-specific net benefits that would accrue from RTO formation? Specifically:

- Are there reasons why you believe that these net benefits found in the technical analyses might be greater or (more importantly) lesser in Oregon? Do you believe there is a need for additional technical analysis of the particular costs and benefits to Oregon from RTO formation?
- What are some of the costs and risks that participation in an RTO might introduce specifically for Oregon? Please suggest how these might be mitigated to ensure net benefits to Oregon and how these mitigation measures can be designed to center underserved and low-income communities.

(3) Oregon Retail Customers: RTO formation could generate significant economic benefits for participating entities, even after taking into account the cost of participating in and operating an RTO. It is important to consider how these costs and benefits would flow through to Oregon's retail electricity customers.

What are your perspectives on costs and benefits to Oregon retail customers associated with RTO formation? Specifically:

- What are some costs that might accrue as a result of participation in an RTO, and how might these be balanced against stated benefits? How might net benefits be measured?
- What mechanisms or processes would be needed to ensure that the net economic benefits accrued from RTO formation directly benefit Oregon retail customers?

(4) Principles: Separate from the consideration of the technical questions below, there may be areas of common ground among stakeholders that can be identified with respect to core principles (e.g., independent governance, a minimal expectation of net benefits to Oregonians, preservation of state policy influence, etc.) that can inform how Oregon evaluates potential RTO formation.

Are there core principles that should guide Oregon's evaluation of potential RTO formation?

Technical Questions:

(5) Transmission Rates: The elimination of pancaked transmission rates has been identified as a significant source of economic benefits resulting from RTO formation. Given the existing variation in transmission rates across Oregon (and the broader West, including CAISO), the impacts on individual transmission customers and transmission owners would likely vary.

Please provide feedback on how these potential impacts to transmission rates from RTO formation would or would not be preferable to the status quo. In responding, you might also consider the following questions:

- ***Rates.*** Do you expect that the adoption of uniform transmission rates under an RTO would result in net benefits or costs?
- ***Revenues.*** Do you expect that the adoption of uniform transmission rates under an RTO would result in a net increase or decrease of revenue for Oregon transmission owners?
- ***Solutions.*** Can you describe or identify potential solutions or mechanisms (e.g., examples from other RTOs) to address any adverse impacts related to transmission rates resulting from RTO formation?

(6) **Transmission Planning & Operation:** An RTO would be able to provide coordinated transmission planning functions and would centrally operate the transmission system across a wide geographic area, with revenues accrued from individual transmission assets flowing to the participating transmission owner.

Please provide feedback on how these potential impacts to transmission planning and operation would or would not be preferable to the status quo. In responding, you might also consider the following questions:

- ***Generator Interconnection:*** RTO formation would standardize the process for interconnecting large-scale generators to the transmission system across a wide area. What are the pros and cons of this compared to the status quo? How can an RTO be designed to address these issues?
- ***Transmission Planning and Expansion:*** An RTO would affect decisions about the need for new transmission investments. What are the key advantages and disadvantages of this compared to the status quo? How can an RTO be designed to identify least-cost solutions that maximize retail customer benefits?
- ***Cost Allocation:*** An RTO could provide a uniform mechanism for allocating the costs of new inter-regional transmission investments. Is the status quo mechanism for allocating the costs of inter-regional transmission projects preferable? What concerns do you have about transmission cost allocation by an RTO?
- ***Legacy Transmission Rights.*** RTO operation of the transmission system would seek to replace the existing system of bilateral transmission rights. How would converting those legacy transmission rights into financial rights compatible with an RTO ultimately affect Oregon retail customers? What mechanisms or processes could be developed to mitigate these concerns?

(7) **Renewables**: An RTO can be designed to support and accelerate the deployment of renewable energy projects, but these design choices could also create new challenges in some cases.

Please provide feedback on how the implications on renewables development from RTO formation would or would not be preferable to the status quo. In responding, you might also consider the following questions:

- ***Types of renewables:*** Technical studies indicate that the *types* (e.g., wind or solar) of renewable energy projects developed in a state may be substantially impacted by RTO formation. For example, the capacity contribution value of developing particular types of renewables in Oregon may increase or decrease in a West-wide RTO compared to the status quo. Do you

anticipate impacts to the types and scale of renewables developed in Oregon would result from RTO formation?

- ***Location of renewables:*** Several studies found that West-wide RTO formation could result in a significant shift in the *location* of renewable development across different states and regions of the West. This could present opportunities and challenges for Oregon. Do you expect that changes in the location of renewable development would be a net positive or negative for Oregon?
- ***PURPA:*** Pursuant to multiple FERC Orders (most recently FERC Order 872), utilities participating in an RTO are exempt from their legally enforceable obligations under PURPA to make avoided-cost pricing available to renewable qualifying facilities with a capacity between 5 MW and 80 MW on the basis that RTOs provide non-discriminatory access to energy markets for projects of this size. What are the pros and cons that these changes to PURPA implementation would create for Oregon?
- ***Distributed Energy Resources:*** While a consequence of an RTO could be to adversely affect the adoption of DERs, RTO energy markets could also be intentionally designed to provide new, uniform revenue streams that make it easier to finance DERs. How should RTO design take into account the opportunities and challenges associated with developing DERs? How can RTO design facilitate the adoption of DERs in high-risk, underserved, or low-income communities?
- ***Manufacturing potential:*** Some studies note the potential for benefits of RTO formation that are difficult to anticipate or quantify, such as the economic benefits associated with in-state manufacturing of clean energy technologies at-scale. Do you anticipate that substantial economic benefits associated with clean energy manufacturing in Oregon could accrue from RTO formation?
- ***Oregon jobs:*** These issues related to the development of renewables have the potential to affect the number and quality of jobs in the clean energy sector in Oregon. Do you anticipate that RTO formation would result in a net increase or decrease in Oregon-based jobs in the clean energy sector? How can these considerations be incorporated into the design of an RTO?

(8) **<u>Environmental Impacts</u>:** Aggressive carbon policies already in place in the West, including Oregon, make it unlikely that RTO formation would significantly accelerate a reduction in carbon emissions. There are, however, other potential environmental considerations resulting from RTO formation.

Please provide feedback on how the environmental impacts resulting from RTO formation would or would not be preferable to the status quo. In responding, you might also consider the following questions:

- ***Thermal dispatch:*** There is some potential that RTO formation could result in a short-term increase in the utilization of existing thermal plants, even though most studies find RTOs support the retirement of coal plants and the efficient operation of remaining gas plants, to the degree they are responsive to market price signals. Would these issues create a barrier to RTO formation? Could these issues be addressed through the design of an RTO?
- ***Geographic footprint of renewables development:*** As noted previously, RTO formation could affect the location of renewables development across the West, with the potential to result in different land use impacts in Oregon (in terms of resource type, scale, and location) compared to what might occur absent an RTO. How could an RTO be designed

to ensure that potential adverse land use, and other associated environmental and biological, impacts to Oregon are adequately addressed?

- ***Environmental Justice***: Energy production and delivery has had disparate impacts (both in terms of opportunities created and adverse effects) on different communities across Oregon. Would there be opportunities in designing an RTO to support the state's interests in addressing disparate impacts and environmental justice issues?
- ***GHG accounting:*** Accounting for the GHG emissions profile of electricity across different regulatory regimes, markets, and state boundaries can be challenging. How could this issue be incorporated into considerations of RTO formation?

(9) Climate Resilience: For the most part, the studies reviewed did not consider the impacts of RTO formation on energy resilience in the context of our rapidly changing climate. For example, just in the last year, catastrophic wildfires have necessitated the need to shut off power to Oregon communities; historic winter ice storms resulted in widespread outages in the Willamette Valley; and dense smoke from a wildfire earlier this summer forced an outage of major transmission lines connecting Oregon to California.

Please provide feedback on how climate resilience implications resulting from RTO formation would or would not be preferable to the status quo. In responding, you might also consider the following questions:

- ***Geographic diversity of resources:*** What opportunities (e.g., new mechanisms for monetizing and supporting the deployment of resilient microgrids) and challenges (e.g., potential for increased reliance on transmission to import power) could an RTO create to support energy resilience for Oregon communities? How could these issues be taken into account when designing an RTO?
- ***Wildfire nexus:*** The recent shutdown of the AC intertie to California for multiple days due to wildfire smoke is an example of the nexus between wildfires and transmission lines. How can wildfire risks be mitigated in the design of an RTO?

Governance & Design Questions:

(10) Governance: Many of the issues identified here help to illuminate the need for effective governance of an RTO that would ensure Oregon's perspectives are adequately represented.

Please provide feedback on the priorities or principles that should be incorporated in the development of governance mechanisms for an RTO. In responding, you might also consider the following questions:

- ***Best Practices:*** There are a variety of RTO governance models across the country. Can you identify any best practices in RTO governance from around the country (or internationally)?
- ***New Practices:*** What are some new governance mechanisms that could ensure net benefits to Oregon retail customers are considered as a result of Oregon RTO participation?
- ***State interests:*** Some stakeholders in other RTOs contend that vesting too much governing authority in participating utilities and existing transmission owners makes it difficult for the state to adopt and implement new policies. How can an RTO be designed to balance the interests of meaningful state oversight and policy with the interests of RTO participants?
- ***Governance principles:*** Can you identify or describe specific governance principles that you believe should be incorporated into the design of any RTO? For example: geographic balance of

representation on the governing board; public power representation; mechanisms for meaningful input and guidance from state policymakers; retail customer protections; opt-out provisions for participating members; etc.

(11) Market Design Optionality: There are numerous ways that energy markets could be designed. The studies we reviewed considered multiple different constructs, from the bilateral status quo, to an expansion of real-time (EIM) and day-ahead markets (EDAM), to multiple full RTOs across the West or a single West-wide RTO.

Please provide feedback on the priorities or principles that should be considered when designing specific energy markets like those that would be administered by an RTO. In responding, you might also consider the following questions:

- ***Retail Customer Benefits:*** Assuming that substantive barriers and challenges can be satisfactorily addressed, do you expect the cumulative benefits to retail customers in Oregon to be significantly greater under certain constructs than others? Is a minimum viable size for the geographic or jurisdictional scope of an RTO necessary to achieve sufficient retail customer benefits to justify forming an RTO?
- ***Optionality:*** Are there opportunities to consider different ways of dividing the traditional functions of an RTO across multiple legal entities in a manner that can simultaneously maximize benefits to Oregon retail customers while minimizing other potential barriers or concerns (e.g., around governance or preserving state influence over Resource Adequacy)?
- ***Marginal Cost Dispatch:*** What types of changes, if any, might be incorporated into the design of RTO energy markets to support regional system reliability as zero marginal cost renewables increase their share of the power mix?