



Leading the Transformation
to a Clean Energy Economy

SEIA.ORG

SEIA Members: Join our Community Groups for Workforce or Apprenticeship Professionals!

Email workforce@seia.org to join!

SEIA Apprenticeship Task Force

- Identify areas of collaboration around **Registered Apprenticeships**.
- Develop **tools & resources** to assist in **securing tax credits** and centering **quality**, safe apprentice experiences.

SEIA Workforce Development Committee

- Facilitate sharing about workforce development **tools, resources, strategies, partnerships, & incentives**.
- Build a **brain trust** to support SEIA and its members.

RE+ 2025

Apprenticeship & Workforce Trends & Networking Power Hour

Tues, Sept. 9 | 10:15am-12:15pm



For a List of
Apprenticeship &
Workforce Related
Sessions and
Events at RE+ 25:



<https://events.seia.org/re-plus/workforce>



solar and storage workforce in Germany

Bundesverband Solarwirtschaft e.V.

Overview of the Dual System

- Combination of on-the-job training at companies with vocational schooling
- Apprentices usually 3–4 days in-company, 1–2 days at school
- Duration: 2–3.5 years, typically ~3 years

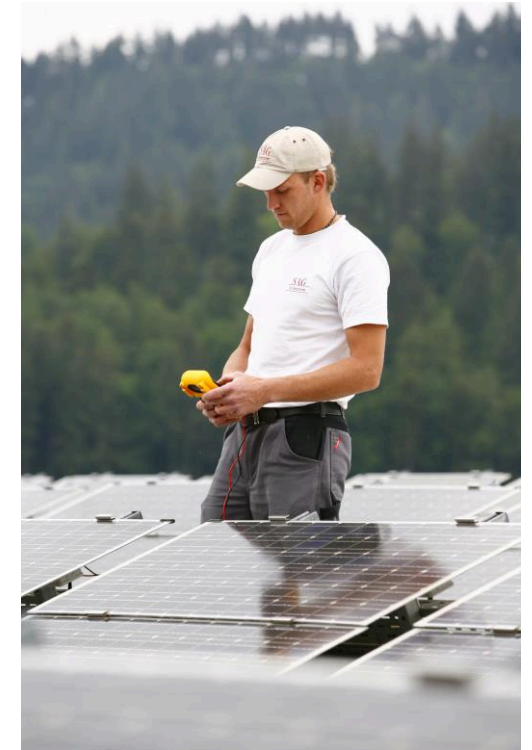
➤ Apprentices earn a training wage and graduate with a recognized qualification



Participants and Example Trades

- About half of German school-leavers choose vocational training
- 320+ recognized occupations
- Example trades:
 - Electrician (3.5 years, ~15,000 new apprentices annually)
 - Roofer (3 years, ~8,500 apprentices)

Apprentices are typically 16–19 years old
but can also be adults



Training Duration and Structure

- Average program: ~3 years
 - **70–80% of training time in-company** (practical work)
 - 20–30% in vocational school (theory and general education)
 - Apprentices sign contracts and receive stipends
- High practical emphasis ensures **job-readiness**





















Scale and Key Figures

- ~8,500 vocational schools across Germany
- ~400,000 training companies ($\approx 20\%$ of all firms)
- ~1.6 million apprentices in training
- Electrical sector: 48,000 businesses, ~46,000 apprentices
- Roofing sector: 15,000 companies, ~8,500 apprentices



career opportunities in renewable energies


									
Sector	Policy, laws	Project development	Project approval	System design	Finance	Manufacturing	Civil and electrical installation	Operation and maintenance	Grid integration
Institution	Ministries, parliament	Projects developer, clients	Public authorities	Engineering companies	Finance institutions	Component producers	Installation companies + engineers	Operators, maintenance companies	Grid operators, regulator
Required personnel	Lawyers, Policy makers	Engineer, Economists, Lawyers	Public servants	Engineer	Economists, Lawyers	Engineers, economists, technicians, workers	Engineers, technicians, workers	Engineers, technician, workers	Engineer, inspector
# of staff required									

Source: Renac Renewables Academy

Join us on our path!



Bundesverband Solarwirtschaft e. V. – German Solar Association
Phone: +49 30 2977788 0 · Email: geschaeftsleitung@bsw-solar.de

bsw.li/4bTjsHf 

bsw.li/3QYcpom 

bsw.li/1JDrtPI 

bsw.li/2VsDOS4 

Tearing the Paper Ceiling:

The case for skills-first talent practices



Opportunity
@Work

Courtney Haynes, Chief Engagement Officer, Opportunity@Work



For the skills that you use in your
job every day, did you learn them
mostly in school OR at work?

Workers Skilled Through Alternative Routes (STARs)

STARs have developed their skills through “alternative” non-degreed routes such as work experience, military service, educational benefits, training & on-ramps, boot camps, and community college.

70+ Million STARs

STARs are located in all regions across the country, including **both urban and rural areas** (71% of rural workers are STARs)



STARs have a similar **gender distribution** as the active population of workers in the U.S.



STARs are a large share of many affinity groups: **veterans, returning citizens, Opportunity Youth, returning caregivers, workers vulnerable to automation, etc.** (72% of veterans are STARs)

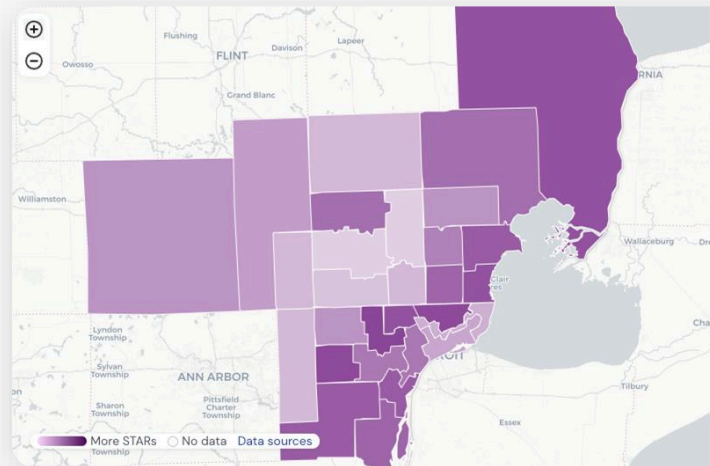


62% of African American workers, 55% of Hispanic workers, and 49% of Non-Hispanic White workers are STARs



STARs Are Everywhere – You Just Need to Look for Them in Your Region

www.starsight.org



< Detroit-Warren-Dearborn, MI

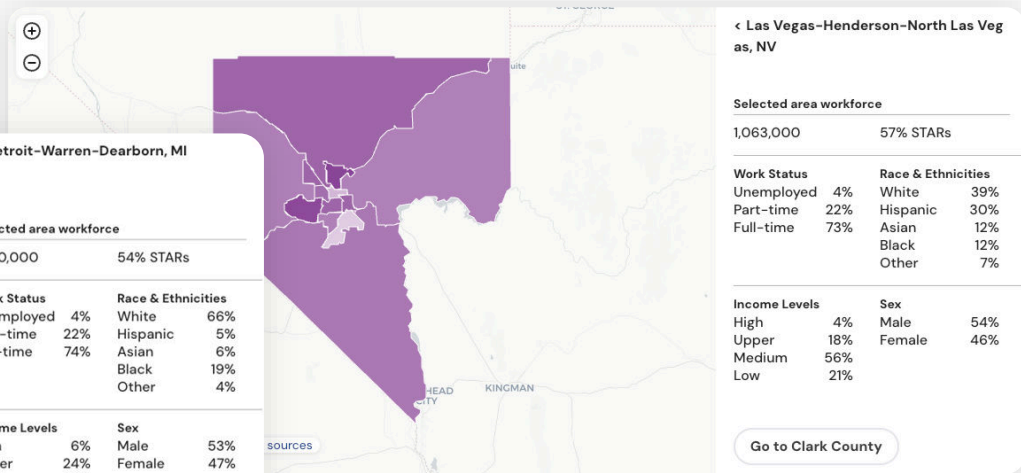
Selected area workforce

1,940,000 54% STARs

Work Status		Race & Ethnicities	
Unemployed	4%	White	66%
Part-time	22%	Hispanic	5%
Full-time	74%	Asian	6%
		Black	19%
		Other	4%

Income Levels		Sex	
High	6%	Male	53%
Upper	24%	Female	47%
Medium	55%		
Low	15%		

Counties ▾



< Las Vegas-Henderson-North Las Vegas, NV

Selected area workforce

1,063,000 57% STARs

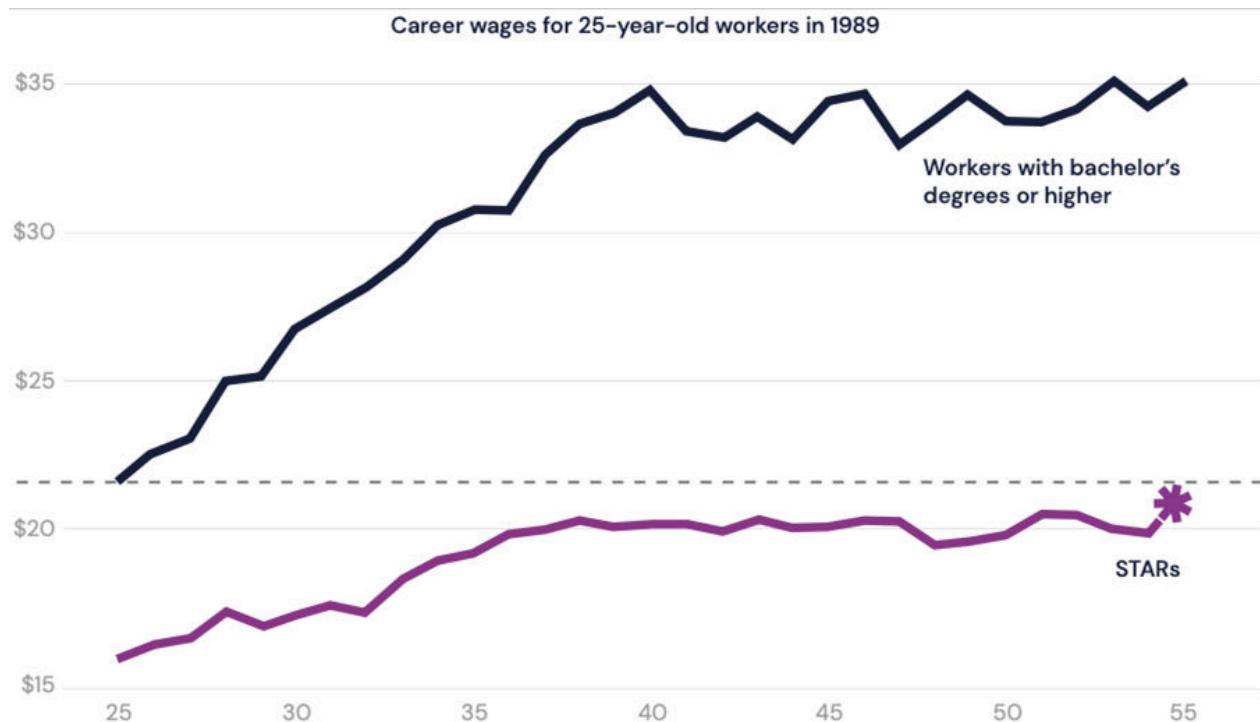
Work Status		Race & Ethnicities	
Unemployed	4%	White	39%
Part-time	22%	Hispanic	30%
Full-time	73%	Asian	12%
		Black	12%
		Other	7%

Income Levels		Sex	
High	4%	Male	54%
Upper	18%	Female	46%
Medium	56%		
Low	21%		

Go to Clark County



STARs wages don't catch up to where workers with BA degrees start their careers for 30 years



Note: Median wages in 2019 dollar for workers 25–29 years old in 1989 for workers with a bachelor's degree or higher versus workers skilled through alternative routes (STARs). Dotted line indicates median hourly wages for workers with a bachelor's degree at age 25 (\$21.59).

Source: Adapted from Blair, Debroy, and Heck (2021, 3). Data are from the 1989–2019 Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS) microdata accessed via IPUMS.

Low Wage ≠ Low Skill

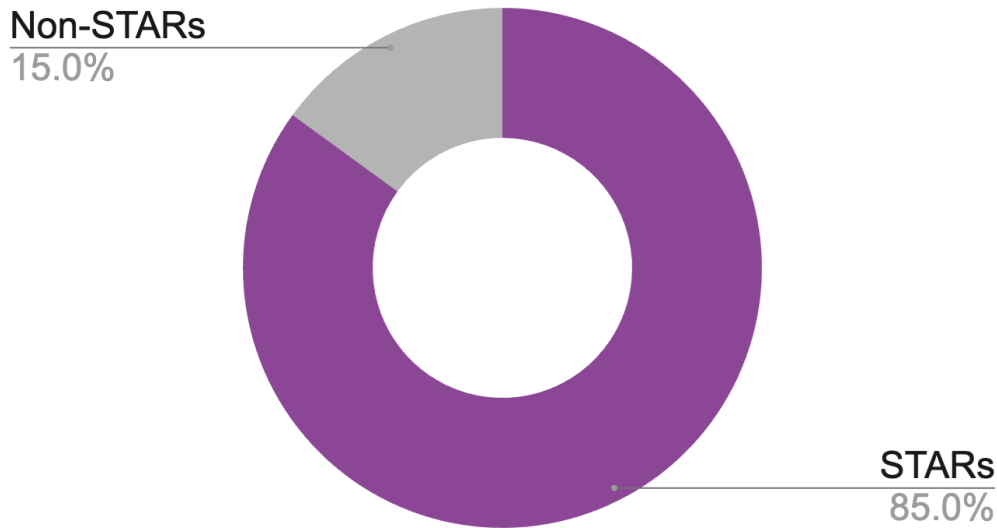


This figure shows the high skills overlap between two sales roles. The first is accessible to STARs, while the second is less so. About 96,000 STARs have made this transition in the five-year period from 2017 to 2021.

Established opportunities like Solar Installation are inclusive and are poised for growth

Pathways into middle-wage clean energy installation jobs are already established

- STARs already make up the majority of solar installers (85%), which pays \$37 an hour
- The skills required for those jobs are highly transferable from lower-wage installation/construction roles offering established pipelines for STARs
- In Milwaukee the top sourcing job for solar installers is electrician (218 transitions), followed by Maintenance and Repair (109) and Computer Support Specialists (94)



Wind Turbine Technicians also provides a proven upward mobility pathway

Lower-Wage Origin Job

Vending Service Technicians

\$17.32 / hr (national avg)

29K workers nationwide

8% of workers have a BA

- 18% wage gain
- 1K annual transitions
- 1.8 skill distance



Misc. Vehicle Mechanics

\$16.09 / hr (national avg)

67K workers nationwide

9% of workers have a BA

- 27% wage gain
- 500 annual transitions
- 2.2 skill distance



Target Job

Wind Turbine Technician

\$20.38 / hr (national avg)

212K workers nationwide

11% of workers have a BA

- 50% wage gain
- 2.2K annual transitions
- 2.2 skill distance



- 25% wage gain
- 2K annual transitions
- 1.9 skill distance



Higher-Wage Destination Job

Aircraft Mechanic

\$29.81 / hr (national avg)

167K workers nationwide

10% of workers have a BA

Industrial Machinery Mechanic

\$37.61 / hr (national avg)

382K workers nationwide

8% of workers have a BA

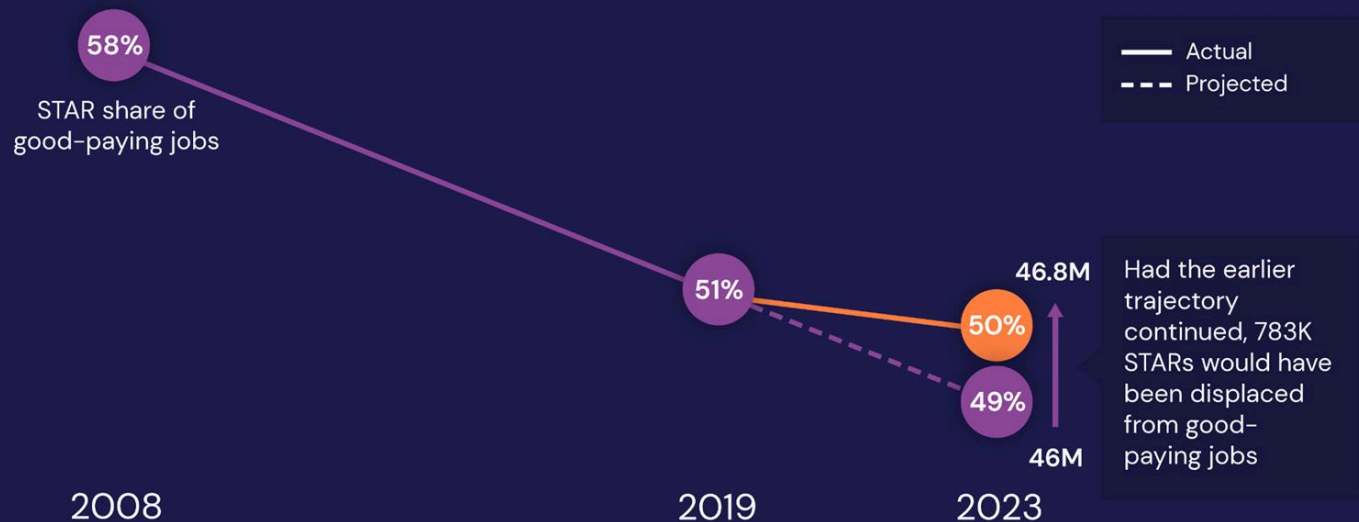
Promising “proven” pathway for STARs, given significant numbers who have historically traversed this pathway

Implications for sourcing vary by the strength of the pathway

Occupation example	Pathway type	Summary	Targeting implication
Wind Turbine Technician	Historical STARS pathway	Rapidly pursue STARS who are in relevant origin jobs relative to a target role	Target STARS where they live/work with direct marketing to advertise
Energy Efficiency Auditor	High potential STARS pathway	Test internal mobility play across technician roles, build partnerships across employers sitting on origin-destination pathway	Target STARS working with largest health providers to drive mobility options internally and externally
Hydrologist	Less defined STARS Pathway	Build programs with local talent developers that scale to meet demand for these skills.	Support Talent Developer expansion to meet needs of these roles Consider work-based learning programs

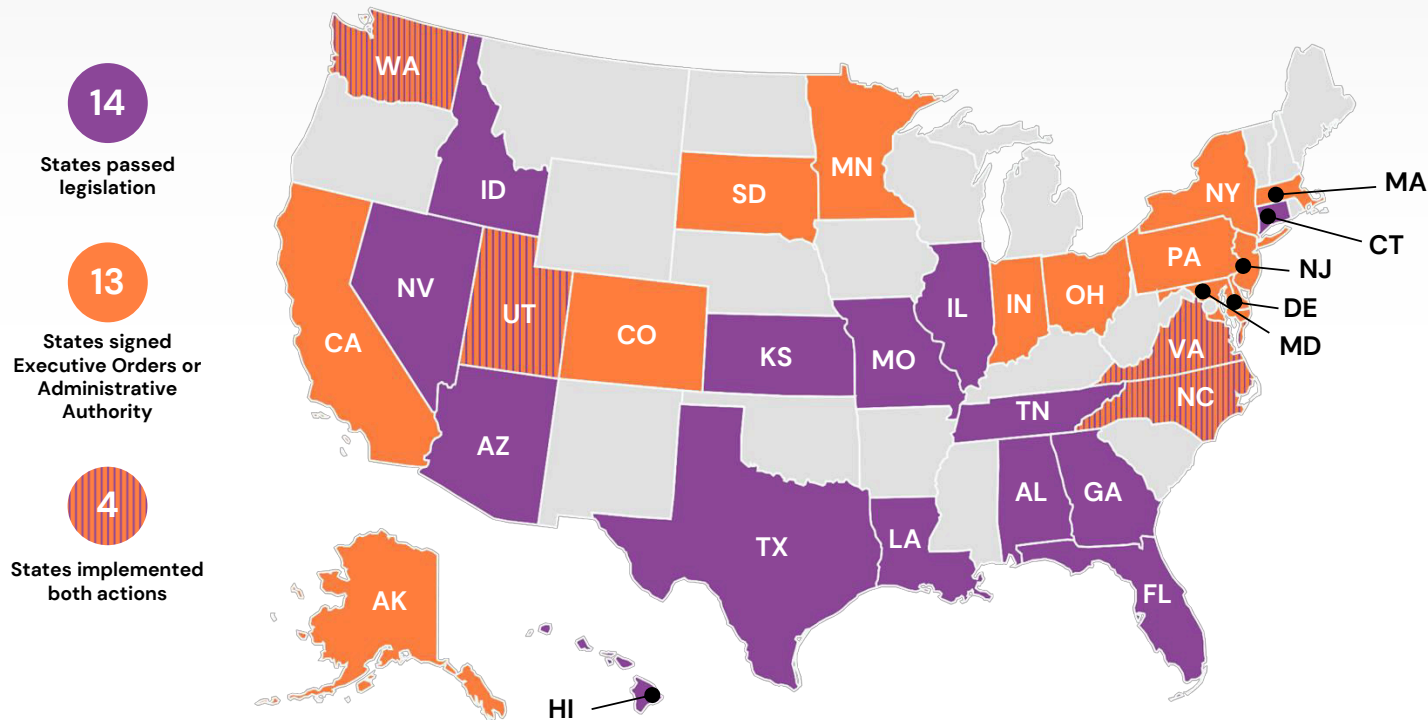
Arresting the downward trajectory of STAR share

Rapid decline in STAR share of good-paying jobs slows, yielding 783K more STARs in good-paying jobs than projected

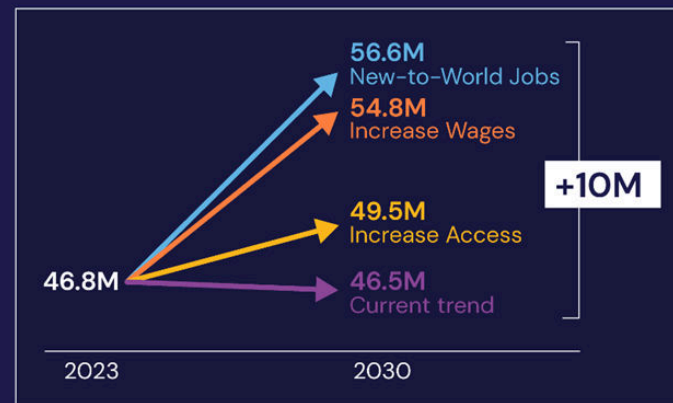
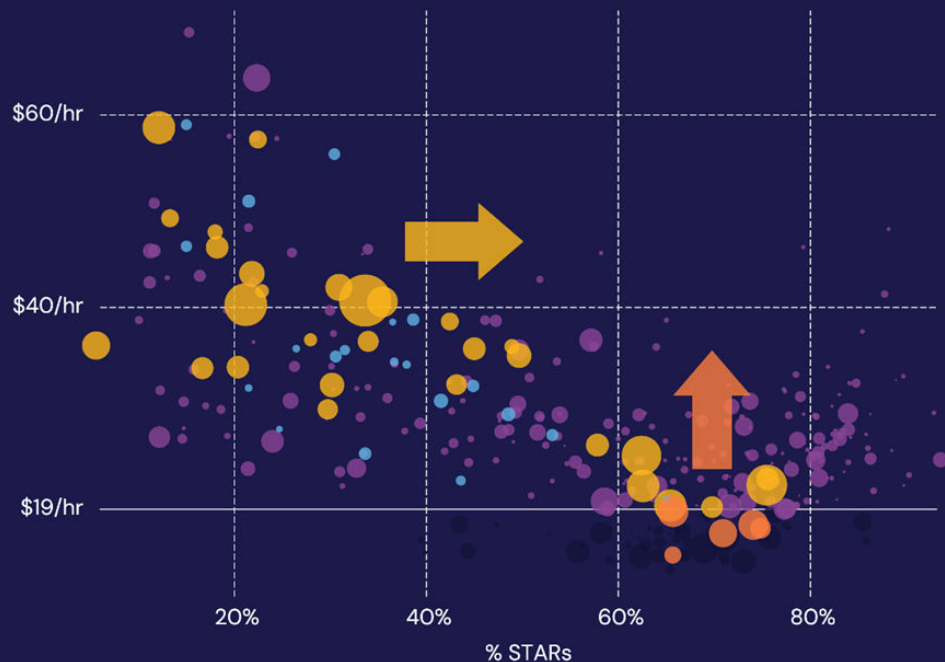


Note: This plot shows the STAR share from 2008 – 2019 in purple, and the projected 2023 STAR share had this trend continued. The actual STAR share from 2019 – 2023 is shown in orange. From 2008 – 2019, 6.3M STARs lost access to good-paying jobs (–0.6% per year). Had this trend continued, 783K more STARs would have been displaced from good-paying jobs. From 2019 – 2023, the decline in STAR share slowed to –0.4% per year. STARs outperformed the historical trend of the prior decade, re-gaining access to good-paying jobs. Source: Opportunity@Work analysis of the 2008 to 2023 1-Year American Community Survey, Integrated Public Use Microdata Series

31 States Lead the Way in Removing Degree Requirements, potentially unlocking access to 736,000+ good jobs



The STAR Mobility Compass Provides a Vision for the Future



Note: This bubble plot shows occupations mapped by their national median hourly wage (y-axis) and the projected share of STARs in 2030 if current trends continue (x-axis). Each bubble represents an occupation, sized by the number of projected workers in 2030. Source: Opportunity@Work analysis of the 2000 Decennial Census Survey and the 2001 to 2023 1-Year American Community Survey, Integrated Public Use Microdata Series, and the Bureau of Labor Statistics Occupational Employment Projections, 2023–33.

Employers play a critical role in a shifting labor market

Most employers
are here.



Shift permission
structures to
enable company
focus on the
STARs talent pool

Create clear
signals for sources
of STARs demand and
supply to find each
other

Define STARs-
centric workflows
that
support hiring &
advancement
of STARs

Align actions &
incentives
for STARs hiring &
advancement
outcomes throughout
ecosystem/network

Facilitate
investment
throughout the
talent lifecycle
(eg. in talent dev.
vs selection)

END STATE:
STARs hiring &
advancement
"business as
usual" (as is for
campus hires)

Awareness to Action

Behavior Adapting

Changed Outcomes



Opportunity
@ Work

TEAR
THE PAPER
CEILING

Thank You

**Join the conversation, partner with us
to find the skilled talent you need!**

Courtney Haynes | courtney@opportunityatwork.org



Deep Dive: Best Practices in Workforce Development and Creating a Productive Company Culture

Workforce Development

September 8, 2025



Hello!



Dr. Janell Hills-Thomas,
Sr. Director of Equitable Workforce
Strategies, IREC

Interstate Renewable Energy Council (IREC)



**IREC builds the foundation for rapid adoption
of clean energy and energy efficiency to
benefit people, the economy, and our planet.**

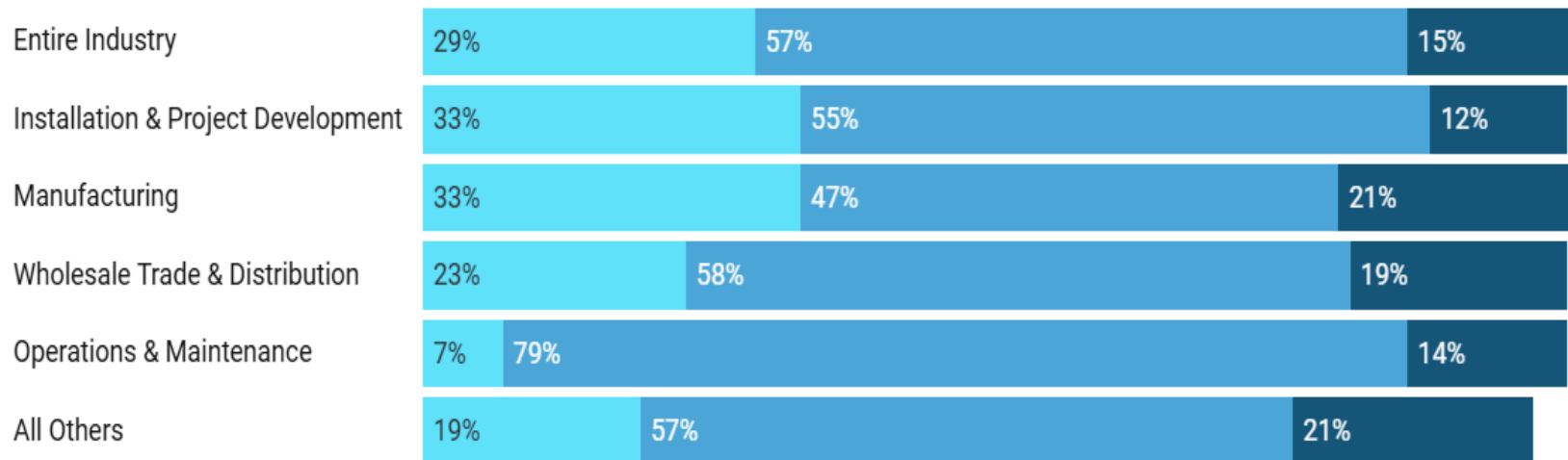
2023 Solar Job Census WF Highlights

- 29% of employers across the solar industry reported it was “very difficult” to hire qualified workers.
- 57% said it was somewhat difficult
- 15% found hiring to be not at all difficult
- This is a significant difference from 2022
 - 44% of employers said hiring was very difficult

What will IREC's 2025 Census Reveal.....stay tuned

Level of Difficulty Finding Qualified Solar Workers, 2023

Very difficult Somewhat difficult Not at all difficult



Source: IREC National Solar Jobs Census 2023 • Created with [Datawrapper](#)

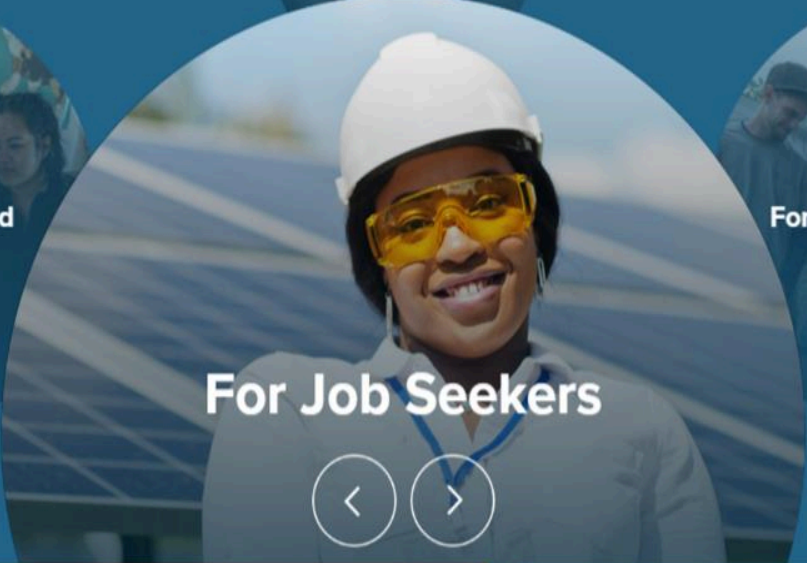
GreenWorkforceConnect.org



GREEN WORKFORCE CONNECT

Connecting job seekers, employers, training providers, and contractors to support a highly trained and inclusive energy workforce






For Education &
Workforce
Organizations



For Employers and
Contractors



For Community-Based
Organizations

For Job Seekers



Explore careers in building performance



Explore careers in solar energy



Learn more about energy careers



Find training and employers in your area



What are some common solar energy careers?



Electrician

\$60,000–\$63,000

Install, maintain, and repair electrical wiring, equipment, and fixtures for a multitude of electrical technologies. These jobs may include solar, wind, hydropower, geothermal, and battery storage systems.

[Learn more about this role.](#)



Solar Installer

\$35,000–\$84,000

Set up and maintain the equipment and wiring that connect a solar energy system to the electrical grid. Solar installers can work in residential, commercial, and/or utility-scale installations.

[Learn more about this role.](#)



Advanced Manufacturing Technician

\$60,000–\$65,000

Set up, test, and adjust manufacturing machinery and equipment used in solar installation.

[Learn more about this role.](#)

What types of tasks would I be working on?

The solar and storage industry has a place for everyone—no matter what your skills, interests, and educational background.

Depending on the job, you could be:



Installing solar panels
on rooftops



Managing large utility-
scale solar projects



Assembling panels or
batteries in a factory



Involved in sales and
marketing



Working as an
engineer

Solar Career Maps

There is a career path for you in the solar and storage industry!

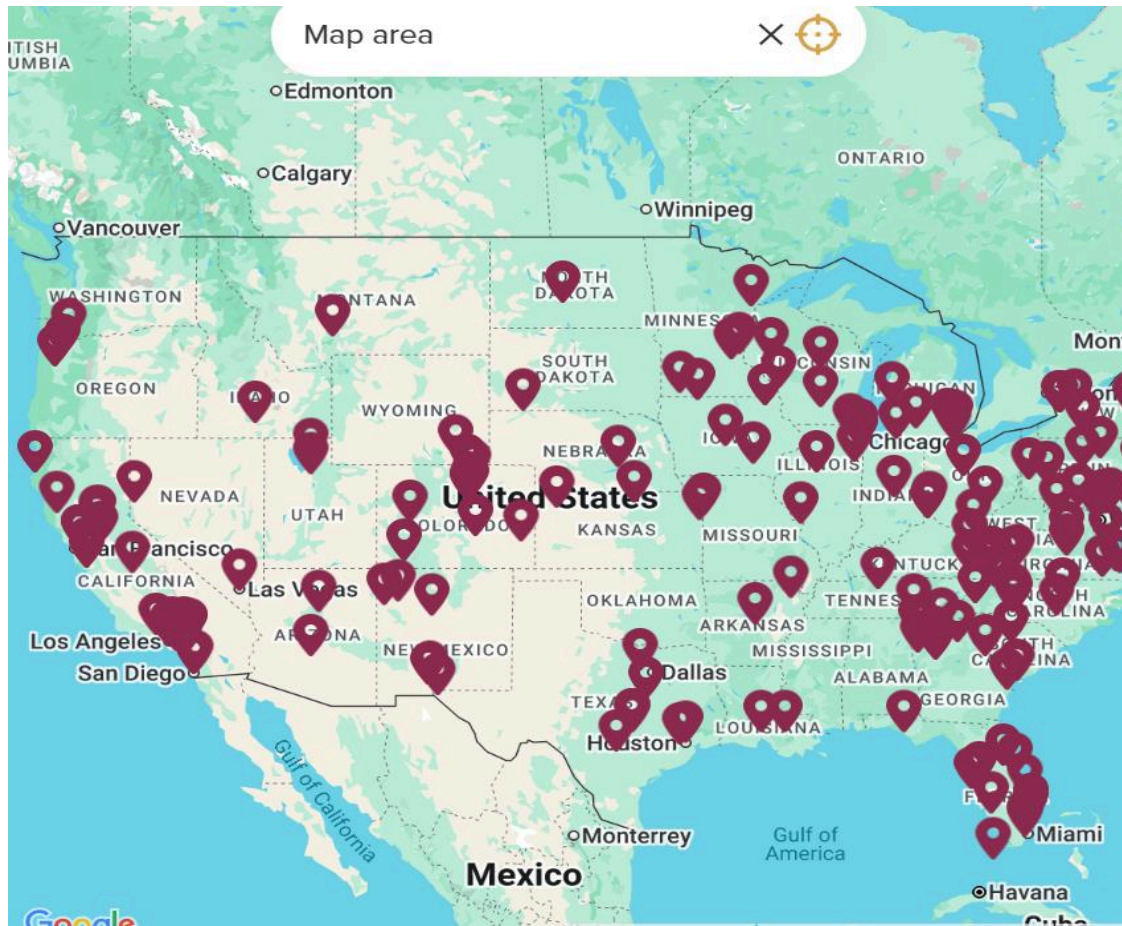
Find more solar energy careers, explore salary ranges, and chart your own path to advancement.

[View the Map](#)



And...Many Resources

Over 200 Solar Training Providers!



Pagan Poggione

Senior Director, Strategic Workforce Engagement
Interstate Renewable Energy Council (IREC)

paganp@irecusa.org





Strengthening Workforce Pipelines: *Leveraging Tools and Resources*

- Take advantage of vetted, high-quality supports
- A workforce is critical to energy deployment and savings, community resilience, and safe and comfortable housing
- Growing demand and an aging workforce means there is an urgent need for new talent
- People across the country lack exposure to career pathways, training, and employment

State Spotlights Where You Live, Transforming Your Career Page



Strengthening Workforce Pipelines: *Youth Pathways*

- Youth represent a pipeline of untapped talent
- Early exposure increases career awareness and readiness
- Young people bring tech-savviness and new ideas
- Connecting youth to career pathways improves community resilience and economic mobility
- Workforce stability depends on engaging younger generations now

Talent Pipelines for Employers



Strengthening Workforce Pipelines: *Registered Apprenticeships*

- No cost technical assistance
 - Understanding and navigating the RA system
 - Registering or expanding RA programs
 - Identifying partners/training providers
- Outreach and engagement support
 - Strategies to reach underrepresented populations
- Recruitment and connection to candidates (2026)
 - Limited incentive funding available





Strengthening Workforce Pipelines: *Business Supports for Contractors*

- 10 Steps to Become a New Home Energy Performance Contractor
- Home Performance Contractor Business Plan: Guidelines and Sample Plan
- Proforma Financial Statement for Home Performance Businesses
- Budget and Chart of Accounts Worksheet for Home Performance Businesses
- Guide to Insurance for Your Energy Company
- Guide to Customer Relationship Management (CRM) Systems for Your Business
- Guide to an Employee Handbook for Your Energy Business
- Example Employee Handbook for Your Energy Business
- Guide to Onboarding Your Home Energy Performance Installers



**Ahora
Disponible
en Español**



Beyond Green Workforce Connect: *More IREC Resources*

- *Exploring Solar Careers* and more at **CleanEnergyTraining.org**
- Additional education at **CleanEnergyClearinghouse.org**
- Interconnection policies and state grades at **FreeingTheGrid.org**
- Energy storage interconnection solutions at **EnergyStorageInterconnection.org**
- Local community support at **Energy-Ready.org**
 - SolSmart, Charging Smart, and Distributed Wind Smart



Thank you!

