Oregon's Renewable Electricity Future:

Comparison of the Economic Contributions of Alternative Primary Policy Approaches and Bills *RPS Acceleration* (HB 3180) vs. *Emissions-Based* (HB 2021/2995)

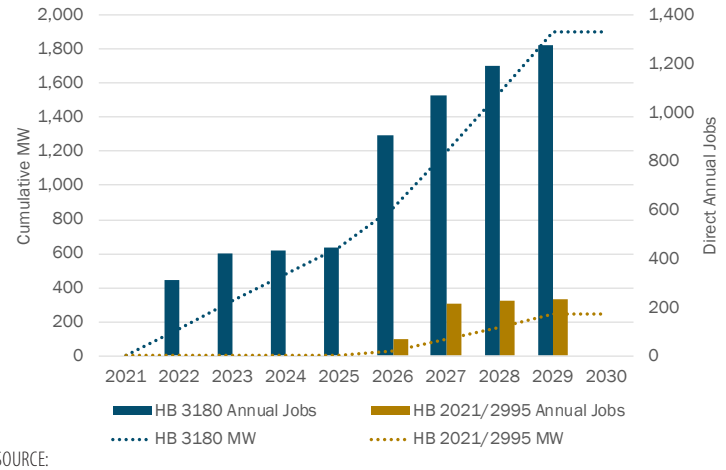
MARCH 2021

Oregon is currently considering legislation to increase its clean energy standards to further decarbonize the electric power sector. Two alternative approaches, with different underlying primary regulatory drivers are being considered via competing bill concepts. One approach, **HB 3180, amends Oregon's existing 2016 Renewable Portfolio Standards (RPS) statute.** The current RPS requirement is for 50 percent of affected utilities' electricity to come from newly-built renewable energy *generators* by 2040 (with milestones every 5 years). **HB 3180 would increase RPS to 90 percent by 2035, and 100 percent by 2050**. HB 3180 also includes annual milestones and requires 50 percent of new projects to meet local grid resiliency criteria. Alternatively, **HB 2021/2995 propose new statutes that regulate utility emissions**, mandating reductions of 80 percent, 90 percent, and 100 percent in emissions by 2030, 2035, and 2040, respectively. These new statues would require new multi-agency rulemakings to implement, but do not incorporate any local grid resiliency criteria. This report compares the economic contributions of the two approaches — HB 3180 and HB 2021/2995 — by evaluating how they would impact renewable energy generation in Oregon and support jobs, wages, and economic activity in the state.

KEY TAKEAWAYS

- From 2021 to 2030, **HB 3180 is expected to result in approximately 7.8 times more direct investment in Oregon** compared to HB 2021/2995.
- **HB 3180 is expected to result in immediate investments relative to the existing RPS schedule, over $425.5 million in installation spending by 2025.** HB 2021/2995 is not expected to result in new investments in Oregon until 2026.
- **HB 3180 is expected to support an average of 605 direct jobs per year through 2030 in Oregon**. HB 2021/2995 is expected to support an average of 74 direct jobs per year in Oregon over the same period.
- Investments in renewable energy in Oregon will support secondary economic activity through supply chain and consumption purchases, particularly through employee spending. Through 2030, **HB 3180 is expected to support a total of 1,021 total average annual jobs, as well as $166.1 million in total labor income and $404.7 million in total economic activity from 2021 to 2030 in Oregon.**
- **HB 3180 is expected to generate $14.6 million in statewide property taxes** in Oregon through 2030 ($5.2 million by 2025), compared to $1.9 million by 2030 under HB 2021/2995 ($0 by 2025).
- Per diem spending by non-local workers will support higher total wage levels and increased economic activity in rural economies. **HB 3180 is expected to support approximately $10.6 million per year in per diem spending** through 2030, compared to $1.2 million per year under HB 2021/2995.
- New renewable energy capacity in Oregon will stimulate economic activity, primarily in rural economies. It is expected that **684 annual total jobs (direct and secondary) will be supported in South East and Central Oregon — 8.6 times higher under HB 3180** than HB 2021/2995.
- From 2021 to 2050, **HB 3180 is expected to support 14.5 times more total jobs, 13.7 times more total labor income, and 13.7 times more total economic activity in Oregon** compared to HB 2021/2995.
- HB 3180 is expected to **result in an additional $38 million in annual BPA transmission revenue by 2030** compared to HB 2021/2995.

EXHIBIT 1. Cumulative Net-New In-State Renewable Generation (MW) and Direct Annual Jobs (2021-2030)



SOURCE:
Created by ECONorthwest based on information provided by Energy and Environmental Economics, Inc and IMPLAN.

The purpose of this report is to compare the economic activity in Oregon supported by alternative decarbonization legislation approaches: (1) HB 3180, an RPS-increase driven approach; and (2) an emissions driven approach, as per HB 2021 and HB 2995. The information in this report is based on legislation as introduced and including as understood per pending amendments on primary bill features (particularly major regulatory milestones and local grid resiliency criteria affecting Oregon-based siting). Additional amendments may occur for both proposed bills — however, they were not available as of the writing of this report.

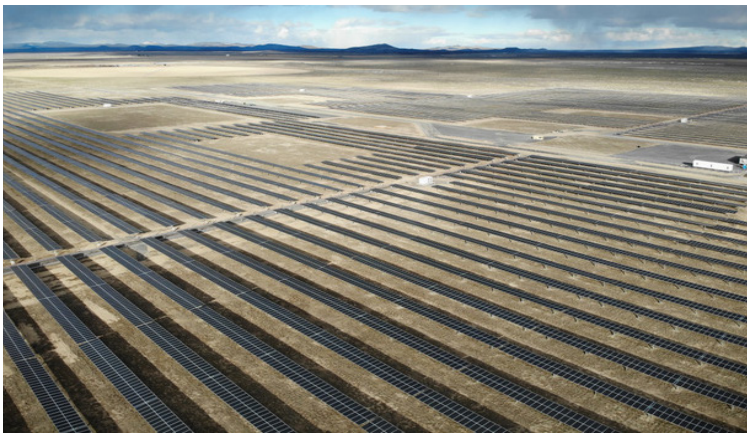
OVERVIEW OF PROPOSED BILLS

The proposed bills, HB 3180 and HB 2021/2995,[1] differ primarily in two regards that are relevant for calculating economic contributions to Oregon. HB 3180 accelerates the current RPS schedule to 90 percent by 2035 and 100 percent by 2050, with annual progress milestones. Importantly, HB 3180 also requires that 50 percent of new renewable generation capacity contribute to Oregon grid resiliency by connecting to the local and regional grid.[2] As a result, it is expected that 45 percent of all RPS compliance would likely be sited in Oregon.[3]

Comparatively, HB 2021/2995 has emission-based standards. HB 2021 and HB 2995 are substantially similar for purposes of this analysis, both achieving decarbonization through emissions-driven greenhouse gas reduction regulatory mechanisms, not RPS. The two bills have the same proposed reduction milestones (as per proposed amendments). **Neither HB 2021 or HB 2995 has an in-state or other local siting preference.** HB 2021/2995 requires that annual greenhouse gas emissions associated with electricity sold to retail consumers be reduced by 80 percent of the baseline by 2030, 90 percent below by 2035, and 100 percent by 2040.[4,5] Implementation timelines for a new emission-based approach — HB 2021 or HB 2995 — will require several years of rulemaking activity, across multiple state agencies, which will delay clarity on utilities ability to procure additional generation.

HB 3180's local grid resiliency criteria, accelerated RPS milestones (beginning in 2022), and relatively quicker implementation due to modifications of an existing statute are the major drivers of the differences in economic contributions between the two approaches. Exhibit 2 highlights the key comparisons between the two proposed approaches.

Another difference between the two proposed bills that influences the distribution of the jobs, wages, and economic activity supported in Oregon is the price premiums that electric utilities can offer for new renewable electricity under HB 3180. These price premiums incentivize the use of minority-owned contractors, higher levels of Oregon-based supply content, exceeding prevailing wage rates for labor, and exceeding apprenticeship labor standards. HB 2021/2995 does not have any similar price premium provisions.



Solar Project in Lake County, Oregon (Source: NewSun Energy)

EXHIBIT 2. HB 3180 and HB 2021/2995 Key Comparisons

BILL	BILL TYPE	MILESTONE YEARS	OR SITING REQUIREMENT	PRICING INCENTIVES
HB 3180	Renewable Portfolio Standards (RPS)	Annual Milestones with Constant Increases 90% Renewable by 2035 100% Renewable by 2050	Expected to be 50% of new capacity to meet RPS standards	1% for use of minority-owned contractors in construction 1% for RPS over-performance 2% for an Oregon-based supply content that exceeds 5% 1% for exceeding labor targets for prevailing wage 1% for exceeding apprenticeship labor standards Total may not exceed 5%
HB 2021/2995	Emissions Reduction Standards	100% Emissions Reduction by 2040 90% by 2035 80% by 2030	None Included	None Included

SOURCE: Created by ECONorthwest based on bill language as introduced and known amendments.

[1] Suggested amendments to HB 2021 may include elements from HB 2995 as introduced — thus, we refer to both proposed bills in the text and analysis. However, the provisions of each bill are yet to be finalized as of the writing of this report.

[2] In accordance with Section 7 of HB 3180, as introduced.

[3] This 45 percent estimate assumes that 90 percent of qualifying projects would be sited in Oregon.

[4] HB 2021/2995, as introduced, requires that emissions from electricity sold to retail consumers be reduced by 100 percent of baseline by 2035 (100 percent by 2040 is based on known proposed amendments).

[5] The analysis by Energy and Environmental Economics, Inc. calculated emissions using a baseline of 2010-2012 emissions levels, as proposed in the legislation.

INVESTMENTS IN OREGON

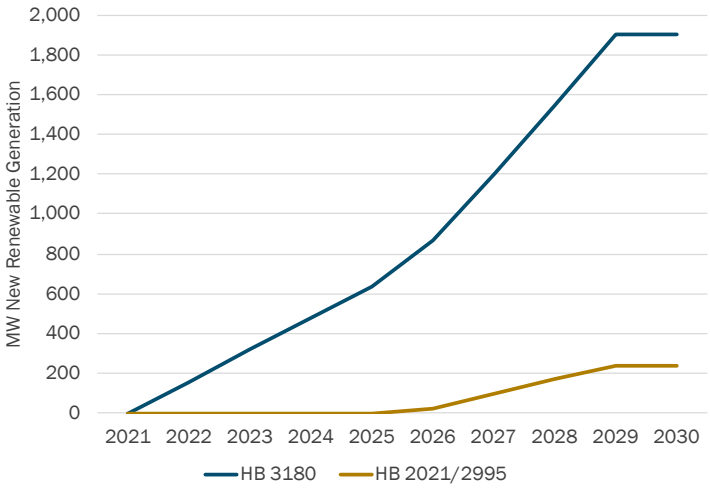
The difference in the levels of new renewable electricity generation capacity that will be built in Oregon between the proposed bills is a function of both the new capacity required to meet the standards compared to current RPS levels, as well as the share that will be built within the state. Under HB 3180, 50 percent of the covered new capacity needed to meet the annual RPS percentage requirements must be constructed in a manner that augments grid resiliency in Oregon, in particular by connecting to Oregon utilities' grids within 50 miles of state boundaries or the contiguous BPA system.[6] As a result, it is expected that 90 percent of those qualifying projects would be sited in Oregon, resulting in 45 percent of total new RPS compliant generation constructed in state. Under HB 2021/2995 there is no requirement that would lead to increased investments in Oregon over the exiting RPS standard. However, previous trends[7] as well as recent procurement plans for Oregon electric utilities,[8] suggest that approximately 7.5 percent of new renewable capacity would likely be constructed in Oregon absent any siting requirements.[9]

Based on existing trends, the majority of new renewable electricity generation capacity will likely come from new wind and solar with storage projects, with the relative share of new wind investments declining and solar with storage increasing over the next 30 years.[10] In addition to the majority of new renewable energy generation in Oregon from wind and solar, there likely will be some new small-scale hydropower facilities. The maximum potential development of these small-scale hydro facilities is expected to be between 100 to 150 MW through 2050, with likely development over the next 20 years of 30 to 50 MW.[11] These facilities include projects as small as 50kW and up to 10MW, some of which are already planned.

Because of the uncertainties associated with long-term projections of the composition of the economy, and because near term economic impacts are of particular concern, the primary focus of this analysis is on the near term effects of the proposed bills from 2021 to 2030.

Exhibit 3 shows the expected new, annual in-state renewable electricity generation in megawatts (MW) in Oregon under each bill from 2021 to 2030. For both proposed bill approaches, new renewable electricity generation is expected to increase each year through at least 2034 compared to current RPS standards, with relatively smaller increases in subsequent years for HB 3180 through 2050. In net, there will be approximately 7.9 times more renewable generating capacity constructed in Oregon under HB 3180 compared to HB 2021/2995 between 2021 and 2030.

EXHIBIT 3. Cumulative Net-New In-State Renewable Generation (MW, 2021-2030)



SOURCE: Created by ECONorthwest based on information provided by Energy and Environmental Economics, Inc.

Importantly, the timeline for triggering new generation procurement and construction under an emissions approach — HB 2021/2995 — would first require multiple years of rulemaking.[12] As such, a multi-year period delay (2 to 4 years)[13] is assumed for regulatory implementation, to then be followed by another 2 to 4 years before procurement by utilities proceeds, for which projects procured would then presumably have in-service dates 1-3 years thereafter.[14] Cumulatively, this equates to a 5 to 11 year process. This report uses the most aggressive likely achievable timeline of 5 years for when HB 2021/2995 would result in incremental procurement for emissions reductions requirements beyond the RPS implied obligations.

[6] In accordance with Section 7 of HB 3180, as introduced.

[7] From 2001 to 2019 approximately 7.3 percent of annual new utility-scale solar and wind capacity in the Pacific and Mountain regions was constructed in Oregon according to the EIA, Net Generation, available at https://www.eia.gov/electricity/data/

[8] PA Consulting Group. (2020). Oregon Public Utilities Commission Independent Evaluator's Updated Status Report on PacifiCorp's 2020AS RFP. Retrieved from https://edocs.puc.state.or.us/efdocs/HAH/um2059hah15492.pdf

[9] Existing procurement plans suggest that in-state new RPS compliant generation could be as low as zero before 2030 (PA Consulting Group 2020).

[10] The comparative analysis of renewable development under each bill and calculations of the share of new wind and solar were provided by Energy and Environmental Economics, Inc.

[11] For example, the Belmont and Dee Bridge projects in the City of Hood River, more information available at https://olis.oregonlegislature.gov/liz/2021R1/Downloads/CommitteeMeetingDocument/229498.

[12] Andrus, B. (2021). *Analysis of rulemaking and implementation timelines for emissions-based vs. RPS-expansion-based power decarbonization policy approaches.* Memo by NewSun Energy to Oregon Clean Energy Legislators. March 9.)

[13] Oregon Department of Energy, *Rulemaking*, available at https://www.oregon.gov/energy/Get-Involved/Pages/Rulemaking.aspx

[14] Andrus, B. (2021). *Analysis of rulemaking and implementation timelines for emissions-based vs. RPS-expansion-based power decarbonization policy approaches.* Memo by NewSun Energy to Oregon Clean Energy Legislators. March 9.)

Two factors — the overall implied delay of any incremental renewables procurement, as well as lack of local grid resiliency criteria — limit the potential near-term economic contributions associated with the proposed *emissions-based* bills HB 2021/2995, relative to HB 3180.

In contrast, HB 3180 would not likely require substantial rulemaking prior to continued utility renewables procurement since it is an update to the current RPS. HB 3180 would also allow existing planned utility procurement to continue unimpeded. HB 3180 would require additional generation of renewable energy compared to current RPS levels, by accelerating the next RPS milestone. Changes to these assumptions would change the results of the amount and timing of economic activity supported in Oregon.

The vast majority of the incremental MW built in Oregon will be delivered using Bonneville Power Administration (BPA) transmission. Assuming that 90 percent of the new renewable capacity is delivered via BPA, annual revenues to that agency for providing point-to-point transmission service will be increased in excess of $11 million by 2025, and approximately $38 million by 2030.[15]

This analysis does not address the potential changes in costs under the proposed bills compared to current RPS requirements. An analysis by Energy and Environmental Economics, Inc.,[16] suggests that the cost difference between resources built inside versus outside of Oregon could be negligible.

DEFINITIONS

DIRECT EFFECTS are the spending (output), jobs, and employee compensation by the investments in renewable energy in Oregon.

SECONDARY EFFECTS are the economic effects supported by spending in the local economy due to increases in supply chain purchases (indirect effects) as well as the changes in regional household spending patterns caused by changes in household income (induced effects). For example, laborers who spend money in the local economy at retail stores, restaurants, health care providers, and other goods and services generate secondary effects.

TOTAL EFFECTS are the sum of direct, indirect, and induced effects.

JOBS is measured in terms of full-year- equivalents (FYE). One FYE job equals work over twelve months in each industry. For example, two jobs that last six months each count as one FYE job. A job can be full-time or part-time, seasonal or permanent. This is the same definition used by the U.S. Bureau of Labor Statistics and IMPLAN.

LABOR INCOME consists of employee compensation and proprietor income and is a subset of output. This includes workers' wages and salaries, as well as other benefits such as health, disability, and life insurance, retirement payments, and non-cash compensation.

TOTAL ECONOMIC CONTRIBUTION represents all sales and other operating income occurring in the study area (inclusive of supply-chain purchases and compensation of employees). It is the equivalent to output and is the broadest measure of economic activity.

ECONorthwest used 2018 Oregon IMPLAN software to calculate economic contributions unless otherwise noted.

[15] Calculated based upon the long-term firm point-to-point transmission service rate of $1.533 per kilowatt per month from Bonneville Power Administration. (2019). 2020 Transmission, Ancillary, and Control Area Service Rate Schedules and General Rate Schedule Provisions (FY 2020-2021).

[16] Energy and Environmental Economics, Inc. (No Date). Public studies: high renewable penetration cost in the region relative to reference is not major. Presentation slides.

ECONOMIC CONTRIBUTIONS

Direct Spending

The amount of direct spending on new renewable electricity generation in Oregon is equal to the new capacity times the cost of installation.

- **Solar with Storage:** For solar with storage, information from NewSun indicates that engineering, procurement and construction cost approximately $1,280 per kW-AC.[17] This value is similar to estimated national average solar construction costs reported by the U.S. Energy Information Administration (EIA) of $1,850 per kW-AC, as of 2018,[18] and $1,440 per kW-AC from Berkeley National Laboratory as of 2019.[19,20]
- **Wind:** The estimate of the installed cost of wind is $1,440 per kW-AC from Berkeley National Laboratory as of 2019.[21,22]

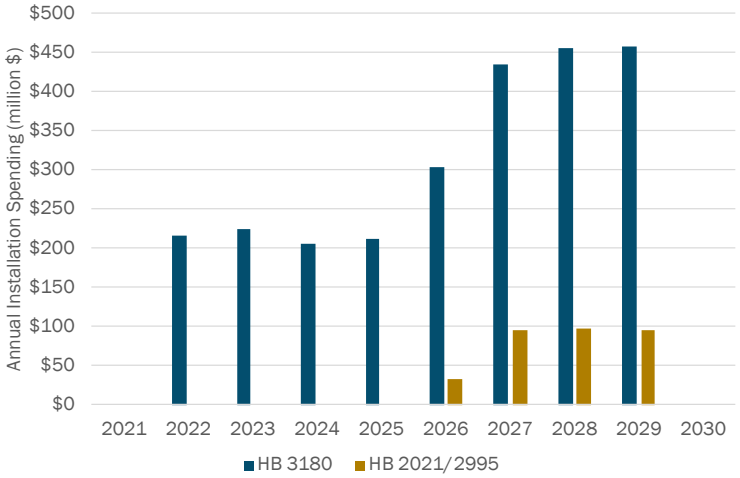
Using the above cost information and capacity projections, the total installation spending from 2021 to 2030 under HB 3180 in Oregon is expected to be $2.51 billion for wind and solar with storage, which is about 7.8 times larger than the expected total installation spending for HB 2021/2995 of $320 million (Exhibit 4).[23] ***This difference means that HB 3180 will result in $2.19 billion more dollars invested on new renewable energy capacity in Oregon by 2030 compared to HB 2021/2995.*** Note that this value is total spending, which includes a large portion of materials that are sourced from out of state.

Jobs

Direct Jobs

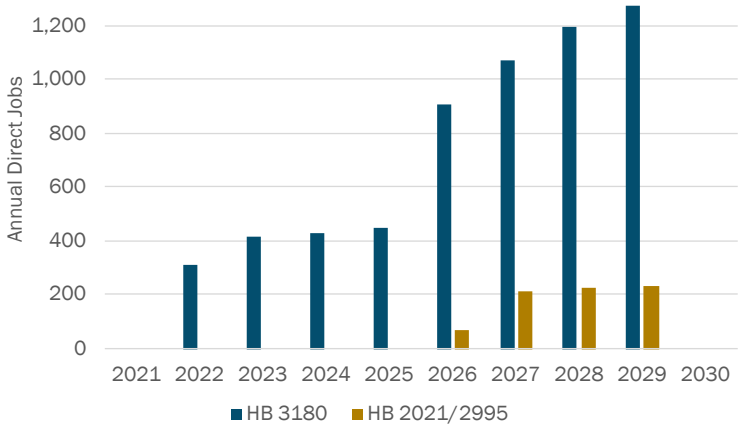
Direct jobs supported by installation activities including engineering, procurement, and construction are measured as the number of jobs per MW. Solar with storage installation is relatively more labor-intensive than other types of power generation construction, and the solar industry in Oregon relies on approximately 4.03 FYE jobs per MWAC constructed.[24] This value is roughly consistent with other estimates of the number of jobs supported by solar installation elsewhere in the United States. For instance, a study in Ohio estimated that solar installation requires 3.4 FYE jobs per MW.[25] Jobs per MW for wind installation are lower than for solar, with an average of 61 FYE jobs per project for an average project size of 73 MW,[26] resulting in an implied 0.84 FYE jobs per MW.[27,28] ***These estimates indicate that an average of 605 direct jobs per year will be supported by HB 3180 through 2030 in Oregon, while HB 2021/2995 will only support an average of 74 direct jobs per year over the same period*** (Exhibit 5).

EXHIBIT 4. Total Annual Spending on Creating New Renewable Generation Capacity in Oregon (2021-2030)



SOURCE: Created by ECONorthwest based on information provided by Energy and Environmental Economics, Inc.

EXHIBIT 5. Annual Direct Jobs Supported by Installation of New Renewable Capacity in Oregon (2021-2030)



SOURCE: Created by ECONorthwest based on information provided by Energy and Environmental Economics, Inc., Michaud et al. (2020), and NREL's Jedi Wind Model.

[17] $1,280 per AC watt is roughly equivalent to $0.90 +/- $0.10 per DC watt (subject to specific solar system designs).
[18] EIA. (No Date). *Construction cost data for electric generators installed in 2018.* Retrieved from: eia.gov/electricity/generatorcosts/
[19] Bolinger, M., Seel, J., Robson, D., & Warner, C. (2020). *Utility-Scale Solar Data Update: 2020 Edition.* Lawrence Berkeley National Laboratory.
[20] Installed prices for solar energy have decreased by more than 70 percent since 2010 when prices were $5.32 WAC (Bolinger et al. 2020). Price declines are likely to continue in the future, suggesting construction costs, and therefore jobs and economic activity supported, could be lower in the future than the $1.28 per WAC used for this analysis.
[21] Berkley Lab. (2019). *Wind Technologies Market Report.* Retrieved from https://emp.lbl.gov/wind-technologies-market-report
[22] Like solar, wind energy construction and installation costs have also fallen over time, down more than 40 percent since the peak in 2009 and 2010 according to Berkley Lab (2019).
[23] Note that this 10.0 ratio is slightly higher than the 9.9 ratio of total renewable generation between the two proposed bills due to the different build out between wind and solar and their different installation costs.
[24] Information provided by a solar developer/builder in Pacific Northwest.
[25] Michaud, G., Khalaf, C., Zimmer, M., and Jenkins, D. (2020). Measuring the economic impacts of utility-scale solar in Ohio. Prepared for the Utility Scale Solar Energy Coalition of Ohio.
[26] NREL Jedi Wind Model, available at: https://www.nrel.gov/analysis/jedi/wind.html
[27] The total MW in Oregon is 6415 MW across 46 facilities for an average of 73 MW per facility according to Oregon Department of Energy, available at: https://www.oregon.gov/energy/energy-oregon/Pages/Wind.aspx.
[28] The JEDI Wind model does not have constant (i.e., linear) returns to scale for jobs per MW of installation. Accordingly, the project size influenced the results, which is why the average project size in Oregon of 73 MW was selected as the input.

Total Jobs

All direct spending supports secondary jobs downstream in the supply chain and other associated sectors. Together, direct and secondary jobs represent the total jobs supported by the spending on new renewable energy generation in Oregon. The IMPLAN employment multiplier for the *Construction of New Power and Generation Facilities* industry in Oregon is 1.69 — meaning that every 1 direct job supports 0.69 secondary jobs in Oregon through supply chain and consumption effects. The total average jobs per year supported by local spending in Oregon on renewable energy installation activities through 2030 is 1,021 for HB 3180 and 125 for HB 2021/2995.

EXHIBIT 6. Avg. Annual Direct & Total Jobs Supported (2021-2030)

	HB 3180	HB 2021/2995
Average Annual Direct Jobs	605	74
Average Annual Total Jobs	1,021	125

SOURCE: Created by ECONorthwest using IMPLAN.

Labor Income

Direct labor income (from installation jobs) and secondary labor income (from downstream supply chain and supporting industry jobs) can be calculated using the local spending percentages for construction and development/engineering contained in the IMPLAN model. Like the jobs estimate, the labor income estimates represent only labor income supported in Oregon by installation of new renewable energy capacity. ***The total labor income supported through 2030 in Oregon is over 7.1 times larger under HB 3180 compared to HB 2021/2995.***

EXHIBIT 7. Direct & Total Labor Income Supported (2021-2030)

	HB 3180	HB 2021/2995
Sum of Direct Labor Income (2021-2030)	$105.0 million	$14.8 million
Sum of Total Labor Income (2021-2030)	$166.1 million	$23.3 million

SOURCE: Created by ECONorthwest using IMPLAN.
NOTE: Dollar values are nominal 2021 values, not adjusted for future inflation nor discounted.

Total Economic Contribution

The direct economic contribution to Oregon is the portion of total installation spending that flows directly to Oregon suppliers or workers. As a novel industry in the state, there are limited supply chain manufacturers that produce technical components for grid-scale solar installations. Thus, the entirety of construction costs estimated under either bill will not be spent all within the state. Many of the materials required for a solar with storage facility is not sourced from Oregon, such as the solar panels, steel, electrical, cabling, and other equipment. Exhibit 8 summarizes the assumptions needed to estimate the proportion of spending that will stay in Oregon to support Oregon-based suppliers and workers. The percent of total spending on construction, materials, engineering, and planning are based on NREL estimates of the distribution of costs for wind[29] and solar.[30]

Additional-in state spending will lead to increased opportunities to utilize a burgeoning Oregon-based solar construction industry.

EXHIBIT 8. Installation Local Purchase Percentages

	PERCENT OF TOTAL SPENDING		PERCENT CURRENTLY SOURCED IN OREGON	EXPECTED PERCENT SOURCED IN OREGON IN THE FUTURE
	SOLAR	WIND		
Engineering and Planning	2.4%	13.9%	6%	15%
Construction	20.3%	18.5%	25%	50%
Materials	69.0%	65.7%	0%	0%
Other	8.3%	1.9%	0%	0%
Total	100%	100%		

SOURCE: Created by ECONorthwest using Stehly et al. (2020) and Fu et al. (2018) and information provided by NewSun Energy.

[29] Stehly, T., Beiter, P., and Duffy, P. (2020). 2019 Cost of Wind Energy Review. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5000-78471. https://www.nrel.gov/docs/fy21osti/78471.pdf.
[30] Fu, Ran, Feldman, D., and Margolis, R. (2018). U.S. Solar Photovoltaic System Cost Benchmark: Q1 2018. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-72399. https://www.nrel.gov/docs/fy19osti/72399.pdf.

This development of the industry, likely to occur as in-state spending increases, is accounted for through a ramped increase of the percent currently sourced in Oregon from 2021 to 2030. The analysis assumes that a fully developed supply chain will result in 15 percent of engineering/planning spending and 50 percent of construction spending will occur in Oregon after 2030.[31]

Across all years from 2021 through 2030, local direct spending in Oregon is expected to total $225.6 million under HB 3180 and $31.7 million under HB 2021/2995. Through supply chain impacts, the total economic activity supported in Oregon through 2030 is $404.7 million for HB 3180 and $56.9 million for HB 2021/2995. ***Total economic activity supported in Oregon that supports local jobs and suppliers will be over 7.1 times larger under HB 3180 compared to HB 2021/2995 from 2021 to 2030.***

EXHIBIT 9. Direct and Total Economic Activity Supported in Oregon (2021-2030)

	HB 3180	HB 2021/2995
Sum of Direct Economic Activity (Oregon Spending) (2021-2030)	$225.6 million	$31.7 million
Sum of Total Economic Activity in Oregon (2021-2030)	$404.7 million	$56.9 million

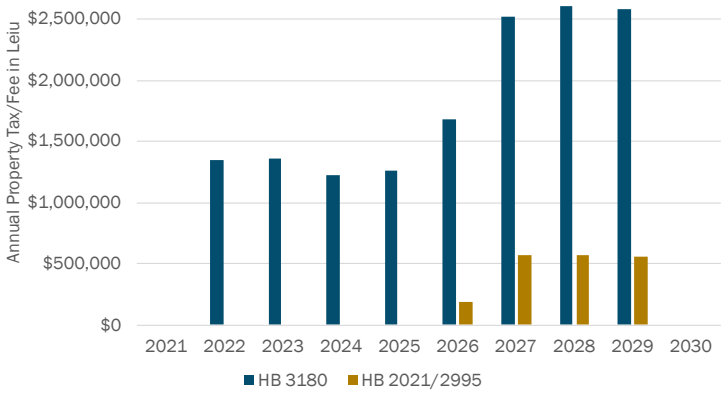
SOURCE: Created by ECONorthwest using IMPLAN.
NOTE: Dollar values are nominal 2021 values, not adjusted for future inflation nor discounted.

Property Taxes

Only privately-owned renewable energy projects that primarily produce electricity for use offsite are subject to property taxes in Oregon.[32] Solar projects generally pay a fee in lieu of property taxes at a rate of $7,000 per MW of nameplate capacity for up to 20 years.[33] Wind projects generally participate in a Strategic Investment Program (SIP) and negotiate property tax requirements with each county. Instead of paying taxes on the improvement value (as a result of the installation of infrastructure), wind projects pay a community service fee equal to 25 percent of avoided property taxes (not to exceed $2.5 million).[34,35] As of 2017, property taxes paid by wind projects averaged $9,592 per MW (inflated to current 2021 dollars). Using the MW per year of property taxes for wind and the fee in lieu for solar results in ***expected statewide property taxes in Oregon through 2030 of $14.6 million under HB 3180 and $1.9 million under HB 2021/2995 from 2021 to 2030.***

[31] Information provided by a solar developer/builder in Pacific Northwest.
[32] Blumenstein, L., and Schlusser, A. (2019). *Renewable Energy and Direct Public Revenue in Oregon*. Green Energy Institute, Lewis and Clark Law School.
[33] ORS 307.175, available at: https://www.oregonlaws.org/ors/307.175
[34] Blumenstein, L., and Schlusser, A. (2019). *Renewable Energy and Direct Public Revenue in Oregon*. Green Energy Institute, Lewis and Clark Law School.
[35] ORS 285C.609, available at: https://www.oregonlaws.org/ors/285C.609

EXHIBIT 10. Total Annual New Property Tax Payment/Fee in Lieu (2021-2030)



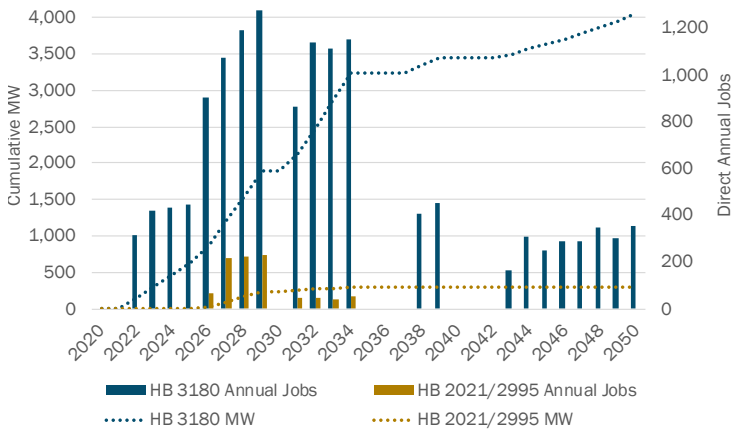
SOURCE: Created by ECONorthwest using information from Blumenstein and Schlusser (2019).

ECONOMIC CONTRIBUTIONS FROM 2031 TO 2050

This report focuses on the differences in economic contributions between HB 3180 and HB 2021/2995 through the year 2030 because the near-term effects are more certain than effects further in the future. Over time there will likely be changes in costs, technologies, labor and contractor availability, and other unforeseen market changes. This point is especially salient for the developing solar industry in Oregon, which will likely benefit from economies of scale as solar energy generation increases.

However, the different structures of the proposed bills do allow for some comparison of their potential effects beyond 2030. HB 3180 continues to increase RPS through 2050, while HB 2021/2995 targets 2040 for when all covered energy emissions would be required to be 100 percent renewable. Continuing the assumptions used to estimate the economic contributions from 2021 to 2030 suggests that a total of 4,057 MW of renewable energy will be generated in Oregon from 2021 to 2050 under HB 3180 and a total of 295 MW under HB 2021/2995 (Exhibit 11).

EXHIBIT 11. Cumulative Net-New In-State Renewable Generation (MW) and Direct Annual Jobs (2020-2050)



SOURCE: Created by ECONorthwest based on information provided by Energy and Environmental Economics, Inc. and IMPLAN.

Accordingly, the total installation spending from 2021 to 2050 and the jobs, total labor income, and total economic activity that HB 3180 supports will be approximately 14.5, 13.7, and 13.7 times higher than HB 2021/2995, respectively.

GEOGRAPHIC DISTRIBUTION

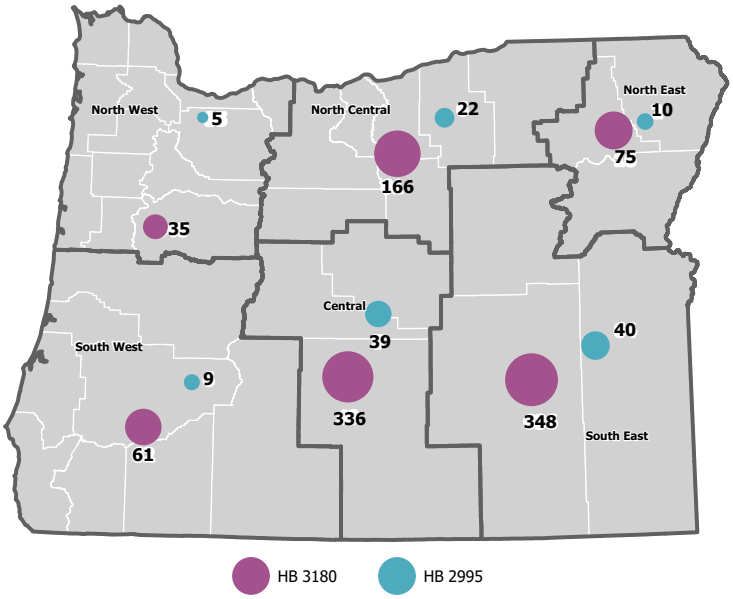
Distribution by Region

The assumptions for the future distribution of where renewable projects will be located are based where new capacity for wind and solar exists in conjunction with transmission capacity in Oregon.[36]

- **Jobs**

  Total average annual expected employment from 2021 to 2030 will be highest in the South East and Central regions of Oregon for wind and solar (Exhibit 12).

EXHIBIT 12. Total Average Annual Jobs by Region (2021-2030)



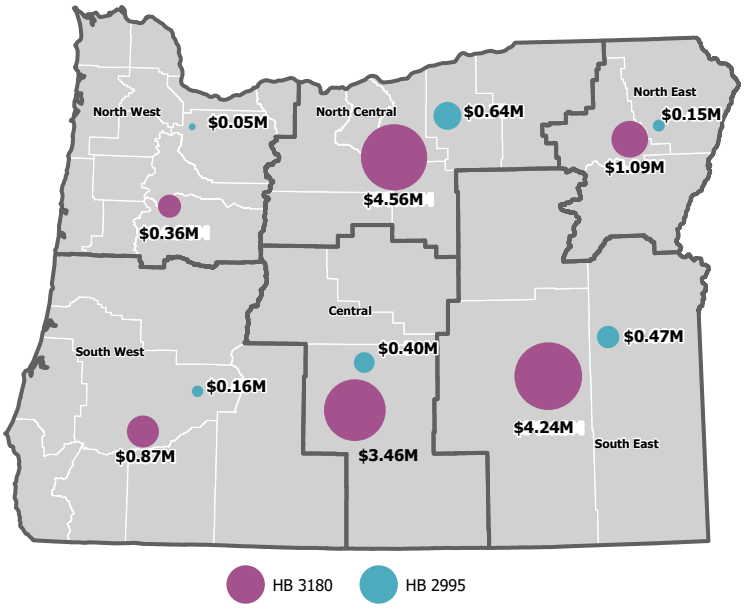
- **Property Taxes**

  Property taxes for wind and solar projects are expected to vary by county, depending on expected construction of new capacity. Applying the property tax per MW estimate results in the highest property tax revenue in the South East, North Central, and Central Regions of Oregon for wind and solar through 2030 (Exhibit 13).

Per Diem Spending

Not all regions have sufficient local labor sources for anticipated construction needs. Workers living beyond the commuting distance of a new renewable energy installation will likely establish temporary residence in the area during their time working

EXHIBIT 13. Total Property Tax by Region (2021-2030)



on-site. This temporary lodging can include hotels, motels, short-term apartment or home rentals, RV/trailer parks, onsite modular housing, and other temporary housing. In addition to lodging, workers will also spend money for food, retail items, and some services. Since these workers would not be in the region except for the renewable energy project, their spending is net new to that region.

Utility-scale solar developers in Oregon expect that in rural counties, up to 50 percent of the necessary labor will come from outside those counties. The per diem rates for these workers vary between $150 to $250, depending on location and specialization. Excluding the North West and South West regions, which may have a sufficient existing workforce workers, the economic activity supported by the $150 per diem in transitory worker spending between 2021 and 2030 is expected to be approximately $10.6 million per year under HB 3180 and $1.2 million per year under HB 2021/2995.[37] These values are in addition to the direct labor income calculated previously in this report from industry averages (excluding per diems).

[37] This calculation assumes per diem FYE workers are paid for 5 days per week for 50 weeks out of the year.
[38] Workers in the electric/utilities industries "Electric Power Generation, Transmission And Distribution", "Natural Gas Distribution", and "Electric And Gas, And Other Combinations".
[39] U.S. Census Bureau. 2015-2019 PUMS data, Oregon statewide.

The per diem spending also has secondary economic contributions as it recirculates through the local economy. Every dollar in per diem spending supports local jobs, labor income, and economic contributions, primarily in the temporary lodging, retail, and restaurant sectors. Exhibit 14 summarizes the difference in these secondary effects for each proposed bill — the secondary economic activity supported by per diem spending under HB 3180 is approximately 8.9 times larger than HB 2021/2995.

EXHIBIT 14. Average Annual Secondary Jobs, Labor Income, and Economic Contributions Supported by Per Diem Spending

IMPACT	HB 3180	HB 2021/2995
Average Annual Secondary Jobs Supported	54	6
Average Annual Secondary Labor Income Supported	$2.8 million	$0.3 million
Average Annual Secondary Economic Contribution	$8.6 million	$1.0 million

SOURCE: Created by ECONorthwest using IMPLAN.

WORKER DISTRIBUTION

Jobs will be distributed across the state based upon the industries employed to perform the work, primarily in the solar and wind construction installation sectors, engineering, planning, and energy developers. The HB 3180 bill contains provisions to incentivize the use of minority-owned contractors and apprenticeship workers. It also includes price incentives for exceeding RPS targets and for paying more than prevailing wage rates. Further, the 7.8 times more investment in Oregon under HB 3180 will amplify benefits for labor generally and for minorities compared to HB 2021/2995.

HB 2021 currently includes no significant provisions to incentivize or mandate use of small businesses, minority, women, or veteran owned businesses, or apprenticeship work standards. In Oregon, 14.2 percent of workers in the electricity industry, including construction of electricity generation facilities, identify as non-white,[38] while 24.2 percent of Oregon's population is non-white.[39] Similarly, only about 20 percent of this industry is comprised of women. Absent these provisions it is possible that the distribution of jobs and labor income will disproportionately flow to non-minority groups. HB 2995 has related provisions, but out-of-state predominant construction will limit benefits, if any, to Oregonians.

Prepared by ECONorthwest
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ECONorthwest is the largest economics consulting firm in the Northwest, with offices located in Portland, Los Angeles, Seattle, Boise, Bend, and Eugene. Founded in 1974, ECONorthwest works with public and private sector clients around the country answering questions through the lens of applied microeconomics. This report was produced under contract to and with substantial assistance from NewSun Energy, a proponent of HB 3180. For more information about this report, please contact Laura Marshall at marshall@econw.com.

This report is not a cost-benefit analysis and therefore says nothing about economic efficiency or changes in social welfare from the proposed bills. It also is not a net economic impacts analysis that considers alternative uses of the funds or effects on other aspects of economic activity in the state, such as energy price effects or effects on existing energy generators. This report compares the total gross economic contributions from the proposed bills. IMPLAN does not measure long-term impacts, but rather looks at the economy at a single point in time of one year. Applying these annual values to future estimates, as done in this analysis, is done with caution because the structural relationships of the local economy are likely to change in the future (e.g. there will be different suppliers and people will spend their wages on different items). This analysis does not include an evaluation of the economic contributions of development activities for projects where development is attempted but not built, including consulting, travel, hiring, land payments, labor, and surrounding work — from which additional economic contributions are likely, and could be further studied.

Solar Project in Harney County, Oregon

Construction of four 10 MW-AC solar facilities built in 2019-2020 at Starvation Ridge Solar Farm and Riley Solar Farm in Harney County, near Burns, Oregon, kept restaurants and hotels full, and spare bedrooms rented out, for much of a year in Burns, and employed local contractors. The Harney County projects, covering roughly 400 acres, will pay $280,000 per year in property taxes for the next 15 years. (Source: NewSun Energy)