State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030

Sarah Truitt, James Elsworth, Juliana Williams, David Keyser, Allison Moe, Julia Sullivan, and Kevin Wu

National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy
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Finally, we thank the 48 state energy office representatives who provided input into the initial scoping and direction of this report and to Kerry Campbell from the Pennsylvania Department of Environmental Protection, Energy Programs Office who provided valuable inputs and perspective into the final report.

List of Acronyms

ATB	Annual Technology Baseline
BES	battery energy storage
dGen	Distributed Generation Market Demand Model
DOE	U.S. Department of Energy
EIA	U.S. Energy Information Administration
EPRI	Electric Power Research Institute
GWh	gigawatt-hour
IEA	International Energy Agency
I/O	input-output
MWh	megawatt-hour
NREL	National Renewable Energy Laboratory
PV	photovoltaics
ReEDS	Regional Energy Deployment System
SEIA	Solar Energy Industries Association
USEER	U.S. Energy and Employment Report

Executive Summary

As states and local governments weigh how to spur economic growth, stimulate job creation, and simultaneously adapt to meet climate goals, modern energy codes, and energy demand, this report provides a simple and transparent method to estimate the size of the workforce needed to support modeled deployments for energy efficiency in buildings, stationary battery energy storage (BES), solar photovoltaics (PV), and land-based wind in 2025 and 2030.

In addition to a straightforward estimation method, this report includes state-level job estimates for two different deployment scenarios: a business-as-usual scenario and a more accelerated deployment scenario. The job estimates in this report are based on two published national-scale studies,[1] but are not consistent with potential future deployment levels needed to achieve aggressive decarbonization goals.

The scope of the technologies included in this report is limited to four key energy technologies within the power sector that have strong job growth prospects and widespread geographic deployment potential. Although the included technologies are not all-encompassing, they have generated specific interest from state energy offices across the nation.[2] Offshore wind and concentrating solar power are not included because they are not widely applicable geographically across the nation. Transportation and fuel technologies are specifically excluded from this study as well.

The following table includes nationwide jobs associated with each technology included in this study. Values for 2020 are reported in the 2021 U.S. Energy and Employment Report (USEER) for BES, PV, and wind jobs; the values are modeled for energy efficiency jobs with the IMPLAN input-output model using expenditures derived from utility energy efficiency savings potential estimates published by the Electric Power Research Institute (EPRI). The lower end of the ranges for 2025 and 2030 represents jobs associated with deployments under a business-as-usual scenario. The upper end represents jobs associated with an accelerated deployment scenario. Energy efficiency jobs include only one scenario for jobs associated with cost-effective efficiency measures from a utility perspective and do not capture energy efficiency jobs associated with economy-wide energy efficiency measures in buildings or those aligned with meeting decarbonization goals.

[1] Studies referenced are the *U.S. Energy Efficiency Potential Through 2040: Update on Potential for Energy Savings Through Utility Programs Across the Nation from the Electric Power Research Institute* (EPRI 2018) and *2020 Standard Scenarios Report: A U.S. Electricity Sector Outlook* (Cole et al. 2020).

[2] Information gathered during a focus group session with state energy office representatives in November 2020.

Table ES-1. U.S. Job Estimates for Four Clean Energy Sectors

Clean Energy Sector	U.S. Job Estimates 2020 (Reported/Modeled)	U.S. Job Estimates 2025 (Modeled)	U.S. Job Estimates 2030 (Modeled)
Solar (PV)	293,874	384,000–529,000	509,000–757,000
Wind (land-based)	116,817	132,000–161,000	143,000–219,000
Battery Storage (grid-connected)	66,751	126,000–181,000	197,000–376,000
Energy Efficiency (utility cost-effective measures in buildings)	65,313	167,000	283,000

Notes: 2020 jobs for PV, BES and wind jobs were reported in the 2021 USEER, then modified to align with the select technologies included in this report. Energy efficiency jobs were modeled using deployment potential from the *U.S. Energy Efficiency Potential Through 2040: Update on Potential for Energy Savings Through Utility Programs Across the Nation from the Electric Power Research Institute* and the IMPLAN model. Jobs in 2025 and 2030 were estimated using methods described in Section 2: Methodology.

This report includes an overview of each clean energy sector, summarizing national deployment trends, national employment estimates, COVID-19 impacts, descriptions of occupations and general credentials, and links to additional resources.

State-by-state job estimates are included for all 50 states and the District of Columbia in Appendix A. It is important to note that the deployment and associated job estimates projected for 2025 and 2030 are not forecasts and do not represent net job creation. Rather, they represent the size of the workforce required to install and operate the technologies at the projected deployment levels modeled for each technology. The accelerated level of deployment of all the included technologies may not achieved by those years, due to supply chain constraints, grid integration considerations, and cost competition between the various technologies. As such, the accelerated deployment and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment scenario should be considered separately as a comparison of opportunities.

Further, the job estimation methodology does not account for changes in the proportion of total U.S. jobs a state may capture in the future, and assumes the industry makeup of in-state employment does not change in future years.

This report is intended to convey information that will help readers make informed decisions regarding workforce development investments that support clean energy deployments and help identify employment prospects in the clean energy economy.

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1 Introduction

The United States is home to a tapestry of energy resources that provide the foundation for stable, well-paying jobs for American workers in a variety of industries across the energy sector. Pre-pandemic, the energy sector—including traditional fossil fuels, renewables, hydro, energy efficiency, and transportation—employed 6.8 million Americans in 2019, nearly 5% of the American workforce. In 2019, the energy sector added 120,300 jobs, growing three times faster than the economy at large and adding 7% of all new jobs in the economy (NASEO and EFI2020a). However, the energy sector employed 10% fewer people in the last quarter of 2020, a decline of 840,000 workers from the pre-pandemic peak at the end of 2019 (NASEO and EFI 2021).

State and local governments can play an important role in supporting clean energy employment by investing in workforce training and retraining programs that are calibrated to growing demand, collaborating with energy sector employers to promote reskilling, and adopting industry-recognized certification programs. Clean energy jobs provide a vast array of benefits, including:

- **Accessibility and versatility:** Jobs in each of the four technologies included in this report provide a variety of entry, mid-level, and advanced positions. Occupations include technicians, construction workers, electricians, engineers, salespeople, administration, logistics, and others. Most of the entry-level positions do not require four-year degrees, although many of the mid-level and advanced positions require more experience, education, or certification.
- **Geographic diversity:** Because the technologies included in this report can be applied almost anywhere energy is used or produced, they create jobs in urban, suburban, and rural areas nationwide.
- **Higher-than-median wages:** According to the Clean Jobs, Better Jobs report published in October 2020, clean energy jobs paid 25% more than the national median wage in 2019 and were more likely to include medical and retirement benefits (E2, ACORE, and CELI 2020). Table 1 shows how median wages for clean energy jobs compare with overall median wages in each state in 2019.
- **Opportunity to join a union:** Workers in clean energy industries join unions at a higher rate than average when compared with the U.S. workforce in total and at similar rates as the overall construction industry (E2, ACORE, and CELI 2020).
- **Upward mobility:** Renewable energy and energy efficiency industries are experiencing high growth and need professionals at every level from entry to executive, resulting in inherent potential for upward mobility, if workers are provided opportunities to gain the skills necessary for advancing to higher-level positions.

Table 1. Annual Median Hourly Wages by State, 2019

Data from E2, ACORE, and CELI (2020)

	State Clean Energy Wage, 2019	% Above/Below State-Specific Median Wage
Alabama	$18.56	**10.8%**
Alaska	$25.75	**10.3%**
Arizona	$21.27	**14.9%**
Arkansas	$16.71	**5.5%**
California	$27.49	**29.2%**
Colorado	$23.12	**8.5%**
Connecticut	$25.19	**8.4%**
Delaware	$22.44	**13.6%**
District of Columbia	$27.56	**-21.8%**
Florida	$19.13	**11.1%**
Georgia	$21.36	**19.9%**
Hawaii	$23.78	**11.3%**
Idaho	$17.91	**5.8%**
Illinois	$22.46	**13.1%**
Indiana	$17.37	**-2.3%**
Iowa	$17.93	**-2.8%**
Kansas	$18.67	**5.0%**
Kentucky	$17.92	**5.0%**
Louisiana	$20.98	**24.9%**
Maine	$18.22	**-1.4%**
Maryland	$24.37	**10.6%**
Massachusetts	$29.84	**23.2%**
Michigan	$19.93	**6.8%**
Minnesota	$22.44	**5.9%**
Mississippi	$14.69	**-2.2%**
Missouri	$18.97	**6.2%**

	State Clean Energy Wage, 2019	% Above/Below State-Specific Median Wage
Montana	$18.08	**3.9%**
Nebraska	$17.54	**-4.6%**
Nevada	$20.55	**16.9%**
New Hampshire	$23.02	**14.4%**
New Jersey	$24.22	**11.1%**
New Mexico	$18.95	**11.7%**
New York	$27.07	**20.9%**
North Carolina	$20.05	**12.8%**
North Dakota	$20.34	**-0.1%**
Ohio	$18.85	**1.2%**
Oklahoma	$17.50	**1.9%**
Oregon	$23.91	**20.9%**
Pennsylvania	$20.26	**5.7%**
Rhode Island	$21.33	**0.2%**
South Carolina	$17.98	**7.8%**
South Dakota	$16.15	**-3.2%**
Tennessee	$19.87	**15.2%**
Texas	$23.39	**27.6%**
Utah	$19.30	**5.5%**
Vermont	$18.81	**-4.8%**
Virginia	$21.84	**7.1%**
Washington	$25.39	**10.7%**
West Virginia	$17.91	**10.3%**
Wisconsin	$19.73	**4.5%**
Wyoming	$19.14	**-4.4%**

Note: Wages presented are pre-pandemic wages and do not reflect changes in the labor market since then.

The technologies included in this report are limited to four key energy technologies associated with the power sector that have strong job growth prospects and widespread geographic deployment potential across the nation. Although the included technologies are not all-encompassing, they have generated specific interest from state energy offices.[3] Offshore wind and concentrating solar power are not included because they are not widely applicable across the nation. Transportation and fuel technologies are specifically excluded from this study as well.

Career opportunities will shift as state and local governments adopt more stringent building energy codes and set more aggressive climate goals. These changes will take place on different timescales and manifest in various ways from state to state and region to region. State and local governments can play an important role in supporting these types of transitions by investing in workforce development programs.

[3] Information gathered during a focus group session with state energy office representatives in November 2020.

1.1 Understanding Jobs Estimates

Job estimates can be developed with a variety of approaches and methodologies that can result in a wide range of projected employment outcomes. A literature review to understand various approaches to estimating jobs included 13 recent and relevant publications published between 2012 and 2021 (see Appendix D). Some of the most common job estimating approaches include utilizing census and survey data, running input-output (I/O) models,[4] and conducting analysis of prior job studies. Understanding how the jobs are being reported is necessary to make use of these data.

Generally, metrics can include direct jobs created to install or operate the technology; indirect jobs related to the supply chain requirements for the technology; or induced jobs, which reflect changes in spending in a region as a result of the direct and indirect job changes.

Beyond these general categories, a simple and common way to report jobs is by total jobs. This is typically a "point in time" measurement that gives a proxy of how many people would be employed in a given industry in a specific year. Jobs per investment level is also a count at a moment in time, but is normalized to the level of investment, such as jobs per $1 million invested.

Finally, job years provides a different perspective that brings an element of time into the analysis—10 jobs that each last 1 year is calculated as 10 job years, and 1 job sustained for 10 years is also 10 job years. Job years is a helpful tool for estimating employment needs of a specific project but can be confusing in terms of community impact when shared with the public if it is not clearly explained. For example, 1,000 job years for a 10-year project translates to only 100 total jobs. Reporting job years helps to normalize the different durations that a construction job may last compared with an operations and maintenance job that will last the duration of the installation's useful life.

Table 2 shows a subset of the job studies included in the job estimation literature review that illustrate the variety of job estimates based on different approaches and methodologies. The results are driven by the way each report defines the boundaries of an industry and what type of job metric is used. Equally important is how the authors define a "job" and whether it includes a threshold amount of time spent working with a technology to be considered. For example, the National Solar Jobs Census and the USEER both report total jobs in the solar industry, but the definition for what counts as a solar job differs. The National Solar Jobs Census requires a worker to spend at least half of their time working with solar technologies to be considered a "solar job." The USEER counts anyone who spends any time on solar as a "solar job."

[4] The I/O models used in the literature review reports include IMpact analysis for PLANning (IMPLAN), Impact of Sector Energy Technologies (ImSET), Jobs and Economic Development Impact (JEDI), and Dynamic Energy Efficiency Policy Evaluation Routine (DEEPER).

Table 2. Sampling of Data From Recent Job Studies

Author Organization(s)	Publication Title	Year	Sectors	Methodology	Job Types Reported	Job Units Reported	Sample of Results
Elsevier (Garrett-Peltier 2017)	*Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model*	2017	Renewables, EE	I/O	Direct, indirect	Jobs/$1M	7.49 jobs/ $1M invested in renewable energy, 7.72 jobs/ $1M invested in EE
Solar Energy Industries Association (SEIA 2021)	*National Solar Jobs Census*	2020	Solar (PV)	Survey	Direct, indirect	Total jobs	400,000–900,000 solar (PV) jobs created by 2030
National Association of State Energy Officials, Energy Futures Initiative, BW Research (NASEO, EFI 2020)	*U.S. Energy and Employment Report*	2020	Total energy sector	Survey	Direct, indirect	Total jobs	2.3M jobs in economy-wide EE sector
Energy Storage Association (ESA 2020)	*Enabling the Clean Power Transformation*	2020	Energy storage	Literature review	Unspecified	Total jobs	At least 200,000 jobs created by 2030
University of Massachusetts (Pollin et al. 2021)	*Employment Impacts of Proposed U.S. Economic Stimulus Programs*	2021	All infrastructure industries (including energy)	I/O	Direct, indirect, induced	Jobs/$1M	11.8 jobs per $1M investment in wind
American Council for an Energy Efficient Economy (Ungar 2021)	*Clean Infrastructure: Efficiency Investments for Jobs, Climate, and Consumers*	2021	Clean infrastructure industries	I/O	Unspecified	Job years/ $1B	1.9M–4.3M job years/ $107–$232B invested

1.2 How to Use This Report

This report provides a simple and transparent approach for making rough estimates regarding jobs associated with energy efficiency in buildings, PV, stationary BES, and land-based wind technologies in 2025 and 2030. Readers can use this report to identify opportunities for in-state job growth associated with deployments of these technologies.

Based on the input from state energy office representatives[5] and data availability, job projections are associated with one scenario for energy efficiency and two scenarios—"business-as-usual" and "accelerated" deployments—for the other technologies. This report does not address prospective state or national clean energy goals or policies.

A national jobs per megawatt multiplier is calculated for the BES, PV, land-based wind sectors, and the associated support industries (manufacturing, construction, wholesale trade and distribution, professional services, utilities, and other). The multipliers are intended to provide a blunt estimating method for readers to gauge the number and types of jobs a state may capture in each clean energy sector and associated industry. Readers may apply the multipliers to their own specific industry mix and deployment projections. A state-level multiplier is included for energy efficiency jobs in Appendix C based on utility energy efficiency potential and associated program investments in each state. Section 2 includes a detailed discussion of the methodology, caveats, and limitations.

Section 3 provides a clean energy sector overview for each technology, covering national deployment trends and estimates, national employment figures, COVID-19 impacts, descriptions of occupations and general credentials, and links to additional resources.

State-by-state job estimates in alphabetical order are located in Appendix A. It is important to note that the state-level job estimates are not forecasts and do not represent net job creation. Rather, they represent the number of jobs that could be expected in a state if the United States reaches stated national deployment levels and the state captures the same proportion of industry employment as it did in 2020. It is unlikely that deployment of all the included technologies would achieve an accelerated level of deployment simultaneously, due to constraints such as supply chain issues, grid capacity limitations, and competition between the various technologies. However, NREL analysis has shown that expansion of transmission and broader electrification and storage can greatly ease grid limitations (Murphy et al. 2021). Therefore, the accelerated deployment and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment scenario should be considered separately as a comparison of opportunities. This report is intended to convey information that will help readers make informed decisions regarding workforce development investments that support clean energy deployments and identify employment prospects in the clean energy economy.

[5] Information gathered during a focus group session with state energy office representatives in November 2020.

2 Methodology

NREL conducted a literature review and utilized the IMPLAN I/O model in this study to develop jobs estimates based on deployments and investments. The jobs estimated in this report represent direct and indirect jobs only. Induced jobs are not included in this analysis. Total jobs are reported in three snapshots in time —2020, 2025, and 2030.

Energy efficiency job multipliers are reported in units of jobs per $1 million USD invested. BES, PV, and land-based wind job multipliers are reported in units of jobs per megawatt deployed. Therefore, two separate, but aligned, approaches were used.

Informed by the literature review, the general employment estimation method involved four major steps:

1. Developing a jobs multiplier for each technology based on the level of national employment and national deployments or investments in the United States in 2020
2. Modeling deployment or investment scenarios for each technology in 2025 and 2030
3. Calculating the number of jobs required to support the national deployment or investment scenarios using the national job multipliers for each technology
4. Allocating jobs to states according to their overall proportion of total U.S. jobs or investments in 2020.

For PV and BES, job multipliers were reduced over time in alignment with cost reductions anticipated for each technology in 2025 and 2030, as published in the 2021 Annual Technology Baseline (NREL 2021) because cost reductions are assumed to come from labor efficiencies. Land-based wind and energy efficiency job multipliers were held constant due to relative industry maturity. A description of the job calculation process for each technology is included in Appendix B.

2.1 Deployment Scenarios

Because of the variety of data sources and complexity among the various clean energy industries, different approaches were required for quantifying the deployment scenarios.

2.1.1 Energy Efficiency

The deployment scenario for energy efficiency is based on analysis from the *U.S. Energy Efficiency Potential Through 2040: Update on Potential for Energy Savings Through Utility Programs Across the Nation from the Electric Power Research Institute* (EPRI 2018). This analysis estimates the total achievable energy efficiency potential that would be cost-effective for utilities to acquire. EPRI's data included deployments of energy efficiency deemed cost-effective from a utility perspective for both retrofits and new construction.

Efficiency savings associated with energy codes and standards are considered to have no incremental cost to utilities and are therefore not captured in the EPRI utility savings potential estimates. EPRI's estimated achievable potential includes measures that may not currently be incentivized through utility programs, especially in states with less mature efficiency programs. Although utility savings potential does not capture all energy efficiency savings deployed throughout the economy,[6] EPRI's modeling of utility potential provides detailed, comprehensive, and consistent data for state-by-state projections of specific energy efficiency measures. Estimates of economy-wide energy efficiency jobs are outside the scope of this project because state-by-state projections of economy-wide energy efficiency[7] deployment are not readily available.

EPRI's analysis uses the U.S. Energy Information Administration's (EIA's) Annual Energy Outlook 2018 (EIA 2018) as the foundation for long-term electricity consumption forecasts. However, the Annual Energy Outlook 2018 electricity consumption reference case includes anticipated savings from prospective federal, state, and local building codes and appliance standards as well as trends in consumer adoption and estimates of utility energy efficiency program savings. EPRI therefore developed an adjusted baseline forecast that represents the forecasted electricity consumption without assumed savings from utility energy efficiency programs or from codes and standards that were not already enacted.

Using the adjusted baseline, EPRI then modeled technical, economic, and achievable savings potential of measures that reduce electricity usage. Technical potential refers to the energy savings that would occur if all buildings adopted all efficient, commercially available technologies, regardless of cost.

Economic potential refers to the energy savings that would occur if all buildings adopted technologies that pass the Total Resource Cost test, as defined by the California Standard Practice Manual. EPRI assumes program administration costs of 20% of the incremental measure cost for inclusion in the Total Resource Cost test. Achievable potential modifies the economic potential by applying market barriers or other adoption factors to each end use. Adoption factors include energy efficiency program ramp rates, state retail electricity rates, and other customer behavior. As a result, the estimated achievable potential projected by EPRI was approximately 57% of the total economic potential. This report uses EPRI's achievable potential estimates and the associated investments calculated by NREL for the state-by-state energy efficiency deployment scenario.[8]

2.1.2 Solar, Wind, Battery Energy Storage

The deployment scenarios for stationary, grid-connected BES, PV, and land-based wind were simulated using the Regional Energy Deployment System (ReEDS)[9] and Distributed Generation Market Demand (dGen)[10] models. The ReEDS model estimates utility-scale power sector deployments, and dGen estimates distributed PV adoption for the contiguous United States.

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[6] Utility energy efficiency savings potential does not capture energy efficiency savings associated with measures deployed by customers that are not cost-effective from the utility perspective. The savings potentials modeled in the EPRI report assume an energy efficiency baseline that increases with future energy codes that are already passed, along with modest improvements in equipment efficiency.
[7] Economy-wide savings refer to savings associated with energy efficiency measures adopted without incentives or promotion from utility programs, including those savings associated with measures installed to meet building and appliance codes and standards plus non-incentivized customer purchases.
[8] Additional information on EPRI and others' approaches to energy efficiency modeling is available at https://www.energy.gov/eere/slsc/energy-efficiency-potential-studies-catalog.
[9] ReEDS documentation is located at https://www.nrel.gov/docs/fy21osti/78195.pdf.
[10] dGen documentation is located at https://nrel.github.io/dgen/.

When making decisions, the ReEDS model takes a system-wide, least-cost approach, while dGen uses a customer-centric adoption approach. The ReEDS model also accounts for unique traits of renewable energy such as resource variability and grid integration requirements. Two scenarios from the 2020 Standard Scenarios Report: A U.S. Electricity Sector Outlook (Cole et al. 2020)—the mid-case scenario and the low-cost scenario for each technology—were used to derive projected deployment of BES, PV, and land-based wind. The mid-case scenario uses the moderate technology cost and performance assumptions from NREL's 2020 Annual Technology Baseline,[11] while the low-cost scenario uses the advanced technology cost declines and performance assumptions.[12] Both scenarios include national and state-level policies in place as of June 30, 2020.

The mid-case and low-cost scenarios were chosen based on preferences stated by state energy official representatives to use "business as usual" and "accelerated" scenarios to project deployments.[13] In this study, the mid-case scenario represents a business-as-usual level of deployment, and the low-cost scenario represents an accelerated deployment scenario. The base year, 2020, was adjusted for PV based on cumulative installed capacity reported by the Solar Energy Industries Association for 2020. These two scenarios produced by the ReEDS model were used to estimate annual deployment through 2030. The ReEDS model aligns closely with reported 2020 deployment data published in the U.S. Department of Energy's (DOE) *Land-Based Wind Market Report: 2021 Edition* (DOE 2021) and therefore ReEDS deployment levels were used for cumulative land-based wind deployments in 2020. Because of a lack of published data on small BES installations (under 1 MW), the ReEDS model was relied on for estimated BES deployments in 2020. More information on these and other deployment scenarios can be found in the 2020 Standard Scenarios Report: A U.S. Electricity Sector Outlook (Cole et al. 2020).

The ReEDS model only captures the contiguous United States, and therefore does not include Alaska and Hawaii. Additionally, the District of Columbia is combined with Maryland within the model, making it challenging to disaggregate deployment specific to the District of Columbia. Deployment projections for Alaska, Hawaii, and the District of Columbia were therefore derived from an extensive internet search and communications with trade organizations. Deployments in Alaska, Hawaii, and the District of Columbia were added to the ReEDS projections where data were available at the time of publishing. Specific sources for deployments are listed in each state profile in Appendix A.

2.2 Employment Estimates

To be consistent with the USEER and IMPLAN, job estimates included in this report represent direct and indirect jobs regardless of the amount of time an employee spends working with the

[11] See https://atb.nrel.gov/archive for the previous Standard Scenarios reports and data.
[12] The low-cost scenario for each specific technology from the Standard Scenarios was used. Each of these scenarios applied the accelerated or low-cost projection from the 2020 ATB for the given technology, and the mid-cost projection for all the other technologies considered in the scenario.
[13] Information gathered during a focus group session with State Energy Office representatives in November 2020.

technology, and are not a full-time equivalent measure. Likewise, the IMPLAN model, used to estimate energy efficiency jobs, includes all full-time, part time, and temporary positions.[14]

2.2.1 Energy Efficiency

We calculated job estimates associated with cost-effective utility energy efficiency potential from the *U.S. Energy Efficiency Potential Through 2040: Update on Potential for Energy Savings Through Utility Programs Across the Nation from the Electric Power Research Institute* (EPRI 2018). Each state's investment in energy efficiency was calculated based on utility avoided costs rather than first year incremental costs, due to data availability. The state-level investments were then put into the IMPLAN[15] I/O model to develop state-level job estimates.

Energy efficiency job estimates in this report do not account for all energy efficiency workers as defined in and measured by the USEER. Neither EPRI's efficiency potential estimates nor this analysis account for full economy-wide energy efficiency expenditures to improve buildings, which were nearly $32 billion in the United States in 2019, according to the International Energy Agency (IEA 2019). Therefore, the energy efficiency job estimates included in this report are much lower than estimates of the economy-wide building energy efficiency workforce, such as the USEER. Another difference between this report and the USEER is that the roughly 23,000 jobs associated with utility energy efficiency program administration are counted as power generation sector jobs in the USEER, while we consider them energy efficiency jobs in this report (NASEO and EFI 2021).

Finally, job estimates for energy efficiency are presented as a single number, rather than a range because a single scenario from EPRI was used to estimate future energy efficiency deployments.

2.2.2 Solar, Wind, Battery Energy Storage

For BES, PV, and land-based wind, a national jobs multiplier was calculated for each technology using national 2020 deployments reported by trade associations and state-by-state USEER employment figures published in 2021 (jobs reported for the year 2020). The multipliers represent the number of jobs associated with each megawatt of deployment.

The industry breakdown (proportion of manufacturing, construction, wholesale trade and distribution, professional services, utilities, and other job types) from the USEER 2021 was used to establish an industry mix for each of the three clean energy sectors. This study does not separate operations and maintenance jobs into its own category. An industry breakdown and breakout of the overall job multipliers is included in each sector's summary in Section 3 so readers may apply a more specific multiplier to their state depending on its current or future mix of in-state industries.

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[14] The USEER and IMPLAN follow the U.S. Department of Commerce, Bureau of Economic Analysis definitions for employment by industry. Further details are included at https://www.bea.gov/data/employment/employment-by-industry.

[15] IMPLAN is an input-output model that completes an economic analysis based on the interdependencies between economic sectors. IMPLAN jobs include all full-time, part time, and temporary positions.

The job multipliers for PV and BES use the capital expenditure cost declines for the moderate projections published in NREL's 2021 Annual Technology Baseline (ATB) (NREL 2021)[16] as a proxy for labor force reductions per megawatt of deployment in 2025 and 2030. Cost reductions for all applications of these technologies (e.g., utility and rooftop solar) were averaged. Although recent trends show the greatest growth in utility-scale PV, which relies upon fewer people per megawatt installed than residential PV, an unweighted average was used for simplicity.

Because land-based wind is a more mature sector with fewer opportunities to reduce costs through labor reduction, no cost declines or labor reductions are applied to the jobs per megawatt multiplier.

2.2.3 Use of Jobs Multipliers

The national jobs multipliers were then applied to national deployment projections (in megawatts) according to the mid-case and low-cost scenarios for PV, BES, and land-based wind to arrive at the lower and upper range of jobs in each of the three clean energy sectors nationwide.

Table 3 describes each step of this approach with an example for PV. Additional examples and further details are provided in Appendix B.

Table 3. Example of Calculations for National Job Estimates for PV in 2025

Step	Description	Example
		PV Jobs in 2025, Low-Cost Scenario
1	Calculate a national jobs multiplier for solar PV using reported 2020 deployments and job figures.	293,874 jobs/102,465 MW = 2.87 jobs/MW in 2020
2	Calculate the average rate of CapEx cost declines projected between 2020 and 2025 from the Annual Technology Baseline (ATB) for all applications of PV deployments.	ATB moderate CapEx cost decline between 2020 and 2025 = 28%
3	Reduce the 2020 jobs multiplier by the rate of cost decline to derive the 2025 jobs multiplier.	2.87 jobs/MW *(1-.028) = 2.06 jobs/MW in 2025
4	Apply the 2025 jobs multiplier to the 2025 national deployment projection from ReEDS and dGen to arrive at the total PV jobs nationwide in 2025.	257,226 MW projected for 2025 * 2.06 jobs / MW in 2025 = 529,885 jobs projected in 2025

For energy efficiency, NREL calculated a state-level direct job multiplier per $1 million invested in cost-effective energy efficiency measures by dividing IMPLAN's direct job outputs per state by a state's projected level of investment. Appendix C includes a list of direct energy efficiency job multipliers by state and projected investments for 2025 and 2030.

[16] Cost reductions for each technology are taken from the most recent 2021 Annual Technology Baseline, an annual projection of various technology cost curves published by NREL.

The jobs multipliers are intended to provide a blunt estimating tool for readers to gauge the volume of jobs a state may capture in each clean energy sector, and readers may apply these multipliers to their own forecasts or goals for deployments.

2.2.4 State Employment Estimates

State energy efficiency job estimates are derived by inputting projected investments of utility cost-effective energy efficiency measures in each year in each state into the IMPLAN model. The IMPLAN model contains data from multiple government sources to map buy-sell relationships so users can identify how specific expenditures will impact a given regional economy. We included direct and indirect jobs associated with cost-effective utility programs in this study.

For BES, PV, and land-based wind, NREL used the state employment figures for each technology published in the 2021 USEER and calculated each state's share of total jobs nationwide in each technology sector. This proportion was then applied to the national job estimates for 2025 and 2030 to arrive at each states' employment figures. The modeling does not account for changes in the proportion of overall jobs held by each state over time. For simplicity, it is assumed that each state retains its 2020 proportion of overall jobs for each technology sector in 2025 and 2030. Future policies may change the proportion of national jobs a state captures or the mix of industries located in a state. The industry mix is not provided for each state or forecasted for 2025 and 2030.

2.3 Caveats and Limitations

The overarching purpose of this report is to provide readers with context and data to inform decision-making related to workforce development to support four clean energy technologies. While the models used in this study to derive deployment projections account for complex interactions among various technologies and policies, they have limitations. For example, ReEDS takes a system-wide, least-cost perspective that does not necessarily reflect the perspectives of individual decision makers, including specific investors, regional market participants, or corporate or individual consumer choice; nor does it model contractual obligations or noneconomic decisions.[17]

Where available, we added installed capacity projections to our ReEDS values for Alaska, Hawaii, and the District of Columbia. Due to lack of data availability, projections for Alaska and Hawaii do not extend beyond 2025 for any technology except energy efficiency (which was modeled). The job estimates in future years for Alaska, Hawaii, and the District of Columbia were developed based on their 2020 proportion of total U.S. jobs in each clean energy sector, which is not dependent on in-state deployments. In addition, the 2020 jobs data from the USEER include wind jobs associated with the 30-MW Block Island offshore wind farm. Projections for future deployments include only land-based wind. Note that these anomalies affect only the overarching job multipliers.

This study aligns with the definition of what constitutes a "job" in the USEER and does not indicate full-time equivalent employment. The amount of time a person spends working with a

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[17] Additional information about ReEDS' caveats can be found at https://www.nrel.gov/docs/fy21osti/78195.pdf.

specific technology application varies among the technologies included. For example, it is likely that a wind employee works only on wind projects, while an energy efficiency worker may spend 50% or less time overall with energy efficient technologies. The U.S. Department of Commerce Bureau of Economic Analysis definitions for employment by industry[18] are applied in this report.

The base year for this study, 2020, reflected the size of the workforce one year into the global pandemic. These 2020 job numbers are the basis for the job multipliers. As such, the volatility of the global pandemic as it relates to jobs and deployment levels affects multipliers depending on the length of time it takes to install various technologies. For example, the workforce in 2019 may have been largely responsible for the installations that came online in 2020, depending on project construction and interconnection timelines (the time between when the technology was installed and subsequently interconnected to the grid).

Our methodology does not account for changes in the proportion of total U.S. jobs a state may capture in the future. Further, it assumes each states industry makeup remains the same in 2025 and 2030 as it was in 2020. This approach was chosen over allocating jobs to states based on projected in-state deployments because many jobs, especially upstream jobs, are not located within the state where the deployment is taking place. For example, Alabama has little to no land-based wind deployments but is home to more than 1,200 jobs in the wind sector (manufacturing). Conversely, Wyoming, as state with plenty of land-based wind deployments, reports just over 100 wind jobs (NASEO and EFI 2020b).

The lack of precision regarding how a state's industry composition or relative proportion of employment may evolve in future years precludes us from making assumptions about the industry mix and market share of employment in each state in 2025 and 2030. In addition, privacy concerns prevent us from publishing state-level industry information for 2020. Therefore, we assume a state captures the same proportion of jobs nationwide as it did in 2020, but are unable to provide further granularity into the types of jobs that are available within a state.

Finally, we assume that the job multiplier for energy efficiency measures stays constant through 2030 because there is much uncertainty surrounding how the labor involved in installing residential and commercial energy efficiency measures could change in future years (due to the wide variety of efficiency and electrification measures that are emerging). For land-based wind, we assume that future projected technology cost reductions are not related to labor efficiencies and therefore assume the jobs multiplier to hold steady through 2030. As explained in the methodology section, we reduce the PV and BES job multipliers according to the 2021 ATB moderate cost declines because we assume these will be achieved, in part, through labor efficiencies.

[18] U.S. Department of Commerce, Bureau of Economic Analysis definition for employment by industry, https://www.bea.gov/data/employment/employment-by-industry.

3 Clean Energy Sectors

This section contains a brief description of the clean energy sectors included in this study: energy efficiency in buildings, stationary grid-connected BES, PV, and land-based wind energy. Each section includes historic investments or installed capacity, projected deployments in 2025 and 2030, national employment estimates, an industry subsector mix, a sampling of occupations in each sector, description of the skills and education needed to obtain those jobs, and links to additional resources.

Table 4 summarizes nationwide job estimates associated with each technology included in this study. The lower end of the range represents jobs associated with supporting the existing installations and new deployments in 2025 and 2030 under a business-as-usual scenario. The upper end is associated with an accelerated level of new deployments through 2030. Energy efficiency jobs include only those associated with cost-effective efficiency measures from a utility perspective and do not capture energy efficiency jobs associated with economy-wide energy efficiency measures in buildings or those aligned with meeting decarbonization goals.

Table 4. U.S. Job Estimates for Four Clean Energy Sectors

Clean Energy Sector	U.S. Job Estimates 2020 (Reported/Modeled)	U.S. Job Estimates 2025 (Modeled)	U.S. Job Estimates 2030 (Modeled)
Solar (PV)	293,874	384,000–529,000	509,000–757,000
Wind (land-based)	116,817	132,000–161,000	143,000–219,000
Battery Storage (grid-connected)	66,751	126,000–181,000	197,000–376,000
Energy Efficiency (utility cost-effective measures in buildings)	65,313	167,000	283,000

Notes: 2020 jobs for PV, BES and wind jobs were reported in the 2021 USEER, then modified to align with the select technologies included in this report. Energy efficiency jobs were modeled using expenditure projections from the *U.S. Energy Efficiency Potential Through 2040: Update on Potential for Energy Savings Through Utility Programs Across the Nation from the Electric Power Research Institute* and the IMPLAN model. Jobs in 2025 and 2030 were estimated using methods described in Section 2: Methodology.

3.1 Sector Summary: Energy Efficiency in Buildings

Major components of energy efficiency deployment include utility ratepayer-funded programs, publicly funded programs, and market-driven deployment, which is deployment of energy-efficient measures without financial incentives. Utility spending on energy efficiency programs has substantially grown in the last 10 years, although that growth rate has slowed in recent years, as shown in Figure 1. In 2019, the nationwide proportion of utility retail electricity sales met by energy efficiency savings was 0.70%. The states with the highest proportions of retail sales met by energy efficiency were Rhode Island, Massachusetts, Maryland, Vermont, and California, with 2.51% to 1.74%, respectively (Berg et al. 2020).

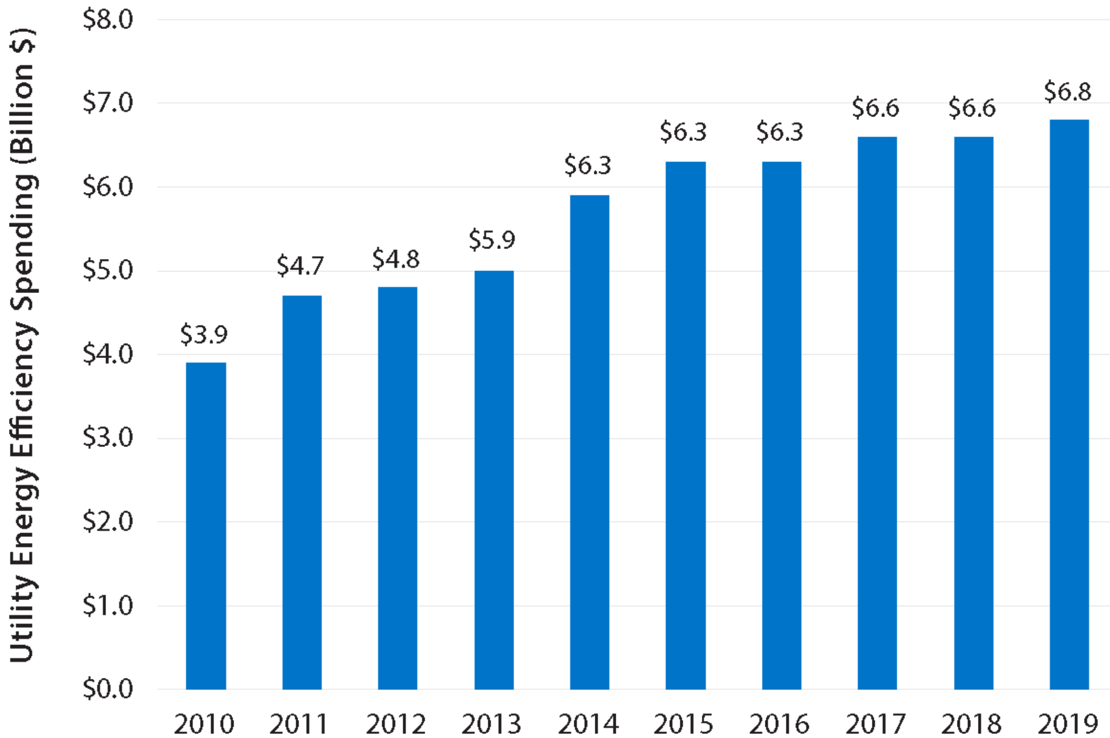

Figure 1. Annual national electric utility energy efficiency program spending, 2010–2019

Data from Berg et al. (2020)

Although there are robust data on utility-funded programs, measuring market-driven energy efficiency deployment is less straightforward. The IEA estimates that economy-wide spending on building energy efficiency was nearly $32 billion in 2019 (IEA 2019), but does not provide detailed state-by-state or sectoral details.

Table 5. U.S. Spending on Electricity Energy Efficiency Programs by State, 2019

Data from the ACEEE State Energy Efficiency Scorecard (2020)

State	2019 Electric Efficiency Spending ($ million)	$ Per Capita
Rhode Island	104.1	98.24
Massachusetts	620.4	90.02
Vermont	55.2	88.46
Maryland	275.6	45.58
Connecticut	161.4	45.28
California	1,516.4	38.28
Oregon	161.5	38.28
New Hampshire	48.6	35.74
Idaho	61.4	34.37
Illinois	433.8	34.23
Maine	45.9	34.12
New York	645.2	33.17
Hawaii	42.0	29.66
Minnesota	157.0	27.84
Michigan	250.7	25.10
Washington	190.7	25.05
Iowa	75.6	23.95
Arkansas	68.0	22.52
District of Columbia	15.4	21.79
Colorado	108.0	18.75
Delaware	17.9	18.41
Wyoming	10.2	17.66
Oklahoma	68.6	17.34
Pennsylvania	197.5	15.43
Indiana	101.8	15.12
New Mexico	31.7	15.12

State	2019 Electric Efficiency Spending ($ million)	$ Per Capita
Ohio	175.0	14.97
Nevada	45.3	14.71
Utah	47.1	14.69
Missouri	85.8	13.98
North Carolina	145.8	13.90
New Jersey	123.0	13.85
Wisconsin	79.0	13.57
Montana	14.4	13.44
South Carolina	64.0	12.43
Arizona	82.4	11.32
Texas	196.2	6.77
Kentucky	27.2	6.09
Mississippi	17.1	5.74
Georgia	57.0	5.37
South Dakota	4.7	5.31
Louisiana	24.6	5.29
Florida	105.4	4.91
West Virginia	7.6	4.24
Virginia	31.7	3.72
Nebraska	7.1	3.65
Tennessee	19.2	2.81
Alabama	7.7	1.57
North Dakota	0.2	0.20
Kansas	0.3	0.11
Alaska	0.0	0.03
U.S. total	**6,832.4**	
Median	**64.0**	**15.12**

3.1.1 National Employment Figures

According to the USEER, the energy efficiency sector employed 2.38 million people nationwide in 2019 and 2.1 million in 2020 (NASEO and EFI 2020a; 2021). The sector added 400,000 jobs between 2014 and 2019, outpacing job growth in the economy at large over the same period (NASEO and EFI 2020a). The energy efficiency jobs included in the USEER encompass professions involved in new construction and existing building retrofits in residential, commercial, and industrial applications as well as the manufacture of ENERGY STAR® appliances. Utility employees who administer and work within these programs represent approximately 1% of the overall energy efficiency workforce as measured in the USEER, but are accounted for under the electric power generation sector (NASEO and EFI 2021).

The USEER provides a high-level picture of economy-wide employment in the energy efficiency sector. The USEER data are provided for context but should not be directly compared to the jobs estimates in this report. Our analysis focuses specifically on direct and indirect jobs associated with implementing energy efficiency measures that are cost-effective for utilities, and does not capture jobs associated with economy-wide or market-driven energy efficiency deployment, which accounted for nearly 4 times more investment than utility expenditures alone. The USEER is a useful benchmark for various employment trends in the energy efficiency sector even though it is not directly comparable to this analysis. Figure 2 shows national employment estimates resulting from utility efficiency programs in 2025 and 2030. NREL estimated the number of energy efficiency jobs in 2025 and 2030 based on EPRI's achievable potential estimates for energy efficiency deployments nationwide in those years. NREL's calculation shows that on average, 5.5 jobs are supported for every $1 million invested in cost-effective electric utility energy efficiency programs across the country. The modeled nationwide achievable energy efficiency potential in 2025 is 157,442 GWh and 265,160 GWh in 2030, more than a four-fold increase over 10 years from 61,360 GWh in 2020.

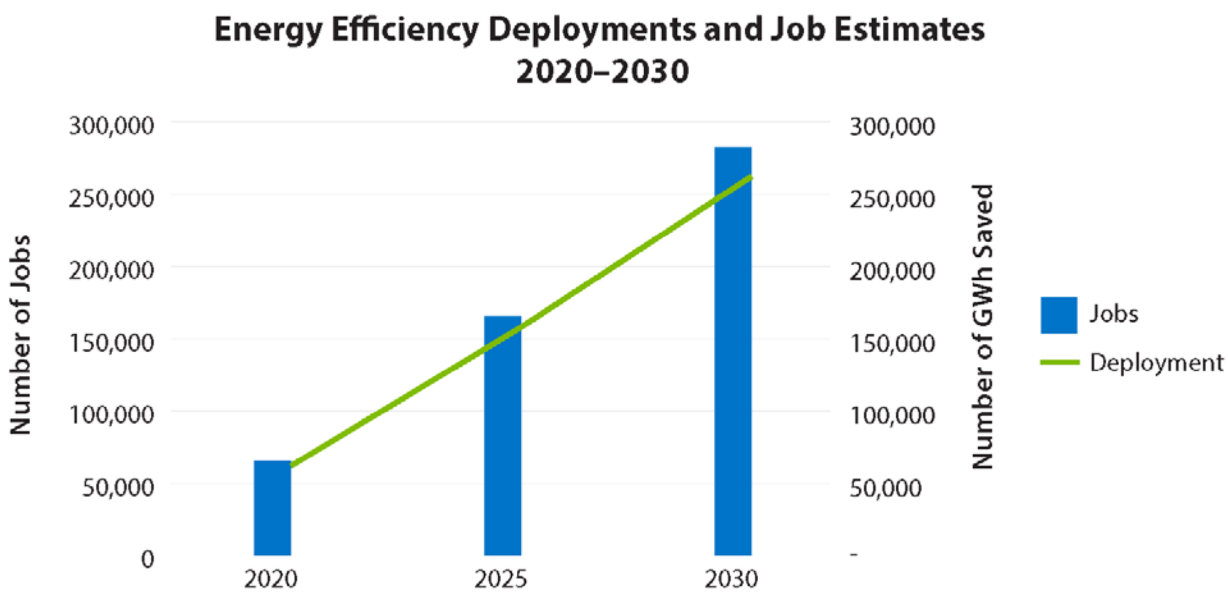

Figure 2. Estimated U.S. deployment and jobs supported by cost-effective utility energy efficiency potential in 2025 and 2030

Data from EPRI, calculations by NREL (2021)

3.1.2 COVID-19 Impacts

Between March and May 2020, the overall energy efficiency sector (as measured in the USEER 2020 report) lost 431,762 jobs due to the COVID-19 pandemic (Jordan 2021). The sector then recovered 129,598 of the lost jobs between June and December 2020. Overall, energy efficiency lost 271,700 jobs between 2019 and 2020 with the construction sector experiencing nearly two-thirds of these losses (Jordan 2021). Energy efficiency lost the most jobs of any sector included in this report.

3.1.3 Occupations

The workforce involved in improving the energy efficiency of the built environment includes a wide range of professionals, from building trades to architecture and engineering. Figure 3 shows the economy-wide breakdown of employees in energy efficiency who work in construction, professional and business services, wholesale trade, and manufacturing, including manufacturers of ENERGY STAR appliances.

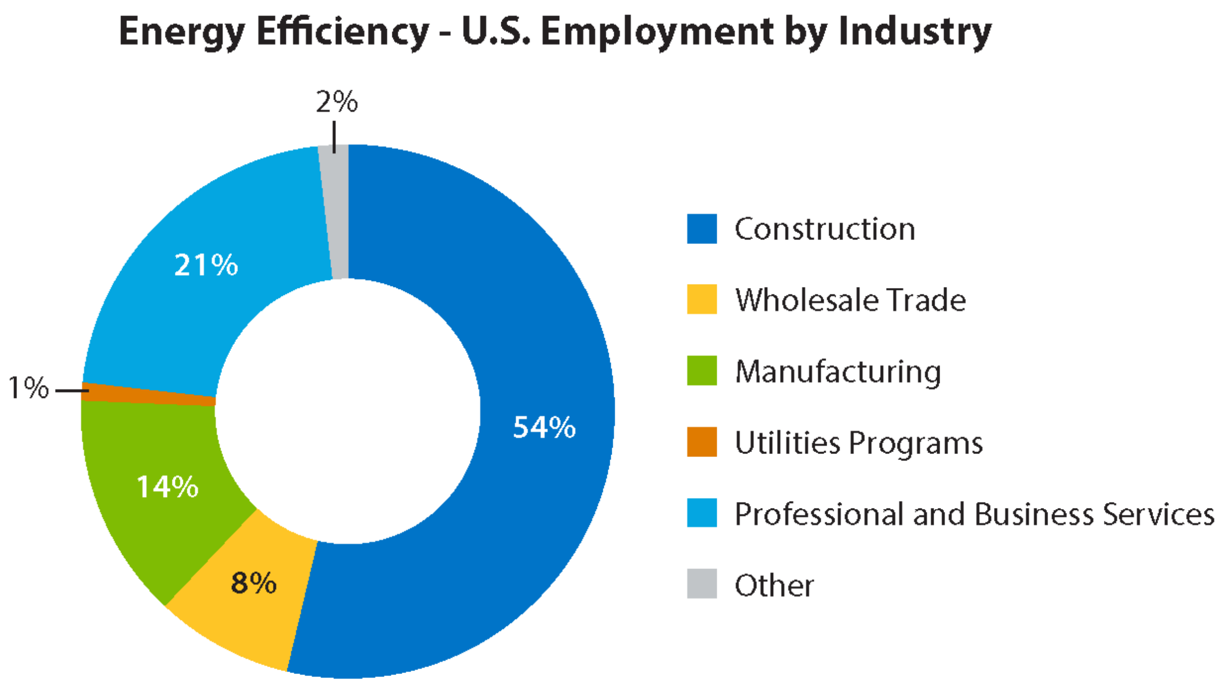

Figure 3. 2020 U.S. energy efficiency employment by industry for economy-wide energy efficiency

Data from NASEO and EFI (2021)

The construction industry makes up more than half of all energy efficiency workers measured by the USEER. Professional and business services, which include consulting services such as engineering and design, as well as an array of other services such as legal, logistics, and other business services, follow at 21%.

The occupations included in Table 6 provide a sample of the range of jobs within the energy efficiency sector and should be viewed as representative but not comprehensive.

Table 6. Sampling of Energy Efficiency Occupations

Occupation	Description	Skills, Education, and Certifications
Construction Supervisor	Oversees the elements of commercial construction projects that impact the installation of high-performance building assemblies and mechanical systems, with a focus on the requirements of green building certification and credentialing schemes.	• Entry-level: high school diploma and significant construction experience required. • Advanced: post-secondary education preferred. • Recognized certifications: American Institute of Constructors, Certified Construction Manager, Certified Professional Contractor, Project Management Professional, occupational Safety and Health Administration (OSHA) 30-hour certification.
Residential Building Code Official[a]	Reviews plans and engineering calculations, processes permit requests, and conducts site inspections to ensure code compliance for residential construction projects.	• Entry-level: high school diploma or equivalent required. • Mid-level: 2- or 4-year degree in construction science, construction management, architecture, engineering, or related field preferred; education, training, or experience with green buildings and energy efficiency industry preferred. • Advanced: a license may be required in some states.
Residential Heating, Ventilating, and Air-Conditioning (HVAC) Technician[b]	Diagnoses and repairs and wide variety of residential heating and air-conditioning systems.	• Entry-level: high school diploma or equivalent required. Post-secondary technical training preferred. • Mid-level: recognized certifications: Environmental Protection Agency certification, HVAC Excellence, North American Technician Excellence, National Comfort Institute, OSHA 10-hour or OSHA 30-hour certification.
Building Automation Systems Engineer[b]	Supervises the installation and maintenance of building automation systems that create centralized controls for a building's lighting, heating and cooling, and water heating systems.	• Mid-level: 4-year degree in mechanical, electrical, or industrial engineering, or computer science; 2-year technical degree with substantial work experience in the related field; professional engineer license preferred.
Energy Efficiency Sales Representa-tive	Generates leads and sales and provides preliminary technical support for residential building performance equipment and materials.	• Entry-level: high school diploma or equivalent required. Experience with Salesforce or customer relationship management software preferred. • Mid-level: recognized certifications: Building Performance Institute, Residential Energy Services Network.

[a] Additional details for these job profiles are available from the Green Building Career Map https://greenbuildingscareermap.org.

[b] Additional details for these jobs are available from the Careers in Climate Control Technology Map: https://hvaccareermap.org.

3.1.4 Additional Resources

More information on the energy efficiency sector can be found at the following websites:

- **Green Buildings Career Map:** https://greenbuildingscareermap.org
- **Careers in Climate Control Technology Map:** https://www.hvaccareermap.org/
- **Weatherization Assistance Program Job Task Analyses:** https://www.energy.gov/eere/wipo/guidelines-home-energy-professionals-accredited-training#jta
- **State Energy Scorecard:** https://www.aceee.org/state-policy/scorecard
- **Association of Energy Services Professionals:** https://www.aesp.org/.

3.2 Sector Summary: Battery Energy Storage

By the end of 2020, Wood Mackenzie estimated there were 3.3 GW of stationary BES installed in the United States, around 2.3 GW of which was front-of-the-meter,[19] 500 MW nonresidential, and 500 MW residential. In 2020 alone, a record 1,464 MW was installed, a dramatic increase over the 521 MW installed in 2019 despite the effects of the COVID-19 pandemic. The total energy capacity on the market by 2020 was 6,700 MWh, with 3,500 MWh installed in 2020 alone (Wood Mackenzie 2020).

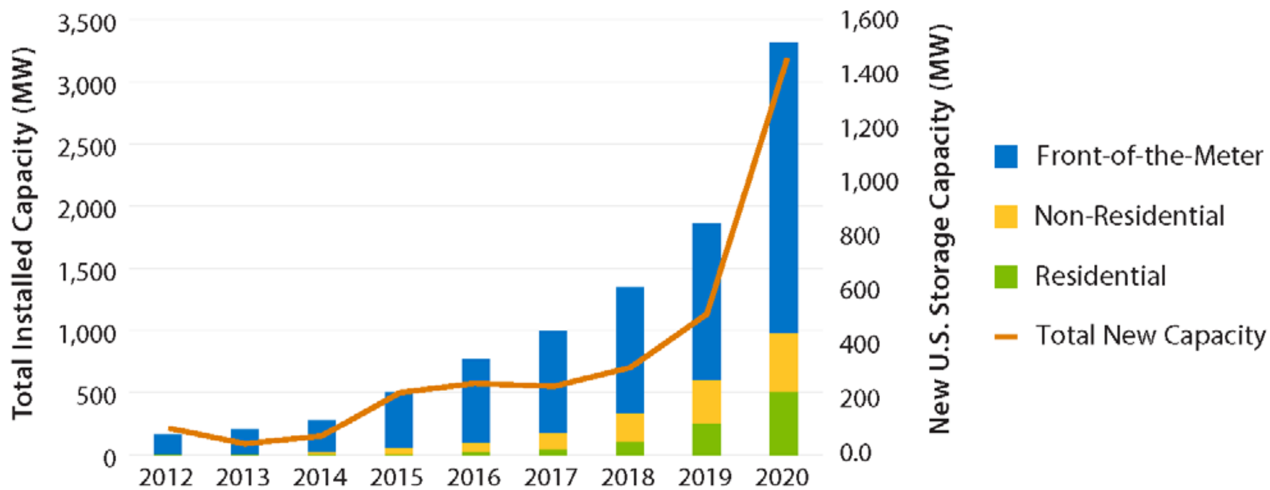

Figure 4. Installed battery storage capacity in the United States by year, 2012–2020

Data from Wood Mackenzie/Energy Storage Association (2020)

NREL's ReEDS model results show that BES installations could be as high as 4 GW in 2020 if counting small-scale (<1 MW) grid-connected systems in addition to larger systems. In addition, ReEDS estimates that 10 times more BES could come online by 2030, reaching 41 GW in 2030.

3.2.1 National Employment Figures

The stationary BES sector employed 66,751 people in the United States at the beginning of 2020, an increase of 6.1% compared with 2019 (NASEO and EFI 2020a). Figure 5 shows BES deployments across the residential, commercial, and industrial sectors nationwide in 2020 and estimated deployments in 2025 and 2030. California leads the United States in the number of grid-connected energy storage installations in 2021, followed by Hawaii, New York, and Texas. (University of Michigan 2021).

[19] Front-of-the-meter deployments refer to those that are controlled by the utility rather than by a utility customer.

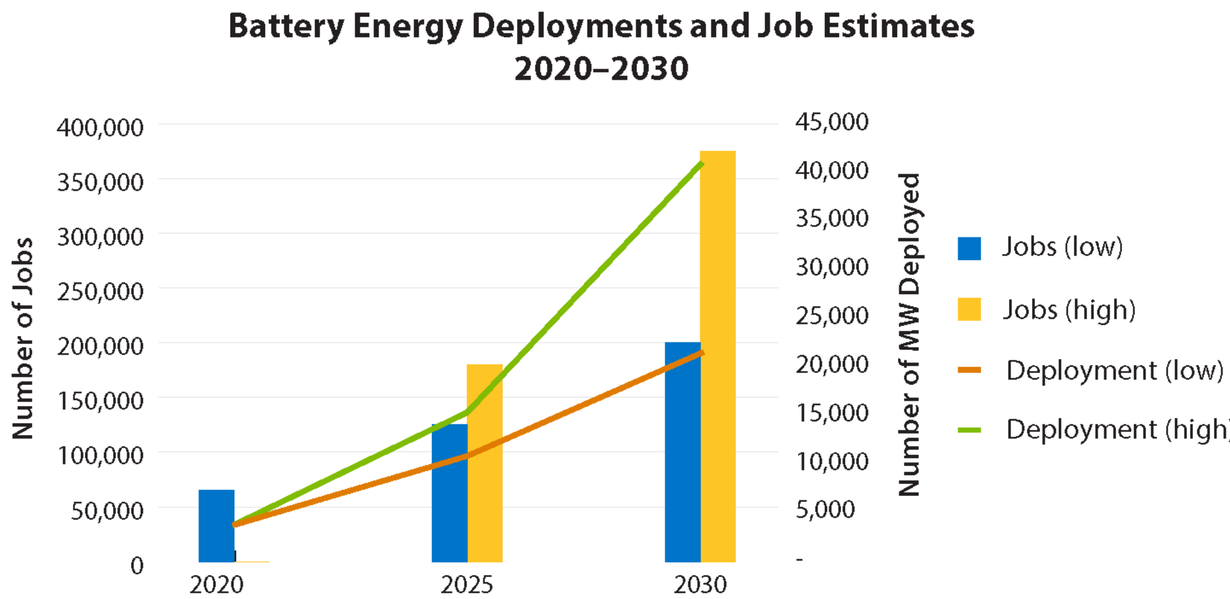

Figure 5. Cumulative battery energy storage deployments and jobs in 2020; estimated deployments and jobs 2025 and 2030

Data from NREL (2021)

3.2.2 COVID-19 Impacts

More battery storage was installed in 2020 than any other year, meeting short-term forecasts from previous years, indicating minimal to no impact of COVID-19 on the sector overall. Residential and other behind-the-meter installations did fall short of past projections in 2020; however, large-scale, front-of-the-meter installations surpassed projections, indicating that these large-scale projects were impacted less by the pandemic (Wood Mackenzie 2020).

3.2.3 Occupations

Figure 6 shows a breakdown of industries within the BES sector. Construction jobs make up the largest portion, with more than half of all jobs in the BES sector. Overall, downstream work (construction, professional services, and wholesale trade and distribution) accounts for nearly 50,000 jobs, or slightly more than 70% of all jobs in the sector.

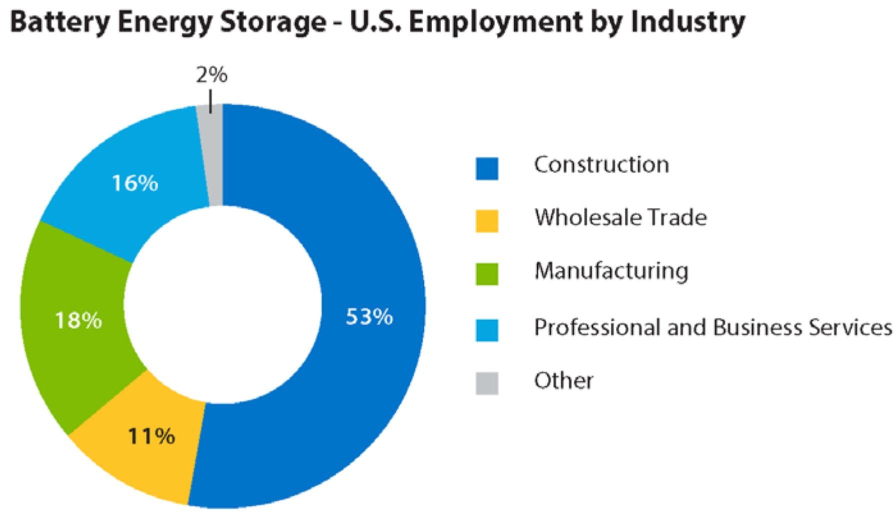

Figure 6. U.S. battery energy storage employment by industry

Data from NASEO and EFI (2021)

Table 7 includes a jobs multiplier for each of the industries supporting the BES sector. Readers can use the multipliers to customize job estimates to local industry conditions. The multiplier is expected to decline in 2025 and 2030 as BES technology costs decline and companies implement labor efficiencies.

Table 7. U.S. BES Job Multipliers by Industry

Data from USEER, ReEDS, Annual Technology Baseline

Industries	No. of Jobs 2020	U.S. BES Industry Composition 2020	U.S. BES Jobs/MW by Industry 2020	U.S. BES Jobs/MW by Industry 2025	U.S. BES Jobs/MW by Industry 2030
Construction	35,263	53%	8.8	6.1	4.9
Professional Services	10,988	16%	2.7	1.9	1.5
Manufacturing	11,910	18%	3	2.1	1.6
Wholesale Trade and Distribution	7,549	11%	1.9	1.3	1
Other	1,041	2%	0.3	0.2	0.1
Total 2020	**66,751**		**16.7**	**11.6**	**9.1**
2020 cumulative U.S. BES deployment was approximately 4,000 MW. Labor requirements per MW is expected to decline 31% between 2020 and 2025, and another 20% between 2025 and 2030.					

The occupations included in Table 8 provide a sample of the range of jobs within the BES sector and should be viewed as representative but not comprehensive.

Table 8. Sampling of Battery Energy Storage Occupations

Information from American Jobs Project (2018)

Occupation	Description	Skills, Education, and Certifications
Research and Design	Design technology and chemistries needed for battery function.	• Entry-level: chemistry: associate's degree, high school diploma • Mid-level: chemistry: bachelor's degree; technology: bachelor's degree • Advanced: chemistry: bachelor's degree, Ph.D., master's degree
Suppliers/ Distributors	Market and sell raw or refined materials used for battery manufacturing; trade and distribute finished batteries.	• Mid-level: bachelor's degree, some college
Manufacturing	Manufacture precursors for battery cells, followed by assembly of cells into battery packs.	• Entry-level: high school diploma, less than a high school diploma in some cases • Mid-level: GED, high school diploma • Advanced: bachelor's degree, associate's degree
Design/ Construction/ Operations and Maintenance	Designing plans for and deploying battery packs and technologies into stationary energy storage usage; operating and maintaining battery projects.	• Entry-level: high school diploma or GED, can progress to mid-level • Advanced: for project designers/managers, no data found.

3.2.4 Additional Resources

More information on the energy efficiency industry can be found at the following websites:

- **Energy Storage Database:** https://sandia.gov/ess-ssl/gesdb/public/
- **Clean Power Association (formerly the Energy Storage Association):** https://cleanpower.org/
- **Energy Storage and Microgrid Training and Certification:** https://www.esamtac.com/
- **Energy Storage Association, State Policy Menu for Storage:** https://energystorage.org/thought-leadership/state-policy-menu-for-storage/.

3.3 Sector Summary: Solar Photovoltaics

U.S. solar PV installations increased significantly between 2010 and 2019, growing from 1.3 GW in 2010 to 72.8 GW in 2019 (Cole et al. 2019). As seen in Figure 7, installations have increased year over year at an average annual growth rate of almost 50%, with a notable spike in 2016 when the investment tax credit was originally set to decline (it was later extended). The Solar Energy Industries Association (SEIA) estimates that in 2020, the United States had more than 100 GW of installed PV capacity (SEIA 2021).

Generation from distributed PV (smaller, often rooftop systems) and utility-scale PV systems increased by 25.5% in 2020 (EIA 2021c). This growth was largely driven by 14 GW of utility-scale projects, although residential deployments also ended the year up 11% compared to 2019 (SEIA 2021). Despite this notable rise, solar generation comprised only 3.26% of total electricity generation in the United States in 2020 (EIA 2021a).

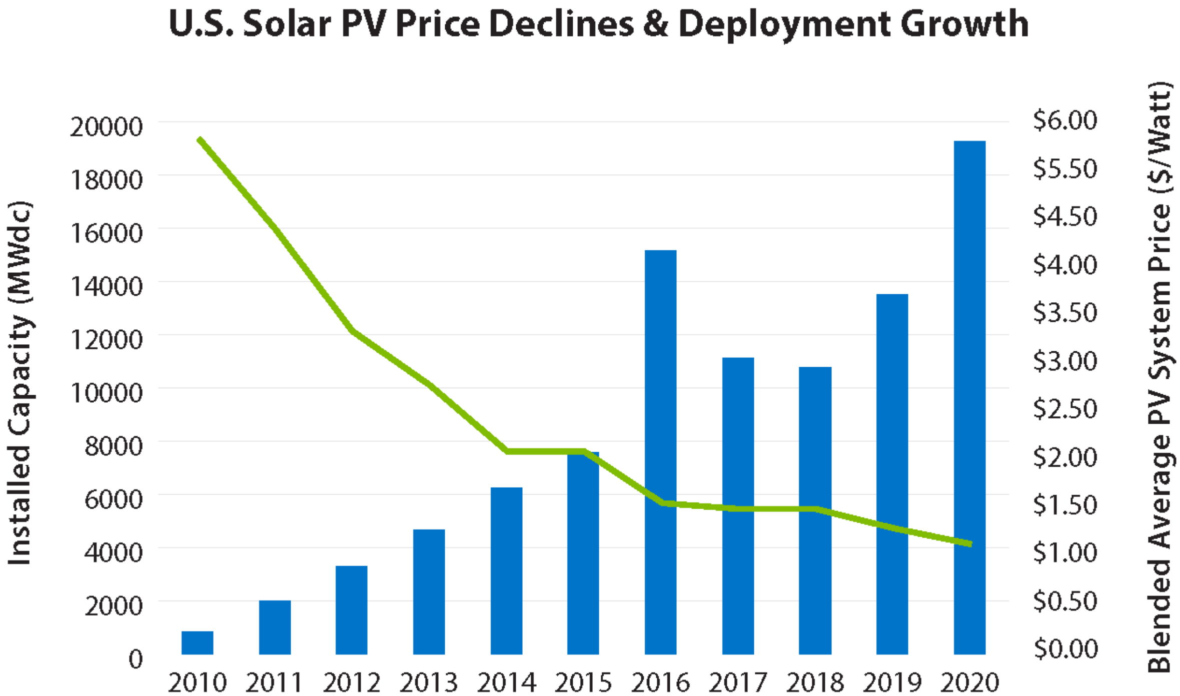

Figure 7. U.S. annual photovoltaic installations and price declines 2010–2020

Data from SEIA Solar Industry Research Data (n.d.)

California has historically led all states in PV installed, but other markets are expanding rapidly. New state entrants are expected to capture a growing share of the national market as prices continue to fall (Wood Mackenzie, SEIA 2021a). There is some correlation between installations and states with the most solar irradiance. However, there are instances in which states with low irradiance have high PV deployments, as seen in Massachusetts and Minnesota.

3.3.1 National Employment Figures

In 2020, the U.S. PV sector employed nearly 300,000 workers who spent at least some of their time installing PV systems, and approximately 230,000 who spent at least half of their time installing PV systems (NASEO and EFI 2021). The solar industry was the largest employer of all energy generation sectors measured by the 2021 USEER report. About 55% of solar workers spent most of their time on residential projects, 19% spent most of their time on utility projects, 18% spent most of their time on nonresidential, and 8% spent a majority of their time on community solar. Majority-time solar jobs have grown from around 93,500 workers in 2010 to 248,000 in 2019, for a pre-pandemic annual average growth rate of 12% through 2019 (SEIA 2021a).

Figure 8 shows estimated deployments and associated jobs in 2025 and 2030.

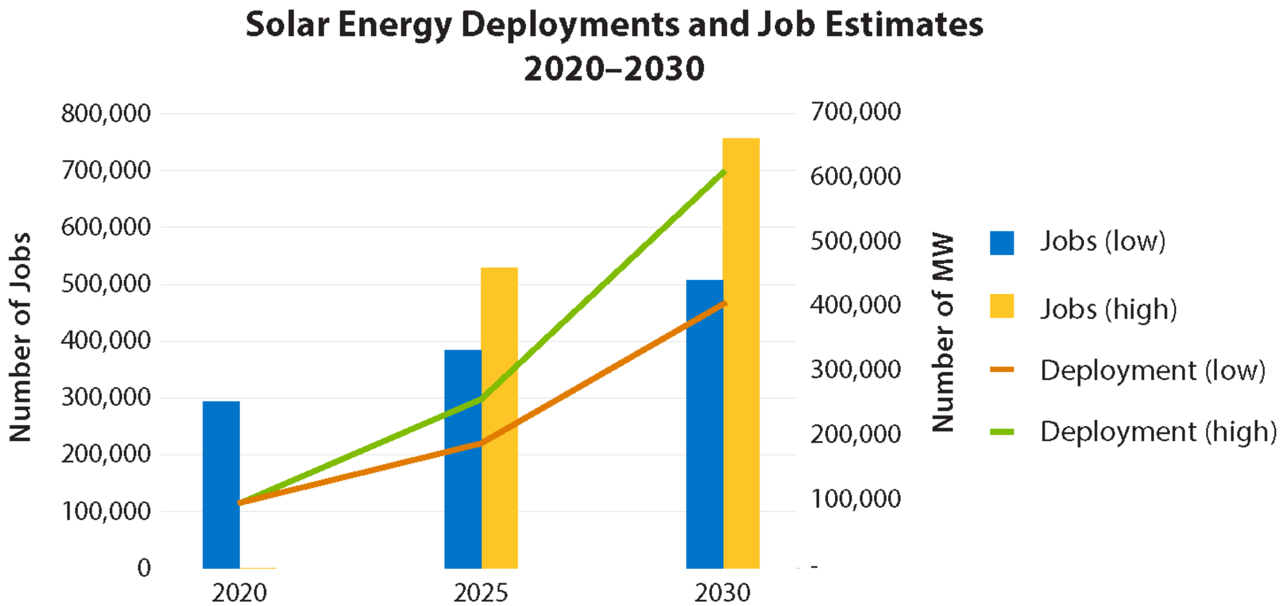

Figure 8. Cumulative deployments and jobs in 2020; estimated solar deployments and jobs in 2025 and 2030

Data from NREL (2021)

3.3.2 COVID-19 Impacts

Despite this growth, the solar industry suffered a large initial setback in jobs in 2020 due to the COVID-19 pandemic. These job losses were largely in residential solar and have been estimated at around 65,000 jobs lost, leaving 114,000 fewer solar jobs than were initially forecasted for the year (SEIA 2020).

Although many of these jobs did return, some may not, as the pandemic shifted from door-to-door to remote sales and the industry continues to make labor efficiency improvements. The shift toward more utility-scale installations (which are less labor-intensive) also contributed to overall job declines (Eckhouse 2020).

3.3.3 Occupations

Construction and professional services make up nearly 70% of solar jobs in the United States, showing that a large majority of the U.S. PV industry comprise downstream jobs (NASEO and EFI 2021). As such, installation and project development have made up most of the solar job growth in the past few years.

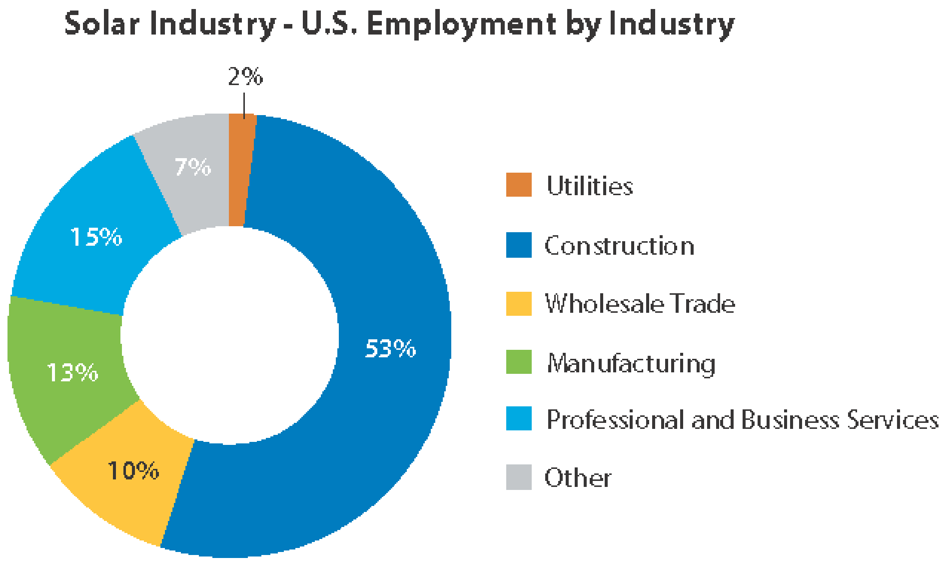

Figure 9. U.S. solar PV employment by industry

Data from NASEO and EFI (2021)

Table 9 includes a jobs multiplier for each of the industries supporting the PV sector. Readers can use the multipliers to customize job estimates to local industry conditions. We anticipate the job multiplier will decline in 2025 and 2030 as PV technology costs decline and companies implement labor efficiencies.

Table 9. PV Job Multipliers by Industry

Data from USEER, SEIA, Annual Technology Baseline

Industries	No. of Jobs 2020	U.S. PV Industry Composition 2020	U.S. PV Jobs/MW by Industry 2020	U.S. PV Jobs/MW by Industry 2025	U.S. PV Jobs/MW by Industry 2030
Construction	156,634	53%	1.5	1.1	0.7
Professional Services	43,266	15%	0.4	0.3	0.2
Manufacturing	39,420	13%	0.4	0.3	0.2
Wholesale Trade and Distribution	28,635	10%	0.3	0.2	0.1
Utilities	5,176	2%	0.1	0	0
Other	20,742	7%	0.2	0.1	0.1
Total 2020	**293,874**		**2.9**	**2.1**	**1.2**
2020 cumulative U.S. PV deployment was approximately 102,500 MW. Labor requirements per MW are expected to decline 28% between 2020 and 2025, and another 40% between 2025 and 2030. Note that numbers are rounded.					

The jobs included in Table 10 provide a sample of the range of occupations within the solar PV sector and should be viewed as representative but not comprehensive.

Table 10. Sampling of Solar PV Occupations

Information from the Solar Career Map

Occupation	Description	Skills, Education, and Certifications
Solar Installation and Operations	Preparing sites and installing systems; operation and maintenance of systems; managing and monitoring projects.	• Entry-level crew: basic construction; certifications such as NABCEP PV installer certification available • Mid-level crew leader: knowledge of electric and fire code; installation experience
System Design	Selecting, sizing, configuring systems; engineering, economic analysis, testing, evaluation, and specification.	• Mid-level: bachelor's degree, associate's degree, certification • Advanced: licensure or postgraduate degree
Project Development	Procurement, marketing, sales, contracting, plan review, permitting, compliance, and inspection.	• Entry-level: high school diploma, certification • Mid-level: bachelor's degree, certification, associate's degree, licensure, master's degree • Advanced: postgraduate degree, certification
Manufacturing	Module, racking, and inverter manufacturers; researchers, designers, and producers.	• Entry-level: post-secondary credential, associate's degree, certification • Mid-level: associate's degree, bachelor's degree • Advanced: postgraduate degree, licensure, certification

3.3.4 Additional Resources

More information on the solar energy industry can be found at the following websites:

- **Solar Career Map:** https://www.irecsolarcareermap.org/
- **National American Board of Certified Energy Professionals:** https://www.nabcep.org/certifications/nabcep-board-certifications/
- **Solar Policy Toolkit: National Conference of State Legislatures:** https://www.ncsl.org/research/energy/solar-policy-toolbox.aspx
- **Solar State-by-State Progress Map:** https://www.seia.org/states-map
- **Solar Energy Industries Association:** https://www.seia.org/.

3.4 Sector Summary: Land-Based Wind Energy

Land-based wind set a record in 2020 by adding nearly 17 GW of new wind power capacity, across the country (DOE 2021). Until 2020, growth in annual new wind capacity peaked in 2012 and slowed in 2013, likely a result of uncertainty surrounding the Federal Production Tax Credit (Lantz et al. 2014).

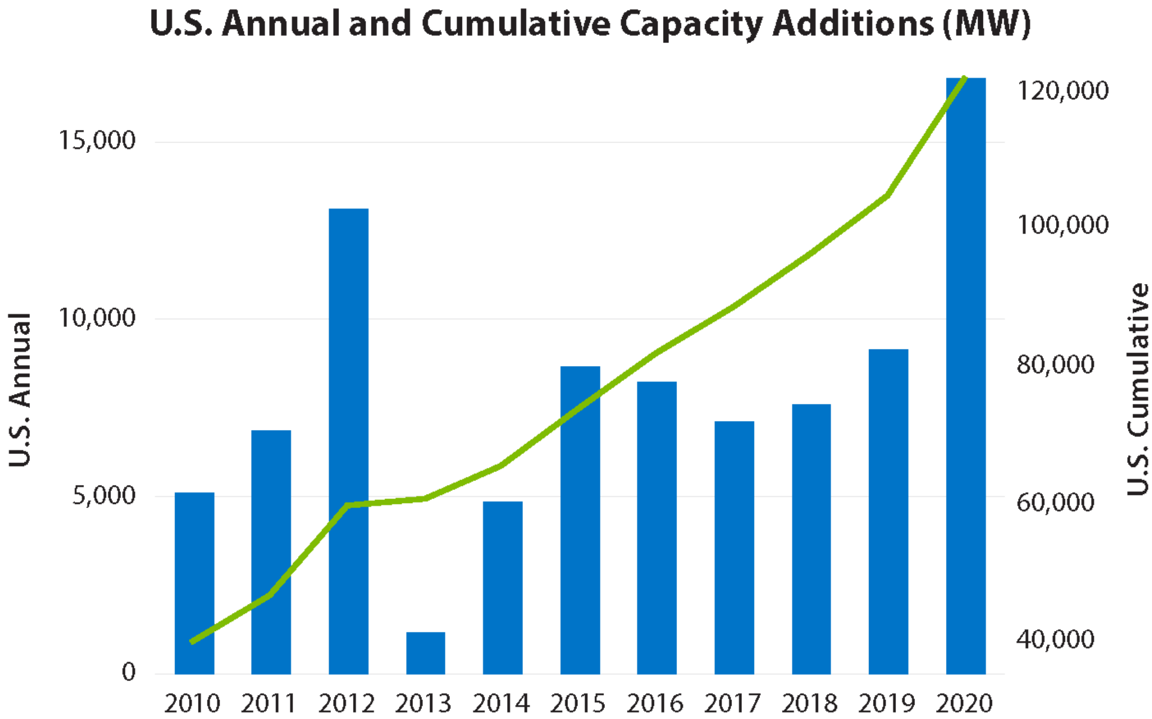

Figure 10. U.S. land-based wind energy growth over time

Data from Lawrence Berkeley National Laboratory (2021)

Wind accounted for 31% of all new generation capacity added in 2020 (EIA 2021b) and now represents 8% of the country's electricity supply (LBNL 2021).

At the state level, Texas had the largest amount of wind capacity in 2020 with approximately 4,000 MW installed, followed by Iowa (~1,200 MW) and Oklahoma (~1,100 MW). Wind as a percentage of in-state electricity sales, however, is highest in Iowa (69%), followed by North Dakota (62%) and Kansas (61%) (DOE 2021).

3.4.1 National Employment Figures

The wind sector added 16,000 jobs between 2015 and 2019, steadily adding jobs once the Federal Production Tax Credit was renewed in 2016 (NASEO and EFI 2020c).[20]

In 2020, the wind sector employed nearly 117,000 workers, representing the second largest employer after solar in the U.S. electric power sector (NASEO and EFI 2021). Figure 11 shows national employment and deployment estimates for the U.S. wind sector from 2020 to 2030.

[20] 2015 is the first year of data available.

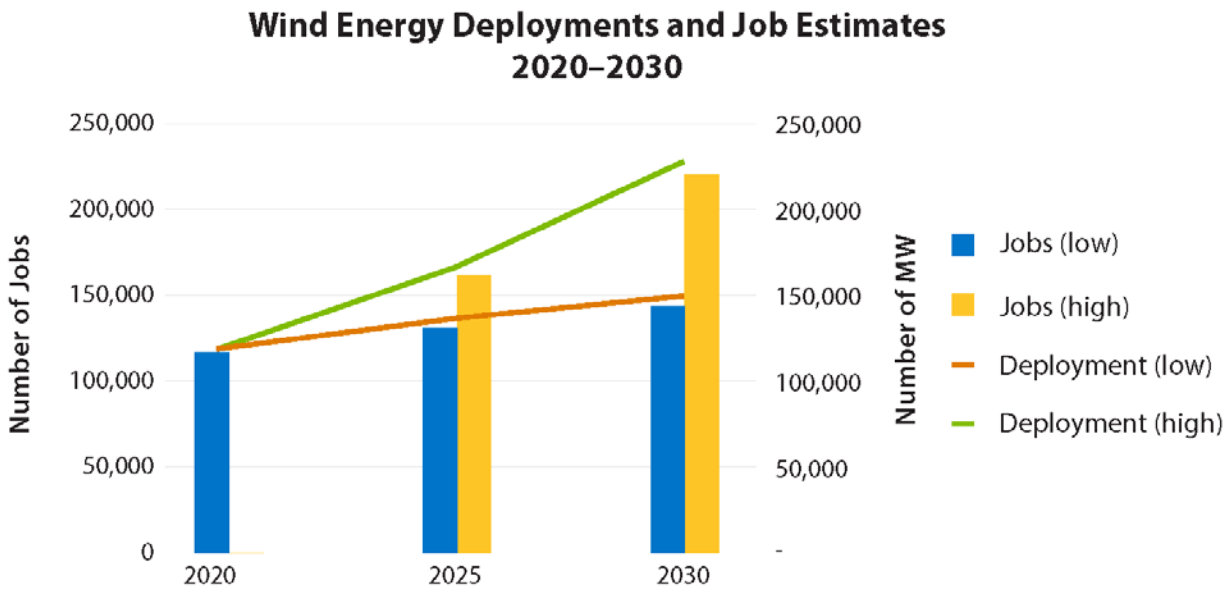

Figure 11. Cumulative actual deployments and jobs in 2020; estimated wind deployments and jobs in 2025 and 2030

Data from NREL (2021)

3.4.2 COVID-19 Impacts

Before COVID-19, the wind sector had more than 44 GW and $62 billion in projects in the pipeline. Analysts feared that the pandemic put an estimated 25 GW of wind projects at risk, which amounts to an estimated loss of 35,000 jobs, and $35 billion in investment (American Wind Energy Association 2020). However, while the impacts of the pandemic may not yet be fully known, wind-related jobs increased by nearly 2% in 2020, and wind was the only power generation sector to report an increase in jobs (NASEO and EFI 2021).

3.4.3 Occupations

Figure 12 shows that construction workers make up the single largest occupation group within the wind sector. This is followed by professional services (25%) and manufacturing (20%). Professional and business services, which include consulting services such as engineering and design as well as contractors hired to oversee operations, provide maintenance services not classified as construction repairs as well as an array of other services such as legal, scientific, and logistics services.

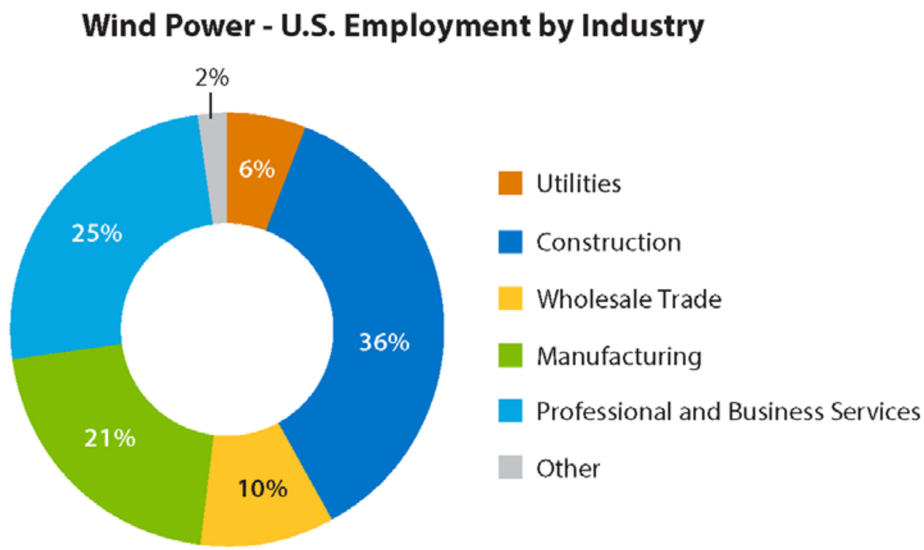

Figure 12. Wind industry employment by industry subsector

Data from NASEO and EFI (2021)

Table 11 includes a jobs multiplier for each of the industries supporting the wind sector. Readers can use the multipliers to customize job estimates to local industry conditions. The multiplier is not expected to decline in 2025 or 2030 because we believe that cost reductions in the land-based wind sector will be due to factors other than labor force reductions.

Table 11. Wind Job Multipliers by Industry

Data from USEER and DOE

Industries	No. of Jobs 2020	U.S. Wind Industry Composition 2020	U.S. Wind Jobs/MW by Industry 2020	U.S. Wind Jobs/MW by Industry 2025	U.S. Wind Jobs/MW by Industry 2030
Construction	42,054	36%	0.35	0.35	0.35
Professional Services	29,204	25%	0.24	0.24	0.24
Manufacturing	24,532	21%	0.2	0.2	0.2
Wholesale Trade and Distribution	11,682	10%	0.1	0.1	0.1
Utilities	7,009	6%	0.06	0.06	0.06
Other	2,336	2%	0.02	0.02	0.02
Total 2020	**116,817**		**0.96**	**0.96**	**0.96**
2020 cumulative U.S. land-based wind deployment was approximately 122,000 MW. Labor multipliers are not expected to decline for U.S. land-based wind in 2025 or 2030. Note that numbers are rounded.					

As shown in Table 12, there is no single education and training requirement by occupation that employers prefer except for general construction workers, which only require a high school diploma (Keyser and Tegen 2019). The general construction category excludes management, trade workers, engineers, and other specialized workers involved in construction. Table 12 includes a sampling of occupations in the wind sector and is not a comprehensive list.

Table 12. Sampling of Wind Industry Occupations

Information from Keyser and Tegen (2019)

Occupation	Description	Skills, Education, and Certification
Project Development	Designing wind projects for implementation; including legal, regulatory, economic, and meteorological components; almost entirely advanced-level jobs.	• Mid-level: power systems/transmission engineer: practical experience, bachelor's in engineering and/or construction management, certification as professional engineer • Mid-level: project engineer: bachelor's in mechanical, aerospace, or electrical engineering; practical experience
Component Manufacturing	Research, design, assemble, and transport components of wind turbines.	• Entry-level: high school diploma and additional training for advanced assembly • Mid-level: bachelor's degree, industry certification, and related work experience • Advanced: engineer: bachelor's/master's and demonstrated experience; manager: bachelor's and significant work experience
Construction	Construction of wind turbine, from site selection to turbine installation.	• Entry-level: no formal education requirements, related experience for operating machinery • Mid-level: bachelor's degree and past construction experience, certification becoming important in recent years • Advanced: manager: bachelor's, MBA, past experience; engineer: bachelor's, past experience
Operations	Operations and maintenance of wind turbines; managing and monitoring projects.	• Entry-level: associate's technical degree (for wind technicians) • Mid-level: associate's degree, bachelor's degree, past wind plan experience • Advanced: manager: bachelor's degree, business and/or finance experience; engineer: bachelor's degree, practical experience, professional certification depending on field
Education, Training, and Research	Building wind industry knowledge by training new workers or research projects.	• Mid-level: associate's degree, bachelor's degree, past experience, possible certification • Advanced: research: master's, Ph.D.; Education/training: Ph.D.

3.4.4 Additional Resources

More information on the wind energy industry can be found at the following websites:

- **Wind Career Map:** https://www.energy.gov/eere/wind/wind-career-map
- **Wind Energy Training:** National Center for Construction Education and Research: https://www.nccer.org/workforce-development-programs/disciplines/craft-details/wind-energy
- **Wind Energy Policies and Incentives Database:** https://windexchange.energy.gov/policies-incentives

- **Wind Energy Permitting and Zoning Guidance:** https://windexchange.energy.gov/projects/permitting
- **American Clean Power Association:** https://cleanpower.org/.

4 Conclusion

The information in this report is intended to provide readers with a transparent and simple method for estimating the size of the workforce needed to support various deployment levels of energy efficiency, BES, PV, and land-based wind. The manufacturing, installation, and operation of these four technologies offer a range of occupations with job opportunities at every education level across many industries, including manufacturing, construction, professional services, wholesale trade and distribution, utilities, and others. Readers may apply this estimation methodology to their own deployment forecasts or goals to tailor the estimates to their local contexts and needs.

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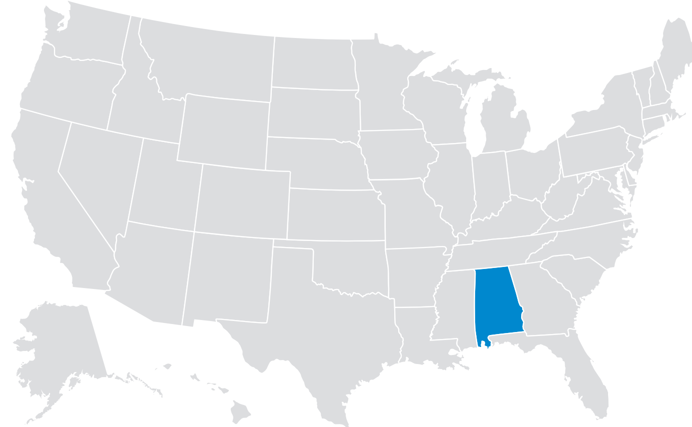
Appendix A. State-Level Job Estimates

This appendix includes a fact sheet for all 50 U.S. states and the District of Columbia, listed in alphabetical order. The job estimates presented represent the number of jobs that would be supported by the level of deployment projected for each technology. Each fact sheet includes census information on the state's working population, estimates for in-state jobs in energy efficiency, stationary battery energy storage (BES), solar photovoltaics (PV) and land-based wind, as well as deployments reported or modeled for 2020. A methodology section, data sources and links to more information is included at the end of each fact sheet.

NREL Transforming ENERGY

Alabama's Clean Energy Jobs Potential Through 2030

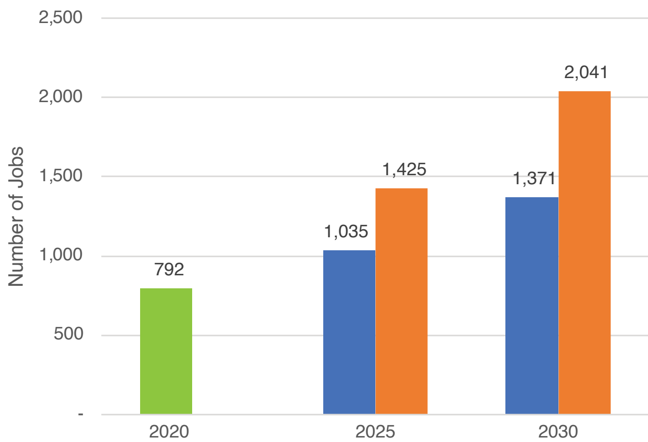


According to the U.S. Census Bureau, Alabama had 3,150,156 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend: Jobs *(reported)* · Jobs *(modeled with IMPLAN)* · Jobs *(low, modeled; see methodology)* · Jobs *(high, modeled; see methodology)*

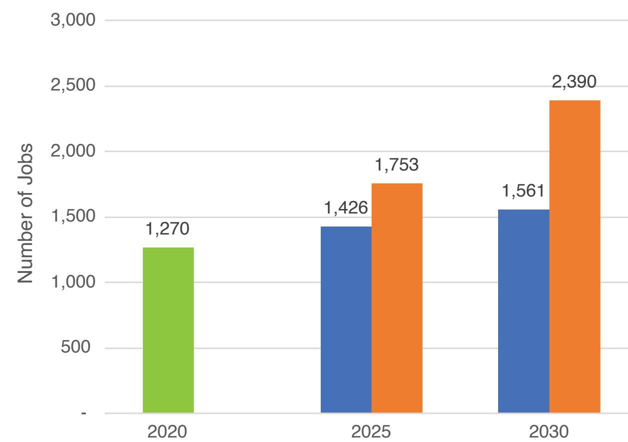
Solar Energy Job Estimates 2020–2030

(photovoltaics)



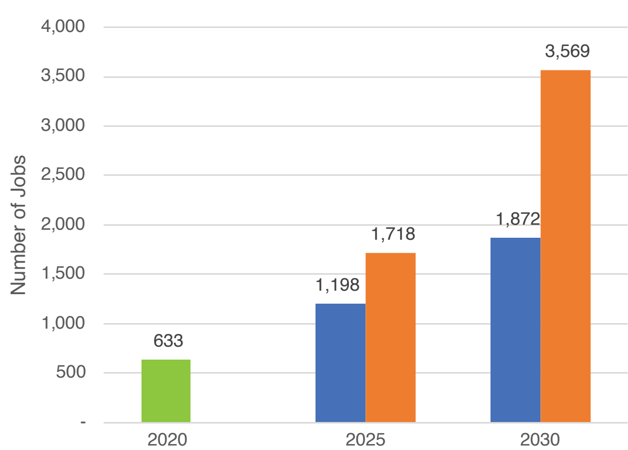
Wind Energy Job Estimates 2020–2030

(land-based)



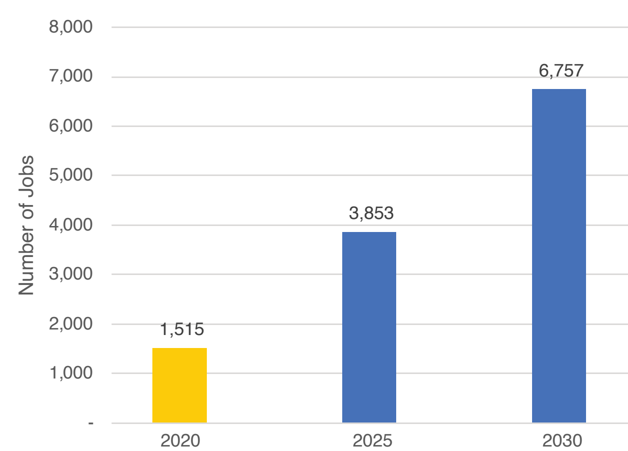
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1]Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not a full-time equivalent measure.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	283	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	2	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,260	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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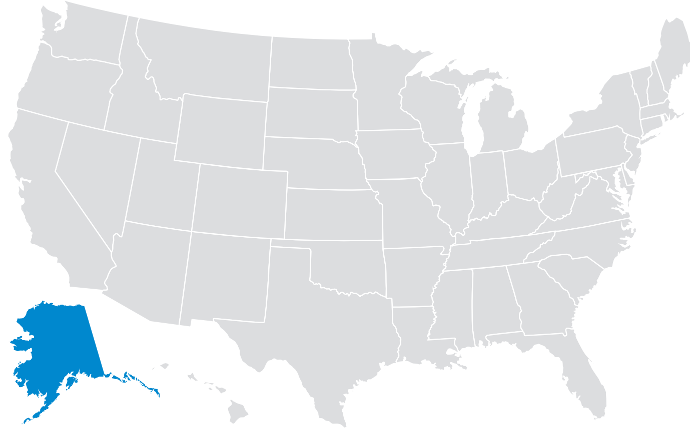
Alaska's Clean Energy Jobs Potential Through 2030

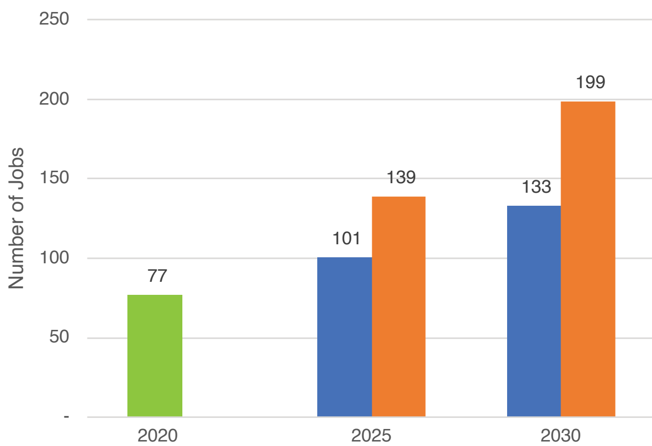


According to the U.S. Census Bureau, Alaska had 487,637 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

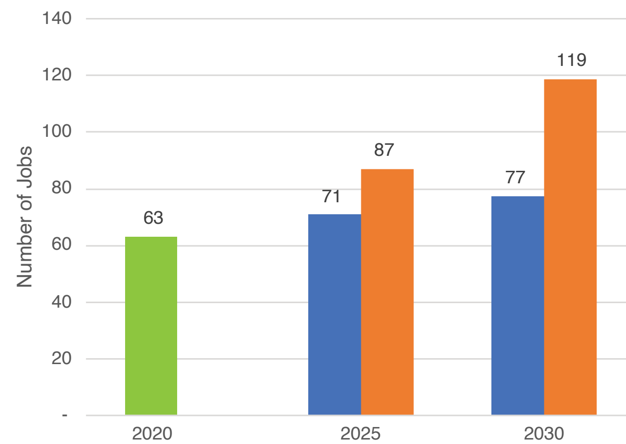
Solar Energy Job Estimates 2020–2030

(photovoltaics)



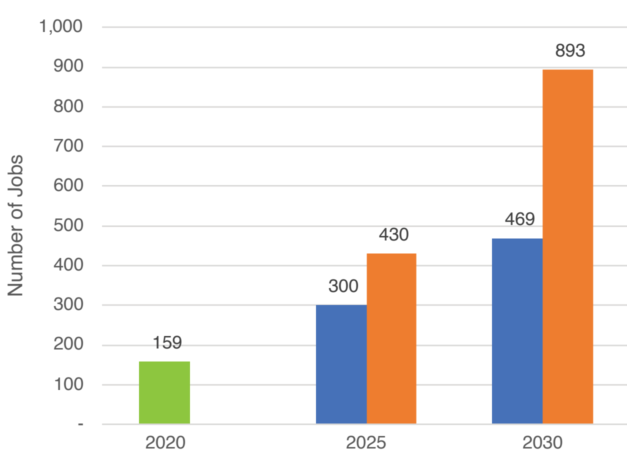
Wind Energy Job Estimates 2020–2030

(land-based)



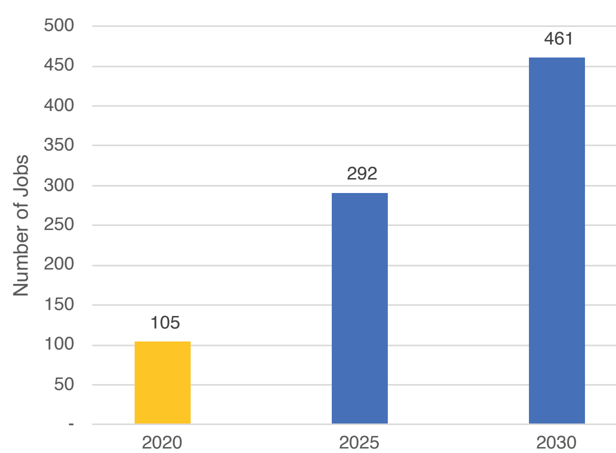
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	13	MW	Solar Energy Industries Association (SEIA)
Wind	64	MW	U.S. Department of Energy Wind Exchange
Battery Storage	83	MW	Alaska Center for Clean Energy and Power and Renewable Energy Alaska Project
Energy Efficiency	113	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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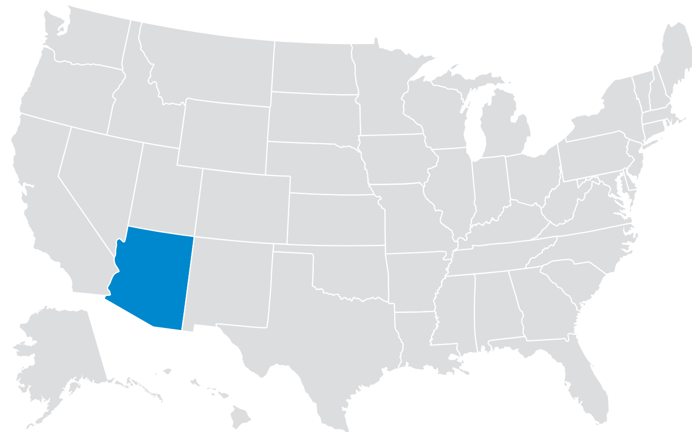
Arizona's Clean Energy Jobs Potential Through 2030

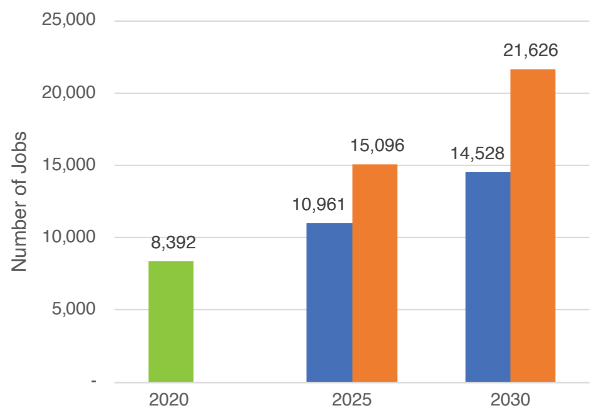


According to the U.S. Census Bureau, Arizona had 4,611,844 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

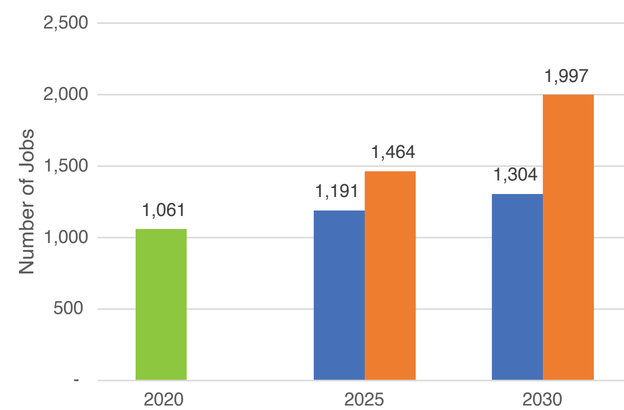
Solar Energy Job Estimates 2020–2030

(photovoltaics)



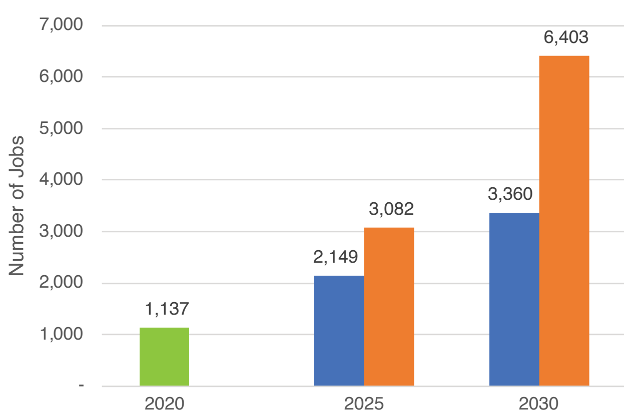
Wind Energy Job Estimates 2020–2030

(land-based)



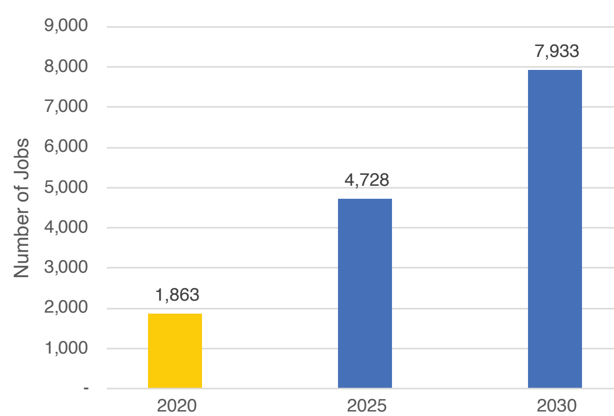
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1]Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not a full-time equivalent measure.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	5,247	MW	Solar Energy Industries Association (SEIA)
Wind	618	MW	U.S. Department of Energy Wind Exchange
Battery Storage	84	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,469	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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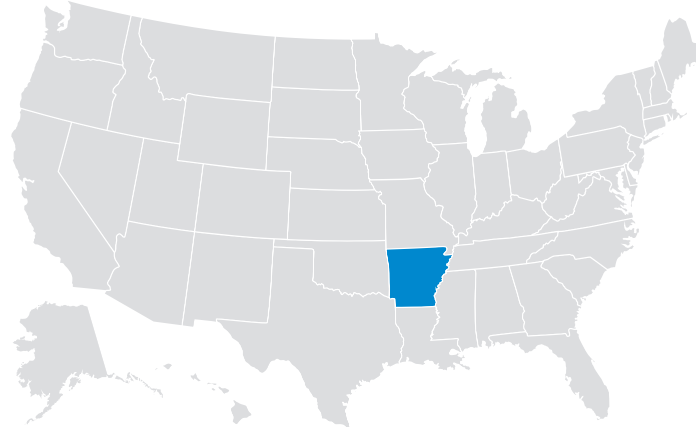
Arkansas's Clean Energy Jobs Potential Through 2030

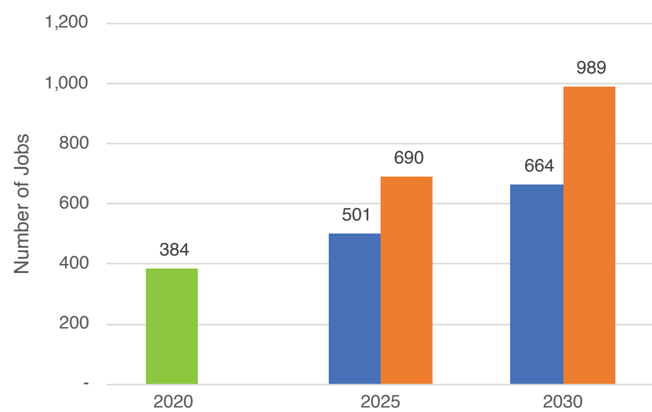


According to the U.S. Census Bureau, Arkansas had 1,915,575 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

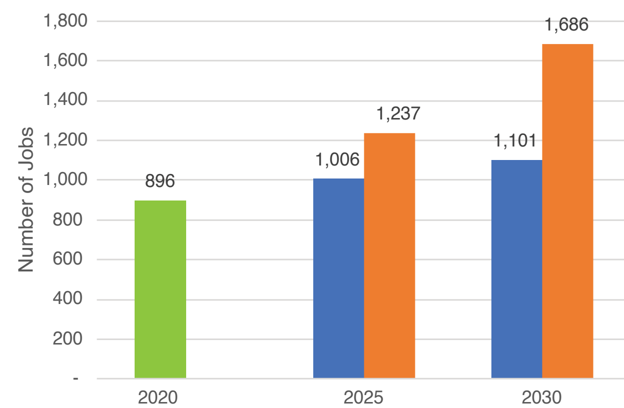
Solar Energy Job Estimates 2020–2030

(photovoltaics)



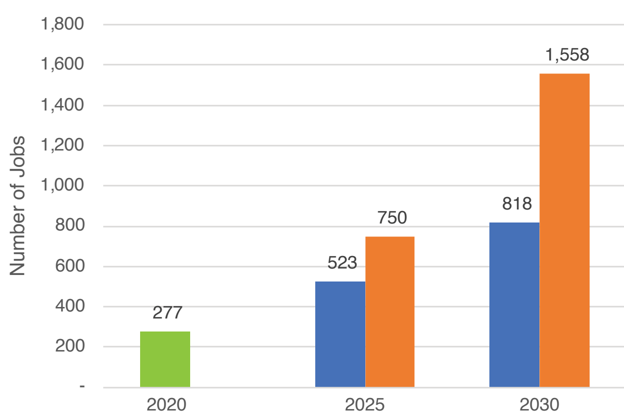
Wind Energy Job Estimates 2020–2030

(land-based)



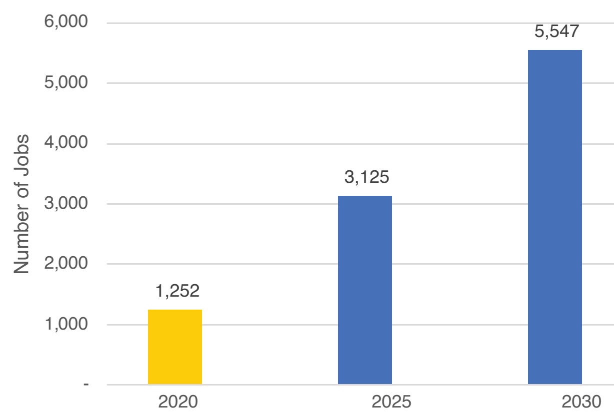
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not a full-time equivalent measure.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	386	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	799	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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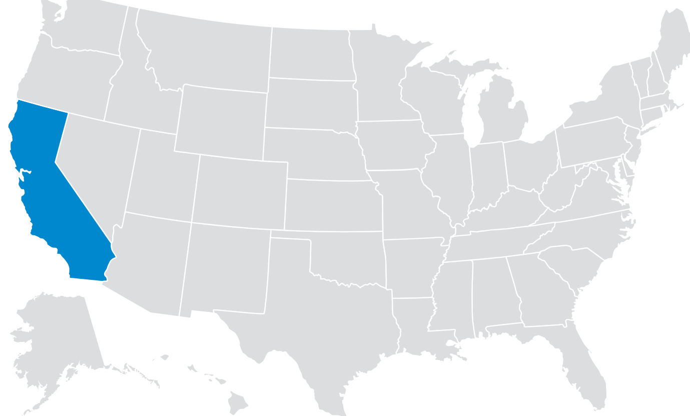
California's Clean Energy Jobs Potential Through 2030

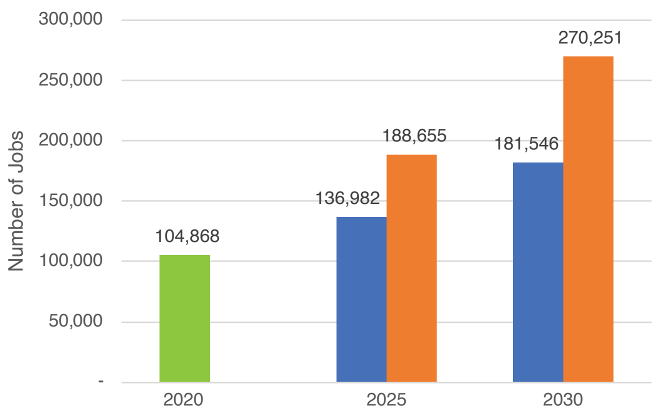


According to the U.S. Census Bureau, California had 26,289,114 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

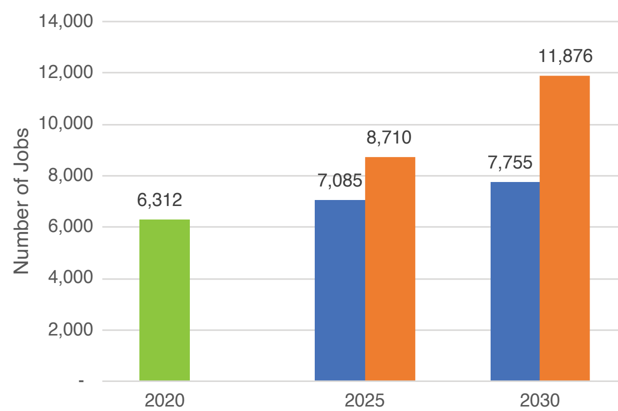
Solar Energy Job Estimates 2020–2030

(photovoltaics)



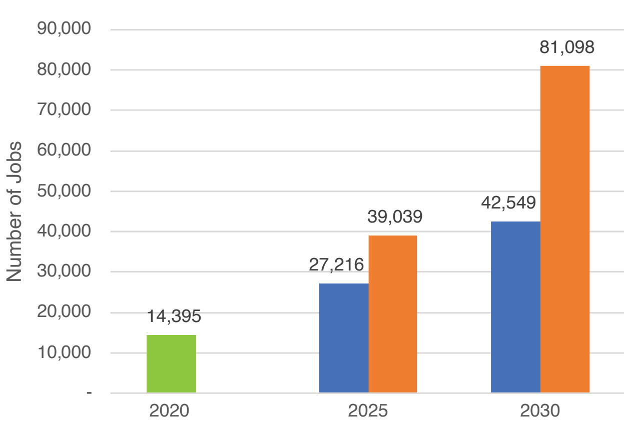
Wind Energy Job Estimates 2020–2030

(land-based)



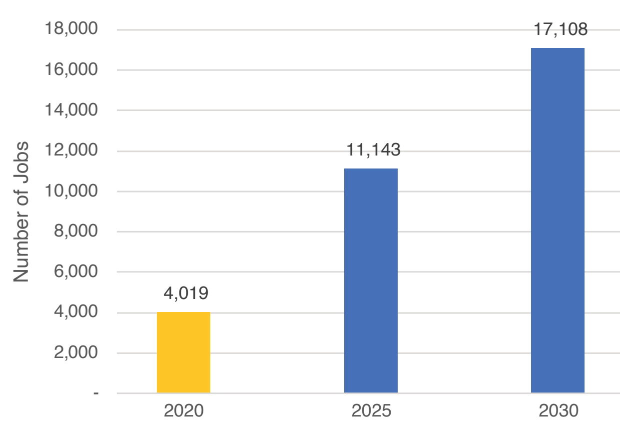
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	31,873	MW	Solar Energy Industries Association (SEIA)
Wind	5,922	MW	U.S. Department of Energy Wind Exchange
Battery Storage	690	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	5,781	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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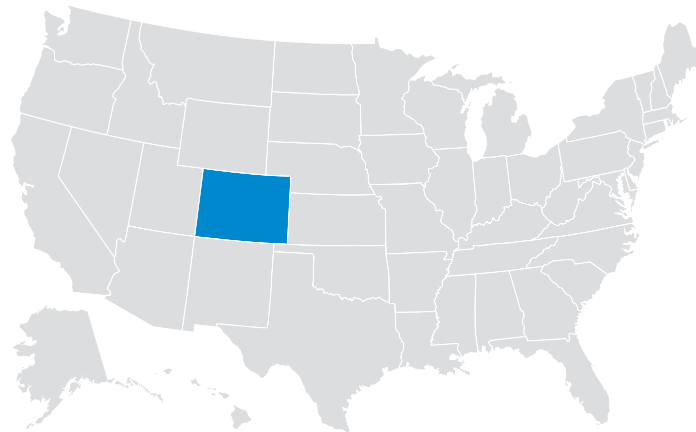
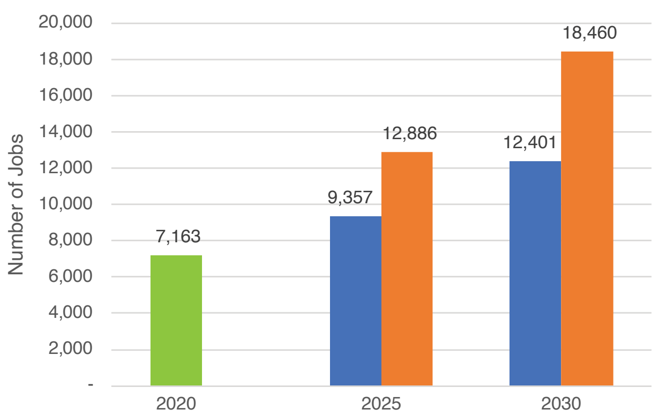
Colorado's Clean Energy Jobs Potential Through 2030



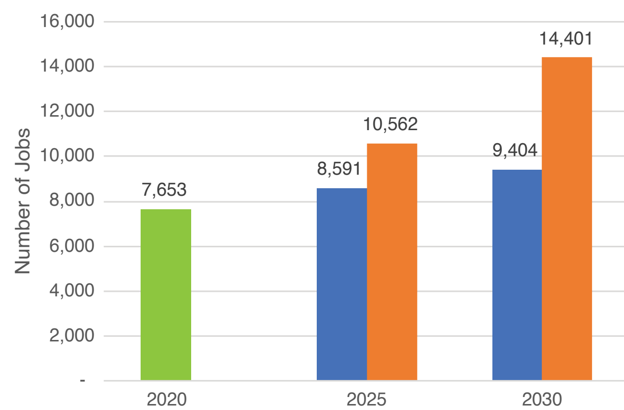
According to the U.S. Census Bureau, Colorado had 3,875,432 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

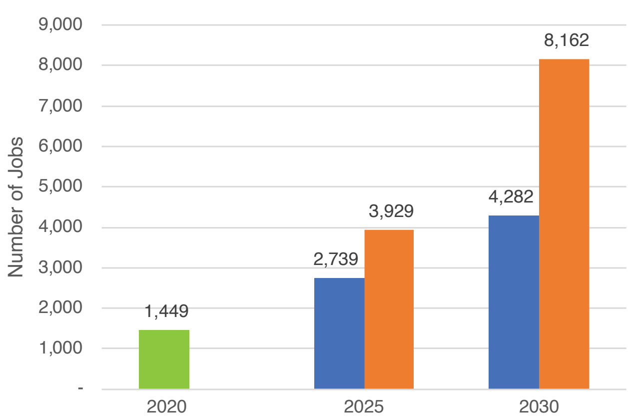
Solar Energy Job Estimates 2020–2030
(photovoltaics)



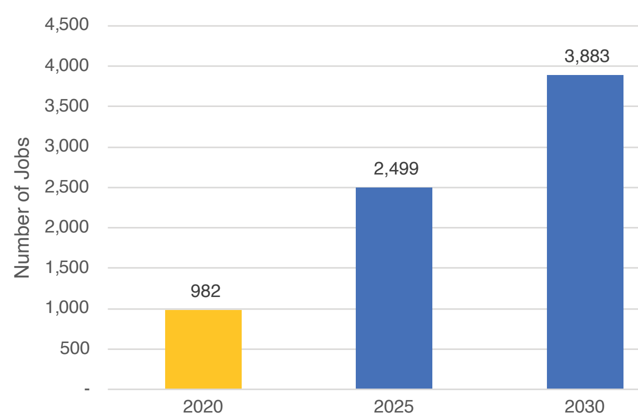
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

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Energy Efficiency

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2020 Deployments

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2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	1,756	MW	Solar Energy Industries Association (SEIA)
Wind	4,692	MW	U.S. Department of Energy Wind Exchange
Battery Storage	10	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	927	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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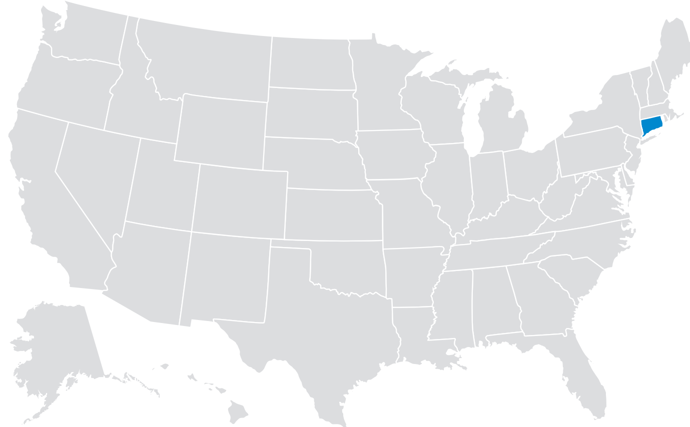
Connecticut's Clean Energy Jobs Potential Through 2030

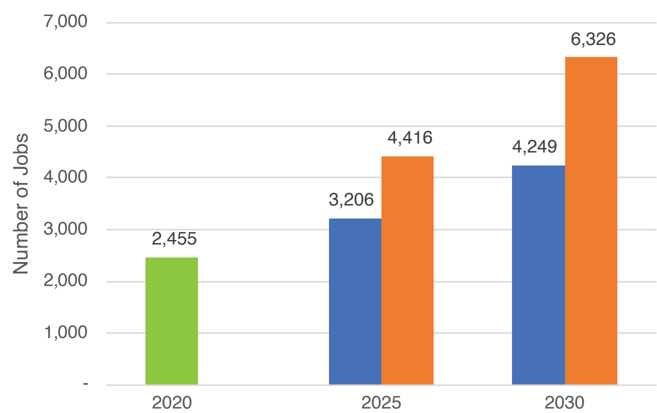


According to the U.S. Census Bureau, Connecticut had 2,345,997 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

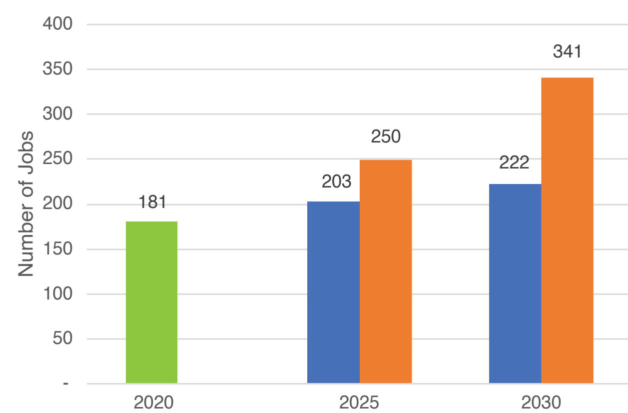
Solar Energy Job Estimates 2020–2030

(photovoltaics)



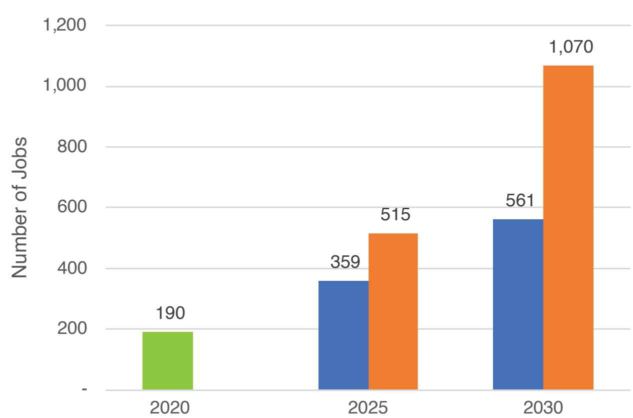
Wind Energy Job Estimates 2020–2030

(land-based)



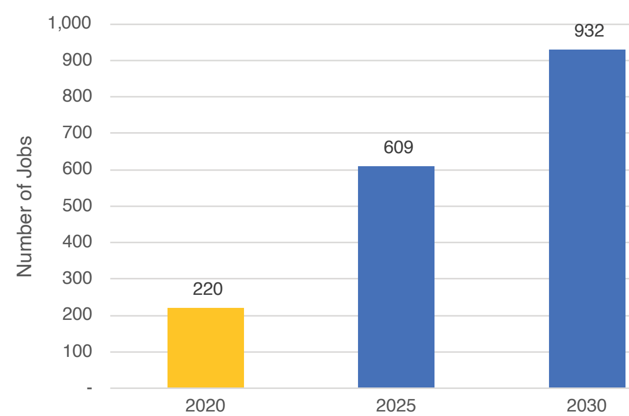
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	909	MW	Solar Energy Industries Association (SEIA)
Wind	5	MW	U.S. Department of Energy Wind Exchange
Battery Storage	10	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	350	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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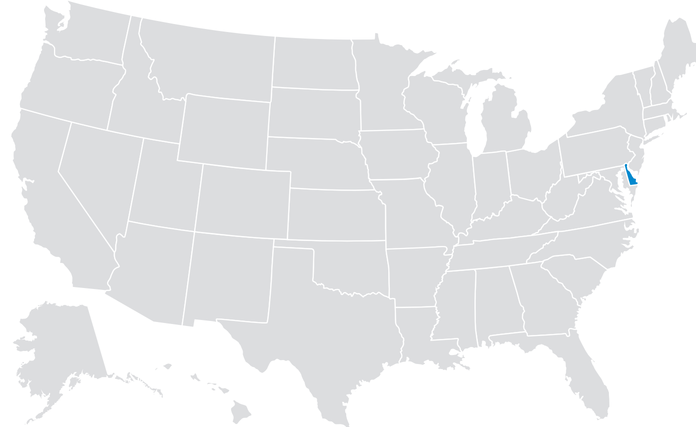
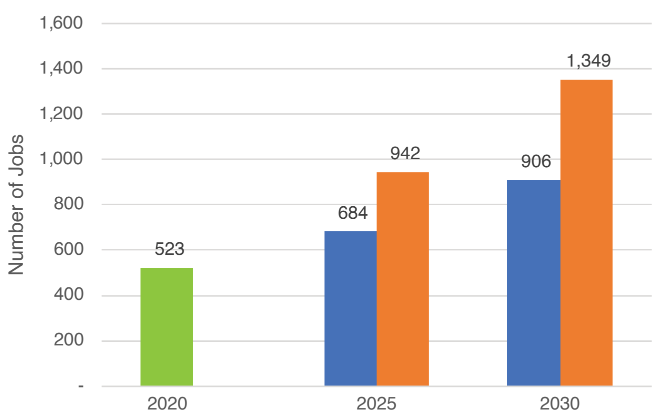
Delaware's Clean Energy Jobs Potential Through 2030



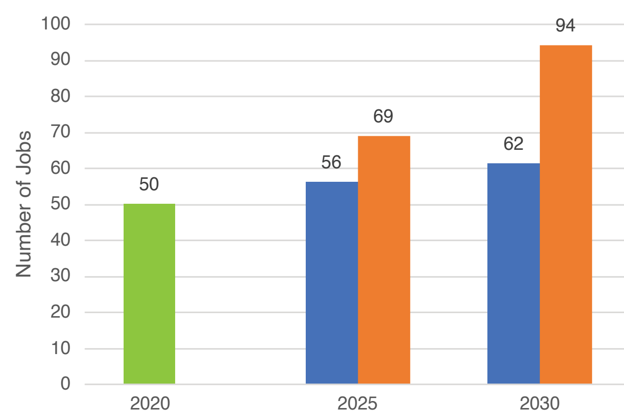
According to the U.S. Census Bureau, Delaware had 615,804 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* | Jobs *(modeled with IMPLAN)* | Jobs *(low, modeled; see methodology)* | Jobs *(high, modeled; see methodology)*

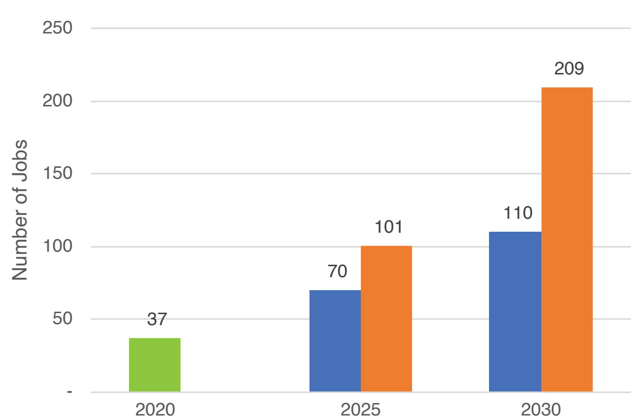
Solar Energy Job Estimates 2020–2030
(photovoltaics)



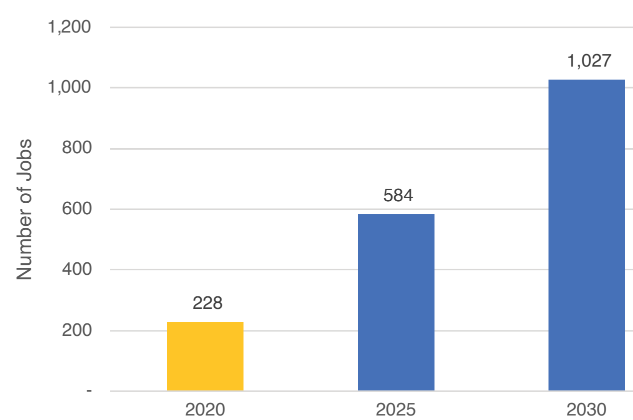
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	154	MW	Solar Energy Industries Association (SEIA)
Wind	2	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	195	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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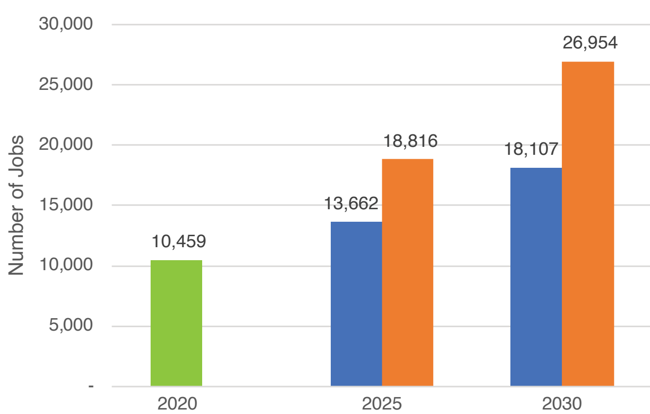
Florida's Clean Energy Jobs Potential Through 2030

According to the U.S. Census Bureau, Florida had 13,466,496 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — **Jobs** *(reported)* — **Jobs** *(modeled with IMPLAN)* — **Jobs** *(low, modeled; see methodology)* — **Jobs** *(high, modeled; see methodology)*

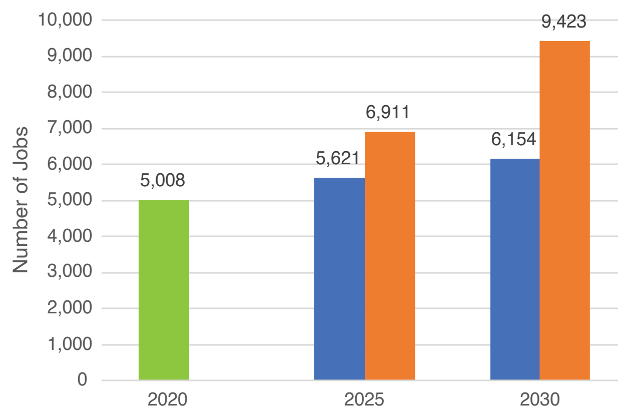
Solar Energy Job Estimates 2020–2030

(photovoltaics)



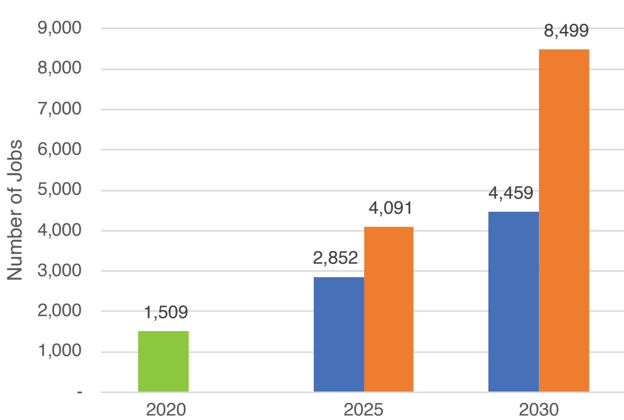
Wind Energy Job Estimates 2020–2030

(land-based)



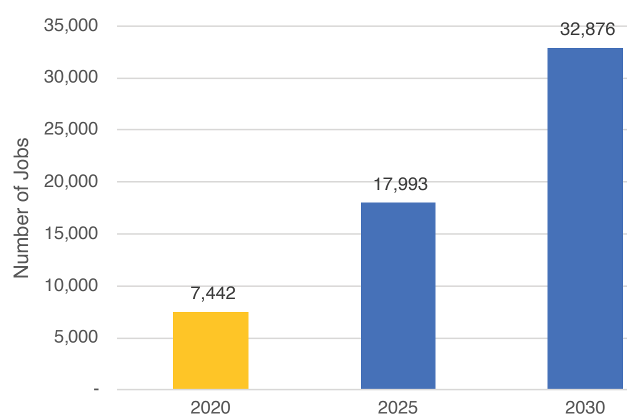
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	7,074	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	89	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	4,538	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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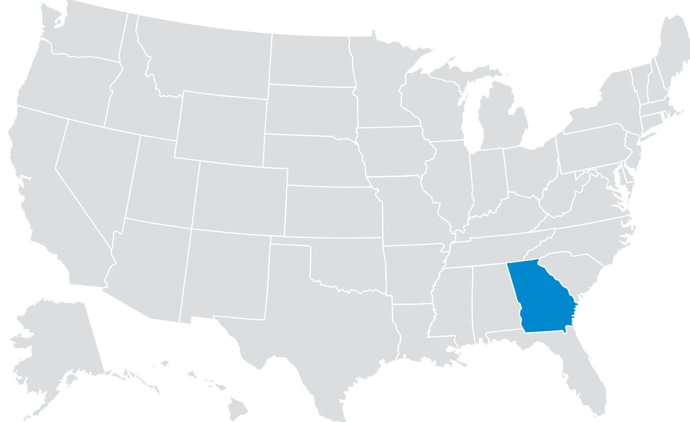
Georgia's Clean Energy Jobs Potential Through 2030

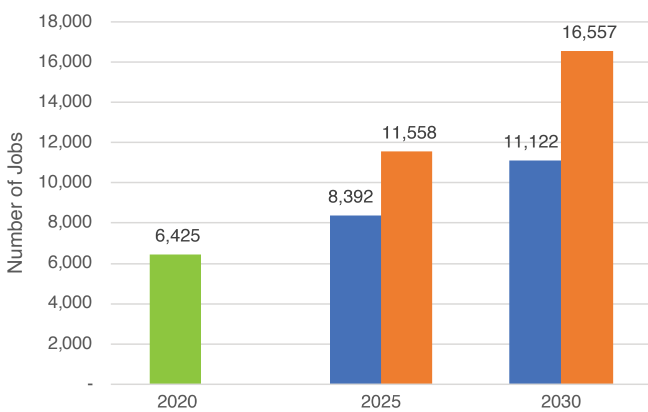


According to the U.S. Census Bureau, Georgia had 7,017,580 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

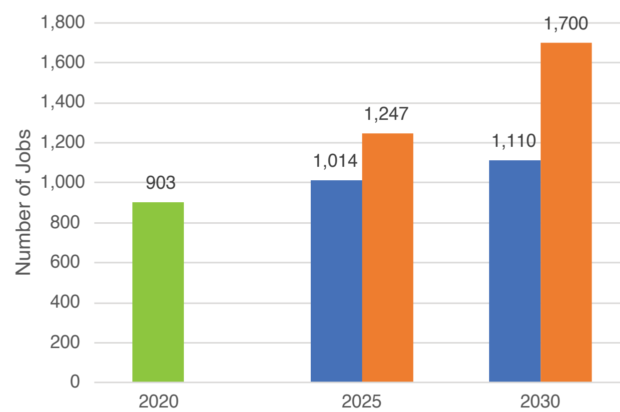
Solar Energy Job Estimates 2020–2030

(photovoltaics)



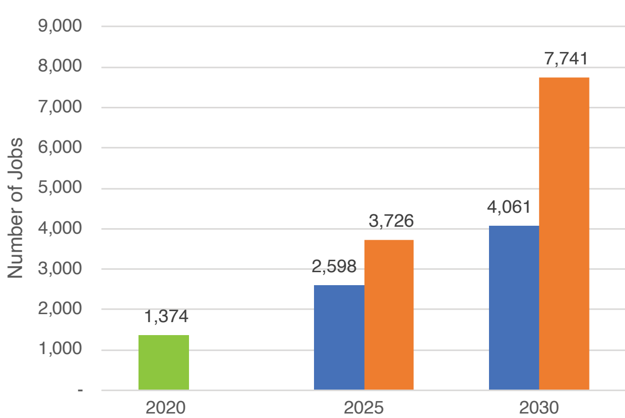
Wind Energy Job Estimates 2020–2030

(land-based)



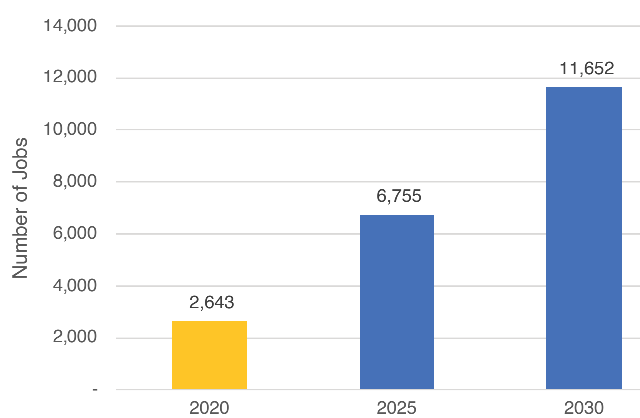
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	3,069	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	2	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	2,349	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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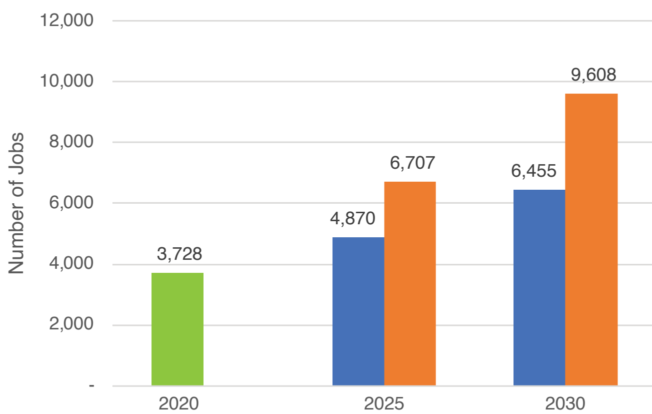
Hawaii's Clean Energy Jobs Potential Through 2030

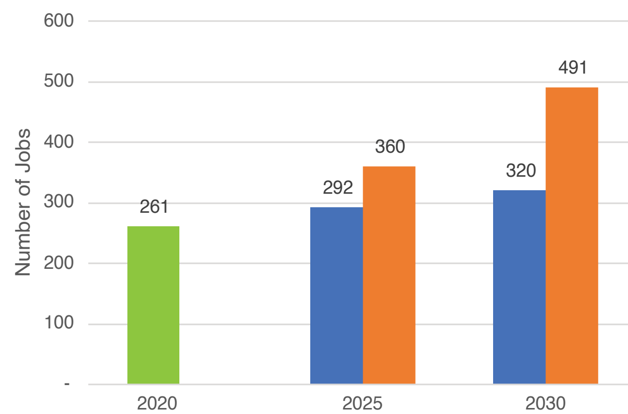
According to the U.S. Census Bureau, Hawaii had 893,995 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

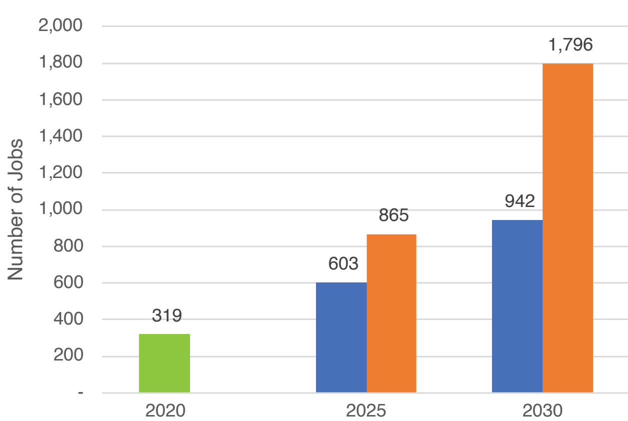
Solar Energy Job Estimates 2020–2030
(photovoltaics)



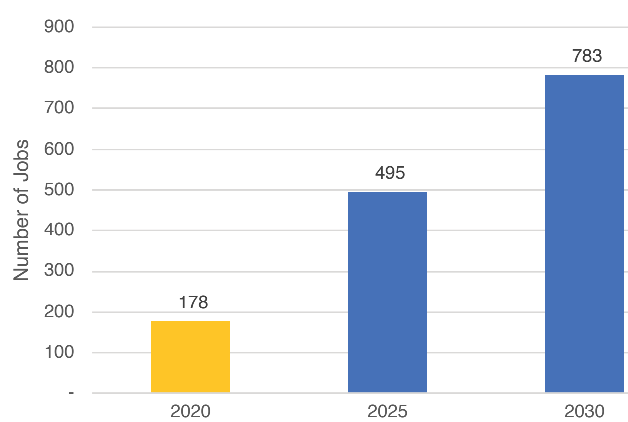
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	1,427	MW	Solar Energy Industries Association (SEIA)
Wind	233	MW	U.S. Department of Energy Wind Exchange
Battery Storage	23	MW	Hawaii State Energy Office
Energy Efficiency	197	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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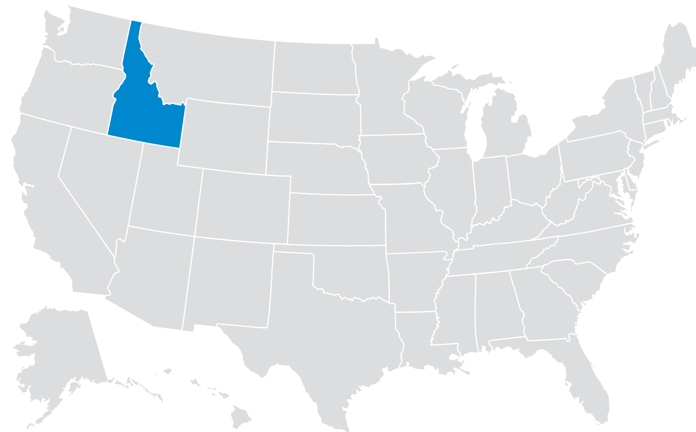


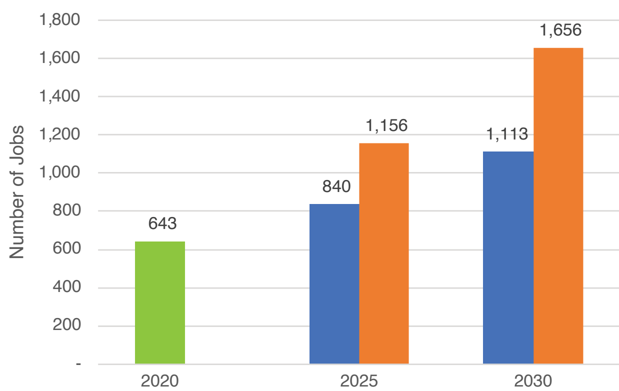
Idaho's Clean Energy Jobs Potential Through 2030

According to the U.S. Census Bureau, Idaho had 1,127,985 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* — Jobs *(modeled with IMPLAN)* — Jobs *(low, modeled; see methodology)* — Jobs *(high, modeled; see methodology)*

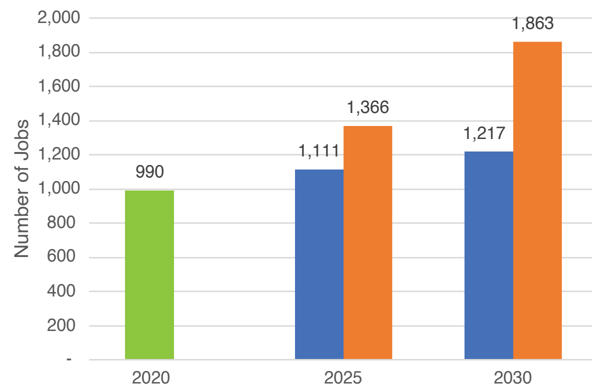
Solar Energy Job Estimates 2020–2030

(photovoltaics)



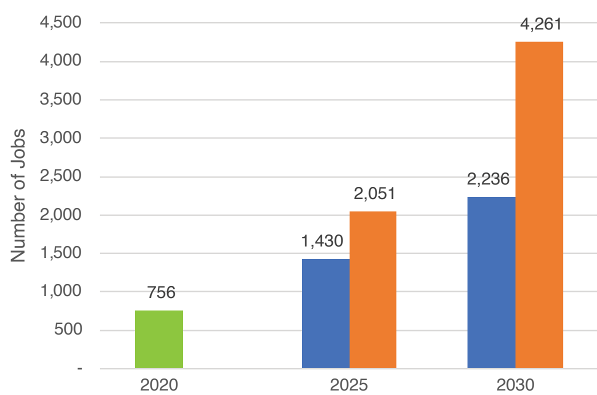
Wind Energy Job Estimates 2020–2030

(land-based)



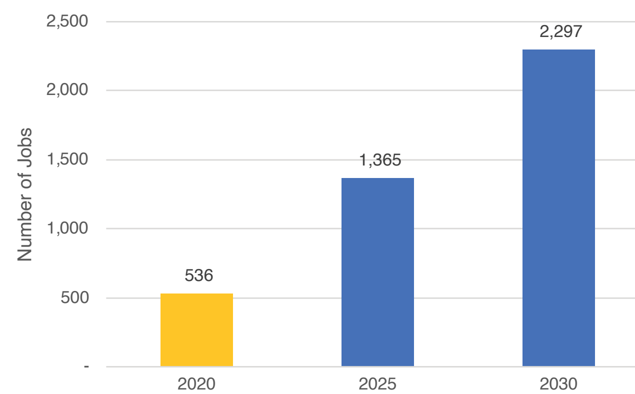
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

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2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	578	MW	Solar Energy Industries Association (SEIA)
Wind	973	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	367	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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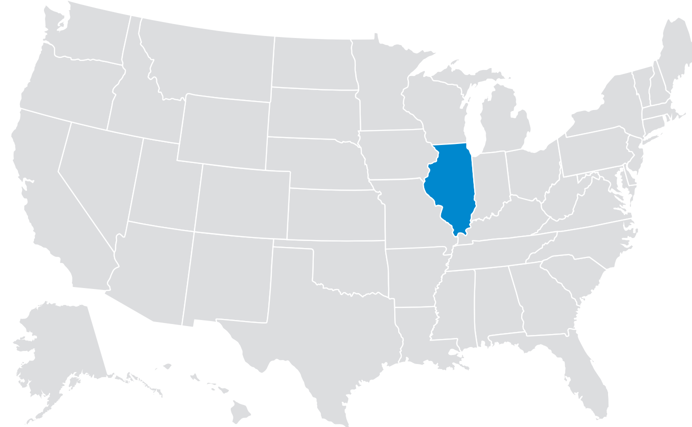
Illinois's Clean Energy Jobs Potential Through 2030

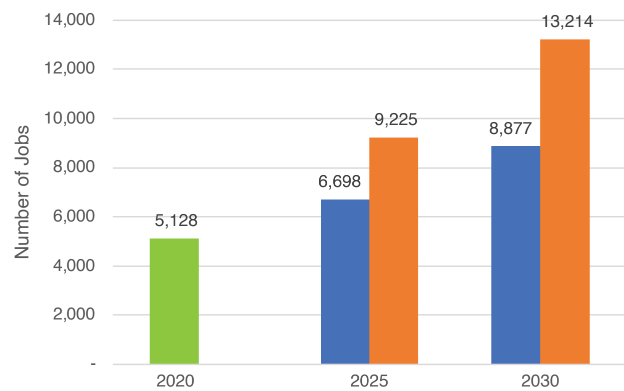


According to the U.S. Census Bureau, Illinois had 8,307,951 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

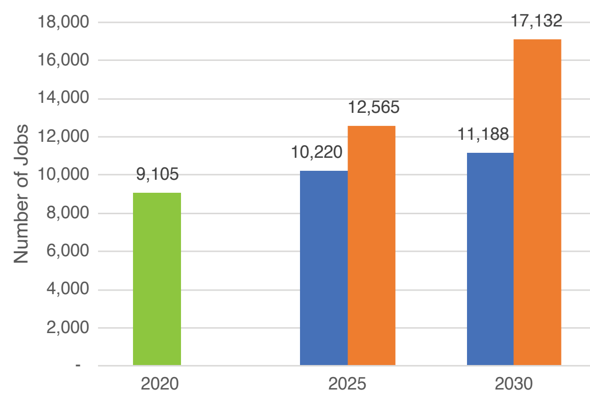
Solar Energy Job Estimates 2020–2030

(photovoltaics)



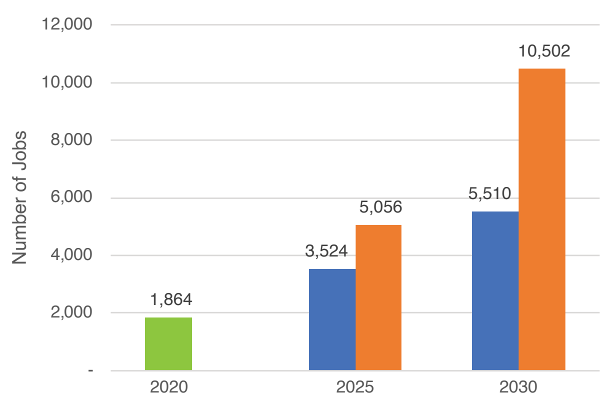
Wind Energy Job Estimates 2020–2030

(land-based)



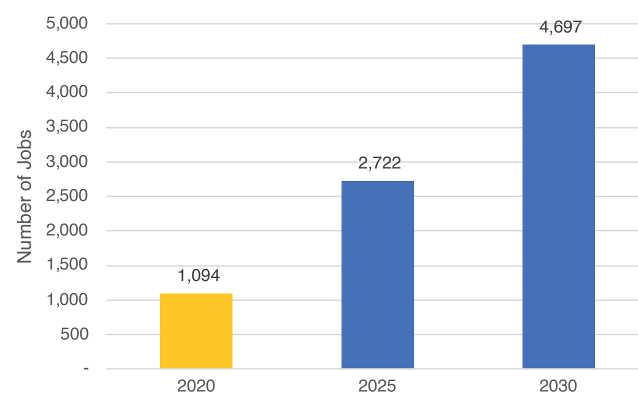
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	618	MW	Solar Energy Industries Association (SEIA)
Wind	6,409	MW	U.S. Department of Energy Wind Exchange
Battery Storage	272	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,233	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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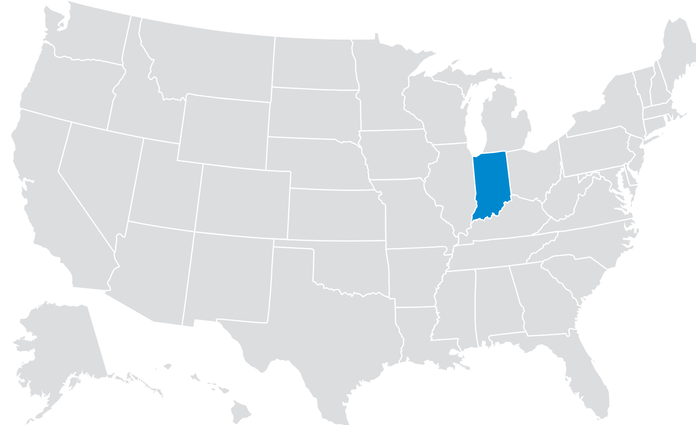
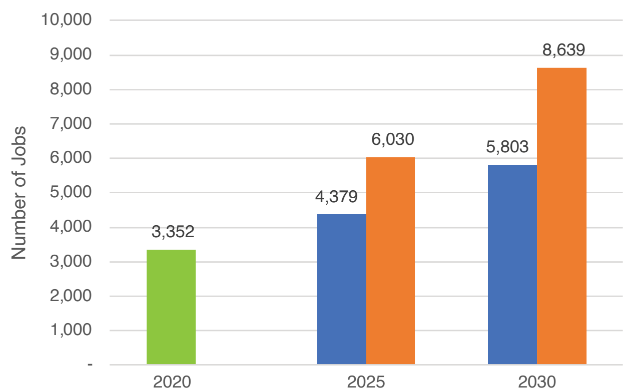
Indiana's Clean Energy Jobs Potential Through 2030



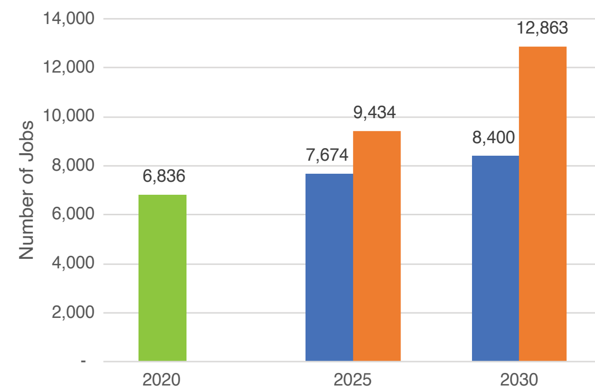
According to the U.S. Census Bureau, Indiana had 4,350,335 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* | Jobs *(modeled with IMPLAN)* | Jobs *(low, modeled; see methodology)* | Jobs *(high, modeled; see methodology)*

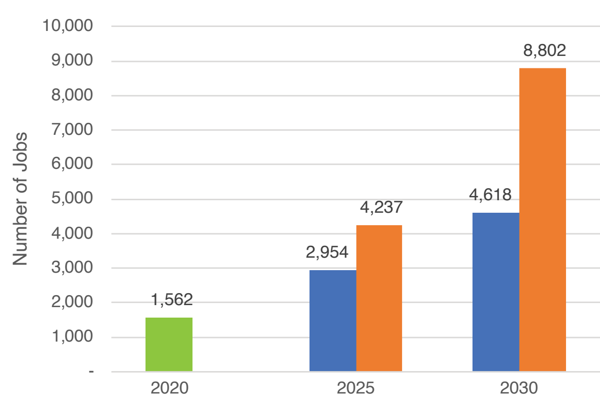
Solar Energy Job Estimates 2020–2030
(photovoltaics)



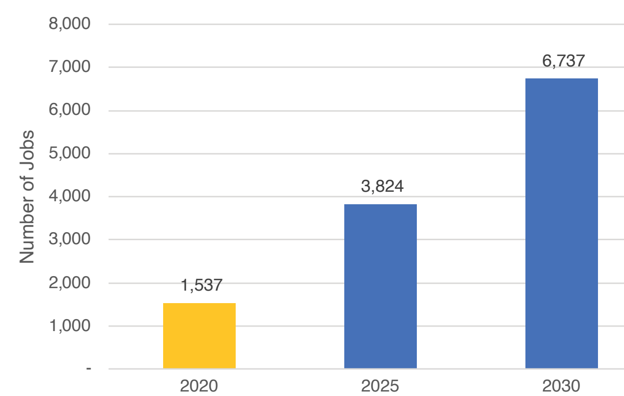
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	939	MW	Solar Energy Industries Association (SEIA)
Wind	2,968	MW	U.S. Department of Energy Wind Exchange
Battery Storage	59	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,440	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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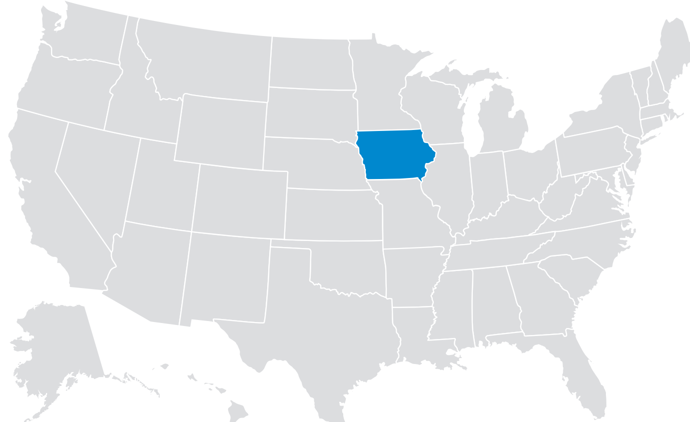


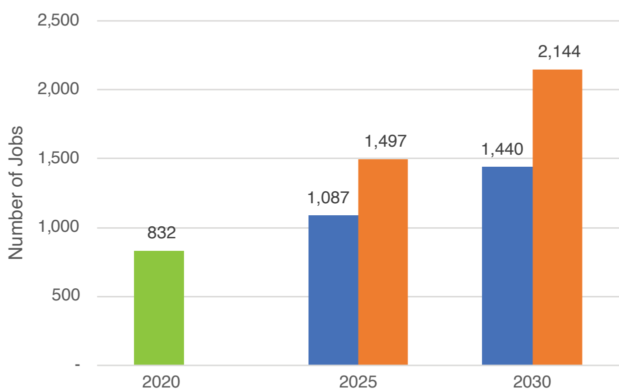
Iowa's Clean Energy Jobs Potential Through 2030

According to the U.S. Census Bureau, Iowa had 2,001,321 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

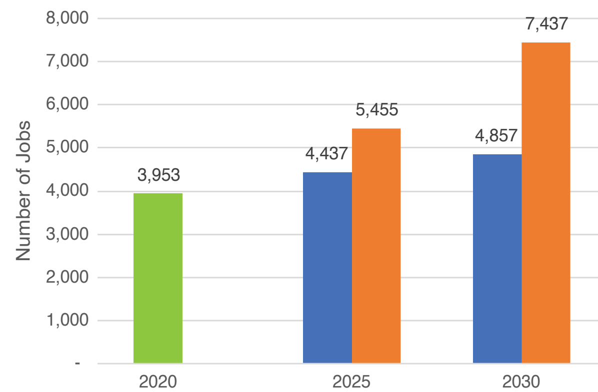
Solar Energy Job Estimates 2020–2030

(photovoltaics)



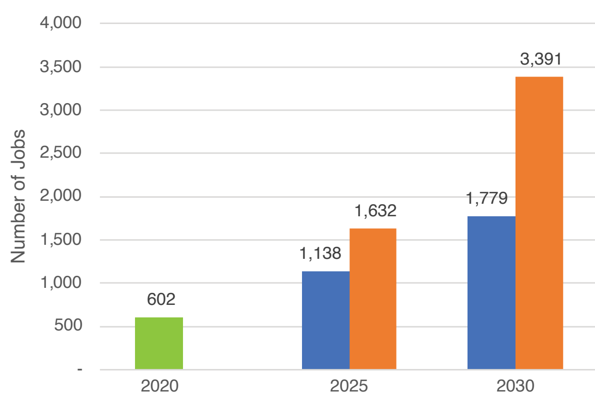
Wind Energy Job Estimates 2020–2030

(land-based)



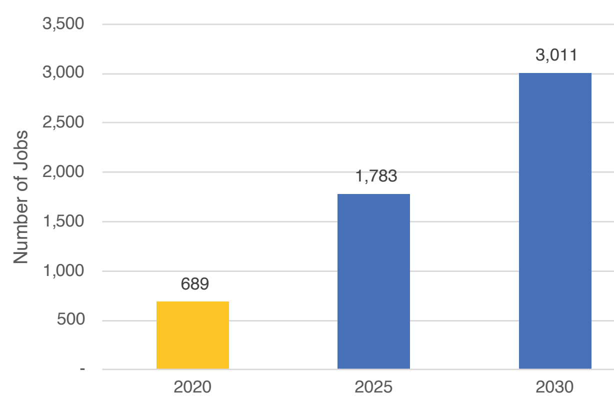
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

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Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

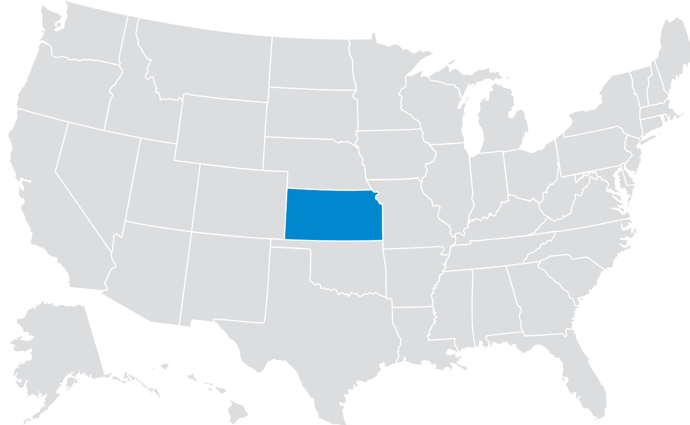
Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	424	MW	Solar Energy Industries Association (SEIA)
Wind	11,660	MW	U.S. Department of Energy Wind Exchange
Battery Storage	2	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	613	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.



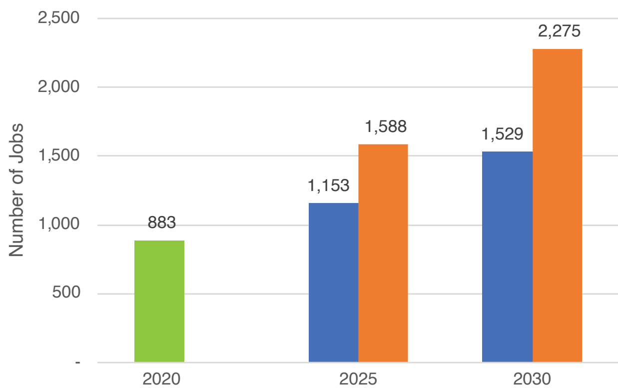
Kansas's Clean Energy Jobs Potential Through 2030

According to the U.S. Census Bureau, Kansas had 1,851,812 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — **Jobs** *(reported)* — **Jobs** *(modeled with IMPLAN)* — **Jobs** *(low, modeled; see methodology)* — **Jobs** *(high, modeled; see methodology)*

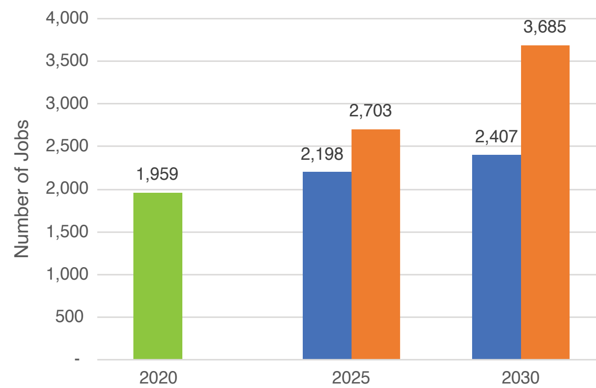
Solar Energy Job Estimates 2020–2030

(photovoltaics)



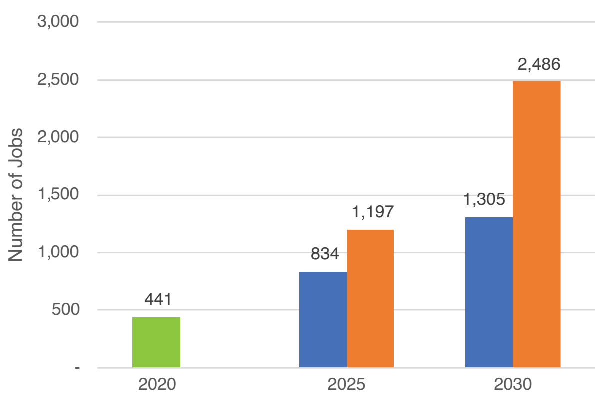
Wind Energy Job Estimates 2020–2030

(land-based)



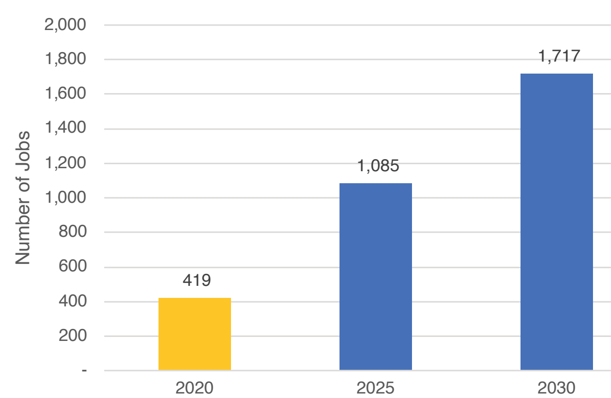
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	85	MW	Solar Energy Industries Association (SEIA)
Wind	7,016	MW	U.S. Department of Energy Wind Exchange
Battery Storage	2	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	499	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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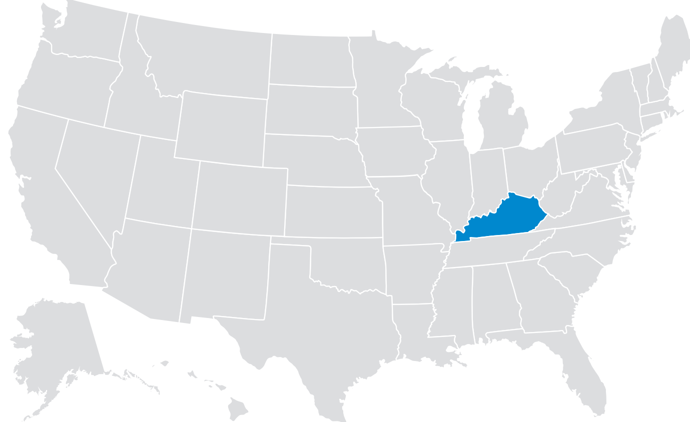
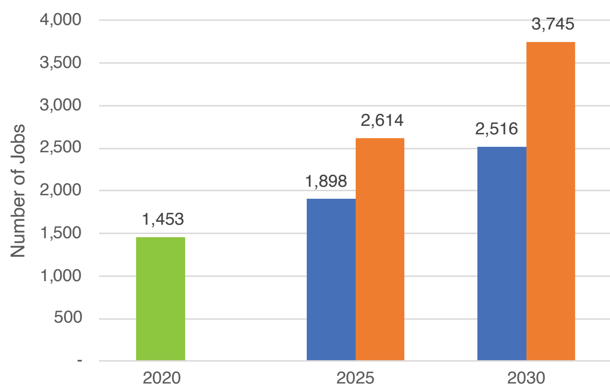
Kentucky's Clean Energy Jobs Potential Through 2030



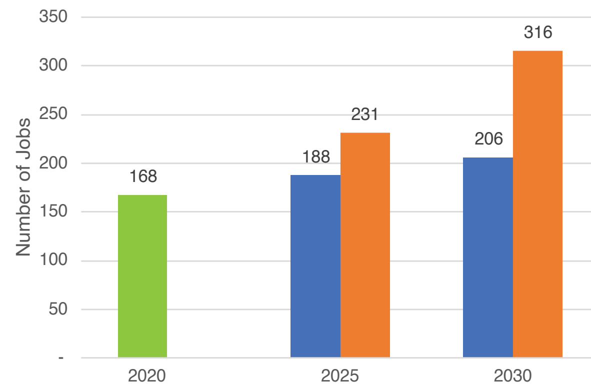
According to the U.S. Census Bureau, Kentucky had 2,882,971 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* · Jobs *(modeled with IMPLAN)* · Jobs *(low, modeled; see methodology)* · Jobs *(high, modeled; see methodology)*

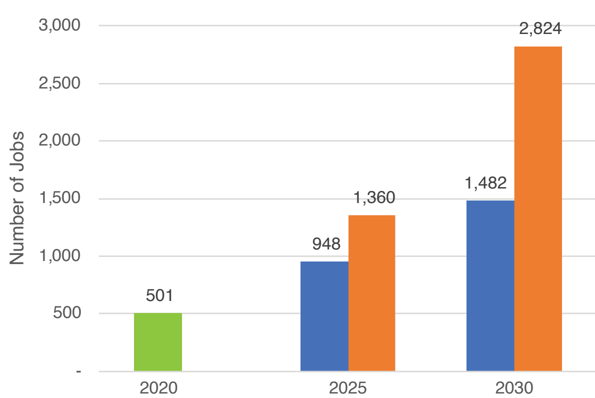
Solar Energy Job Estimates 2020–2030
(photovoltaics)



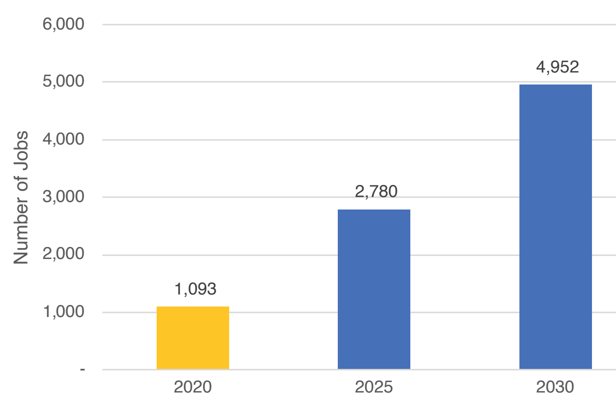
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	61	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	8	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,097	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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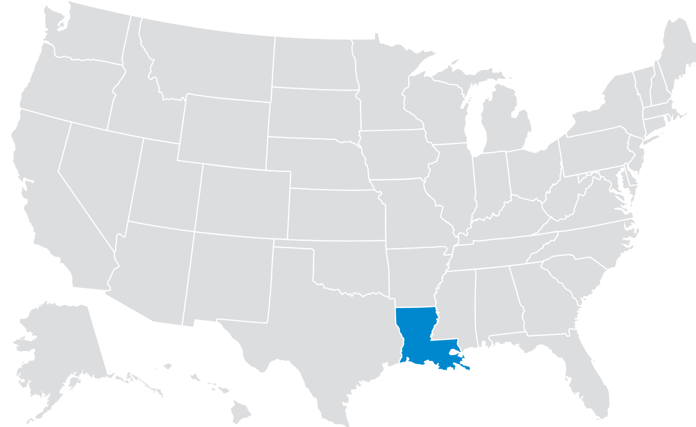
Louisiana's Clean Energy Jobs Potential Through 2030

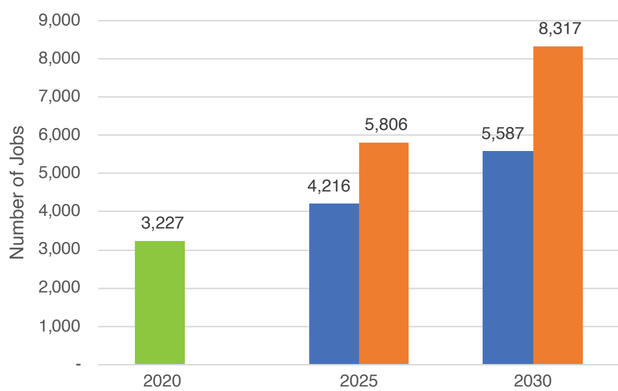


According to the U.S. Census Bureau, Louisiana had 2,998,379 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

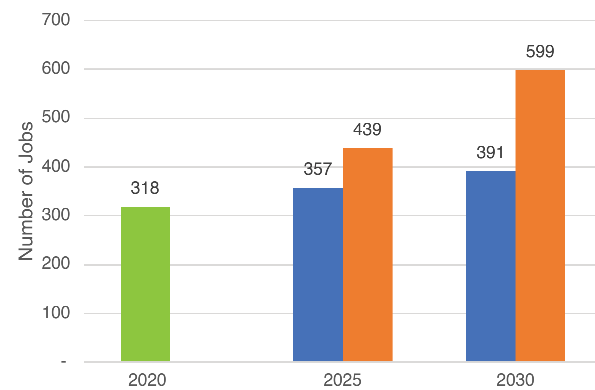
Solar Energy Job Estimates 2020–2030

(photovoltaics)



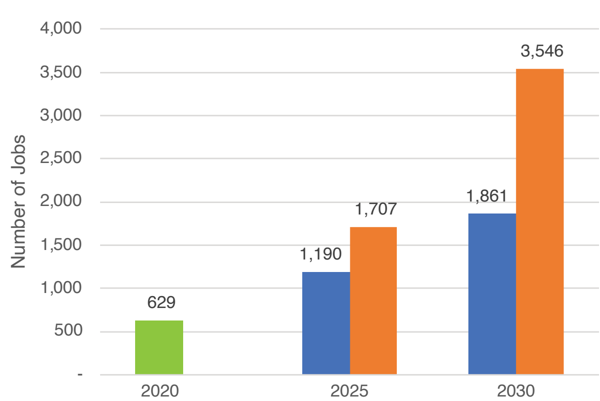
Wind Energy Job Estimates 2020–2030

(land-based)



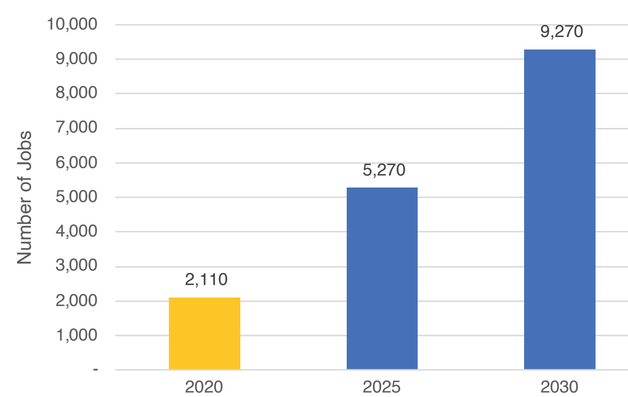
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	191	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	1	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,392	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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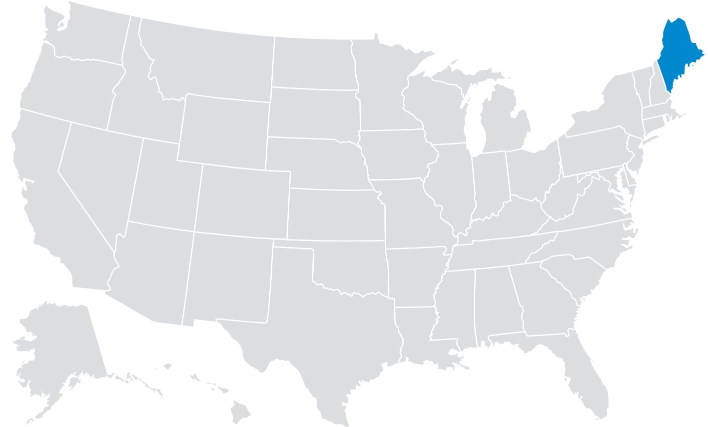
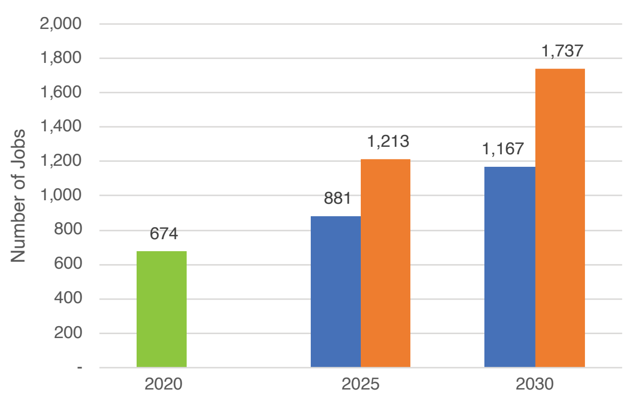
Maine's Clean Energy Jobs Potential Through 2030



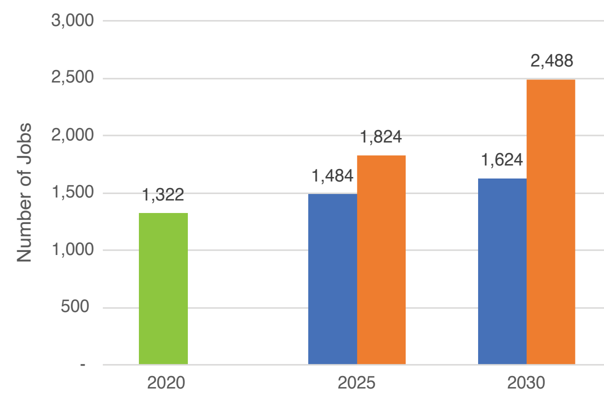
According to the U.S. Census Bureau, Maine had 857,677 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* — Jobs *(modeled with IMPLAN)* — Jobs *(low, modeled; see methodology)* — Jobs *(high, modeled; see methodology)*

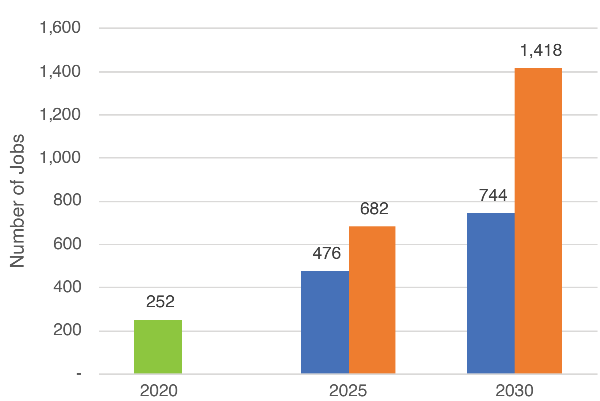
Solar Energy Job Estimates 2020–2030
(photovoltaics)



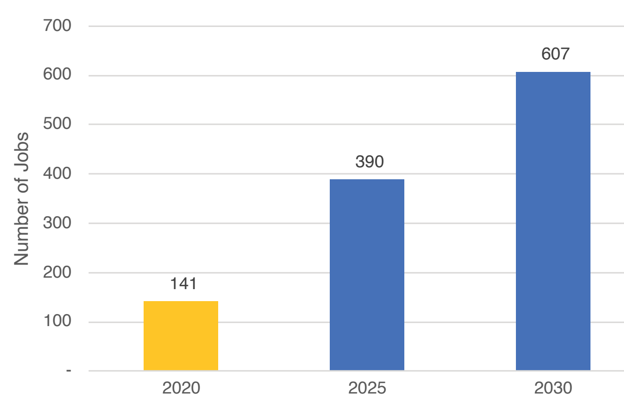
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	246	MW	Solar Energy Industries Association (SEIA)
Wind	996	MW	U.S. Department of Energy Wind Exchange
Battery Storage	33	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	148	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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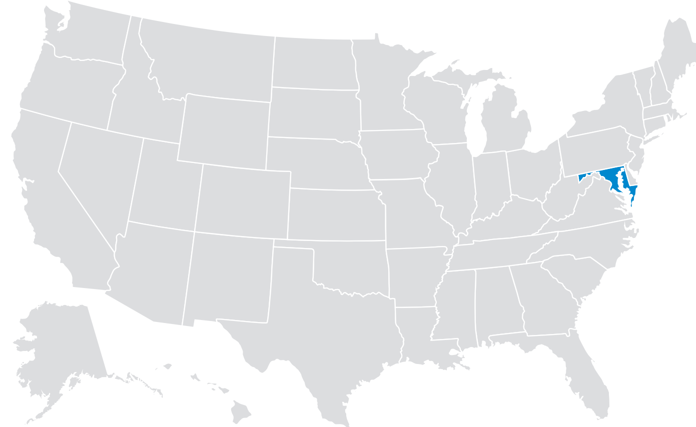
Maryland's Clean Energy Jobs Potential Through 2030

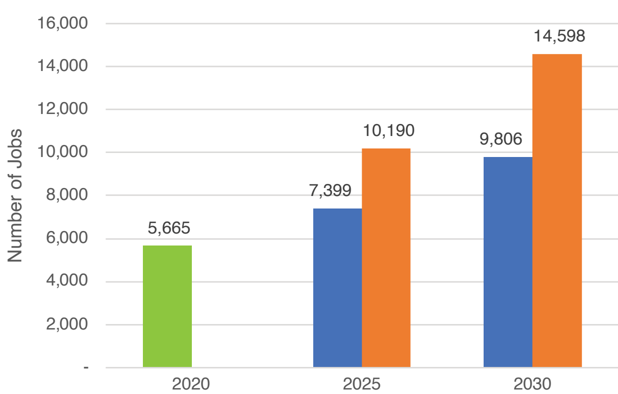


According to the U.S. Census Bureau, Maryland had 3,977,305 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

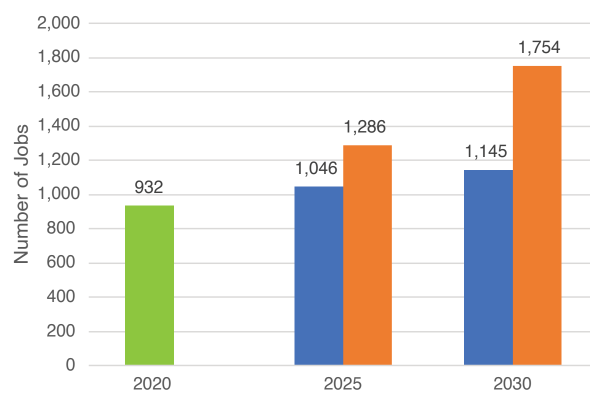
Solar Energy Job Estimates 2020–2030

(photovoltaics)



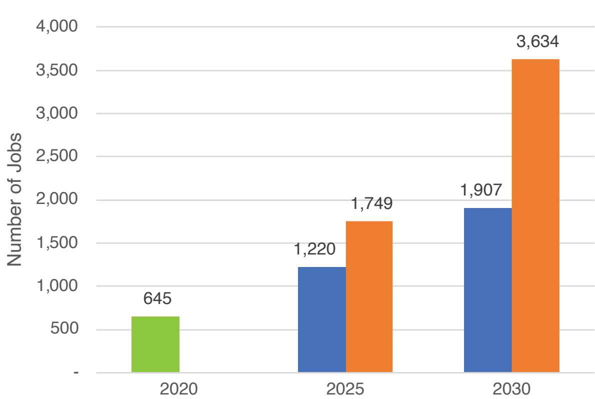
Wind Energy Job Estimates 2020–2030

(land-based)



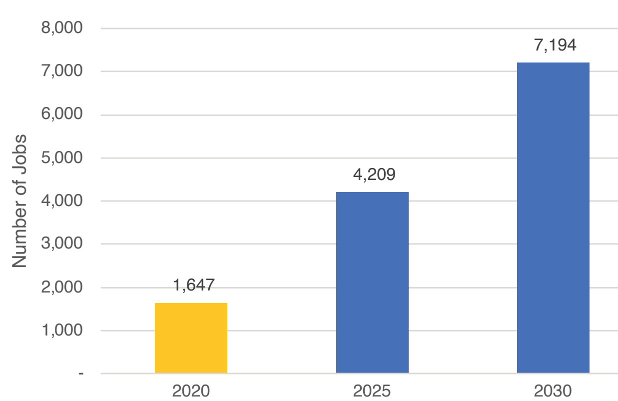
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	1,342	MW	Solar Energy Industries Association (SEIA)
Wind	191	MW	U.S. Department of Energy Wind Exchange
Battery Storage	392	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,336	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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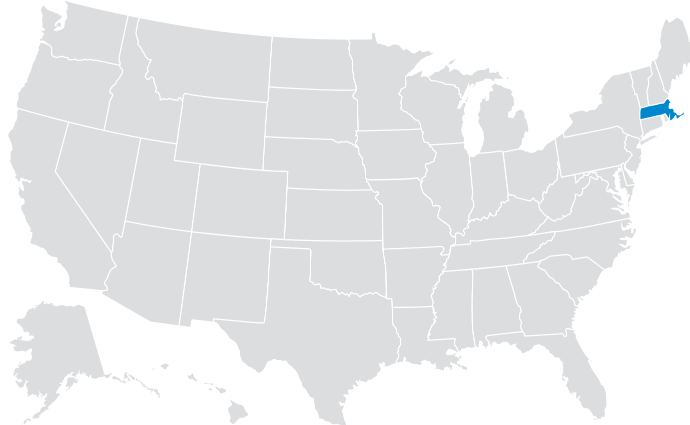
Massachusetts's Clean Energy Jobs Potential Through 2030

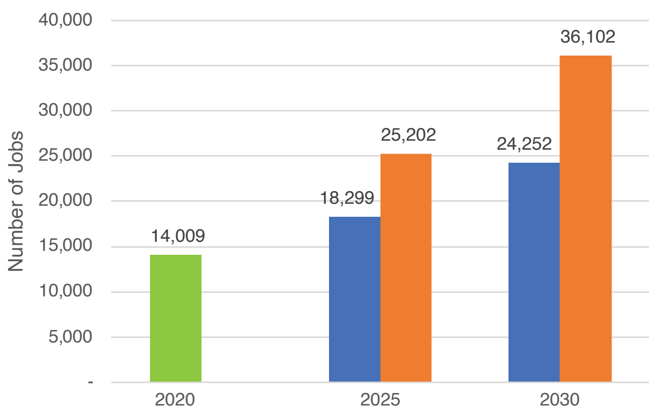


According to the U.S. Census Bureau, Massachusetts had 4,614,016 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* (green); Jobs *(modeled with IMPLAN)* (yellow); Jobs *(low, modeled; see methodology)* (blue); Jobs *(high, modeled; see methodology)* (orange)

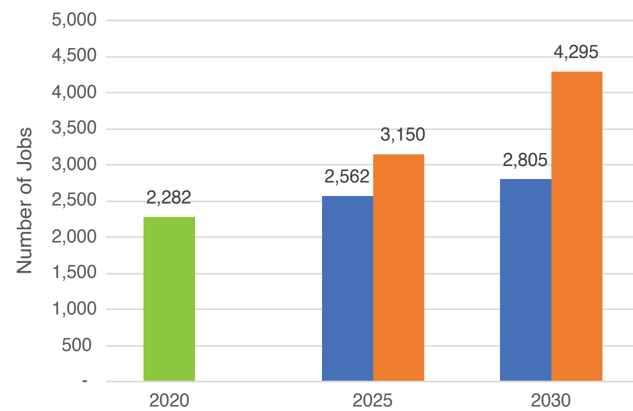
Solar Energy Job Estimates 2020–2030

(photovoltaics)



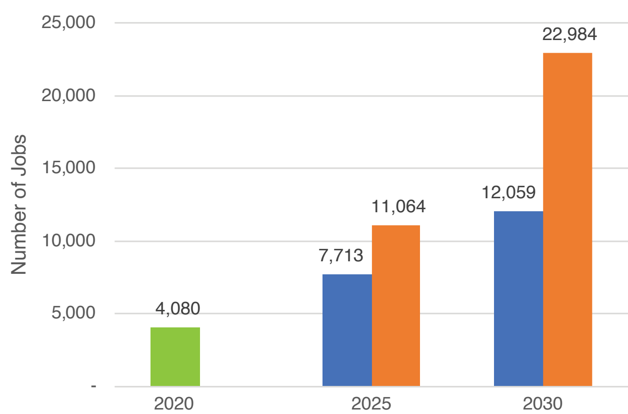
Wind Energy Job Estimates 2020–2030

(land-based)



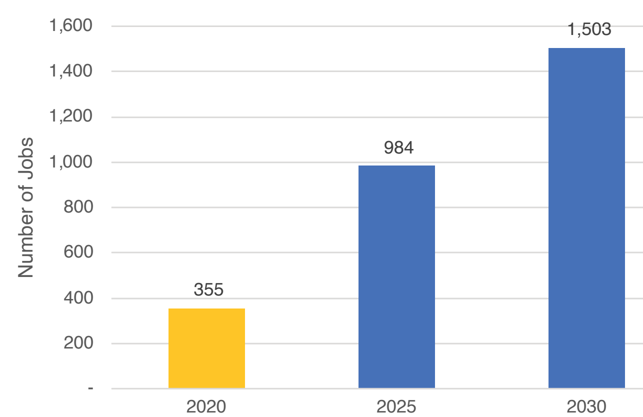
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	3,263	MW	Solar Energy Industries Association (SEIA)
Wind	120	MW	U.S. Department of Energy Wind Exchange
Battery Storage	116	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	656	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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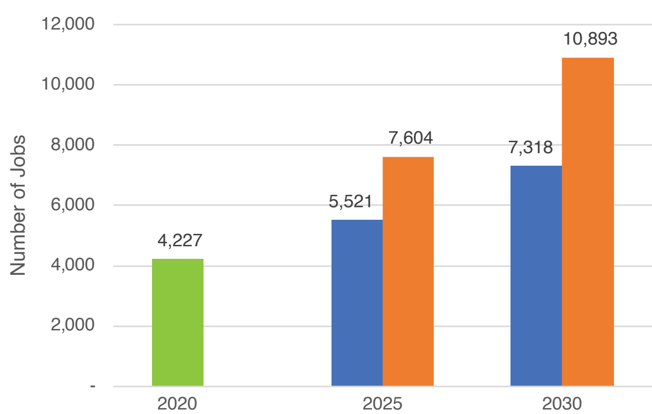
Michigan's Clean Energy Jobs Potential Through 2030

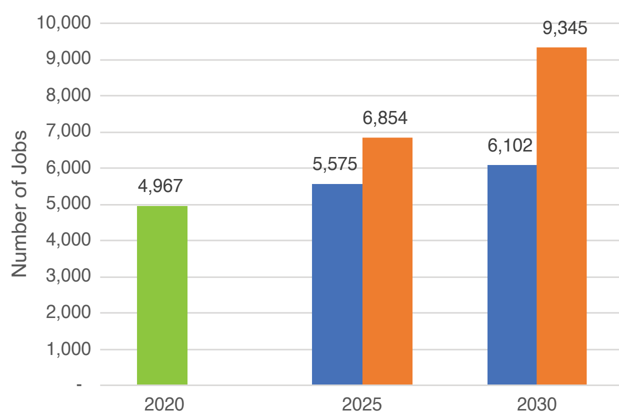
According to the U.S. Census Bureau, Michigan had 6,456,210 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* — Jobs *(modeled with IMPLAN)* — Jobs *(low, modeled; see methodology)* — Jobs *(high, modeled; see methodology)*

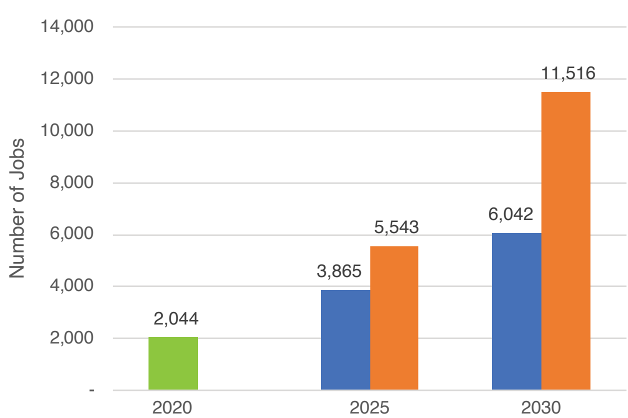
Solar Energy Job Estimates 2020–2030
(photovoltaics)



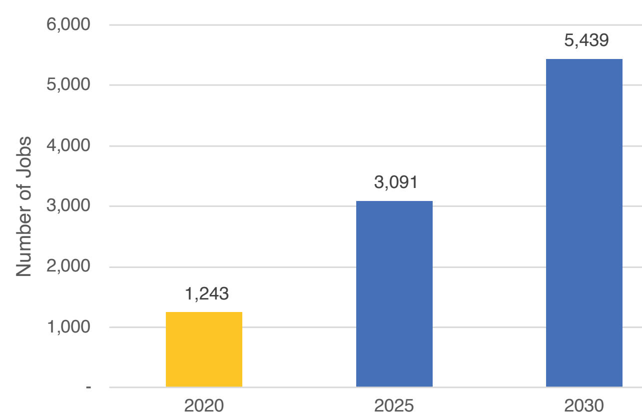
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	521	MW	Solar Energy Industries Association (SEIA)
Wind	2,681	MW	U.S. Department of Energy Wind Exchange
Battery Storage	2	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,693	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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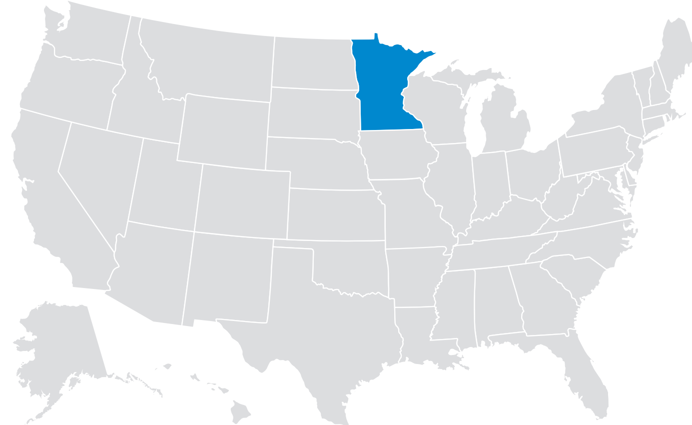
Minnesota's Clean Energy Jobs Potential Through 2030

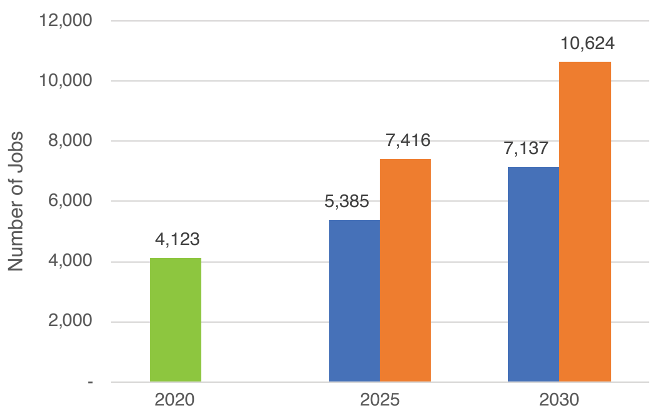


According to the U.S. Census Bureau, Minnesota had 3,634,453 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

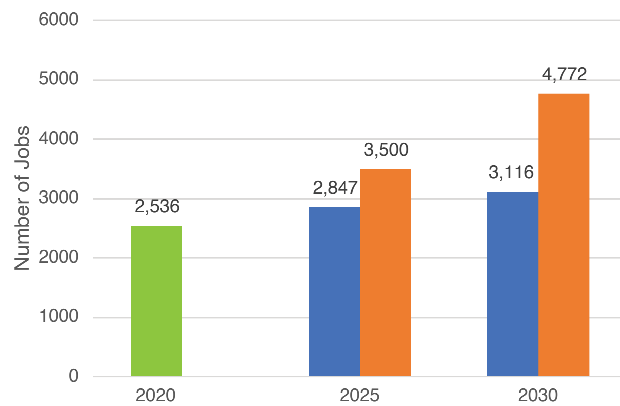
Solar Energy Job Estimates 2020–2030

(photovoltaics)



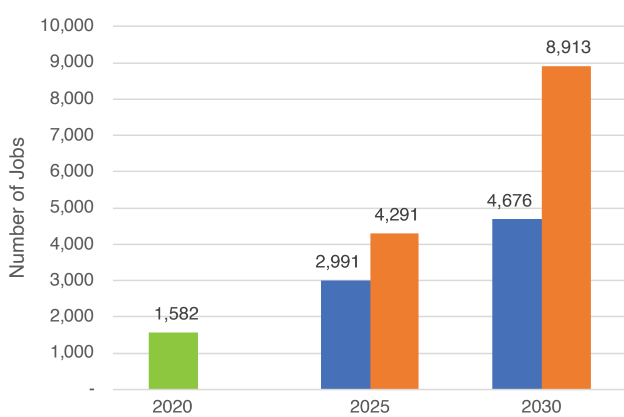
Wind Energy Job Estimates 2020–2030

(land-based)



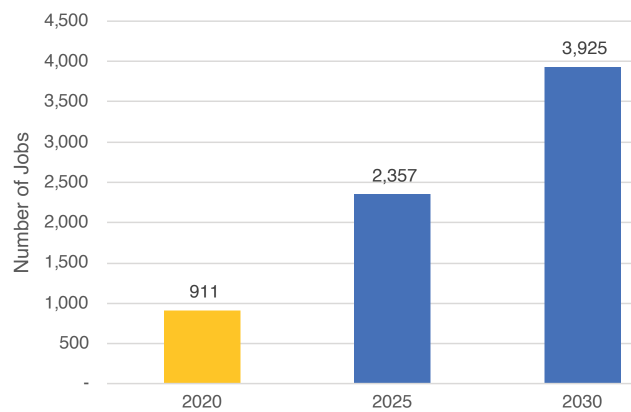
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	1,602	MW	Solar Energy Industries Association (SEIA)
Wind	4,299	MW	U.S. Department of Energy Wind Exchange
Battery Storage	26	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	879	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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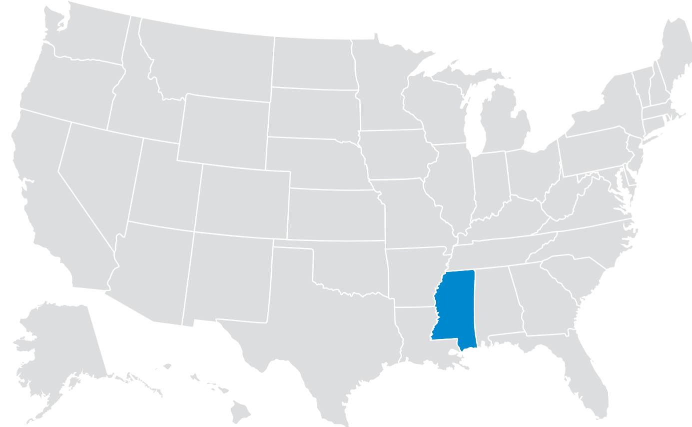
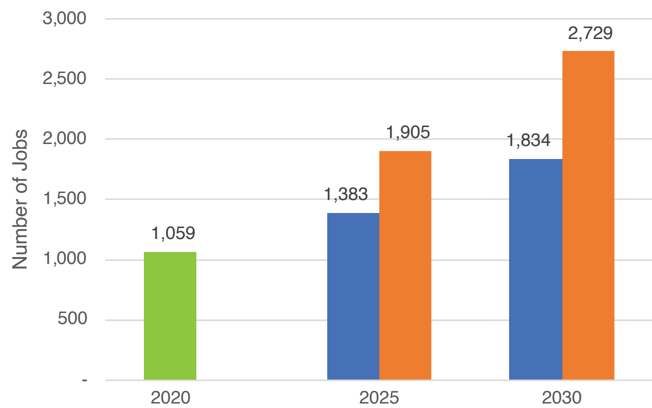


Mississippi's Clean Energy Jobs Potential Through 2030

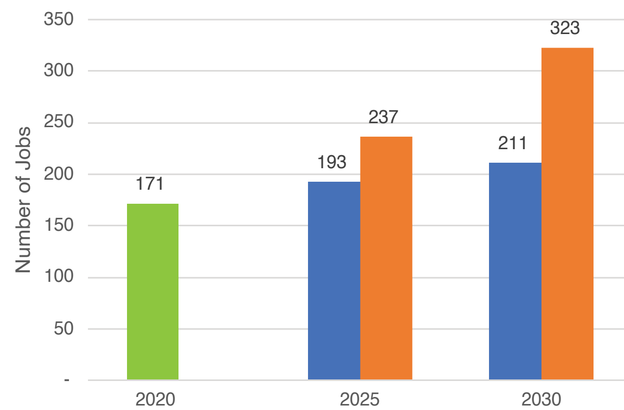
According to the U.S. Census Bureau, Mississippi had 1,908,307 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

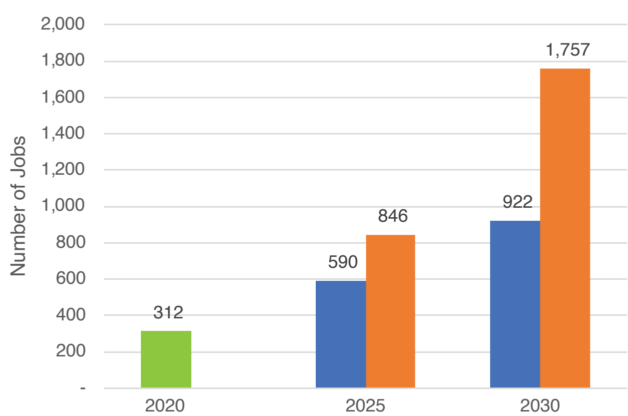
Solar Energy Job Estimates 2020–2030
(photovoltaics)



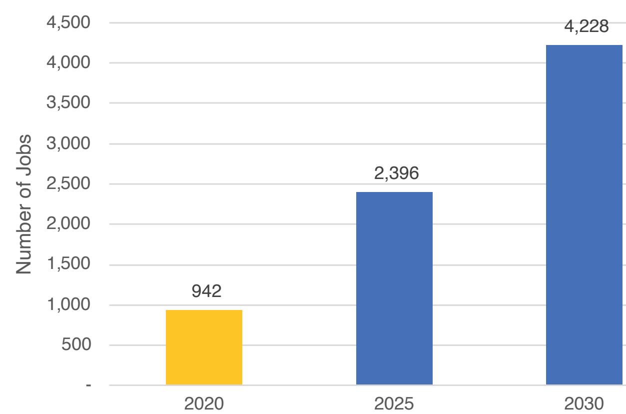
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	319	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	705	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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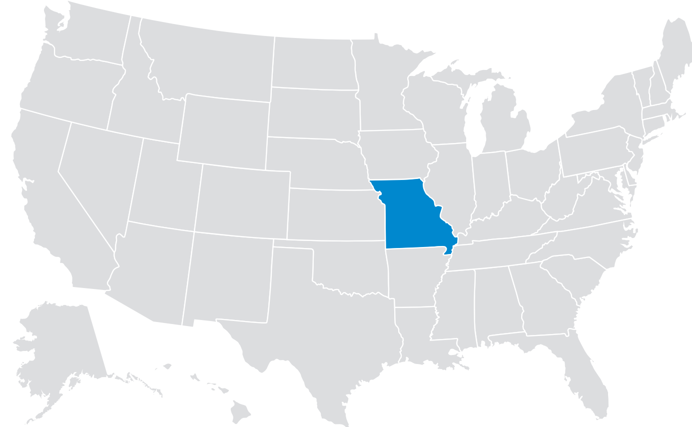
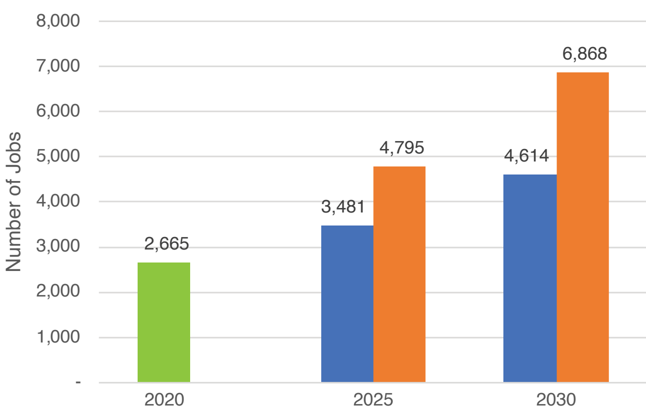
Missouri's Clean Energy Jobs Potential Through 2030



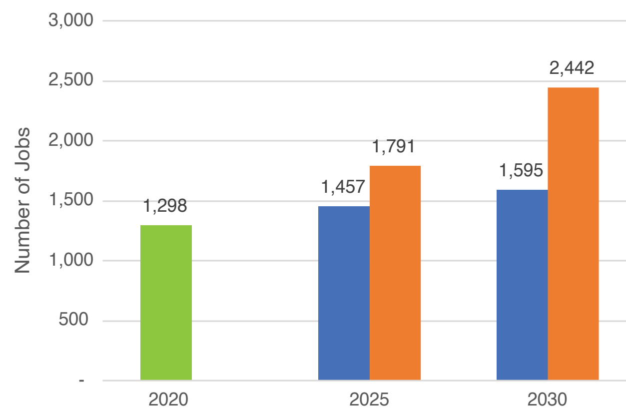
According to the U.S. Census Bureau, Missouri had 3,941,446 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

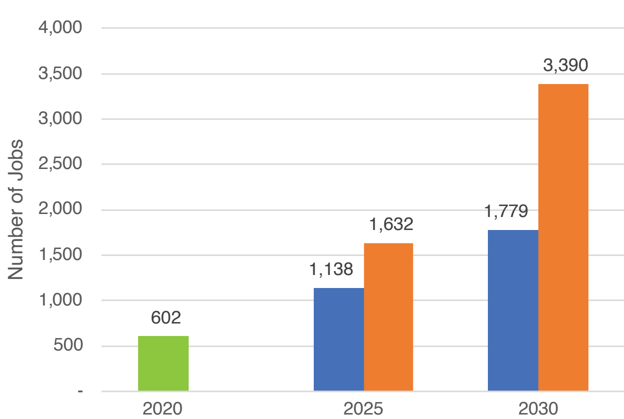
Solar Energy Job Estimates 2020–2030
(photovoltaics)



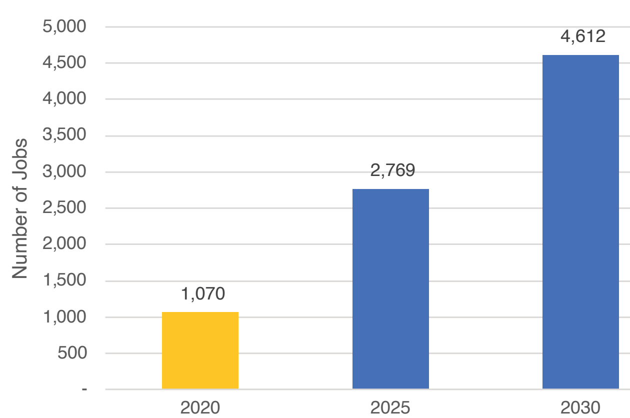
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	303	MW	Solar Energy Industries Association (SEIA)
Wind	1,987	MW	U.S. Department of Energy Wind Exchange
Battery Storage	4	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,005	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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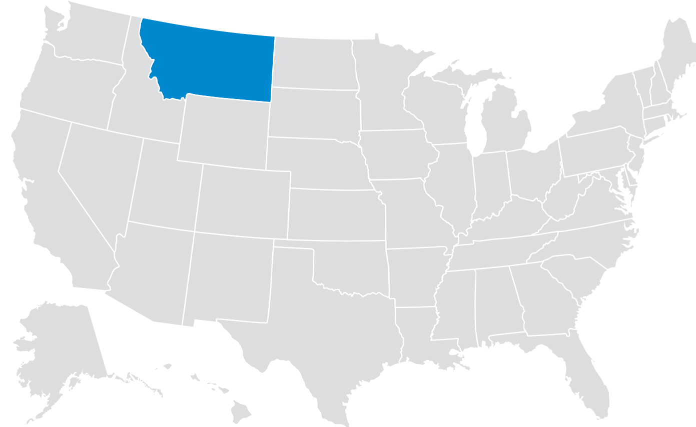
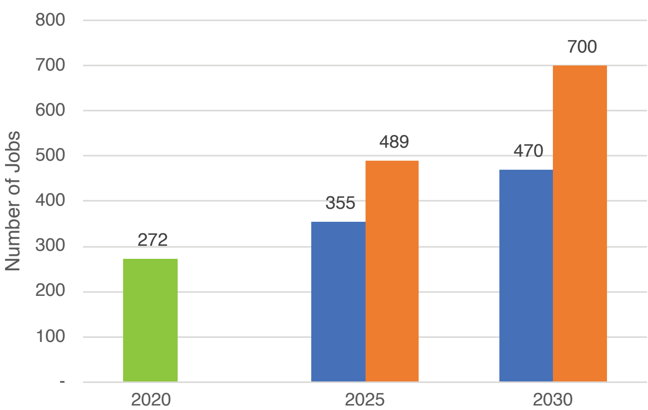


Montana's Clean Energy Jobs Potential Through 2030

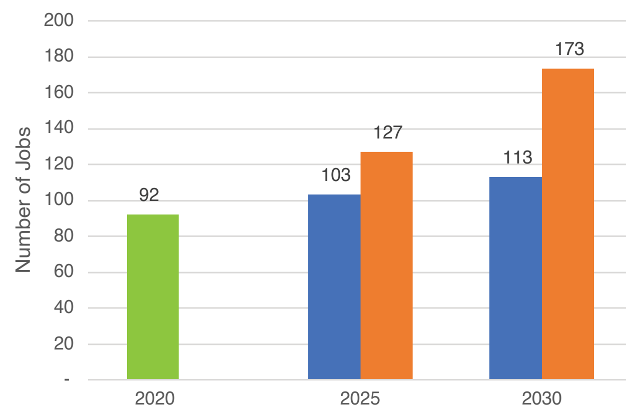
According to the U.S. Census Bureau, Montana had 672,413 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

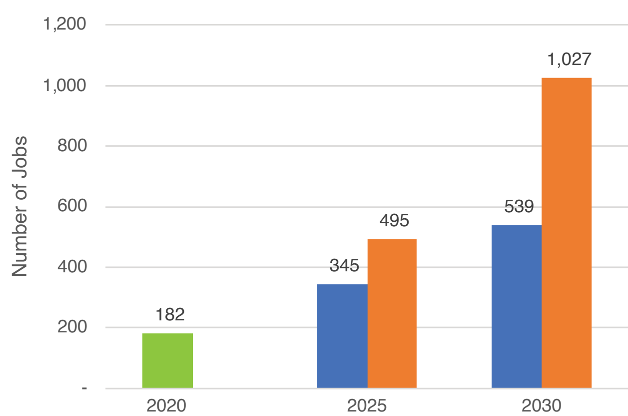
Solar Energy Job Estimates 2020–2030
(photovoltaics)



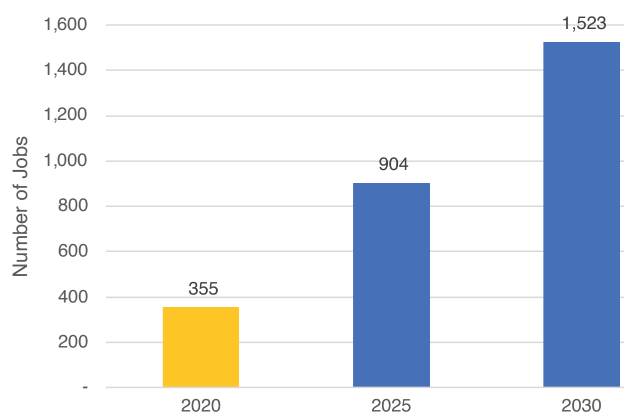
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	118	MW	Solar Energy Industries Association (SEIA)
Wind	880	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	229	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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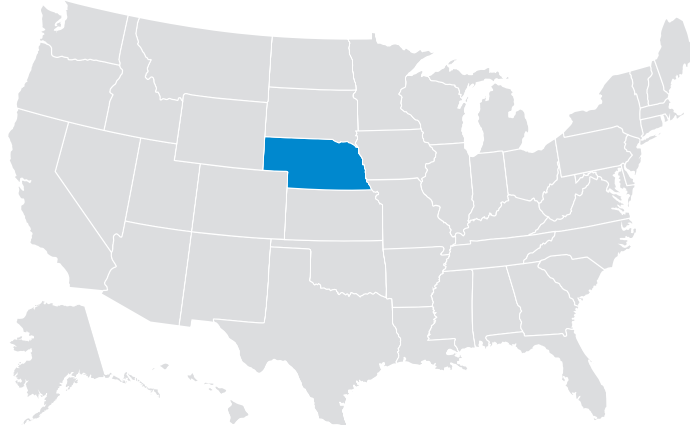
Nebraska's Clean Energy Jobs Potential Through 2030

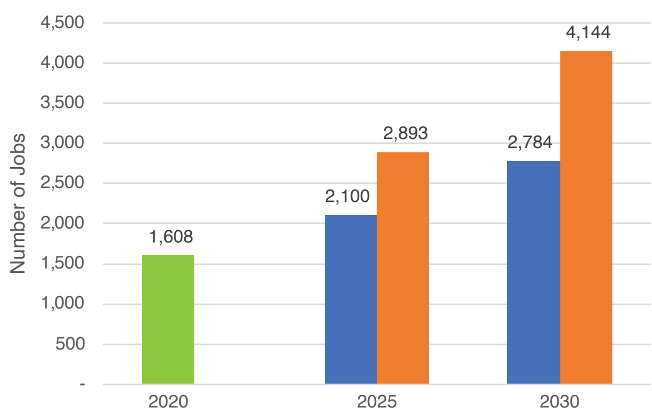


According to the U.S. Census Bureau, Nebraska had 1,223,867 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

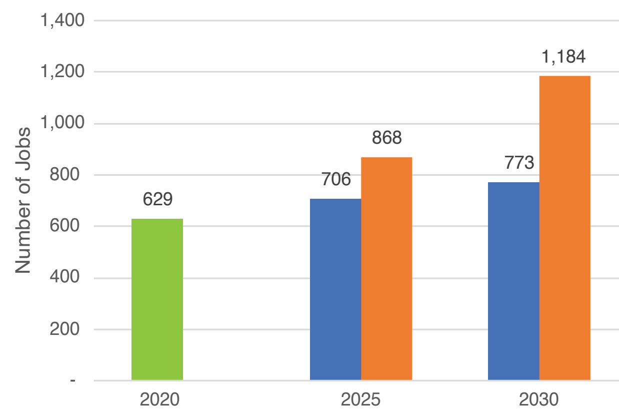
Solar Energy Job Estimates 2020–2030

(photovoltaics)



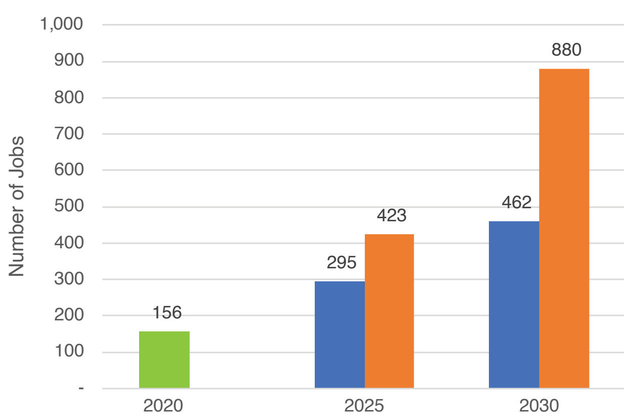
Wind Energy Job Estimates 2020–2030

(land-based)



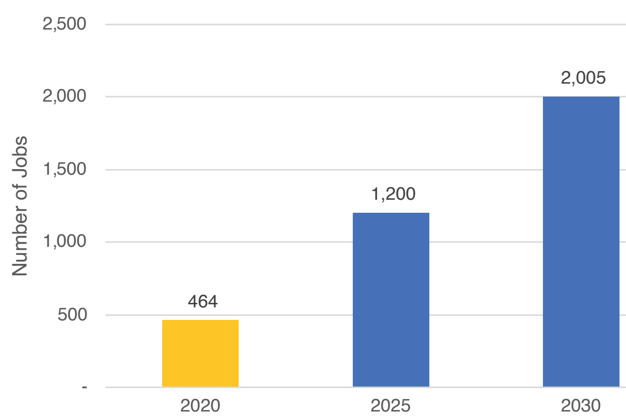
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1]Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	63	MW	Solar Energy Industries Association (SEIA)
Wind	2,531	MW	U.S. Department of Energy Wind Exchange
Battery Storage	1	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	364	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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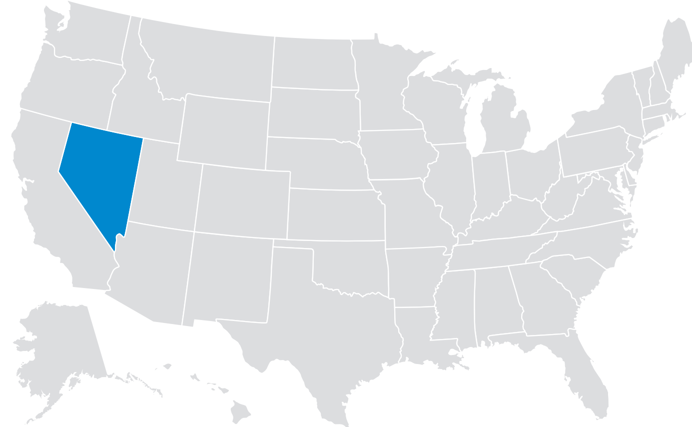
Nevada's Clean Energy Jobs Potential Through 2030

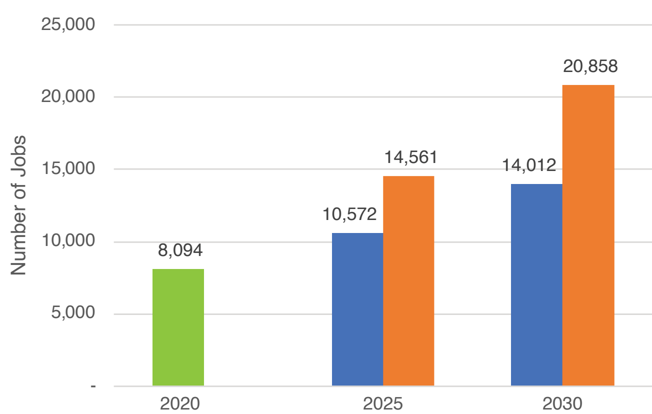


According to the U.S. Census Bureau, Nevada had 2,005,764 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* · Jobs *(modeled with IMPLAN)* · Jobs *(low, modeled; see methodology)* · Jobs *(high, modeled; see methodology)*

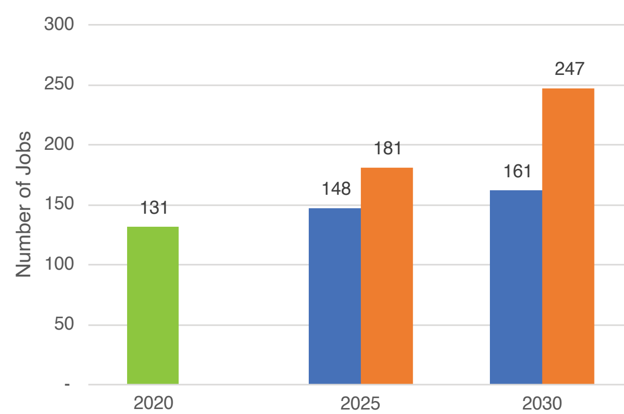
Solar Energy Job Estimates 2020–2030

(photovoltaics)



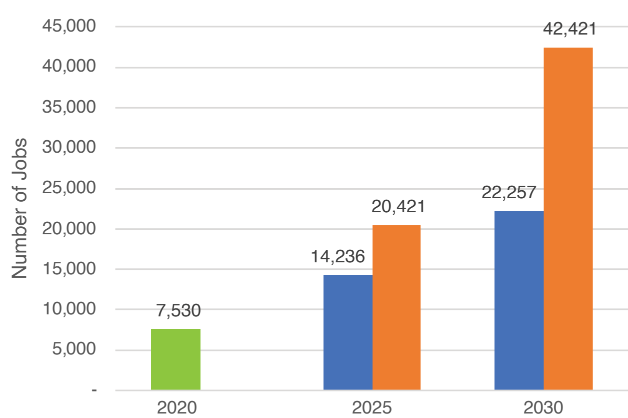
Wind Energy Job Estimates 2020–2030

(land-based)



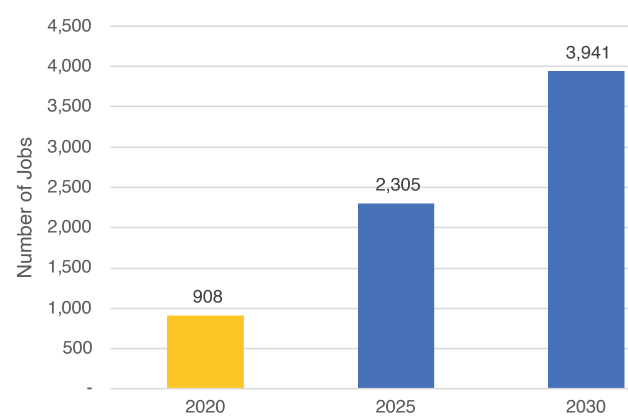
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

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2020 Deployments

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2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	3,904	MW	Solar Energy Industries Association (SEIA)
Wind	152	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	633	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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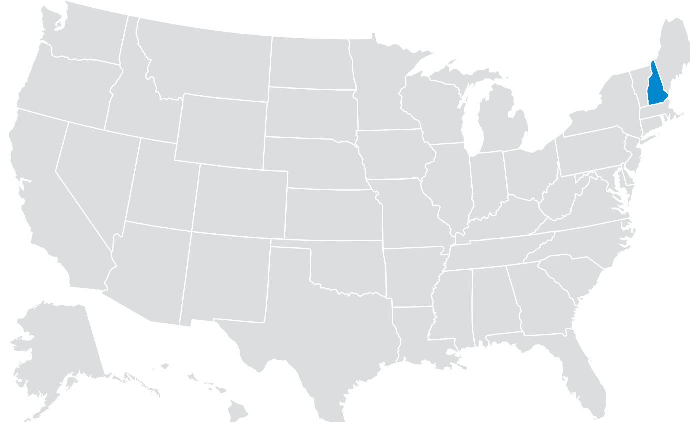
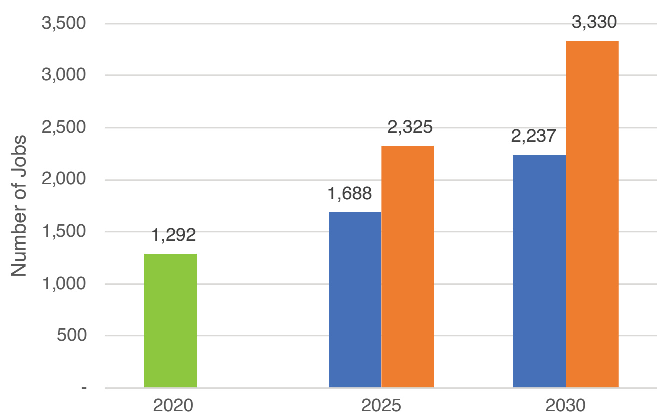


New Hampshire's Clean Energy Jobs Potential Through 2030

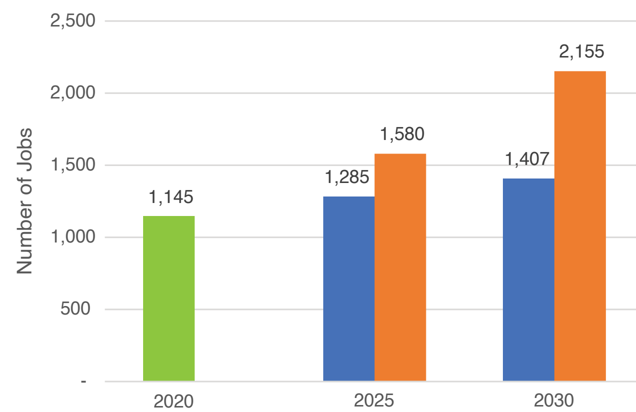
According to the U.S. Census Bureau, New Hampshire had 898,653 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* | Jobs *(modeled with IMPLAN)* | Jobs *(low, modeled; see methodology)* | Jobs *(high, modeled; see methodology)*

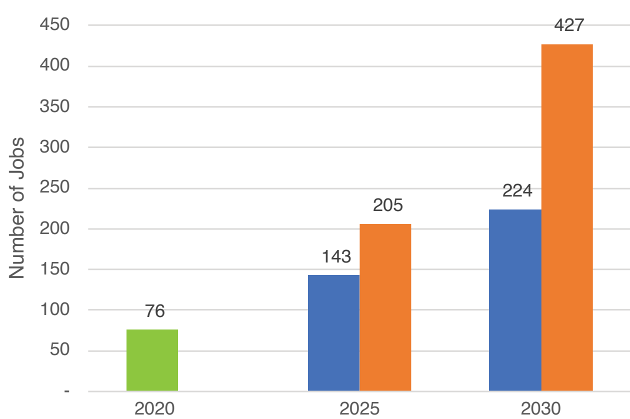
Solar Energy Job Estimates 2020–2030
(photovoltaics)



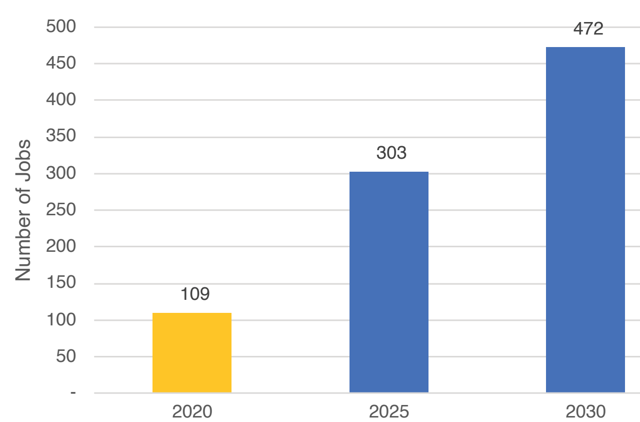
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	141	MW	Solar Energy Industries Association (SEIA)
Wind	214	MW	U.S. Department of Energy Wind Exchange
Battery Storage	6	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	138	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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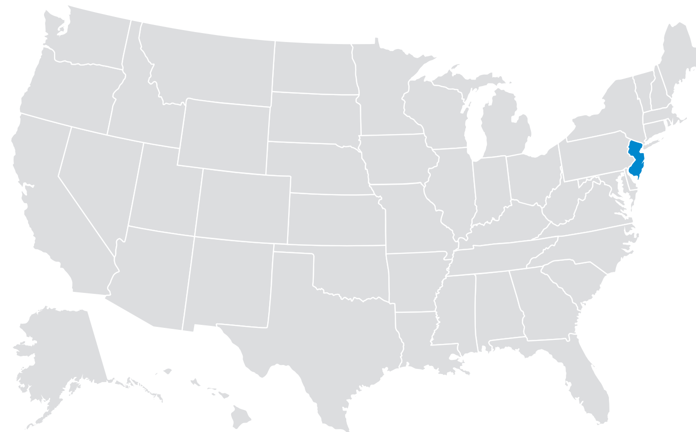
New Jersey's Clean Energy Jobs Potential Through 2030

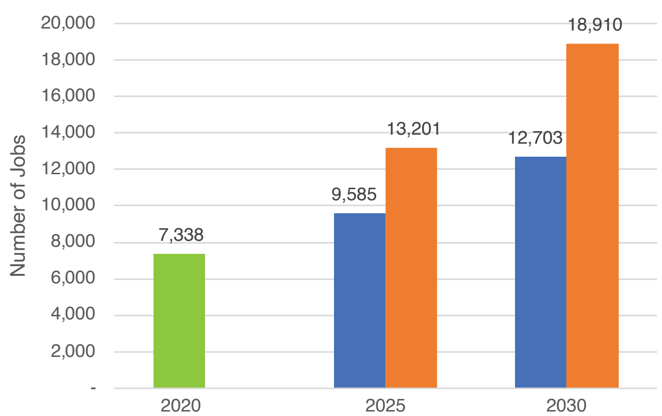


According to the U.S. Census Bureau, New Jersey had 5,807,394 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

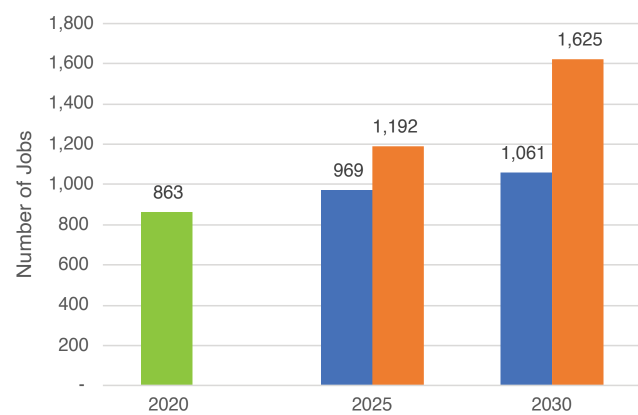
Solar Energy Job Estimates 2020–2030

(photovoltaics)



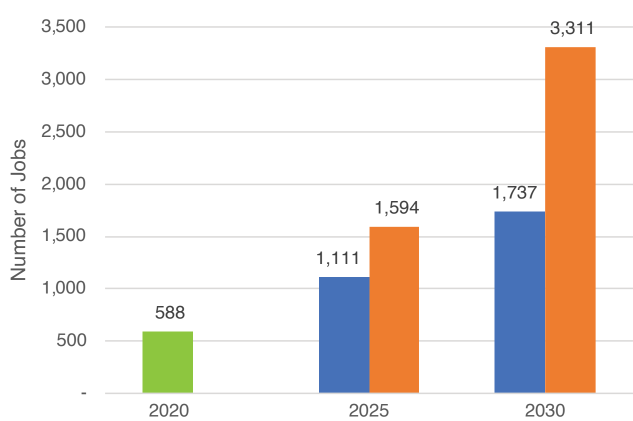
Wind Energy Job Estimates 2020–2030

(land-based)



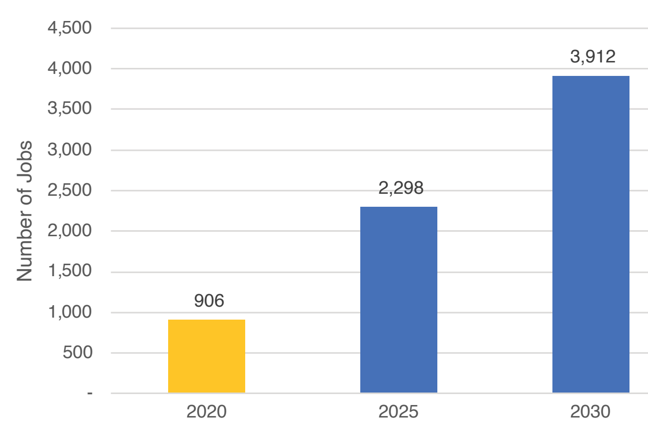
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	3,653	MW	Solar Energy Industries Association (SEIA)
Wind	9	MW	U.S. Department of Energy Wind Exchange
Battery Storage	600	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,333	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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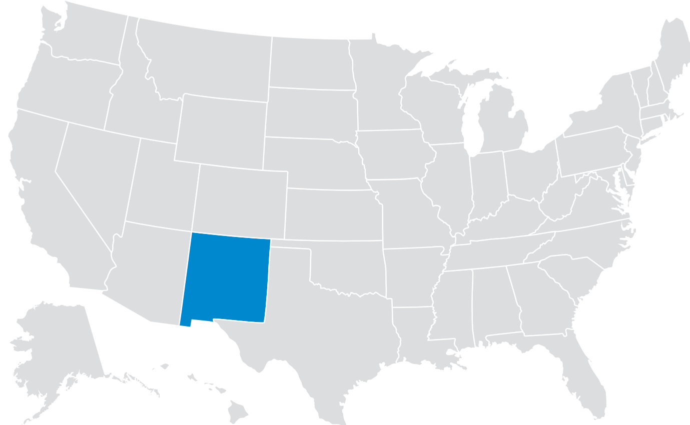
New Mexico's Clean Energy Jobs Potential Through 2030

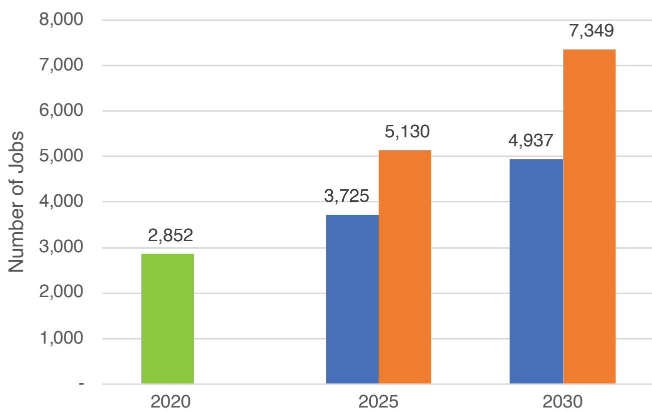


According to the U.S. Census Bureau, New Mexico had 1,325,163 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

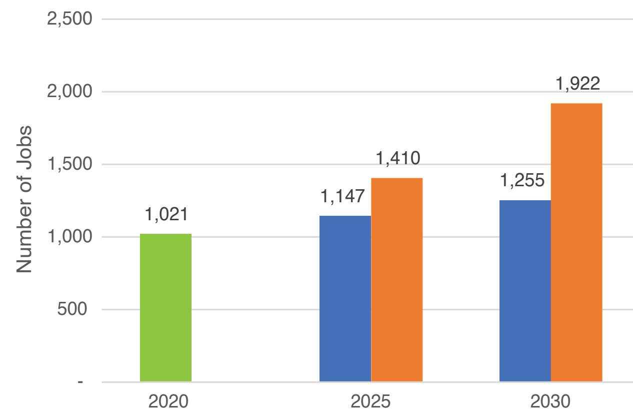
Solar Energy Job Estimates 2020–2030

(photovoltaics)



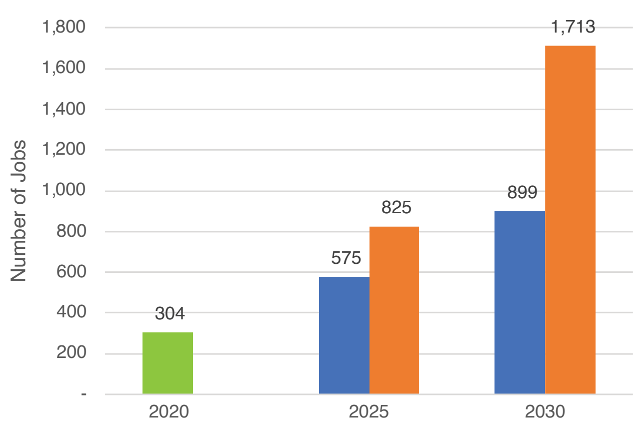
Wind Energy Job Estimates 2020–2030

(land-based)



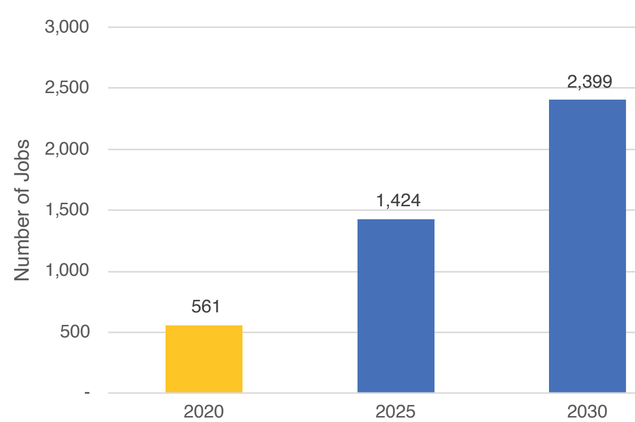
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	1,211	MW	Solar Energy Industries Association (SEIA)
Wind	2,723	MW	U.S. Department of Energy Wind Exchange
Battery Storage	7	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	390	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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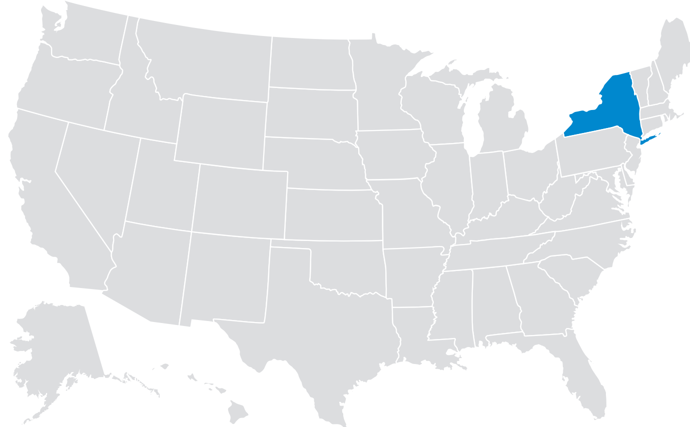
New York's Clean Energy Jobs Potential Through 2030

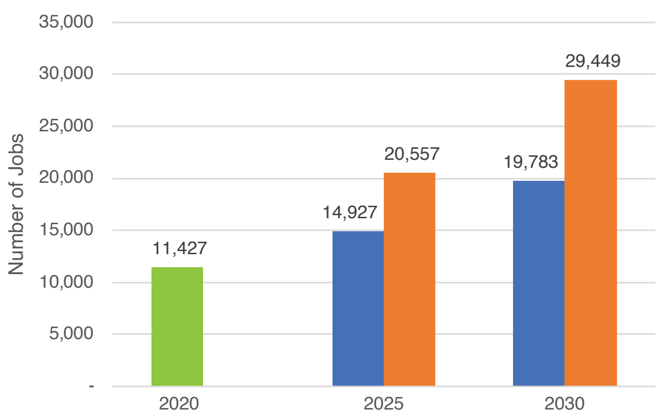


According to the U.S. Census Bureau, New York had 12,821,382 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

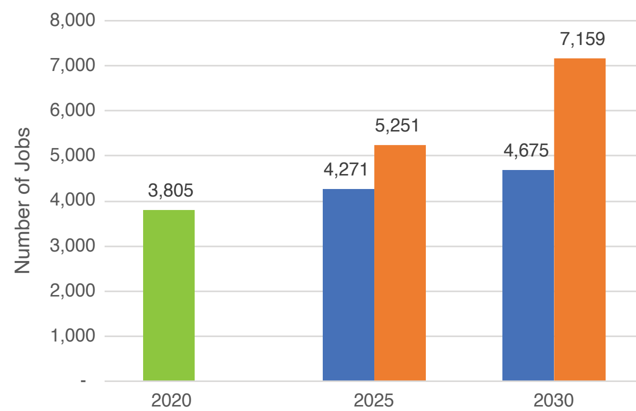
Solar Energy Job Estimates 2020–2030

(photovoltaics)



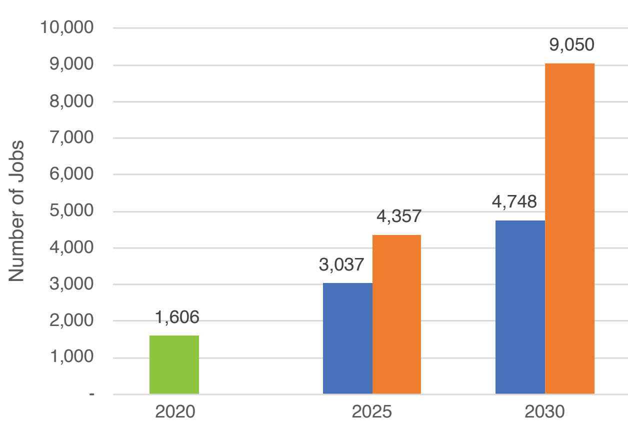
Wind Energy Job Estimates 2020–2030

(land-based)



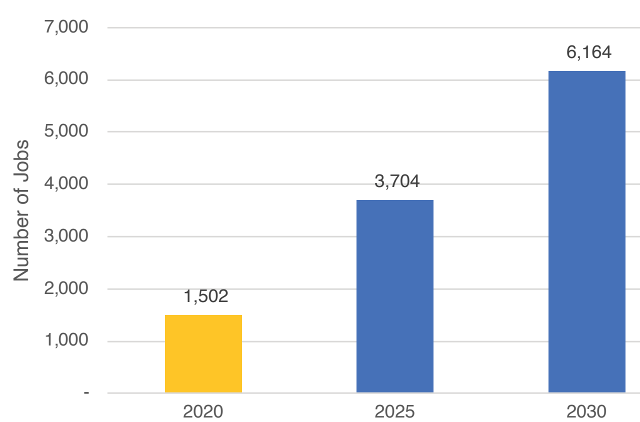
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1]Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	2,840	MW	Solar Energy Industries Association (SEIA)
Wind	1,987	MW	U.S. Department of Energy Wind Exchange
Battery Storage	500	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	2,818	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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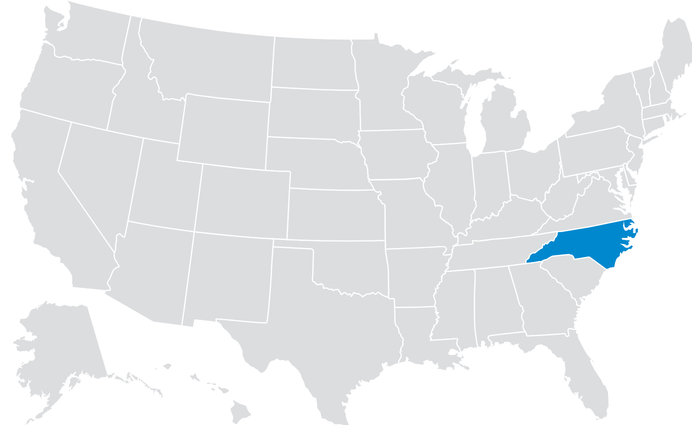
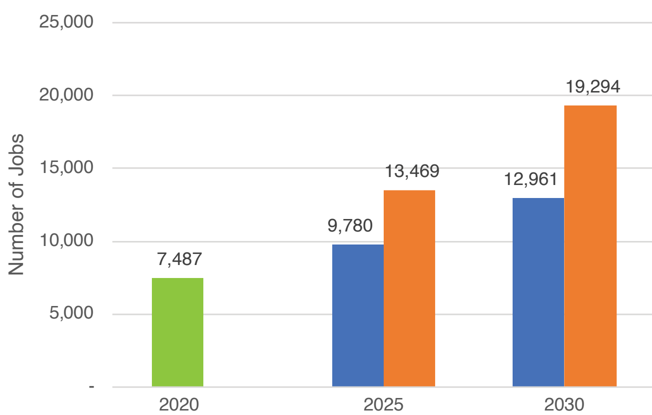
North Carolina's Clean Energy Jobs Potential Through 2030



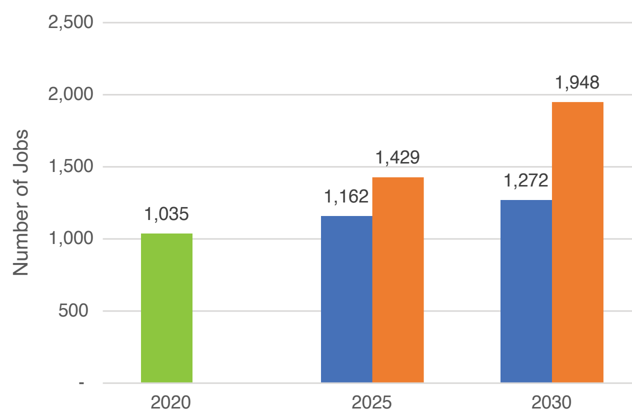
According to the U.S. Census Bureau, North Carolina had 6,838,336 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

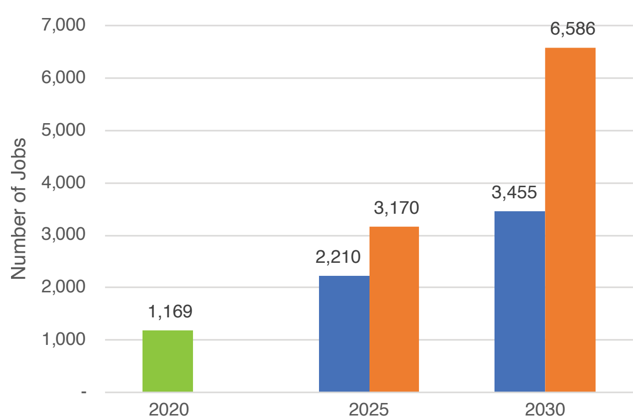
Solar Energy Job Estimates 2020–2030
(photovoltaics)



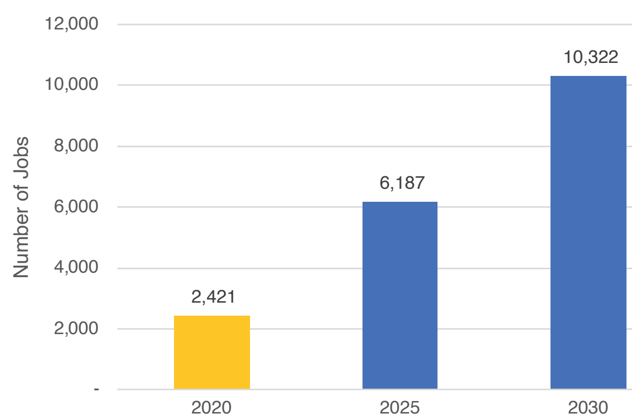
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	7,132	MW	Solar Energy Industries Association (SEIA)
Wind	208	MW	U.S. Department of Energy Wind Exchange
Battery Storage	2	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	2,462	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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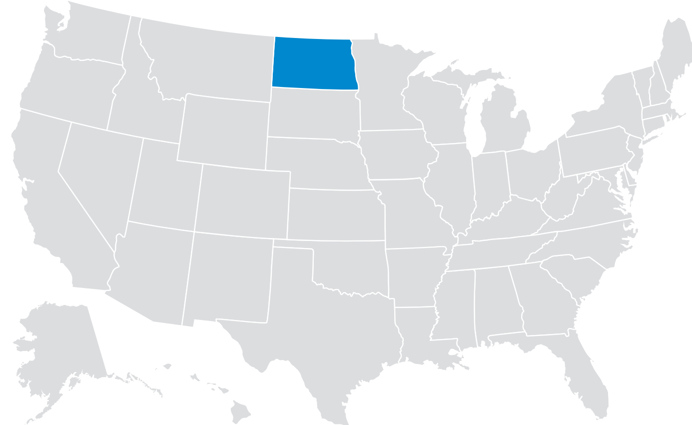


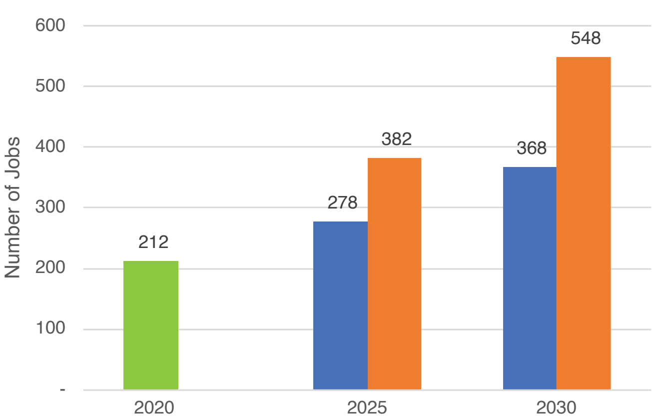
North Dakota's Clean Energy Jobs Potential Through 2030

According to the U.S. Census Bureau, North Dakota had 491,950 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

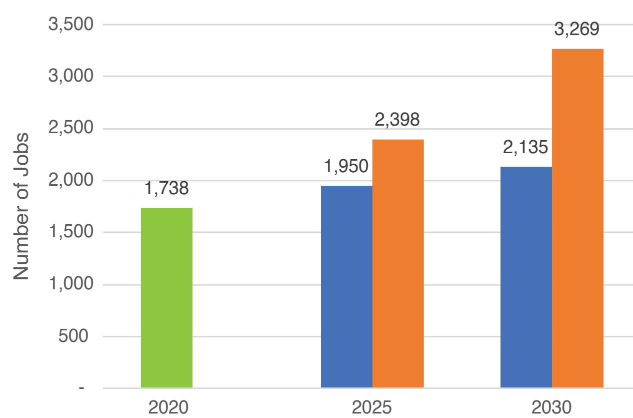
Solar Energy Job Estimates 2020–2030

(photovoltaics)



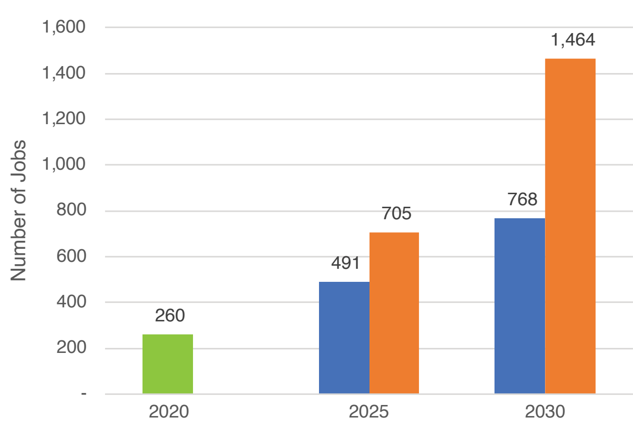
Wind Energy Job Estimates 2020–2030

(land-based)



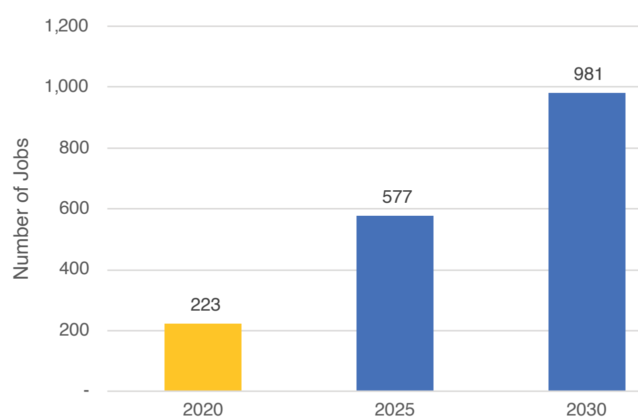
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1]Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

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2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	1	MW	Solar Energy Industries Association (SEIA)
Wind	3,989	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	223	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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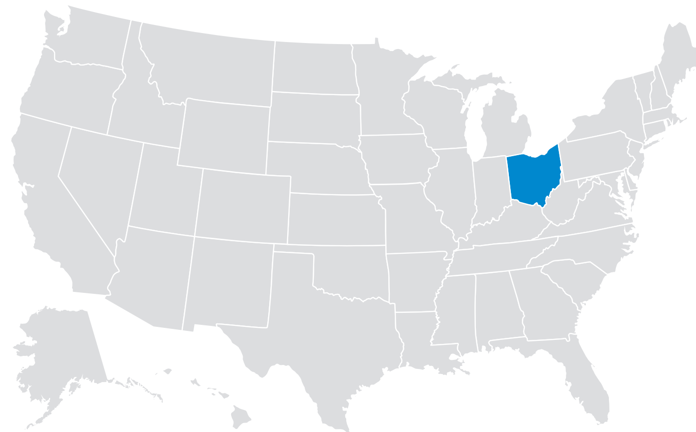
Ohio's Clean Energy Jobs Potential Through 2030

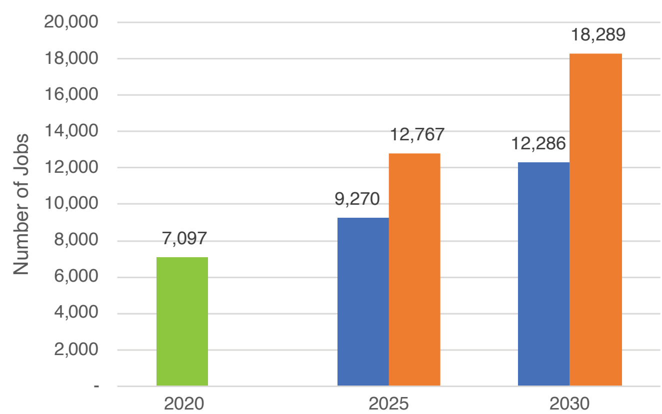


According to the U.S. Census Bureau, Ohio had 7,516,303 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* — Jobs *(modeled with IMPLAN)* — Jobs *(low, modeled; see methodology)* — Jobs *(high, modeled; see methodology)*

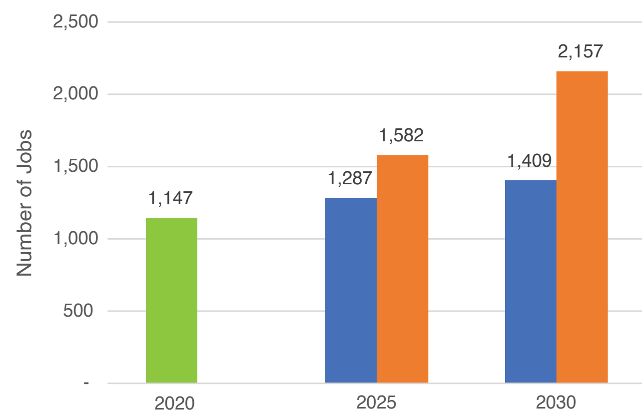
Solar Energy Job Estimates 2020–2030

(photovoltaics)



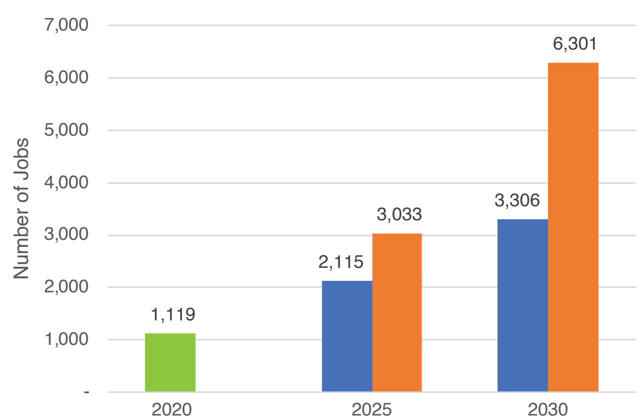
Wind Energy Job Estimates 2020–2030

(land-based)



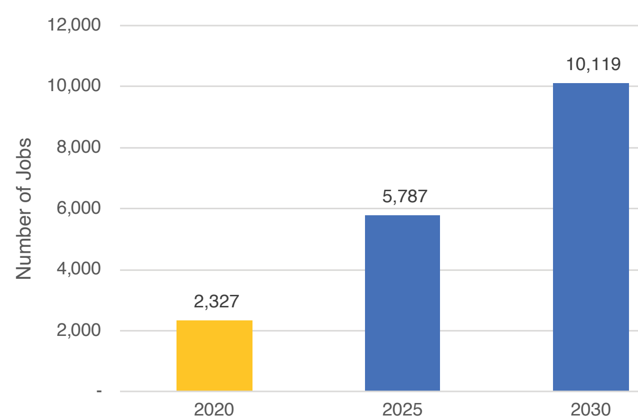
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	527	MW	Solar Energy Industries Association (SEIA)
Wind	864	MW	U.S. Department of Energy Wind Exchange
Battery Storage	98	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	2,259	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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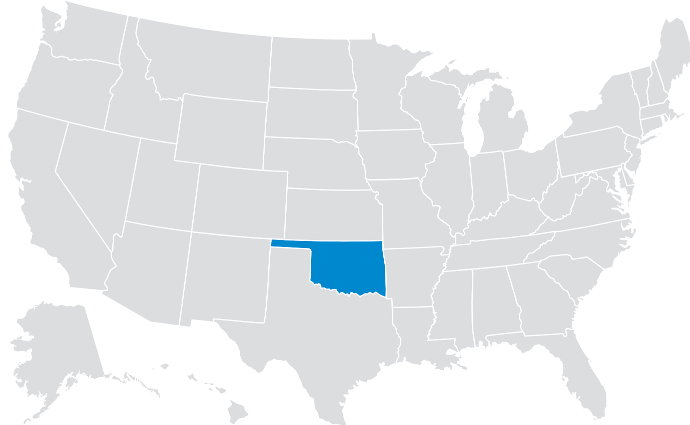
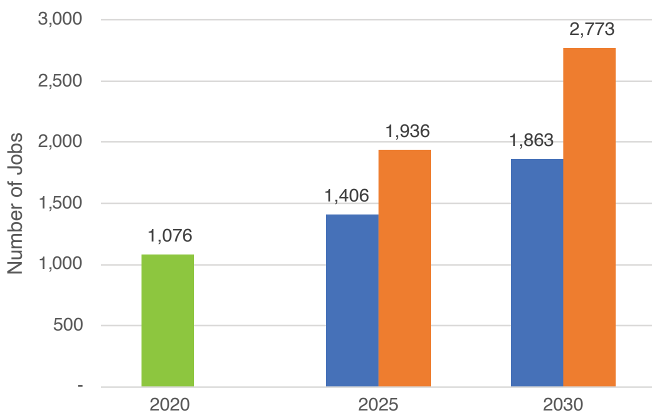
Oklahoma's Clean Energy Jobs Potential Through 2030



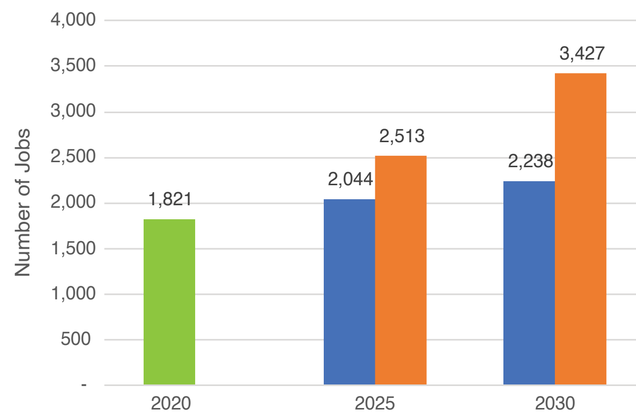
According to the U.S. Census Bureau, Oklahoma had 2,527,722 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

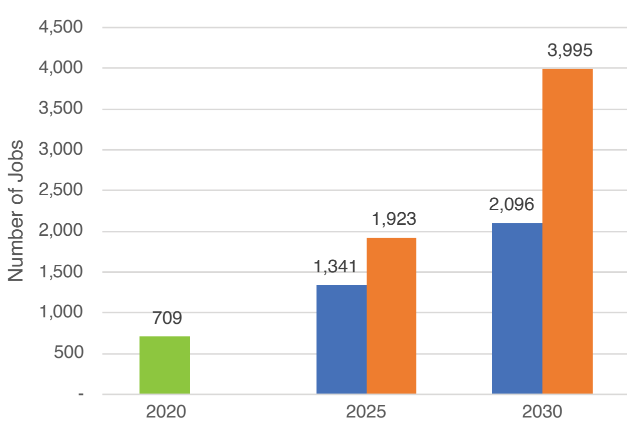
Solar Energy Job Estimates 2020–2030
(photovoltaics)



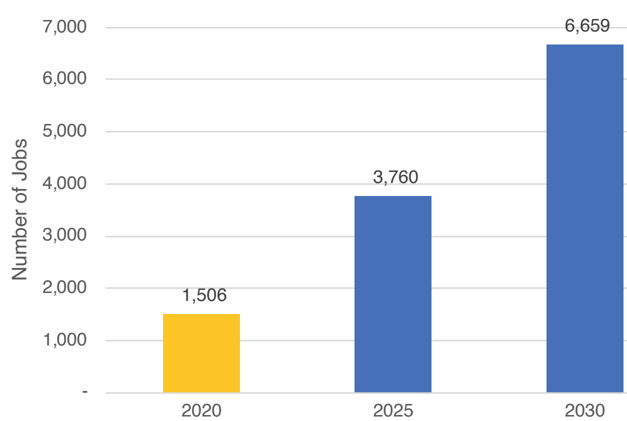
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

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2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	80	MW	Solar Energy Industries Association (SEIA)
Wind	9,048	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,019	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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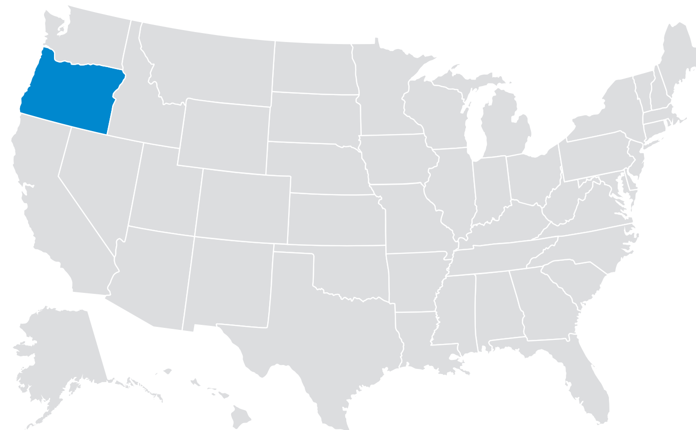
Oregon’s Clean Energy Jobs Potential Through 2030

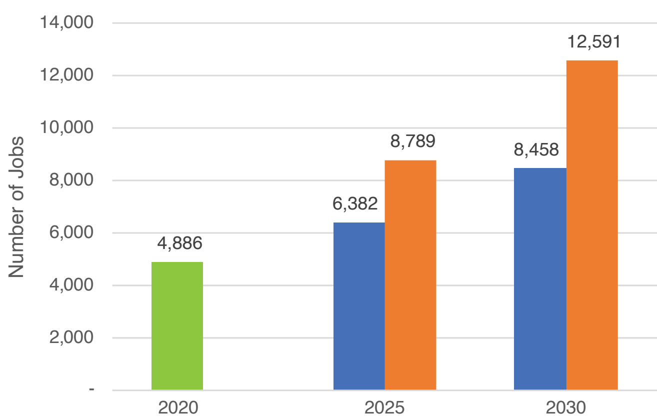


According to the U.S. Census Bureau, Oregon had 2,736,598 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

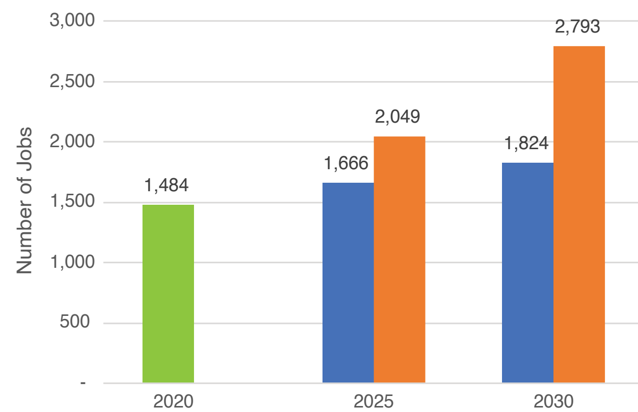
Solar Energy Job Estimates 2020–2030

(photovoltaics)



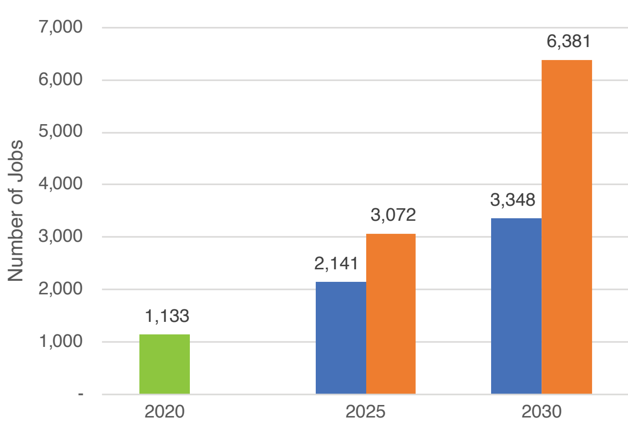
Wind Energy Job Estimates 2020–2030

(land-based)



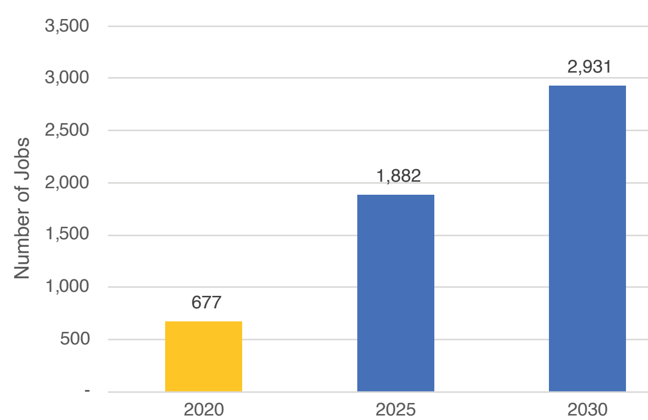
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1]Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

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Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	1,123	MW	Solar Energy Industries Association (SEIA)
Wind	3,737	MW	U.S. Department of Energy Wind Exchange
Battery Storage	11	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	769	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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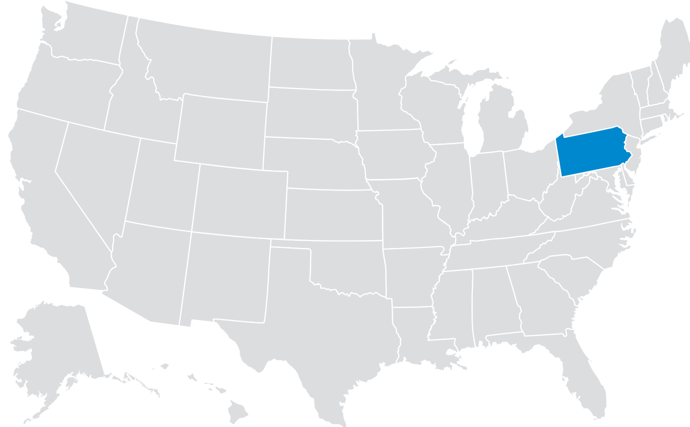


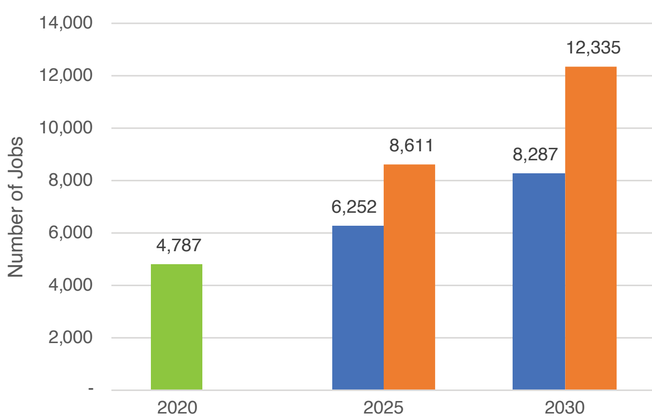
Pennsylvania's Clean Energy Jobs Potential Through 2030

According to the U.S. Census Bureau, Pennsylvania had 8,239,858 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

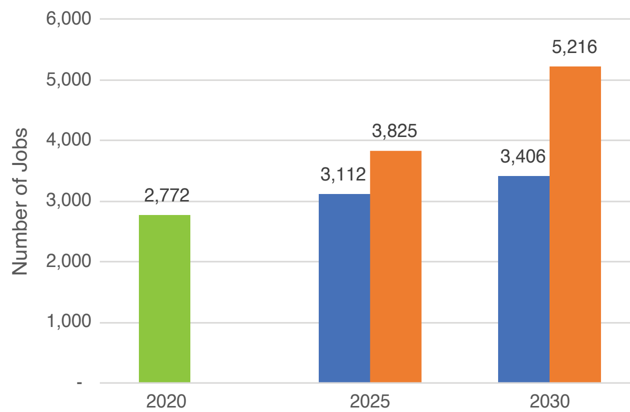
Solar Energy Job Estimates 2020–2030

(photovoltaics)



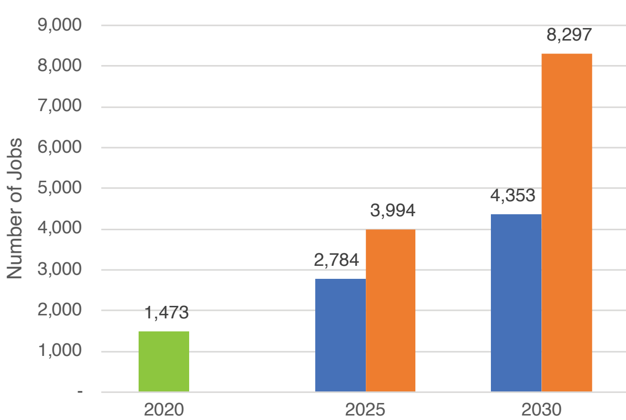
Wind Energy Job Estimates 2020–2030

(land-based)



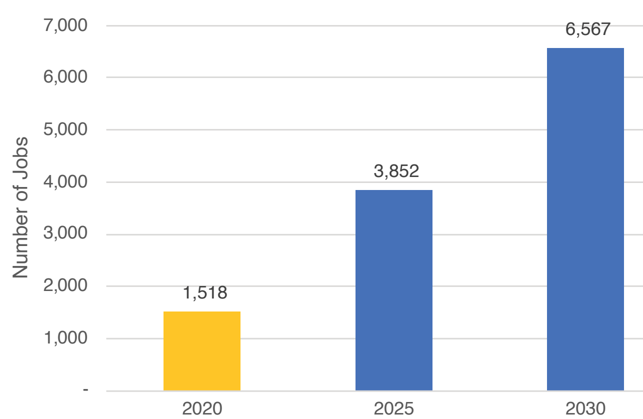
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	787	MW	Solar Energy Industries Association (SEIA)
Wind	1,459	MW	U.S. Department of Energy Wind Exchange
Battery Storage	75	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	2,138	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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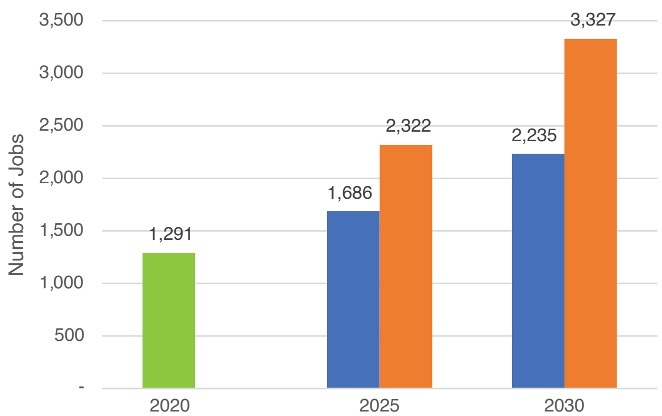
Rhode Island's
Clean Energy Jobs Potential Through 2030

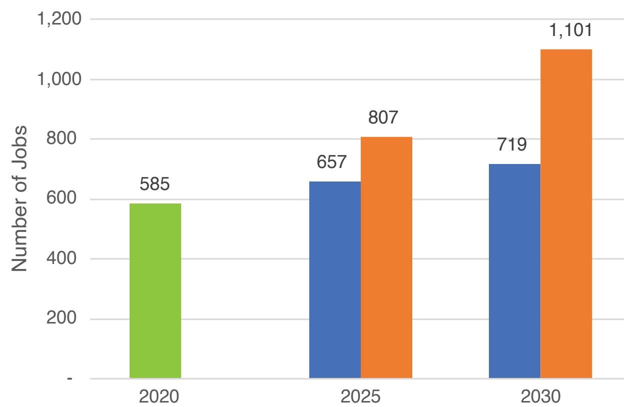
According to the U.S. Census Bureau, Rhode Island had 705,677 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* | Jobs *(modeled with IMPLAN)* | Jobs *(low, modeled; see methodology)* | Jobs *(high, modeled; see methodology)*

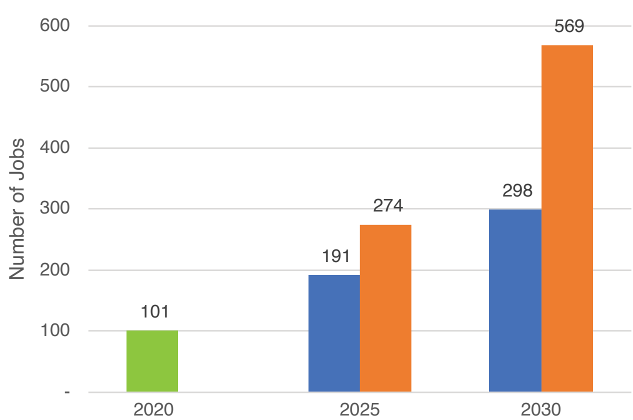
Solar Energy Job Estimates 2020–2030
(photovoltaics)



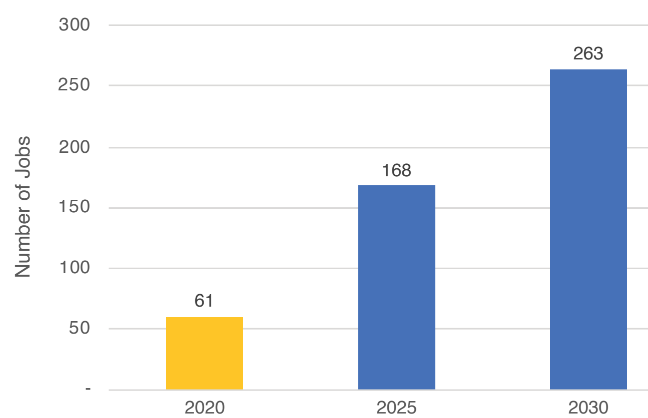
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

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2020 Deployments

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2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	412	MW	Solar Energy Industries Association (SEIA)
Wind	75	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	89	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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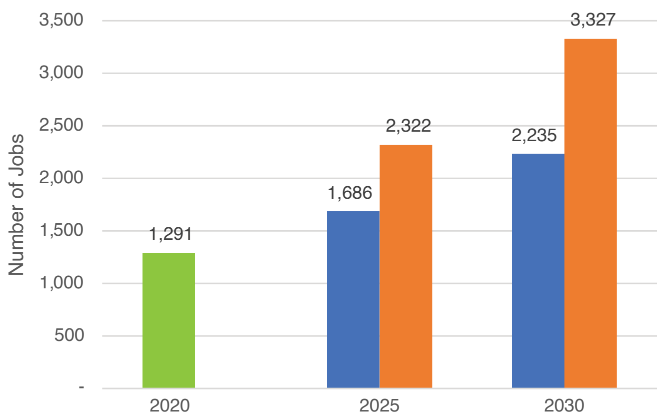
Rhode Island's Clean Energy Jobs Potential Through 2030

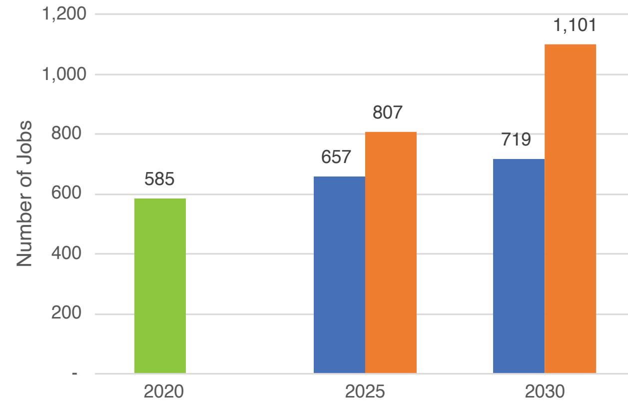
According to the U.S. Census Bureau, Rhode Island had 705,677 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

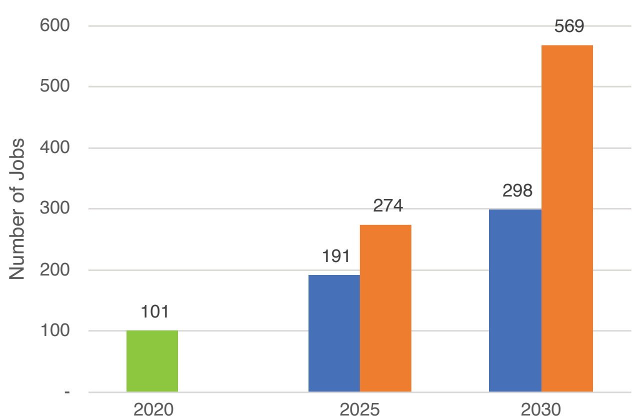
Solar Energy Job Estimates 2020–2030
(photovoltaics)



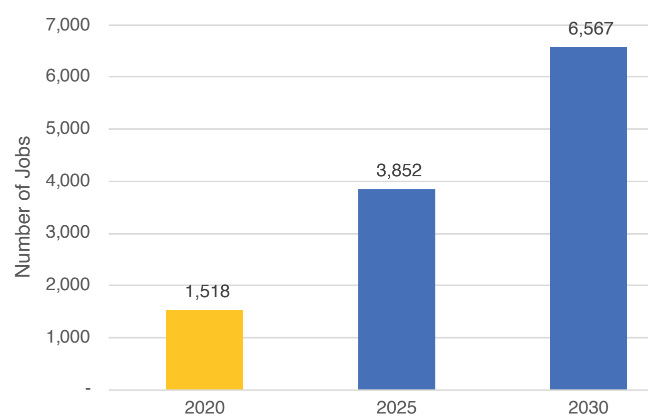
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

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Energy Efficiency

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2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	412	MW	Solar Energy Industries Association (SEIA)
Wind	75	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	89	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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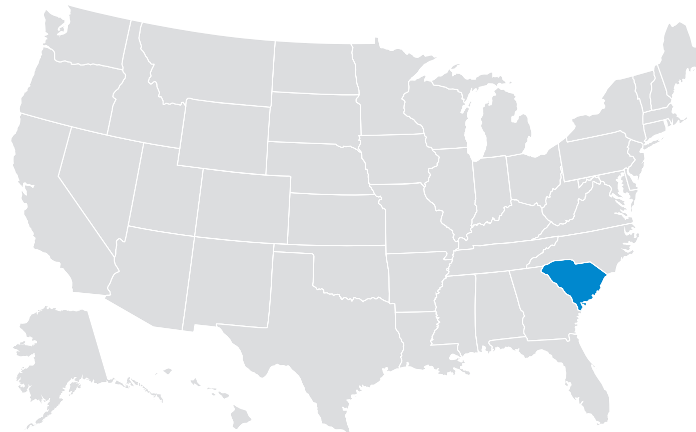


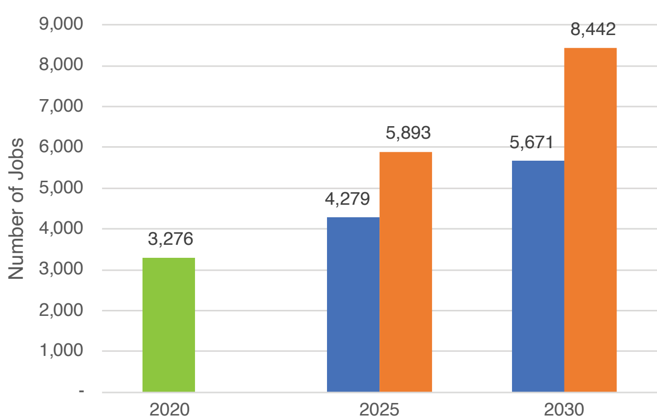
South Carolina's Clean Energy Jobs Potential Through 2030

According to the U.S. Census Bureau, South Carolina had 3,288,642 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

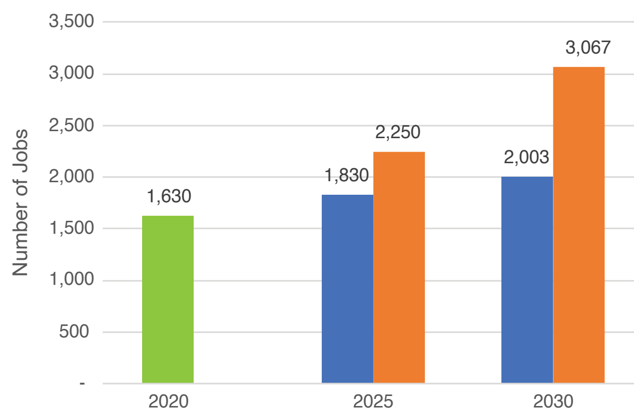
Solar Energy Job Estimates 2020–2030

(photovoltaics)



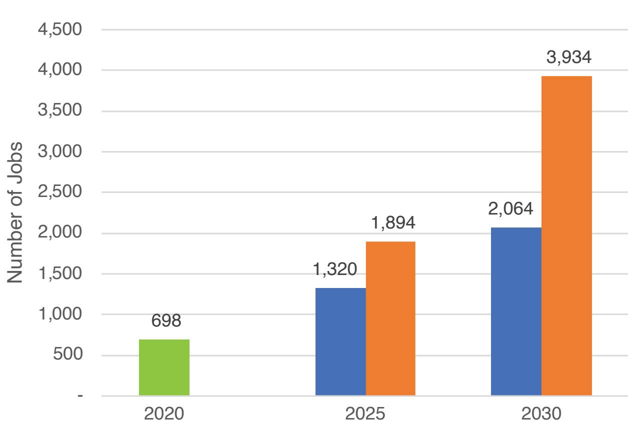
Wind Energy Job Estimates 2020–2030

(land-based)



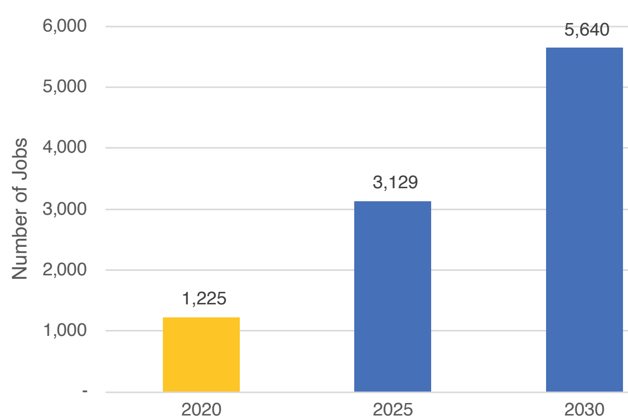
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1]Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

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2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	1,891	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	8	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,349	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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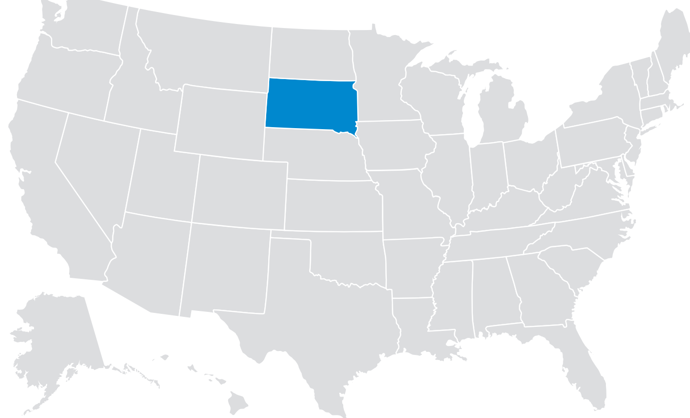
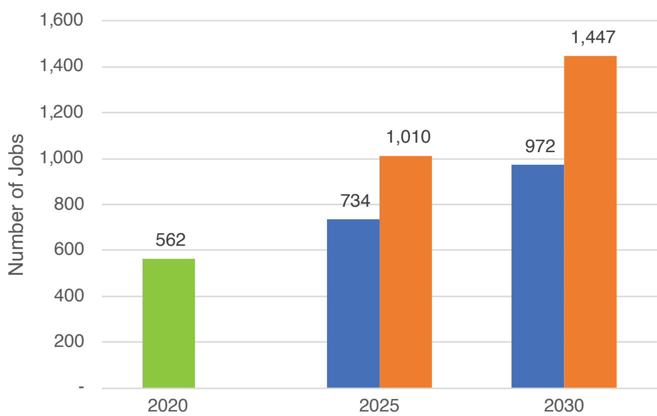
South Dakota's Clean Energy Jobs Potential Through 2030



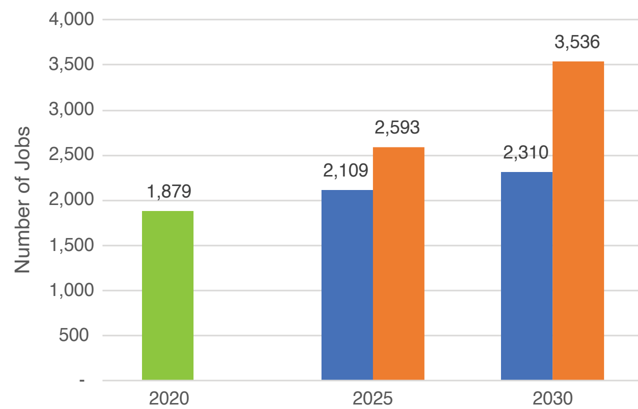
According to the U.S. Census Bureau, South Dakota had 549,894 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

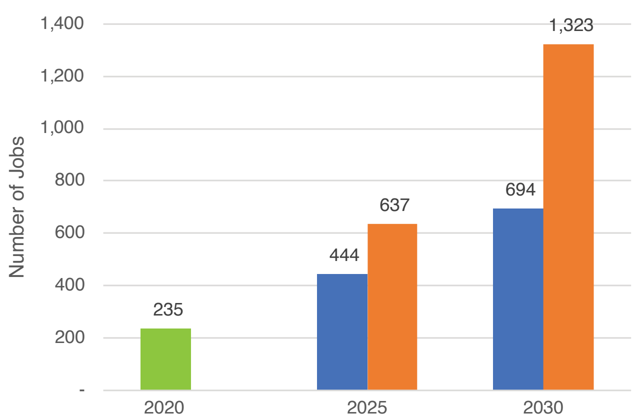
Solar Energy Job Estimates 2020–2030
(photovoltaics)



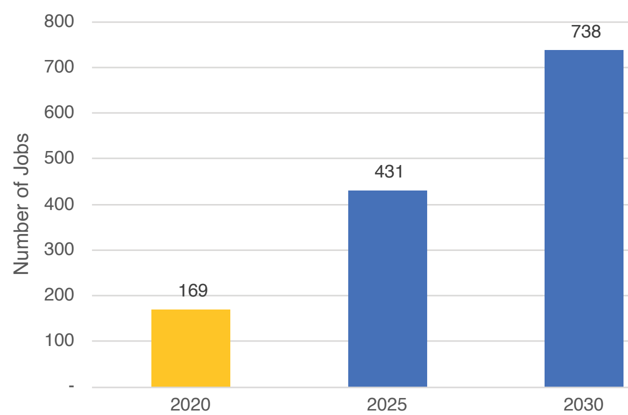
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1]Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	2	MW	Solar Energy Industries Association (SEIA)
Wind	2,305	MW	U.S. Department of Energy Wind Exchange
Battery Storage	2	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	149	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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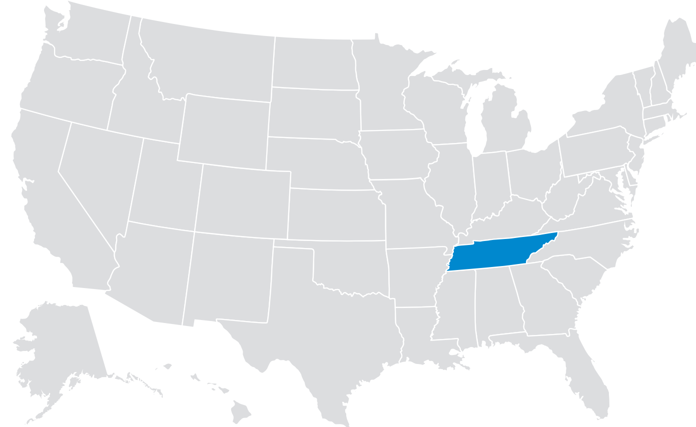
Tennessee's Clean Energy Jobs Potential Through 2030

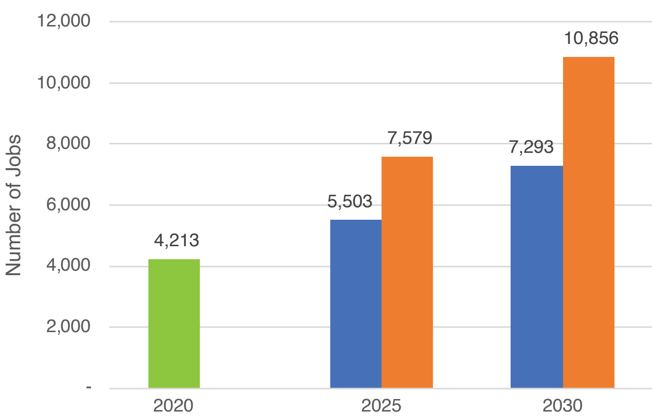


According to the U.S. Census Bureau, Tennessee had 4,433,899 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* · Jobs *(modeled with IMPLAN)* · Jobs *(low, modeled; see methodology)* · Jobs *(high, modeled; see methodology)*

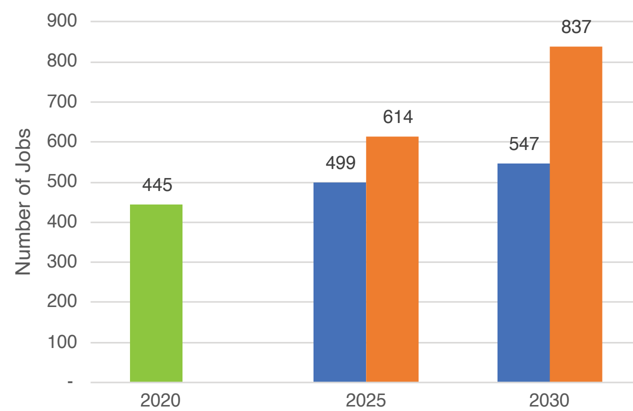
Solar Energy Job Estimates 2020–2030

(photovoltaics)



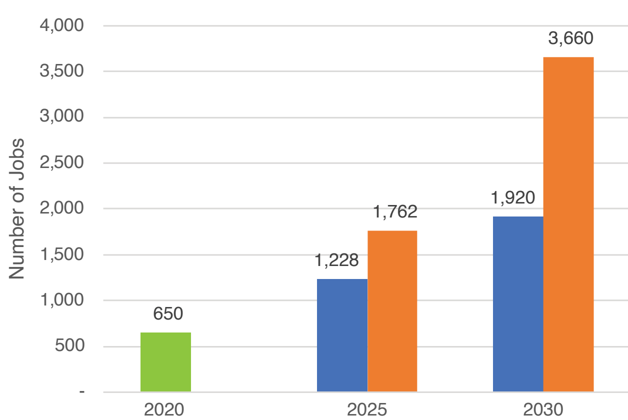
Wind Energy Job Estimates 2020–2030

(land-based)



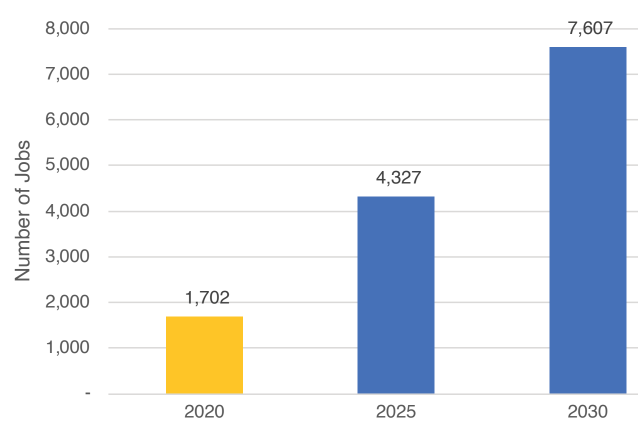
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	356	MW	Solar Energy Industries Association (SEIA)
Wind	29	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,522	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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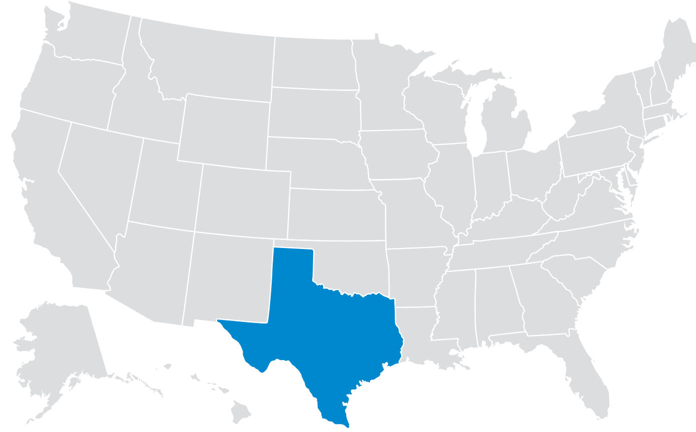
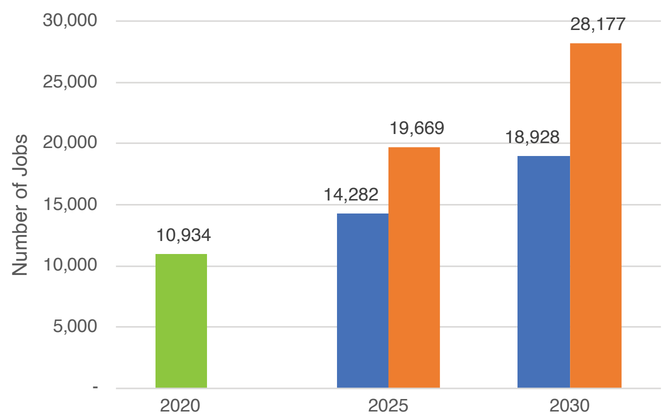
Texas's Clean Energy Jobs Potential Through 2030



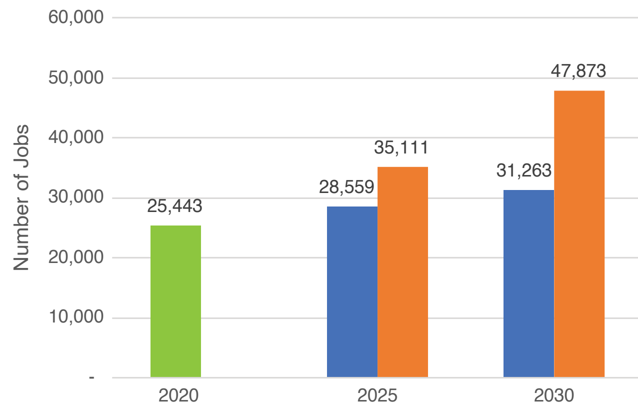
According to the U.S. Census Bureau, Texas had 19,095,227 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

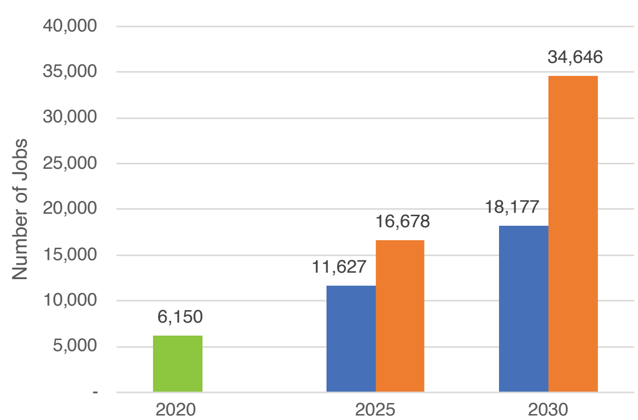
Solar Energy Job Estimates 2020–2030
(photovoltaics)



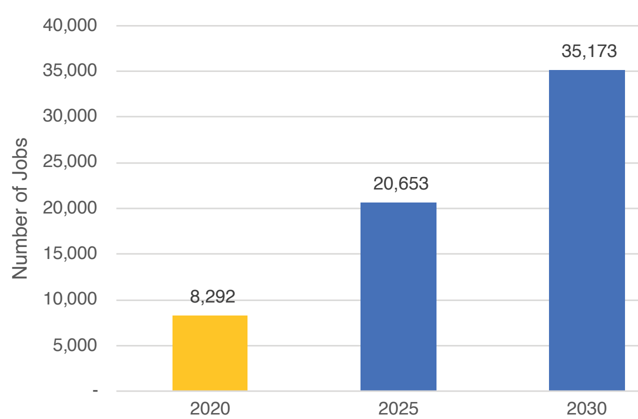
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	9,311	MW	Solar Energy Industries Association (SEIA)
Wind	33,133	MW	U.S. Department of Energy Wind Exchange
Battery Storage	573	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	6,526	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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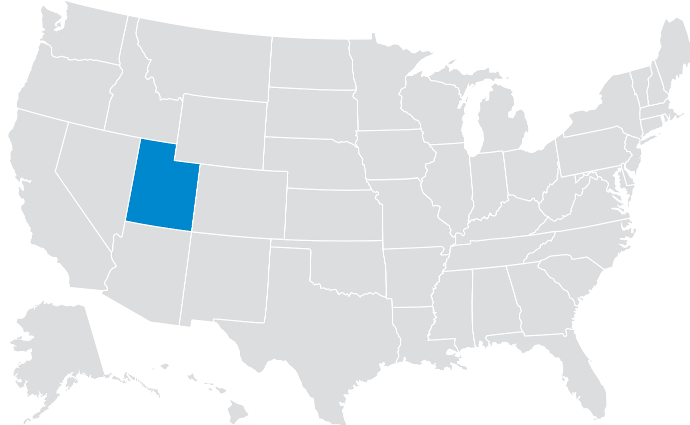
Utah's Clean Energy Jobs Potential Through 2030

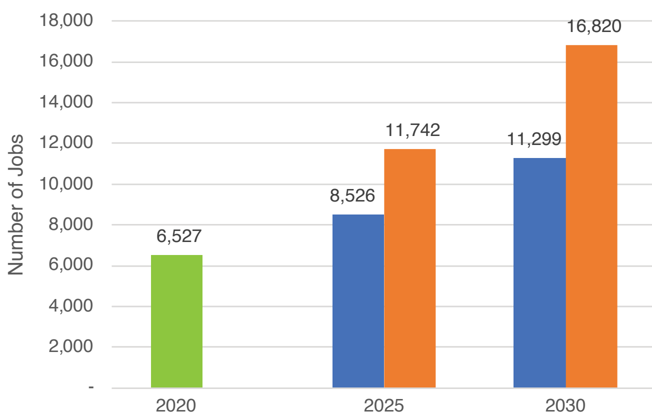


According to the U.S. Census Bureau, Utah had 2,069,226 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

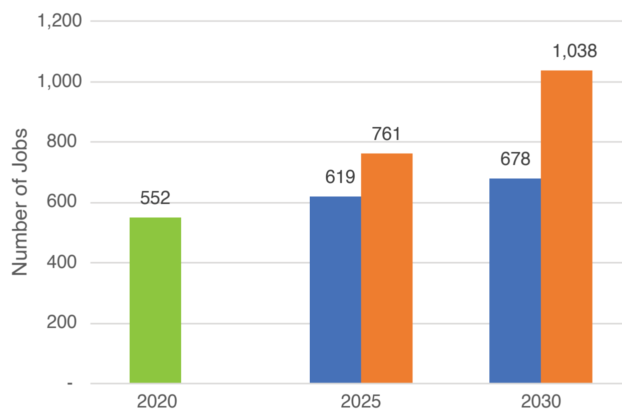
Solar Energy Job Estimates 2020–2030

(photovoltaics)



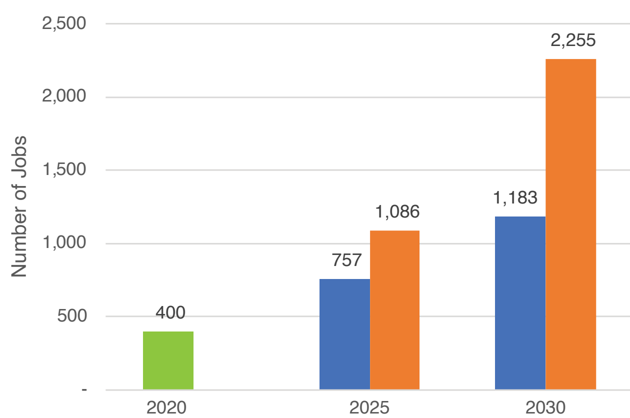
Wind Energy Job Estimates 2020–2030

(land-based)



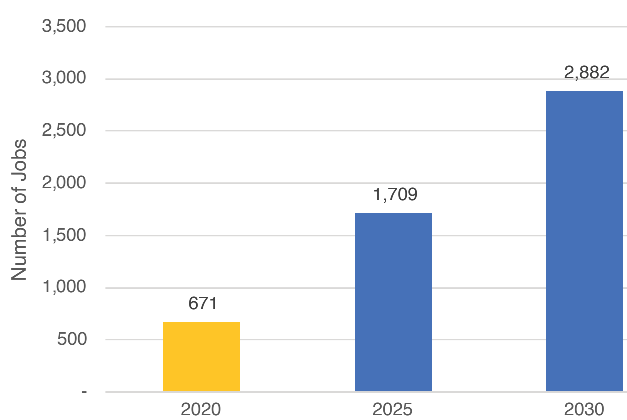
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	2,336	MW	Solar Energy Industries Association (SEIA)
Wind	391	MW	U.S. Department of Energy Wind Exchange
Battery Storage	1	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	487	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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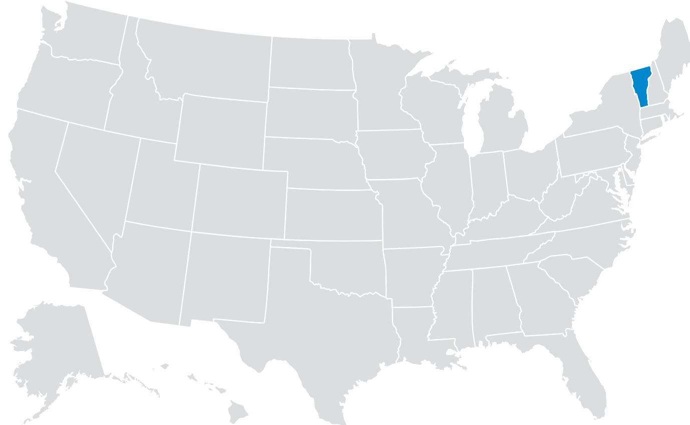
Vermont's Clean Energy Jobs Potential Through 2030

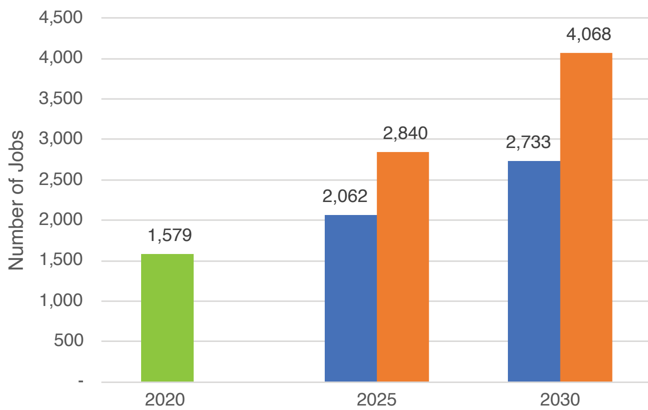


According to the U.S. Census Bureau, Vermont had 406,641 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* · Jobs *(modeled with IMPLAN)* · Jobs *(low, modeled; see methodology)* · Jobs *(high, modeled; see methodology)*

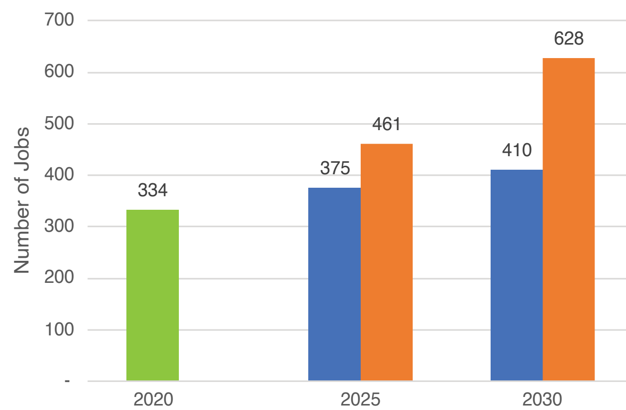
Solar Energy Job Estimates 2020–2030

(photovoltaics)



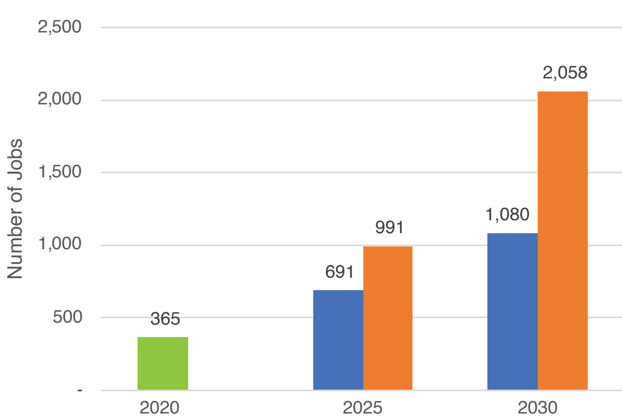
Wind Energy Job Estimates 2020–2030

(land-based)



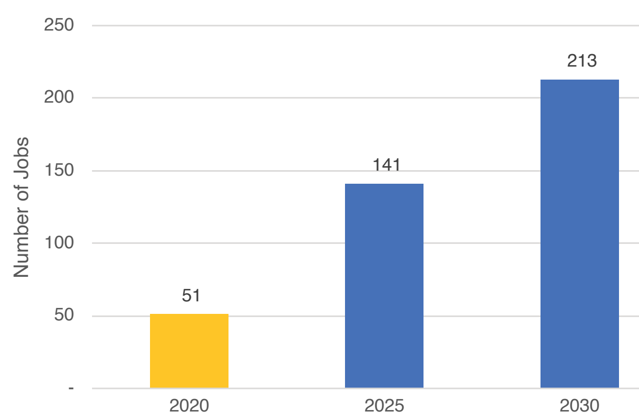
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	382	MW	Solar Energy Industries Association (SEIA)
Wind	149	MW	U.S. Department of Energy Wind Exchange
Battery Storage	22	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	74	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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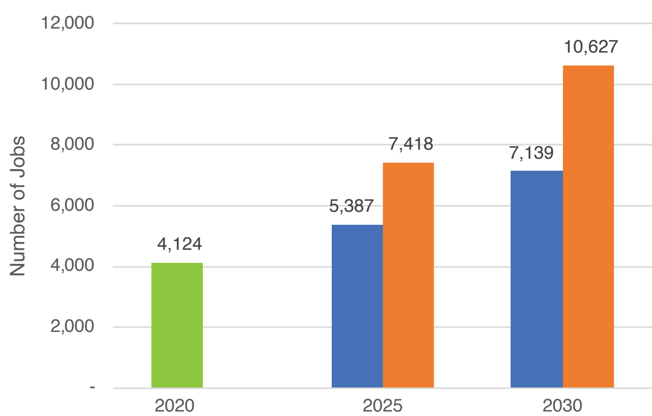
Virginia's Clean Energy Jobs Potential Through 2030

According to the U.S. Census Bureau, Virginia had 5,629,718 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* — Jobs *(modeled with IMPLAN)* — Jobs *(low, modeled; see methodology)* — Jobs *(high, modeled; see methodology)*

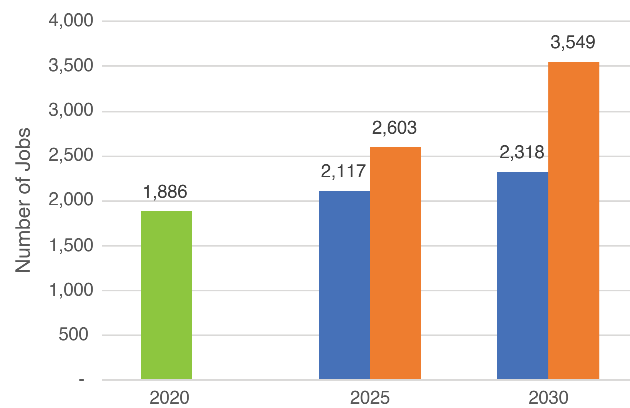
Solar Energy Job Estimates 2020–2030

(photovoltaics)



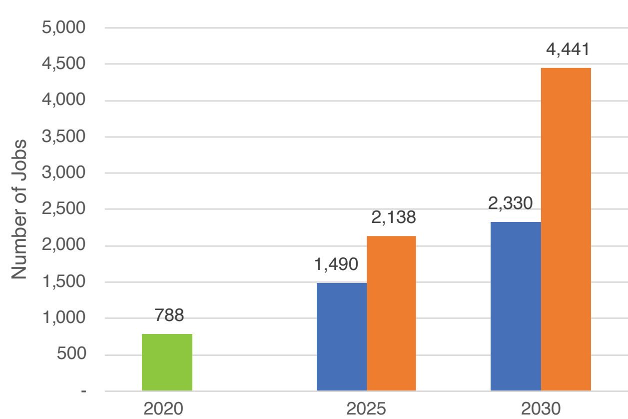
Wind Energy Job Estimates 2020–2030

(land-based)



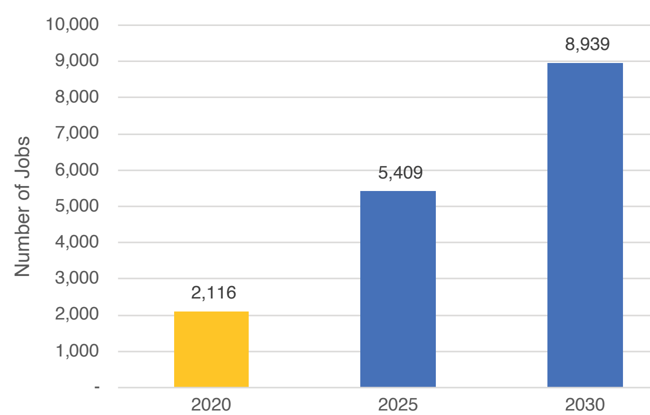
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



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Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

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2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	2,546	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	43	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,868	GWh	Electric Power Research Institute (EPRI)

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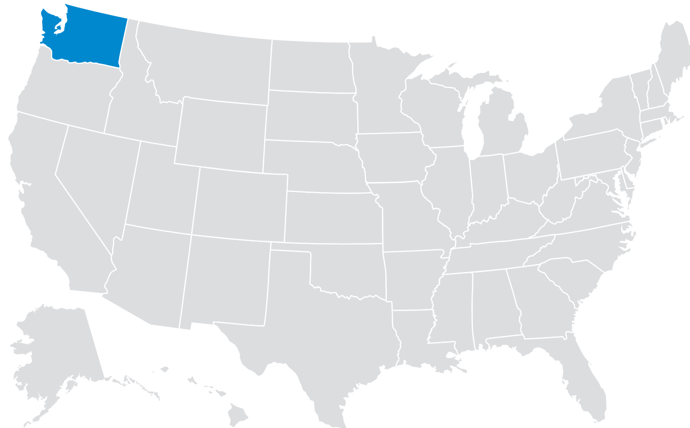
Washington's Clean Energy Jobs Potential Through 2030

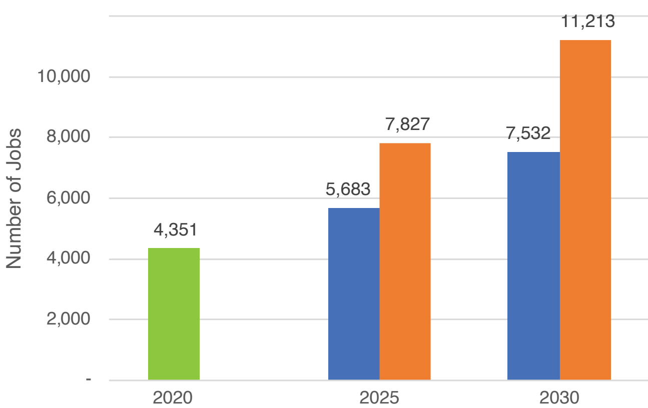


According to the U.S. Census Bureau, Washington had 5,017,738 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

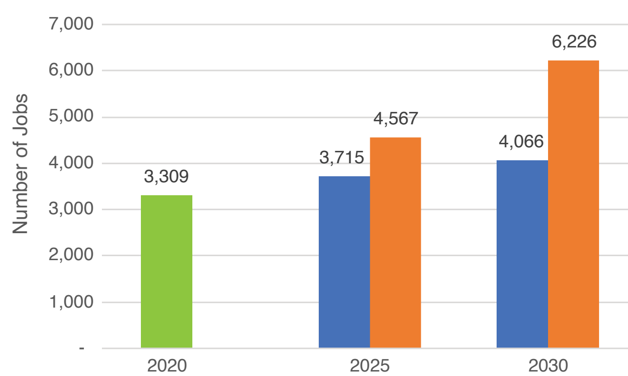
Solar Energy Job Estimates 2020–2030

(photovoltaics)



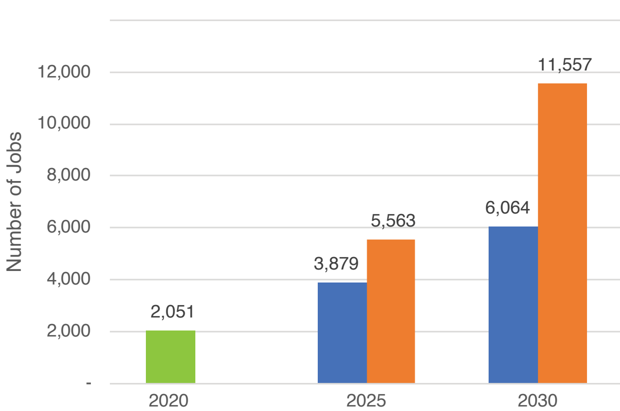
Wind Energy Job Estimates 2020–2030

(land-based)



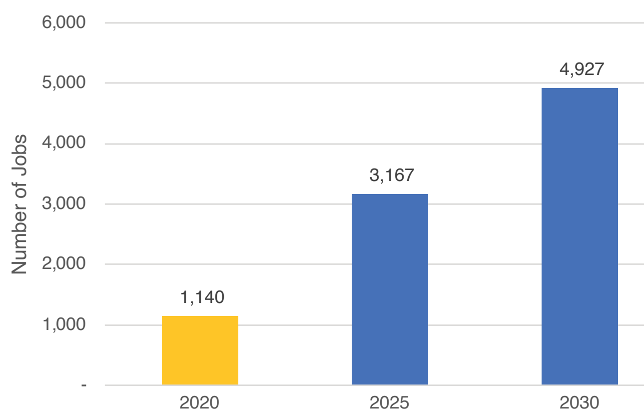
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

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2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	258	MW	Solar Energy Industries Association (SEIA)
Wind	3,395	MW	U.S. Department of Energy Wind Exchange
Battery Storage	15	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,412	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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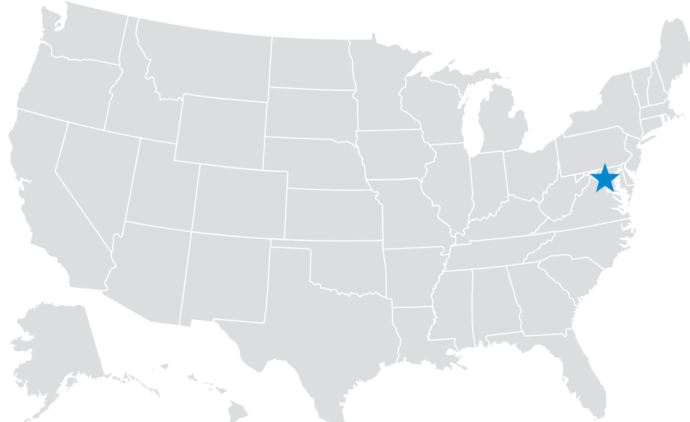
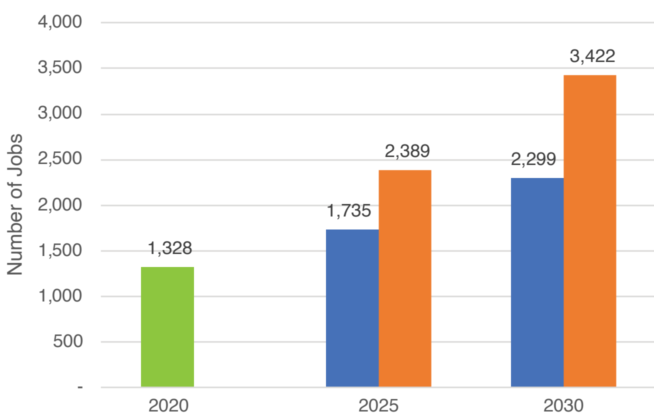
Washington DC's Clean Energy Jobs Potential Through 2030



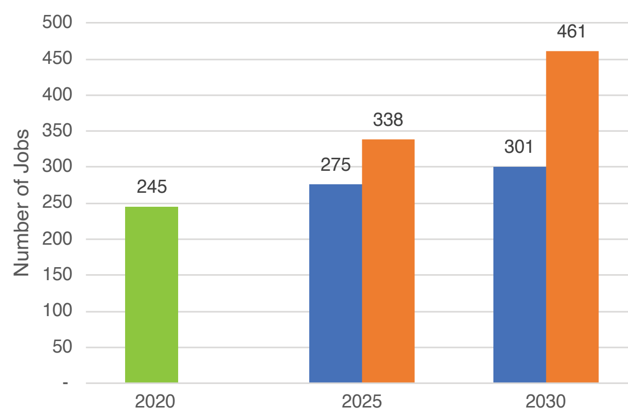
According to the U.S. Census Bureau, Washington DC had 416,300 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend — Jobs *(reported)* · Jobs *(modeled with IMPLAN)* · Jobs *(low, modeled; see methodology)* · Jobs *(high, modeled; see methodology)*

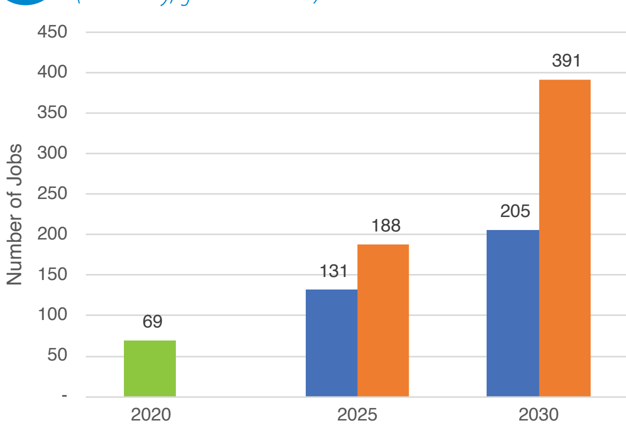
Solar Energy Job Estimates 2020–2030
(photovoltaics)



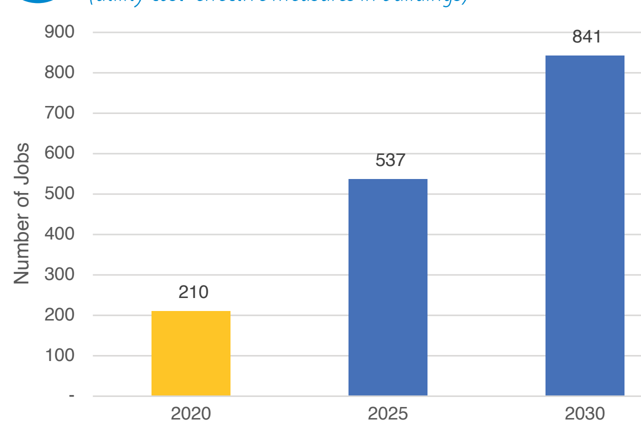
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

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2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	108	MW	Solar Energy Industries Association (SEIA)
Wind	0	MW	U.S. Department of Energy Wind Exchange
Battery Storage	<1MW	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	266	GWh	Electric Power Research Institute (EPRI)

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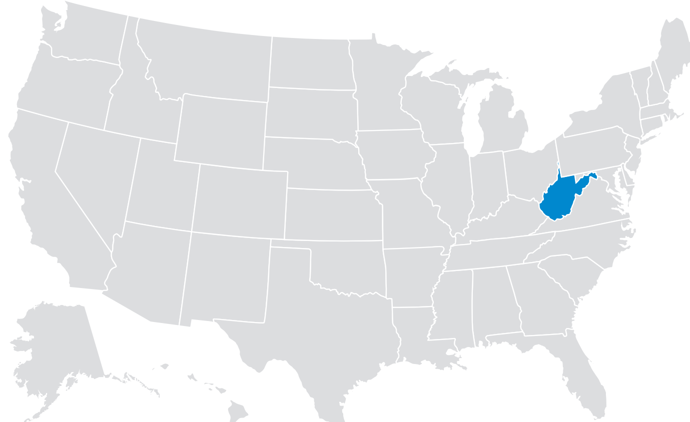
West Virginia's
Clean Energy Jobs Potential Through 2030



According to the U.S. Census Bureau, West Virginia had 1,129,785 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

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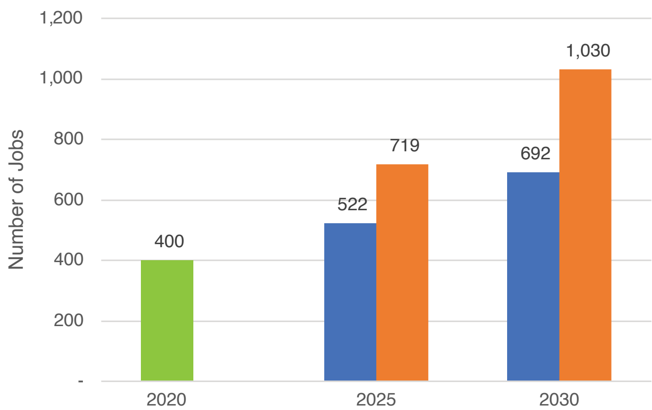

Wind Energy Job Estimates 2020–2030
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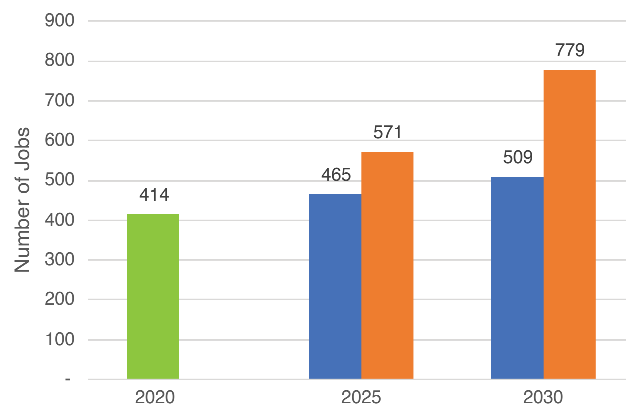
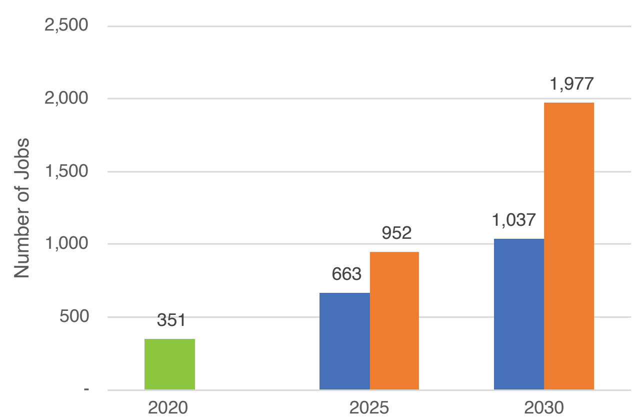
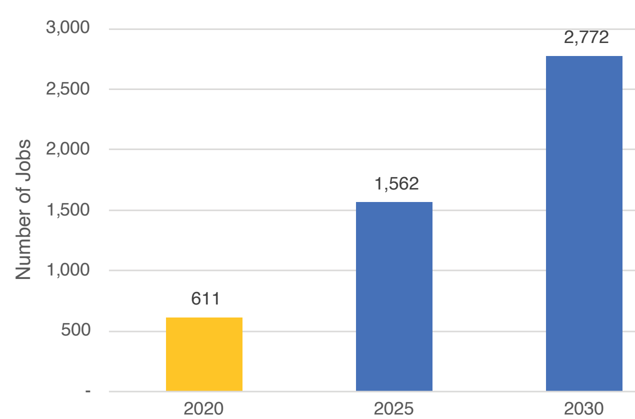


Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



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2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	13	MW	Solar Energy Industries Association (SEIA)
Wind	742	MW	U.S. Department of Energy Wind Exchange
Battery Storage	100	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	495	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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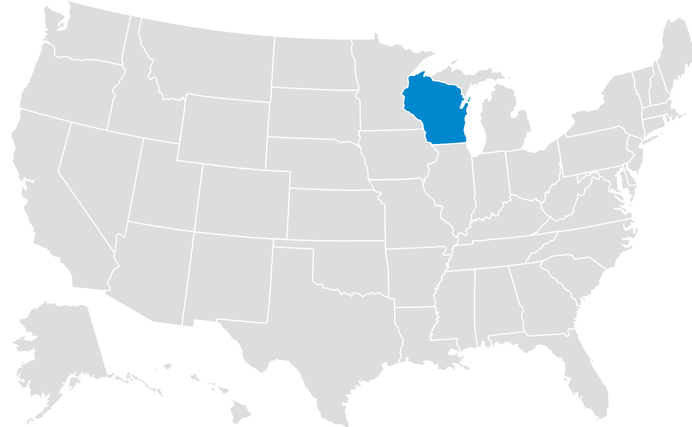
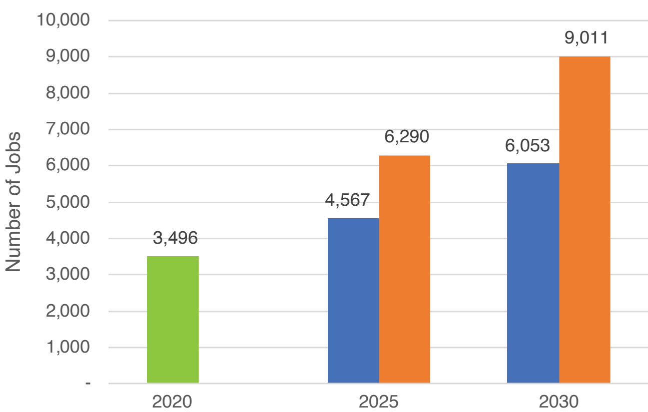
Wisconsin's Clean Energy Jobs Potential Through 2030



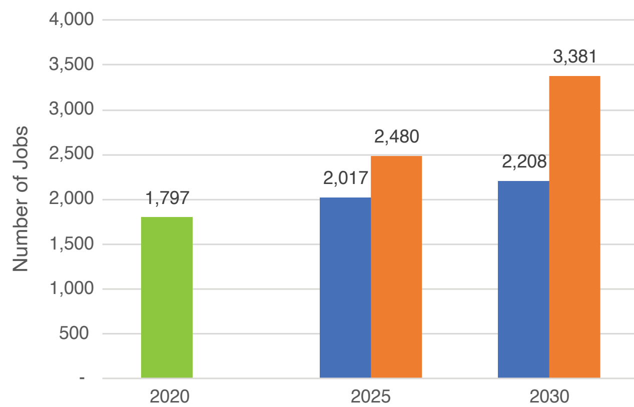
According to the U.S. Census Bureau, Wisconsin had 3,762,091 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

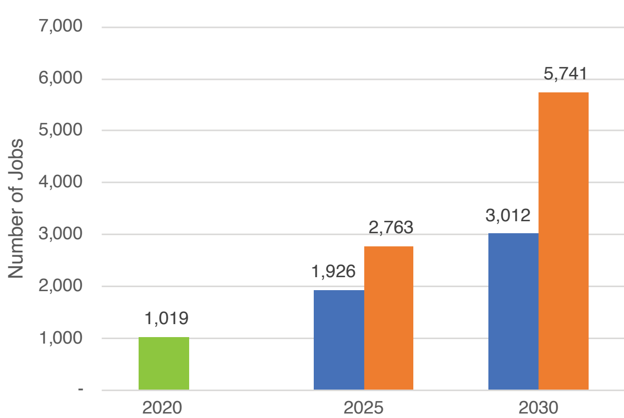
Solar Energy Job Estimates 2020–2030
(photovoltaics)



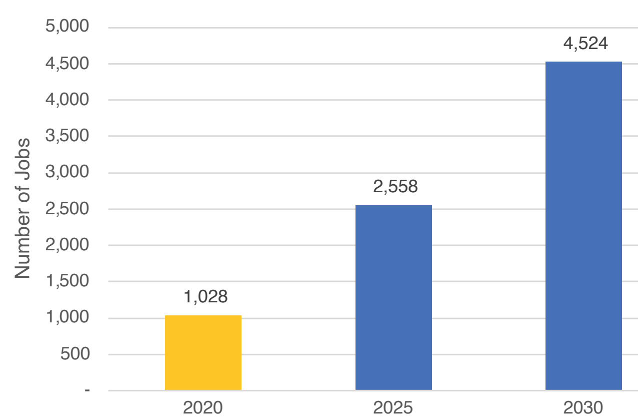
Wind Energy Job Estimates 2020–2030
(land-based)



Battery Storage Job Estimates 2020–2030
(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030
(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	450	MW	Solar Energy Industries Association (SEIA)
Wind	746	MW	U.S. Department of Energy Wind Exchange
Battery Storage	28	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	1,101	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

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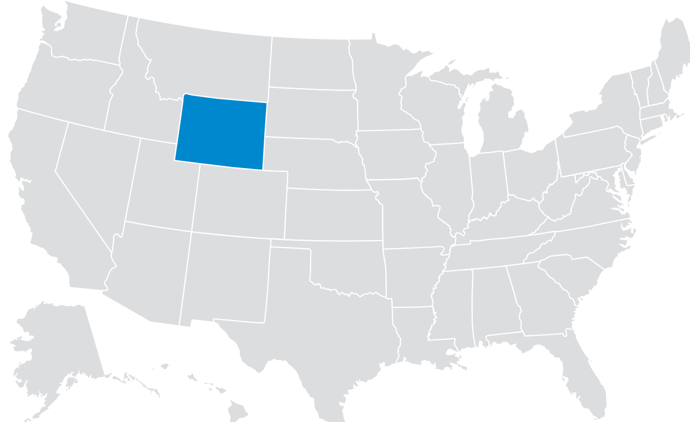
Wyoming's Clean Energy Jobs Potential Through 2030

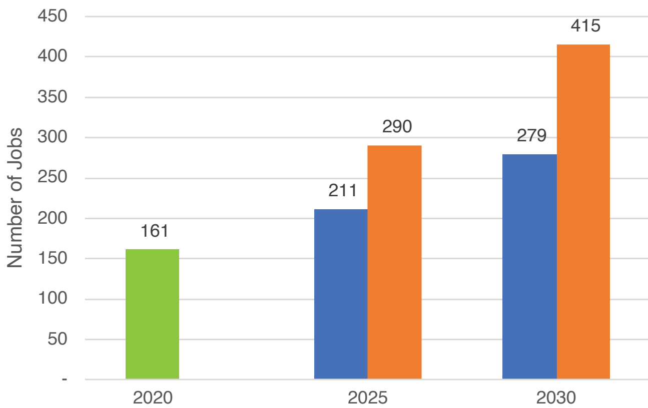


According to the U.S. Census Bureau, Wyoming had 367,435 people in its working population (15 to 64 years of age) in 2019. The graphs below show solar photovoltaic (PV), land-based wind, battery energy storage (BES), and energy efficiency job estimates in 2020, 2025, and 2030.[1] These job estimates do not represent net job creation. Rather, they represent the size of the workforce required to achieve projected national deployment levels of each technology for 2025 and 2030 if the state captures the same proportion of jobs in the sector as it did in 2020.

Legend Jobs *(reported)* Jobs *(modeled with IMPLAN)* Jobs *(low, modeled; see methodology)* Jobs *(high, modeled; see methodology)*

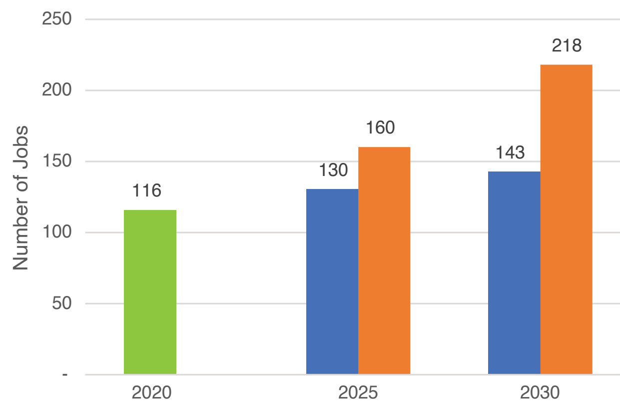
Solar Energy Job Estimates 2020–2030

(photovoltaics)



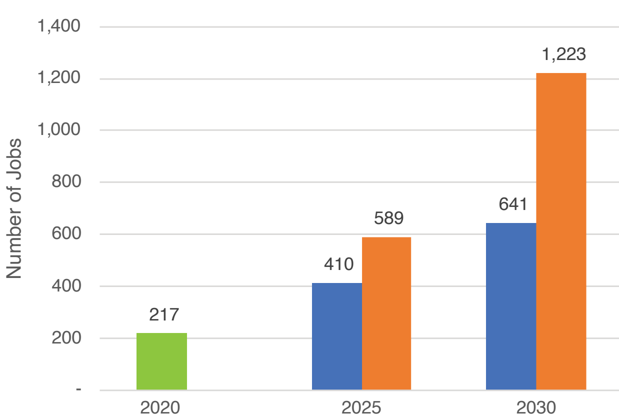
Wind Energy Job Estimates 2020–2030

(land-based)



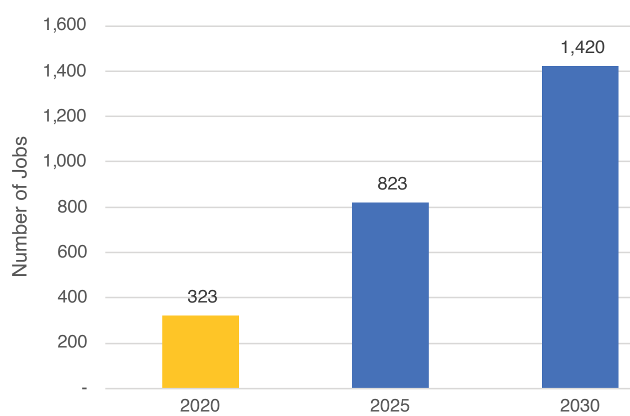
Battery Storage Job Estimates 2020–2030

(stationary, grid-connected)



Energy Efficiency Job Estimates 2020–2030

(utility cost-effective measures in buildings)



[1] Jobs include direct (installation and operations, maintenance) and indirect (supply chain) jobs aligned with goods and services associated with each clean energy sector regardless of the amount of labor hours spent working with the technology in a work week. The job estimates presented here therefore are not full-time equivalent measures.

Methodology

Battery Energy Storage (BES), Solar Photovoltaics (PV), and Land-Based Wind

State-level job figures shown for 2020 reflect what was reported in the *Energy Employment by State: 2021, U.S. Energy and Employment Report (USEER)*, adjusted to match the scope of the technologies included in this report (e.g., solar includes only PV and not concentrating solar power, wind only includes land-based wind and not offshore wind, etc.). For 2025 and 2030, NREL projected national deployments and associated job estimates and allocated jobs to states based on the proportion of the job market a state captured in 2020 according to the jobs reported in the *Energy Employment by State: 2021, USEER*. This analysis assumes that a state will capture the same proportion of national jobs in each clean energy sector as it did in 2020.

National job estimates in 2025 and 2030 were derived from multiplying projected deployments (using NREL's Regional Energy Deployment System (ReEDS) and Distributed Generation Market Demand (dGen) models) by a national jobs multiplier (calculated using cumulative deployments and reported jobs nationwide in 2020). The job multiplier was applied to two deployment scenarios to arrive at a range of projected jobs for BES, PV, and land-based wind nationwide in 2025 and 2030. The lower end of the range is based on the ReEDS mid-case ("business as usual") scenario that assumes a mid-case cost reduction trajectory for each technology; the upper end of the range is based on "accelerated" deployment scenarios that assumes each of the three technologies experience more pronounced cost declines while other generation technologies experience mid-case cost reductions. As such, the accelerated deployment projections and associated jobs estimates should not be viewed as an integrated comprehensive future scenario that states could achieve. Rather, each technology's accelerated deployment estimates should be considered separately as a comparison of opportunities.

Energy Efficiency

Energy efficiency jobs were estimated using the Electric Power Research Institute's (EPRI) State Level Energy Efficiency Potential Estimates data and the IMPLAN input-output model. Energy efficiency deployments for 2025 and 2030 were modeled using EPRI's total achievable energy efficiency potential scenario, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective and does not account for other economy-wide energy efficiency measures (measures adopted without financial incentives or promotion from utility programs). Therefore, the job estimates for energy efficiency are not comparable to those measured by the *U.S. Energy and Employment Report*, which captures economy-wide energy efficiency jobs. Energy efficiency jobs are allocated to states based on the proportion of national investments a state is projected to make.

2020 Deployments

Solar and wind deployments for 2020 are reported by trade associations. Because few data exist showing state-level BES deployments, NREL used the ReEDS model to estimate 2020 BES deployments. Energy efficiency deployments for 2020 were modeled using EPRI's State Level Energy Efficiency Potential Estimates for the total achievable energy efficiency potential, which calculates savings from all cost-effective measures from a utility perspective. EPRI's model only includes measures that are cost-effective from a utility perspective, and does not account for other economy-wide energy efficiency measures.

2020 Statistics

Technology	Deployments	Units	Data Sources
Solar	140	MW	Solar Energy Industries Association (SEIA)
Wind	2,738	MW	U.S. Department of Energy Wind Exchange
Battery Storage	0	MW	Regional Energy Deployment System (ReEDS) Model
Energy Efficiency	205	GWh	Electric Power Research Institute (EPRI)

Further details can be found in the Methodology section of *State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030*. Please visit https://www.nrel.gov/docs/fy22osti/81486.pdf.

Additional support and resources from NREL are available at https://www.nrel.gov/state-local-tribal/.

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Appendix B. Calculations for PV, Wind, and BES Job Multipliers

This appendix includes a step-by-step explanation of the calculation methodology used in this report to estimate jobs associated with national deployments of stationary BES, solar PV, and land-based wind technologies.

Table B-1. Calculations for BES Job Multipliers

Step	Description	Battery Energy Storage (Grid-Connected)		
		2020	2025	2030
1	Calculate the national jobs multiplier using 2020 reported deployments and jobs (jobs/MW) (66,751/4,003 = 17).	17		
2	Calculate the rate of CapEx cost decline expected from 2020–2025 and 2025–2030 from the Annual Technology Baseline (ATB) for each technology (moderate CapEx cost reduction scenario, average cost decline among utility, commercial and residential BES applications).		-31%	-20%
3	Reduce the 2020 jobs multiplier by the amount of cost declines to derive 2025 and 2030 jobs multipliers.		11.47	9.14
4	Estimate national MW deployment in 2025 and 2030 based on NREL's ReEDS model for mid-case and low-cost scenarios, adjusted to include Alaska, DC, and Hawaii deployments in 2020.		11,007–15,789 MW	21,576–41,124 MW
5	Multiply 2025 and 2030 deployments by the 2025 and 2030 jobs multiplier to arrive at an estimated # of jobs nationally in 2025 and 2030 in each technology sector (rounded to nearest thousand).		126,000–181,000 jobs	197,000–376,000 jobs
6	Calculate each state's ratio of total jobs in each technology sector in 2020.	State by state %s		
7	Multiply total jobs nationwide in 2025 and 2030 by state's proportion of all U.S. jobs to arrive at estimated jobs in each state in 2025 and 2030 (assuming the state captures the same proportion of total U.S. BES jobs as they did in 2020).	State by state #s	State by state #s	State by state #s

Table B-2. Calculations for PV Job Multipliers

Step	Description	Solar (PV)		
		2020	2025	2030
1	Calculate a national jobs multiplier using 2020 reported deployments and jobs (jobs/MW) (293,874/102,465 = 2.87).	2.87		
2	Calculate the rate of CapEx cost decline expected from 2020–2025 and 2025–2030 from the Annual Technology Baseline (ATB) for each technology (moderate CapEx cost reduction scenario, average cost decline among utility, commercial and residential solar applications).		-28%	-40%
3	Reduce the 2020 jobs multiplier by the amount of cost declines to derive 2025 and 2030 jobs multipliers.		2.06	1.23
4	Estimate national MW deployment in 2025 and 2030 based on NREL's ReEDS model for mid-case and low-cost scenarios, adjusted to include Alaska, DC, and Hawaii deployments in 2020.		186,772–257,226 MW	412,105–613,463 MW
5	Multiply 2025 and 2030 deployments by the 2025 and 2030 jobs multiplier to arrive at an estimated number of jobs nationally in 2025 and 2030 in each technology sector (rounded to nearest thousand).		384,000–529,000 jobs	509,000–757,000 jobs
6	Calculate each state's ratio of total jobs in each technology sector in 2020.	State by state %s		
7	Multiply total jobs nationwide in 2025 and 2030 by state's proportion of all U.S. jobs to arrive at estimated jobs in each state in 2025 and 2030 (assuming the state captures the same proportion of total U.S. solar jobs as they did in 2020).	State by state #s	State by state #s	State by state #s

Table B-3. Calculations for Wind Job Multipliers

Step	Description	Wind (Land-Based)		
		2020	2025	2030
1	Calculate a national jobs multiplier using 2020 reported deployments and jobs (jobs/MW) (116,817/122,340 = 0.95).	0.95		
2	We did not reduce the 2020 jobs multiplier over time due to the maturity of the wind sector and limited opportunities to reduce costs through labor force reductions.		0.95	0.95
3	Estimate national MW deployment in 2025 and 2030 based on NREL's ReEDS model for mid-case and low-cost scenarios, adjusted to include Alaska, DC, and Hawaii deployments in 2020.		136,942–168,359 MW	149,905–229,551 MW
4	Multiply 2025 and 2030 deployments by the 2025 and 2030 jobs multiplier to arrive at an estimated # of jobs nationally in 2025 and 2030 in each technology sector (rounded to nearest thousand).		132,000–161,000 jobs	143,000–219,000 jobs
5	Calculate each state's ratio of total jobs in each technology sector in 2020.	State by state %s		
6	Multiply total jobs nationwide in 2025 and 2030 by state's proportion of all U.S. jobs to arrive at estimated jobs in each state in 2025 and 2030 (assuming the state captures the same proportion of total U.S. wind jobs as they did in 2020).	State by state #s	State by state #s	State by state #s
7	Calculate a national jobs multiplier using 2020 reported deployments and jobs (jobs/MW) (116,817/122,340 = 0.95).	0.95		

Appendix C. Energy Efficiency Job Multipliers by State

Provided below are the jobs multipliers for direct jobs by state and estimated levels of spending calculated based on the *U.S. Energy Efficiency Potential Through 2040: Update on Potential for Energy Savings Through Utility Programs Across the Nation from the Electric Power Research Institute* (EPRI 2018). (State-level energy efficiency job estimates included in Appendix A will not match calculations using multipliers in Table C-1 because Appendix A estimates include both direct and indirect jobs.)

Table C-1. State Jobs Multipliers for Direct Jobs Associated With Energy Efficiency Investments

State	Estimated Investment in Utility Cost-Effective Energy Efficiency Programs		Average Direct Jobs/ $1M USD
	2025	2030	
AK	$33,307,204	$51,494,832	5.61
AL	$426,497,279	$720,254,982	5.83
AR	$303,474,359	$521,944,586	6.62
AZ	$547,905,330	$927,275,446	5.44
CA	$1,625,991,860	$2,518,732,887	4.32
CO	$341,537,337	$576,299,939	4.45
CT	$80,939,193	$125,596,993	4.73
DC	$90,427,042	$151,968,187	3.63
DE	$66,475,483	$111,716,125	5.69
FL	$1,817,829,818	$3,229,205,021	6.36
GA	$798,661,768	$1,342,116,034	5.43
HI	$57,915,209	$89,540,208	5.47
IA	$190,947,795	$316,731,190	5.97
ID	$135,228,258	$228,180,139	6.38
IL	$374,590,108	$646,768,067	4.60
IN	$437,641,529	$755,632,783	5.59
KS	$155,327,393	$257,646,494	4.32
KY	$371,107,290	$626,714,138	4.87
LA	$528,438,214	$908,859,206	6.38
MA	$151,827,113	$235,596,975	4.07
MD	$454,343,507	$763,552,117	5.91
ME	$34,289,747	$53,208,946	7.21
MI	$514,488,817	$888,317,470	3.84
MN	$273,575,909	$453,789,075	5.46
MO	$312,730,305	$518,735,718	5.62
MS	$238,689,718	$403,091,571	6.50
MT	$84,510,837	$142,601,072	6.77
NC	$837,115,455	$1,406,823,841	4.66

State	Estimated Investment in Utility Cost-Effective Energy Efficiency Programs		Average Direct Jobs/ $1M USD
	2025	2030	
ND	$69,277,476	$114,912,755	5.34
NE	$113,312,146	$187,954,466	6.73
NH	$31,837,044	$49,402,977	6.04
NJ	$303,100,200	$512,984,987	4.81
NM	$145,331,535	$245,959,213	6.19
NV	$236,014,058	$399,430,393	6.21
NY	$618,569,396	$1,077,089,368	3.71
OH	$686,398,246	$1,185,136,652	5.37
OK	$387,075,044	$665,729,139	6.24
OR	$225,821,649	$349,133,115	5.29
PA	$485,956,839	$822,462,546	5.04
RI	$20,631,559	$32,014,920	5.18
SC	$458,816,730	$771,069,642	4.47
SD	$45,804,961	$76,949,675	6.01
TN	$515,076,183	$869,844,205	5.43
TX	$2,439,826,750	$4,207,054,168	5.33
UT	$179,612,826	$303,073,338	6.02
VA	$635,254,214	$1,067,583,649	5.34
VT	$17,024,643	$26,417,906	5.16
WA	$414,641,915	$641,059,987	4.85
WI	$334,441,981	$577,448,227	4.90
WV	$168,397,008	$283,001,495	6.04
WY	$75,721,273	$127,769,823	6.96

Appendix D. Recent Jobs Studies—Literature Review

The following reports were reviewed as part of a literature review to understand various approaches taken to estimating jobs. Additional reports used are cited in the reference section.

AFL-CIO. 2020. *Energy Transitions*. AFL-CIO and the Energy Futures Initiative. https://static1.squarespace.com/static/58ec123cb3db2bd94e057628/t/5f712b93b66cd43eed7d344a/1601252258579/Energy+Transitions+%28LEP%29+FINAL.pdf.

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