The following information is part of the Oregon Renewable Energy Siting Assessment (ORESA). The ORESA project is funded through a $1.1 million U.S. Department of Defense Office of Local Defense Community Cooperation grant awarded to the Oregon Department of Energy, working with the Department of Land Conservation & Development and Oregon State University's Institute for Natural Resources.
More information is available at https://www.oregon.gov/energy/energy-oregon/Pages/ORESA.aspx

# Oregon Renewable Energy Siting Assessment (ORESA)

## Supporting Materials

*Please refer to the ORESA Final Report and ORESA Mapping and Reporting Tool for more information and context*

# Oregon Renewable Energy Siting Assessment

## Natural Resources, Environment, and Development: Opportunities and Constraints

September 2021

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# Table of Contents

# Executive Summary

The ORESA project's main goal is to assess data, information, and stakeholder perspectives to create transparent, trusted, and accurate information to support renewable energy development in Oregon without specific recommendations or endorsements. The Natural Resources, Environment and Development Opportunities and Constraints Assessment component of the project is the focus of this report and included six main activities: (1) created a stakeholder registry; (2) created and analyzed an online survey; (3) conducted numerous one-on-one interviews; (4) facilitated a military stakeholder roundtable webinar discussion; (5) collected relevant spatial data and managed stakeholder review; and (6) provided input for online tool development.

The stakeholder registry was populated with 396 individuals each assigned to one of ten sectors who were then invited to take an online survey, which was designed to obtain information regarding renewable energy interest, perceived opportunities and constraints, spatial data interest, and preferences for specific online tool functionality – 82 responded. Survey responses were followed-up with one-on-one phone interviews with individuals from each sector in order to obtain more in-depth feedback. In addition, a special group roundtable webinar discussion was held focusing on stakeholder-military interaction.

Main findings from stakeholder feedback include:

- Renewable energy planning in Oregon is being met with considerable excitement and optimism; however, some anxiety and fear persists.
- Solar, onshore wind, and offshore wind were reported as the top three renewable energy types of interest.
- An overwhelming majority of stakeholders felt a comprehensive approach to energy planning in Oregon is needed – one that includes all renewable energy types at all scales.
- Effective and adaptive renewable energy planning and siting requires better collaboration and communication between all parties. Early and regular communication was an overriding theme.
- Support for ongoing public participation in the planning process was highly desirable to most stakeholders.
- Developing and maintaining high quality data and information is needed for effective planning, project implementation, and monitoring.
- Data and process transparency is extremely important in streamlining renewable energy development at reduced costs.
- There is currently a need for a centralized, standardized, editable database of tower locations for military and civilian air safety in Oregon.
- A state-wide or region-wide least-conflict planning process was suggested by stakeholders.

Over 650 spatial datasets were collected, 570 of which were curated into a private working group in Data Basin (http://databasin.org) so all stakeholders could easily review the data and provide specific feedback. A series of Data Basin maps (each containing 15-20 individual datasets) were composed with the more valuable datasets and shared with stakeholders. These maps were presented in a series of Zoom webinars to registered stakeholders. Six webinars were conducted focusing on the different

regions of the state and specific content. Maps remained available for stakeholders to review and comment. A total of 189 individuals attended the webinars; total number of unique attendees was 140.

Comments were assembled and adjustments made to the final spatial data catalog, which contained the data delivered to the ORESA team. Discussion about data gaps, updates, and processing needs was also provided for selected topics. The most important themes to stakeholders included data pertaining to: sensitive habitat and species, infrastructure, cultural resources, energy resources, and conservation areas of interest. Top ranking online tool functions identified by stakeholders included: guided workflow; the ability to download data; printing of individual maps and PDF reports; and thematic layer exploration. An additional set of project take-aways is provided at the end of the report.

# Introduction

The Oregon Renewable Energy Siting Assessment (ORESA) project was funded through a grant from the U.S. Department of Defense (DoD) Office of Economic Adjustment and administered by the Oregon Department of Energy (ODOE). Other project partners included the Oregon Department of Land Conservation and Development (DLCD) and the Oregon State University's Institute for Natural Resources (INR). The main project goal was to assess data, information, and perspectives to create transparent, trusted, and accurate information to support renewable energy development for Oregon (noting where data may be uncertain) without recommendations or endorsements. The five main components to the ORESA project included:

1. Renewable Energy Market and Industry Assessment
2. Military Needs and Interest Assessment
3. Natural Resources, Environment and Development Opportunities and Constraints Assessment
4. Siting Procedures Review
5. Mapping and Reporting Tool

Energy and Environmental Economics (E3) conducted the Renewable Energy Market and Industry Assessment. The main objective was to use available data and information to model future opportunities to develop renewable energy generation and transmission projects in Oregon and adjacent ocean. Cost-optimized renewable energy build-out scenarios were developed for the next 15 years. The assessment also focused on the challenges and opportunities that exist in the renewable development community in Oregon and identified gaps that if addressed could help meet Oregon's long-term energy goals.

The Military Needs and Interest Assessment conducted by Epsilon explored the intersection of renewable energy and military operations in Oregon and the adjacent ocean. Epsilon gathered information from the military and processed spatial data regarding current and future military assets, uses, and needs. Final report describes current and anticipated military mission requirements and highlights existing constraints and opportunities for collaboration between renewable energy development and military uses.

The Siting Procedures Review concentrated on the siting regulations, permitting, and project review processes as they relate to notification, identification, and evaluation of potential impacts. A summary of siting regulations and process review was developed with the help of feedback from stakeholders and best practices identified for better engagement and improved coordination.

The Mapping and Reporting Tool is being developed by INR staff and housed in the Oregon Explorer. The spatially explicit tool is being built to provide a more comprehensive understanding of renewable energy and transmission development in Oregon to a wide range of stakeholders and to help support proactive coordination between them.

The Natural Resources, Environment and Development Opportunities and Constraints Assessment, which is the focus of this report, concentrates on the renewable energy development opportunities and constraints from the standpoint of natural/cultural resources and the physical environment in the state and offshore. The assessment relied heavily on obtaining input from a broad range of stakeholders using a variety of means. Originally, a series of face-to-face meetings was an important component of the outreach effort. Face-to-face meetings are often effective at exposing levels of interest and topical sensitivity that can only be learned from well-managed group interactions. However, the timing of the COVID-19 pandemic interrupted the ability to hold face-to-face meetings, and the assessment used alternative means to obtain the necessary feedback from stakeholders. Outreach involved four different approaches – (1) an online survey, (2) one-on-one phone interviews, (3) a series of regional webinars focused on relevant spatial data for renewable energy development considerations with follow up calls with individual data providers, and (4) a military stakeholder roundtable webinar discussion. The scope of work outlined and summarized in this report included six primary components (**Figure 1**):

A. Stakeholder Registry
B. Online Survey
C. One-on-one Interviews
D. Military stakeholder roundtable webinar
E. Spatial Data Management
F. Online Tool Content and Function Input

A stakeholder registry was developed to identify the target audience for this project. The registry was primarily used to distribute an online survey, but it also provided a record of individuals and organizations with a stake in renewable energy development in the State of Oregon. By creating a living digital registry, the list can be updated and maintained by agency staff and used in the future to further outreach and engagement related to renewable energy development.

The main objective of the survey was to reach as many people as possible representing different stakeholder perspectives in order to gain important insight about renewable energy development in Oregon and the adjacent marine environment using a standardized learning device; the objective was to cover a wide range of topics without an in-depth assessment. In general, the survey was developed to obtain information about the audience; the type(s) of renewable energy of interest; identification of renewable energy development opportunities and constraints; and desirable data and online tool functionality considerations.

Information regarding stakeholder perspectives regarding opportunities and constraints was obtained from the online survey as well as from a series of follow-up one-on-one interviews. These one-on-one conversations with individuals from different stakeholder sectors were designed to focus primarily on opportunities and constraints to renewable energy development in the state. Unlike the survey, these conversations were meant to gain a deeper understanding based on the stakeholder's experience – what works and what doesn't from their perspective. After the one-on-one interviews were completed, a military-focused stakeholder roundtable webinar was convened.

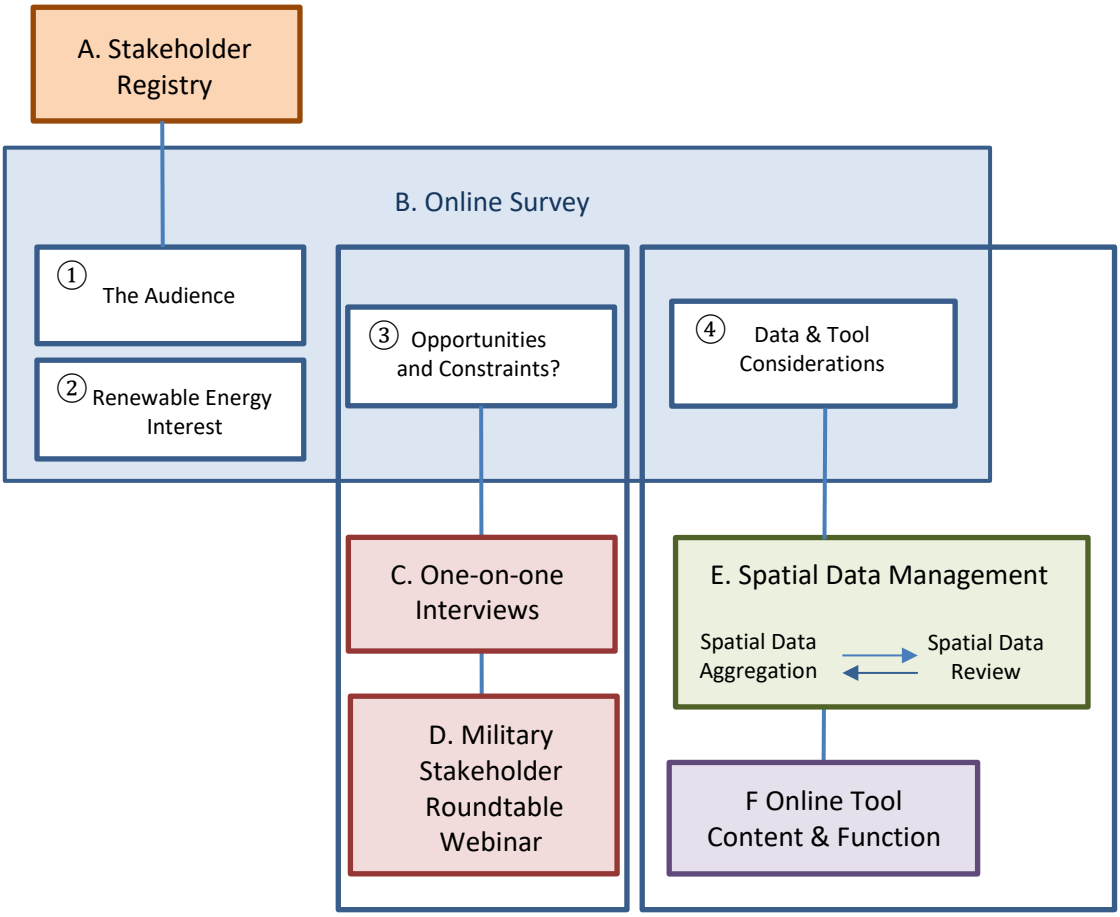


**Figure 1**. Diagram outlining the relationship of the various components of the scope of work implemented and reviewed in this report.

Finally, a major focus of the project was to obtain stakeholder feedback on the spatial data needs for planning and siting renewable energy in the state. At the same time, we took the opportunity to ask stakeholders to provide input on desirable tool functionality (mostly through the survey) to help provide some high-level guidance to the Institute for Natural Resources (INR), which is responsible for developing an online tool. Spatial data management involved two activities – (1) an extensive spatial data aggregation and curation exercise and (2) regionally organized spatial data reviews – both supported by Data Basin (http://databasin.org). Data Basin is an online map-based data sharing platform that facilitates easy and open collaboration. Using Data Basin allowed for a highly transparent review of available data for planning purposes and provided a convenient means for all stakeholders to understand the data better and to provide helpful feedback. All collected and collated spatial data that is allowed to be shared publicly will remain accessible online via Data Basin. Results from the stakeholder survey, extensive data collection and review process, and CBI experience with online tool development formed the basis for this report.

## Stakeholder Registry

In preparation of an online survey, a stakeholder registry was created with attention to broad sector representation (**Appendix A**). Based on our current stakeholder network as well as input from the ORESA team, including members from DLCD, ODOE, and INR, a stakeholder list was generated and organized under ten sectors. The goal was to generate a representative list of individuals and organizations relevant to each sector. The digital registry provides agency staff a convenient way to update and maintain the list of stakeholders relevant to renewable energy development. Sector representation in the registry ranged from 12 to 62 (**Table 1**).

**Table 1**. Number of stakeholders listed by sector in the Stakeholder Registry.

| Sector | Number of Stakeholders |
|---|---|
| Agriculture | 15 |
| Federal Government | 48 |
| Industry | 50 |
| Irrigation Districts | 12 |
| Local Government | 56 |
| NGO | 62 |
| State Government | 34 |
| Tribes | 40 |
| University | 13 |
| Utilities | 66 |
| Total | 396 |

## Online Survey

The online survey was designed in coordination with the ORESA team to obtain information regarding renewable energy interest, opportunities and constraints, spatial data interest, and online tool functionality considerations (**Appendix B**).The survey included 16 questions and could be taken in 10 minutes to maximize the number of potential responses.

Invitations were distributed to the stakeholders from the registry in September 2020; the survey was closed on October 20, 2020. Survey Monkey was used to manage the survey and reminders were periodically sent out to increase participation. Of the 396 invitations, 82 responses (20.7%) were received; above average returns (**Figure 2**). The sectors with the highest response rates included University, Local Government, Industry, and NGOs. Poorest response rates (i.e., less than 10%) included Utilities, Irrigation Districts, and Federal Government staff members. Zip codes were used to obtain an understanding of the spatial distribution of the respondents. Highest concentration areas by county include Coos, Deschutes, Lake, Crooks, and Benton (**Figure 3**). Eight people declined to provide their zip codes and three were from out of state (1 from Washington, D.C. and 2 from Washington state).

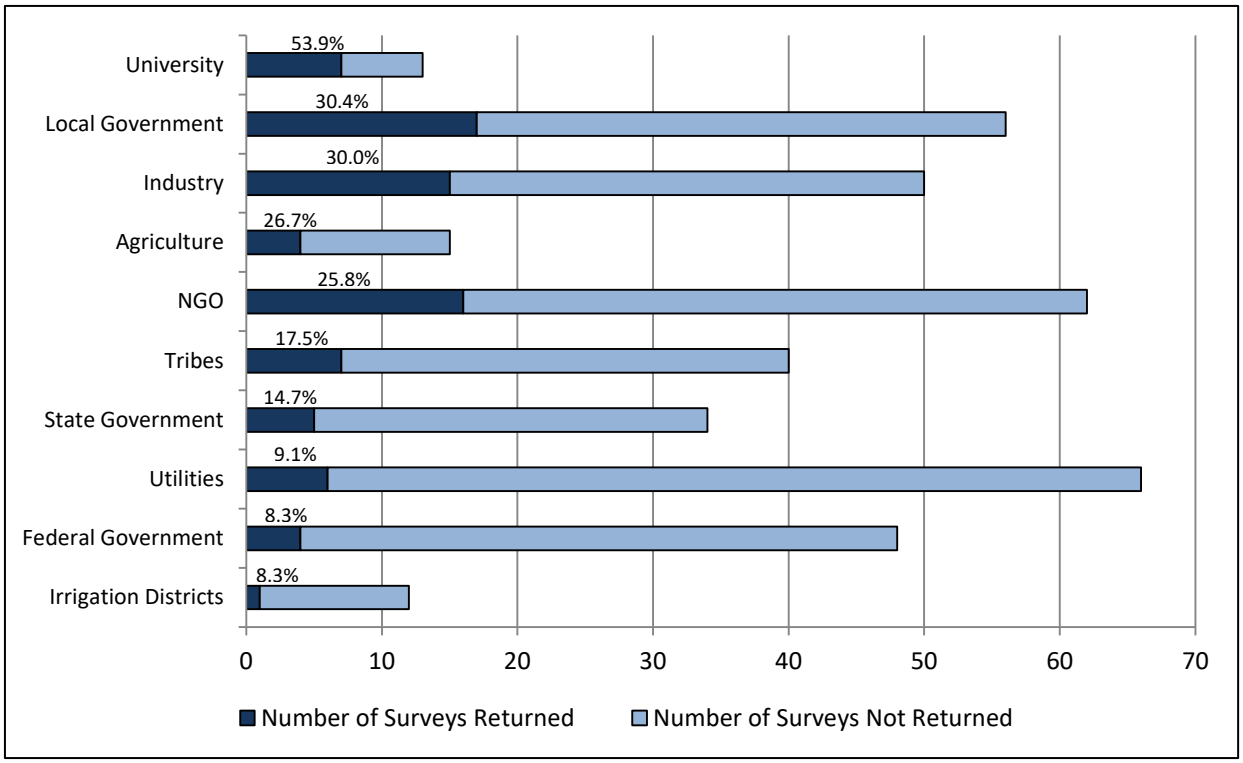


**Figure 2**. Summary of the number of surveys sent and the percent responded by each sector.

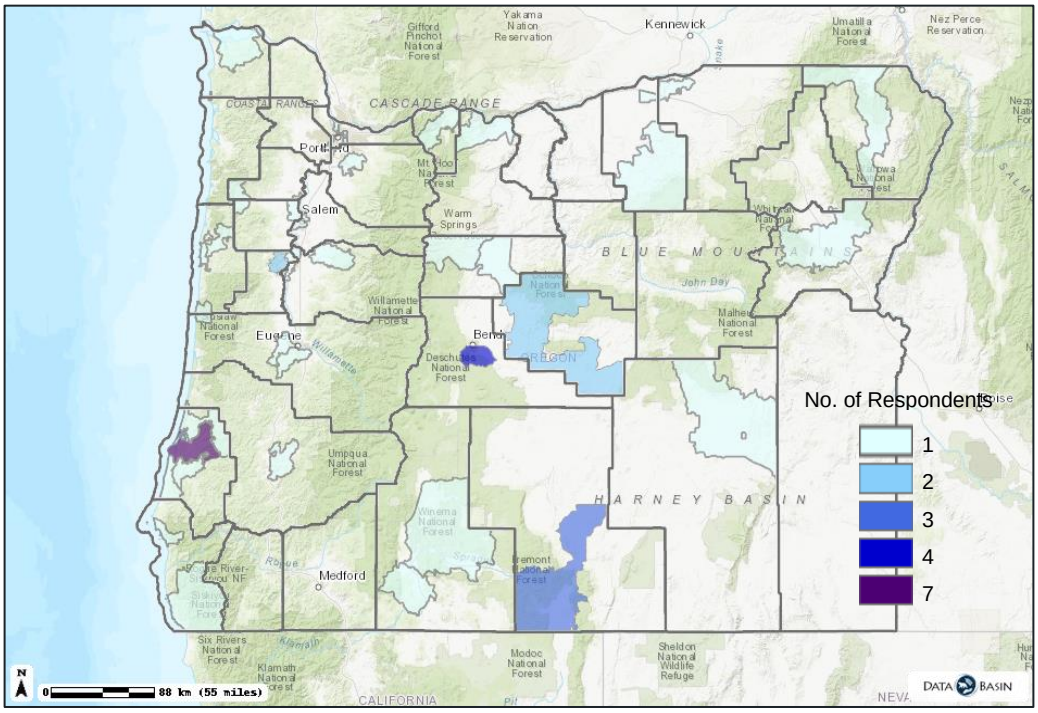


**Figure 3**. Map showing zip code locations of survey respondents.

## Interest in Renewable Energy Source Types

The purpose of this survey question was to determine which renewable energy types were of greatest interest to stakeholders. Survey respondents were asked to check one or more from six types provided plus an "Other" write-in option. Solar was most popular, with approximately 75% of respondents selecting it (**Figure 4**). Three other energy types (offshore wind, small hydro, and onshore wind) were selected by 37-43% of respondents. A little over 33% of respondents listed biomass to be of interest. Geothermal and the "Other" category were of least interest to the survey respondents. The other categories highlighted in the survey answers included wave energy, energy storage, and microgrids as important renewable energy topics.

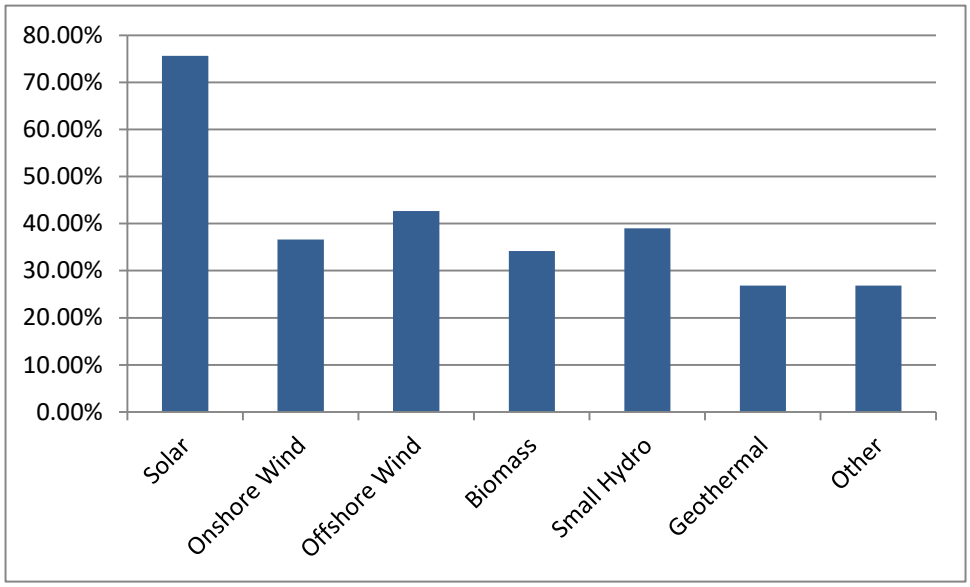


**Figure 4**. Renewable energy types respondents expressed interest in (Percent totals exceed 100% because respondents could select more than one type of interest).

## Scoring of Renewable Energy Development Considerations

The purpose of this survey question was to better understand the motivations or high-level concerns pertaining to renewable energy development. Survey respondents were asked to score renewable energy development considerations (5 = very high importance; 1 = very low importance). Categories included:

- Energy Security/Resilience
- Climate Change Adaptation
- Natural Lands/Wildlife Protection
- Water Protection
- Working Farms, Ranching, and Forest Lands (Working Lands)
- Local Economic Development

- Social/Environmental Justice
- Participatory Planning Process
- Transmission and Storage Infrastructure
- Permitting Process.

Results from the one irrigation district respondent were combined with the Utility category for the two scoring questions. Summaries for all 82 respondents showed that the categories provided were generally viewed as important with all categories receiving ≥50% high or very high rankings (**Figure 5**). Highest ranking categories include Natural Lands/Wildlife Protection, Transmission and Storage Infrastructure, and Climate Change Adaptation. The two categories that scored the lowest but still moderately high importance were Working Lands and Social/Environmental Justice. Results were also summarized by sector so individual sector difference could be observed (**Appendix C**). Caution is warranted for the results where the return sample size was small compared to the number invited as they may be unrepresentative of the sector.

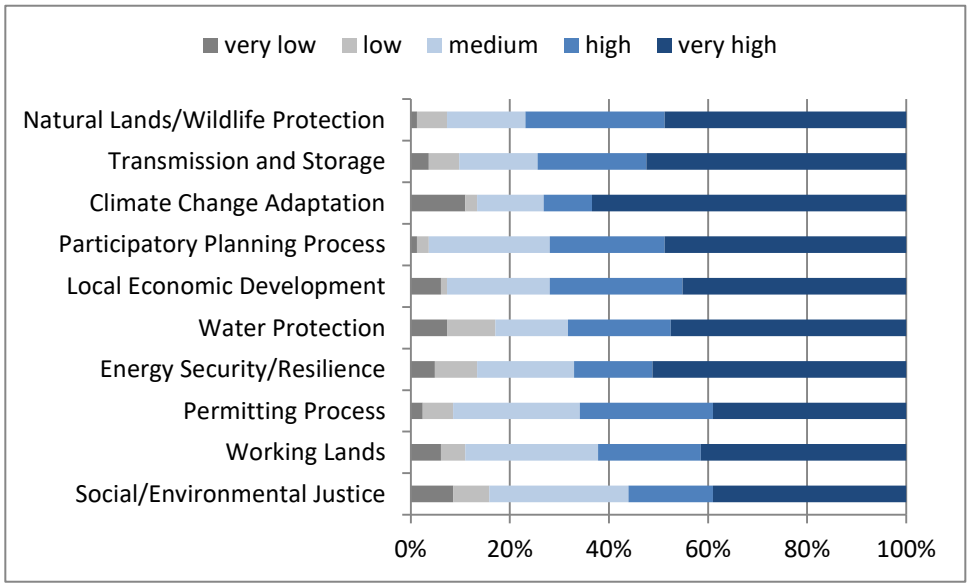


**Figure 5**. Summary responses (n=82) ranking the relative importance of energy development consideration categories.

## Opportunities and Constraints - Background

This section provides context to the stakeholder data review, the opportunities and constraints survey, and the one-on-one interview responses, we include a short summary of solar and wind development trends followed by brief discussions on the three growth drivers – policies, demand, and costs. We provide background to land utilization and environmental impacts from renewable energy development, and we end with a brief discussion on local economic benefits. We only focus on solar and wind as these

were the renewable energy sources of greatest interest to stakeholders and the most likely to dominate future utility scale renewable energy development in the state.

## Growth in Renewable Energy Development

According to the U.S. Energy Information Administration, growth in solar power in the United States rapidly grew from 493 million kW hours in 2000 to over 90,000 million kW hours in 2020 (**Figure 6**). In 2020, Oregon ranked 19th of the 50 states with total capacity of 966 MW of solar based on Q4 2020 accounting, which is enough energy to power nearly 124,000 homes (SEIA, 2021a). Utility scale solar energy development in Oregon started out slowly, but has increased by 280% between 2009 and 2018 (Blumenstein and Schlusser, 2019). Most of this solar generated electricity is used within state where it provided 1.3% of Oregon's electricity consumption in 2018; only about 12% of solar power was exported to neighboring markets (ODOE, 2021). In 2018, utility-scale solar accounted for 79% of solar power generation in the state with 13% from commercial and 8% from residential sources. Growth projections have been estimated to be an additional 1,647 MW over the next five years and capacity is available to support this growth opportunity with 116 companies operating in the state, including manufacturing, installers, developers, and others (SEIA, 2021).

Wind energy development in the United States has contributed more renewable energy compared to solar getting a quicker start to the market and is experiencing ongoing growth (**Figure 7**). Based on Q4 2020 numbers from the U.S. Department of Energy, Oregon has installed wind capacity of 3,737 MW, which is the state's second largest renewable energy source behind hydro. Oregon ranks 9th nationally for wind power capacity (ODOE, 2021). Wind development in Oregon has grown in fits and starts, but grew 56% between 2009-2018 (Blumenstein and Schlusser, 2019). In 2018, wind power made up 11.6 percent of Oregon's electricity generation and 4.69 percent of Oregon's energy consumption. Approximately two-thirds of Oregon's wind generation was exported to neighboring markets. As of October 1, 2020, there are 46 existing wind farms and four state jurisdictional facilities under construction in Oregon totaling an additional 894 MW, with an additional 550 MW of wind projects approved or in review. Three-quarters of existing and planned wind utility-scale generation in Oregon lies on the Columbia River Plateau in Wasco, Sherman, Gilliam, Morrow, and Umatilla counties, with a few developments in Eastern Oregon. Development occurs in these regions due to the rich wind resources as well as access to existing transmission infrastructure.

In 2019, 62% of Oregon's utility scale electricity generation came from renewable sources with 49% from hydro power, 11% from wind, and 2% from other sources such as geothermal and solar (US EIA, 2021a). As described in the subsections below, renewable energy development (particularly solar and wind) is growing across the country and in the state. This is being driven by three main factors: (1) federal and state policies, (2) increased customer choice/preference, and (3) sharp declines in development costs.

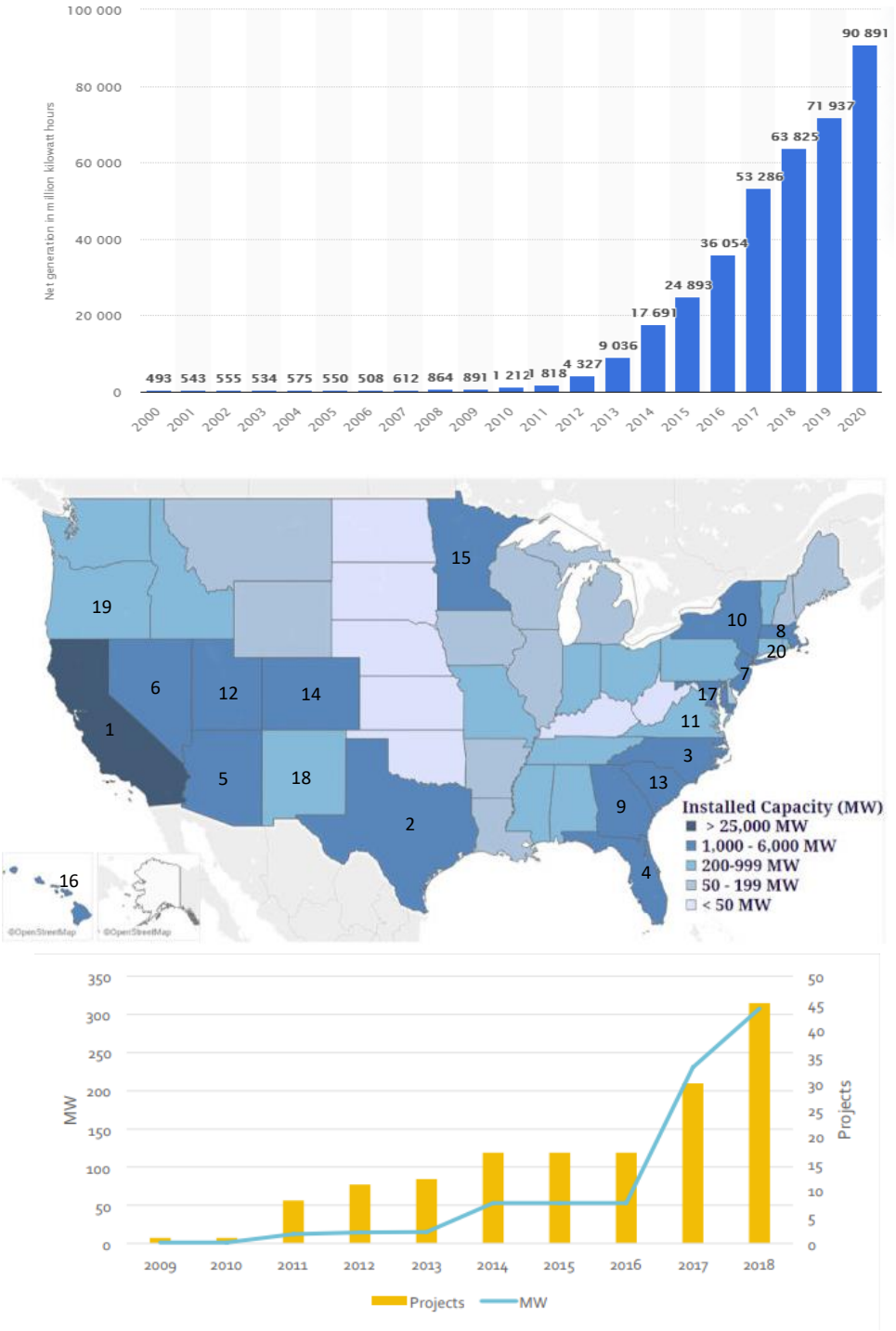


**Figure 6.** Solar power net generation in the United States from 2000 to 2020 from the US Energy Information Administration from Statista (https://www.statista.com/) (Top). Top 20 states for installed solar capacity in 2019 (SEA, 2021b) from the Solar Energy Industries Association (Middle). Utility scale solar development in Oregon between 2009-2018 (Blumenstein and Schlusser, 2019) (Bottom).

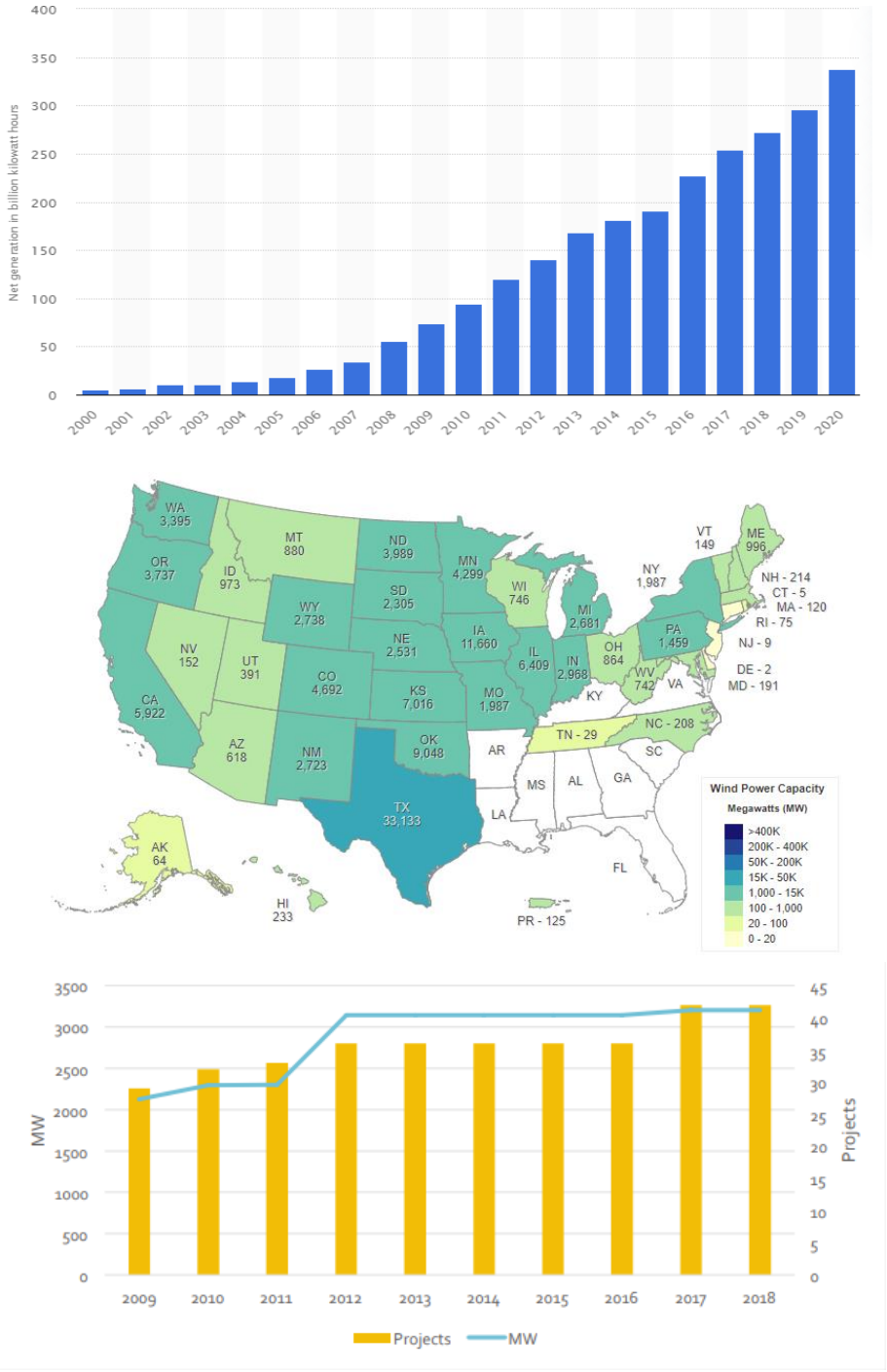


**Figure 7**. Wind power net generation in the United States from 2000 to 2020 from the US Energy Information Administration from Statista (https://www.statista.com/ 2021) (Top). Installed wind power capacity by state in 2020 (U.S. DOE, 2021a) (Middle). Utility scale wind development in Oregon between 2009-2018 (Blumenstein and Schlusser, 2019) (Bottom).

## Renewable Energy Policies

Federal, state, and local government policies have helped drive renewable energy development at all scales.

Federal Policies

Federal policies include tax credit programs such as the Renewable Energy Production Tax Credit (PTC), Investment Tax Credit (ITC), Residential Energy Credit, and Modified Accelerated Cost-Recovery System (US EIA, 2021b). Once providing as much as 30% tax credits, the PTC and ITC had been partially phased out, but recently expanded and extended via the 2021 Consolidated Appropriations Act (Medina and Dajani 2021). In addition, the Public Utility Regulatory Policies Act (PURPA) of 1978 was established after the U.S. energy crisis at the time to encourage development of small, non-utility power facilities (or Qualifying Facilities. Due to various amendments to the act, PURPA gives Qualifying Facilities the right to interconnect with the utility-controlled grid and requires these utilities to purchase QF-generated energy (U.S. DOE, 2021b).

State Policies

State policy has also played a key role in driving renewable energy development. The Oregon Department of Energy has worked with a variety of entities to reduce energy use across the state and was a major focus of the first Sustainability Plan produced in 2003.

The Oregon Renewable Portfolio Standard (RPS), established in 2007 by Senate Bill 838 and updated in 2016 by Senate Bill 1547 requires Oregon's large investor-owned utilities (IOUs) to provide 50% of retail electricity sales from eligible renewable resources with interim targets. (Oregon RPS Statute) Oregon's consumer-owned utilities (COUs) have lower targets. Electric Service Suppliers (ESSs) must also meet the RPS requirements applicable to the electric utilities that serve the territories in which the ESS sells electricity to retail electricity customers. The specific statutory requirements established by SB 1547 are shown in **Table 2**. SB 1547 also requires that all coal is removed from Oregon's electricity mix by 2030 (with an exception for a small portion of Portland General Electric's ownership of Colstrip, which must be phased out by 2035).

**Table 2**. Statutory RPS requirements established by SB 1547.

| | 2020 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|
| IOUs (3% or more of retail sales) | 20% | 27% | 35% | 45% | 50% |
| Large COUs (3% or more of retail sales) | - | 25% | 25% | 25% | 25% |
| Medium COUs (1.5% - 3% of retail sales) | - | 10% | 10% | 10% | 10% |
| Small COUs (less than 1.5% of retail sales) | - | 5% | 5% | 5% | 5% |

Generation sources eligible for the Oregon RPS include solar, wind, geothermal, certain biomass sources, some hydropower, hydrogen, and wave or tidal energy. One goal of the Oregon RPS is to promote "research and development of new renewable energy sources in Oregon." For this reason, aside from a few exceptions, only facilities that became operational on or after January 1, 1995, are eligible for participation in the RPS to incentivize the development of new renewable electricity sources; this is one reason why much of the existing hydropower in the region is not eligible for the RPS.

Two state programs, which have now sunset provided sizeable tax credits to jumpstart renewable energy development in the state: the Oregon Business Energy Tax Credit (BETC) program (1979-2014) and Residential Energy Tax Credit (RETC) program (1978-2017). The BETC program allowed for tax investment credits worth $653 million while the RETC program issued tax credits totaling over $258 million, including 15,000 solar projects. Business Oregon oversaw another cash incentives program that closed in 2017 called the Solar Development Incentives Program, which over the course of its operation providing cash incentives to 19 solar developments totaling $362 million (ODOE, 2018). During the 2019 and 2020 legislative sessions, House Bill 2618 created a $1.5 million rebate program targeting residential customers to reduce the consumer cost of solar development and energy storage. This program also included specific targets for low and moderate income participants and low income service providers.
Using a competitive process, ODOE managed the Renewable Energy Development (RED) Grant Program (now concluded) that promoted investment in renewable energy via grants to individuals, businesses, NGOs, tribes, and others to install renewable energy systems of up to $250,000 not to exceed 35% of eligible costs. The Energy Trust of Oregon, which began operation in 2002 and is funded through a small percentage of customer utility bills as a public purpose charge, invests in cost-effective energy efficiency and helps pay the above-market costs of renewable energy resources. The Energy Trust provides energy efficiency and renewable energy programs to customers in Oregon and SW Washington (Energy Trust of Oregon, 2021).

During the recent 2021 legislative session in Oregon, several new energy programs were passed and will be implemented over the next few years. Below is a list of recent energy related legislation that passed:

- HB 2021 was described as "Clean Energy For All" –
    - 100% Clean Electricity Targets: Oregon's large investor-owned utilities (IOUs) and electricity service suppliers must reduce greenhouse gas emissions associated with electricity sold in Oregon compared to a 2010 baseline – 80% emissions reductions by 2030, 90% by 2035, and 100% by 2040 – effectively requiring emission-free electricity by 2040. The legislation provides exemptions from meeting goals if compliance would impact system reliability or lead to excessive rate increases.
    - New Natural Gas Plant Restrictions: Restricts the Oregon Energy Facility Siting Council from issuing site certificated for fossil-fueled energy facilities including prohibiting site certificate issuance for new fossil-fueled facilities that emit greenhouse gases into the atmosphere.
    - Community Renewable Investment Fund: Creates a $50 million dollar fund at ODOE to provide competitive grants for planning or developing community renewable energy

projects less than 20 megawatts in capacity that promote energy resilience, increase renewable energy generation or storage capacity and provide economic or other benefits to communities.

- Study on Small Scale Renewable Energy Development: Directs ODOE to convene a work group to develop and publish a study on the barriers, opportunities, and benefits of small-scale renewable energy projects.
- Green Energy Tariffs: Permits IOUs to collaborate with local governments to develop green electricity rates in alignment with local government renewable or clean (non-emitting) energy goals to serve retail electricity customers within the geographical boundaries of the local government.
- Responsible Contractor Labor Standards: Requires renewable project developers and contractors to document and meet specific labor standards when constructing renewable energy generating or storage facilities with capacity of 10 megawatts or greater.
- RPS Community-based Renewable Energy Project Target Changes: Increases the RPS community based renewable energy target from 8% of aggregate electrical capacity by 2025 to 10% of aggregate electrical capacity by 2030 for Oregon's large IOUs.

- HB 2289 – Wildfire Rebuilding Process to create a more affordable and streamlined rebuilding process for those who sustained property damage during the 2020 Labor Day wildfires. If certain criteria are met, a property owner may alter, restore, or replace a nonresidential use without further application with the local government. Local and state governments are directed to approve applications and permits in most cases. The new construction must comply with applicable building codes that were in effect on the later of 1/1/2008 or the date of the former dwelling's construction. For residences, the applicable building code will be the 2005 Oregon Residential Specialty Code. For commercial buildings, the applicable building code will be the 2007 OSSC/Energy Code. As part of HB 5006, the budget reconciliation bill, $10 million was directed to the Oregon Department of Energy to provide energy efficiency incentives for the same structures being rebuilt or repaired as a result of the 2020 wildfires.

- HB 3141 – Public Purpose Charge Modernization - changes many elements of the Public Purpose Charge (PPC). The PPC has funded both energy efficiency and renewable energy projects in the territories served by Oregon's two largest investor owned utilities since the passage of SB 1149 in 1999. Among the changes, HB 3141:
  - Extends the public purpose charge for 10 years, through January 1, 2036
  - Reduces the PPC from 3% of revenues to 1.5% of revenues
  - Modifies but maintains PPC support for renewable energy, low-income weatherization, low-income housing, and energy-related projects in schools
  - Moves most cost-effective energy efficiency work from the Public Purpose Charge and funds those programs through rates instead
  - Adds language in renewables section to allow PPC funds to be used for distribution system-connected technologies that support reliability, resilience, and integration of renewable energy with the distribution system, and adds this same language for self-direct large customers

  - Adds language for OPUC to set rates to collect at least $20 million a calendar year from all electric companies to go to the Oregon Housing and Community Services Low-Income Electric Bill Payment Assistance Program
  - Requires the OPUC to establish equity metrics for environmental justice for PPC programs administered by nongovernmental entities
- HB 3375 – Floating Offshore Wind Energy Study – declares a state goal to plan for the development of up to 3 GW of floating offshore wind in federal waters off Oregon's coast by 2030 and states that this planning must be conducted to maximize state benefits and minimize conflicts across ocean ecosystems and ocean users. It also calls for federal planning and permitting processes to consider the decommissioning of offshore energy facilities and related energy infrastructure after permanent end to use. The bill also directs ODOE to conduct a literature review of the benefits and challenges of integrating up to 3 GW of floating offshore wind into the electric grid by 2030. ODOE will consult with other state, regional, and national entities to gather input on the effects, including benefits, and challenges, of integrating 3 GW of floating offshore wind on reliability, state renewable energy goals, jobs, equity, and resilience. Then, the agency will hold at least two public meetings with interested stakeholders to provide a summary of findings and to gather feedback on the benefits and challenges of integrating up to 3 GW of offshore wind. Finally, HB 3375 directs ODOE to provide a summary of key findings from the literature review and consultations with stakeholders, including opportunities for future study and engagement, in a report to the Legislature by September 15, 2022.
- SB 333 – Renewable Hydrogen Study requires ODOE to conduct a study of the potential benefits of and barriers to production and use of renewable hydrogen (RH2) in Oregon. ODOE must submit the study report to the Legislative Assembly no later than September 15, 2022.
- SB 589 – Regional Transmission Organization Study requires ODOE, in consultation with the PUC, to report on benefits, opportunities, and challenges posted by the development of a Regional Transmission Organization (RTO) in this state through a literature review, advisory committee, and public meetings.

State Economic Incentive Zones

Geographically, three priority economic incentive regions have been defined and mapped in the state where development (including renewable energy) is provided additional support (**Figure 8**). Starting in 2011, 14 Rural Renewable Energy Development (RRED) Zones have been established primarily at the county level to incentivize renewable energy development within a 3-5 year time frame. Currently, 10 sites (9 counties plus the City of Pilot Rock) are designated as RRED zones (Oregon Business 2021).

Opportunity Zones consists of an entire census tract, as established for the decennial U.S. Census. Tracts vary in size but generally align with population density. Oregon has 834 census tracts, more than 300 of which were eligible by meeting the definition of a "low income community" in terms of median family incomes or poverty rates. Oregon could nominate up to 86 zones, as each state was allowed up to 25% of its low income communities for designation. The designations are in effect until December 31, 2028, and offer a predictable basis for private investment decisions over several years. Current federal law provides no means to change or add zones. These areas can deliver significant tax savings on medium-

to long-term investments in economically disadvantaged communities. This new tax incentive pertains to both the capital gains invested initially through a qualified opportunity fund (QOF), as well as future capital gains earned on the original investment in zone-based businesses or projects.

Lastly, Oregon's Enterprise Zones offer a unique resource to Oregon communities, and an excellent opportunity for businesses growing or locating in Oregon. Primarily, enterprise zones exempt businesses from local property taxes on new investments for a specified amount of time, which varies among the different zone programs. Sponsored by municipal or tribal governments, an enterprise zone typically serves as a focal point for local development efforts. There are currently 73 enterprise zones creating better opportunities for business investment across Oregon: 56 rural and 17 urban.

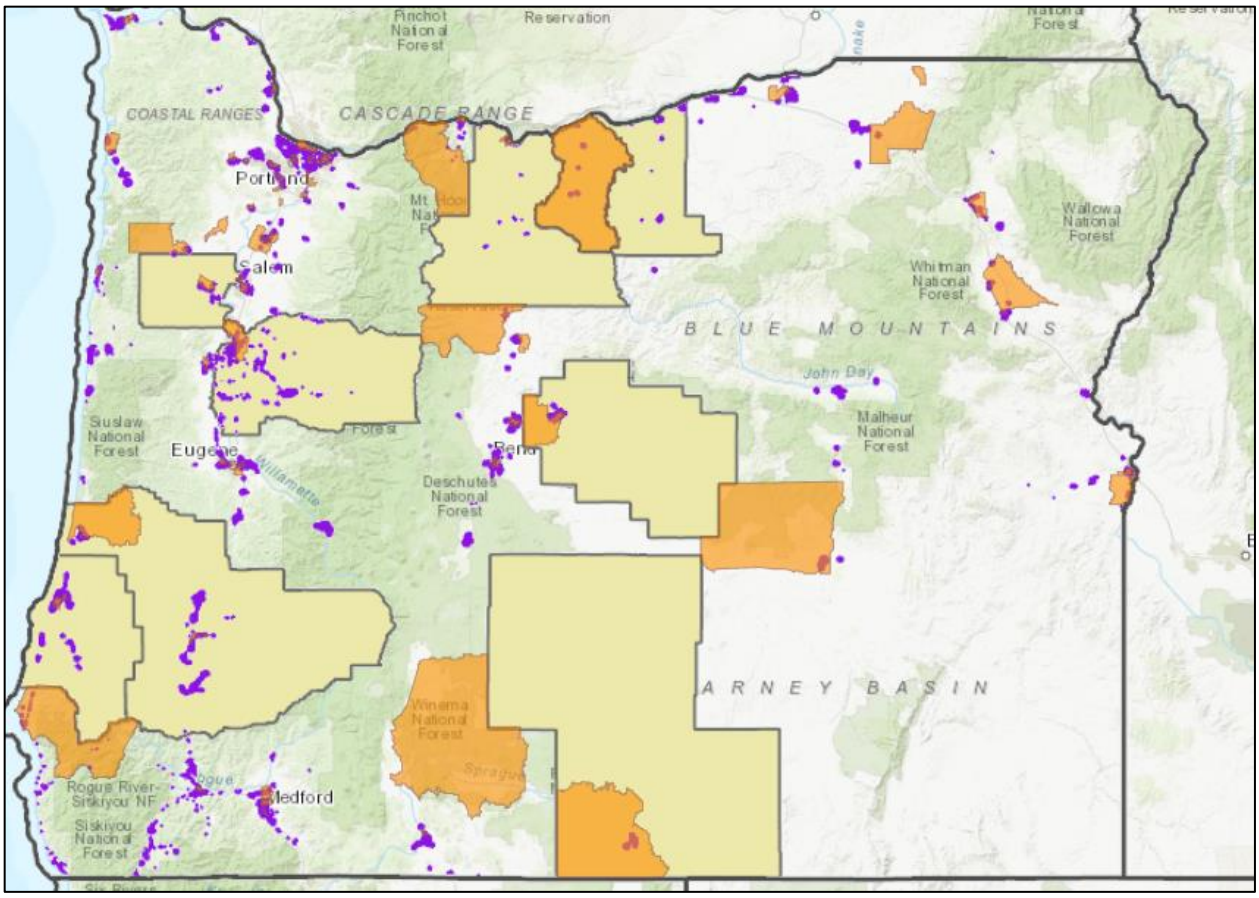


**Figure 8**. Active Rural Renewable Energy Development Zones (yellow), Oregon Opportunity Zones (orange), and Oregon Enterprise Zones (purple).

Municipal Policies

In addition to federal and state policies promoting renewable energy development, around 30 local municipalities have adopted their own climate change mitigation goals and programs. For example, the City of Portland and Multnomah County committed to 100% renewable electricity by 2035 and 100% renewable energy across all sectors by 2050. The City of Ashland offers residential and commercial users a cash rebate of $0.05/W (up to $7,500 per site) when they go solar. In Eugene, the Eugene Water and

Electric Board will pay $0.04/W to solar residential customers up to $2,500. Customers in Salem can receive a $600 rebate for the first 3kW installed solar and $300 for every additional kW up to $1,500.

## Customer Preferences

Based on recent polling, 60-79% of American's feel the country's energy supply should transition away from fossil fuels toward renewable energy alternatives (McCarthy, 2019; Tyson and Kennedy, 2020). While data shows both self-identified Democrats and Republicans support the energy transition, they differ significantly on several overarching questions. For example, there is a large divide in opinion as to whether humans are largely responsible for climate change (72% D versus 22% R) and whether climate change is impacting their own local community (83% D versus 37% R). While 65% feel government is doing too little, it breaks down quite differently between the two parties (89% D versus 35% R) with Independents largely supporting the Democratic position (Pew Research, 2020). There is also a major partisan difference as to what motivates their support for renewable energy development. Democrats are more motivated and driven to combat the impacts from climate change and Republicans are mostly driven by economic considerations (Gustafson et al., 2020). Despite the generally positive attitude toward renewable energy development, people directly impacted by utility scale solar and wind development are sometimes less enthusiastic (Seattle Times, 2021), especially as projects continue to get larger; for example, PV solar installations have increased in size by 80% between 2010 and 2019 (NREL, 2020).

## Development and Operational Costs of Renewable Energy

Of the three renewable energy types of greatest interest to the stakeholders (solar, onshore wind, and offshore wind), solar is currently the least expensive to install although onshore wind shows a slight levelized cost of electricity (LCOE) advantage (IRENA, 2020). Solar and onshore wind are increasingly the least cost energy resource for many areas, often producing electricity at lower costs compared to electricity produced from fossil fuels. Cost savings can translate to lower electric bills for customers, which is one of many motivations and benefits for advancing renewable energy development in Oregon. Between 2010 and 2019, costs for utility scale PV solar fell by 82% globally (74% in the US) largely driven by reductions in solar module prices (hard costs). There was also some increase in the PV solar capacity factor (**Figure 9**; IRENA, 2020). Capacity factor is expressed as the percentage of the annual energy output divided by the maximum output capacity. In Oregon, overall PV solar prices fell by 45% over the past five years (SEIA, 2021a).

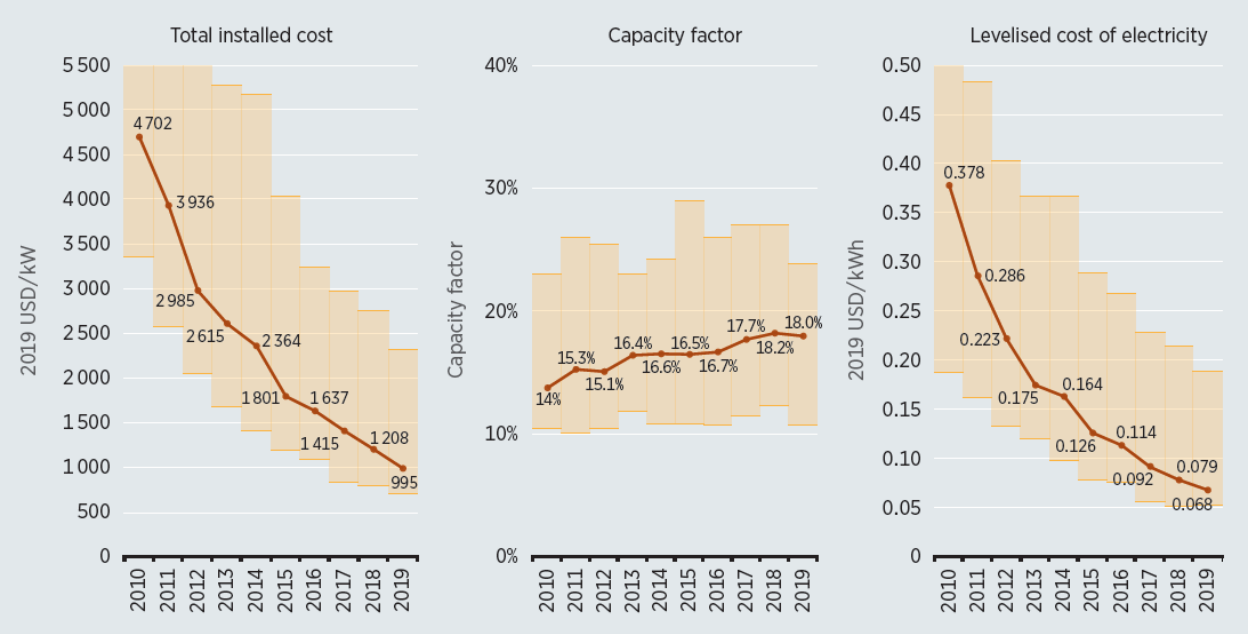


**Figure 9**. Global weighted average total installed costs, capacity factors, and levelized cost of electricity (LCOE) for PV solar from 2010 to 2019 [from IRENA, 2020].

Global costs for onshore wind fell by 39 % between 2010 and 2019 with 75% of new wind projects in 2019 showing lower LCOE costs than fossil fuel power plants (IRENA, 2020). Technology enhancements resulted in considerable improvement in capacity factor going from 27% in 2010 to 36% in 2019 (**Figure 10**; IRENA, 2020).

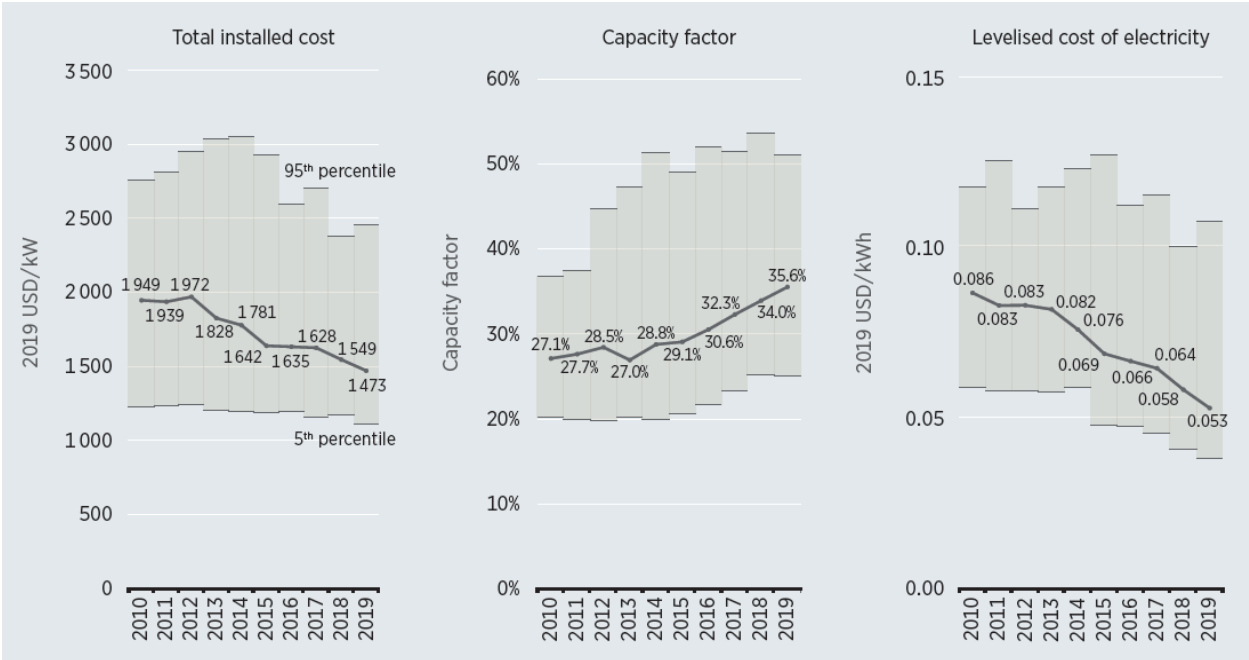


**Figure 10**. Global weighted average total installed costs, capacity factors, and levelized cost of electricity (LCOE) for onshore wind from 2010 to 2019 [from IRENA, 2020].

Compared to utility scale PV solar and onshore wind, offshore wind showed more modest declines in cost (29%) between 2010 and 2019, and it remains the most expensive of the three to deploy (**Figure 11**). It continues to grow as new market opportunities emerge. Reduced costs have been attributed to several factors, including: (1) more extensive developer experience, (2) greater product standardization, (3) manufacturing improvements, (4) regional manufacturing and service hubs, and (5) economies of scale reached (IRENA, 2020).

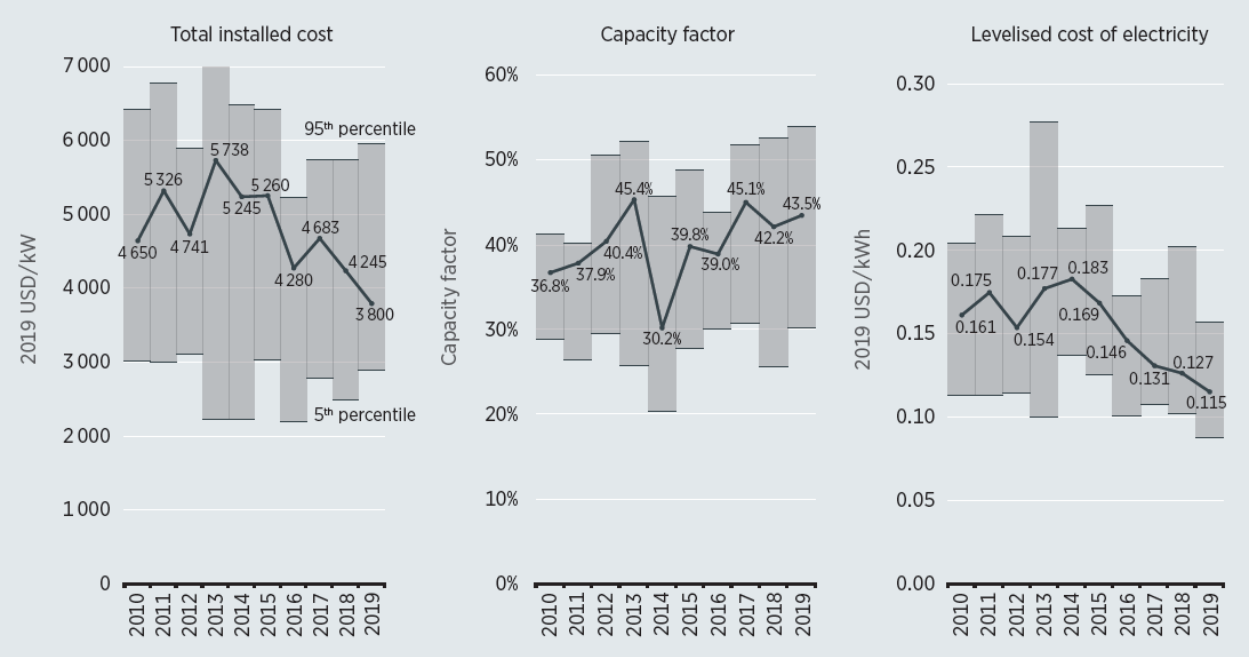


**Figure 11**. Global weighted average total installed costs, capacity factors, and levelized cost of electricity (LCOE) for offshore wind from 2010 to 2019 [from IRENA, 2020].

In spite of the significant reduction in costs to developing renewable energy, there are still large soft costs (costs other than direct construction) to renewable energy development, especially in places like the U.S. and U.K. where environmental and social policies require careful planning and siting. For example, Tegen et al. (2016) cite soft and permitting costs range for a typical 100 MW wind project in 2013 to be in the millions of dollars (**Table 3**). These costs can be reduced by a regional renewable energy planning public process by eliminating the need for repeating planning and identification for areas that could be more easily permitted (Pearce et al., 2016).

**Table 3**. Soft cost ranges associating with siting for a typical 100 MW wind project in 2013 dollars [from Tegen et al., 2016).

| Category | Low Estimate | High Estimate |
|---|---|---|
| Public Engagement | $1,319,000 | $5,581,000 |
| Wildlife | $1,623,000 | $6,697,000 |
| Radar | $30,000 | $710,000 |

## Land Utilization

Land area used for energy production is expected to continue growing into the foreseeable future. By 2040, what is sometimes referred to as 'energy sprawl' is projected to grow by 27% in the United States to meet future energy demand (EIA, 2013); an increase of as much as 50 million new acres of land directly impacted by energy development (Trainor, McDonald, and Fargione, 2016). Some of this land area will likely be dedicated to further expansion of fossil fuel extraction, such as unconventional oil and gas development, which impacted roughly 7.5 million acres between 2000 and 2012 (Alfred et al. 2015). More recently, researchers have expressed concerns over the amount of land needed to support a full renewable energy strategy (Larson et al., 2020 and Merrill, 2021), which according to some scenarios would require hundreds of millions of new acres dedicated to energy production. Although solar and wind facilities require more land area on a per-watt basis than fossil fuel alternatives, some have argued that if one considers the 'time to land use equivalency' or the entire energy life cycle, the cumulative area of land used by renewable energy would be less than the cumulative area used by fossil fuels over time (Denholm and Margolis, 2008 ; Fthenakis and Kim, 2009; Trainor, McDonald, and Fargione, 2016). For example, the land required for coal production would be equal to or exceed that of wind, solar and geothermal energy within 2–31 years (Trainor, McDonald, and Fargione, 2016). That is because once established, renewable energy facilities remain in place year after year while fossil fuel energy due to fuel extraction requires continual conversion and degradation of new areas over time.

Regardless of the mix of renewable energy sources, researching the potential to: (a) reuse already disturbed lands, (b) co-locate energy types (e.g., wind and PV solar), and (c) co-locate energy and other uses (e.g., PV solar and agriculture) is likely to provide some relief to future energy sprawl. For example, the U.S. EPA has identified approximately 130,000 contaminated sites in the country through their RE-Powering Program (https://www.epa.gov/re-powering) that have been pre-screened for renewable energy development potential. In Oregon, the RE-Powering Program has identified 5,693 solar sites, 1,462 wind sites, 5,541 geothermal sites, and 1,033 biomass sites. Kiesecker et al. (2011) estimated that a "disturbance–focused" development strategy would avert the development of 5.7 million acres of natural or working lands and Oregon was reported as one of nine states where Department of Energy projections for new wind to help meet state renewable requirements and goals could be reached on existing disturbed lands. Localized additions of storage, rooftop solar, and small wind generation would also contribute to reducing energy sprawl (Gagnon et al., 2018).

Driven in large part by the spatial and temporal variability of different renewable energy sources (e.g., wind and solar), a growing body of research (especially over the last five years) is being conducted to explore the effectiveness of co-locating different renewable energy types (including storage) at the same location (Jurasz et al., 2020), which could also play an important role at reducing energy sprawl, especially in locations where land is already limiting (IPPC, 2011). Optimization of these hybrid solutions is a topic of great interest in terms of reducing construction and operational costs and lowering storage capacity (Jurasz et al., 2020). Focusing on a west Texas study area, Siochani and Denholm (2012) demonstrated that co-locating solar and wind improved the overall capacity factor of the combined

plant and its associated transmission. A variety of statistical methods and various indices have been developed and applied to a range of hybrid combinations, especially wind/solar/hydro combinations. With the help of these optimization analytical techniques, novel synergies are now being explored in use cases from all over the world and yielding some success (Sreeraj et al., 2010).

Exploring energy solutions that co-locate with compatible land uses has been underway for some time and gaining momentum. For example, research on co-locating agriculture and renewable energy, especially solar, is rapidly growing the in literature. Using a simulation model, Dinesh and Pearce (2015) showed that the value of solar generated electricity coupled to shade-tolerant crop production created economic value of over 30% compared to conventional agriculture. A recent two-year Oregon State University study found that co-locating sheep production with PV solar found lower forage biomass under solar panels was offset by higher forage quality resulting in similar lamb production as seen in open grazing (Andrew et al., 2021). At the Eagle Point Solar Plant in Rogue Valley, Oregon, the impact on pollinators from co-locating solar and agriculture was examined. Researchers found that floral abundance increased and bloom timing was delayed in the partial shade plots, which benefits late-season foragers in water-limited systems. The study demonstrated that pollinators will use habitat under solar arrays, despite variations in community structure across all shade gradients (Graham et al., 2021). These types of solutions help support non-traditional energy generation benefiting local communities in multiple ways (see Local Solar Roadmap).

## Environmental Impacts from Renewable Energy

There are many environmental benefits of renewable energy compared to fossil fuel sources – most importantly the reduction of greenhouse gases, but there are other benefits including air quality improvements and reduced impacts on water quality. Of course, all development has impacts and renewable energy is no exception.

First, there is the conversion of natural and working lands, which is a serious concern based on estimates described in the previous section. Some have expressed concern that the need and desire for a rapid transition to renewable energy sources will threaten important biodiversity hotspot areas undermining the ecological integrity of these critically important areas (Rehbein et al., 2020).

From the standpoint of solar development, research is somewhat scarce on the impacts of these facilities on wildlife. Most existing studies fall under three main categories: (1) impacts from exclusionary fencing; (2) habitat destruction or degradation; and (3) direct mortality (Chock et al., 2021). Behavioral responses to projects are of particular interest as the nature of these impacts may be far reaching and severe, but they are more challenging to evaluate. Solar facilities have the potential to deter, attract, or be imperceptible to wildlife species and each of these outcomes could have negative impacts on populations (Smith and Dwyer, 2016). And we do not fully understand how wildlife species perceive solar facilities and their ability to adapt to these structures. Key research areas pertaining to animal behavior and solar developments fall under three themes: (1) perception of solar facilities, (2)

habitat use in and around developments, and (3) other population fitness issues such as foraging, predation, and reproduction.

Impacts on migratory species are of particular interest as they are the species where threat from large solar and wind facilities is most acute due to repeated mortality of populations as they encounter these areas on a seasonal basis. Solar developments can alter land animal migration routes such as mule deer (*Odocoileus hemionus*) (Sawyer et al., 2009). Migratory bird species can suffer high mortality from solar facilities, especially when the developments are in migration pathways or are near breeding or wintering grounds (Walston et al., 2016). In some cases, especially in arid environments, migratory waterfowl mistake solar fields as waterbodies. This 'lake effect' problem can injure, strand, or kill birds (Kagan et al., 2014).

Wildlife impacts by wind developments has been more heavily studied; the number of peer-reviewed publications has increased tenfold since 2000 (May et al., 2017). Direct collision and barotrauma of birds and bats has been the focus of most assessments although other impacts are notable such as impacts from habitat fragmentation, where the amount of land impacted by roads and other infrastructure is 96X greater than the actual footprints of the turbines (Merrill, 2021). A large number of bird taxa are negatively impacted by wind facilities, especially when the facilities are located along migratory pathways (Wang et al., 2015) and when they are located in prime foraging areas (Katzner et al., 2012). Larger birds of prey (i.e., eagles, condors, hawks, falcons, kites, and owls) are of particular concern. The U.S. Fish and Wildlife Service estimates overall bird mortality from wind facilities range from 140,000 to 500,000 birds each year. Bat mortalities are another concern, with wind facilities accounting for an estimated range of 800,000 deaths annually, which is one of the leading causes of bat mortality in many areas. This is raising considerable concern about population-level impacts (Frick et al., 2010). Bat mortality tends to be greatest in regions with deciduous forests as the dominant land cover and where bat species diversity and abundance is high, and least in more arid regions (Arnett and Baerwald, 2013).

As more practical research is carried out, solutions are being sought to reduce bird and bat mortality. For example, May et al. (2020) discovered that by painting at least one wind turbine rotor blade black, avian mortality was reduced by over 70%. In Spain, Pescador et al. (2019) found kestrel mortality dropped from 75-100% when the areas immediately surrounding turbines were tilled. Another important aspect of managing energy development conflicts with wildlife is the need for standardized pre- and post-development monitoring. In a major renewable energy project review, Conkling et al. (2020) found that only 22% of the 628 projects examined provided both pre- and post-monitoring survey data and only 29% used an experimental design of any kind. Faster progress and better outcomes would be realized if monitoring best practices were applied more broadly.

## Local Economic Benefits

According to American Clean Power (2021), 14% of all electricity produced in Oregon comes from wind, solar, and energy storage power plants ranking Oregon 16th in the nation for non-hydro renewable power. Renewable energy development is associated with a variety of local benefits. Currently, jobs

from the clean power industry are estimated to be around 4,400 and these numbers are projected to grow in the coming years with many of them coming to rural communities. Renewable energy projects provide financial returns to local land owners; for example, the drought-proof land lease payments in 2020 totaled nearly $28 million (American Clean Power, 2021).

Utility scale renewable energy projects generate considerable public revenues that are used to fund services to these counties. Total direct payments to counties and taxing districts in 2017-2018 were over $31.75 million; largely concentrated (93%) in five counties, including Sherman, Gilliam, Umatilla, Morrow, and Malheur (Blumenstein and Schlusser, 2019). Revenues are based on wind in these counties with the exception of Malheur County, which is largely driven by a large geothermal project (Neal Hot Springs Phase 1). Another 12 counties in the state reported public revenues (**Figure 12**).

## Summary of Stakeholder Inputs

Three open-ended survey questions (Q 11, Q12, and Q16) asked stakeholders to provide more detailed insights on renewable energy development opportunities and constraints.

Q #11: What are the characteristics or conditions that lead to land use compatibility (opportunities) with renewable energy development? Please list.
Q #12: What are the characteristics or conditions that lead to land or ocean use challenges with renewable energy development? Please list.
Q #16: Is there anything else you would like to share related to the overall ORESA Project or the Natural Resources, Environment, and Development: Opportunities and Constraints Assessment?
Write-in responses are provided in **Appendix D**. Below is a high-level synopsis.

In addition to the 82 online survey responses, we conducted 23 one-on-one interviews in order to obtain deeper insights into the views from individual stakeholders representing different sectors. Many of the renewable energy opportunities and conditions described in the previous background section were acknowledged in one form or another. However, in almost every case, stakeholders concentrated more on constraints that, if addressed, could greatly improve and streamline renewable energy development in the state.

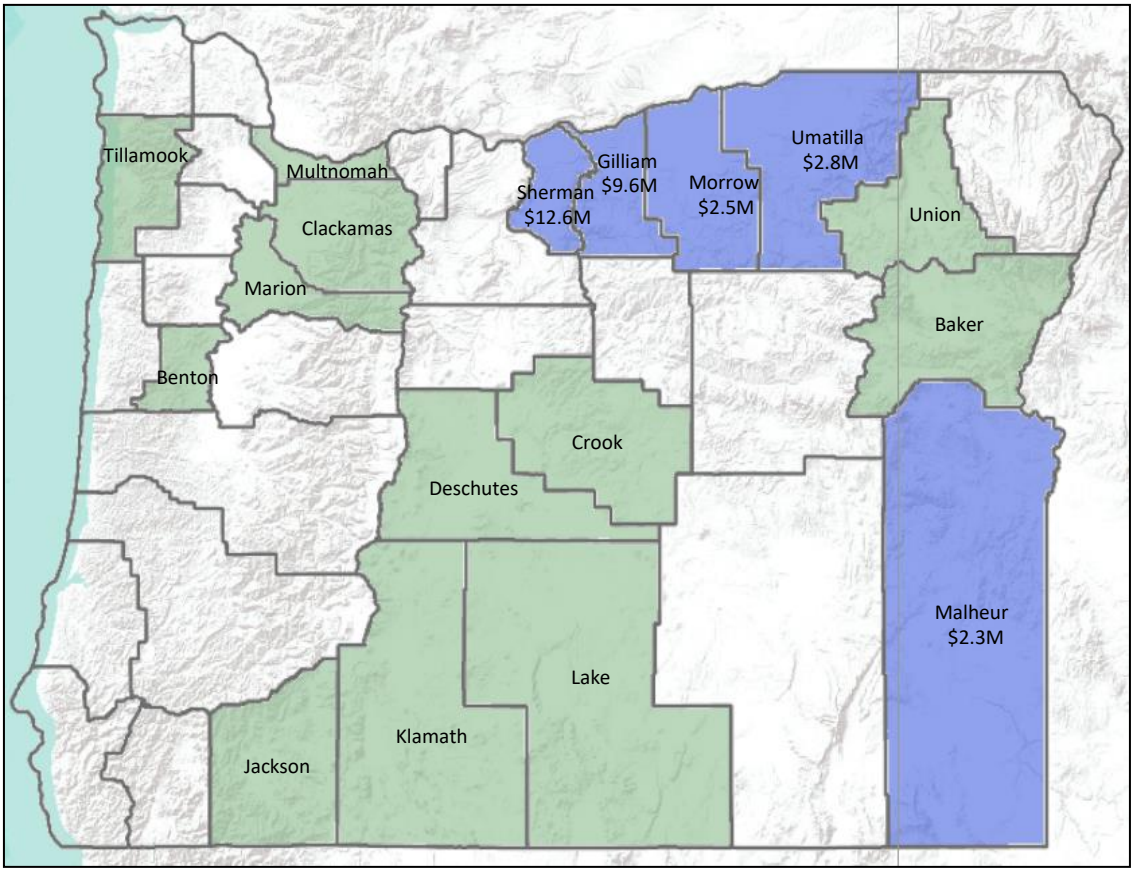


**Figure 12**. Top tax revenue generating counties in 2017-2018 (top 5 highlighted in blue) from renewable energy installations in the state. Based on information from Blumenstein and Schlusser (2019).

## Need for a Comprehensive Planning Approach

Based on the response to the online survey, one-on-one interviews, and data review webinars, there is considerable interest in advancing renewable energy development in the state. As one might expect, there are various reasons for the excitement; some are most interested in combating climate change; others are most interested in the emerging economic opportunities. Regardless of the motivation, there seems to be universal recognition that speed is of the essence (with some exceptions for specific cases). Stakeholders also understand that renewable energy development is not without social and environmental impacts and steps should be taken to minimize them.

One universal theme we heard again and again was the need for a comprehensive approach to include all renewable energy types at all scales. Stakeholders understood the emphasis on utility scale, but were quick to point out that focusing on utility scale alone would be insufficient to meet the state's energy goals, especially when it comes to long-term resilience.

Oregon's energy sector is particularly vulnerable to threats from the natural world, including earthquakes, extreme weather events, and the impacts of climate change. The impacts of climate change are projected to cause increasingly frequent extreme weather events and more extensive wildfires. Also, there is the ever-present danger of large earthquakes. However, it was pointed out that we know very little about the nature, extent, and patterns of this vulnerability to Oregon's energy supply. A better understanding of this vulnerability in space and time would be needed to be better prepared for the future. A deeper understanding of these vulnerabilities could lead to planning a more resilient energy infrastructure. ODOE is engaged in developing a climate vulnerability assessment to address these vulnerabilities in order to build a more resilient energy system. ODOE has also developed a guidebook for consumer owned utilities to help promote local energy resilience, which will contribute to an effective state-wide energy strategy. Several respondents to the survey and the one-on-one interviews recommended a rigorous, multi-disciplinary study on the role and feasibility of distributed energy development and infrastructure with regard to energy resilience in Oregon. This is even more critical at this juncture as Oregon drives toward the RPS mandate to have 50% of retail electricity supplied by renewable energy by 2040. Many expressed concern that government leadership would focus only on utility scale and miss the opportunity to address the issue comprehensively that many people believe is absolutely essential. For example, respondents wanted to see more attention paid to integrating distributed energy solutions at the local level with utility scale. Many individuals we spoke with expressed concern that promoting energy development in traditional ways will not lead to the best outcomes with regard to energy resilience, affordability, local economic benefits, and environmental impacts.

## Need for Better Cooperation and Coordination

Many stakeholders expressed the importance of better cooperation and coordination between local, state, and federal government agencies. Government coordination and cooperation was particularly important to local government staffs who often feel at odds with their state and federal counterparts. Local government welcomes the help from state and federal agencies in terms of overarching guidance and data support, but they become frustrated or even resentful when their decision making is interfered with or superseded by higher levels of government. Adaptive planning and siting is an important concept that requires high levels of collaboration and communication between all parties. This is particularly true between government agencies as they provide the leadership and policy foundation upon which everything else depends. If agencies get out of synch with one another or find themselves at cross purposes, the ability of the state to achieve its renewable energy goals can be seriously undermined. Behaviors such as providing inconsistent or contradictory guidance, abruptly changing regulatory practices, interfering with another's jurisdiction, and changing internal policies unilaterally without adequate notification were reported by stakeholders and these can lead to tremendous inefficiencies and conflicts, which then cascades to all interested parties outside of government eroding confidence in the entire process.

Findings from the companion Military Needs and Interest Assessment emphasize the importance of coordination between government agencies and industry as well. They listed four recommendations that are written from the standpoint of the military's interaction with other agencies. These can easily be generalized to include all government-to-government interaction and to some extent beyond government.

- Communicate project details with the military early in the conceptual phases of a proposal (energy or transmission) and maintain the lines of communication throughout the process.
- Be consistent in communications with all entities.
- Each stakeholder group (local government, project developer, military, etc.) should provide one point of contact for project communications.
- Stakeholders need to provide timely and clear information regarding potential impacts to their missions.

## Desire for a Better Public Process

Numerous studies from all over the world emphasize the importance of multicriteria renewable energy planning usually supported by various modeling approaches and often support the need for inclusive public participation. Sometimes the tools have been the primary evaluation focus (Cormio et al. 2003; Kaya and Kahraman, 2010; Demirtas, 2013), but more frequently articles emphasize the importance of stakeholder participation. Polatidis et al. (2006) focused on southern Europe and reviewed different modeling approaches, but in their study they report on the importance of stakeholder participation. Higgs et al. (2008) reported on using multicriteria analysis with public input to plan renewable energy in the UK. Terrados et al. (2007) emphasized the importance of participatory approaches to renewable energy planning in rural Spain. Pearce et al. (2016) demonstrated the effectiveness of multi-stakeholders, multi-criteria planning in central California supported by EEMS software (Sheehan and Gough, 2016). Hernandez et al. (2014), in their review of solar development challenges and major research needs, highlighted the need for multidisciplinary approaches, multiple perspectives, and collaboration to achieve success.

It was clear from our outreach that renewable energy planning in Oregon is being met with considerable excitement and optimism by many, but some anxiety and fear persists. Results from past processes have created heightened levels of distrust among various stakeholders. In their minds, the outcome from a typical government planning approach is often perceived as a fait du complet and that their solicited participation is disingenuous. Some stakeholders reported feeling disrespected from the outset, which will now require consistent and thoughtful engagement to reverse this sentiment. This social background, especially in some areas of the state, makes streamlined planning now required to meet the demand for rapid decarbonization particularly challenging. As one reviewer put it, embracing a "test, monitor, adapt" approach would be more effective than the more typical "design, build, defend" approach. Unfortunately, the "test, monitor, adapt" strategy can be slow; probably too slow to meet the current climate adaptation challenge and current policy goals. Perhaps a hybrid approach – "design, build, monitor, adapt" – might produce the best results as long as all interested parties were involved

throughout the entire process. Exclusion breeds distrust, which leads to lawsuits, which leads to delays and cancellations.

There is no single remedy to overcome social tensions, but there are some steps leadership can take that we heard from stakeholders (distilled in the list below) that could increase the probability of more successful outcomes going forward.

1. Design and communicate a clear government initiated process that includes meaningful, ongoing stakeholder engagement.
2. Better outcomes are more likely if the issue of renewable energy development is addressed in the most comprehensive way possible. Isolating different technologies in different geographies without the cohesion of an overarching plan that clearly articulates how all of the components work together could result in unforeseen incompatibilities or conflicts.
3. Engage all interested parties as early and as often as possible while creating an atmosphere of collaboration over confrontation. Everyone is welcome provided their participation does not obstruct the process.
4. Develop and maintain high quality data and information needed for planning, implementation, and monitoring (This should not be a government only activity; include stakeholders whenever possible).
5. Provide as much transparency in the data and planning process as possible while honoring privacy when needed.

To help inform potential opportunities and constraints in statewide and local spatial planning exercises, several stakeholders referenced “Smart from the Start”. Smart from the Start provides the opportunity for stakeholders to actively participate in the planning of renewable energy in the state and their local communities. The non-regulatory planning process would identify locations and activities that could then be greatly streamlined for development through more effective incentives and reduction of legal objections (see Kelly and Delfino, 2012).

A coalition of conservation NGOs developed guidelines called Smart from the Start Renewable Energy Development in Oregon and published ten key recommendations.

1. We must take action to combat climate change threats to Oregon’s lands, waters, wildlife and people.
2. Oregon must expeditiously transition to a clean energy economy to help mitigate and adapt to climate change impacts.
3. Development of renewable energy resources in Oregon must adopt “Smart from the Start” planning, construction and operation to avoid, minimize and mitigate for impacts on wildlife, agriculture, and other public values.
4. Smart from the start renewable energy planning and development can support both economic growth and environmental protection in Oregon.

5. Develop state-wide renewable energy siting guidelines and planning tools to guide renewable energy toward low conflict sites.
6. Understand resource conflicts and identify "low conflict" areas appropriate for renewable energy development and those with significant environmental, agricultural or public values where development is inappropriate.
7. Provide incentives for development in areas identified as low conflict for renewable energy development.
8. Adopt new policies that generate new revenue for mitigating harmful impacts from renewable energy development.
9. Identify and implement reforms needed to increase the efficiency of the permitting process while maintaining transparency and accountability.
10. Apply state wildlife and mitigation standards for all renewable energy projects in the state.

This coalition, which comprised 1000 Friends of Oregon, Defenders of Wildlife, Friends of the Columbia Gorge, Greater Hells Canyon Council, Klamath-Siskiyou Wildlands Center, Natural Resources Defense Council, Oregon Natural Desert Association, Oregon Wild, Portland Audubon, and Sierra Club - Oregon feels there is limited information available to guide strategic planning of wind and solar energy development while conserving important natural resources and wildlife. In the absence of information and renewable energy siting principles and policies, they believe Oregon will struggle to meet its clean energy goals while also putting its conservation heritage at risk. The lack of clear policies has also led to growing community opposition to renewable energy development.

They also believe that the conservation community, renewable energy industry, and local stakeholders can overcome this challenge by working collaboratively to develop a framework for how Oregon can achieve its renewable energy goal responsibly for wildlife and local communities. This approach has proven to be successful in other parts of the country and has helped to avoid, minimize and mitigate for impacts on other land uses and natural systems (see Pearce et al. 2014).

Their goal through this collaborative partnership is more of a regional planning effort that provides important context to site-level considerations in different parts of the state. The effort would also establish a voluntary list of specific state-wide siting guidelines and best practices for renewable energy informed by the Smart from the Start approach. The voluntary guidelines will include best practices for siting, developing, and operating projects throughout their lifecycle and will be critical for conserving and protecting Oregon's natural resources while promoting renewable energy.

## Tribal Concerns

Tribes are an important constituency in planning the future of renewable energy in Oregon and the adjacent ocean. Based on the reviews by tribal members, a number of imperatives were communicated to the eam. First, it is important to check-in with tribal representatives as early as possible in any planning process that might include their interests. They also emphasized the need for regular check-in

points to minimize challenges. If consultation with affected Tribes occurs late in a process, challenges are more likely to develop.

Tribal stakeholders pointed out that there is a lack of thorough knowledge regarding cultural resources, and that more effort must be dedicated to filling existing gaps. All too often it is presumed by agencies that Tribal concerns over cultural resources are relegated to 'stones and bones', which implies Tribes have not contributed to life and the landscape continuously including the historic and modern eras. Agencies are encouraged to look beyond important historical artifacts and consider modern day cultural and religious practices that are tied to the land and water. A remaining challenge with regard to the spatial data needed to help take many Tribal concerns into account in renewable energy planning is how to best include them without jeopardizing data and information misuse (see suggestions under the INR tool section of this report).

A guidance document for characterizing tribal cultural landscapes was prepared under a BOEM Interagency Agreement by BOEM, NOAA, Makah Tribe, Confederated Tribes of Grand Ronde, Yurok Tribe, and the National Marine Sanctuary Foundation (BOEM, 2015). In addition, the West Coast Ocean Tribal Caucus (2020) produced a guidance report on effective tribal consultation.

Lastly, there are nine federally recognized Tribes in Oregon and most have overlapping interests; however, it is important for government to not treat them as a group alone, but work with each one individually. The Legislative Commission on Indian Services provides information on tribal entities that should be contacted under different circumstances (https://www.oregonlegislature.gov/cis).

## Specific Comments by Energy Source

### Solar

Survey respondents overwhelmingly chose solar energy as the renewable energy source of greatest interest. But in the minds of many, there seems to be an assumption that large scale solar comprises the only optimal scenario to get to the state's renewable energy goals. Many stakeholders believe there needs to be an ongoing discussion about creating comprehensive energy resiliency, which includes the integration of many different renewable energy sources, including centralized and decentralized implementation strategies along with microgrids and storage resources. The three scale levels that were discussed by several stakeholders included large utility scale, community solar, and behind the meter.
All solar reviewers and discussions regarding solar energy pertained to pv solar; there was no mention of solar thermal plants, which would require additional review beyond glint/glare with regards to potential impact on military operations as well as significant environmental impacts as documented from existing facilities (e.g., Ivanpah in southern California). Solar thermal has been so controversial that California is no longer permitting these types of facilities. With regard to pv solar facilities, there are three main potential conflicts repeatedly mentioned by stakeholders with regard to solar energy.

1. Compatibility with Agriculture
   Many stakeholders recognize that some farmers and ranchers see potential for revenue diversification via solar development, but they expressed the point of view that most of these opportunities on private agricultural land should be limited to community scale or behind the meter operations and should not be permitted on irrigated farmland since these lands are limited in the state (2.6%) but account for 40% of farm revenue. Large scale solar facilities on agricultural lands fragment these rural properties making them more difficult to manage (especially in the eastern region) and inflate neighboring land values. Some expressed interest in exploring co-locating solar development with some agricultural practices (agrivoltaics), but respondents report that Oregon land use laws pose a significant hurdle to explore win-win benefits.

2. Competition with Valuable Industrial/Commercial Sites
   Particularly in counties with high levels of federal land where permitting can be more cumbersome, utility scale solar development can apply unwanted pressure on local officials who need to maximize local economic opportunities with limited private land in and around existing municipalities. Some local planners expressed the view that solar infrastructure should not be permitted in industrial zones within urban growth boundaries (UGB), but outside of these growth boundaries on land that does not have other constraints. Converting the limited industrial land to land-intensive solar arrays within the UGB reduces the potential to attract other energy consuming and employment generating industries. Currently, permitting solar on industrial land is relatively easy, but some feel it is counter-productive in the long run as these lands should be developed in other ways that provide more local jobs and tax revenue.

3. Degradation of Biological and Cultural Values
   Even though the rapid development of renewable energy is broadly viewed as a social imperative, it is also widely recognized that renewable energy development is not totally benign, and if handled carelessly, can create significant negative environmental impacts. Therefore, many stakeholders are concerned about the impact of utility scale solar on local and regional biological and cultural values and want to assure these values are minimally compromised. This requires high quality data and information and a commitment to learn as much as we can over time and adapt as necessary.

## Wind

Based on numerous conversations with stakeholders, wind energy is by far the most controversial renewable energy type and is involved in the two most sensitive renewable energy development regions in the state – Columbia River Plateau and offshore.

From the military perspective, wind facilities can impact military missions by:

- creating sizeable avoidance areas for low flying aircraft;
- impacting airborne radar systems by causing false returns (via Doppler shift);
- affecting weapons and communication systems due to electromagnetic (EM) interference;
- impacting night vision training due to tower lighting

Wind turbines must be in the line of sight to impact radar operations under most conditions, but there are situations where turbines can cause problems even if they are out of line of sight. Instrumentation radars and radar cross section measurement systems may be prone to interference.

Based on the number of survey responses, number of webinar attendees, and requests for one-on-one interviews, offshore renewable energy development (especially wind) is a region of extreme interest and controversy. Based on the many comments received, the most important step leadership can take is to manage direct public involvement in any process going forward and try to look at the issue as holistically as possible, including issues like stable job creation, shore infrastructure support, fishing industry cooperation/collaboration, and natural resource protection. The level of anxiety is very high especially with the fishing industry that shows fear of displacement and further economic decline from the emerging renewable energy market. Several stakeholders expressed concern about over-dependence on inland energy sources making them very vulnerable to disruptions caused by forest fires, weather events, and earthquakes. An open, ongoing respectful dialog with all interested stakeholders is difficult but the only winning strategy according to many stakeholder respondents. Of all the discussions and responses we received, offshore wind was the only one that stakeholders expressed the need to go very slow. Of course, this runs counter to the need for rapid decarbonization.

## Small Hydro

Small hydro was the third most popular renewable energy source highlighted by survey respondents and should be included in Oregon's ongoing energy plan. Small hydro was described on several one-on-one calls in two ways: pressurized piped irrigation, which is growing in popularity, and along open irrigation canals. Upgrading Oregon's irrigation infrastructure conserves water, reduces expenses, improves habitat, and can be renewable energy enabled. Stakeholders we spoke to would like to see more investment in this renewable energy source. Many felt that allowing more electric cooperatives to enter the RE development and generation market would provide an impetus for small and medium renewable energy players. Some stakeholders felt that the big utilities such as PacifiCorp constrain the formation of local cooperatives, which are more interested in distributed energy generation strategies compared to large utility companies. ODFW representatives mentioned that small hydro on canals must be cognizant of aquatic species of concern and listed species in certain areas.

## Biomass

Approximately 35% of the survey respondents noted biomass as a renewable energy source of interest. However, federal law prevents use of federal forests as feedstock for the most part. With large federal land holdings in Oregon, forest biomass availability is severely limited without policy changes at the federal level. Response to ongoing wildfire management may impact opportunities in the future, but a strict, well-regulated system will need to be put in place to avoid potential abuses and unwanted damage to the forest environment. In some instances, mitigation measures may be warranted.

It was also pointed out by one reviewer that woody biomass to biofuels is far more efficient than woody biomass to electricity as costs per kwh are too high compared to other renewable sources. For example, the Red Rock Biofuels Project in Lake County is planned to convert biomass from private forests within a 100 mile radius of the plant in Lakeview, Oregon to produce jet fuel, naphtha, and biodiesel. The byproduct of the process is biochar, which can be used as a soil amendment that increases soil productivity and also serves as long term soil carbon storage.

## Geothermal

Geothermal energy came up minimally in the survey responses and in one-on-one interviews, but geothermal does contribute to the overall statewide strategy. It is limited in geographic distribution in the state (existing developments in Lake, Klamath, and Malheur counties) and requires extensive infrastructure to bring the energy to customers, which poses significant constraints. In spite of these shortcomings, some see geothermal as an important underdeveloped resource.

## Wave

The most noted renewable energy type highlighted under the “other” category. This technology was not described as a major utility scale source of renewable energy, but an interesting option for local energy generation. It is generally seen as having direct local economic and environmental benefits alternative to utility scale offshore wind, but it is not without its skeptics. A story was conveyed that about eight years ago there was considerable enthusiasm for exploring wave energy off the Oregon coast. It was reported to us that the device developed off of Swan Island by Ocean Power Technologies was never deployed after a $10 million federal/state investment. In spite of this failure, several stakeholders felt that the state should not give up on wave energy as it could serve an important energy resilience role for coastal communities. Including wave technology in a more comprehensive energy planning discussion along the Oregon coast could also provide additional social benefits.

## Transmission and Storage

When developing a comprehensive renewable energy plan for the state, transmission is a major consideration, potentially it’s Achilles’ heel for future project implementation. Stakeholders expressed interest in comprehensive inclusion of microgrids into the larger transmission environment, but they felt

utilities are normally proprietary about the grid and are not incentivized to support microgrids. An example success story was described where federal American Educational Research Administration (AERA) funding was used to promote grids/microgrids in South Salem. More of these types of efforts would help Oregon meet its renewable energy goals. They also expressed interest in participating in the planning of transmission go/no go areas as long as there would be no direct impact on critical locations.

A few respondents spoke about Section 368, which is a congressionally mandated transmission planning process. In accordance with Section 368(a) of the Energy Policy Act of 2005, the BLM designated 5,000 miles of energy corridors (commonly referred to as "Section 368 energy corridors" or "West-wide energy corridors") for potential placement of future oil, gas, and hydrogen pipelines and electricity transmission and distribution infrastructure. Based on sensitive wildlife habitat, there are apparently two corridors of concern in Oregon - Corridor 230-248 (Warm Springs corridor) and corridor 7-24 (Southwest Oregon connector). Better alignment of these new transmission routes was focused on avoiding areas sensitive to wildlife. The BLM planning process is generally consistent with state policy and is coordinated through the Governor's office. However, it was mentioned that the state needs to reach out to BLM more regularly on planning processes to ensure alignment in planning.

Transmission concerns in the survey related to environmental impacts of new transmission routes, lack of transmission system overlay with viable siting especially on private lands. Commenters also characterized the utility interconnection process to be unnecessarily cumbersome and financially burdensome even for very small renewable energy projects.

According to the companion ESS assessment, transmission lines and towers impact military training similar to wind turbines. Transmission lines and towers need to be avoided by low flying aircraft; can impact range systems; and can interfere with electronic warfare testing.

The need for improved transparency regarding transmission capacity was also suggested. The current way information is provided to users results in inefficiencies. For example, some reported that capacity information is sometimes tied up by projects that are never built. One reviewer shared a story of how a community solar project (2-3 MW) was stymied by the lack of proper transmission capacity.

It was also pointed out that substations serve as the actual pinch points even if transmission line capacity is available for a renewable energy project. Therefore, new construction of substations or energy storage facilities is needed for distributed renewable energy development in many locations.

Energy storage was not heavily commented on. Nonetheless, some stakeholders outlined its importance. One of the more promising examples came from using pumped storage such as the Swan Lake project in Klamath County, which would pump water to an elevated reservoir during low energy demand and high energy generation, and release water to run turbines during high demand when generation of renewable energy is low. In this case, it took 10 years to get all the necessary paperwork

completed and the project is expected to start in 2022. The arduous and time consuming nature of the permitting process expressed in this and other stories shared by stakeholders highlights the need for the effective integration of new policy and a more inclusive, ongoing public process. In the case of the Swan Lake project, delays resulted from actions by neighboring landowners who objected to having transmission lines running across or near their property and from local Tribes who were concerned about cultural resources. Inclusive planning could have reduced the conflict and significantly shortened the permitting process.

## Military Roundtable Webinar

On May 26, a 90-minute roundtable discussion was held between 31 stakeholders from federal, state, and local government, utilities, developers, and the military. The discussion was built around three main renewable energy development topics: (1) scoping and planning, (2) project coordination, and (3) stakeholder outreach. The objective of the discussion was to hear directly from the attending stakeholders in the group setting about their experiences and suggestions for improvement.

For the first discussion topic (scoping and planning), we asked the group two questions.

1. What are the biggest renewable energy scoping and planning challenges you encounter now?
2. Which steps in the process are most challenging and do you have suggestions to help address them?

Current Oregon regulation requires FAA notification for any structure over 200 feet in height. However, for various military training, operating and testing areas, impacts can occur starting at surface resulting in a significant hazard. Lack of early notification and information about the geographic location of proposals (communication towers, MET towers, solar facilities, wind towers, and transmission infrastructure) is a recognized problem. Early coordination with the military through the NW DoD Regional Coordination Team would be preferred to assure safety and avoid delays in the siting process for such projects. There is currently a need for a centralized, standardized, editable database of tower locations within and around MTRs in Oregon.

Idaho has legislation that requires developers to notify any tower built below 200 feet, and it was suggested that Oregon also consider such legislation. A new statute could specify a centralized database where developers and planners are required to upload plans for structures in and under military assets with specific structural details (including height and safety features). Such a standardized database will address the current variability in GIS capacities and standards among different entities. DLCD suggested that it might be possible develop a county-based inventory of MET towers based on the information that planners have submitted. The Oregon Department of Aviation sometimes only hears of towers or wind turbines only after the information is filed with the FAA. They would prefer that they are notified early in the process before the formal FAA filing.

The second discussion topic focused on project coordination, and we posed three questions to the group.

1. What is your experience in the coordination between military, energy, and land use?
2. What tools worked well in project coordination?
3. What is missing in project coordination that could lead to greater success?

The military including NORAD would prefer that there is early coordination during the early consultation phase with developers in the planning process of structures that have the potential to obstruct or impact into military training, testing, and operating areas. The process is initiated through coordination with the local military rep that can guide the developer through the early consolation phase including review of the project and discussion of any necessary mitigation. The local rep will also work with the developer through the informal and formal review processes, as applicable.

The FAA has a tool to use to determine if a notice is required to the FAA. If over 199 feet, then notice is automatic though not early. A tool exists used to manage this process where developers enter the location and height of a proposed structure. See - https://oeaaa.faa.gov/oeaaa/external/gisTools/gisAction.jsp?action=showNoNoticeRequiredToolForm.

An important point was added that it is NOT just about maintaining a GIS dataset about the physical location of tall structures, met towers, and solar projects. An important addition to a sharing platform housing this data is information about what agency or entity should be notified or involved in some way. This important aspect of attribution may be relevant to other scoping and planning data.

HB 2329, which was effective JAN 1, 2020, requires counties to provide the military with notification of applications for larger wind and solar projects submitted for their review. Some counties, like Morrow County, already require notification at the re-application phase. Early coordination with the military and other parties is extremely important in avoiding delays and other conflicts. A repeated theme throughout the discussion was the need for early and often communication. Providing the means for participants to become more proactive is a highly desirable goal for the renewable energy development community to pursue.

The third discussion topic pertained to stakeholder outreach. We asked the group three questions.

1. Who are your stakeholders, what makes for successful stakeholder outreach?
2. What are the biggest challenges?
3. What is missing and where can adjustments yield better outcomes?

While wind has been one of the dominant renewable energy types in Oregon, PV solar is expected to become a much bigger player in the state.

From an aviation perspective, solar facilities can cause glint and glare that may interfere with pilot navigation. Notification of solar facilities is important to assess if there is glint and glare that the pilot needs to be aware of while flying within low altitude training areas. In most cases through notification and review of a glint/glare analysis related to the military utilized airspace, pilots can mitigate the impacts. Airport control towers do not want a fixed glare, and taking the necessary mitigation measures is advised. There is proprietary software that helps developers estimate the glint and glare of solar panels.

The stakeholders of the Oregon Department of Aviation are primarily the civilians associated with flying planes. They need to be notified if there are structures over 600 feet. They are not concerned with structures below 600 feet as the military is for the MTRs, Special Use Airspace (SUAs), and radar line of sight.

HB 2021sets up a community renewable energy investment fund to provide grants to small community renewable energy projects of < 20 MW. It also potentially earmarks $50 million in grants for community renewable energy projects across Oregon. Consequently, someone recommended that local communities are included in the stakeholder outreach and planning process for renewable energy development, so they can participate very early in the process.

There is a lot of history where people - across sectors - feel like they have not had the opportunity to meaningfully participate. Having transparency of data, processes, and applicable stakeholders has been helpful in various settings. It would be helpful to develop a strategy to include all interested stakeholders in a regional planning process to identify zones with different levels of environmental and social risk. DLCD felt it could be useful to consider a regional planning process to help set the state for individual project proposals. Inclusive processes of this type could help minimize social conflict that can result in delays or even failures of projects. It was suggested that a state-wide or region-wide least-conflict planning process be initiated in Oregon, like what has just been mandated in WA.

# Spatial Data Review

## Priority Data and Information

Survey respondents were asked to score data and information important in renewable energy development planning (5 = very high important; 1 = very low importance). Topics included: Energy Resource; Infrastructure; Socioeconomic; Sensitive Habitat and Species; Working Farms, Ranching, and Forest Lands; Conservation Areas of Interest; Cultural Resources; Military; and Permitting. Summary of all 82 respondents showed that all topic categories were ≥50% for the combined very high and high importance except Socioeconomic and Military, which viewed as least important (**Figure 13**). The top five topics included Sensitive Habitat and Species, Infrastructure, Cultural Resources, Energy Resources, and Conservation Areas of Concern. Sector summaries are provided in **Appendix D** although caution must be observed for those sectors with low representation.

Wu et al. (2020) describe a set of multi-criterial exclusion categories to help screen renewable energy project development. In descending order of importance, the authors outline four major categories and two additional impact categories:

Category 1 – legally protected areas
Category 2 – administratively protected areas
Category 3 – high conservation value lands
Category 4 – landscape intact lands
Ecological Impact Metrics – critical habitat, Important Bird Areas, eagle habitat, sage grouse habitat, big game habitat, wetlands, and wildlife linkages
Agricultural Impact Metrics – prime farmland, agricultural lands, and rangelands

In addition to these important considerations, there are datasets that help define physical opportunities and constraints as well as other contextual information such as political boundaries, hazards, and other potential conflicts relevant to renewable energy planning and siting.

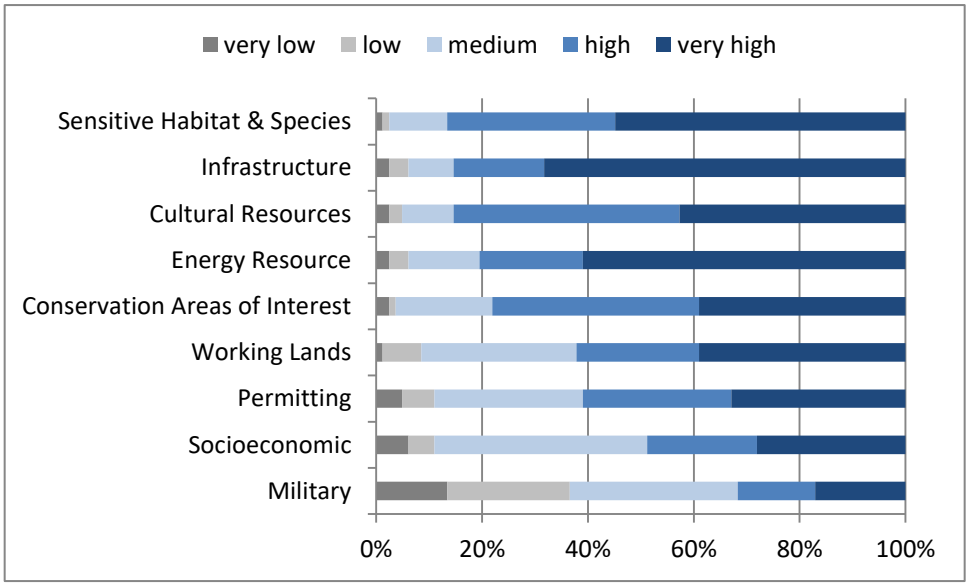


**Figure 13**. Summary responses (n=82) ranking the relative importance of classes of spatial data and information.

Over the course of several months, CBI staff sought relevant spatial datasets that could be useful in renewable energy planning in the state. We reviewed over 650 different spatial datasets from a wide range of topics and sources and uploaded 570 of them into Data Basin (www.databasin.org) where they were organized into a private working group called "Oregon Renewable Energy". From there, team members could review each dataset in the context of other datasets as desired.

In prep for the spatial data stakeholder review, a series of Data Basin maps were composed with what we felt were the most valuable datasets out of the initial collection that included all datasets relevant to the Wu et al. (2020) categories, but not organized in the same way. Datasets were presented in a series of Zoom webinars to registered stakeholders. Six webinars were conducted focusing on the different regions of the state and specific content (**Figure 14**). Datasets were added to each map that covered the entire state, but specifics of the maps would be highlighted geographically. For example, the Fish and Wildlife Considerations map contained datasets for species from the Coast to the High Desert, which were pointed out separately in each regional webinar. A complete number of webinar registrants and attendees are available in **Appendix E**.

We prepared seven statewide terrestrial maps and eight offshore maps for review. All fifteen maps were placed in a gallery called "Oregon Renewable Energy Review Maps" in Data Basin and made public so stakeholders could easily participate in the review. **Table 4** contains a list of all of the prepared review maps with URLs for easy access.

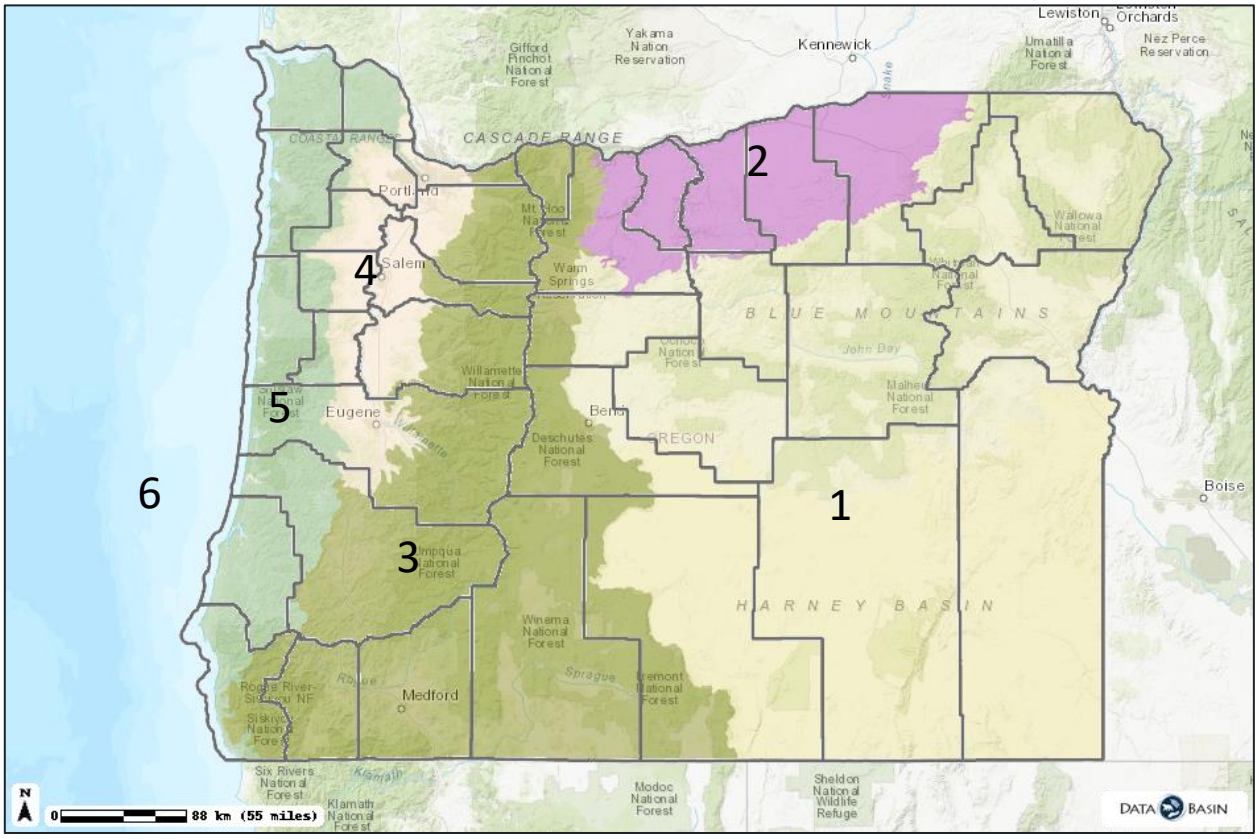


**Figure 14.** General ecoregion-based zone map of Oregon showing focal geographic areas for the data review webinars.

During each webinar, we reviewed three different ways stakeholders could provide comments. Comments could be made directly on the map; individual comments could be added under the comments tab in the map overview page; or participants could fill out a prepared check list. We built this last feature to make the review process even easier for participants. An Excel spreadsheet was prepared for each map that could be easily downloaded and re-uploaded to the map comments tab after it was filled out. Attendees were given until mid-February to submit their comments. Some phoned to provide additional information, especially information on gaps and new datasets under development.

The total number of attendees to the webinar series was 189 (see Appendix D for webinar attendance summaries). Some individuals elected to participate in more than one webinar while others only attended one; total number of unique attendees was 140. While the number of webinar participants was robust, which is a good indicator of overall interest, only a small subset of the attendees (12) provided specific spatial data comments. These detailed reviews were primarily provided by data creators (i.e., government staff, NGO and heavy spatial data users).

**Table 4**. List of all review maps for both terrestrial and offshore areas of Oregon. Data Basin gallery containing all of the individual listings provided below can be obtained at https://databasin.org/galleries/bbebe2847f19499d989f86a956ce03c1/#expand=248960.

| Onshore | Data Basin URL |
|---|---|
| Oregon Context | https://databasin.org/maps/7aeeab37ccd249c98e4d9eeb04f75676 |
| Oregon Renewable Energy | https://databasin.org/maps/ab46d7c66caf46c7b47817ea43279d86 |
| Oregon Hazard Considerations | https://databasin.org/maps/8ad7a8844fc74e4eb26b8f25b64e1d3b |
| Oregon Protected Area Considerations | https://databasin.org/maps/07f487a067744dfdb22285047b808337 |
| Other Air/Water/Land Considerations | https://databasin.org/maps/5f54e138d9bf45a59770f3563d6a5da3 |
| Fish and Wildlife Considerations | https://databasin.org/maps/a5f376bd727e4f6c820270f68ce4b8c0 |
| Other Conservation Value Considerations | https://databasin.org/maps/d4c7e624407540a089f3c6d6fdb49170 |

| Offshore | Data Basin URL |
|---|---|
| Oregon Offshore Context | https://databasin.org/maps/317ba84b9863472f9c5bc13d227b4fc9 |
| Oregon Offshore Renewable Energy | https://databasin.org/maps/db070a625d71462199eefa5c1094fb9f |
| Oregon Offshore Hazards | https://databasin.org/maps/51dd693284f241049cb789c63e8793be |
| Oregon Offshore Protected Area Considerations | https://databasin.org/maps/f22ddad572c24c89aea774e2fe64f0e5 |
| Other Offshore Development Considerations | https://databasin.org/maps/dc03a435496f46e29ede3ed65300adfa |
| Oregon Offshore Fish and Wildlife Considerations - Mammals | https://databasin.org/maps/8a6f64a41699498e990abe1833f3970f |
| Oregon Offshore Fish and Wildlife Considerations – Seabirds | https://databasin.org/maps/0c0e438689b6477389bcab64c80f6124 |
| Oregon Offshore Fish and Wildlife Considerations – Other | https://databasin.org/maps/c74874c053c14087b8349eca82b177f5 |

The following list of datasets contains specific comments from reviewers (in italics). We asked the following questions of the reviewers. Out of the datasets provided, indicate which ones would be best included as context, be used analytically, or both in the future online decision support tool being developed by INR. We also asked reviewers to comment on any issues around a particular dataset. For example, is the dataset out of date, or is there a better alternative? We also asked for any datasets that they felt were missing. Finally, we left it open for reviewers to provide more inclusive suggestions. Below is a summary of the reviews according to each map answering the context/analysis question, new datasets identified, and reviewer suggestions. Remaining data gaps and other data processing issues are presented later in this document. Direct comments by reviewers are presented in italics. More current versions of some datasets (many of them suggested from reviewers) were acquired and made part of the final data delivery. Updated datasets (including date of the updates) are highlighted in yellow in the tables.

## Oregon Context

| Oregon Context | Context | Analyze |
|---|---|---|
| Oregon Counties | x | |
| Oregon City Limits 2019 | x | |
| Oregon Urban Growth Boundaries 2019 | x | |
| BLM OR Water – Points, Flowlines, Waterbodies | x | |
| Oregon Levee Lines | x | |
| Oregon Transportation Network | x | |
| Oregon Railroads | x | |
| Oregon Ecoregions, 2010 | x | |
| National Land Cover Dataset (NLCD) Oregon 2016 | x | |
| Oregon Enterprise Zones 2019 | x | |
| Oregon Opportunity Zones | x | |
| Generalized Zoning for the State of Oregon | x | |
| Oregon Zoning (all lands) | x | |
| Oregon Comprehensive Plan Designations 2019 | X | |

## Renewable Energy

| Oregon Renewable Energy | Context | Analyze |
|---|---|---|
| All ODOE renewable Energy Sites, Oregon (cleaned-up) | x | |
| Solar Plants | x | |
| Oregon Electric Transmission Lines (2020) | | x |
| Oregon Enclosed Electrical Substations (2020) | | x |
| Natural Gas Interstate and Intrastate Pipelines | | |
| Wind Turbines, United States (2017) | x | |
| Hydroelectric Plants | x | |
| Hydro - Feasible Small Project Sites | x | |
| Operating Geothermal Power Plants | x | |
| Geothermal Projects Under Development | x | |
| Biomass Total Residue | x | |
| Wood and Wood Waste Biopower Plants | | |
| Natural Gas Plants | x | |
| Section 368 Energy Corridors, Western United States | | x |
| Section 368 Corridors of Concern, Western United States | | x |

### Section 368 Corridors

In response to Section 368(a) of the Energy Policy Act of 2005, the Bureau of Land Management (BLM) designated 5,000 miles of potential energy corridors (commonly referred to as "Section 380 corridors") throughout the western U.S. These locations are considered to be preferred locations for energy transport infrastructure on BLM lands. It is important to note that Section 368 corridors are currently being reviewed, and some corridors in Oregon have been recommended for deletion. This will be an important layer to update once the review process is complete.

### Additional Data Added (all contextual)

**Concentrated Solar Power, PNW**
https://databasin.org/datasets/c7f065cd65b545b883944fe5b4fb508a/

**Wind Power Resource Estimates for the Pacific Northwest of USA**
https://databasin.org/datasets/965564610da843609d4f48c8e38318e7/

**Geothermal Resources and Hot Springs in HUC6 Watersheds, Oregon**
https://databasin.org/datasets/fee3a38569f6442fb7e53ec147e7b261/

## Oregon Hazard Considerations

| Oregon Hazard Considerations | Context | Analyze |
|---|---|---|
| Oregon Liquefaction Susceptibility | x | |
| Statewide Landslide Susceptibility Overview, Eastern Oregon | | x |
| Statewide Landslide Susceptibility Overview, Western Oregon | | x |
| National Flood Hazard layer NFHL | | x |
| Landslide Inventory Deposits, Oregon | x | |
| Faults of Oregon, USA | x | |
| Wildfire Risk Assessment, Northeast Oregon | x | x |
| Wildfire Risk Assessment, Southwest Oregon | x | x |
| Wildfire Risk Assessment, Northwest Oregon | x | x |
| Wildfire Risk Assessment, Southeast Oregon | x | x |

### Wildfire Risk

Wildfire Risk Assessment, Southwest Oregon
https://databasin.org/datasets/3265d10f6b5e4ef3a6d1ae4f742d625f/
Wildfire Risk Assessment, Southwest Oregon
https://databasin.org/datasets/b77172fe17be451ca74824786e0c754a/
Wildfire Risk Assessment, Southeast Oregon
https://databasin.org/datasets/e3beaa93ac2d41aaa35bf81268acdd3d/
Wildfire Risk Assessment, Northeast Oregon
https://databasin.org/datasets/31cc2ca6bebe4efab3b139c50dd79722/

Reviewers commented that wildfire risk data is an ongoing effort and should be updated in the assessment tool as new model results become available. Yearly would be a reasonable target for the tool.

### National Flood Hazard Layer NFHL

*Flood areas are not identified. In areas which do not have digitized Flood Insurance Rate Maps (FIRMs) no representation of Special Flood Hazard Areas are shown. FIRMS may exist, but are available only in paper form. The DLCD Information Technology staff has provided a digitized version of the FIRMs in those areas. Please note that this lack of digitized flood data applies to approximately half of the State of Oregon.*

### Additional Data Added (all contextual)

**Climate Departure, Climate Exposure & Geoclimatic Stability**
https://databasin.org/datasets/d7478b05391f4c7faf7ba98e994c3f57/

**Terrestrial Land Facet Components**
https://databasin.org/datasets/01fb42c510e04f16a3db426f9dc13e5d/

**Terrestrial Resilience Stratified by Land Facet and Ecoregion**
https://databasin.org/datasets/acc2c55cde5f4e79893960655565a7cc/

**Oregon Tsunami Inundation Zones (from DOGAMI)**
https://databasin.org/datasets/af40b3f82a184882809fa73cd958b542/

**CFEM Coastal Flood Hazard Composite**
https://databasin.org/datasets/38b439f776fb426bbb7d957475aca414/

*These coastal hazard zones represent areas of low to very high (active) erosion of beach or dune sediments by wave action, tidal currents, or drainage. Coastal erosion hazard zones have not been created for Lane, Douglas, and Coos Counties, and only partial data coverage exists for Curry County. The following DOGAMI Publications were used to create this hazard data layer: OFR O-01-03 (Tillamook County: Cascade Head to Cape Falcon); OFR O-01-04 (Clatsop County: Gearhart to Ft. Stevens); OFR O-04-09 (Lincoln County: Cascade Head to Seal Rock); OFR O-04-20 (Curry County: Sisters Rocks to North Gold Beach); OFR O-07-03 (Lincoln County: Seal Rock to Cape Perpetua); and OFR O-09-06 (Clatsop County: Seaside to Cape Falcon).*

## Oregon Protected Area Considerations

With the possible exception of transmission lines and natural gas pipelines, the state has listed the lands in Oregon under OAR 345-022-0040 where the Energy Facility Siting Council does not permit the development of energy facilities. These lands are one of the few categories that can best be regarded as true exclusion areas while most other inputs are best regarded as development considerations. The areas listed under OAR 345-002-0040 include:

- National parks, including but not limited to Crater Lake National Park and Fort Clatsop National Memorial;
- National monuments, including but not limited to John Day Fossil Bed National Monument, Newberry National Volcanic Monument and Oregon Caves National Monument;
- Wilderness areas established pursuant to The Wilderness Act, 16 U.S.C. 1131 et seq. and areas recommended for designation as wilderness areas pursuant to 43 U.S.C. 1782;
- National and state wildlife refuges, including but not limited to Ankeny, Bandon Marsh, Baskett Slough, Bear Valley, Cape Meares, Cold Springs, Deer Flat, Hart Mountain, Julia Butler Hansen, Klamath Forest, Lewis and Clark, Lower Klamath, Malheur, McKay Creek, Oregon Islands, Sheldon, Three Arch Rocks, Umatilla, Upper Klamath, and William L. Finley;
- National coordination areas, including but not limited to Government Island, Ochoco and Summer Lake;
- National and state fish hatcheries, including but not limited to Eagle Creek and Warm Springs;
- National recreation and scenic areas, including but not limited to Oregon Dunes National Recreation Area, Hell's Canyon National Recreation Area, and the Oregon Cascades Recreation Area, and Columbia River Gorge National Scenic Area;
- State parks and waysides as listed by the Oregon Department of Parks and Recreation and the Willamette River Greenway;
- State natural heritage areas listed in the Oregon Register of Natural Heritage Areas pursuant to ORS 273.581 (Natural areas register);
- State estuarine sanctuaries, including but not limited to South Slough Estuarine Sanctuary, OAR Chapter 142;
- Scenic waterways designated pursuant to ORS 390.826 (Designated scenic waterways), wild or scenic rivers designated pursuant to 16 U.S.C. 1271 et seq., and those waterways and rivers listed as potentials for designation;
- Experimental areas established by the Rangeland Resources Program, College of Agriculture, Oregon State University: the Prineville site, the Burns (Squaw Butte) site, the Starkey site and the Union site;
- Agricultural experimental stations established by the College of Agriculture, Oregon State University, including but not limited to: Coastal Oregon Marine Experiment Station, Astoria. Mid-Columbia Agriculture Research and Extension Center, Hood River. Agriculture Research and Extension Center, Hermiston. Columbia Basin Agriculture Research Center, Pendleton. Columbia Basin Agriculture Research Center, Moro. North Willamette Research and Extension Center, Aurora. East Oregon Agriculture Research Center, Union. Malheur Experiment Station, Ontario. Eastern Oregon Agriculture Research Center, Burns. Eastern Oregon Agriculture Research Center, Squaw Butte. Central Oregon Experiment Station, Madras. Central Oregon Experiment Station, Powell Butte. Central Oregon Experiment Station, Redmond. Central Station, Corvallis. Coastal Oregon Marine Experiment Station, Newport. Southern Oregon Experiment Station, Medford. Klamath Experiment Station, Klamath Falls.

- Research forests established by the College of Forestry, Oregon State University, including but not limited to McDonald Forest, Paul M. Dunn Forest, the Blodgett Tract in Columbia County, the Spaulding Tract in the Mary's Peak area and the Marchel Tract;
- Bureau of Land Management areas of critical environmental concern, outstanding natural areas and research natural areas;
- State wildlife areas and management areas identified in OAR chapter 635, Division 8.

Out of the datasets provided, nearly all of these areas can be incorporated into a single file for purposes of a decision support tool. The composite datasets come closest to achieving this, but may need to be augmented with some areas that may be missing. Also, the composite datasets are far more complex in their attribution than is needed for this context.

| Oregon Protected Area Considerations | Context | Analyze |
|---|---|---|
| Protected Areas Database of the United States (PAD-US) (USGS), Oregon | | x |
| National Conservation Easement Database (NCED), August 28, 2020 | | x |
| Dedicated and Registered Natural Area, Oregon | | x |
| Title 3 Land in the Portland Metro Region, Oregon | | x |
| Oregon State Scenic Waterways | | x |
| National Wild and Scenic River Classification | | x |
| National Park Service Tracts | | x |
| Columbia River Gorge national Scenic Area (by ownership) | | x |
| BLM-Administered Lands Excluded from Wind Energy Development | | x |
| Wind Energy Development Right of Way Exclusion Area, Western US | | x |
| National Inventoried Roadless Areas | | x |
| Estuarine Levee Protected Areas, Oregon | | x |

## Other Conservation Value Considerations

| Other Conservation Value Considerations | Context | Analyze |
|---|---|---|
| * Human Modification in the Western US, 2011 v20160512 | x | |
| NW Forest Plan Key Watersheds 2002 | | x |
| Terrestrial Resilience: Permeability | x | |
| Terrestrial Conservation and Restoration Strategy (TRACS) | | x |
| United States Important Bird Areas - National Audubon Society Authoritative Data | | x |
| ODFW Conservation Opportunity Areas, Oregon (2016) | | x |
| TNC Conservation Portfolio | | x |
| BLM Roadless Area Cores | | x |
| National Inventoried Roadless Areas (Western US) | | x |
| High conservation value areas on BLM lands in 11 western states | | x |

*Need to obtain permission from the author to redistribute the dataset highlighted in red.

**Terrestrial Resilience: Permeability** *preferred over Omnidirectional Connectivity for Resilient Terrestrial Landscapes in the Pacific Northwest.*

**Willamette Valley Synthesis Conservation Opportunity Areas (version 2.0)** *redundant with TNC Conservation Portfolio dataset.*

**BLM Roadless Area Cores** was reported as outdated. Replaced with two new datasets: one official BLM and another one developed as a citizen's proposal.

**Additional Data Added**

**BLM OR Wilderness Characteristics** (for Analysis)
https://databasin.org/datasets/3f361e08e8e04b96a71aa72140471b03/

**Undesignated Citizen Proposed Wilderness Areas – 2020** (for context)
https://databasin.org/datasets/2c83129f214c45638b948744616672a5/

## Fish and Wildlife Considerations

| Fish and Wildlife Considerations | Context | Analyze |
|---|---|---|
| USFWS Threatened & Endangered Species Active Critical Habitat (Shapefile) | | x |
| USFWS Threatened & Endangered Species Active Critical Habitat (Line) | | x |
| FWS Critical Habitat - Chinook Salmon | | x |
| FWS Critical Habitat - Steelhead | | x |
| Focal Species Composites Columbia Plateau Ecoregion: Network Centrality, Pinch-Points, Barriers | | x |
| Landscape Integrity, Columbia Plateau Ecoregion | | x |
| Critical Habitat for Coho along the Oregon Coast ESU | | |
| BLM REA NGB 2011 Cumulative Indicator Score for Golden Eagle | | x |
| BLM REA NGB 2011 Cumulative Indicator Score for Pronghorn Habitat | | x |
| Aggregated Priority Areas for Conservation (PACs) | | x |
| Pronghorn Summer Predicted Habitat in California, 2014-2016 | | x |
| Western U.S. Wolverine Dispersal Habitat | | x |
| ODFW Western Oregon Deer & Elk Habitat | | |
| First Generation Fisher Habitat Model, West Coast | | x |
| Oregon Bighorn Sheep Range | | x |
| Deer Winter Range, Eastern Oregon | | x |
| Elk Winter Range, Eastern Oregon | | x |
| Greater Sage-grouse 'lek kernals' in the SageCon study area, southeastern and central Oregon | | x |
| Greater Sage-grouse linkage zones in the SageCon study area, southeastern and central Oregon | | x |

**Recommended Additions**
Data from the Sage-Grouse Conservation Assessment and Strategy for Oregon, but GIS data could not be located.

**Sage-grouse Winter Habitat and Connectivity Corridors**
Data presented in Figure 28.

**BLM Strategic Focal Areas for Sage-Grouse**
Figure 2-2 from report

**Additional Data Added (for Analysis)**

**BLM OR GSG ROD Sagebrush Focal Areas Final Boundary R6ALB Polygon**
https://databasin.org/datasets/c2600884592e42ea9b03684cf1ee21c7/

**Oregon Fish Distributions**
https://databasin.org/maps/new/#datasets=5c5c5eab85834d3b8c16d6d0237dd70a

**Oregon Fish Habitat Distribution - Current and Historical Coastal Cutthroat Trout**
https://databasin.org/datasets/f4e79dbe0246401498e9c244b194caa2/

**Oregon Fish Habitat Distribution - Current and Historical Coastal Pacific Lamprey**
https://databasin.org/datasets/f4e79dbe0246401498e9c244b194caa2/

**Oregon Fish Habitat Distribution - Current and Historical Coastal Green Sturgeon**
https://databasin.org/datasets/b010465e60b642be9de607020b83fc88/

**Oregon Fish Habitat Distribution - Current and Historical Coastal White Sturgeon**
https://databasin.org/datasets/c98dbe6d5a984aa6b4662574d7f46502/

**Oregon Fish Habitat Distribution - Current and Historical Coastal Redband Trout**
https://databasin.org/datasets/3b49e7d827ba40a883ec73250a50dda0/

**Streams Containing Redband Trout**
https://databasin.org/datasets/f5f8f5ddc3234de1b30c737bf92a2c8b/

**Redband Trout Range-wide Assessment (Lakes) - 2011**
https://databasin.org/datasets/e994db7723b643c3abaa9a382dcef614/

**Oregon Fish Habitat Distribution - Current and Historical Coastal Winter Steelhead**
https://databasin.org/datasets/f3572485b6074588a98caf70c4598f50/

**Oregon Fish Habitat Distribution - Current and Historical Coastal Summer Steelhead**
https://databasin.org/datasets/c9ac3d8109324f599727363df885f7a3/

**Oregon Fish Habitat Distribution - Current and Historical Spring Chinook Salmon**
https://databasin.org/datasets/53dbf8c6b99542f2b3e5ff04dd3fe442/

**Oregon Fish Habitat Distribution - Current and Historical Fall Chinook Salmon**
https://databasin.org/datasets/8366d04469574ce7950fbe121d918ef9/

**Oregon Fish Habitat Distribution - Current and Historical Bull Trout**
https://databasin.org/datasets/2508780a68364f799cf22a1ee1c9533e/

**Bull Trout Cumulative Indicator Score (HUC12) - 2011**
https://databasin.org/datasets/d3ddb50b48944ceb9c0f7853d973c5c8/

**Oregon Fish Habitat Distribution - Current and Historical Rainbow Trout**
https://databasin.org/datasets/ce7ee7f5c0004a96bcf9038da8c5727f/

**Oregon Fish Habitat Distribution - Current and Historical Chum Salmon**
https://databasin.org/datasets/022ecd6b9ea44cb58158aba4405c40dd/

**Oregon Fish Habitat Distribution - Current and Historical Coho Salmon**
https://databasin.org/datasets/fbae383d9cec4000bbcf241c5f403e24/

**Lamprey Current and Historic Range**
https://maps.psmfc.org/server/rest/services/StreamNet/FishDistribution_BySpeciesRun/MapServer/17

**Pygmy Rabbit Occurrence and Modeled Habitat**
*Should be created. See Tom Dilts (tdilts@unr.edu) for information. Also noted by ODFW.*

**Pronghorn Antelope**

*Recommend contacting ODFW for more spatial information on this species.*

**Oregon Department of Fish and Wildlife Recommendations for ORESA Tool**

| *Data Set* | *Source* | *Reasoning* |
|---|---|---|
| *T&E Species – buffered to avoid release of site-specific information*<br><br>Not included in Data Basin | *ORBIC* | *Avoidance of take, both direct (state, federal rules) and incidental (federal rules) of state/federal listed species. In addition, certain state-listed species habitats will meet the Habitat Category 1 definition (irreplaceable) in the ODFW Fish and Wildlife Habitat Mitigation Policy, so those projects tend to be controversial in permit review.* |
| *Federally-designated Critical Habitat for ESA listed species* | *USFWS* | *Projects that avoid critical habitat often experience less complex permit review.* |

| | | |
|---|---|---|
| *State Sensitive Species – buffered to avoid release of site-specific information*<br><br>Not included in Data Basin | *ORBIC* | *Avoidance of impacts to State Sensitive Species helps prevent further decline and future listings of populations. Certain Sensitive Species are more susceptible to renewable energy development. While often a site-specific determination, areas of known concentration of sensitive species can inform siting considerations. In these cases, projects become more complex in terms of minimization measures and no net loss-net benefit mitigation standards.*<br><br>*ODFW has preliminarily identified a subset of State Sensitive Species that need particular consideration in energy siting. The list is still in review, and ODFW will submit final recommendations to INR in the coming weeks. It would be ODFW's expectation that all State Sensitive Species be included, but the following be given some asterisked (*) recognition:*<br>• *Washington ground squirrel*<br>• *Pygmy rabbit*<br>• *White-tailed jackrabbit*<br>• *Greater sage-grouse*<br>• *Columbian sharp-tailed grouse*<br>• *Hoary bat*<br>• *silver haired bat*<br>• *Townsend's big eared bat hibernacula*<br>• *Tufted puffin*<br>• *Leach's storm petrel, fork tailed storm petrel*<br>• *Hawk nests (FEHA, SWHA)*<br>• *CA mountain kingsnake*<br>• *Western rattlesnake in WV* |
| *ODFW Conservation Opportunity Areas* | *ODFW* | *High priority areas for conservation identified based on richness of Conservation Strategy Species and Strategy Habitats, and that considers landscape connectivity and ongoing conservation efforts. COA's are not a legally protected designation; however, projects that avoid COA's have a higher probability of* |

| | | |
|---|---|---|
| | | *avoiding complexity in meeting avoidance, minimization, and mitigation goals.* |
| *Eastern Oregon Big Game Winter Range for Elk, Mule Deer, and Big Horn Sheep* | *ODFW* | *ODFW considers big game winter range (BGWR) in Eastern Oregon to be essential, limited, and important habitat (Category 2) according to the definitions in the ODFW Fish and Wildlife Habitat Mitigation Policy. Maintaining big game winter range is essential to sustaining populations. This is particularly important as these populations are of vital economic and recreational importance to rural communities. Renewable energy projects sited outside of BGWR avoid these impacts and often have significantly less complexity in the regulatory process.* |
| *Western Oregon Big Game Winter Range/Summer Concentration Areas for Deer and Elk* | *ODFW* | *ODFW considers big game winter range and summer concentration areas in Western Oregon to be essential, limited, and important habitat (Category 2) according to the definitions in the ODFW Fish and Wildlife Habitat Mitigation Policy. Maintaining big game habitats in*<br><br>*Western Oregon is essential to sustaining populations. This is particularly important as these populations are of vital economic and recreational importance to rural communities. RE projects sited outside of these habitats avoid these impacts and often have significantly less complexity in the regulatory process.* |
| *Essential Pronghorn Habitat* | *ODFW – In development* | *ODFW is finalizing its Essential Pronghorn Habitat maps and white paper, which should be available to INR before the end of February. ODFW considers pronghorn essential habitat to meet the Category 2 definitions in the ODFW Fish and Wildlife Habitat Mitigation Policy. Maintaining these areas is essential to sustaining populations, which are of particular economic and recreational importance to rural communities. Renewable energy projects sited outside of these habitats avoid these impacts and often have significantly less complexity in the regulatory process.* |

| | | |
|---|---|---|
| *Greater Sage-grouse Core Areas, Low Density, and General Habitat* | *ODFW* | *Given the State of Oregon's commitment to greater sage-grouse conservation, and the associated LCDC and ODFW administrative rules governing development within sage-grouse habitats, these data are an important driver of renewable energy siting.* |
| *Oregon Important Bird Areas* | *Audubon* | *Sites most crucial to bird conservation.* |
| *Pacific Flyway Shorebird Areas* | *Audubon* | *Sites most crucial to migratory shorebirds.* |

## Other Land/Water/Air Considerations

| Other Air/Water/Land Considerations | Context | Analyze |
|---|---|---|
| Military Facilities in Oregon | x | |
| Special Use Airspace | x | |
| Boardman Naval Weapons Systems Training Facility Area of Concern | | x |
| Military Training Routes | x | |
| Oregon Water Right Places of Use, High Quality Farmland | | x |
| Oregon Water Right Places of Use | | x |
| Oregon Wetland Soils | x | |
| National Wetlands Inventory (NWI) - Wetlands | | x |
| Gridded Soil Survey Geographic (gSSURGO) Database, Oregon Farmland | | |
| USFS Range Grazing Allotment Polygons | | |
| BLM Grazing Allotment Polygons | | |
| Mineral Information Layer for Oregon-Release 3 | | |
| Oregon National Historic Trail (NHT) | | |
| Nez Perce (Nee Me Poo) National Historic Trail (NHT) | | |
| Lewis and Clark National Historic Trail, Congressionally Designated Route | | |
| California National Historic Trail | | |

Several datasets under this category recommended for removal, included:

**State's Best Agricultural land in 2016 - American Farmland Trust**
**Nationally Significant Ag land, 2016 - American Farmland Trust**
**Oregon Cropland 2019 (USDA Cropscape)**

Prime farmland (another state exclusion category for utility scale renewable energy development) is currently found in the dataset entitled, Gridded Soil Survey Geographic (gSSURGO) Database, Oregon Farmland. A few reviewers expressed interest in furthering the integration of water rights data with the farmland data.

## Oregon Offshore Context

| Oregon Offshore Context | Context | Analyze |
|---|---|---|
| Oregon Counties | x | |
| Oregon Urban Growth Boundaries 2019 | x | |
| Oregon Enterprise Zones 2019 | x | |
| National Land Cover Dataset (NLCD), Oregon | x | |
| Generalized zoning for the state of Oregon | x | |
| 100m Depth Contours | | x |
| Bathymetry - 1100m Depth Contour | | x |
| Pacific Northwest Lithological Habitat | | x |
| Physical Oceanographic and Marine Habitat | | x |
| US Pacific Coast Seafloor Sediment (usSEABED) | | x |
| West Coast USA Current and Historical Estuary Extent | x | |
| Oregon Coast USA Estuarine Biotic Habitat | | x |
| Oregon Zoning (all lands) | x | |
| Oregon Transportation Network | x | |
| Oregon Levee Lines | x | |
| FAA Airports (2019) | x | |

**Additional Datasets Added (all context)**

*There is new data from the NOAA C-CAP Program. In addition to the 30m regional land cover, C-CAP has recently published 10m data for land cover and 30m data for forest canopy and impervious surface for 2015-2017 as a beta product for use.*

**2015-2017 C-CAP Derived 30 meter Forest Canopy Land Cover - BETA**
https://databasin.org/datasets/59b5f49a19d941b182ba814fa047d0b1/

**2015-2017 C-CAP Derived 30 meter Impervious Surface Land Cover - BETA**
https://databasin.org/datasets/5ae73a2eaee049fd87fbe93fa6cbb022/

**NOAA's Coastal Change Analysis Program (C-CAP) 2016 Regional Land Cover Data - Coastal United States**
https://databasin.org/datasets/1d44cc78db554b62a40d712a9067c666/

## Oregon Offshore Renewable Energy

| Oregon Offshore Renewable Energy | Context | Analyze |
|---|---|---|
| All ODOE renewable Energy Sites, Oregon (cleaned-up) | x | |
| Oregon Electric Transmission Lines (2020) | | x |
| Oregon Enclosed Electrical Substations (2020) | | x |
| Wind_Speed_2017_1100m | | x |
| U.S. West Coast Monthly Offshore Wind Speed | | x |
| Natural Gas Interstate and Intrastate Pipelines | x | |
| Offshore Wind Technology Depth Zones | | x |

### Additional Datasets Added

**Wave Energy Period - Annual**
https://databasin.org/datasets/a9d86892d54546aaaaad78763eba6790/

**Significant Wave Height - Annual**
https://databasin.org/datasets/87687f061708472a99a8fdf95c701727/

**Wave Energy, Depth Zones Extent - Outline**
https://databasin.org/datasets/e0a2d3b7e62a4566b54417fc7756c3ab/

## Oregon Offshore Hazards

| Oregon Offshore Hazards | Context | Analyze |
|---|---|---|
| NOAA Wrecks and Obstructions | | x |
| Submarine Cables | | x |
| Faults of Oregon, USA | x | |
| Oregon Liquefaction Susceptibility | | x |
| Oregon DOGAMI Tsunami Evacuation Zone (2013) | | x |
| Oregon Coast 2100 Flooding and Impacted Assets | x | |
| Oregon Coast 2050 Flooding and Impacted Assets | x | |
| Oregon Coast 2030 Flooding and Impacted Assets | x | |

### Additional Datasets Added

**CFEM Coastal Flood Hazard Composite**
https://databasin.org/datasets/38b439f776fb426bbb7d957475aca414/

*These coastal hazard zones represent areas of low to very high (active) erosion of beach or dune sediments by wave action, tidal currents, or drainage. Coastal erosion hazard zones have not been created for Lane, Douglas, and Coos Counties, and only partial data coverage exists for Curry County.*
*The following DOGAMI Publications were used to create this hazard data layer: OFR O-01-03 (Tillamook County: Cascade Head to Cape Falcon); OFR O-01-04 (Clatsop County: Gearhart to Ft. Stevens); OFR O-04-09 (Lincoln County: Cascade Head to Seal Rock); OFR O-04-20 (Curry County: Sisters Rocks to North Gold Beach); OFR O-07-03 (Lincoln County: Seal Rock to Cape Perpetua); and OFR O-09-06 (Clatsop County: Seaside to Cape Falcon).*

**NOAA Coastal Management Sea Level Rise Forecast - Oregon**
https://databasin.org/datasets/134a215ad15f4a86a550e670404c10af/

**Oregon Tsunami Inundation Zones**
https://databasin.org/datasets/af40b3f82a184882809fa73cd958b542/

**Ocean Disposal Sites**
https://databasin.org/datasets/b6f2e2c2d64c4c41ac5593899ec5f07b/

## Oregon Offshore Protected Areas

| Oregon Offshore Protected Area Considerations | Context | Analyze |
|---|---|---|
| NOAA's Marine Protected Area Inventory – 2020 –IUCN MPAs | | x |
| West Coast Marine Protected Areas: Protection Level | | x |
| West Coast Marine Protected Areas: Fishing Restrictions | | x |
| West Coast Marine Protected Areas: Managing Agency | | x |
| Protected Areas Database of the United States (PAD-US) (USGS), Oregon | x | |
| National Conservation Easement Database (NCED), October 2015 | x | |
| Oregon State Scenic Waterways | x | |

**Additional Datasets Added (for analysis)**

**Protected Seas Marine Managed Areas in U.S. Waters**
https://databasin.org/datasets/31fe40a92af84af6ae985bf32baa0a4d/

## Oregon Offshore Development Considerations

| Other Offshore Development Considerations | Context | Analyze |
|---|---|---|
| Special Use Airspace | | x |
| Military Training Routes (USA) | | x |
| Physical Oceanographic and Marine Habitat | | x |
| Navigation and Marine Transportation | | x |
| NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: At-Sea Midwater Trawl Mothership (2002-2017) | x | |
| NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: Shoreside Midwater Trawl for Hake (2002-2017) | x | |
| NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: Non-Catch Shares Hook-and-Line (2002-2017) | x | |
| NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: Catch Shares Bottom Trawl (2011-2017) | x | |

**North American Commercial Marine Vessel Emissions Inventory of Sulphur Oxide (kg/16km2)**
*This dataset is really old and may no longer provide valuable information. Since this dataset was created, there has been the formation of the North American Emission Control Area (ECA) and the California ECA, which have affected ship travel patterns along the West Coast, vessel speeds, etc. Also, a new global clean fuel standard was adopted by the IMO that affects fuel use. This is an important datasets that needs updating.*

**U.S. Pacific EEZ Vessel Density, 2013**
*These data are old as well. Newer data are available. Substituted vessel tracks and vessel counts (see below).*

**Additional Datasets Added (for context)**

**AIS Vessel Transit Counts 2019**
https://databasin.org/datasets/261b444539b642598d0bfab8669adefc/

**AIS Vessel Tracks 2019**
https://databasin.org/datasets/020f12fb4f7347f196775197c502d04e/

**NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: Shoreside Midwater Trawl for Rockfish (2011-2017)**
https://databasin.org/datasets/c918444f474f48f6854d0f269d1a1448/

**NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: Non-Catch Shares Pot (2002-2017)**
https://databasin.org/datasets/a9fc4bdc7dcd46f49a5daf1c0a4a0418/

**NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: Limited-Entry Bottom Trawl (2002-2010)**
https://databasin.org/datasets/5fd58e97906943ae80f290c2e42b63e2/

**NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: Catch Shares Pot (2011-2017)**
https://databasin.org/datasets/c3f95644734f4992a61307e566c891e0/

**NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: Catch Shares Hook-and-Line (2011-2017)**
https://databasin.org/datasets/661a84e632224a3f8a982868defe71b5/

**NOAA Observed Fishing Effort in the U.S. Pacific Coast Groundfish Fisheries: At-Sea Midwater Trawl Catcher-Processor (2002-2017)**
https://databasin.org/datasets/a0d9c53383fa435aac90a84e2cb7ecda/

Pertinent to **NOAA Observed Fishing Effort in the U.S. Pacific Coast** datasets…

*The states of California, Oregon, and Washington, as well as NMFS, have a large amount of information that relates to potential impacts on fishing activities. Sources include commercial fishery landings data, logbooks (requirements and coverage vary by state and fishery), Observer data (requirements and coverage vary by fishery), Vessel Monitoring System location data (requirements and coverage vary by fishery), marine traffic/AIS data (coverage varies by vessel size and type), costs and earnings data (requirements and coverage vary by fishery), recreational charter boat survey data (response is voluntary), recreational angler effort data (varies by state), and fishing permit information. There currently is* ***no*** *comprehensive source of fishing trip or effort location information on the west coast, nor any state considered individually.*

*The data currently available on ORESA pertain to the commercial groundfish fishery. The fishery comprises approximately 81% of landings by weight, and 31% of landings by value (revenue) of total Oregon commercial fishing landings. This information is calculated from commercial landings data (fish tickets), which* ***are*** *comprehensive. Aggregated landings by port and species, together with an understanding of state and federal fisheries regulations, can support general broad-scale knowledge of landings and revenue patterns. A variety of public reports using landings data are available from PACFIN (https://reports.psmfc.org/pacfin/f?p=501:1000). Summaries, figures, and data on landings or revenue by state, fishery, and month are publicly available from the NWFSC's FISHEYE website (https://dataexplorer.northwestscience.fisheries.noaa.gov/fisheye/landings_tracker/).*

*Oregon happens to be better situated than other states in terms of commercial fishing effort location data because groundfish comprises 81% of commercial landings by weight (although only 31% by value). The groundfish fishery has been 100% observed and/or required logbooks, with the exception of the non-catch share fixed gear sectors, which is a small percentage of effort (6% of landings by weight; 0.2% by value). However, Oregon's other commercial fisheries, which include coastal pelagics, Dungeness crab, highly migratory species (such as tuna),*

*salmon, shellfish, and shrimp also have the potential to be impacted by offshore wind siting decisions, and should be mapped as well. The National Marine Fisheries Service (Southwest and*

*Northwest Fisheries Science Centers) are currently working on characterizing the location of effort in the Dungeness crab and salmon fisheries, and have a proposal to characterize the representativeness of the data and include the rest of the commercial fisheries in this effort as well. A team to support science needs for offshore wind development is in the process of being established at NMFS.*

*Recreational fisheries are also important sources of income and well-being on the west coast, and should ultimately be included in fishing effort mapping as well.*

## Oregon Offshore Fish and Wildlife – Mammals

| Oregon Offshore Fish and Wildlife Considerations - Mammals | Context | Analyze |
|---|---|---|
| Northern Elephant Seal Utilization Distribution, California Current | x | |
| California Sea Lion Utilization Distribution, California Current | x | |
| Pinniped Haulout and Rookery Locations, Oregon | x | |
| Steller Sea Lion Critical Habitat | | x |
| U.S. West Coast Large Whale Entanglements, 1982-2019 | x | |
| Biologically Important Areas for Cetaceans - Feeding | | x |
| Biologically Important Areas for Gray Whales on the US West Coast | | x |
| Biologically Important Areas for Humpback Whales on the US West Coast | | x |
| | | |
| Humpback Whale Summer/Fall Density, California Current | | x |
| Blue Whale Summer/Fall Density, California Current | | x |
| Blue Whale Utilization Distribution, California Current | | x |
| Fin Whale Relative Habitat Suitability, West Coast | x | |
| Risso's Dolphin Summer/Fall Density, California Current | x | |
| Sperm Whale Summer/Fall Density, California Current | | x |
| Baird's Beaked Whale Summer/Fall Density, California Current | | x |
| Dall's Porpoise Summer/Fall Density, California Current | x | |
| Pacific White-sided Dolphin Summer/Fall Density, California Current | x | |
| Northern Right Whale Dolphin Summer/Fall density, California Current | x | |

*New cetacean data should be available soon and available from marine cadastre.*

**Additional Datasets Added (for context except one – see below)**

**Small Beaked Whale Guild Summer/Fall Density, California Current**
**https://databasin.org/datasets/12b14c2fe72240ae9d266c9e2d48fdfa**

**Common Bottlenose Dolphin Summer/Fall Density, California Current**
https://databasin.org/datasets/392235a9303447369b581d09cb5dee97

**Fin Whale Summer/Fall Density, California Current**
https://databasin.org/datasets/ab57f9d0796c4fd489efb52b8b64fcdb

**Short-beaked Common Dolphin Summer/Fall Density, California Current**
https://databasin.org/datasets/bca3509ac3ed4fdcaef47e48bae298e1

**Long-beaked Common Dolphin Summer/Fall Density, California Current**
https://databasin.org/datasets/91fe1a69f389429792360a43836fbd8c

**Striped Dolphin Summer/Fall Density, California Current**
https://databasin.org/datasets/f35e0a10f18d4799863adca888d382d6

**Blue Whale Core Areas of Use, West Coast (for analysis)**
https://databasin.org/datasets/b43388e2a2104cde919d0a91f7072a84

**Blue Whale Home Ranges, West Coast**
https://databasin.org/datasets/ee0a44f4ea694db88dc19d1459a0ee68

## Oregon Offshore Fish and Wildlife Considerations – Seabirds

| Oregon Offshore Fish and Wildlife Considerations - Seabirds | Context | Analyze |
|---|---|---|
| Important Bird Areas of Washington and Oregon | | x |
| Pelagic Important Bird Areas | | x |
| ODF Marbled Murrelet Management Areas | x | |
| Marbled Murrelet Critical Habitat | x | |
| Seabird Spring Survey Compilation: Observations from various surveys between 1975 and 2008 | | x |
| Seabird Summer Survey Compilation: Observations from various surveys between 1975 and 2008 | | x |
| Seabird Fall Survey Compilation: Observations from various surveys between 1975 and 2008 | | x |
| Seabird Winter Survey Compilation: Observations from various surveys between 1975 and 2008 | | x |
| California Current System predicted seabird abundance, Spring | | x |
| California Current System predicted seabird abundance, Summer | | x |
| California Current System predicted seabird abundance, Fall | | x |
| California Current System predicted seabird abundance, Winter | | x |
| Predicted average abundance of sooty shearwaters in the California Current System | | x |
| Sooty Shearwater Utilization Distribution, California Current | | x |

| | | |
|---|---|---|
| Predicted average abundance of black-footed albatross in the California Current System | | x |
| Black-footed Albatross Utilization Distribution, California Current | | x |
| Laysan Albatross Utilization Distribution, California Current | | x |

*Include nesting habitat for marbled Murrelet in nearshore waters. See Journal of marine Systems 146:17-25.*

U.S. Geological Survey is nearing completing species distribution models for a comprehensive list of seabirds species funded by BOEM.

**Additional Datasets Added (for analysis)**

**Predicted summer standardized abundance of 16 seabird species in the California Current System**
https://databasin.org/datasets/c125ff8d8d65413f96d0835687e08c3f

**Predicted average abundance of common murres in the California Current System**
https://databasin.org/datasets/b0e79e4f34f3419a9c7c9f2a515ceb85

**Predicted average abundance of California gulls in the California Current System**
https://databasin.org/datasets/25a53cb251cc413aab379e9b5672ae07

**Predicted average abundance of black-footed albatross in the California Current System**
https://databasin.org/datasets/ea5f9e75c4ed44cf93a0583d0e2c1894

**Predicted average abundance of Bonaparte's gulls in the California Current System**
https://databasin.org/datasets/9520913a538b4a75a733db38ab77c84f

**Predicted average abundance of Brandt's cormorants in the California Current System**
**https://databasin.org/datasets/8dfe15c09aab4194a2f9ba8859c0d78a**

**Predicted average abundance of brown pelicans in the California Current System**
https://databasin.org/datasets/e32ff523bbcb40839a33e8440c5d39d2

**Predicted average abundance of Cassin's auklets in the California Current System**
**https://databasin.org/datasets/f3986e559bd84d83b7bd9f0948c92de6**

## Oregon Offshore Fish and Wildlife Considerations – Other

| Oregon Offshore Fish and Wildlife Considerations - Other Species | Context | Analyze |
|---|---|---|
| Habitats of Particular Concern, United States | | x |
| Essential Fish Habitat | | x |
| West Coast Critical habitat Designations, NMFS | | x |
| Critical Habitat for Coho along the Oregon Coast ESU | | x |
| Kelp Canopy, Oregon | | x |
| Oregon Coast USA Estuarine Biotic Habitat | | x |
| Average Quarterly Predictions for Anchovy (Engraulis mordax), California Current System, 1995-2018 | x | |
| Average Quarterly Predictions for Albacore (Thunnus alalunga), California Current System, 1995-2018 | x | |
| Average Quarterly Predictions for Clubhook Squid (Onychoteuthis borealijaponica), California Current System, 1995-2018 | x | |
| Average Quarterly Predictions for Common Thresher Shark (Alopias vulpinus), California Current System, 1995-2018 | x | |
| Average Quarterly Predictions for Blue Sharks (Prionace glauca), California Current System, 1995-2018 | x | |
| Average Quarterly Predictions for Sardine (Sadinops sagax), California Current System, 1995-2018 | x | |

**Additional Datasets Added (for context)**

**Average, Monthly Predictions for Shortfin Mako Sharks (Isurus oxyrinchus), California Current System, 1998-2016**
https://databasin.org/datasets/f272387b9b9146778586ed36219c340a

**Average, Monthly Predictions for Swordfish (Xiphias gladius), California Current System, 1998-2016**
https://databasin.org/datasets/b747f0ae29024776b36d815b80d6a57f

# Data Gaps, Updates, and Processing Needs

## Energy and Transmission

Maintaining location and attribute information for all **renewable energy developments** in the state regardless of their size (pending and completed) will be important going forward as most of the national datasets are less current and often lack important attribute details. Substations and transmission datasets are equally important, including capacity.

The **Section 368 Energy Corridors** are currently undergoing approval. The final dataset should be included as soon as the decision is made, which is expected within the year.

## Hazards

**Wildfire risk** is the most dynamic dataset under the hazard category. We have included a version from Pyrologix LLC commissioned by the U.S. Forest Service produced in 2018. Ideally, a wildfire risk map should be generated annually and modified by previous fire perimeters, which can be obtained from the National Interagency Fire Center (see link for active map service showing current and recent fire perimeters (https://databasin.org/datasets/bc14704bf3d2433fbc666bb16b86805e/).

The current **national flood hazard** layer maintained by FEMA is incomplete. Flood areas are not identified. In areas that do not have digitized Flood Insurance Rate Maps (FIRMs), no representation of Special Flood Hazard Areas are shown. FIRMS may exist, but are available only in paper form. The DLCD Information Technology staff has provided a digitized version of the FIRMs in those areas. This lack of digitized flood data applies to approximately half of the State of Oregon.

The **coastal flood hazard** zone composite represents areas of low to very high (active) erosion of beach or dune sediments by wave action, tidal currents, or drainage. Coastal erosion hazard zones are not complete. Data does not yet exist for Lane, Douglas, and Coos Counties, and only partial data coverage exists for Curry County.

## Protected Areas

**Protected areas** mapping is dynamic and more challenging than many realize. Combining the geometry and standardizing the attributes is nontrivial and requires frequent updating (ideally annually). INR, U.S. Geological Survey, and CBI routinely update some form of protected area/ownership composite dataset. Each one handles particular land management units differently and none appear to have all protected lands in the state included (local parks are the most common missing areas in some parts of the state). For simplicity, a composite containing the legislatively listed Oregon development exclusions areas should be created and maintained. Changes in management designations in the marine environment is

in some ways even more challenging since protections of marine areas are three-dimensional by nature and include temporal considerations. This is one of the more frequent updating tasks going forward.

Location of existing **conservation easements** is another important dataset to keep current. The National Conservation Easement Database (NCED) was formed by a coalition of conservation NGOs, including CBI, NatureServe, Ducks Unlimited, Defenders of Wildlife, and Trust for Public Land (TPL). The maintenance of the dataset is being managed by TPL and Ducks Unlimited. Updates are periodically posted. We have included the most recent dataset dated August 2020. Routine updates can be acquired from the NCED website (https://www.conservationeasement.us/).

## Other Conservation Values

Mapping areas with **wilderness characteristics on BLM lands** is ongoing in eastern Oregon via official and unofficial efforts. At some point, an agreed upon dataset should emerge from the process and included in future assessments and tools. It was recommended that **county-level Goal 5 mapped resources** should be explored and possibly included.

## Fish and Wildlife

Oregon Department of Fish and Wildlife are producing new datasets in the future that will be valuable in renewable energy development assessments.

**Essential pronghorn antelope habitat** – ODFW is finalizing new habitat maps with an accompanying white paper. Results should be available soon.

**Statewide species connectivity maps for up to 60 species** from the Oregon Connectivity Assessment and Mapping Program, which are expected to be available in 2023.

ODFW recommends that all **State Sensitive Species** (152 taxa) be carefully considered in development decisions. Species distribution models exist for some of these species (e.g., several of the fishes), but in cases where only a portion of the habitat is considered sensitive, these specific areas are not delineated. For most sensitive species, only general range maps exist, which are too generalized for potential development conflict evaluation.

Producing species distribution models for all of the State Sensitive Species would be very valuable for all land use and resource planning in the state. Most species distribution models would benefit from a statistical model approach (e.g., MaxEnt), but other would be better served using expert models. Bats are particularly difficult to model, but improvements are being made by integrating acoustic monitoring (see https://batamp.databasin.org/).

Specific **Pacific flyway** use data is difficult to ascertain except for known stopover or overwintering waterbodies. Other seasonal bird movements (e.g., birds of prey and elevation migrants) would be

valuable (particularly to avoid wind development impacts), but also difficult to generate for most species.

**Migratory shorebird sites** have been identified as part of Audubon's Pacific American Shorebird Conservation Strategy, which is available in PDF format. GIS data underlying this report may be acquired with special request to Audubon. Report is available at https://www.fws.gov/migratorybirds/pdf/management/PASCS_final_medres_dec2016.pdf.

**Sage-grouse** is an important driver in renewable energy siting in eastern Oregon with different governmental and non-governmental entities conducting ongoing studies that typically generate spatially explicit products. We have included several of these datasets in the current data review, but this is such an important and heavily studied species that status updates and enhancements are likely to continue and should be monitored for inclusion in future versions of decision support tools.

**Seabirds** are probably the most important taxonomic group for avoiding environmental conflicts from offshore wind development. A major seabird distribution modeling exercise by U.S. Geological Survey, which was funded by BOEM, should be available sometime on 2021. This is the most comprehensive seabird distribution modeling study along the Pacific coast to date.

**Marine Mammals** (especially cetaceans) is another taxonomic group with ongoing research. Periodic updates should be planned as new datasets become available.

## Other Air/Water/Land

Incorporation of **water rights data** into the existing **prime farmland** framework may provide a more comprehensive picture in agricultural screens for renewable energy development.

The dataset entitled, **North American Commercial Marine Vessel Emissions Inventory of Sulphur Oxide (kg/16km2)** is really old and may no longer provide valuable information. Since this dataset was created, there has been the formation of the North American Emission Control Area (ECA) and the California ECA, which have affected ship travel patterns along the West Coast, vessel speeds, etc. Also, a new global clean fuel standard was adopted by the IMO that affects fuel use. This is an important datasets that needs updating.

A team to support science needs for offshore wind development is in the process of being established at National Marine Fisheries Service (NMFS). Be on the lookout for products generated from this group in upcoming years.

Mapping **fishing effort** is complex and evaluated by multiple state and federal agencies along the west coast. Data quality is inconsistent and integration of data from different sources is challenging. Improvements to datasets pertaining to this critically important topic are very much needed.

**Recreational fisheries** are also important sources of income and well-being on the west coast, and should ultimately be included in fishing effort mapping as well.

### Tribal Cultural Data

Cultural data collected and maintained by the nine tribes in Oregon were not sought due to data sensitivities. Some themes from the Tribes are sure to be in GIS format while others are less formally assembled. From the standpoint of any assessment tool, it would be best to create a data and decision making work flow that provides users with the option to query tribal data via a tribal liaison or a tribal controlled segment of the decision support tool. For sites that look more favorable based on the other data and information, provide the option for users to connect with participating Tribes for cultural screen. This would provide the means for tribal data to be included without making any potentially sensitive data open to the users – keeping the data control and reporting of the findings in the hands of the Tribes would contribute greatly to a trusting work relationship.

## Online Tool

### Desired Tool Function for Renewable Energy Decision Support

We included a few questions in the survey relevant to the online tool, which is under development by INR. We wanted to ask stakeholders what data themes were most important and what operational functions were most desirable. For this second issue, we provided nine topics plus the option to write-in other options. The desire for a guided workflow for an area of interest to identify opportunities and constraints was the highest ranking function (**Table 5**).

**Table 5**. Summary of survey responses regarding online tool functions of interest for renewable energy planning.

| Function | No. | Percent |
|---|---|---|
| Guided Workflows | 58 | 70.73% |
| Download Data | 52 | 63.41% |
| Printable PDF Reports | 50 | 60.98% |
| Print a Map | 47 | 57.32% |
| Thematic Layer Exploration | 44 | 53.66% |
| Add Layers | 43 | 52.44% |
| Measure | 32 | 39.02% |
| Upload Layers | 31 | 37.80% |
| Other | 16 | 19.51% |
| 3D | 14 | 17.07% |

The ability for users to download spatial data and print PDF reports also ranked high. Over half of the respondents valued the ability to explore various thematic data layers, add layers to the analysis within the tool, and print a map. Less important features included the ability to upload their own data and measure length and area within the tool. The ability to visualize in 3D showed the poorest response with only 17% of survey respondents showing desire for this feature.

Sixteen suggestions were offered that did not fit any of the topics provided. Most of these comments pertained to interest in specific datasets (see Appendix D). One respondent advocated for a tool that would allow for the exploration and testing of different scenarios that would report on trade-offs. A developer from industry stated they have their own mapping capability and just need access to important datasets.

## Functionality and Feature Options

According to the online survey, providing a guided workflow as part of an online tool was the #1 answer with over 70% of respondents identifying this feature. Guided workflows can take several forms. The most common is the user queries an area on a web map viewer and the system runs an analysis against the spatial data and generates a summary report. All or most of the spatial data should also be made available to the user to view onscreen, providing some level of dataset exploration – another valued feature by the survey respondents. There is considerable design and technical details to address, including printing a map from screen and downloading results as a PDF, both of which scored high with reviewers. Choosing an area to analyze can be achieved in several ways:

(1) users draw a rectangular area of interest onscreen, and/or
(2) users draw any shape (point, line, and polygon) onscreen, and/or
(3) users upload a shapefile(s) into the application for analysis

Another important technical consideration regarding analyzing areas includes the option to analyze more than one area at a time – allowing the user to do comparisons between potential development sites. If this feature is offered, design of the final report needs to be far more flexible to accommodate the range of sites chosen. If more than one site is chosen, a summary page is advised. It is also advised to limit the number of sites that can be analyzed at the same time (max of ten is a reasonable number); otherwise, users will be tempted to run very large numbers at a time, which will likely swamp the server and potentially even crashing the server.

## Data Handling

If the online decision support tool is targeting both onshore and offshore environments, everything from the standpoint of data needs to be duplicated. Upfront, users are given the option to focus on one or the other region, which loads different sets of data for contextual and analytical purposes.

From the datasets provided (**Appendix G**), a subset representing the most important factors should be chosen or created for the application; 40-50 datasets seem to work well from the standpoint of user consumption and tool analytical performance. Some of these will provide context only while others will be loaded for analysis purposes. Some will require frequent updating while others will not. Subdividing the layers by general theme also helps users organize the content. Some suggestions include:

1. Boundaries
2. Energy and Transmission
3. Environmental (which can be subdivided into several major subcategories such as wildlife, heritage data, critical habitat, intactness, opportunity areas, etc.)
4. Land Designation and Land Use
5. Hazards
6. Climate Change

All of the main data features listed in the survey for which many expressed interest (download data, add layers, and upload layers) may be better handled outside the INR application. This would simplify the application design. Adding additional datasets into the decision support tool is complex. It really depends on the underlying mapping technology used to support the application. Regardless, it will be more difficult to add new datasets into the analysis as preprocessing is required in order to maintain high levels of tool accuracy and performance.

## Logins and Save

The last topic under this section pertains to whether or not managed logins are desired. We did not ask this question in the survey, as this is mainly a question for the specific application development agency. Based on CBI's experience, this topic frequently comes up at some point in a decision support application of this type, and it is far more efficient to address this issue from the outset rather than to wait until the rest of the programming is completed or well underway. With a login account system, users can be given different levels of data access and functionality. For example, agency staff can have access to sensitive datasets that are excluded from the public version. In addition, agency staff may have access to added application functionality that allows for specific project evaluation and management. Having user logins would provide the foundation for users to save their work and share it with others.

# Key Take-aways

## Background

Based on recent polling, 60-79% of American's feel the country's energy supply should transition away from fossil fuels toward renewable energy alternatives.

Of the three renewable energy types of greatest interest to the stakeholders (solar, onshore wind, and offshore wind), solar is currently the least expensive to install although onshore wind shows a slight levelized cost of electricity (LCOE) advantage.

In spite of the significant reduction in costs to developing renewable energy, there are still large soft costs (costs other than direct construction) to renewable energy development.

Considerable opportunity exists to site large scale renewable energy projects on already disturbed land. The Re-Power Program of the U.S. EPA has identified 5,693 solar sites, 1,462 wind sites, 5,541 geothermal sites, and 1,033 biomass sites in Oregon.

Driven in large part by the spatial and temporal variability of different renewable energy sources (e.g., wind and solar), a growing body of research has begun exploring the effectiveness of co-locating different renewable energy types together.

## General Stakeholder Feedback

Participants represented all ten sectors we identified. Highest response rates came from individuals associated with universities, local government, industry, agriculture, and NGOs.

Of the ten energy development consideration categories provided in the survey, respondents ranked Natural Lands/Wildlife Protection, Transmission and Storage, Climate Change Adaptation, and Participatory Planning Process the highest.

Participants represented Based on responses from stakeholders, renewable energy planning in Oregon is being met with considerable excitement and optimism; however, some anxiety and fear persists.

Stakeholders understand that renewable energy development is not without social and environmental impacts and there is almost unanimous agreement that steps should be taken to minimize them. At the same time, there is broad recognition that speed is of the essence; therefore, a "design, build, monitor, adapt" approach may produce the best results.

Stakeholders identified the need for and interest in a comprehensive approach – one that includes all renewable energy types at all scales. Isolating different technologies in different geographies without the cohesion of an overarching plan that clearly articulates how all of the components work together could result in unforeseen incompatibilities or conflicts.

Overwhelmingly, stakeholders want to meaningfully participate in ongoing renewable energy planning in the state. Engaging all interested parties as early as possible and regularly throughout the process would help create an atmosphere of collaboration over confrontation, which could lead to huge benefits.

Good planning, implementation, and monitoring require high quality data and information, which should not rely on government sources only. Providing as much transparency as possible while honoring privacy when needed should remain a high priority.

The importance of better cooperation and coordination between federal, state, and local government agencies was a common theme, especially between state and local government.

Tribes are an important constituency in planning the future of renewable energy in Oregon and early contact with tribal representatives is extremely important.

Tribal stakeholders pointed out that there is a lack of knowledge regarding cultural resources, and that more effort must be dedicated to filling existing gaps. Agencies are also encouraged to look beyond important historical artifacts and consider modern day cultural and religious practices that are tied to the land and water.

## Comments by Energy Source

### Solar

Survey respondents overwhelmingly chose solar energy as the renewable energy source of greatest interest. But in the minds of many, there seems to be an assumption that large scale solar comprises the only optimal scenario to get to the state's renewable energy goals and too much focus on large scale will sacrifice energy resilience in the long run.

Many stakeholders recognize that some farmers and ranchers see potential for revenue diversification via solar development, but they expressed the point of view that most of these opportunities should be limited to community scale or behind the meter operations.

Considerable interest exists in exploring co-locating solar development with some agricultural practices (agrivoltaics), but respondents report that Oregon land use laws pose a significant hurdle to explore these sorts of win-win benefits.

Particularly in counties with high levels of federal land where permitting can be more cumbersome, utility scale solar development can apply unwanted pressure on local officials who need to maximize local economic opportunities with limited private land in and around existing municipalities.

Some local planners expressed the view that solar infrastructure should not be permitted in industrial zones within urban growth boundaries (UGB), but outside of these growth boundaries on land that does not have other constraints.

## Wind

Wind energy is by far the most controversial renewable energy type and is involved in the two most sensitive renewable energy development regions in the state – Columbia River Plateau and offshore.

Based on the many comments received on offshore development, the most important step leadership can take is to manage direct public involvement in any process going forward and try to look at the issue as holistically as possible.

Of all the discussions and responses we received, offshore wind was the only one that stakeholders expressed the need to go very slow.

## Small Hydro

Small hydro was the third most popular renewable energy source highlighted by survey respondents and should not be overlooked in Oregon's ongoing energy plan.

Stakeholders would like to see more investment in this renewable energy source. In particular, pressurized piped irrigation, which can have multiple benefits besides renewable energy generation including, water conservation, cost reduction and wildlife habitat improvement.

## Biomass

With large federal land holdings in Oregon, forest biomass availability is severely limited without policy changes at the federal level. However, woody biomass to biofuels is far more efficient than woody biomass to electricity as costs per kwh are too high compared to other renewable sources.

## Wave

Wave energy generation was the most noted renewable energy type highlighted under the "other" category in the survey and is viewed as an interesting option for local energy generation. It is generally seen as having direct local economic and environmental benefits.

## Transmission and Storage

When developing a comprehensive renewable energy plan for the state, transmission is potentially it's Achilles' heel.

Stakeholders expressed interest in comprehensive inclusion of microgrids into the larger transmission environment, but they felt utilities are normally proprietary about the grid and are limited incentives to support microgrids.

The BLM planning process based on Section 368 is generally consistent with state policy and is coordinated through the Governor's office; however, there are two proposed energy corridors in the

state that many feel are too sensitive from a wildlife habitat perspective. The state needs to reach out to BLM more regularly on planning processes to ensure better alignment in planning.

Substations serve as the actual pinch points even if transmission line capacity is available for a renewable energy project. Therefore, new construction of substations or energy storage facilities is needed for distributed renewable energy development in many locations.

## Military Roundtable

Early communication and coordination was the overriding theme for the stakeholder discussion.

There is currently a need for a centralized, standardized, editable database of tower locations within and around MTRs in Oregon. The group conveyed that a new statute is feasible and could require developers to upload plans for tall structures with specific structural details (including height and safety features). An important addition to this data is information about what agency or entity should be notified or involved in some way.

Idaho has legislation that requires developers to notify any tower built below 200 feet, and it was suggested that Oregon also consider such legislation.

The Oregon Department of Aviation sometimes only hears of towers or wind turbines only after the information is filed with the FAA. They would prefer that they are notified early in the process before the formal FAA filing.

The military including NORAD would prefer that there is early coordination during the early consultation phase with developers in the planning process of structures that have the potential to obstruct or impact into military training/operating areas. Progress is being made such as HB 2329, which requires counties to provide the military with notification of larger solar or wind development applications.

While wind has been one of the dominant renewable energy types in Oregon, PV solar is expected to become a much bigger player in the state, and it can impact military operations primarily through glint and glare that can interfere with pilot navigation.

There is a lot of history where people - across sectors - feel like they have not had the opportunity to meaningfully participate. Having transparency of data, processes, and applicable stakeholders has been helpful in various settings and should be a mainstay into the future.

It was suggested that a state-wide or region-wide least-conflict planning process be initiated in Oregon, like what has just been mandated in Washington.

## Spatial Data Review

Based on survey results, most data categories received high rankings. Sensitive Habitat and Species, Infrastructure, and Cultural Resources topped the list. Socioeconomic and Military data ranked lowest.

The study collected and internally reviewed over 650 spatial datasets; created maps for review featuring over 200 datasets; and added or updated approximately 80 datasets based on the data review.

Data Basin was successfully used to organize and conduct the data review process by stakeholders. Six regional webinars were held and attended by 189 participants (140 unique individuals).

The most relevant spatial data from the process were delivered to INR and DLCD, and the 500+ spatial datasets from the ORESA Project will remain on Data Basin for future acquisition and use.

## Online Tool

Based on survey responses, six online tool functions received over 50% interest.

By far, the most important function was for the online tool to include a guided workflow for users. The ability for users to download the actual data and generate printable PDF reports also ranked very high.

Giving users the ability to; (1) print a map out of the tool, (2) add additional layers, and (3) explore the layers within the tool were also important functions.

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# APPENDIX A: Stakeholder Registry by Sector

Please see separate Excel spreadsheet entitled ORESA-ODOC Stakeholder Registry by Sector.

# APPENDIX B: Copy of the Online Survey

1. Name
2. Sector >

   NGO

   Utilities

   Transmission

   Federal Government

   State Government

   Local Government

   University

   Agriculture

   Tribal

   Industry

   Other (please specify)

3. Organization
4. Job Title
5. Email Address
6. Zip Code

7. What type(s) of utility scale renewable energy sources (any renewable energy project generating >1MW of power) are you interested in providing feedback on? Check those that apply:

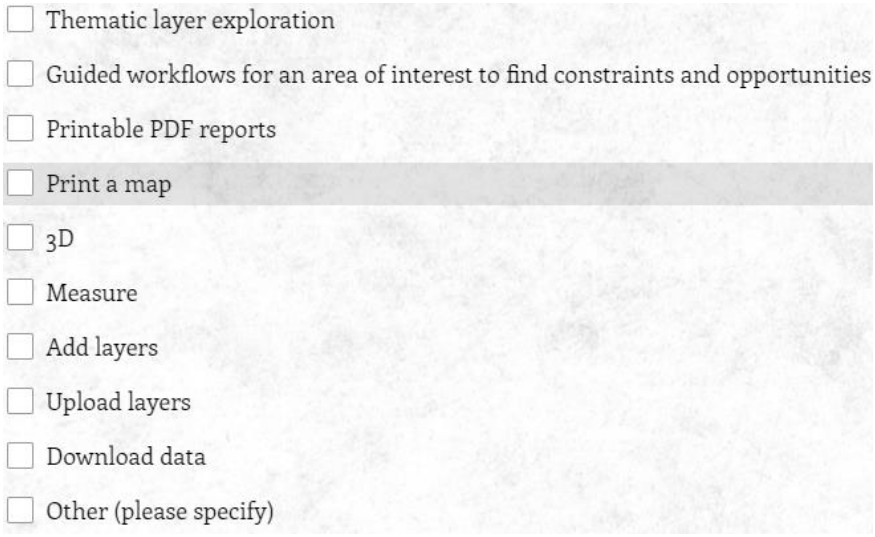
   ☐ Solar ☐ Onshore Wind ☐ Offshore Wind ☐ Biomass ☐ Small hydro
   ☐ Geothermal ☐ Other (please specify)

8. Please score renewable energy development considerations (5= very high importance; 1= very low importance).

| | |
|---|---|
| Energy Security/Resilience | 1 – 2 – 3 – 4 – 5 |
| Climate Change Adaptation | 1 – 2 – 3 – 4 – 5 |
| Natural Lands/Wildlife Protection | 1 – 2 – 3 – 4 – 5 |
| Water Protection | 1 – 2 – 3 – 4 – 5 |

| | |
|---|---|
| Working Lands Protection | 1 – 2 – 3 – 4 – 5 |
| Local Economic Development | 1 – 2 – 3 – 4 – 5 |
| Social/Environmental Justice | 1 – 2 – 3 – 4 – 5 |
| Participatory Planning Process | 1 – 2 – 3 – 4 – 5 |
| Transmission & Storage Infrastructure | 1 – 2 – 3 – 4 – 5 |
| Permitting Process | 1 – 2 – 3 – 4 – 5 |

9. This ORESA project will create a mapping and reporting tool on the Oregon Explorer to inform site planning and decision making. What data and/or tool functions would be most helpful to you or your organization for related renewable energy planning and decision-making?




10. Please score the following data and information categories in terms of importance to renewable energy planning (5= high importance; 1= low importance).

| | |
|---|---|
| Energy Resource | 1 – 2 – 3 – 4 – 5 |
| Infrastructure | 1 – 2 – 3 – 4 – 5 |
| Socioeconomic | 1 – 2 – 3 – 4 – 5 |
| Sensitive Habitats and Species | 1 – 2 – 3 – 4 – 5 |
| Working Lands | 1 – 2 – 3 – 4 – 5 |
| Conservation Areas of Interest | 1 – 2 – 3 – 4 – 5 |
| Cultural Resources | 1 – 2 – 3 – 4 – 5 |
| Military | 1 – 2 – 3 – 4 – 5 |
| Permitting Process | 1 – 2 – 3 – 4 – 5 |

11. What are the characteristics or conditions that lead to land use compatibility (opportunities) with renewable energy development? Please list.

12. What are the characteristics or conditions that lead to land or ocean use challenges with renewable energy development? Please list.

13. Are there any particular datasets, studies, or other information that you know of or have to offer that support renewable energy planning in the state? Please list title and source contact (where it can be found) for each item you list.

14. Are there other individuals or organizations whose input would be valuable for this effort? Please provide their names and contact information, if possible.

15. Can we contact you for further information?

O Yes

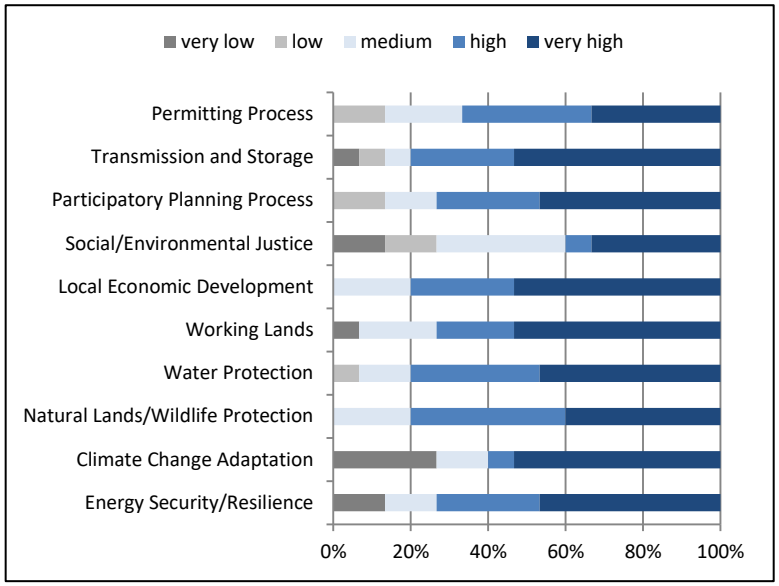
O No

16. Is there anything else you would like to share related to the overall ORESA Project or the Natural Resources, Environment, and Development: Opportunities and Constraints Assessment?

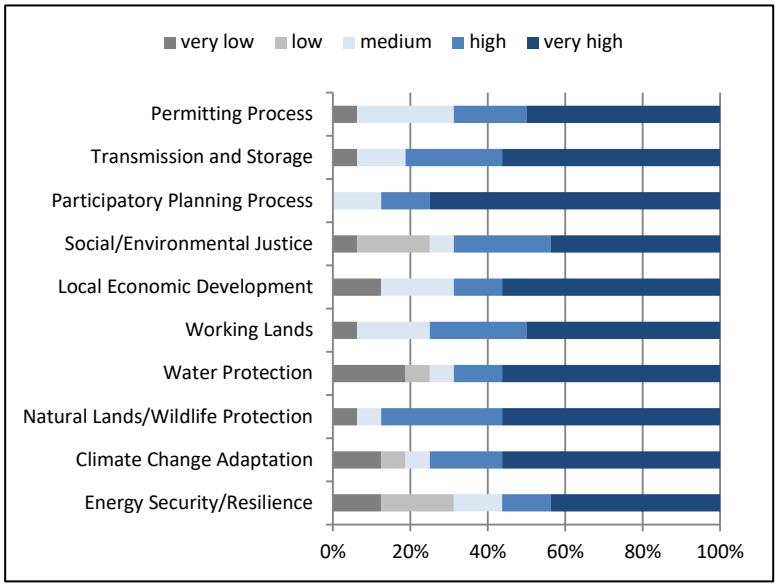
# APPENDIX C: Survey Results by Sector – Renewable Energy Development Considerations

Categories included: Energy Security/Resilience, Climate Change Adaptation, Natural Lands/Wildlife Protection, Water Protection, Working Farms, Ranching, and Forest Lands, Social/Environmental Justice, Participatory Planning Process, Transmission and Storage Infrastructure, Permitting Process
(blue to gray histograms indicate good sample size; orange to gray histograms indicate small sample size)

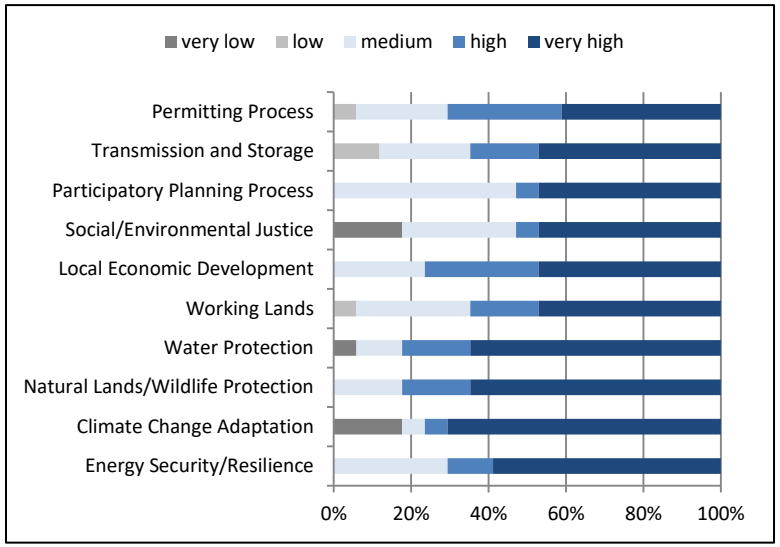
**Industry (n=15)**



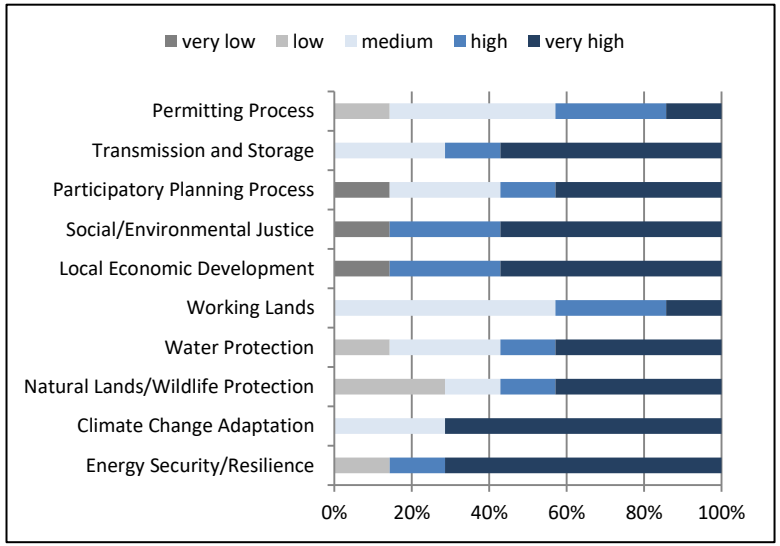

**NGO (n=17)**



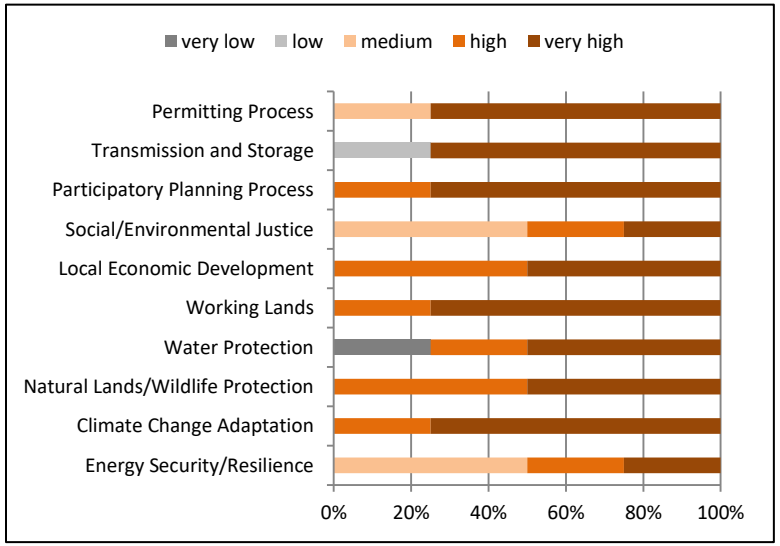
**Local Government (n=17)**



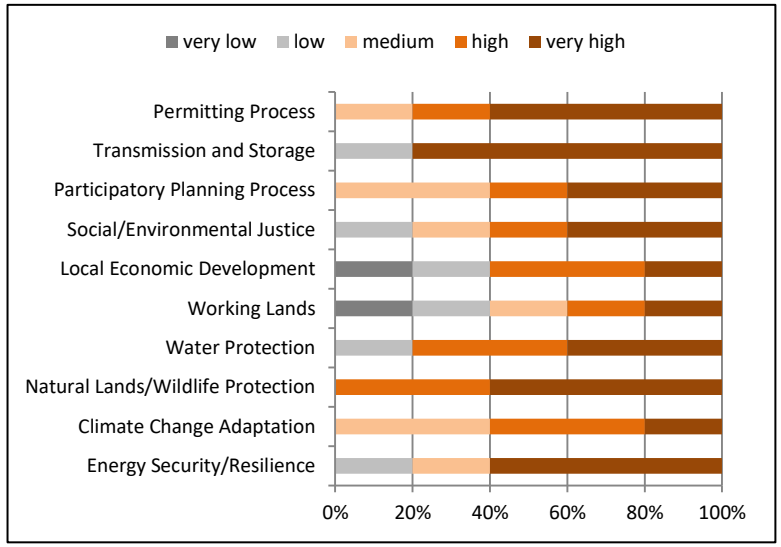

**University (n=7)**



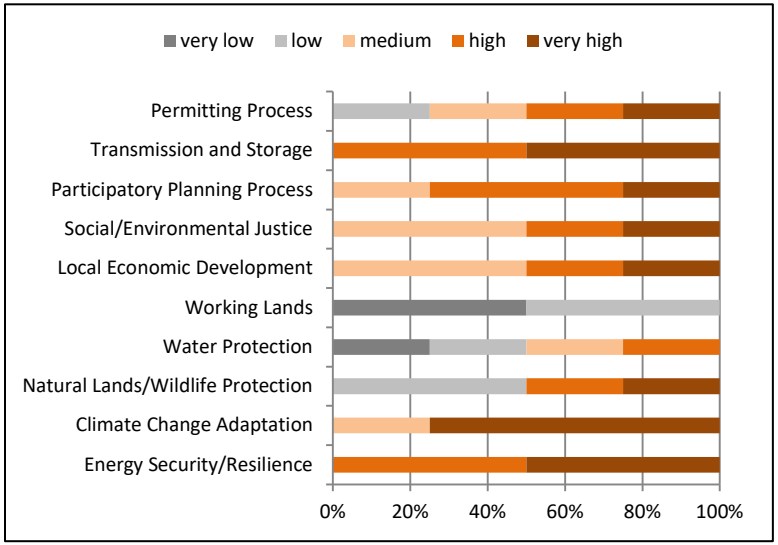

**Agriculture (n=4)**



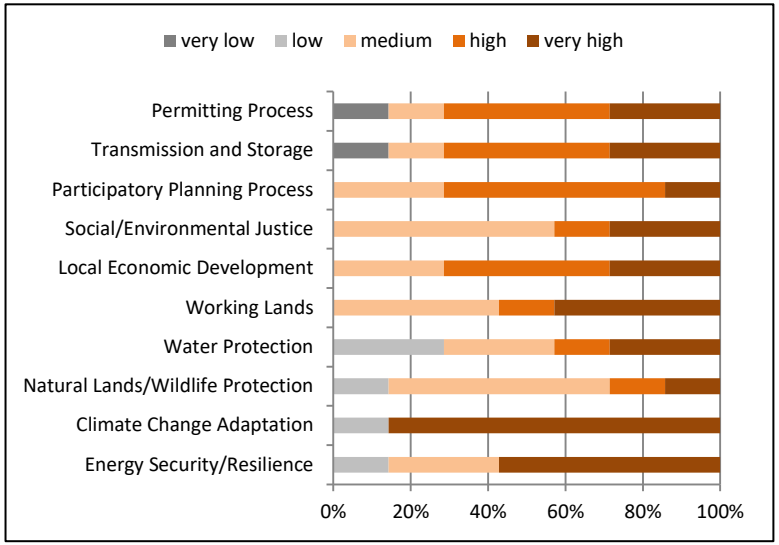

**State Government (n=5)**



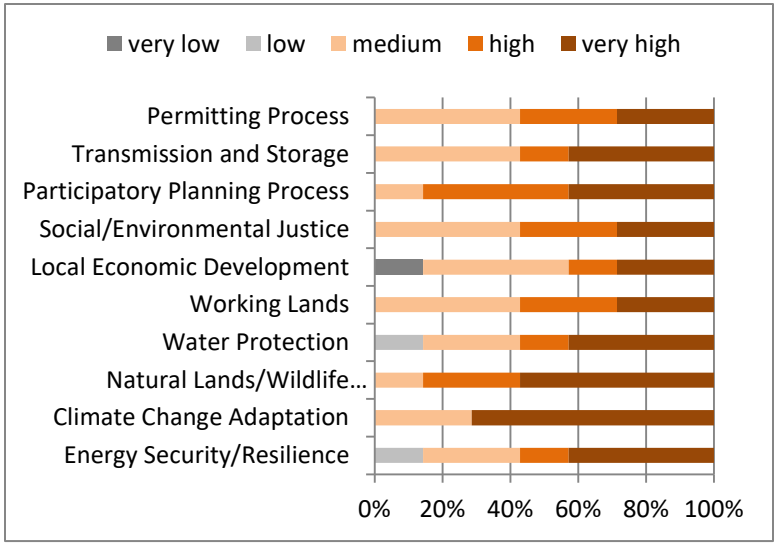
**Federal Government (n=4)**




**Utility (n=7)**



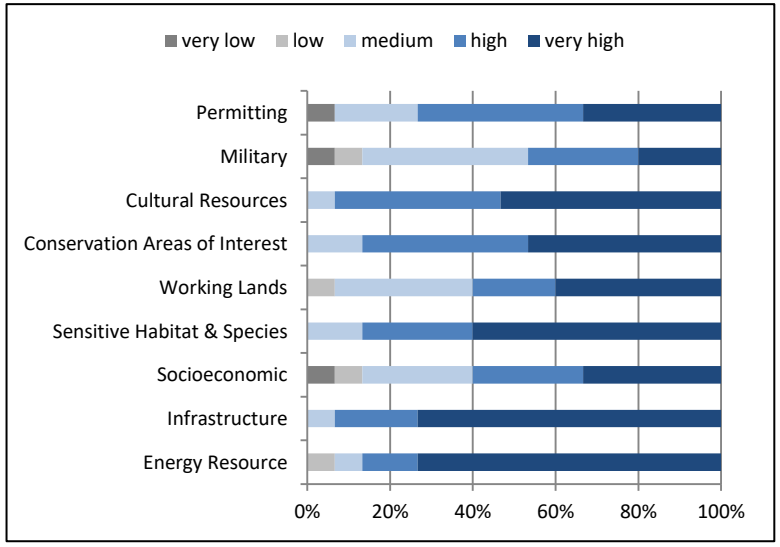

**Tribal (n=7)**



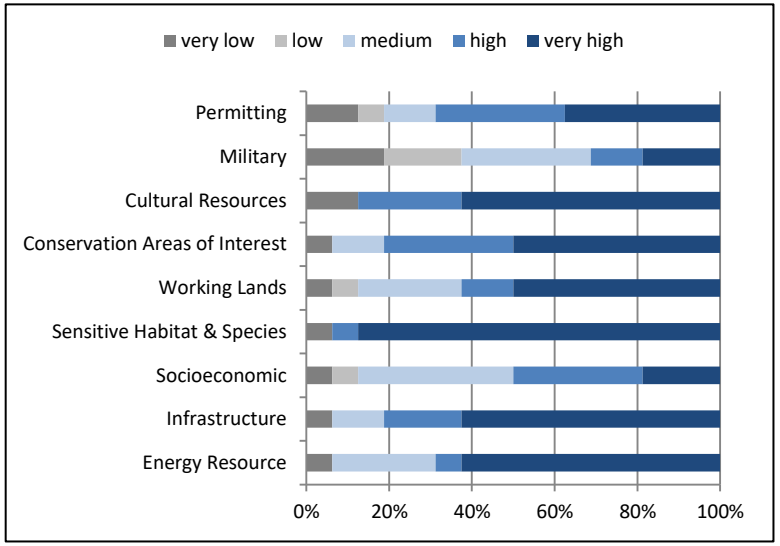
# APPENDIX D: Survey Results by Sector – Renewable Energy Priority Data and Information

Categories included: Energy Resource, Infrastructure, Socioeconomic, Sensitive Habitat and Species, Working Farms, Ranching, and Forest Lands, Conservation Areas of Interest, Cultural Resources, Military, Permitting
(blue to gray histograms indicate good sample size; orange to gray histograms indicate small sample size)

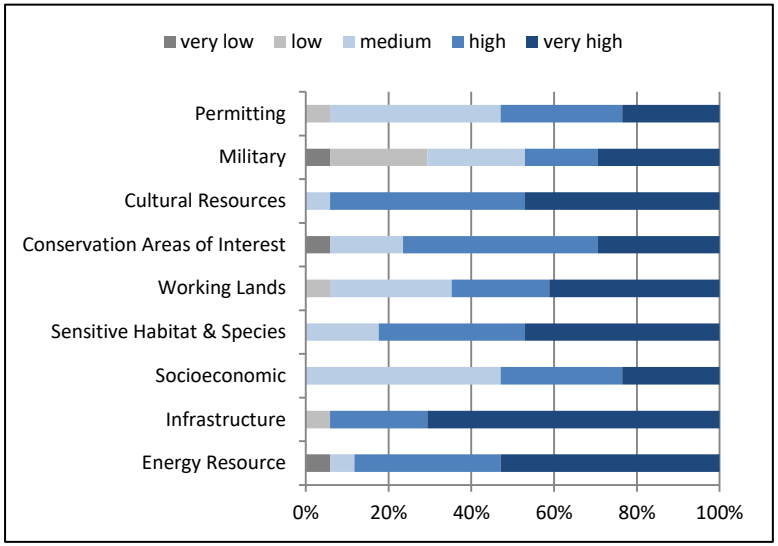
**Industry (n=15)**



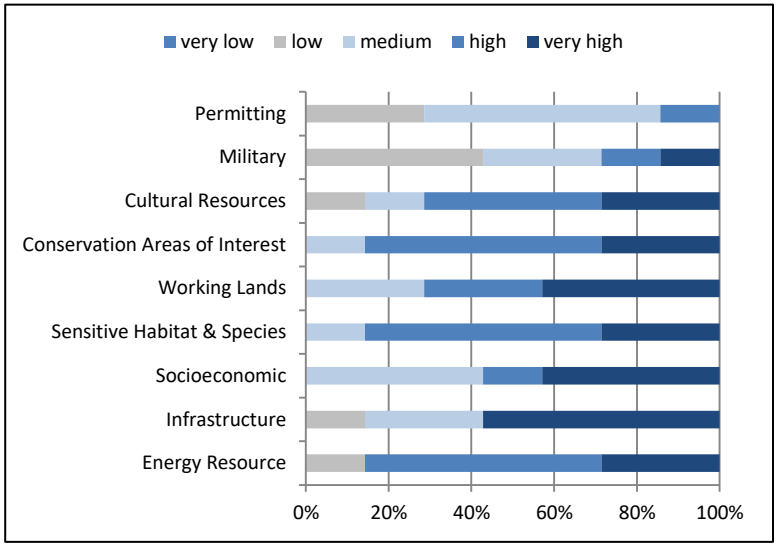

**NGO (n=17)**



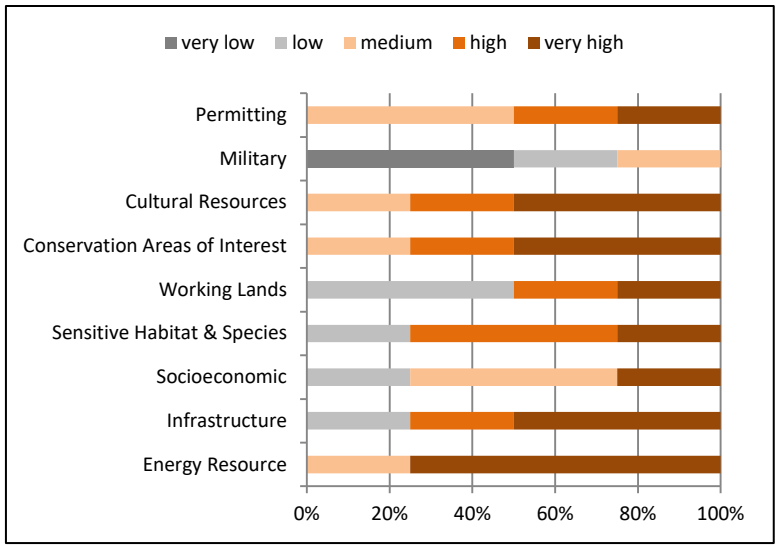
**Local Government**



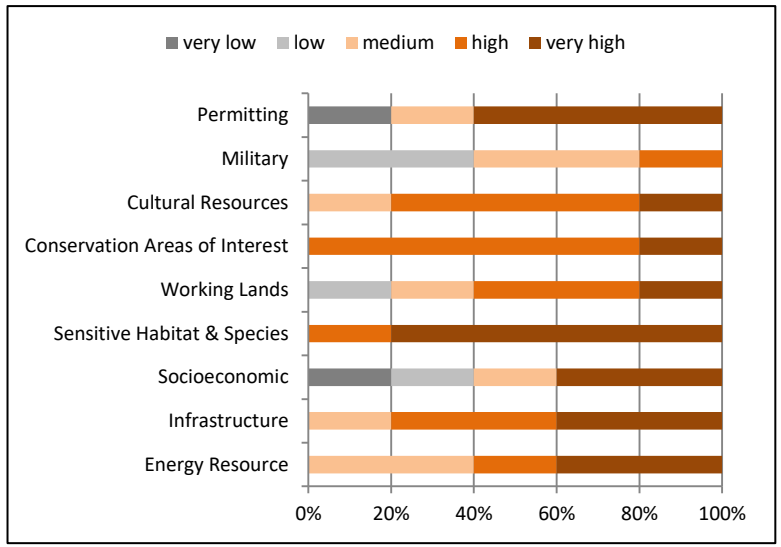

**University (n=7)**



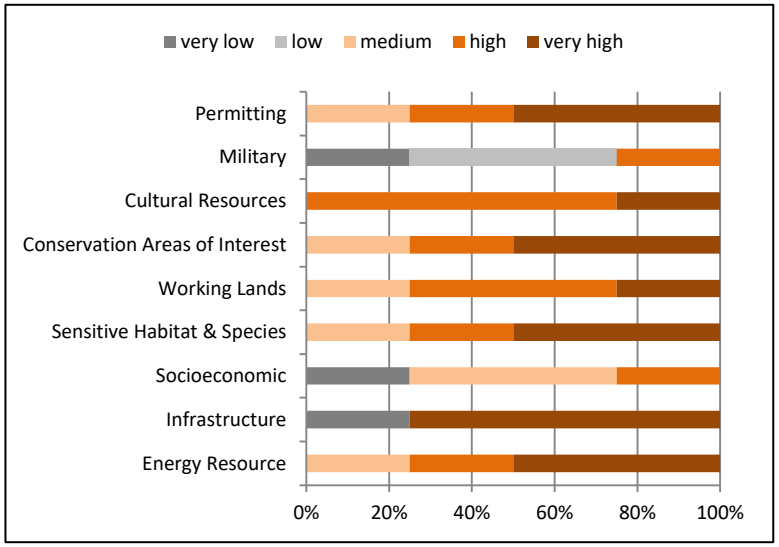

**Agriculture (n=4)**



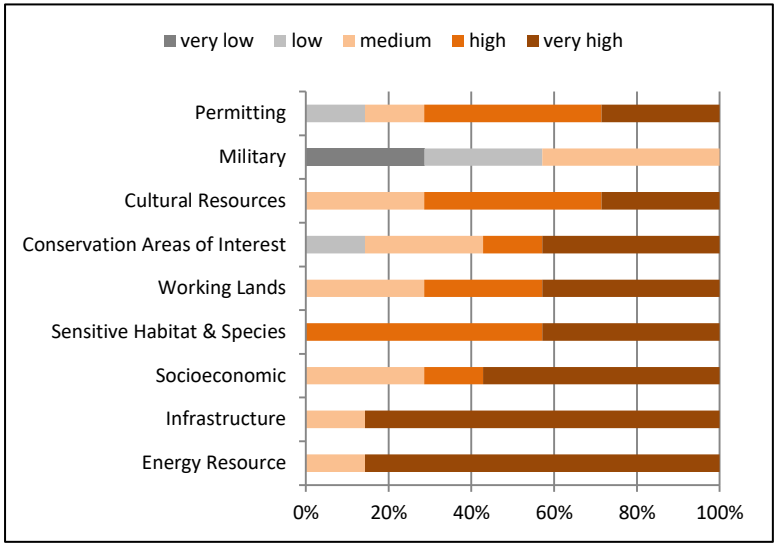

**State Government**



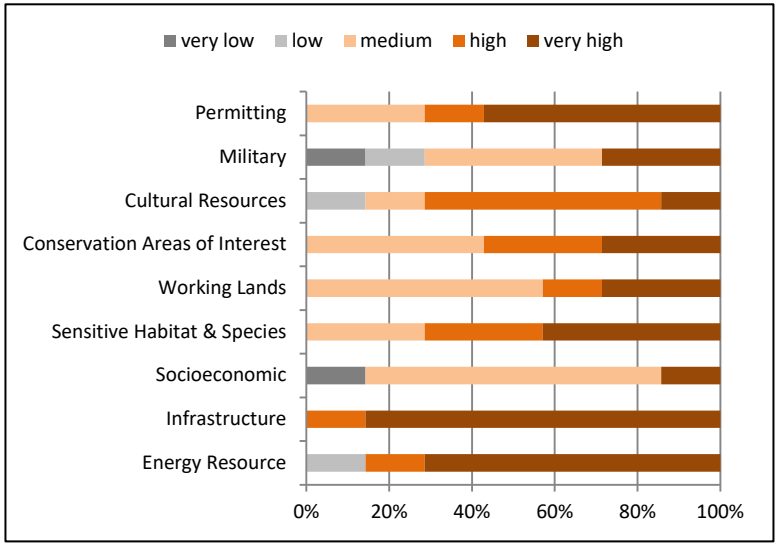
**Federal Government (n=4)**




**Utility (n=7)**




**Tribal (n=7)**



# APPENDIX E: Organized Summary of Written Survey Responses to Questions 11, 12 and 16

(We *have attempted to retain the language of the respondents as much as is possible, but have edited it slightly for clarity*.)

**Q #11: What are the characteristics or conditions that lead to land use compatibility (opportunities) with renewable energy development? Please list.**

**Q #12: What are the characteristics or conditions that lead to land or ocean use challenges with renewable energy development? Please list.**

**Q #16: Is there anything else you would like to share related to the overall ORESA Project or the Natural Resources, Environment, and Development: Opportunities and Constraints Assessment?**

## Public Process

Opportunities

Good stakeholder engagement, adoption of a "test, monitor, and adapt" approach to energy development as opposed to a “design, build, and defend" approach

Need direct, timely, and robust involvement by the public process from all sectors

Include the adjacent landowners in transparent public process to avoid “not in my back yard” (NIMBY) litigation

Early engagement with local stakeholders and communities rather than a developer picking the location they want and then going to the community

Challenges

Identifying and resolving real or perceived infringement on existing uses

Existing industries (fishing, shipping, ranching, and utilities) have a seat at the table. Emerging industries are at a distinct disadvantage. Conventional energy supplies were developed over decades with significant government subsidies and incentives. Emerging energy supplies, with advantages that are not recognized in the Integrated Resource Plans of regulated utilities, are at a disadvantage as are citizens.

Cultural concerns/resistance to use of resource lands

ODFW’s overreach to stymy permitting and the lack of scaling of their engagement to issue sensitivity

The state and federal governments do not have a clear process for meaningful stakeholder engagement

## Transmission

Opportunities
Interconnecting to local grids necessary for comprehensive inclusion of all communities in energy generation

Would be very useful to create maps that facilitate transmission planning, with go/no-go areas, where state agencies would facilitate and support such, so long as (direct) footprint isn't impacting critical locations. In other words, new transmission lines will HAVE to cross mountains, public lands, etc.

Creating a tool and policy context recognizing that so fast-tracking could occur (something will always be impacted) will help keep the transmission shortage issue and related timelines to permit & build (can be decade-length, esp. due to these issues) from being a binary, hard-wall, fatal flaw to the decarbonization of the Northwest.

Implement micro-grid solutions

Challenges
New transmission routes cuts through forest and increase invasives; cuts under or over streams

Lack of transmission system overlay with viable siting (esp. private lands)

The utility interconnection process for even very small renewable projects is complicated, unnecessarily cumbersome, discouraging project proponents by adding a layer of financial burden to the project

## Policy frameworks

Opportunities
Policies to benefit local economies and Black, Indian and People of Color (BIPOC)

Federal/State subsidy to level economic opportunity

Availability of a reasonable, predictable permitting regime

Structure RE development to economically benefit landowners

Appropriate zoning open to energy development

GOAL 13 updates to move into an energy generation goal is essential

Offer incentives for people that use less energy

Challenges
Streamlining county permitting processes for RE development

“I've spoken with farmers who have invested time and $$ into solar only to run into permitting issues and have solar panels just collecting dust. I don't have additional details but it seems like making permitting as streamlined as possible for folks interested in doing this work is important.”

Lengthy and complicated EFSC permitting process

There is a disconnect between permitting transmission and projects

Complex county land use rules

Arbitrary rules like the distance between solar projects versus viewing the energy as needing a "resource" of infrastructure to site close to, it is more sustainable to site close together and share infrastructure and roads if possible.

The DLCD rules for solar development on different soil classes are too restrictive and inflexible

Outdated agency policies with respect to modern RE technology, societal values and climactic developments our land use goals recognize the value of energy conservation, but not renewable energy generation.

Fully funded by developers, no transferal of costs to users

Full responsibility of owners for complete removal of equipment in case of failure - COSTLY

Uneven playing field in government incentives/subsidies for renewables compared to non-renewables

Challenging historical and cultural issues and difficult to navigate mitigation requirements

Challenging wildlife issues and difficult to navigate mitigation requirements

There may be Forest Plan constraints that will need to be amended where relevant

The biggest sticking points in the regulatory process from a natural resource perspective has to do with projects that are sited within areas such as big game winter range, movement

corridors, bat concentration areas, raptor/eagle nest sites, and pygmy rabbit and Washington ground squirrel habitat.

A heavily revolving door between 1000 Friends of Oregon (members of the LCDC Commission) and DLCD decision making staff. This has allowed for one agenda to rule Oregon land use like a religion, and even coming to the table to discuss issues or adapt rules is viewed as a sin against the views of 1000 Friends, Department of Agriculture, and the Farm Bureau.

## What areas are compatible?

Use existing brown fields, disturbed areas, proximity to infrastructure to reduce cost of delivery to markets, proximity to existing grids and roads, use utility right-of-ways, and areas close to available workforce.

Already degraded land (e.g., parking lots, former ag fields, road right-o- ways, rooftops, etc.)
Land that has no habitat or agricultural value

Areas where one can cluster multiple projects

Explore developing agrivoltaics

## What areas to avoid?

Avoid areas where local ecological or cultural values are present, landscape scale conservation priorities (migration corridors, watershed or groundwater recharge zones, etc.), current and future natural hazard zones, and productive farmlands

Avoid conflicts with military uses

We need to make sure we are not encouraging renewable siting on productive agricultural land just because that land is "cheaper" - agricultural land is in limited supply and needs to be protected for agricultural use.

Important viewsheds

Federal threatened and endangered species occurrence and critical habitat (where designated) as well unique habitats

Known or potential areas and resources important to tribes, including trust resources held and/or managed by the United States for the benefit of I indigenous peoples

All specially designated federal lands, including legislative protections (e.g., wilderness) and administratively established areas, such as wilderness study areas, identified lands with wilderness characteristics, Areas of Critical Environmental Concern, Research Natural Areas and Outstanding Natural Areas

Known species migration routes and areas important for habitat connectivity and climate change refugia

Areas critical to military use or potentially interference such as radar

Areas restricted by FAA

Goal 5 protected areas

## Offshore wind

Opportunities

The challenge is to develop offshore wind in consultation with fishing industry and find solutions that work for both, and insure those cooperative solutions are actually implemented.

Land and ocean are not the same. Ocean is 3-D and different people use different places. Ocean conditions are more dynamic than on land.

For Ocean Renewable: Existing shoreside infrastructure and grid considerations, existing uses and values, cultural perceptions, jobs and economy, natural resource impacts

There's been some great research on ocean use off the OR coast; don't reinvent the wheel or move forward without familiarizing yourself with it.

Because OSW is likely to be fairly far from shore, most NIMBY-style concerns like viewshed impacts, can be minimized.

Significant infrastructure investment must be made to make this a safe and practical solution to NW US energy needs.

Need to develop energy storage infrastructure along the coast

Challenges and constraints

Avoid legally unavailable areas (e.g., existing cables, MPAs, etc.)

Minimizing impacts on commercial fishing

Avoiding ecologically sensitive areas

Lack of transparent process and concern for existing social economic structure that will be displaced by an ill-founded process that believes that their holy cause to stop climate change allows them to displace fishermen, shut down fisheries and make our country even more dependent on seafood imports from countries that do not practice sustainable fisheries management nor are doing major changes to stop climate changes or pollution

Conflicts with existing users (fishermen/processors) and traditional fishing grounds

Inflated figures or projections of the creation of "local jobs" for projects

The offshore area around the Oregon Coast is a challenging and hostile environment that consistently sees high sea and wind states. Also there is a lack of maritime development along the central and southern OR Coast that makes responding to issues with offshore wind or wave energy difficult.

There is a lot of fear, angst and anger about the lack of direct public involvement and participation in this process. Couple this with a lack of outreach to our fishing communities, and you have a volatile combination. This can be resolved by taking our generations old occupations and heritage into respectful consideration.

## Agriculture

Opportunities

To explore the feasibility of co-siting on farm lands (agrivoltaics)

Finding ways of engaging and collaborating with farmers and/ or farm organizations sooner rather than later is essential.

Challenges

The increase in large-scale solar arrays on farmland has economic impacts on surrounding farm economies, due to fragmentation of farm and ranchland, and impact on land values.

Large-scale solar facilities can extend over large swaths of land, blocking or restricting sun and water, impacting the vegetation and soil beneath, restricting wildlife migration and fragmenting habitat.

Displaced wildlife can have unintended effects on working farms and ranches.

When the potential for renewable energy development increases property values or lease prices in an agricultural area to the point where farmland is no longer affordable for farmers (or land managers would prefer to lease for energy development because they stand to make more money), where renewable energy development fragments an agricultural landscape, making it more difficult for farmers to farm (especially in eastern parts of the region, farmers and ranchers often need large contiguous parcels).

## Tribal concerns

From a perspective rooted in Cultural Resources concerns: absence of Tribal Consultation, lack of thorough Cultural resources analysis (cultural plants, archaeology, cultural connection and practices, Historic Places of Cultural and Religious practice and significance, sightlines, etc.). All too often it is presumed by agencies that Tribal concerns for cultural resources are relegated to

'stones and bones'. It implies Tribes have not contributed to life and landscape continuously including the historic and modern eras. Notification of proposed projects can also be a challenge. A suggestion, though not limited to, is notification at time of concept or 'funding ask' and again at time funding has been received. Multiple points of check in during the process may help with minimizing challenges. Consultation with affected

Tribes can often occur late in the process and result in challenges. There are 9 federally recognized Tribes in Oregon and most have overlapping interest areas. Through the State's recognition of these Tribes it is important to work with each individually.

## Other enabling or constraining factors

Both solar and wind can be highly compatible with agricultural land uses, provide an additional income stream for farmers, and be built in a way that makes it possible to restore the land to farming after the useful life of the project.

New substations or energy storage facilities need to be constructed for distributed energy development.

Proximity to resource based fuel source, need to treat forest land to mitigate wildfire impacts (biomass).

Prefer locating generation facility close to the site of end use.

Geothermal has endless possibilities as it could be piped anywhere.

Ensure funding for regular data collection and assessments.

Undeclared but potential land/water designations (easements, state or federal conservation designations, pending but not final fish/wildlife protected habitat, etc.), and similarly with respect to existing competing uses of land/water that have not yet led existing economic/social interests to express a desire to exclude competing renewable energy use. In both cases, proposed renewable energy development can lead to galvanizing latent but previously unexpressed views of the best use of the location of the proposed project.

Ability to collaborate with other beneficial users of the land or ocean on project design and siting

Market certainty for contract terms and duration

## Information needs

Synthesis of research is necessary to understand the impacts of renewable energy development on wildlife habitat and corridors

Feasibility of floating solar on water reservoirs

Missing or outdated maps from ODFW

Lack of understanding of benefits, and limitations of Renewable energy sources

More education is needed to understand renewable energy efficiency, and it's necessary connection to base load power generation.

Lack of habitat use/range of Species of Greatest Conservation Need in the Oregon Conservation Strategy
DLCD and DP of Ag reluctance to acknowledge the work of OSU on Dual use projects.

Often challenges to renewable energy development are based on incomplete or incorrect information. For example one often hears concerns about property-value or tourism impacts that are not borne out by data or studies.

Need grid optimization studies to ensure renewable energy can be used all along the existing grid and prioritization for necessary upgrades.

## Broader RE issues

The scoping of Question 7 excludes projects of 1MW and less, that is very relevant to coastal communities and disaster-resilient microgrids for critical facilities, and effectively excludes wave energy by not listing it as a choice. These design decisions arbitrarily and narrowly define the scope of this study, reducing its credibility. The study should be repeated in a more inclusive manner.

The value of community resilience is an emerging concept that would be a useful input.

Many coastal industries and communities take pride in sustainability, yet rely on electrical energy and liquid fuels from elsewhere, so the associated impacts and uncertainties are excluded from the balance.
Build back better workforce protections and engage labor.

There has been little integration of renewable energy development and community resiliency / disaster preparedness planning to date. With the increase in PSPSs and wildfires, I expect that to receive much more attention from both local and state government.

# APPENDIX F: Number of Webinar Registrants and Attendees

The following table lists the number of registrants and attendees to each webinar.

| No. | Region | Registrants | Attended |
|---|---|---|---|
| 1 | Basin and Range (E. Oregon) | 66 | 46 |
| 2 | Columbia Basin (E. Oregon) | 51 | 26 |
| 3 | Cascade/Klamath Region | 42 | 29 |
| 4 | Coast Range | 44 | 23 |
| 5 | Willamette Valley | 34 | 16 |
| 6 | Offshore | 93 | 49 |

# APPENDIX G: Data Delivery List

Please see Excel spreadsheet entitled ORESA Final Data List for Terrestrial and Marine