

11TH ANNUAL

# NATIONAL SOLAR JOBS CENSUS 2020

MAY 2021



# About this Report

Since 2010, the National Solar Jobs Census has been the definitive measure of solar energy industry employment in the United States, charting the growth of the solar workforce alongside the rise of solar energy as a major contributor to the U.S. energy supply and economy as a whole.

The Census is a collaborative effort of the Solar Energy Industries Association, The Solar Foundation, and the Interstate Renewable Energy Council. Primary data collection and analysis is performed by BW Research Partnership, the premier independent energy employment research firm. Unless stated otherwise, all data included in this report is from BW Research Partnership.

This report tracks domestic solar employment across all solar industry market sectors and across the supply chain, from residential solar installation to utility-scale construction, and from raw materials to finished products.

Starting in 2015, the methods and data used to create the Census have been shared with the U.S. Energy and Employment Report (USEER) that tracks employment across all energy technologies.

In this report, a solar worker is defined as anyone who spends 50% or more of their time working on solar related activities. In the past, the USEER has used a broader definition that includes workers spending any amount of time on solar. Slide 18 includes a more detailed discussion of the differences between the two workforce accounting methods.

Interactive versions of the charts contained in this report, as well as underlying data, are available at [seia.org/census](http://seia.org/census).



# Key Findings

- The U.S. solar industry employed **231,474** workers in 2020, a **6.7%** drop from 2019
- Employment declined across all labor categories and in most states
- The pandemic was largely responsible for the job decline, as companies have yet to fully recover from spring 2020 work stoppages and the ensuing economic recession
- Despite job loss, the solar industry installed **record levels of solar capacity in 2020**, indicating increases of labor productivity ranging from 2% - 32% across market segments
- Labor productivity improvements were a result of growth in average system size, less labor-intensive customer acquisition and increased competition for skilled labor
- The industry **grew more diverse in 2020**, with workforce shares at all-time highs across most demographic measures of diversity
- **10.3% of solar workers are unionized**, above the national average and comparable with similar construction trades
- Wages for solar workers are similar to, or higher than, wages for U.S. workers in similar occupations
- While the solar industry is on a trajectory to reach **400,000 solar jobs by 2030**, employment will need to exceed **900,000 workers by 2035** to reach the 100% clean electricity goal set by President Biden



**The U.S. solar energy industry was on track for a record year in 2020 with both installations and employment expected to reach all-time highs. Installations were already up through February 2020 and initial impacts on the industry were limited to concerns about global supply chains until COVID-19 took hold in the U.S., triggering stay at home orders and other protocols that impacted many industries, including solar.**

Lockdowns that began in March 2020 in major solar markets from California to the Mid-Atlantic put a halt to most residential and commercial installations – the largest source of solar jobs – leading to tens of thousands of layoffs and furloughs. Many local governments stopped processing, or struggled to process, building permit applications before making the transition to remote or online systems, leading to a backlog for new projects once installations resumed.

Many installers serving residential and commercial customers adapted to physical distancing requirements by moving away from in-person sales and found significant success reducing their costs and winning new business. Moreover, the overall increase in people working from home, using more electricity and spending less money elsewhere increased interest in solar. This helped solar companies rehire many of their laid-off and furloughed staff. But the challenges of pandemic life have prevented total solar employment from returning to pre-pandemic levels. For example, some workers with children in remote school could not return to work.

Utility-scale solar construction was generally allowed to continue work that had already begun, thanks in part to federal and state guidance that deemed large-scale solar construction to be essential work. This sector never saw the steep employment drops experienced by residential and commercial solar installers. However, many large solar contractors experienced labor shortages throughout the remainder of the year.

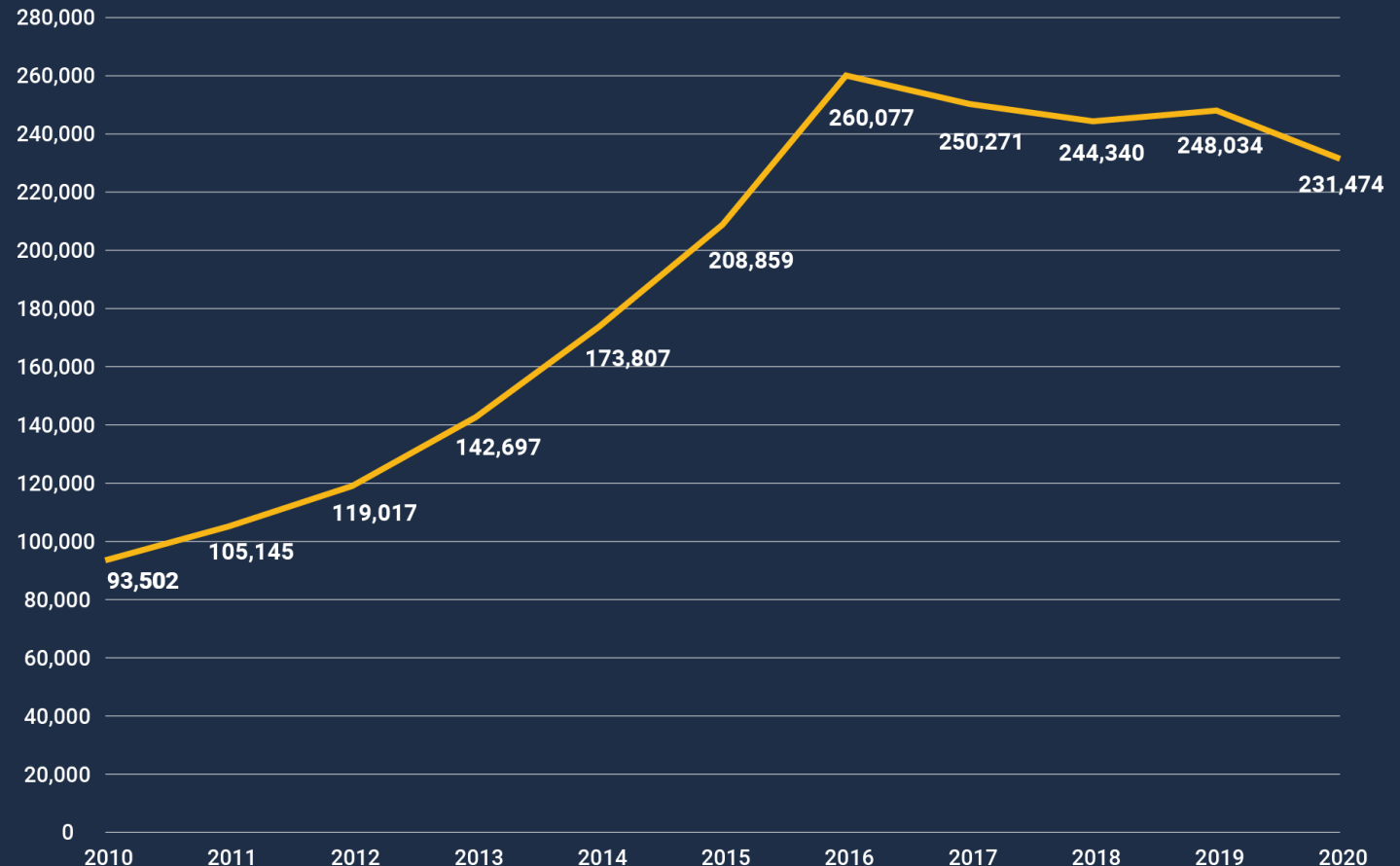
The overall U.S. residential construction boom has also created fierce competition for a limited supply of construction trades workers, especially electricians. Those who remained, returned or joined the solar workforce in 2020 found new ways to increase their productivity and, in the end, the solar industry managed a record year of installations despite significant challenges.

## Introduction: Solar Workforce Amid the Pandemic

## U.S. solar employment dropped by **6.7%** in 2020 to **231,474**, its lowest level since 2015

The drop-off began with the pandemic, which forced many companies to tighten their labor budgets in the face of lockdowns that halted work and led to drops in demand last spring.

Though demand for solar has largely recovered across most market segments, many companies have not yet hit their pre-pandemic employment levels as they navigate economic uncertainty.



# Solar Jobs Fall Due Primarily to Pandemic

# Solar Deployment Hits Record Levels Despite Job Loss

Despite employment reductions, annual solar installations reached a record **19.2 GWdc in 2020**.

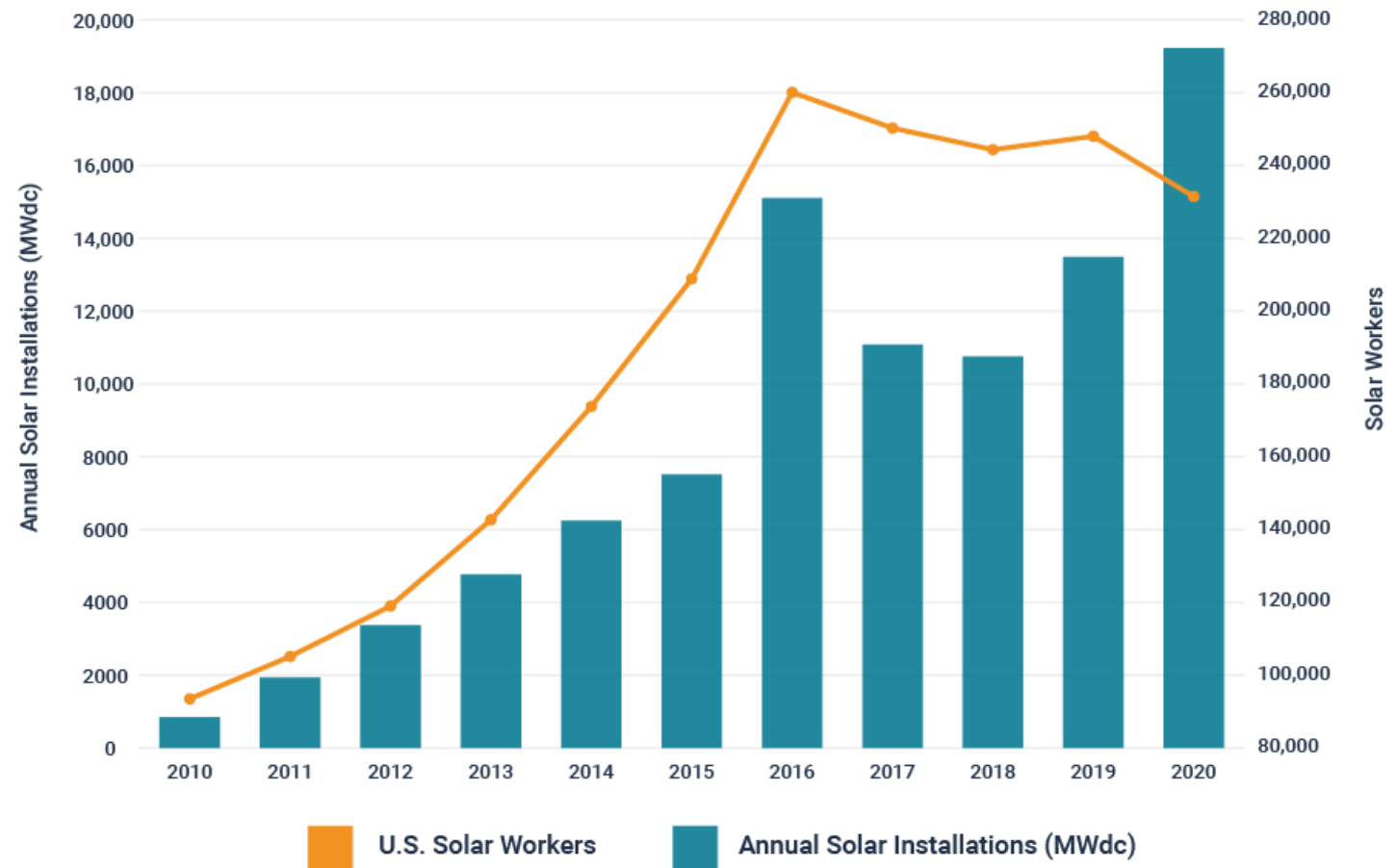
The industry was able to achieve these totals despite reduced employment in part due to a rapid increase in the share of utility-scale deployment.

- Utility-scale installations represented **73% of all solar capacity installed in 2020**, a new record
- Because utility-scale projects use fewer installation workers per kilowatt deployed, the increase in utility-scale market share allowed for greater deployment with lower labor intensity

However, equally important was an **increase in labor productivity** across all market segments.

- Residential productivity increased 19%.
- Non-residential productivity increased 2%
- Utility-scale productivity increased 32%

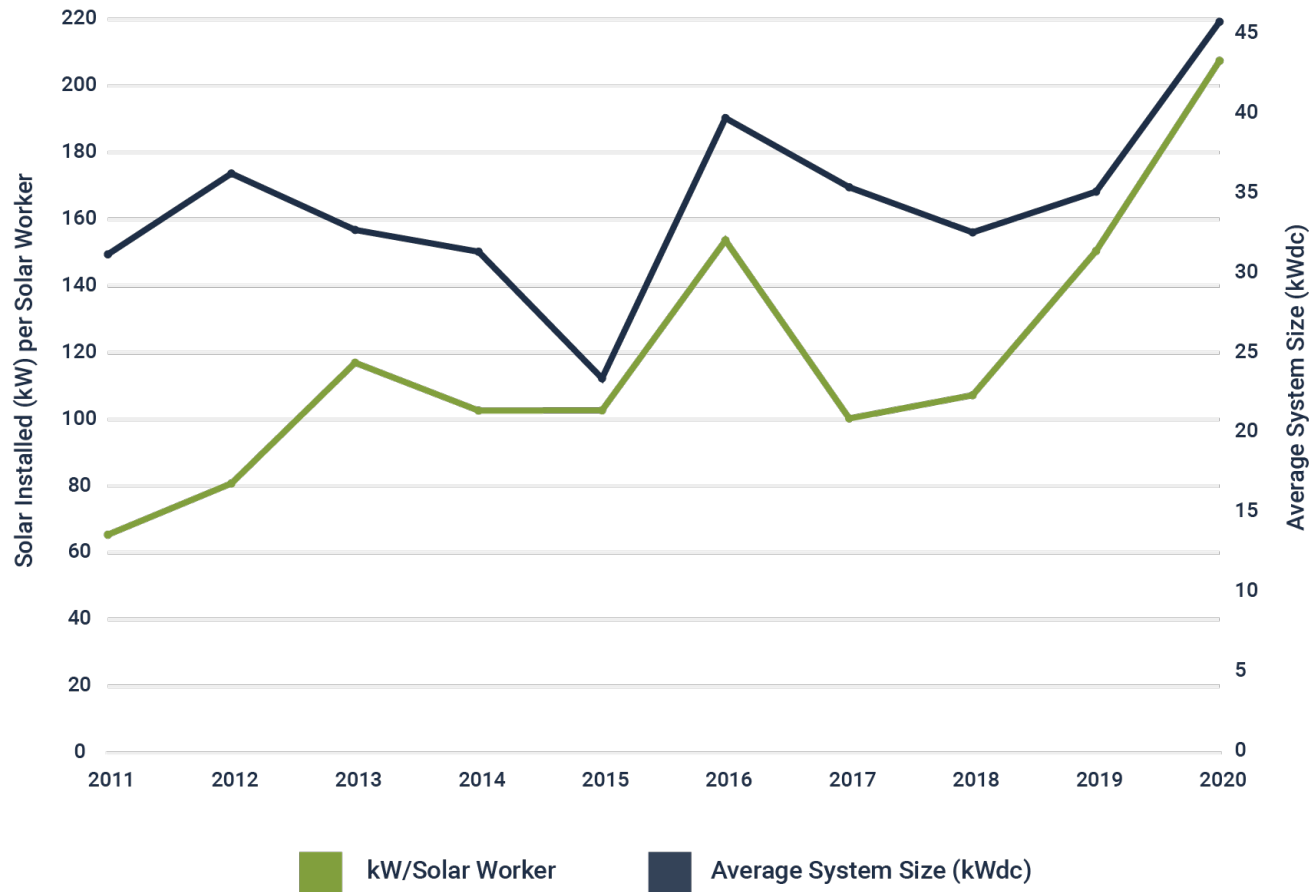
## Labor Productivity Increased Allowing Increased Deployment



Sources: National Solar Jobs Census 2020, SEIA/Wood Mackenzie Power & Renewables U.S. Solar Market Insight 2020 Year in Review

# Labor Productivity At Record Levels

## Installation/Construction-Related Labor Productivity



Solar labor productivity has increased steadily over time, but took a major leap forward in 2020.

In the distributed solar segments, and residential in particular, **the pandemic fundamentally altered the way companies do business.**

- Residential sales shifted heavily from in-person to online/remote sales, reducing salesperson labor needs
- As a result of increased time at home, homeowners became more cognizant of their energy use and spent less on travel, making solar sales easier and further reducing labor needs
- As residential construction boomed in the latter half of the year, competition for skilled labor with this industry forced efficiency improvements

In the utility-scale segment, the **average system size nearly doubled from 2019 (to 43 MW),** with economies of scale reducing labor needs and increasing productivity.

Installation and construction-related employment continued to be the largest segment in the industry, representing **67% of all jobs**.

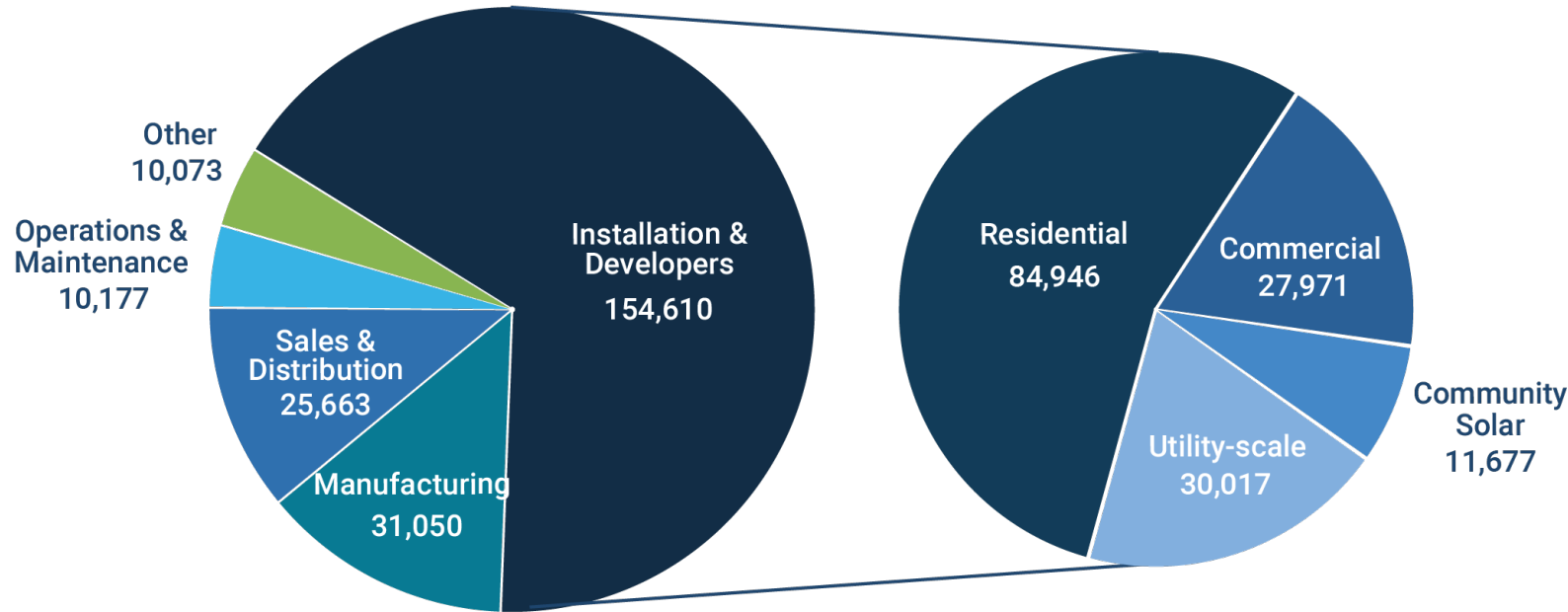
Distributed installation jobs alone (Residential, Commercial and Community Solar) make up more than half of all industry employment, with large portions of jobs in other categories also supported by distributed solar demand.

Workers in manufacturing jobs represented **14% of all industry employment**, while Sales and Distribution and Operations and Maintenance represented **11% and 4%** of all jobs, respectively.

The 'Other' category, comprised of workers in fields like finance, legal, research, advocacy and communications, makes up **4% of all solar workers**.

Of all installation jobs:

- 55% residential
- 18% commercial
- 8% community solar
- 19% utility-scale



## Employment Breakdown by Sector



# Jobs Decline Across All Categories Amid Pandemic

Installation jobs dropped by **4.2%** to **154,610** as the pandemic reduced staffing levels in the residential and commercial segments in particular.

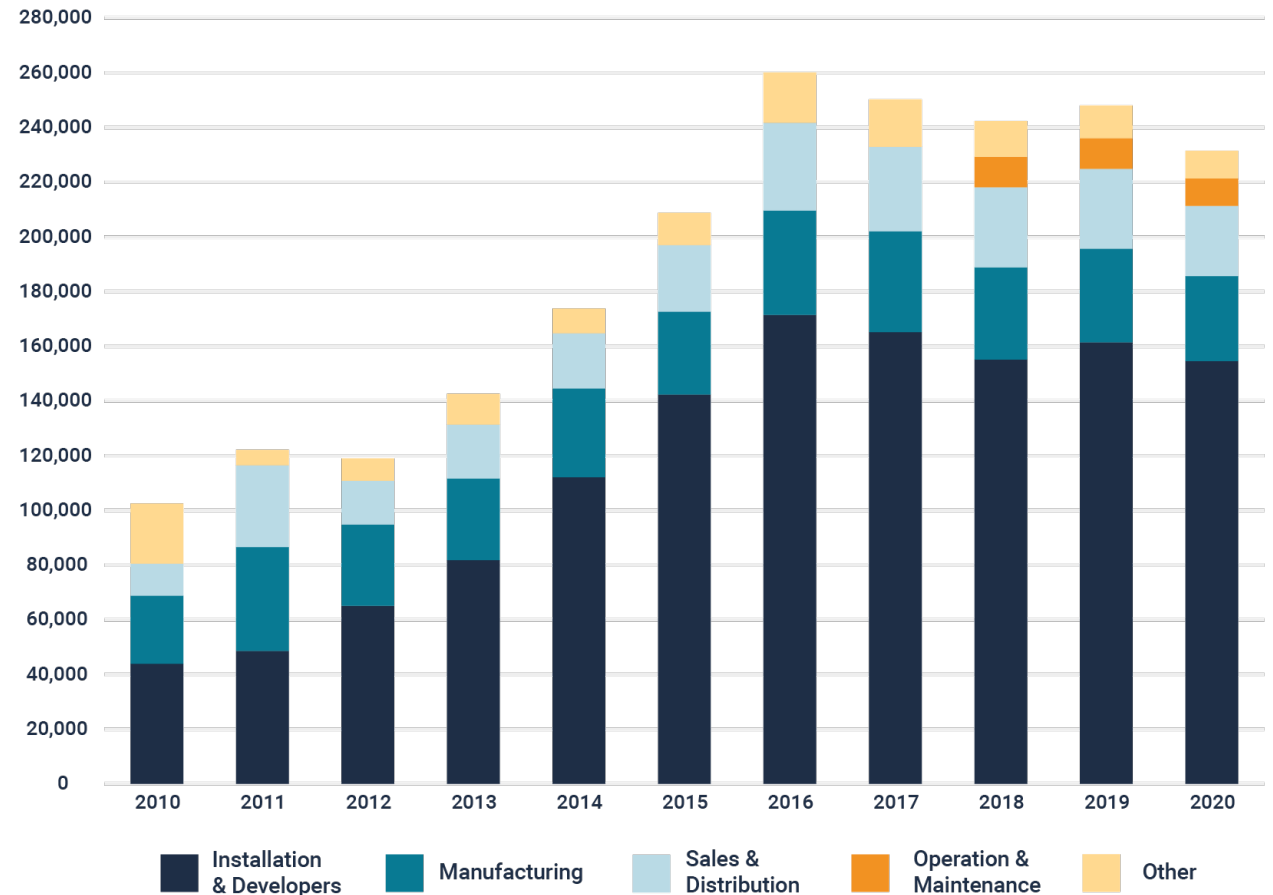
Manufacturing jobs were down 9.3% in 2020, landing at **31,050**.

- Manufacturing production slowed to accommodate increased spacing requirements, and some factories were shut down temporarily. While many facilities have recovered, many of the same pandemic requirements still apply

Sales & Distribution Jobs dropped by 12.2% in 2020, to **25,663**.

- This category relies heavily on demand from the installation and manufacturing segments. As deployment and production slowed, wholesale and retail trade and distribution was also impacted, leading to employment reductions

## Solar Employment by Sector



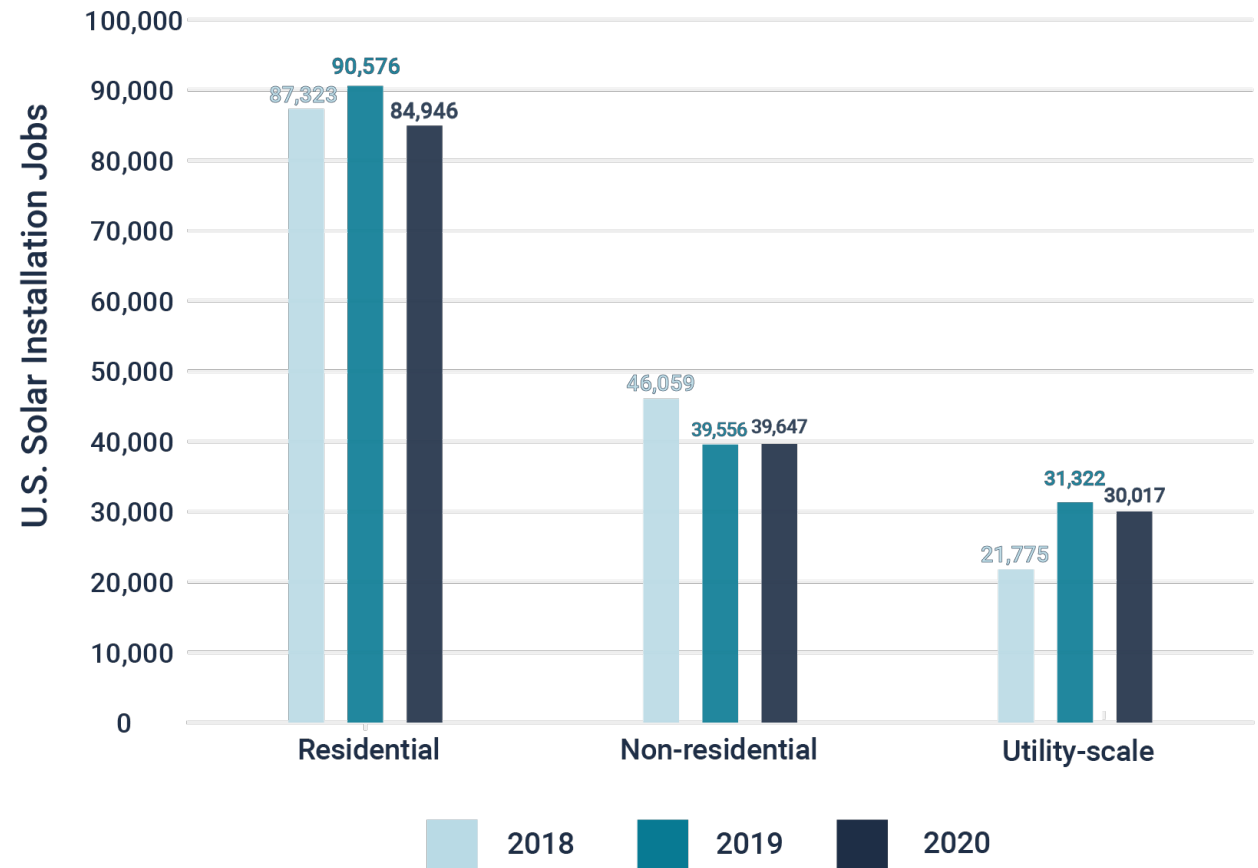
# Installation Jobs Drop Across Market Segments

The residential and commercial segments were hit hardest by the pandemic in the spring as social distancing requirements limited installers' ability to access job sites and obtain new business.

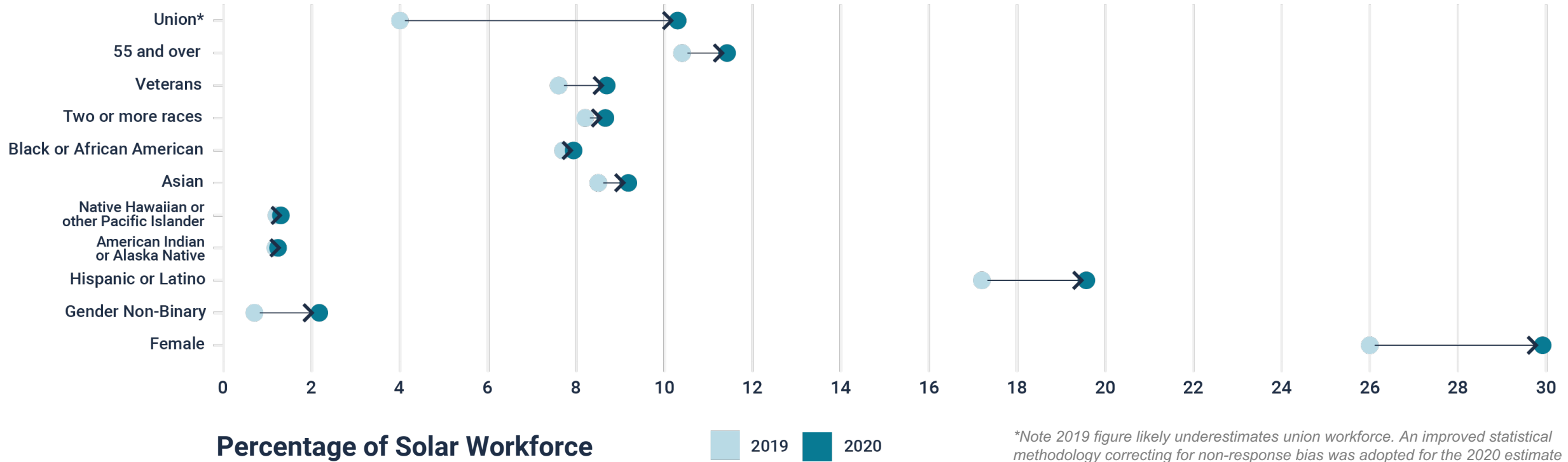
Despite increases in demand over the second half of the year, the segment has yet to ramp up to pre-pandemic levels. Total residential and commercial solar installation jobs declined by roughly **5,500 in 2020 or 4.3%**.

As a result of being designated as an essential service in most states early in the pandemic, most utility-scale solar construction encountered few delays. However, labor availability at many projects was still down from 2019 as workers missed time due to the pandemic. Utility-scale jobs decreased by **1,300** over the last year, or **4.3%**.

## Installation Employment by Market Segment



# Solar Workforce Grew More Diverse in 2020



Nearly all demographic measures of diversity in the solar workforce saw modest increases in 2020, bringing numbers to an all-time high across most categories.

Women in solar grew from **26% to 30%** of the workforce.

- While the industry overall lost workers in 2020, the number of women employed in solar increased by nearly **4,800 to over 69,000**

Since 2015, solar industry employment has increased by **39%** for women, **92%** for Hispanic or Latino workers, **18%** for Asian workers, **73%** for Black or African American workers, and **19%** for veterans.

- Over that same time, overall solar industry employment has risen by 11%

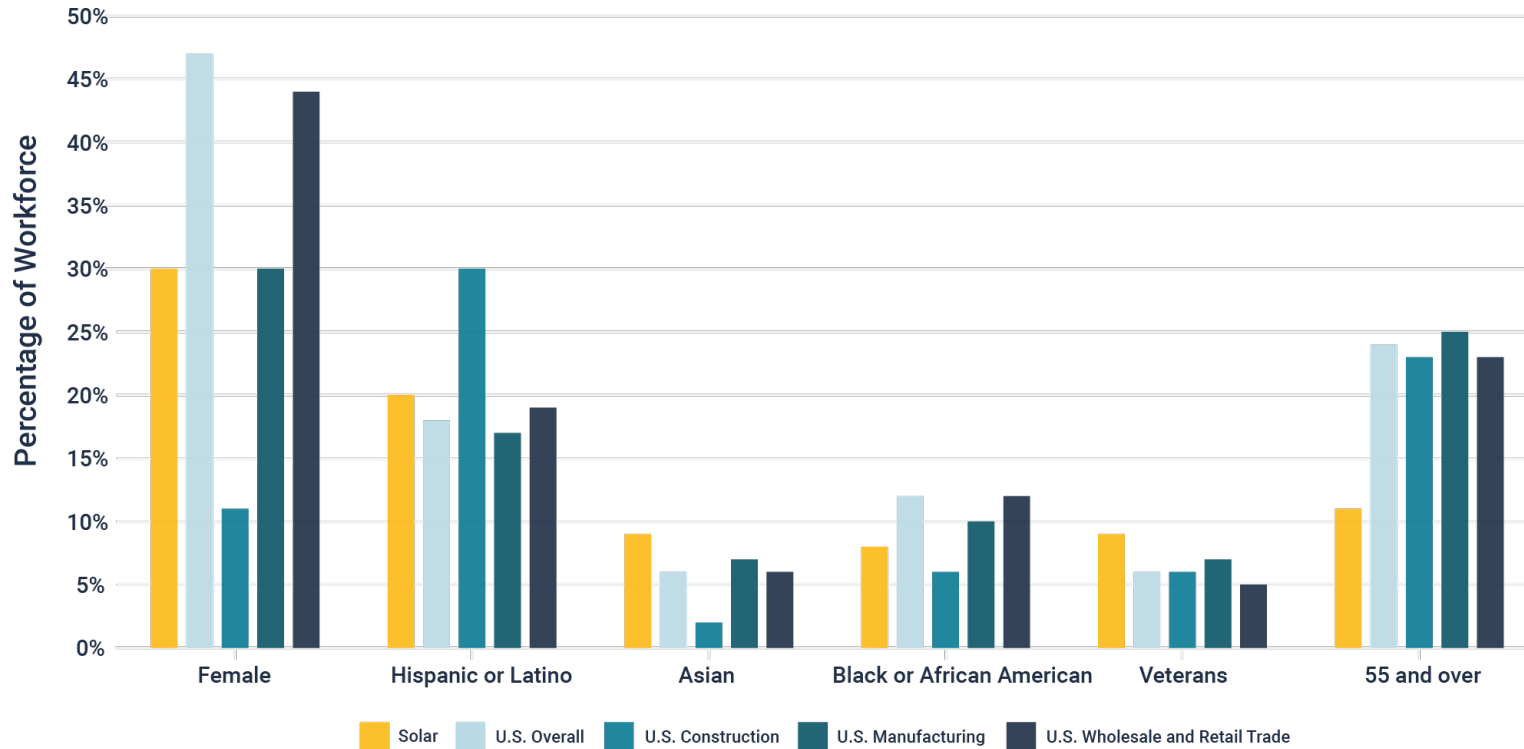
The share of workers who are members of labor unions now stands at **10.3%**.

Though the solar industry has made significant progress in diversifying over the past 5 years, there is **still significant work to be done** before the solar industry matches the diversity of the country.

# Diversity in Solar Is Comparable to Other Industries

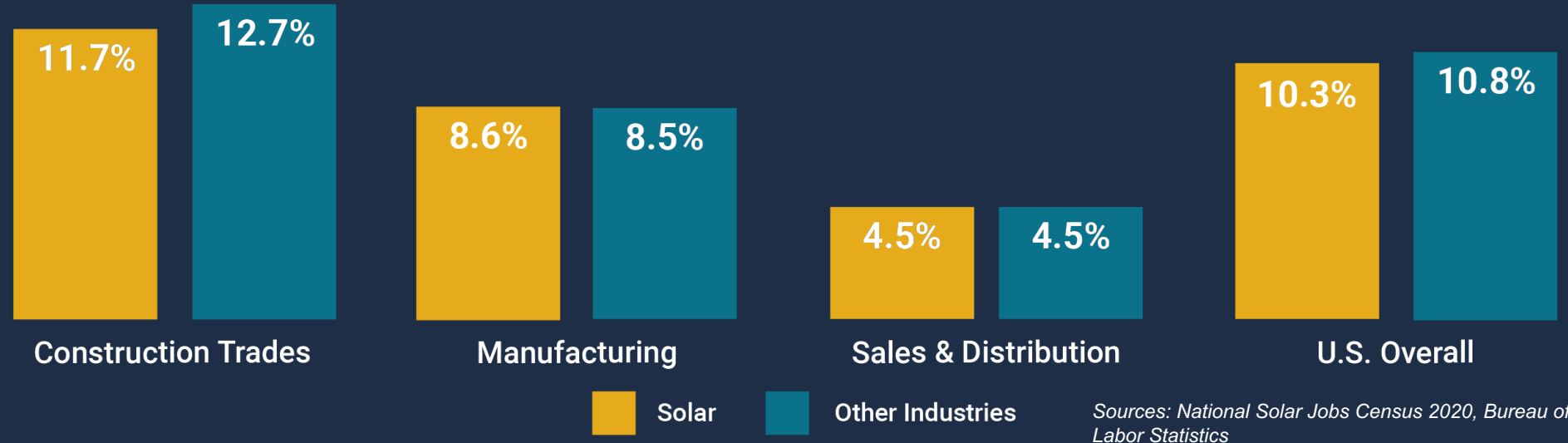
- Solar workers identify as “female” at almost **three times the rate** as the overall construction industry
- **Veterans make up a larger share** of the solar workforce (9%) than the overall economy

**Environmental justice and equity** are embedded in solar industry policy priorities and growth planning and will be critical as the industry rises to meet the joint challenges of climate change, the energy transition and social and environmental justice.



Sources: National Solar Jobs Census 2020, Bureau of Labor Statistics

## Percent of Total Workforce Unionized: Solar vs. Other Industries



## Solar Unionization Rate

Solar workers are represented by unions **at rates similar to the overall economy** and at comparable levels in construction and manufacturing.

This is despite a significant share of solar employment (residential) being in the home improvement sector with a large share of sole proprietorships where unionization does not apply.

## Top States for Solar Jobs

State	2020 Rank	2019 Rank	2020 Jobs	Change from 2019
California	1	1	68,677	-7.5%
Florida	2	2	11,219	-8.1%
New York	3	3	10,214	-4.9%
Texas	4	5	10,088	-1.7%
Massachusetts	5	4	9,495	-8.7%
Arizona	6	6	7,346	-5.5%
Utah	7	9	6,926	-2.5%
Colorado	8	8	6,771	-5.6%
Ohio	9	7	6,532	-10.3%
Nevada	10	10	6,174	-11.8%

## Top States for Employment Growth Since 2015

State	Employment Growth Since 2015	Percent Change
Florida	4,659	71%
Utah	4,246	158%
Texas	3,058	44%
Virginia	2,352	120%
Minnesota	2,003	101%
New York	1,964	24%
Pennsylvania	1,810	72%
Indiana	1,794	114%
Illinois	1,779	51%
Colorado	1,771	35%

## Top States for Solar Jobs per Capita

State	Jobs per Capita
Utah	1:473
Nevada	1:503
California	1:576
Vermont	1:615
Hawaii	1:617
Massachusetts	1:741
Colorado	1:854
Arizona	1:974
Rhode Island	1:1,087
New Mexico	1:1,128

# State Overview

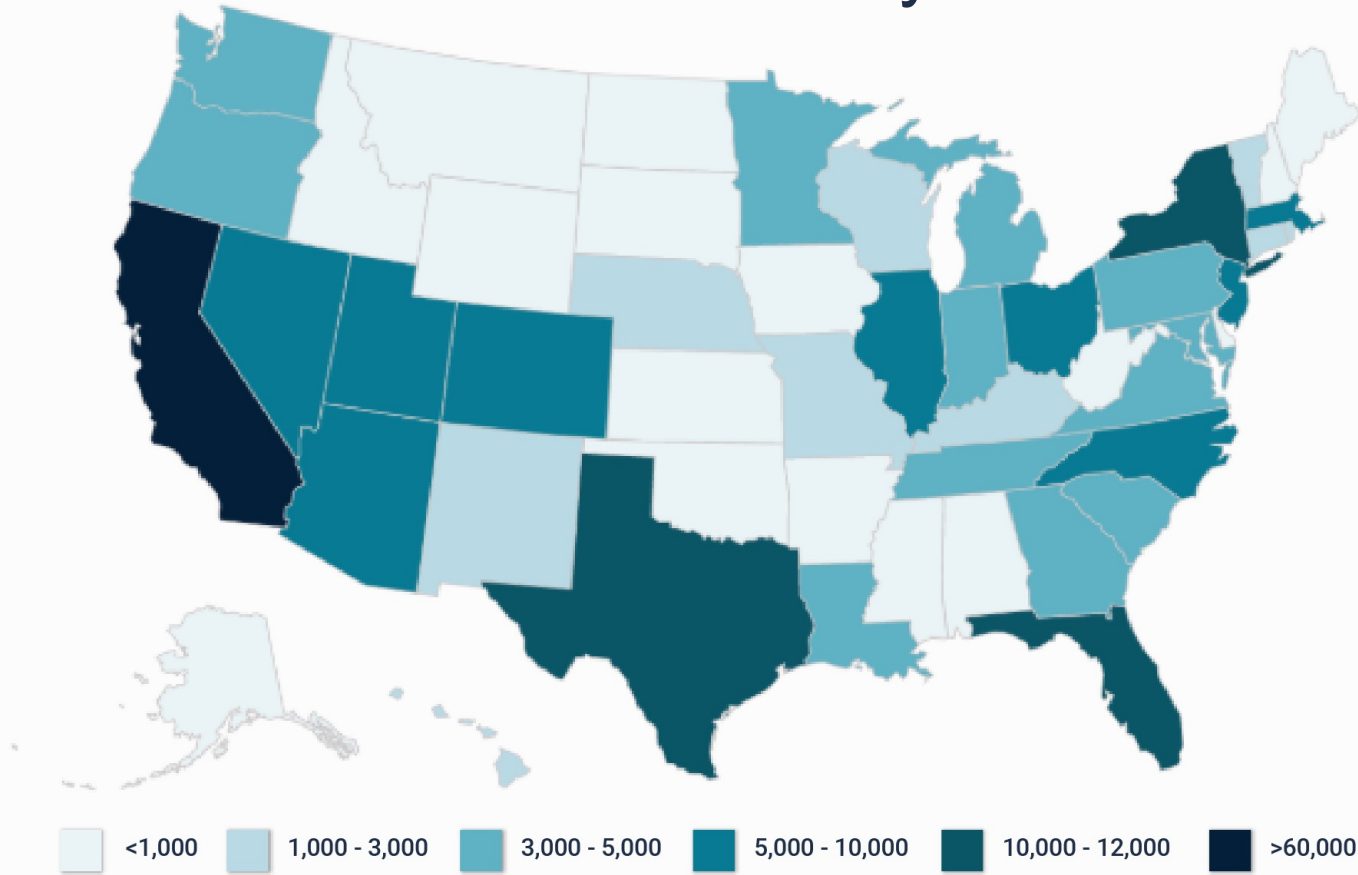
Primarily as a result of the pandemic, solar employment **dropped in 44 states in 2020**, representing the most broad-based labor reduction on record.

The pandemic had uneven impacts at the state level, however. States with large distributed solar markets experienced the most employment loss, as residential and commercial segments were hit hardest by work restrictions and have yet to fully recover. Markets with larger shares of utility-scale deployment fared somewhat better, though those labor forces were also reduced by workers missing time due to the pandemic.

In a handful of markets, rapid year-over-year increases in deployment, often in utility-scale solar, **helped to offset job losses in distributed markets**, leading to modest levels of employment growth or lower levels of job loss.

Of the top 10 states for solar employment growth percentage in 2020, 8 of them also rank in the top 20 for solar deployment growth rate in 2020.

# Solar Jobs State-by-State



Despite the labor downturn in 2020, solar employment growth over the last 5 years has been robust in most states. Markets in Florida, Utah, Texas and Virginia have all benefitted from expansions in both distributed and utility-scale projects over that time frame.

While state-level solar employment often correlates closely with solar deployment, many jobs exist outside the installation sector and are more resistant to fluctuations in local solar installations. States with large manufacturing presences, such as Ohio and Georgia, primarily serve demand outside their states. Likewise, the existence of corporate clusters in metropolitan areas like New York City and San Francisco helps sustain solar job presence regardless of deployment growth.

The flow of labor across state lines also clouds the linkages between employment and deployment. Many installation companies, particularly in the northeast, have staff that work across state lines, sometimes on a daily basis. Despite this, the Census labor accounting requires that their employer attribute their labor to a single state.

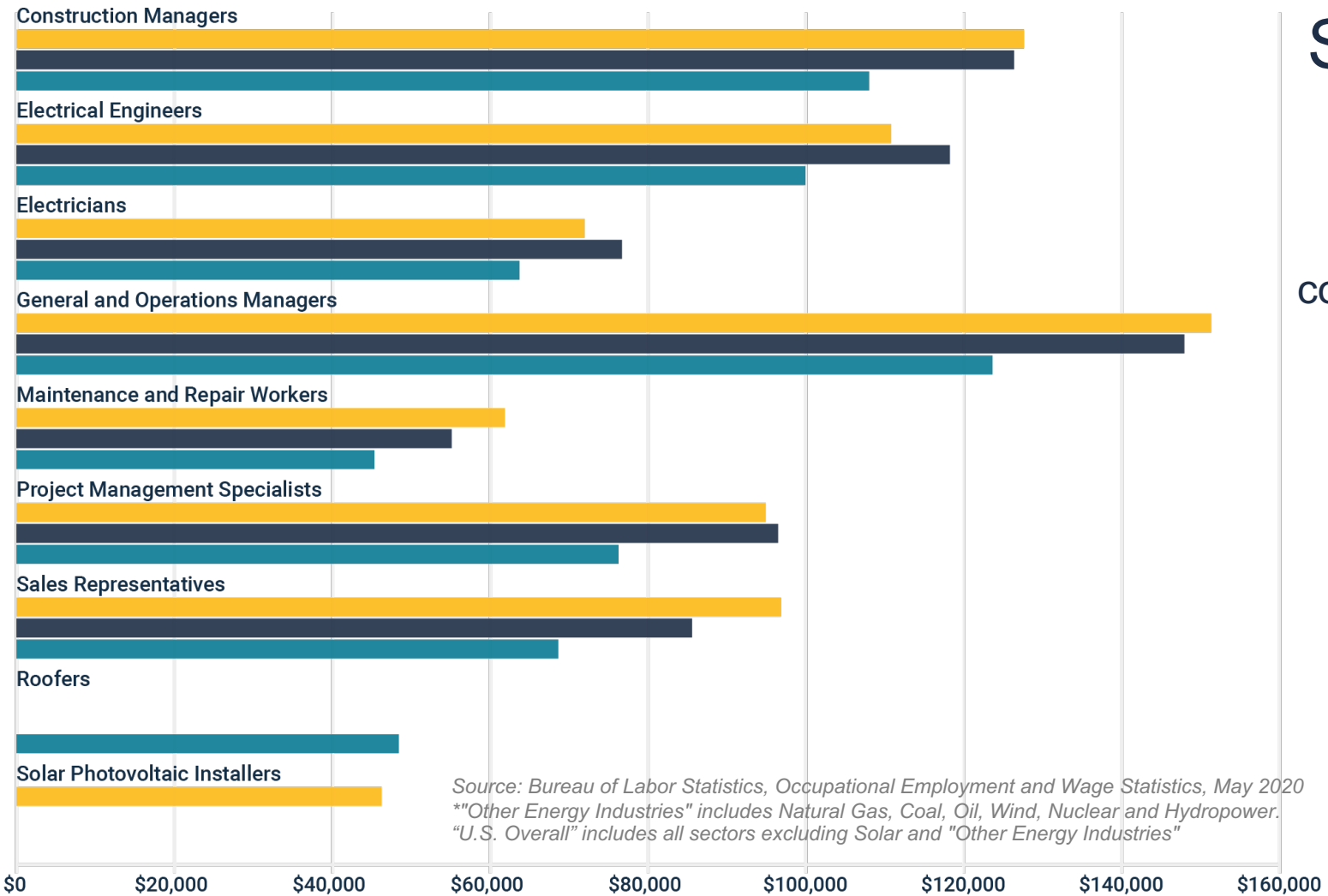
# Solar Compensation is On Par with Similar Trades

Compensation in the solar industry is comparable with similar occupations in other energy industries and higher than U.S. averages for most of the same positions.

Solar installers make similar amounts to their peers in the **roofing industry**.

Solar electricians make more than the **average electrician**.

**Construction managers** in solar make more than average and more than peers in other energy industries.



Source: Bureau of Labor Statistics, Occupational Employment and Wage Statistics, May 2020  
\*“Other Energy Industries” includes Natural Gas, Coal, Oil, Wind, Nuclear and Hydropower.  
“U.S. Overall” includes all sectors excluding Solar and “Other Energy Industries”

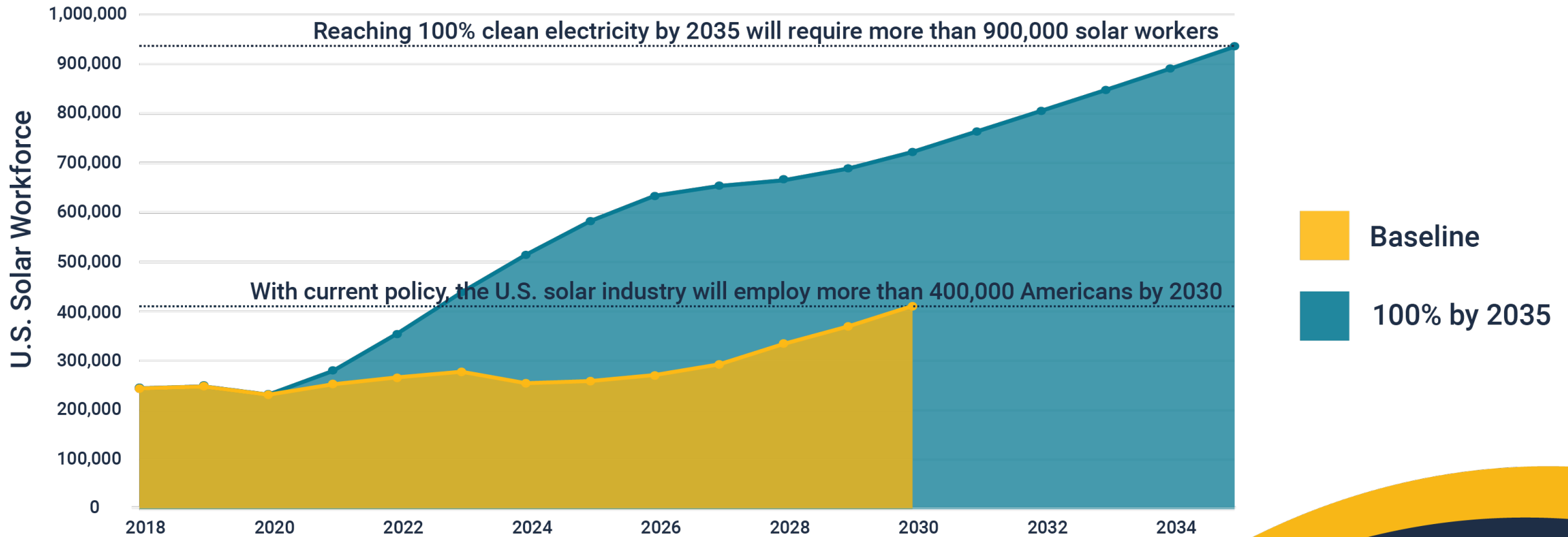
- Solar
- Other Energy Industries
- U.S. Overall

Average Annual Compensation





# Baseline Solar Employment Forecast vs. Workforce Needed to Reach 100% Clean Electricity by 2035



Sources: National Solar Jobs Census 2020, SEIA approximation of Biden Clean Energy Goal

Under the current trajectory, and without significant policy shifts, the solar+ storage industry will employ **400,000 workers in 2030**.

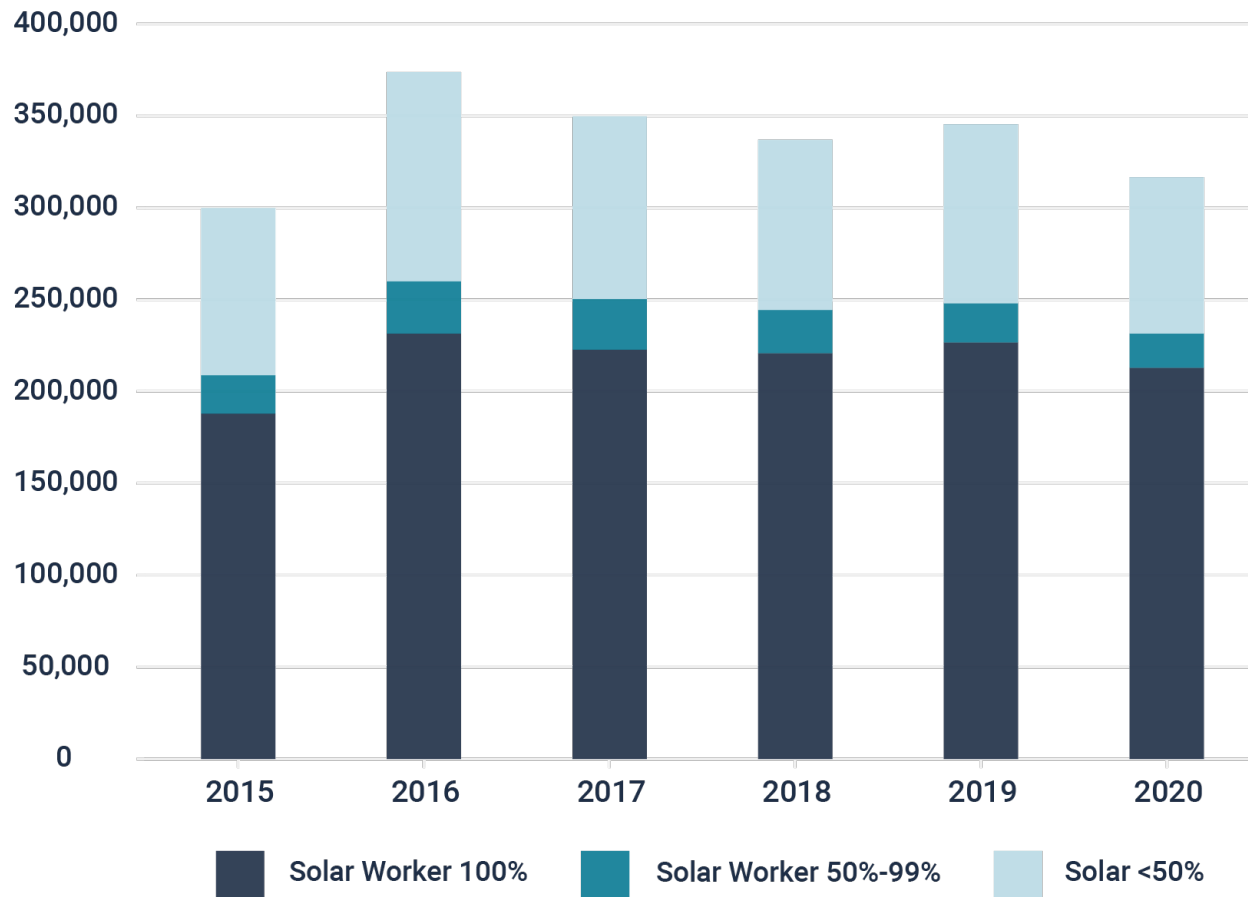
The path necessary to achieve President Biden's goals to decarbonize the grid and expand domestic manufacturing will require more than **900,000 solar workers** across the supply chain by 2035.

Future  
Workforce  
Needs

# What is a “Solar Worker”



U.S. Solar Employment by Time Spent on Solar Work



In this report, a “solar worker” is any person who spends more than **50% of their working hours on solar-related work.**

- 92% of solar workers who spend at least 50% of their time on solar spent 100% of their time on solar in 2020

This report shares its underlying statistical sample with the United States Energy Employment Report (USEER) and the E2 Clean Jobs America 2020 report, which counts anyone who spends any time working in solar as a solar employee, including those who spend less than 50% of their time on solar work.

- Counting all people who spent anytime on solar work in 2020 yields a total of 316,675

# Methodology

The 2020 Solar Jobs Census uses publicly available data from the 2021 U.S. Energy and Employment Report (USEER) on solar employment produced by BW Research Partnership, the Energy Futures Initiative (EFI), and the National Association of State Energy Officials (NASEO).

Previous report methodology can be found at: <https://www.usenergyjobs.org/>.

The research methodology is the same as previous years and an updated link for 2021 will be provided when available.





# For More Information

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