

Clean Jobs America 2022¹

A RETURN TO RAPID GROWTH, WITH CLEAN VEHICLE JOBS DRIVING AHEAD

Clean energy and clean transportation jobs grew by more than 5 percent in 2021, with electric vehicle manufacturing jobs leading the way and renewable energy regaining most of the jobs lost in the COVID-19 economic downturn.

More than 3.2 million Americans were employed in renewable energy, energy efficiency, storage and grid modernization and clean fuels at the end of 2021, according to an E2 analysis of U.S. Department of Energy jobs data.

Approximately 156,000 jobs were added across all clean energy and clean vehicle subsectors in 2021—more than half of all jobs added to the total energy sector. Clean energy and clean transportation now employs more than 40 percent of all energy workers in America. Two years after the COVID-19 economic downturn wiped out more than 600,000 clean energy jobs, nearly 75 percent of those jobs were regained.

The growth in clean energy jobs in 2021 was in contrast to job declines in the fossil fuel industry, further underscoring the ongoing transition to a clean economy. Across the electric power generation and fuels sectors, fossil fuels lost more than 35,000 jobs nationwide.

Small businesses—the backbone of America's economy—continue to employ the majority of clean energy workers. About 90 percent of all clean energy jobs were at companies that employed fewer than 100 workers—64.4 percent were at companies employing fewer than 20.

Almost half of all clean energy jobs are in construction-related fields, and about 14 percent are in the manufacturing sector.

Despite the strong job growth in 2021, uncertainty around federal policy cast a pall over the industry and job growth at the beginning of 2022. New clean energy project installations declined by 55 percent in the second quarter of 2022 alone, according to the American Clean Power Association,² putting future job growth at risk.

However, with promising climate and clean energy investments and tax credits moving again in Congress in the summer, and the Biden administration stepping up its efforts to expand clean energy and cut carbon pollution, the second half of 2022 was looking brighter for continued strong growth in clean energy jobs.

KEY FINDINGS

3.2M

AMERICANS
WORKED IN CLEAN
ENERGY IN 2021

50%

OF NEW ENERGY
JOBS WERE IN
CLEAN ENERGY

26%

GROWTH IN CLEAN
TRANSPORTATION
JOBS

1.5M

CONSTRUCTION
JOBS SUPPORTED BY
CLEAN ENERGY

3.5X

CLEAN ENERGY NOW
EMPLOYS 3.5 TIMES
MORE AMERICANS
THAN FOSSIL FUELS
NATIONWIDE



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// RENEWABLE ENERGY

Jobs grew across the board in solar, wind and geothermal as [clean energy continues to be the cheapest power available](#) to utilities in most parts of the country. The solar industry added more than 17,200 jobs (up 5.4 percent) while wind energy added 3,350 new jobs (up about 3 percent). In all, about 515,250 Americans worked in solar, wind, geothermal and small hydroelectric projects, according to the analysis.



// ENERGY EFFICIENCY

Energy efficiency remained the single-biggest employer across the entire energy sector, employing nearly 2.2 million Americans. Energy efficiency includes manufacturing jobs making products such as ENERGY STAR appliances, high-efficiency heating, air conditioning and ventilation (HVAC) equipment and LED lighting; technical and trade jobs installing and servicing energy efficient products; and construction jobs upgrading building envelopes and insulation.

Energy efficiency jobs grew by nearly 58,000 in 2021 (up 3 percent), with jobs in renewable heating and cooling leading the way.



// STORAGE AND GRID MODERNIZATION

As energy storage continues to become an integral part of any new renewable energy project, and as battery technology continues to improve and prices continue to fall, jobs continue to grow.

In 2021, battery and energy storage companies added nearly 3,000 jobs, up more than 4 percent from the previous year. Jobs making our power grids more resilient and able to handle more renewable energy grew by about 5 percent, with smart grid-related companies adding more than 1,100 jobs last year.



// CLEAN VEHICLES

The big story in 2021 was around clean vehicles.

Electric vehicle makers added about 22,000 jobs (up 26 percent) with even faster growth projected to come. In addition to jobs making fully electric vehicles, automakers added additional 14,800 jobs (up 31 percent) in plug-in hybrid vehicle manufacturing, while an additional 23,600 jobs (up 20 percent) were added in traditional hybrid vehicle manufacturing.

The growth in clean transportation jobs came in a year that global electric vehicle sales [doubled to a record 6.6 million vehicles](#). Automakers rolled out dozens of new electric vehicles in 2021, and [interest continues to soar in 2022](#) as gasoline prices hit new highs, topping \$7 a gallon in some states.



// FOSSIL FUELS AND NUCLEAR

Conversely, jobs in coal, petroleum and nuclear continue to decline, according to Energy Department data, with coal jobs falling 12 percent and petroleum jobs sinking 6 percent as the costs of those fuels continued to rise for utilities and consumers alike. Nuclear energy jobs fell by more than 4 percent as the only major nuclear project under construction in America, at Georgia's Plant Vogtle, continued to struggle with delays and cost overruns that are expected to double [the project's price tag, to more than \\$30 billion](#).

Fig. 1 // U.S. CLEAN ENERGY EMPLOYMENT by sector 2021

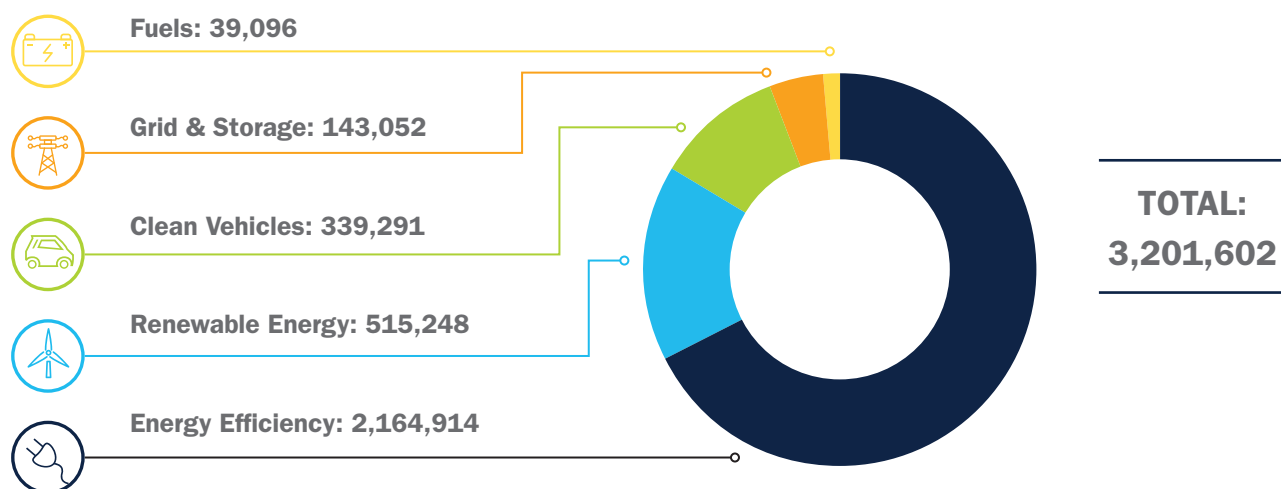


Fig. 2 // U.S. CLEAN ENERGY EMPLOYMENT by subsector 2021

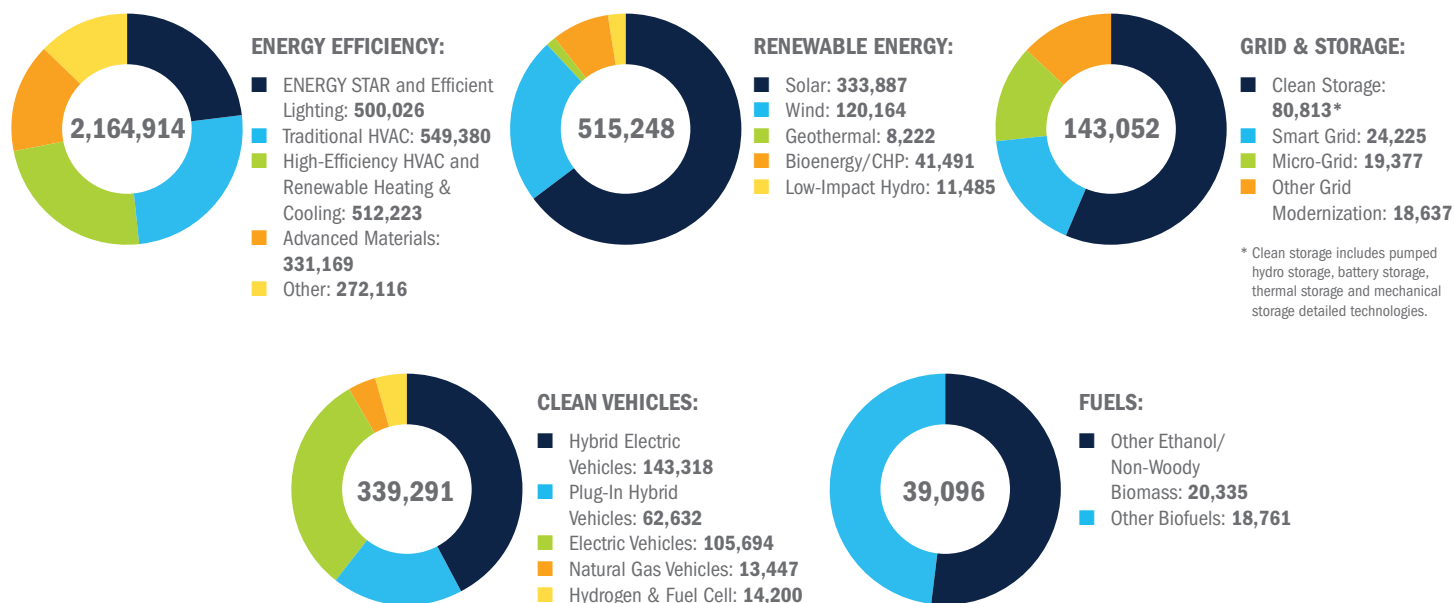


Fig. 3 // U.S. CLEAN ENERGY EMPLOYMENT by value chain 2021

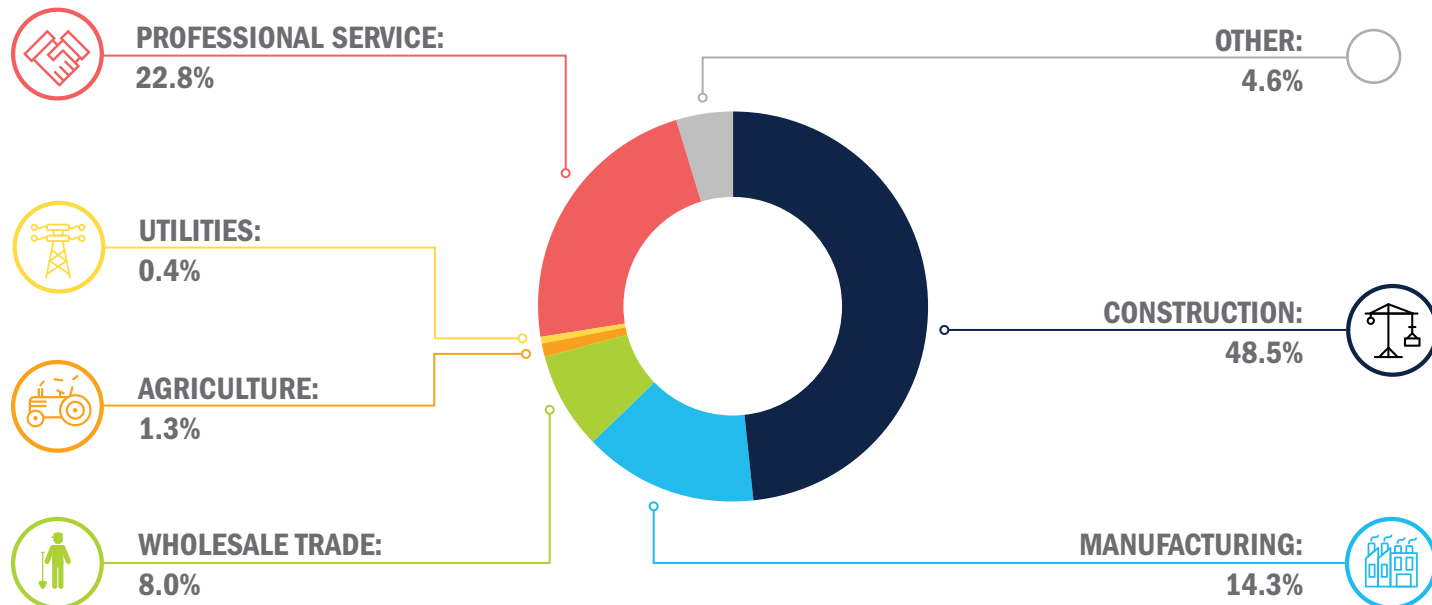
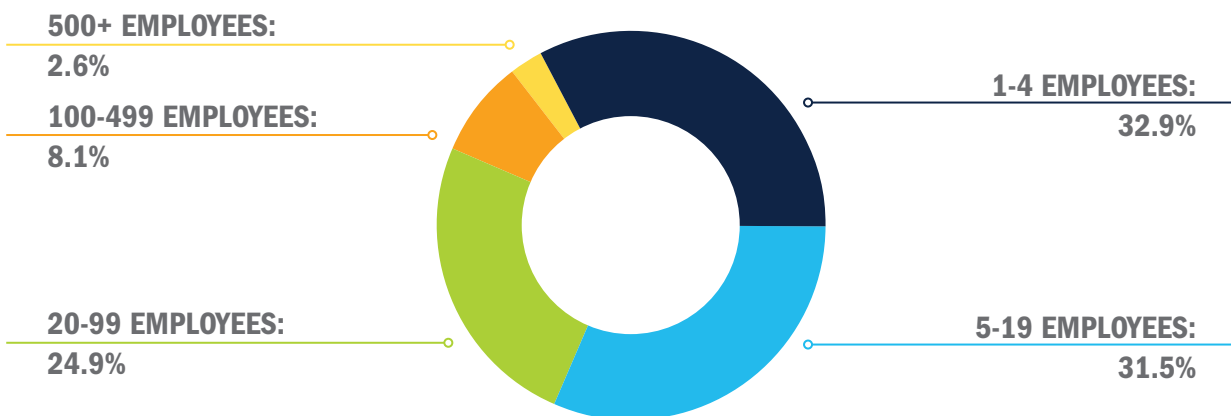


Fig. 4 // U.S. CLEAN ENERGY EMPLOYMENT by business size 2021



What we include are jobs in solar energy, wind energy, combined heat and power, bioenergy, non-woody biomass, low-impact hydro power, geothermal, clean vehicle technologies, clean energy storage, smart grid, micro grid, grid modernization, advanced biofuels, and energy efficiency including ENERGY STAR and high-efficiency appliances, efficient lighting, HVAC, renewable heating and cooling, and advanced building materials. The clean energy occupations covered in this report span economic sectors including construction, manufacturing, wholesale trade, transmission and distribution, and professional services.

What we do not include are jobs of workers who may spend some of their time in clean energy but a plurality in another energy sector. For example, workers employed by an excavation business might spend the majority of their time grading and preparing drilling pads for oil or gas rigs, but they also might spend a portion of their time preparing sites for wind turbines or large solar installations. If clean energy does not account for a plurality of their work, those workers would not be counted as being employed in the clean energy economy but would instead be counted as part of another energy sector. We also do not include jobs in corn ethanol, woody biomass, large hydropower, and nuclear because of environmental issues associated with those industries. Jobs in retail trade, repair services, water or waste management, and indirect employment or induced employment are not included.

Clean Energy's Rapid Growth Returns

After a rough 2020, clean energy returned to being one of the fastest-growing job sectors in the country—accounting for half of all new jobs in America's energy sector in 2021 (156,000 out of 300,000).

In 2021, every clean energy subsector added jobs, with the entire sector growing 5 percent overall. And the surge has been steady for a while now. In fact, from June 2020 to the end of 2021, jobs in every single sector increased at least 11 percent with employment in clean vehicles increasing over 50 percent—adding more than 100,000 jobs in those 18 months.

Fig. 5 // U.S. CLEAN ENERGY EMPLOYMENT
by year 2017–2021

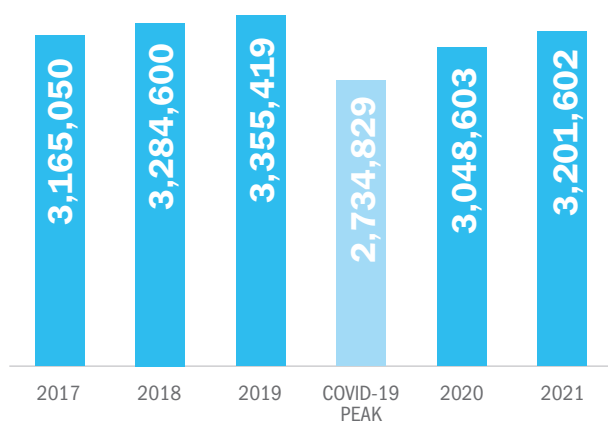


Fig. 6 // U.S. CLEAN ENERGY EMPLOYMENT GROWTH
by fastest-growing sector,
June 2020 – December 2021

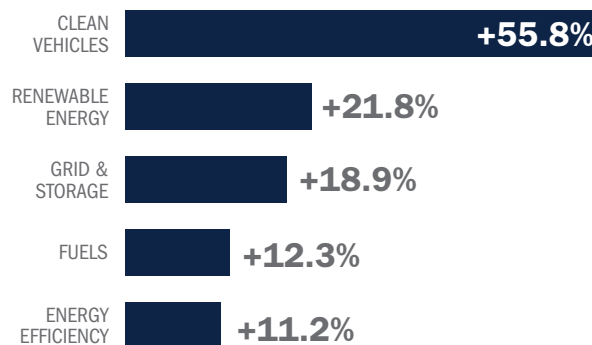


Fig. 7 // U.S. EMPLOYMENT GROWTH 2017-2021³

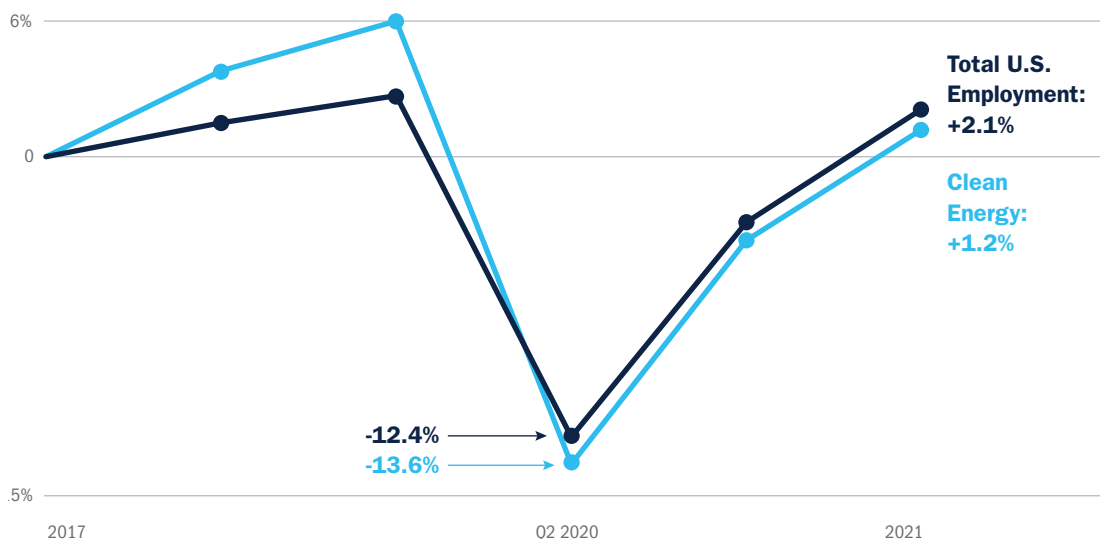
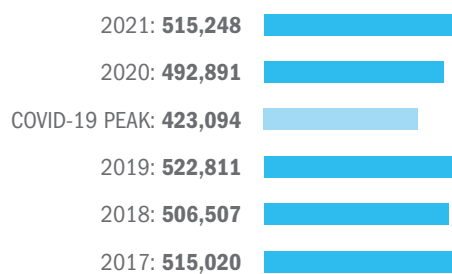


Fig. 8 // U.S. CLEAN ENERGY EMPLOYMENT by sector 2017–2021

ENERGY EFFICIENCY:



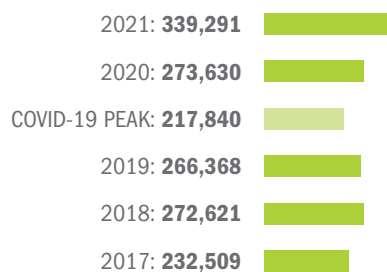
RENEWABLE ENERGY:



GRID & STORAGE:



CLEAN VEHICLES:



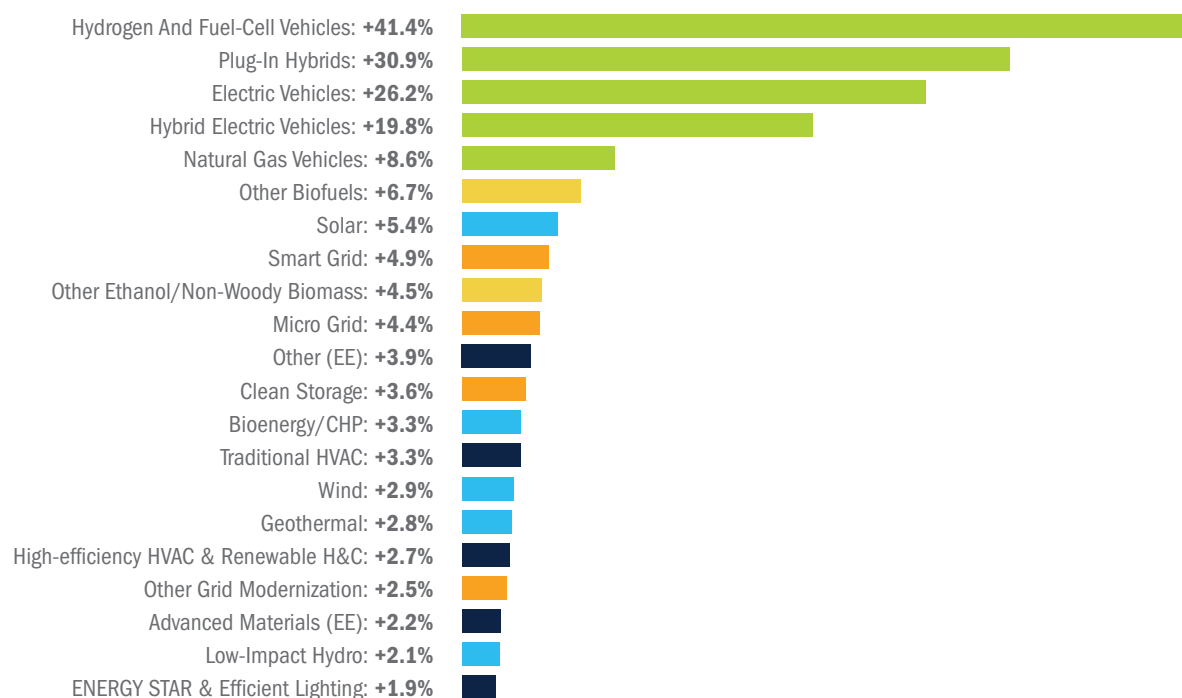
CLEAN FUELS:



Table 1 // U.S. CLEAN ENERGY EMPLOYMENT by subsector 2017–2021

Sector	2021	2020	2019	2018	2017
Solar	333,887	316,675	345,393	334,992	350,291
Wind	120,164	116,817	114,774	111,166	107,444
Geothermal	8,222	8,002	8,794	8,526	7,929
Bioenergy/CHP	41,491	40,146	41,546	40,245	37,825
Low-Impact Hydro	11,485	11,251	12,304	11,578	11,531
Clean Storage	80,813	78,040	79,699	76,339	66,874
Smart Grid	24,225	23,089	25,631	25,153	24,586
Micro Grid	19,377	18,556	22,192	21,559	20,275
Other Grid Modernization	18,637	18,187	20,122	18,857	18,482
ENERGY STAR & Efficient Lighting	500,026	490,717	552,435	538,390	511,933
Traditional HVAC	549,380	531,640	598,375	582,108	558,576
High-efficiency HVAC & Renewable H&C	512,223	498,863	566,290	556,399	537,475
Advance Materials	331,169	324,060	366,608	357,765	350,918
Other (Energy Efficiency)	272,116	261,894	295,185	290,203	289,622
Other Ethanol / Non-Woody Biomass	20,335	19,455	20,694	20,074	20,083
Other Biofuels	18,761	17,581	19,009	18,625	18,695
Hybrid Electric Vehicles	143,318	119,638	113,449	110,984	99,871
Plug-in Hybrid Vehicles	62,632	47,842	51,619	53,221	40,308
Electric Vehicles	105,694	83,733	77,667	86,076	69,250
Natural Gas Vehicles	13,447	12,377	12,878	12,545	12,338
Hydrogen/Fuel-Cell Vehicles	14,200	10,040	10,755	9,795	12,338

Fig. 9 // U.S. CLEAN ENERGY EMPLOYMENT GROWTH by fastest-growing subsector 2020–2021



Clean Energy Jobs By State

Every state saw an increase in clean energy occupations with California continuing to lead the nation in overall clean energy jobs with more than 505,000 (up 4 percent). [Texas, which led the country in solar and wind energy projects in 2021](#), followed with 239,000 jobs (up 7 percent). New York, [which passed the most ambitious climate policies in the country in 2019](#) and in 2021 made major announcements in offshore wind and building efficiency, remains third in the country with 160,600 jobs (up 5 percent).

Vermont led all states with the highest percentage of clean energy jobs with clean energy supporting more than 5 percent of all employed workers. Massachusetts, Wyoming, Maryland, and Rhode Island all finished with clean energy accounting for more than 3 percent of all jobs. Across the entire U.S., clean energy employed 2.1 percent of all workers.

States that recently passed major climate and clean energy legislation benefited from dramatic growth, reinforcing the fact that smart policies create good jobs. New Mexico, for instance, saw an 8 percent jump in clean energy jobs after passing sweeping clean energy legislation in 2020-2021. Fifteen states saw their clean energy jobs grow more than 6 percent.

Texas and Kentucky also saw a nearly 7 percent increase in clean energy jobs, in part because electric vehicle manufacturers and suppliers moved or expanded operations there. Similarly, Tennessee saw a 6.5 percent increase, while Florida's clean energy jobs grew by about 6 percent. Federal investments in clean energy would spur additional job creation across the country.

Fig. 10 // U.S. EMPLOYMENT by clean energy workers per 1,000 jobs⁴

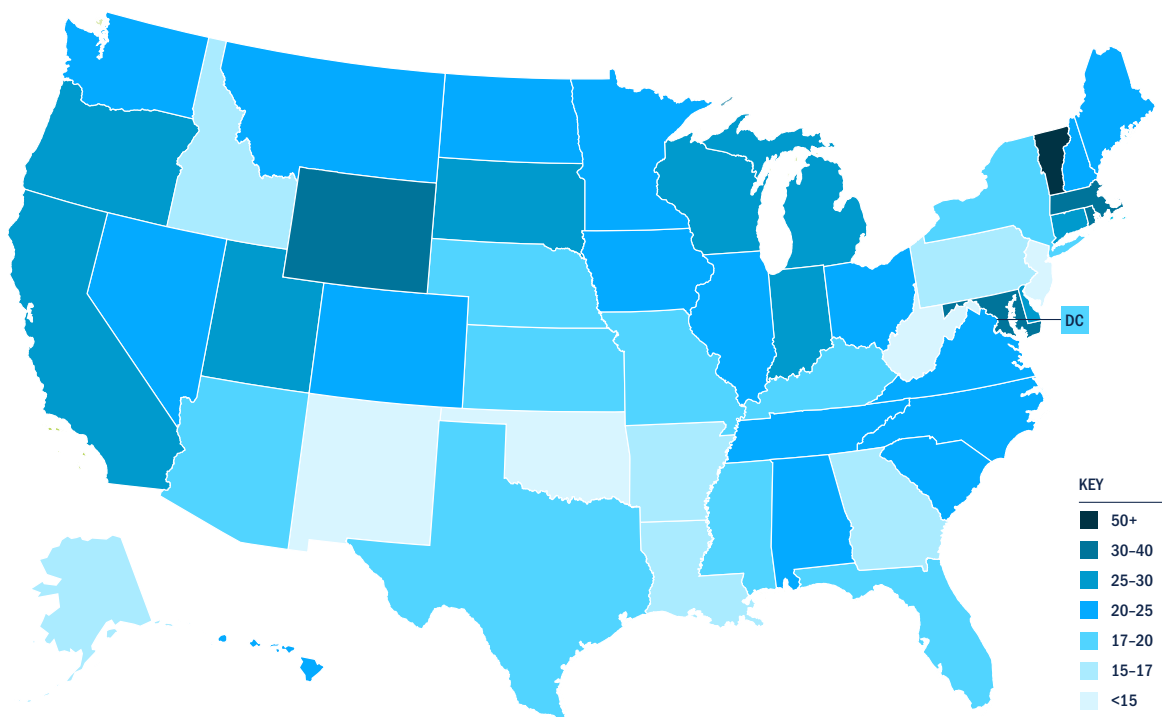


Table 2 // U.S. CLEAN ENERGY EMPLOYMENT by state 2021

Rank	State	Total Clean Energy Jobs	Share of Statewide Workforce	Renewable Energy	Energy Efficiency	Grid & Storage	Clean Fuels	Clean Vehicles	Growth
1	California	505,083	2.9%	132,783	289,788	23,019	5,832	53,661	4.1%
2	Texas	238,884	1.8%	41,560	158,882	13,018	2,191	23,232	6.9%
3	New York	160,642	1.7%	19,429	123,921	4,273	1,725	11,294	4.9%
4	Florida	158,467	1.7%	24,798	114,079	5,323	2,794	11,472	5.9%
5	Illinois	120,775	2.1%	18,095	82,592	4,904	1,517	13,668	4.9%
6	Michigan	119,853	2.8%	11,384	74,624	3,709	652	29,484	5.6%
7	Massachusetts	113,409	3.2%	20,919	79,173	6,588	655	6,074	4.1%
8	Ohio	110,272	2.1%	10,287	74,966	2,955	1,302	20,762	6.6%
9	North Carolina	103,854	2.2%	12,030	78,018	3,531	1,488	8,787	4.2%
10	Pennsylvania	92,773	1.6%	10,466	67,782	3,727	1,326	9,473	6.3%
11	Virginia	92,315	2.4%	9,530	73,119	2,490	345	6,831	4.5%
12	Indiana	86,215	2.8%	11,435	49,959	2,972	770	21,078	6.9%
13	Maryland	80,025	3.0%	8,354	66,167	2,017	214	3,272	2.8%
14	Tennessee	77,685	2.5%	6,043	49,076	7,982	1,200	13,384	6.5%
15	Washington	76,905	2.2%	9,967	57,791	3,480	1,744	3,921	1.6%
16	Georgia	75,211	1.6%	9,800	53,294	4,046	437	7,633	5.8%
17	Wisconsin	71,370	2.5%	6,529	56,241	2,186	377	6,037	2.9%
18	Colorado	61,179	2.2%	17,625	34,205	3,044	1,987	4,318	5.2%
19	Arizona	59,383	1.9%	11,497	41,271	2,280	353	3,981	5.1%
20	Minnesota	57,931	2.1%	8,270	42,218	2,764	684	3,994	4.7%
21	Missouri	54,397	1.9%	5,497	38,689	1,880	900	7,430	5.5%
22	Oregon	53,869	2.8%	7,546	38,847	3,472	747	3,257	3.3%
23	New Jersey	53,334	1.3%	11,401	34,585	1,738	404	5,206	6.5%
24	South Carolina	44,011	2.0%	6,594	27,827	1,858	601	7,131	5.1%
25	Utah	43,452	2.7%	8,234	30,947	1,102	124	3,045	4.7%
26	Alabama	41,984	2.1%	3,821	28,374	1,794	221	7,773	6.3%
27	Connecticut	41,458	2.5%	3,638	34,106	798	351	2,565	3.9%
28	Kentucky	35,437	1.8%	2,391	22,707	1,308	282	8,749	6.9%
29	Nevada	32,378	2.3%	10,030	11,404	9,151	129	1,664	3.8%
30	Iowa	30,393	2.0%	5,682	18,864	1,384	870	3,594	5.0%
31	Louisiana	28,094	1.5%	4,440	20,047	1,504	253	1,850	6.4%
32	Kansas	23,821	1.7%	3,679	16,394	1,051	294	2,403	5.5%
33	Oklahoma	21,602	1.3%	3,433	13,415	1,505	820	2,430	7.3%
34	Mississippi	20,018	1.7%	1,603	14,032	776	511	3,097	6.8%
35	Arkansas	19,965	1.6%	1,788	14,420	808	569	2,381	6.2%
36	Nebraska	18,822	1.9%	3,119	12,868	512	208	2,115	5.5%
37	New Hampshire	15,915	2.4%	3,278	11,096	309	134	1,098	3.9%
38	Vermont	15,668	5.2%	2,209	10,139	929	664	1,727	2.8%
39	Rhode Island	14,309	3.0%	2,156	10,863	578	278	434	3.1%
40	District of Col.	14,244	1.9%	2,096	11,501	302	29	316	4.9%

Table 2 // U.S. CLEAN ENERGY EMPLOYMENT by state 2021 (continued)

Rank	State	Total Clean Energy Jobs	Share of Statewide Workforce	Renewable Energy	Energy Efficiency	Grid & Storage	Clean Fuels	Clean Vehicles	Growth
41	Idaho	13,409	1.7%	2,000	8,684	1,109	266	1,350	6.9%
42	Hawaii	12,873	2.1%	4,714	5,326	526	1,875	432	2.6%
43	Maine	12,493	2.0%	2,560	8,328	479	212	915	4.8%
44	Delaware	12,268	2.7%	772	10,733	218	77	468	2.4%
45	New Mexico	12,014	1.5%	4,507	5,712	715	125	956	8.1%
46	South Dakota	11,860	2.7%	2,743	7,266	452	197	1,201	4.0%
47	Montana	9,898	2.0%	539	8,136	415	52	757	4.6%
48	West Virginia	9,540	1.4%	1,070	6,509	810	36	1,115	6.0%
49	North Dakota	8,614	2.1%	2,177	4,944	511	158	824	4.3%
50	Wyoming	8,226	3.1%	377	6,929	441	83	397	2.3%
51	Alaska	5,006	1.7%	350	4,056	307	36	257	3.3%

Methodology

The analysis is based on employment data collected and analyzed by the BW Research Partnership for the 2022 U.S. Energy and Employment Report (USEER). The USEER analyzes data from the U.S. Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) to track employment across many energy production, transmission and distribution subsectors. In addition, the 2022 USEER relies on a unique supplemental survey of 33,000 business representatives across the United States.

Created and conducted by BW Research, the methodology has been approved by the Office of Management and Budget (OMB) and U.S. Department of Energy (DOE). This survey is used to identify energy-related employment within key subsectors of the broader industries as classified by the BLS and to assign them into their component energy and energy efficiency sectors.

About This Report

This is the seventh annual Clean Jobs America report produced by E2 based on analysis of the USEER, which was first released by the DOE in 2016. E2 was an original proponent of the DOE producing the USEER, and was a partner on the reports produced by the Energy Futures Initiative (EFI) and National Association of State Energy Officials (NASEO) after the Trump administration abandoned it in 2017.

For additional insight into E2's Clean Jobs America 2022 or our other annual Clean Jobs America reports, visit www.e2.org/reports.

An FAQ is available at www.e2.org/reports/clean-jobs-america-faq.

About E2

E2 is a national, nonpartisan group of business leaders, investors and others who advocate for smart policies that are good for the environment and good for the economy.

ENDNOTES

- 1 Unless otherwise stated, all data is from the 2021 U.S. Energy and Employment Report (USEER), April 2021, Department of Energy (DOE). All employment findings in USEER is based on survey and data analysis collected from Q4 2019 prior to any onset of the COVID-19 crisis. See Pages 201-206 for methodology questions.
- 2 <https://cleanpower.org/news/clean-energy-deployment-slowed-substantially-in-q2-as-policy-inaction-and-economic-uncertainty-imperils-energy-transition>.
- 3 Quarterly Census of Employment and Wages, Third Quarter 2020. Available at https://data.bls.gov/cew/apps/data_views/data_views.htm#tab=Tables.
- 4 Quarterly Census of Employment and Wages, Third Quarter 2020. Available at https://data.bls.gov/cew/apps/data_views/data_views.htm#tab=Tables.



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**Good for the Economy.
Good for the Environment.**