# Clean Jobs California 2024



## CALIFORNIA CLEAN ENERGY JOBS GROW 4.1%; POISED FOR CONTINUED GROWTH

**KEY FINDINGS**

**1st**
for most clean energy jobs in the U.S. with over **545,000 employed**

**21,622**
new clean energy jobs added last year

**2/3**
2 of the top 3 counties for clean energy jobs in the U.S. are in southern California

**4x**
Clean energy jobs are growing over 4 times faster than the rest of California's economy

**2.7%**
of clean energy jobs are outside metro areas

## SECTOR SUMMARY HIGHLIGHTS

**CLEAN ENERGY OVERALL:** California's clean energy workforce added 21,622 new workers in 2023, growing 4.1 percent and adding jobs at a much faster rate than the state's overall employment, which grew by only 0.2 percent. The state ranked 1st for largest clean energy workforce nationally for 2023, with 544,604 clean energy jobs in total. The bulk of the workforce were in construction and professional services industries. In 2023, there were seven times more clean energy than fossil fuel jobs in California. Two counties are in the top three list for most clean energy jobs in the nation: Los Angeles (101,437 jobs) and Orange (58,520 jobs), and five California counties are in the top ten.

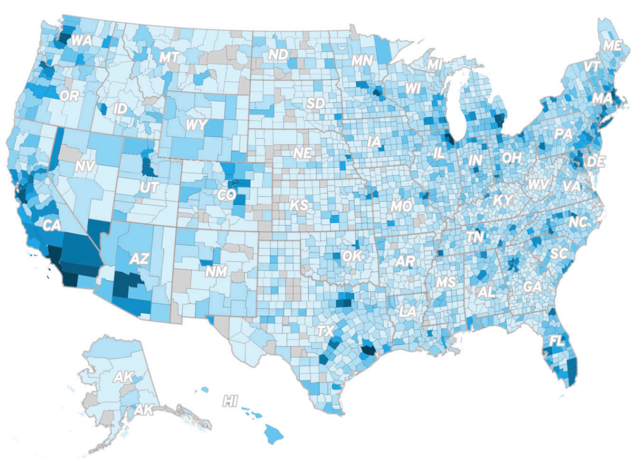
**RENEWABLE GENERATION:** Renewable generation grew 2.6 percent in 2023, bringing California's renewable generation workforce to 136,591 individuals–the largest in the country. Solar and wind account for the majority of the sector's workforce with 117,946 jobs and 8,132 jobs respectively.

**ENERGY EFFICIENCY:** Energy efficiency is California's largest clean energy sector with 302,176 workers. The sector grew 2.6 percent in 2023.

**STORAGE AND GRID MODERNIZATION:** Jobs in battery, storage, and grid modernization grew 4.1 percent in 2023, making the sector the second fastest growing clean energy sector in the state behind clean vehicles. California's storage and grid modernization workforce totaled 24,940 in 2023–by far the largest in the nation.

**CLEAN VEHICLES:** The clean vehicles sector has the fastest growing workforce in California's clean energy industry, growing 14.3 percent in 2023 to employ a total of 74,923 workers. The sector grew much faster than the gas/diesel vehicles sector in California, which shrunk by -0.62 percent in 2023.

**CLEAN FUELS:** California's clean fuels workforce makes up the smallest clean energy sector in the state with 5,974 total jobs. Despite being the smallest clean energy sector, jobs in clean fuels grew at a rate of 1.6 percent in California.




## EXPLORE THE DATA FURTHER

Dive deeper into clean jobs data at www.cleanjobsamerica.e2.org to explore the latest state and county clean energy employment data across the entire U.S., including national and statewide rankings by total clean energy jobs, jobs per capita, and employment growth.

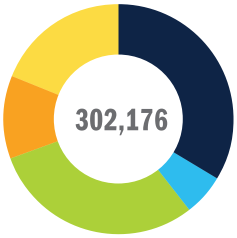
For information on methodology and this report's analysis—including what technologies and sectors are counted as clean energy, what jobs are not counted, definitions of clean energy sectors and subsectors, and more—visit www.cleanjobsamerica.e2.org.

WWW.E2.ORG
@E2ORG
#CLEANJOBSAMERICA
CLEANJOBSAMERICA.E2.ORG

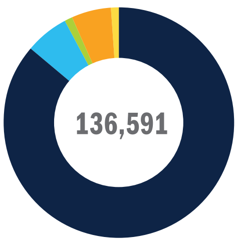
DECEMBER 2024
E2FS: 24-11-B

# CALIFORNIA CLEAN ENERGY ECONOMY—AT A GLANCE

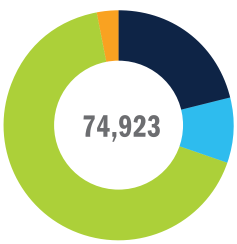
## FIG 1 // CALIFORNIA CLEAN ENERGY EMPLOYMENT by sectors



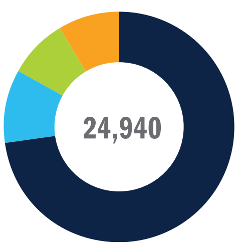

### ENERGY EFFICIENCY:
- ENERGY STAR and Efficient Lighting: **68,127**
- Traditional HVAC: **111,955**
- High-Efficiency HVAC and Renewable Heating & Cooling: **60,780**
- Advanced Materials: **23,432**
- Other: **37,884**




### RENEWABLE GENERATION:
- Solar: **117,946**
- Wind: **8,132**
- Geothermal: **1,734**
- Bioenergy/CHP: **7,387**
- Low-Impact Hydro: **1,393**

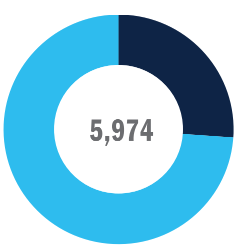



### CLEAN VEHICLES:
- Hybrid Electric Vehicles: **16,014**
- Plug-In Hybrid Vehicles: **6,716**
- Electric Vehicles: **50,085**
- Hydrogen & Fuel Cell: **2,107**



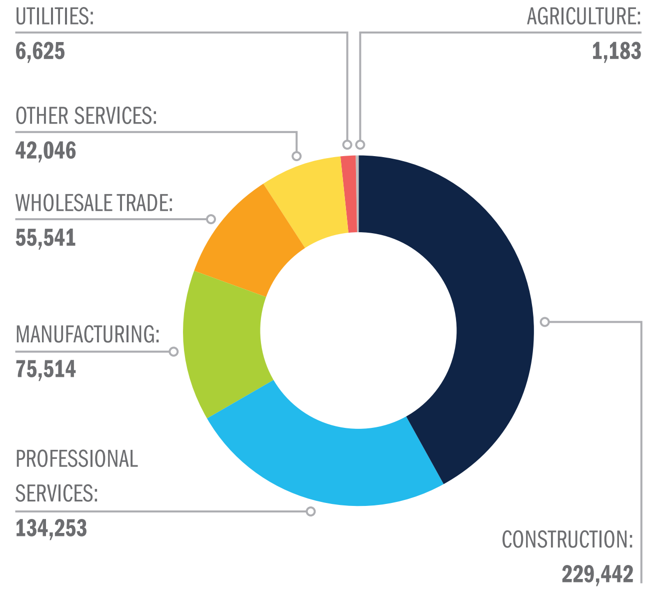

### GRID & STORAGE:
- Clean Storage:* **18,062**
- Smart Grid: **2,618**
- Micro-Grid: **2,126**
- Other Grid Modernization: **2,135**

* includes pumped hydro storage, battery storage, thermal storage, and mechanical storage detailed technologies

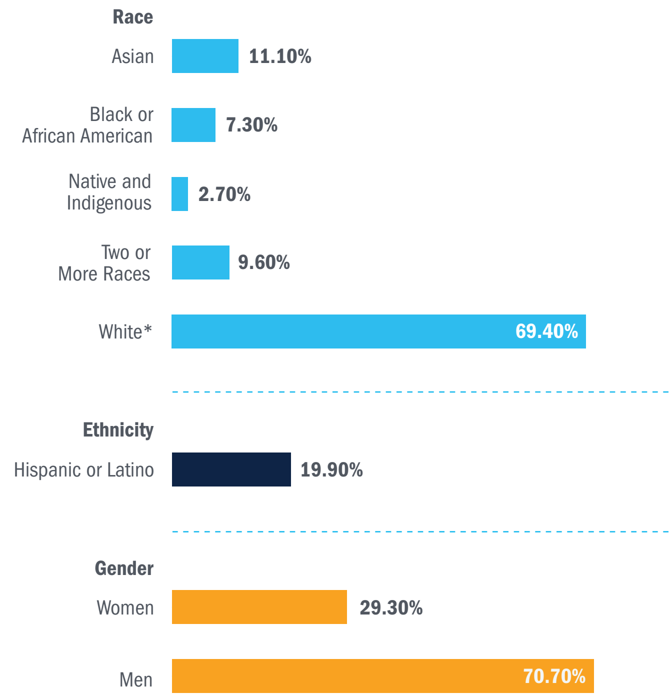



### FUELS:
- Other Ethanol/Non-Woody Biomass: **1,572**
- Other Biofuels: **4,401**

## FIG 2 // CALIFORNIA CLEAN ENERGY EMPLOYMENT by value chain

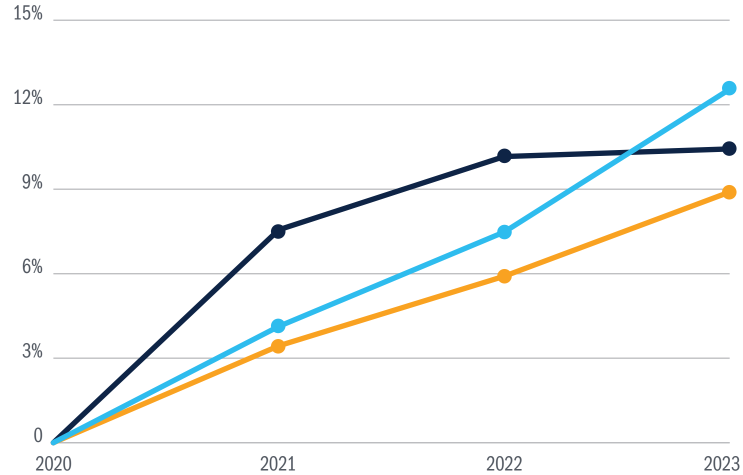



## FIG 3 // CALIFORNIA CLEAN ENERGY EMPLOYMENT by demographics[2]



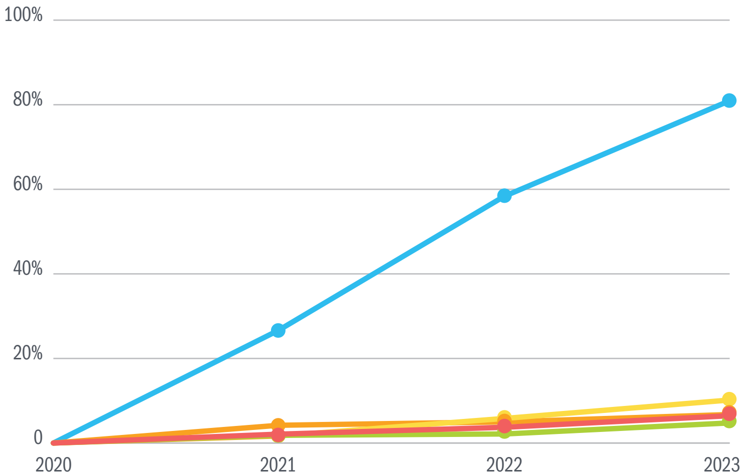

* Includes non-Hispanic and Hispanic whites

## FIG 4 // CALIFORNIA ENERGY EMPLOYMENT by industry growth




| | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| **California Clean Energy Employment** | | | | |
| | 483,886 | 503,880 | 522,982 | 544,604 |
| **Overall California Employment** | | | | |
| | 16,401,290 | 17,641,250 | 18,066,913 | 18,111,429 |
| **Overall California Energy Employment** | | | | |
| | 856,109 | 885,539 | 909,876 | 932,273 |

## FIG 5 // CALIFORNIA ENERGY EMPLOYMENT by clean energy sector employment growth




| | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| **Energy Efficiency** | | | | |
| | 283,839 | 289,788 | 294,396 | 302,176 |
| **Renewable Generation** | | | | |
| | 130,403 | 132,783 | 133,188 | 136,591 |
| **Storage/Grid** | | | | |
| | 22,638 | 23,019 | 23,954 | 24,940 |
| **Clean Fuels** | | | | |
| | 5,597 | 5,832 | 5,877 | 5,974 |
| **Clean Vehicles** | | | | |
| | 41,408 | 52,459 | 65,567 | 74,923 |

# POLICIES MATTER

To maintain California's global leadership in climate-tech innovation and jobs in the clean energy economy, the state must continue to pass policies to reach our carbon neutrality goals. California must advance sector-specific policies to further decarbonize our economy.

We need state policy leadership that includes responsible port development to stage offshore wind, efforts to strengthen and extend the state's cap & trade program, continue to decarbonize our buildings and industrial sectors, and accelerate the transition away from fossil fuels to clean electricity and transportation. California also needs to manage electricity costs to ensure electrification remains the most cost-effective clean energy solution. Affordability solutions include enabling greater energy sharing across the West and improving oversight of Investor-Owned Utilities' wildfire prevention spending.

The state must continue to leverage federal funding through the Inflation Reduction Act and Bipartisan Infrastructure Law to drive greater deployment of charging infrastructure, clean vehicles, and clean energy solutions that benefit disadvantaged communities, as outlined in the Justice40 Initiative.

# CALIFORNIA CLEAN ENERGY ECONOMY—APPENDIX

## Table 1 // CALIFORNIA CLEAN ENERGY EMPLOYMENT by metro

| Metro Area | Total Clean Energy | Renewable Gen. | Storage/Grid | Clean Fuels | Energy Efficiency | Clean Vehicles |
|---|---|---|---|---|---|---|
| Bakersfield, CA | **9,112** | 3,203 | 331 | 247 | 3,943 | 1,388 |
| Chico, CA | **2,053** | 659 | 36 | 45 | 1,053 | 259 |
| El Centro, CA | **1,374** | 567 | 23 | 199 | 425 | 161 |
| Fresno, CA | **9,189** | 1,866 | 241 | 195 | 4,886 | 2,000 |
| Hanford-Corcoran, CA | **459** | 52 | 12 | 24 | 245 | 126 |
| Los Angeles-Long Beach-Anaheim, CA | **159,957** | 26,271 | 9,403 | 617 | 98,783 | 24,884 |
| Madera, CA | **819** | 111 | 11 | 32 | 510 | 154 |
| Merced, CA | **1,290** | 328 | 18 | 80 | 553 | 311 |
| Modesto, CA | **4,517** | 523 | 117 | 490 | 2,513 | 874 |
| Napa, CA | **1,411** | 139 | 34 | 32 | 1,066 | 141 |
| Oxnard-Thousand Oaks-Ventura, CA | **8,702** | 1,306 | 274 | 258 | 5,561 | 1,304 |
| Redding, CA | **1,656** | 342 | 38 | <10 | 942 | 324 |
| Riverside-San Bernardino-Ontario, CA | **44,481** | 9,399 | 2,175 | 246 | 22,742 | 9,918 |
| Sacramento—Roseville—Arden-Arcade, CA | **35,748** | 12,290 | 908 | 1,028 | 17,316 | 4,207 |
| Salinas, CA | **3,129** | 614 | 56 | 279 | 1,700 | 481 |
| San Diego-Carlsbad, CA | **53,965** | 14,889 | 2,233 | 451 | 31,621 | 4,771 |
| San Francisco-Oakland-Hayward, CA | **106,509** | 34,592 | 4,065 | 342 | 53,176 | 14,334 |
| San Jose-Sunnyvale-Santa Clara, CA | **49,448** | 16,338 | 2,723 | 119 | 27,887 | 2,381 |
| San Luis Obispo-Paso Robles-Arroyo Grande, CA | **7,522** | 4,835 | 113 | 28 | 2,079 | 467 |
| Santa Cruz-Watsonville, CA | **2,531** | 455 | 78 | 105 | 1,350 | 543 |
| Santa Maria-Santa Barbara, CA | **4,705** | 694 | 143 | 151 | 3,186 | 530 |
| Santa Rosa, CA | **8,025** | 3,144 | 194 | 50 | 3,810 | 826 |
| Stockton-Lodi, CA | **6,613** | 1,193 | 584 | 352 | 2,910 | 1,574 |
| Vallejo-Fairfield, CA | **3,088** | 183 | 296 | 21 | 1,995 | 593 |
| Visalia-Porterville, CA | **2,981** | 388 | 56 | 383 | 1,541 | 613 |
| Yuba City, CA | **820** | 92 | 40 | 40 | 489 | 159 |

*Note:* An additional 14,500 clean energy jobs are found in rural or nonmetropolitan areas[3]

## Table 2 // CALIFORNIA CLEAN ENERGY EMPLOYMENT by county

| County Name | Total Clean Energy | Renewable Gen. | Storage/Grid | Clean Fuels | Energy Efficiency | Clean Vehicles | Workers Per 1K Jobs | Job Growth |
|---|---|---|---|---|---|---|---|---|
| Alameda County | **37,777** | 9,059 | 1,564 | 92 | 16,293 | 10,769 | 23.6 | 5.30% |
| Alpine County | **16** | 13 | <10 | <10 | <10 | <10 | 8 | 8.90% |
| Amador County | **201** | 42 | <10 | <10 | 110 | 44 | 8.1 | 5.20% |
| Butte County | **2,053** | 659 | 36 | 45 | 1,053 | 259 | 13.1 | 2.90% |
| Calaveras County | **233** | 31 | <10 | <10 | 167 | 30 | 11.5 | 3.30% |
| Colusa County | **87** | 12 | <10 | 24 | 32 | 18 | 4.7 | -0.40% |
| Contra Costa County | **15,644** | 5,449 | 463 | 112 | 8,301 | 1,319 | 21 | 1.50% |
| Del Norte County | **115** | 10 | <10 | <10 | 89 | 13 | 7.2 | 2.10% |
| El Dorado County | **1,735** | 288 | 68 | <10 | 1,052 | 322 | 14.9 | 11.80% |
| Fresno County | **9,189** | 1,866 | 241 | 195 | 4,886 | 2,000 | 10.9 | 3.50% |
| Glenn County | **109** | 14 | <10 | 14 | 58 | 19 | 5.7 | 1.20% |
| Humboldt County | **924** | 162 | 18 | <10 | 567 | 171 | 9.1 | 2.90% |
| Imperial County | **1,374** | 567 | 23 | 199 | 425 | 161 | 10.6 | 8.80% |
| Inyo County | **201** | 117 | <10 | <10 | 56 | 27 | 13.1 | -4.20% |
| Kern County | **9,112** | 3,203 | 331 | 247 | 3,943 | 1,388 | 13.3 | 5.60% |
| Kings County | **459** | 52 | 12 | 24 | 245 | 126 | 4.5 | 3.00% |
| Lake County | **500** | 308 | <10 | <10 | 144 | 40 | 15.2 | 10.80% |
| Lassen County | **101** | 19 | <10 | <10 | 51 | 22 | 5.6 | 2.40% |
| Los Angeles County | **101,437** | 14,953 | 5,741 | 381 | 63,130 | 17,231 | 11.2 | 3.70% |
| Madera County | **819** | 111 | 11 | 32 | 510 | 154 | 7.3 | 2.30% |
| Marin County | **4,263** | 1,215 | 172 | <10 | 2,454 | 414 | 19 | 3.70% |
| Mariposa County | **77** | 24 | <10 | <10 | 44 | <10 | 6.7 | 6.90% |
| Mendocino County | **598** | 161 | 10 | 12 | 325 | 90 | 9.4 | 3.90% |
| Merced County | **1,290** | 328 | 18 | 80 | 553 | 311 | 7.8 | 13.10% |
| Modoc County | **41** | <10 | <10 | <10 | 20 | <10 | 7.8 | 1.30% |
| Mono County | **102** | 12 | <10 | <10 | 87 | <10 | 6.3 | 1.10% |
| Monterey County | **3,129** | 614 | 56 | 279 | 1,700 | 481 | 8.8 | 1.80% |
| Napa County | **1,411** | 139 | 34 | 32 | 1,066 | 141 | 9.4 | 2.10% |
| Nevada County | **1,063** | 191 | 24 | <10 | 686 | 161 | 15.2 | 3.60% |
| Orange County | **58,520** | 11,317 | 3,662 | 236 | 35,653 | 7,652 | 17.6 | 3.50% |
| Placer County | **6,666** | 2,138 | 171 | <10 | 3,532 | 816 | 18 | 3.20% |
| Plumas County | **151** | 45 | <10 | <10 | 88 | 14 | 12.3 | 10.10% |
| Riverside County | **26,796** | 7,153 | 1,296 | 191 | 13,498 | 4,657 | 16.2 | 3.60% |
| Sacramento County | **20,261** | 4,691 | 551 | 980 | 11,511 | 2,527 | 14.1 | 5.30% |
| San Benito County | **379** | 18 | <10 | 12 | 289 | 51 | 11.2 | 2.10% |
| San Bernardino County | **17,685** | 2,246 | 879 | 55 | 9,244 | 5,261 | 10.3 | 5.80% |
| San Diego County | **53,965** | 14,889 | 2,233 | 451 | 31,621 | 4,771 | 17.5 | 6.80% |
| San Francisco County | **36,133** | 16,552 | 1,227 | 90 | 17,677 | 587 | 25.1 | 2.10% |
| San Joaquin County | **6,613** | 1,193 | 584 | 352 | 2,910 | 1,574 | 11.6 | 13.60% |
| San Luis Obispo County | **7,522** | 4,835 | 113 | 28 | 2,079 | 467 | 31.7 | 7.80% |
| San Mateo County | **12,692** | 2,316 | 639 | 39 | 8,451 | 1,247 | 15 | 2.10% |
| Santa Barbara County | **4,705** | 694 | 143 | 151 | 3,186 | 530 | 11.2 | 4.50% |
| Santa Clara County | **49,069** | 16,320 | 2,714 | 107 | 27,598 | 2,330 | 21.8 | 2.90% |

| County Name | Total Clean Energy | Renewable Gen. | Storage/Grid | Clean Fuels | Energy Efficiency | Clean Vehicles | Workers Per 1K Jobs | Job Growth |
|---|---|---|---|---|---|---|---|---|
| Santa Cruz County | **2,531** | 455 | 78 | 105 | 1,350 | 543 | 12.5 | 2.00% |
| Shasta County | **1,656** | 342 | 38 | <10 | 942 | 324 | 12 | 7.90% |
| Sierra County | **12** | <10 | <10 | <10 | <10 | <10 | 10.5 | -0.50% |
| Siskiyou County | **264** | 70 | <10 | <10 | 149 | 33 | 9.7 | 15.60% |
| Solano County | **3,088** | 183 | 296 | 21 | 1,995 | 593 | 10.8 | 2.30% |
| Sonoma County | **8,025** | 3,144 | 194 | 50 | 3,810 | 826 | 19.4 | 2.10% |
| Stanislaus County | **4,517** | 523 | 117 | 490 | 2,513 | 874 | 11.5 | 3.60% |
| Sutter County | **559** | 35 | 34 | 34 | 328 | 128 | 8.7 | 2.30% |
| Tehama County | **242** | 50 | 22 | 12 | 117 | 42 | 6 | 0.90% |
| Trinity County | **30** | 10 | <10 | <10 | 13 | <10 | 5.5 | 4.90% |
| Tulare County | **2,981** | 388 | 56 | 383 | 1,541 | 613 | 8.5 | 3.10% |
| Tuolumne County | **323** | 57 | 11 | <10 | 191 | 62 | 9.3 | 5.30% |
| Ventura County | **8,702** | 1,306 | 274 | 258 | 5,561 | 1,304 | 13.1 | 1.90% |
| Yolo County | **7,087** | 5,173 | 117 | 34 | 1,220 | 543 | 32.7 | 1.10% |
| Yuba County | **260** | 57 | <10 | <10 | 160 | 31 | 6.3 | 1.70% |
| N/A | **9,109** | 758 | 616 | 57 | 6,892 | 786 | 8.5 | 3.30% |

*Note:* 9,109 clean energy jobs are in an unknown or undefined county

1 Unless otherwise stated, all data is based on 2023 Q4 employment data and surveys collected and analyzed by the BW Research Partnership for the 2024 U.S. Energy and Employment Report (USEER), June 2024, Department of Energy (DOE). Employment data used in this analysis comes from the U.S. Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) and a nationwide employer survey of 34,200 business establishments administered in Q1 2024. See Pages 201-206 for methodology questions.

2 Information on the representation of people with disabilities, lesbian, gay, bisexual, transgender, intersex, and queer people, migrants, religious minorities, and different age demographics in clean energy is limited. Based on the available data from the Bureau of Labor Statistics (BLS) and the supplemental employer survey used by the USEER, this analysis was unable to produce any findings regarding those groups.

3 Rural clean energy jobs are calculated based on the Bureau of Labor Statistics' (BLS) nonmetropolitan area for every state, which is any area not designated as a metropolitan area by BLS. This is the most commonly used definition to analyze rural and small-town trends, and is available at https://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/what-is-rural. New Jersey, Rhode Island, and the District of Columbia contain no nonmetropolitan statistical areas.