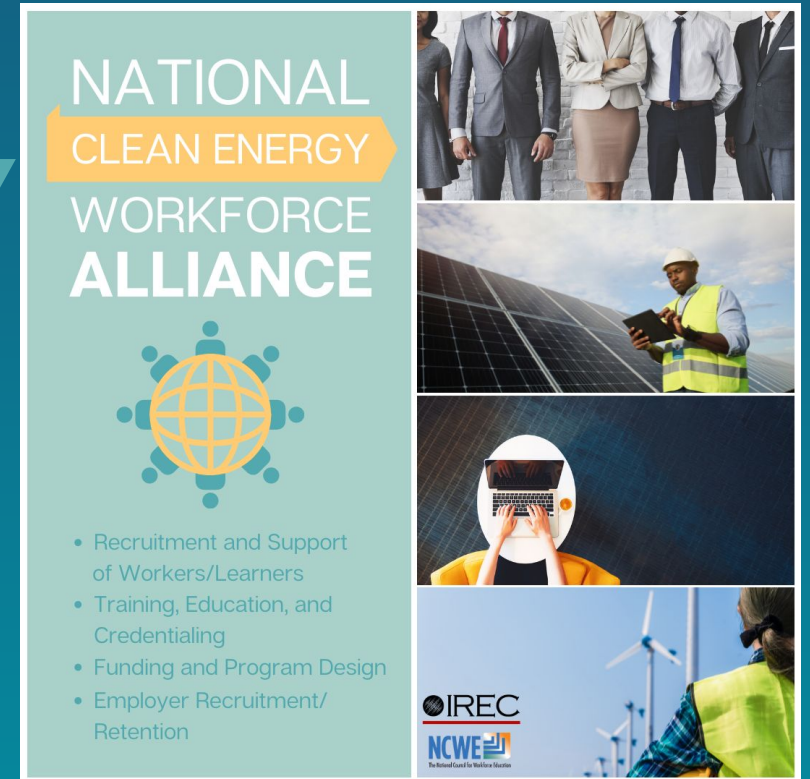



National Clean Energy Workforce Alliance

Equitable Solar Workforce Development Community Convening




August 15, 2024



**NATIONAL
CLEAN ENERGY
WORKFORCE
ALLIANCE**



- Recruitment and Support of Workers/Learners
- Training, Education, and Credentialing
- Funding and Program Design
- Employer Recruitment/Retention



**CONVENED WITH SUPPORT FROM
BANK OF AMERICA**

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.

Today's Agenda

- **IREC:** Introduction to National Clean Energy Workforce Alliance
- **Short Workforce Development Presentations:**
 - Freedom Forever — Workforce Development Partnerships
 - PVcase — Bridging the Renewable Energy Skills Gap
 - RE-volv — Solar Ambassador Fellowship Program
 - Solar Landscape — Workforce Development
 - Elevate — Workforce Solar Training Methodology and Approach

Today's Agenda

- **Short Presentations Con't**
 - City of Minneapolis — Solar and Building Electrification Training and Career Placement
 - Solar United National — SUN Development and Workforce Training
- **Midwest Renewable Energy Association** — Presentation of Landscape Review and Gap Analysis
- **Stakeholder Review Survey**
- **Discussion and Next Steps**
- **Q/A**

NCEWA Partnership Introductions

- **Cynthia Finley, Ph.D.**, Vice President, Workforce Strategies & Innovation, IREC
- **Dr. Janell Hills-Thomas**, Director, Equitable Workforce Strategies, IREC
- **Dr. Deb Rowe**, National Council for Workforce Education (NCWE) - President U.S. Partnership for Education for Sustainable Development
- **Dr. Girard Melancon**, Director of the National Green Jobs Advisory Council (NGJAC) at the National Council for Workforce Education

A few reminders

- Listeners are on mute.
- Use the “Q&A” tab to send us any questions. We’ll address your questions in the discussion at the end of this webinar.
- We’ll send you a copy of this presentation and other follow up resources.
- Mark your calendar! Third Thursday of each month @ 2:00 p.m. ET!
- Closed Captioning has been enabled for this webinar if attendees would like to utilize closed captioning, press "Show caption" in the user control panel at the bottom of your screen.

NATIONAL CLEAN ENERGY WORKFORCE ALLIANCE



NATIONAL

CLEAN ENERGY

WORKFORCE
ALLIANCE

COHORTS

**Funding and
Program Design**

Federal, regional, and
state entities, policy
makers, utilities

**Recruitment and
Support of
Workers/Learners**

CBOs, energy justice
orgs, CAPs, workforce
system, others providing
services and removing
barriers to entry

**Training, Education,
and Credentialing**

Colleges and other
education and training
orgs, organized labor,
credentialing bodies

**Employer
Recruitment/
Retention**

Employers and trade
associations





GREEN WORKFORCE CONNECT

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



Presenters



Nick Hylla, Executive Dir., MREA



Ellen Barlas, Associate Dir., MREA

Presenters



Janet Gomez
Director, Talent
Acquisition·Freedom Forever



Stefan Boehme
Education Content Manager
PVCase



Lauren Friedman
Solar Ambassador Program
Manager·RE-VOLV

Presenters



Sarah Pidgeon
Executive Director for
Workforce Development
Solar Landscape



Nycholle Brown
Senior Project Manager,
Workforce and Contractor
Development
Elevate



Grant Scheffer
Solar United National

Presenter



Justo Garcia, Solar and Building Electrification Training and
Career Placement · City of Minneapolis

Midwest Renewable Energy Association



Promoting renewable energy, energy efficiency, and sustainable living through education and demonstration since 1990.

Together with partners around the Midwest, we work to expand renewable energy adoption through innovative programs, renewable energy training, and educational events.





National Clean Energy Workforce Alliance – Training Program Presentations

 freedom forever

Workforce Development Partnerships

Janet Gomez

FREEDOM FOREVER
DIRECTOR, TALENT ACQUISITION



ABOUT US

Freedom Forever is a Residential Solar Installer servicing 33 states and 1 US Territory out of 53 Installation hubs.



Our seven core company values inspire everything we do and shape the everyday culture we experience:



DIVERSITY



SERVANT
LEADERSHIP



INTEGRITY



SAFETY



ACCOUNTABILITY



COLLABORATION



DISRUPTION



EQUITABLE SOLAR WORKFORCE PARTNERSHIPS



We take pride in our dedication to prioritizing recruitment from underserved communities. By doing so, we aim to attract top talent and provide career opportunities and training to individuals who may not have had previous access to such options in our industry.

SUCCESSFUL PARTNERSHIPS

- Urban League
- OAI
- Amplify Academy
- Millenium Solar Training Academy
- YouthBuild
- IL Central College (Solar Training Pipeline Program)
- Love Life Outreach
- ME Refugees & Immigrant Services
- Oregon Tradeswomen Inc
- Heartland Community College
- Workforce Community Career Centers
- Tribal Community Programs
- IREC and the ACE Network



PARTNERSHIPS OVERVIEW

Our commitment to our community partnerships involves a range of activities including:

- Visiting training centers with branch leaders to present to students and showcase the different career paths available
- Conducting one-on-one interviews onsite
- Attending graduation ceremonies to meet with students immediately upon graduation
- Participating in job fairs and career events
- Donating materials
- Serving on advisory committees to help develop solar training programs



COMMITMENT TO OUR EMPLOYEES AND A STRONGER INDUSTRY

- Investing in Employee Growth
- Ensuring Everyone Thrives
- Building a Sustainable Future
- Caring for Our Team



"We must help raise the bar in the solar industry as a whole. Workers in the renewable industry trades deserve comprehensive training programs that ... create a better experience for workers and customers, ensure safety on the job site, and ultimately lead to a stronger industry."

MATT MARKHAM,
DIRECTOR OF
ELECTRICAL OPERATIONS





Bridging the renewable energy skills gap

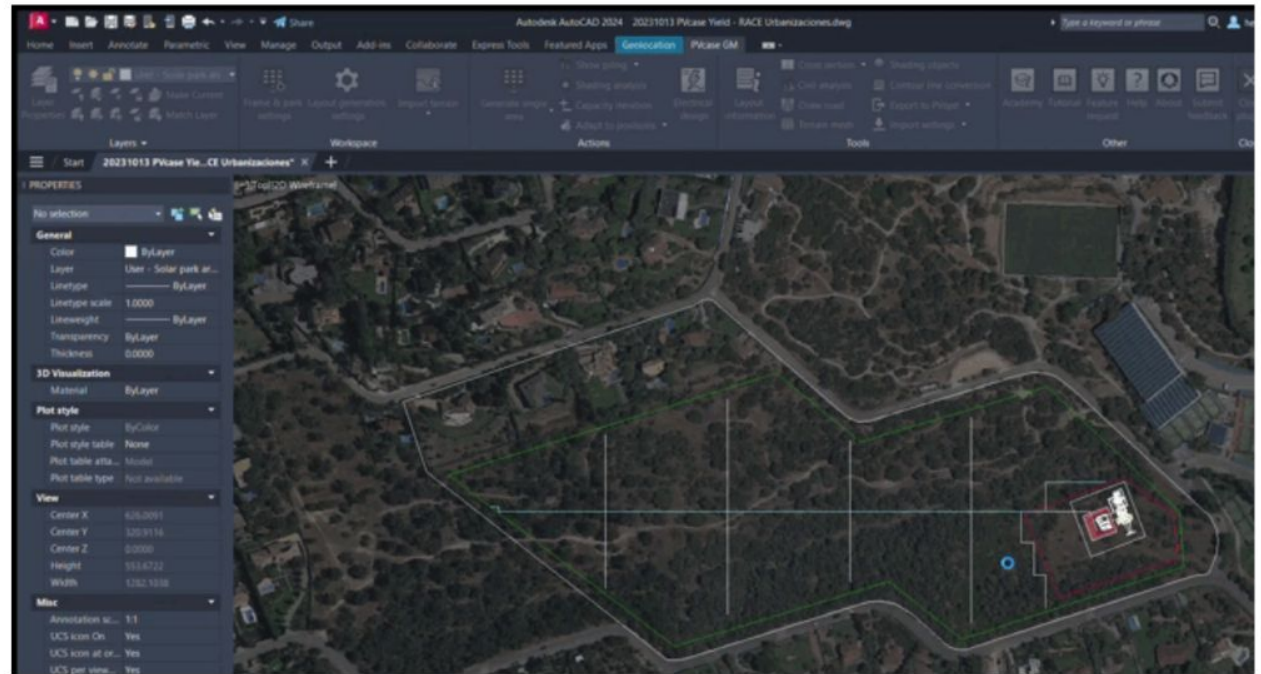
A success story of PVcase, Enery, and the
University of Applied Sciences Upper Austria

Identifying the Need

The rapid expansion of the renewable energy sector has created a high demand for skilled professionals capable of designing and implementing utility-scale solar projects.

“By 2025 more than 1 million solar workers in the EU will need to be trained to deliver well-functioning and safe solar equipment and installations.”

EU Solar Jobs Report 2023



Program Overview



In 2023 PVcase partnered with Energy and the University of Applied Sciences Upper Austria

- **Program Goals:**
 - Reduce the time of gaining engineering skills while introducing design automation tools used in the solar industry, via interactive project-based learning.
- **Target Group:**
 - Students in the Sustainable Energy Systems master's program

Innovative Training Program

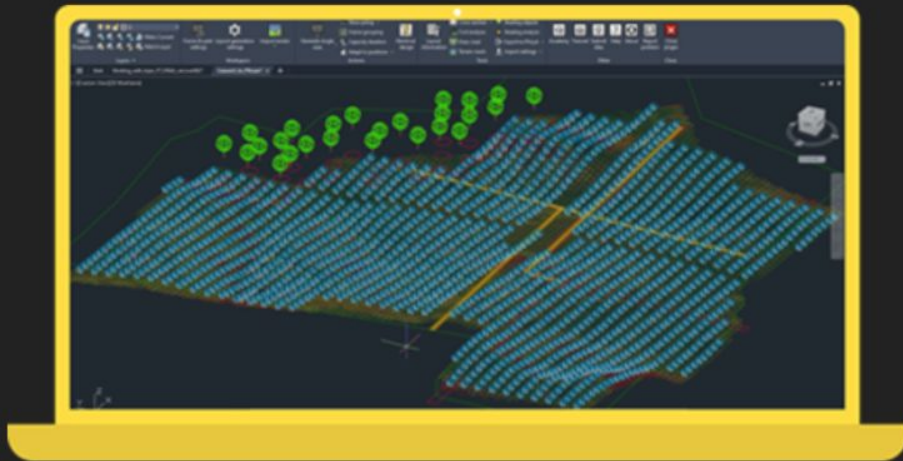
- PVcase Ground Mount was integrated into theoretical lectures at the University of Applied Sciences Upper Austria.
- A power user from Enery provided on-site lectures including project assignments to students.
- Educational licenses for students enabled them to get hands-on experience in utility-scale solar planning and design with PVcase Ground Mount.
- Comprehensive online training material at PVcase Academy allowed for further studies of the tool.



Impact

What happened since the program was launched?

- **22** students participated in the 2023 pilot
- **35** students enrolled in 2024
- **21** students used PVcase Ground Mount for their Master's Thesis.



- **Discounted Internship licenses** were introduced to incentivise companies to provide learning opportunities for students.
- **Expansion of the educational licensing program** to top universities with **over 10.000 students** globally.

Challenges and Solutions

- Most students lacked basic AutoCAD knowledge
 - The updated university curriculum now includes a mandatory AutoCAD basics course to prepare students.
- Students did not utilize the PVcase Academy as compared to paying clients
 - Tailored learning paths will be introduced, and PVcase Product Suite training will allow university to expand their curriculum (GIS, C&I rooftop, and Yield analysis).
- Educational license request process was too slow
 - Students can now request educational and research licenses directly from PVcase, without involving the lecturer, streamlining the process.

Conclusion



- The project was **implemented within 6 months** to be ready at the beginning of the semester.
- After the pilot program between PVcase, Enery and Austrian university, a **scalable framework was developed** by PVcase and is about to be implemented and launched in 10+ countries world wide.
- **Partnership** between industry experts, tech companies and universities **created a closed loop**, equally beneficial for all parties involved, which makes it self-sufficient,
- This initiative helped to **reduce typical training time** by 50% and improved skill proficiency by 20%. In addition, students were offered Internship positions by PVcase customers.



Thank you!
Any Questions?



EMPOWER

INVEST

EDUCATE

RE-volv's Solar Ambassador Fellowship Program

Building professional experience in the climate sector.





RE-VOLV



SOLAR AMBASSADOR FELLOWSHIP

ABOUT RE-VOLV

RE-volv is a climate action nonprofit. We help nonprofits across the country go solar.

RE-volv raises awareness about equitable climate solutions and empowers communities to take action.

RE-volv also invests in the future by training the next generation of clean energy leaders:

The Solar Ambassadors.



Solar Ambassador Fellowship

EMPOWERING STUDENTS. ENERGIZING COMMUNITIES

The RE-volv Solar Ambassador fellowship program is an academic year-long fellowship open to students at any US college or University.

The program focuses on exposure and experiential learning.

FELLOWSHIP LOGISTICS

TRAINING:
ORIENTATION
AND MONTHLY
WEBINARS

TEAM WORK:
STUDENTS
HOST EVENTS
AND OUTREACH
TO NONPROFITS

SHADOWING:
STUDENTS
SHADOW US
THROUGH SOLAR
PROJECT DEV

**CAREER PREP &
CONNECTIONS**
MENTORING,
RESUME
SUPPORT, &
MORE

RE-VOLV

We provide our Solar Ambassadors with professional development opportunities, including training in:

- Solar energy
- Project management
- Technology
- Sales and finance
- Event planning

At the end of the program, every Solar Ambassador receives a certificate of completion and graduating seniors get career support.

www.re-volv.org/solar-ambassador

SOLAR AMBASSADOR FELLOWSHIP



Benefits

RE-VOLV

2023-24 SCHOOLS



GEORGIA TECH

In March, the Ambassador team at Georgia Tech helped LifeLine Animal project, Georgia's largest animal welfare organization, go solar.

The 200kW system will save LifeLine an estimated \$1.6 million on their energy bills over the system's lifetime.

Students were featured on Atlanta local news and added the project to resumes and portfolios when applying to jobs and internships.

"As a student with a growing passion for renewable energy, the Solar Ambassador program looked like the perfect way to get experience with solar and simultaneously make a difference in my community"
- Ella Stewart, Georgia Tech Solar Ambassador Team Leader



THE IMPACT (all time)

440+

Solar
Ambassadors

46

Universities involved
across the United
States

16

Nonprofits
successfully
solarized

17.8M

lbs of CO₂
avoided

THE IMPACT ('23-24 cohort)

5/5

Av. increase in
solar career
interest

77%

Employment Rate
for 23-24 cohort
(so far!)

100%

Jobs in solar or
related field



What's next?

- Growing and scaling to serve more schools – especially smaller schools, MSIs, HBCUs, Community Colleges
- Including more advocacy and education work



Workforce Development

EDUCATE TRAIN EMPLOY

Advancing equitable access to the benefits of solar energy through community solar and workforce development





solarlandscape

Commercial Rooftop & Community Solar Specialists

Maintaining the highest quality rooftop solar with our in-house engineering and design teams, and commitment to community engagement and workforce since 2012

\$20M

Bill savings for subscribers over 20 years

45,000

Metric tons of avoided GHG emissions

#1

Provider of LMI Community Solar in the Nation according to Groundswell

325 MW

Operating, in construction, & awarded



Community Solar + Workforce Development



Every community solar project creates **local jobs** and job **training opportunities**

Workforce Development Program

2,200+
Trainees

STEP-UP Solar installation job training for individuals facing barriers to employment

75
Teachers

TRAIN-THE-TRAINER Training for career and technical education HS teachers to incorporate solar installation into their curriculum

2,300
HS Students

GREEN AMBASSADOR PROGRAM (GAP) Virtual solar energy education course, classroom visits, and annual \$20,000 scholarship challenge



AWARDS & GRANT FUNDING

- U.S. Department of Energy (DOE) **Sunny Award Winner**
- DOE Solar Energy Technologies Office **Equitable Workforce Development Grant Awardee** to scale STEP-UP Nationally

Workforce Partnerships with Schools & Nonprofits | [New Jersey](#) | [Illinois](#) | [New Mexico](#) | [Massachusetts](#) | [New York](#) | [Maryland](#)



Case Study: Launching STEP-UP in Chicago

Current & Past Workforce/Education Partners

- Hispanic American Construction Industry Association (HACIA)
- Chicago Urban League
- Safer Foundation
- YouthBuild USA
- Better Sister & Brother Growth Network
- SCARCE

Industry Led Training Model

- **Crash course hands-on solar installation training** for Illinois residents
- Introduction to MES requirements in Illinois and opportunities for EEP's and EEC's
- Trainees receive **stipends, certificates, and access to transportation assistance**
- Training opportunities for small, local solar companies looking to grow their business

Highlights

- Over **65 community members** trained
- 100% of surveyed trainees said they would recommend the Solar Landscape training
- 7/10 participants at a July 2023 training are now employed in solar or a related industry



"I enjoyed the hands-on activities. It allowed for us to get an understanding of how the work is on the job sites."

Workforce Trainee

January 2024 Training with Chicago Urban League

Key Take Aways & Program Goals

- Build partnerships with local CBO's and workforce organizations
- Offer customized training to meet local needs
- Train-the-Trainer supports program sustainability
- We are aiming to train and place 350 individuals into solar careers over the next 3 years
- We are also seeking to connect trainees to registered apprenticeships





Thank You



Clean Energy Workforce Training Programs

Methodology & Approach



ELEVATE

Introductions



Jaylin McDonald
Project Coordinator
Workforce and Contractor Development



Nycholle Brown
Sr. Project Manager
Workforce and Contractor Development



Tina Marie Williamson
Project Coordinator
Workforce and Contractor Development

Agenda

- Introductions
- Who we are
- Mission
- Vision
- Overview: Clean Energy Workforce Training

Who We Are

- Elevate is a nonprofit organization that works nationally and is headquartered in Chicago.
- Elevate designs and implements programs to ensure that everyone has clean and affordable heat, power, and water in their homes and communities — no matter who they are or where they live.
- “Equity Through Climate Action”

Where We Work:



Elevate's Mission

We design and implement programs that reduce costs, protect people and the environment, and ensure the benefits of clean and efficient energy use reach those who need them most.

Vision

Elevate seeks to create a just and equitable world in which everyone has clean and affordable heat, cooling, power, and water in their homes and communities — prioritizing frontline communities.



Overview: Clean Energy Workforce Training

The solar training program ranges from 4-16 weeks, Monday-Friday, and is delivered in a hybrid setting (virtual, in-person, and hands-on labs). Students participate in job shadows, field trips, and high-end training that builds their knowledge capacity and increases their earning power. Additionally, students receive certifications that gives them a competitive edge in the clean energy workforce.

North American Board of Certified
Energy Practitioners (NABCEP)

American Red Cross CPR & First Aid

OSHA 30
Construction

OSHA Scaffolding

Power Industrial
Vehicles (PIV)

Iron Ridge
Materials Installer

Scissors lift/Skid
Steer/Forklift

Outreach and Recruitment



Community
& Partner
Engagement



Information
Sessions



Application
Submittal



Interviews &
Selection



Partner Engagement



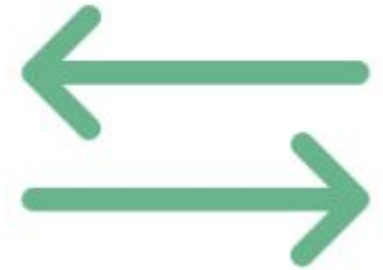
**Curriculum &
Classroom Schedule**



**Instructor &
Collaborator Check-ins**

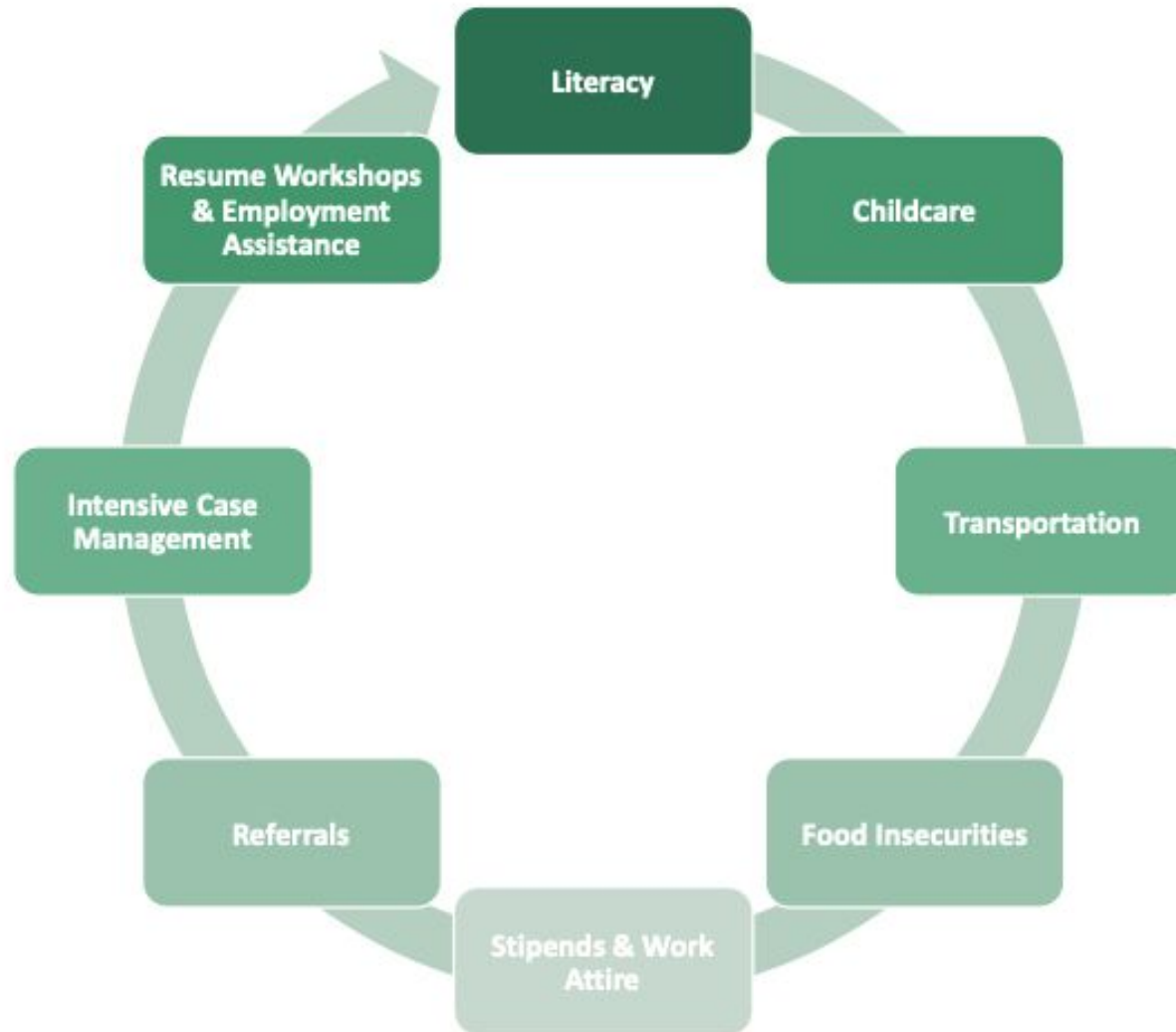


**Theoretical & Practical
Training Workshops**



**Managing Adjusting
and Changes during
Training**

Clean Energy Workforce Training: Wrap-around Resources



Lessons Learned- Internal and External Insights



**Program Successes
and Challenges**



Mitigation Strategies



**Partner Engagement
& Feedback**



Program Refinement

Contact



Nycholle Brown

Sr. Project Manager

Workforce and Contractor Development

Phone: (773) 294-8939

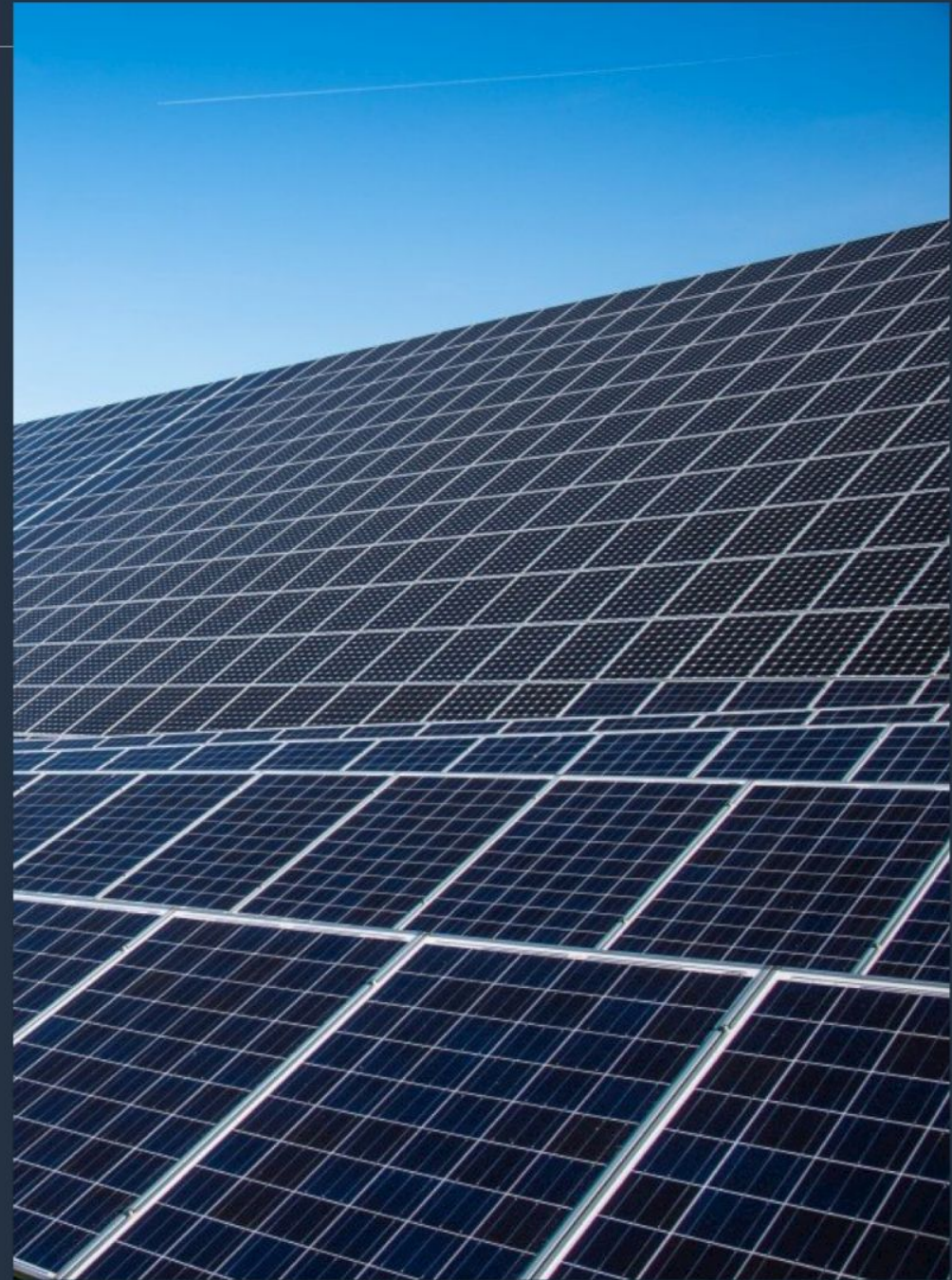
Email: Nycholle.brown@elevatenp.org



Solar and Building Electrification Training and Career Placement in Minneapolis Green Zones

Midwest Renewable Energy Association

City of Minneapolis, Green Careers Exploration



Identifying the Need

- Opportunity to recruit and train individuals and deploy new electrical infrastructure in environmental justice areas that are working to address persistent high unemployment and elevated energy burden.



Program Overview

- In 2020 the Midwest Renewable Energy Association (MREA) partnered with the City of Minneapolis through the Green Careers Exploration Program.
- **Program Goals:**
 - Equip youth with essential skills for careers in the solar industry and environmentally friendly career paths, addressing urgent climate concerns while promoting diversity.
- **Target Group:**
 - Youth from Black, Brown, and Indigenous communities.



Program Overview



- Training sessions took place at the Regional Apprenticeship Training Center (RATC) in Northern Minneapolis, a Black-owned facility chosen for its accessibility.
- Customized training to meet local needs:
 - Pathways to the North American Board of Certified Energy Practitioners (NABCEP) PV Associate Credential
 - No-barriers-to-entry introductory solar training program
 - Solar training labs for hands-on experience

Impact

- Since its inception:
 - 219 students participated in MREA solar training at the RATC
 - In 2024, the MREA will provide 12 weeks of training at the center
 - 23 students secured paid internships
 - 20 students were hired full-time by six solar companies in the Minneapolis area



Sustainability and Scalability

- Challenges faced: the MREA's NABCEP PV Associates courses were not a great fit for all students
- Wrap around services like bus passes and childcare stipends are key
- The success of this program is the partnership between the city, the training provider and the community.



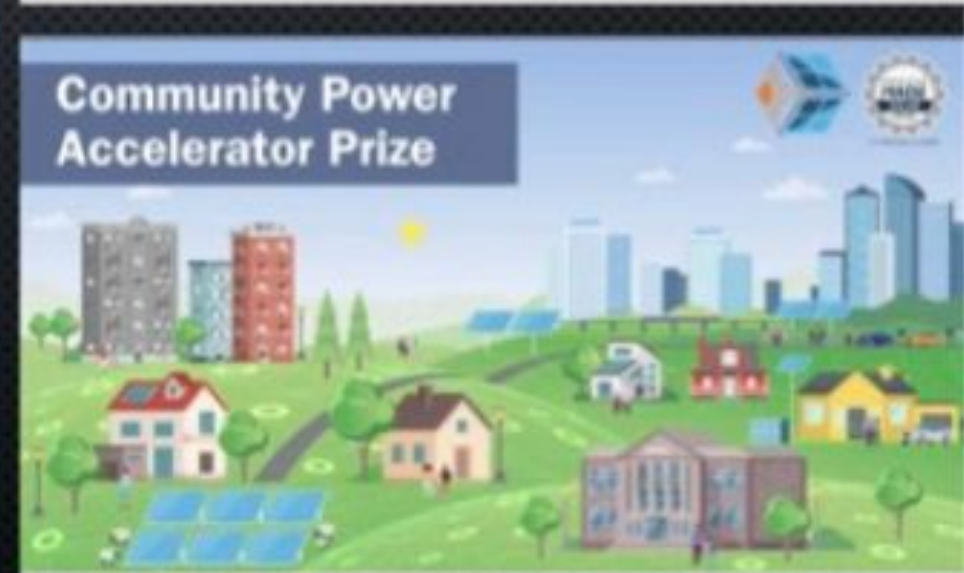
Conclusion

- It took 4 years to build the program to its current level
- The partnership aspect between the jurisdiction, the community and the training provider is what makes this program work
- Questions?

SUN DEVELOPMENT & WORKFORCE TRAINING



PROJECTS TO TRAINING MODEL



EV ELECTRICIAN

HARWARE

\$75/HOUR

APPRENTICESHIP

SCHOOL - COLLEGE PATHWAY



EV SERVICE TECHNICIAN

SOFTWARE

\$25/HOUR

NO APPRENTICESHIP

NO SCHOOL- COLLEGE PATHWAY



ENERGY AUDITOR & WEATHERIZATION INSTALLER



QUALIFICATION:

BUILDING ANALYST CERTIFIED BY BPI
(BUILDING PERFORMANCE INSTITUTE)

TRAINING AND EMPLOYMENT THROUGH
LOCAL WAP'S AND EOC'S

CONTAINED ENVIRONMENT AGRICULTURE



Train local farmers to grow year round crops and mitigate the effects of Climate change.

Create the future food workforce.

Provide healthy food.



Equitable Solar Communities of Practice



- The U.S. Dept. of Energy (DOE) Solar Energy Technologies Office launched the Equitable Solar Communities of Practice program to support the expansion of equitable benefits in solar adoption.
- The **Solar Workforce community of practice** focuses on topics relating to ensuring that solar jobs are accessible to workers from all backgrounds, provide prevailing wages and benefits, and offer pathways for union membership.
 - **Lead Organization:** Midwest Renewable Energy Association (MREA)
 - **Core Team Members:** GRID Alternatives, Renewables Forward, Solar Energy International, the American Federation of Government Employees (AFGE), the City of Minneapolis Green Careers program, and the Interstate Renewable Energy Council (IREC).



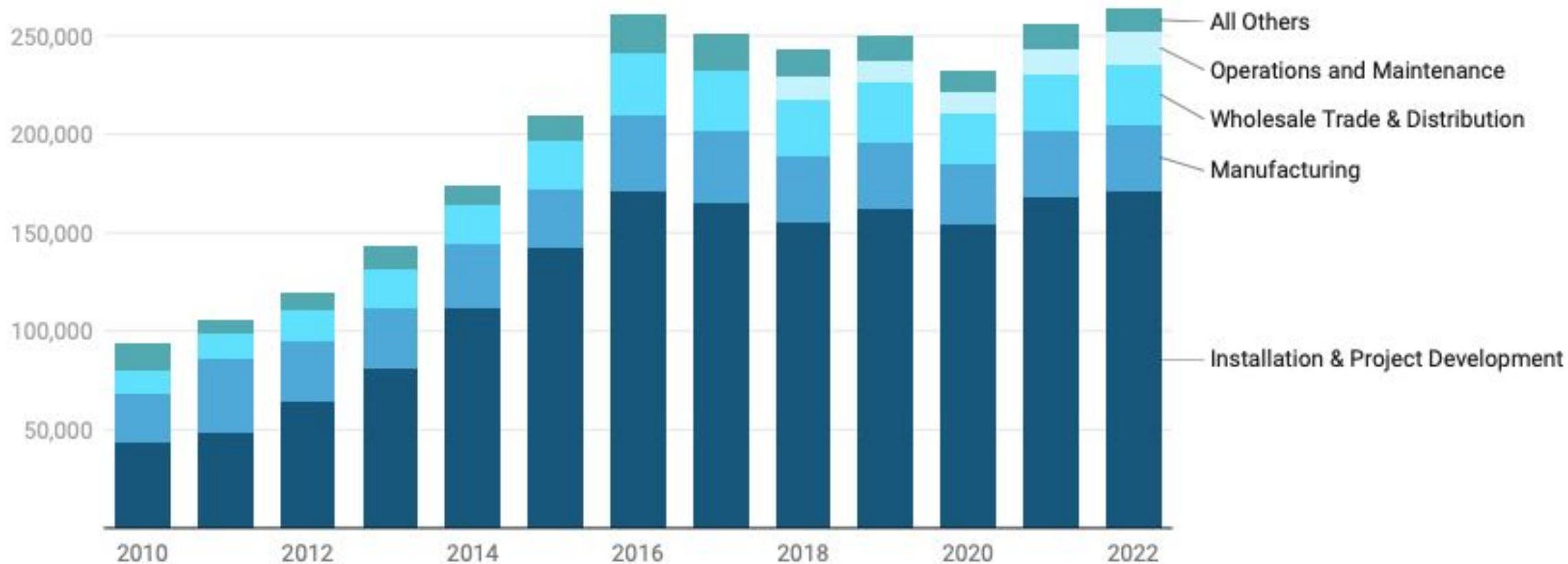


Landscape Review

Equitable Solar Workforce Development



U.S. Solar Employment Growth by Sector

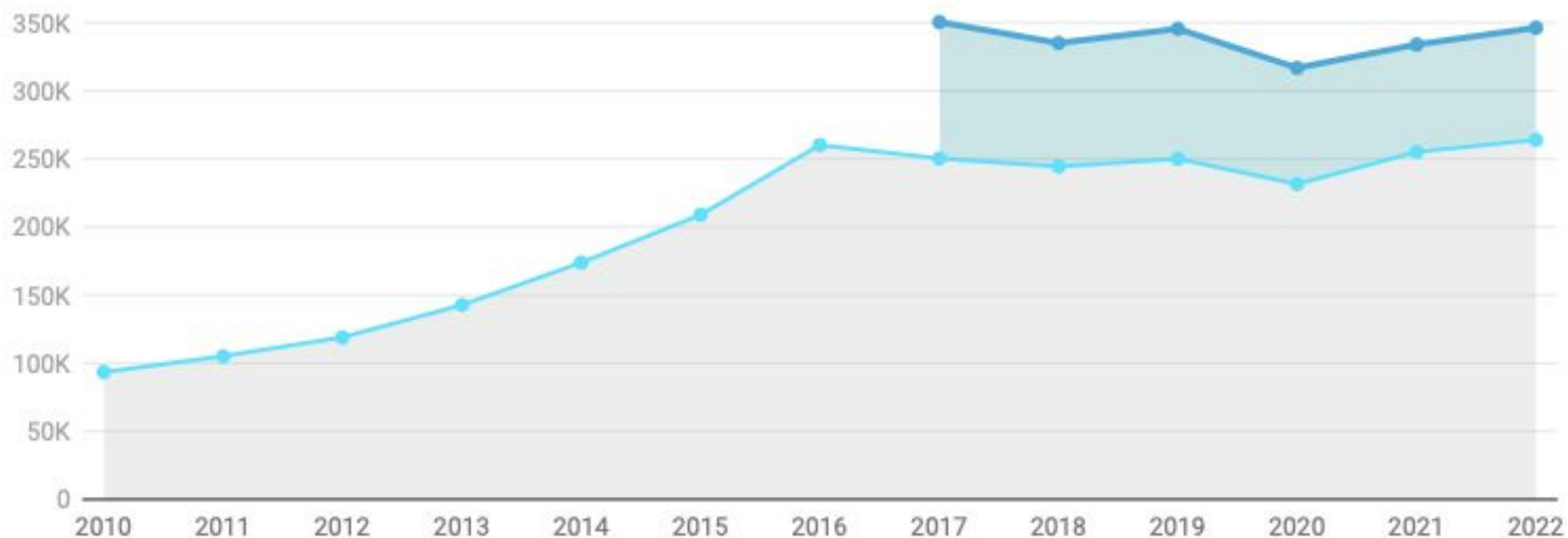


Note: Prior to 2018, O&M jobs were included in the "All Others" category. Sector-level data for Puerto Rico are included in 2019, 2021, and 2022.

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

U.S. Solar Employment Growth, 2010-2022

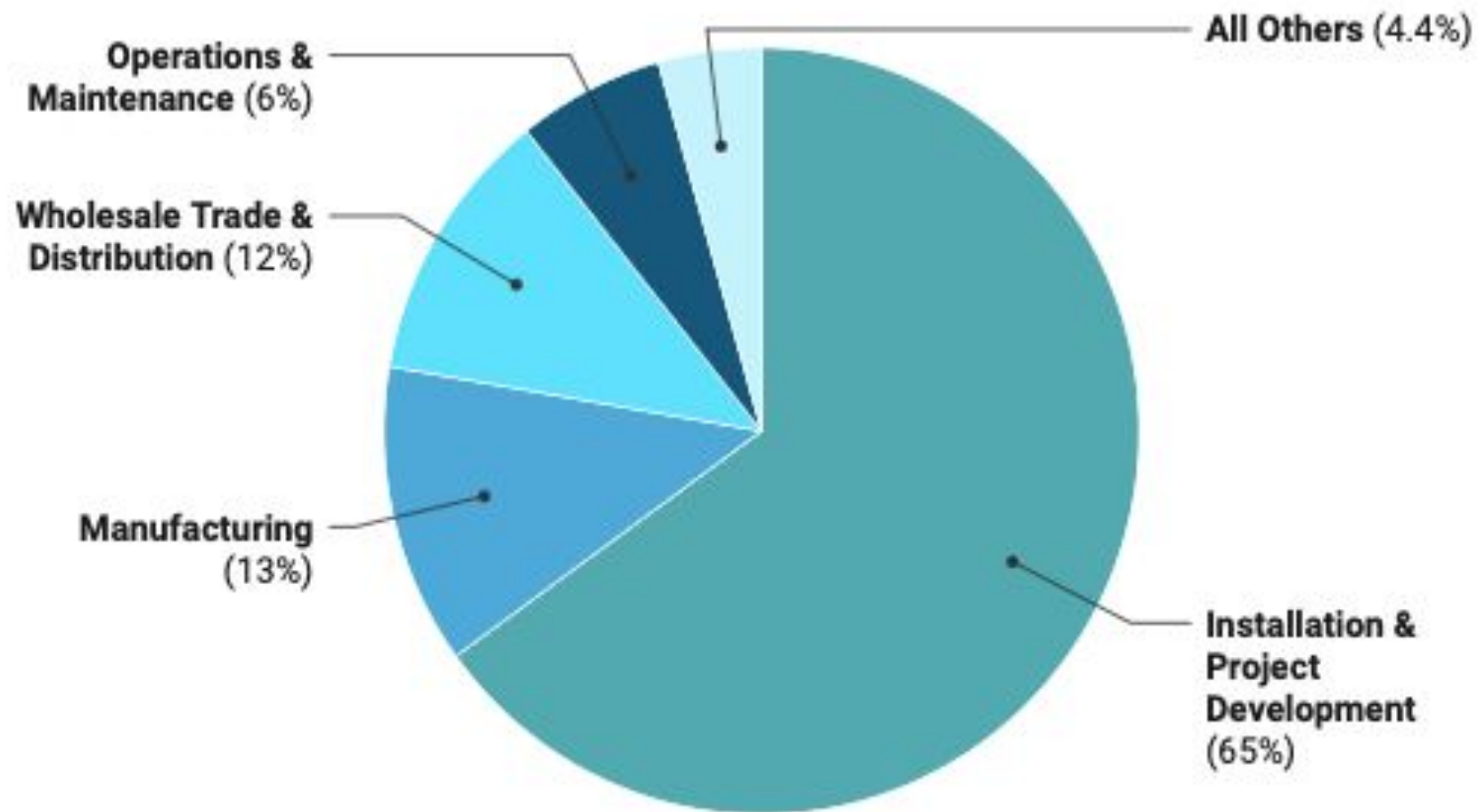
— All Solar Jobs — Majority-Time Solar Jobs



Note: "All solar jobs" refer to all workers who spend more time on solar than any other energy industry. Majority-time solar jobs refer to those who spent 50-100% of their time on solar-related work.

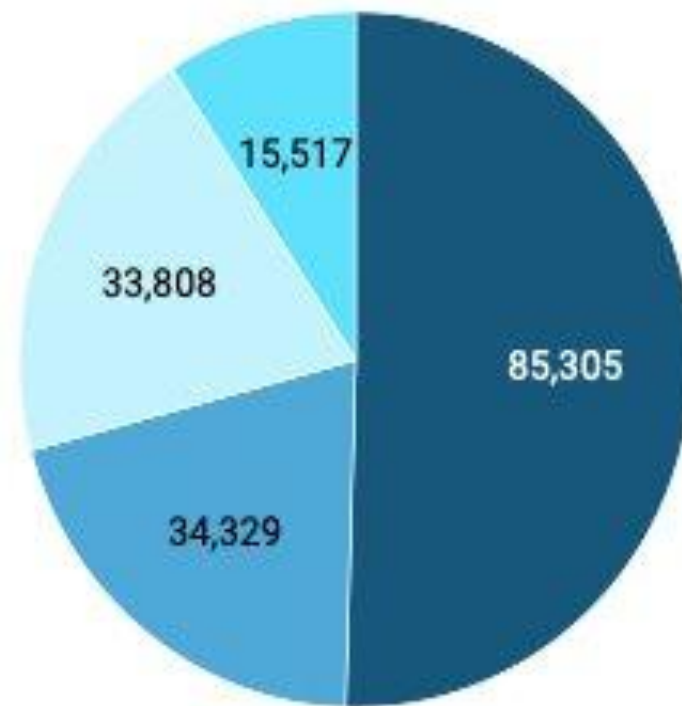
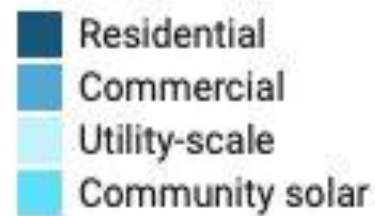
Source: IREC National Solar Jobs Census 2022 • Created with [Datavrapper](#)

U.S. Solar Jobs by Sector, 2022



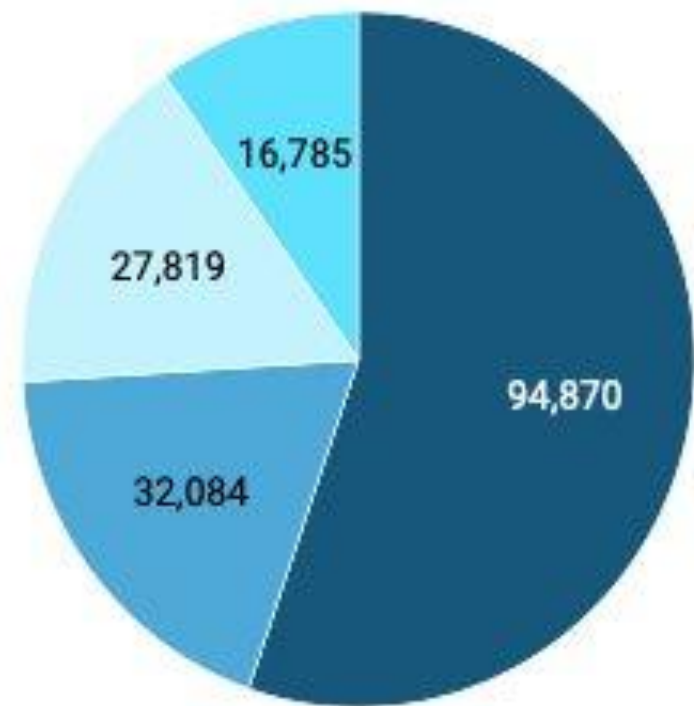
Source: IREC National Solar Jobs Census 2022 • Created with Datawrapper

U.S. Solar Installation Jobs by Market Segment, 2021-2022



2021

Total Jobs, Solar Installation Sector:
168,959



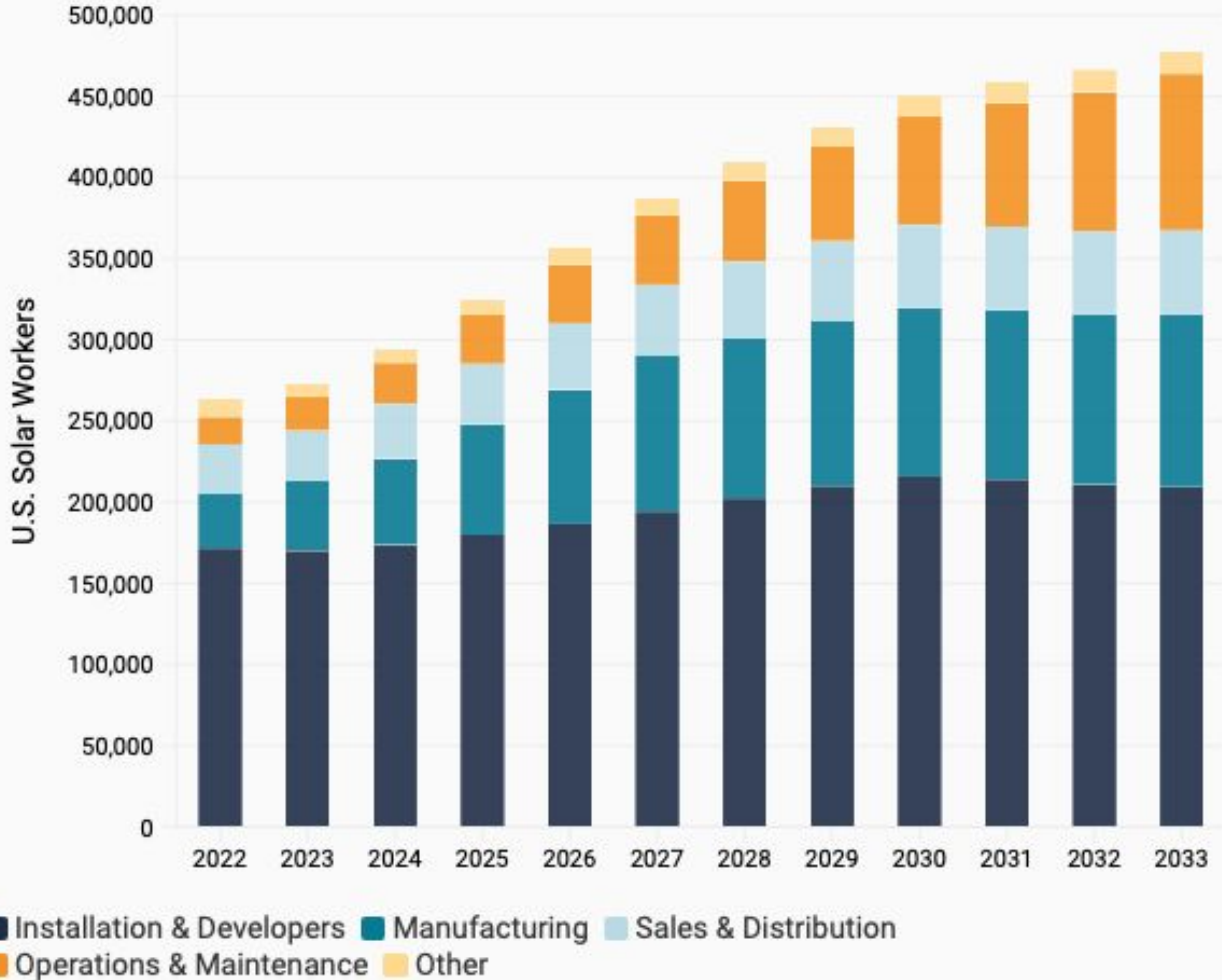
2022

Total Jobs, Solar Installation Sector:
171,558

Inflation Reduction Act (IRA) and Solar Jobs

- Over the next decade, SEIA reports the IRA will create an additional 137,000 jobs when compared with a no-IRA scenario.

U.S. Solar Workers by Job Category



Source: SEIA analysis based on data from Wood Mackenzie, IREC National Solar Jobs Census



Training Program Credentials

- **Licensing:** Requirements differ by State. Requires documented experience, training, testing, continuing education, and reporting to licensing body.
- **Certification:** Training aligned with third party testing provider. Requires continuing education to maintain.
- **Certificates and/or Technical Diplomas:** Often provided by 2-year colleges with guidance from an industry advisory board. Do not require independent testing or continuing education.
- **Degree Programs:** Bachelor and Associate degree programs offered at 2 and 4-year colleges. Typically require formal industry advisory boards and labor market analysis.



<https://www.nabcep.org/certifications/nabcep-board-certifications/>,

<https://irecusa.org/clean-energy-training/credentials/credential-holder-registry/> and <https://www.nccer.org/>

Solar Careers: Occupations

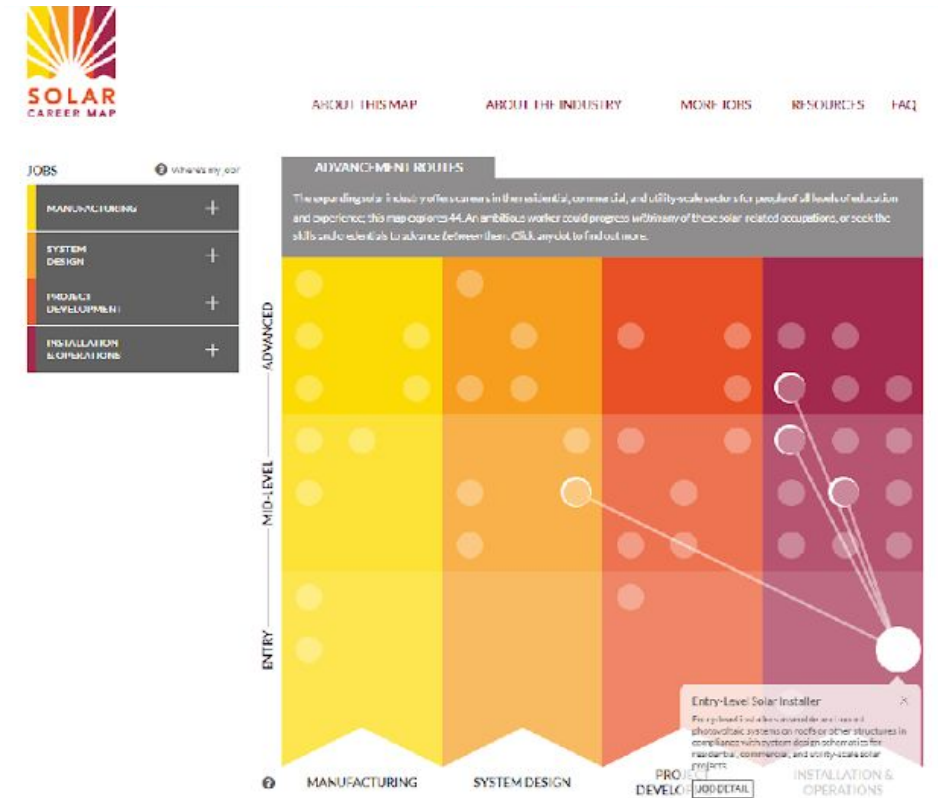
- **Solar Photovoltaic Installer:**
 - Fastest projected growth rate
 - Limited data available by state
 - Fluctuates with state policy
 - Does not delineate between residential and utility scale
- **Related Occupations:**
 - Occupations more clearly defined
 - More detailed state level data
 - Data collection formalized by federal and state agencies

Occupation	Projected Job Growth (National)
Solar Photovoltaic Installer (O*NET 47-2231.00) ²⁹	22%
Civil Engineers (incl. Transportation Engineers) (O*NET 17-2051.00) ³⁰	5%
Civil Engineering Technologists and Technicians (O*NET 17-3022.00) ³¹	1%
Construction Managers (O*NET 11-9021.00) ³²	5%
Electrical and Electronics Engineers (O*NET 172071.00) ³³	4%
Electrical and Electronic Engineering Technicians (O*NET 17-3023.00) ³⁴	1%
Electricians (O*NET 47-2111.00)	6%
Engineering Technologists and Technicians (O*NET 17-3029.00) ³⁵	3%
Environmental Engineers (O*NET 17-2081.00) ³⁶	6%
Project Management Specialists (O*NET 13-1082.00) ³⁷	6%

Solar Careers: A Changing Landscape

Career Mapping:

- IREC has a good baseline
- Industry is evolving with resi/commercial and utility scale sectors diverging
- Solar installer not "apprenticeable"
- Industry focus is on existing, related "apprenticeable" occupations
- State laws shaping career pathways
- IRA: Apprenticeship, prevailing wage



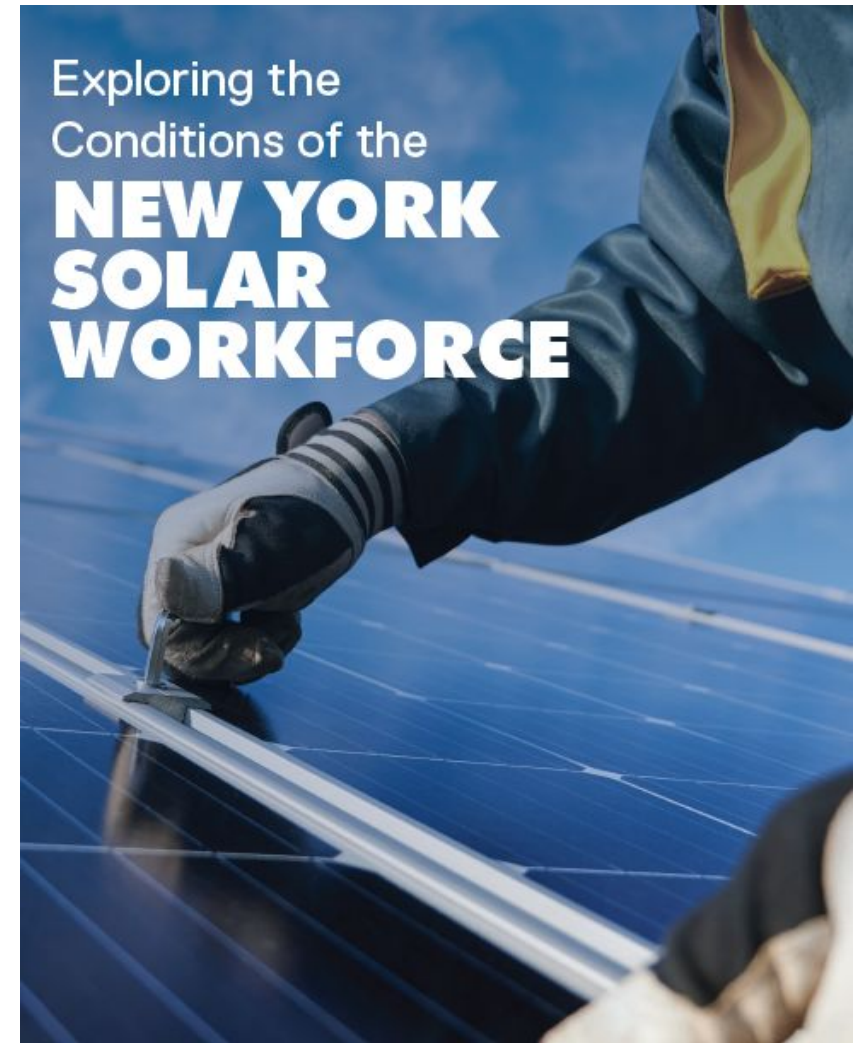
<https://www.irecsolarcareermap.org/>

Solar Careers: New York Workforce Study

Findings – Understanding the Workforce

1. National and state level job estimates based on industry-side data of solar workers may be inaccurate as solar installation and maintenance workers work for multiple employers
2. Solar installation and maintenance workers who work in New York, do not all reside in the state; work across multiple states; and have often relocated for their solar work sites in New York

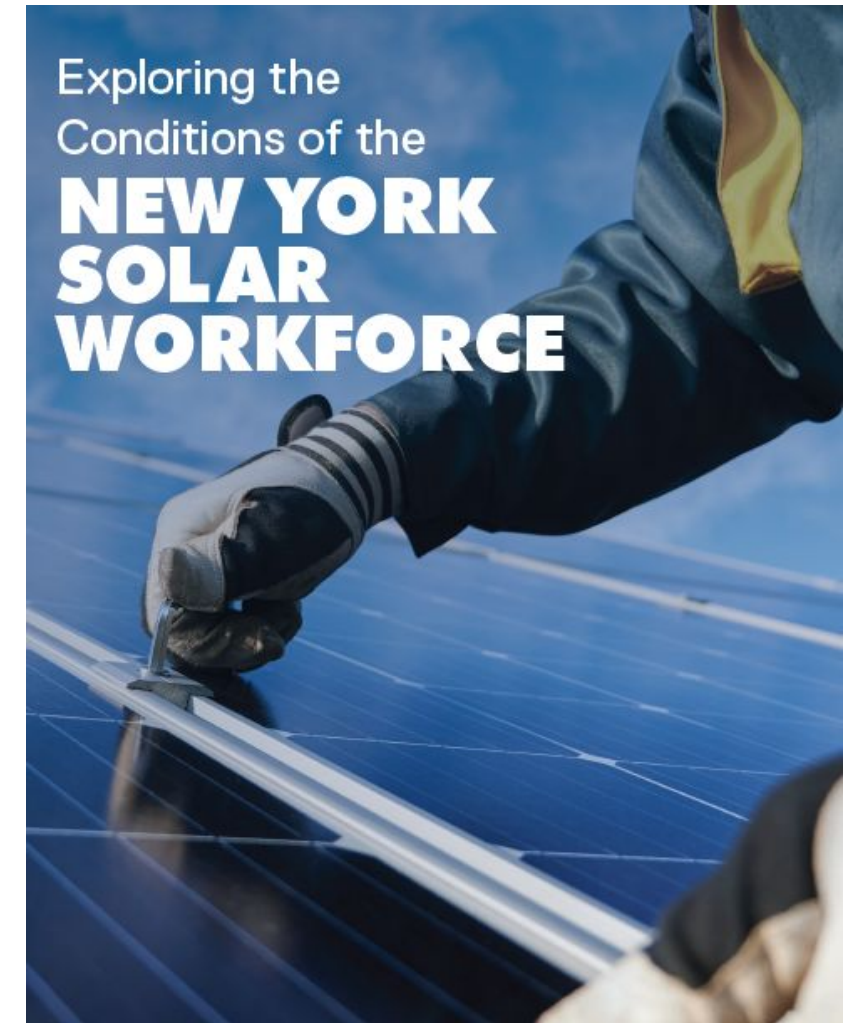
https://www.ilr.cornell.edu/sites/default/files-d8/2024-04/CJI-NYS%20Solar%20Workforce%20Report_April%202024_Final.pdf



Solar Careers: New York Workforce Study

Findings – Racial Disparities

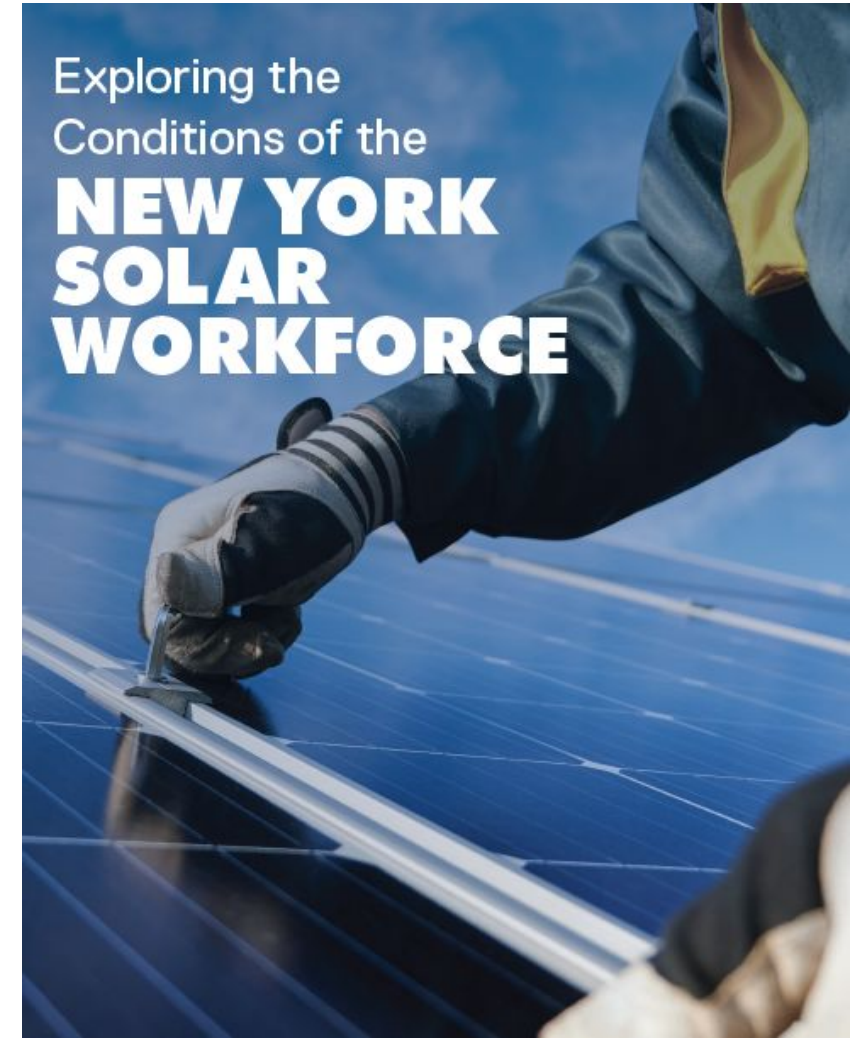
9. White workers paid an annual salary made nearly twice the median rate of their Black and Hispanic counterparts.
10. Black workers were more likely to report they received payment in the form of cash.
14. Black workers were more likely to indicate they had self-paid for their certifications such as OSHA certifications.



Solar Careers: New York Workforce Study

Conclusion

This exploratory study found significant issues for solar construction workers in the sample which was 99.6% non-union. These issues included the prevalence of payment per panel installed, lack of access to benefits, stimulant usage, and transience. Additionally, this study found significant racial disparities across pay, hours worked, benefits and retention.

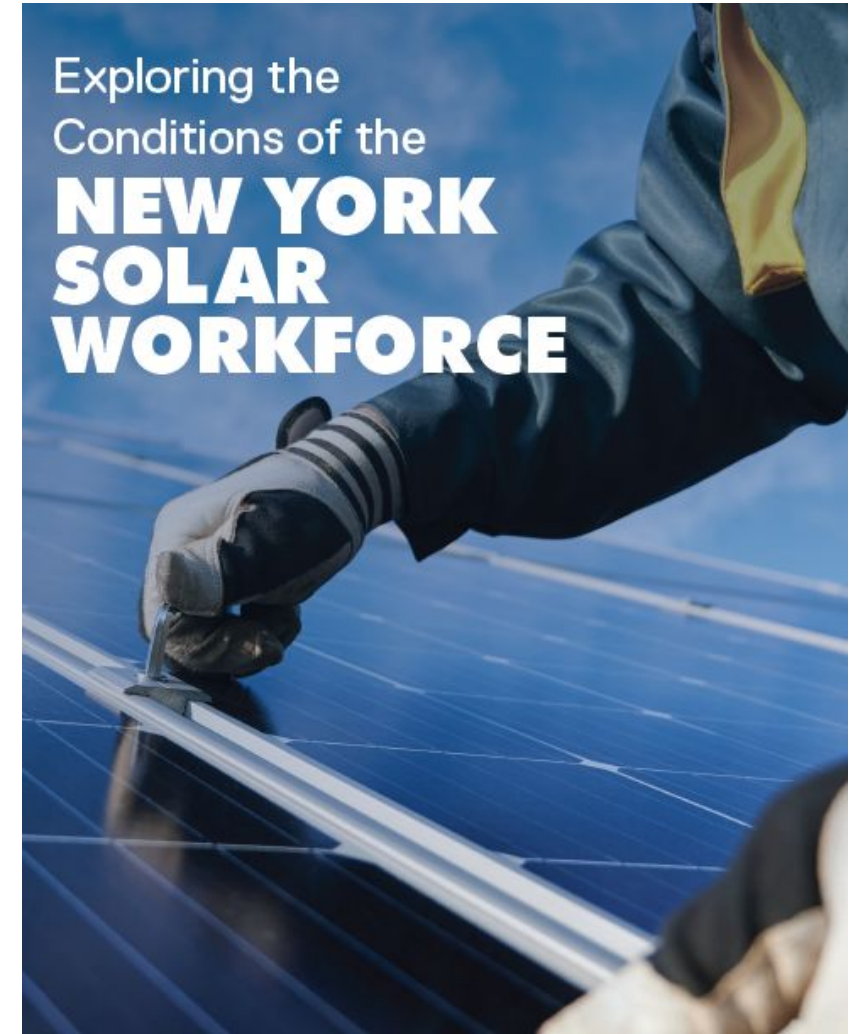


https://www.ilr.cornell.edu/sites/default/files-d8/2024-04/CJI-NYS%20Solar%20Workforce%20Report_April%202024_Final.pdf

Solar Careers: New York Workforce Study

Conclusion

Given that unionized workers are more likely to earn higher wages, tend to have reduced racial and gender pay gaps, are more likely to be covered by employer-provided benefits, and are more likely to report unsafe working conditions (Bannerjee et al., 2021), it follows that future research should investigate samples of primarily unionized solar workers.



https://www.ilr.cornell.edu/sites/default/files-d8/2024-04/CJI-NYS%20Solar%20Workforce%20Report_April%202024_Final.pdf

Apprenticeship



What are apprenticeship programs?

<https://www.apprenticeship.gov/>

- Structured, long-term training programs that combine on-the-job learning with related instruction that leads to a recognized license or qualification in a skilled trade.
- Include uniform supervisory requirements, wages, benefits, etc. That conforms to a standard approved by the state apprenticeship administrator and/or U.S. DOL.
- Related instruction is received through the association, union, or formal training partnership.
- The 200 Apprenticeship Readiness Programs in 29 US states are a proven model to prioritize community hiring.

Apprenticeship: Solar Industry Representation

- Currently, 10.5% of solar workers are represented by a union, collective bargaining agreement, and/or project labor agreement.
- Although apprenticeship levels are relatively low across the solar industry, the IRA includes labor standards that supports apprenticeship participation on every solar project over 1MW.

Union Representation in the Solar Industry



Note: Solar data refers to whether employees are represented by unions, collective bargaining agreements, and/or project labor agreements.

Source: IREC National Solar Jobs Census 2022, U.S. Bureau of Labor Statistics • Created with [Datavrapper](#)

Apprenticeship - Labor Unions

- Recently, prominent national labor unions have engaged with the solar industry and committed their members to supporting widespread deployment of solar and energy storage. These unions play a critical role in project development:
 - IBEW – International Brotherhood of Electrical Workers
 - LIUNA - Laborers' International Union of North America
 - IUOE - International Union of Operating Engineers
 - UBC - United Brotherhood of Carpenters
- In 2023, IBEW, IUOE, and LIUNA signed a national tri-trade solar agreement governing the construction of utility-scale solar projects, making it easier for developers, contractors, and unions to bring renewable energy generation online..



https://www.necanet.org/docs/default-source/labor-relations-conference/labor-relations-bulletins/lr-bulletin---national-tri-trade-solar-agreement-q-and-a.pdf?sfvrsn=450ead40_3

Pre-Apprenticeship Programs

- Offer introductory training and entry-level work experiences, typically to secondary school, vocational school, or recently graduated individuals.
- Programs have a recruitment relationship with existing Apprenticeship sponsors, prepare students to pass required testing, and can satisfy basic related instruction requirements.
- Pre-Apprenticeship programs currently participating in solar industry events:
 - HBI – Home Builders Institute (Pre-Apprenticeship)
 - CEO – Center for Employment Opportunity (Pre-Apprenticeship & Training)
 - YouthBuild (Pre-Apprenticeship & Training)
 - PowerCorps BOS (Pre-Apprenticeship & Training)



Apprenticeship: Dept. Of Labor Determination

- Solar Installer is not currently recognized as apprenticeable by the US Department of Labor. "Based on its analysis of the work process schedules of existing apprenticeable occupations, thus far OA takes the position that commercial solar installation work can be conducted across a variety of such occupations, including but not limited to electricians, laborers, iron workers, operating engineers, and carpenters."
- To be apprenticeable an occupation must
 - Involve skills that are customarily learned in a practical way through a structured program of on-the-job supervised learning
 - Be clearly identified and commonly recognized throughout an industry
 - Require instruction to supplement on-the-job learning
 - Involve the progressive attainment of technical skills...

<https://www.apprenticeship.gov/sites/default/files/bulletins/Bulletin%202023-124%20Apprenticeable%20Occupations%20for%20RAs%20in%20the%20Solar%20Industry.docx>

Apprenticeship: Residential and Commercial

There is an apparent need to develop/scale Apprenticeship programs that serve workers in residential and commercial solar companies.

- Most solar workers serve the residential market.
- National union commitments have been made specifically for utility scale deployment.
- Most residential and commercial solar projects in the US are built by non-union contractors.
- The Associated Builders and Contractors (ABC) is increasingly supporting Apprenticeship with non-union residential and commercial solar companies.

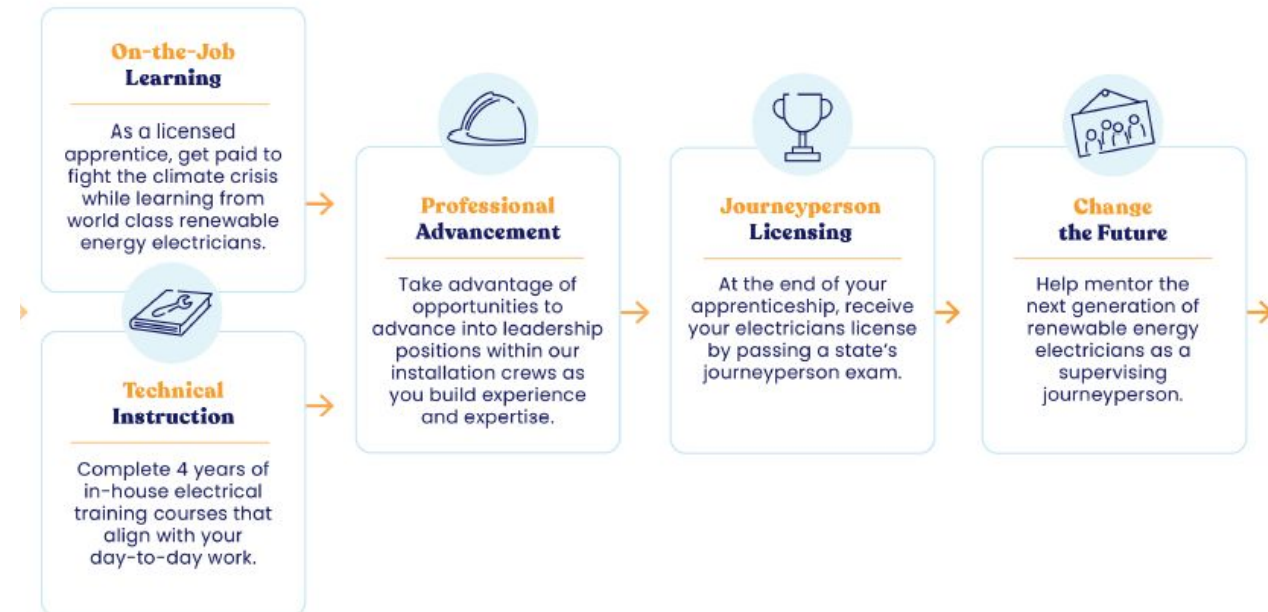


<https://www.abc.org/>

Apprenticeship: State Agency Approvals

- State Apprenticeship Agencies (SAA) are approving solar installer apprenticeship programs:
- Examples include:
 - Solar Energy Apprenticeship Program in Florida <https://floridasolarapprentice.com/>
 - Revision Energy Apprenticeship Program in Maine <https://www.revisionenergy.com/solar-company/solar-careers-and-training/electrical-apprenticeship-program>
 - Renewable Energy JATC in Oregon <https://www.oregon.gov/boli/apprenticeship/Pages/apprenticeship-details.aspx?appid=11260994>

ReVision Energy Electrical Apprenticeship Career Pathway



Apprenticeship: Dept. of Labor Guidance

- The U.S. DOL has multiple ongoing grants and contracts with intermediaries to support Apprenticeship.
- This includes IREC serving as an intermediary through the U.S. DOL Apprenticeships in Clean Energy (ACE) Network, a coalition of expert organizations to guide the development of Registered Apprenticeships at clean energy companies.
- Adaptive Construction Solutions (ACS) is also actively supporting solar company Apprenticeships.
- IREC is also supporting the development of National Guideline Standards (NGS) of Apprenticeship for occupations of interest to the solar industry. The MREA is contracted to develop NGS with the guidance of industry working groups and has completed NGS for Construction Craft Laborer. Subsequent occupations forthcoming..



<https://irecusa.org/programs/ace-network/>

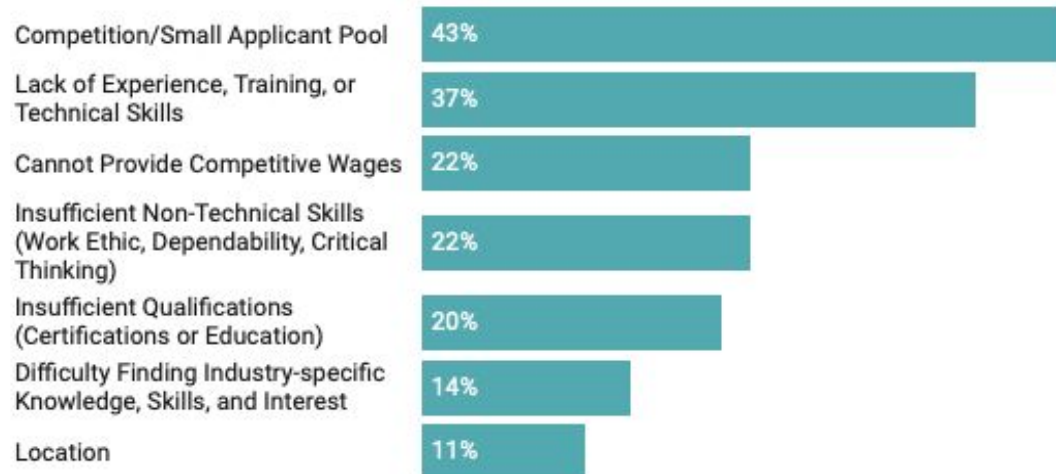


<https://www.goapprenticeship.com/>

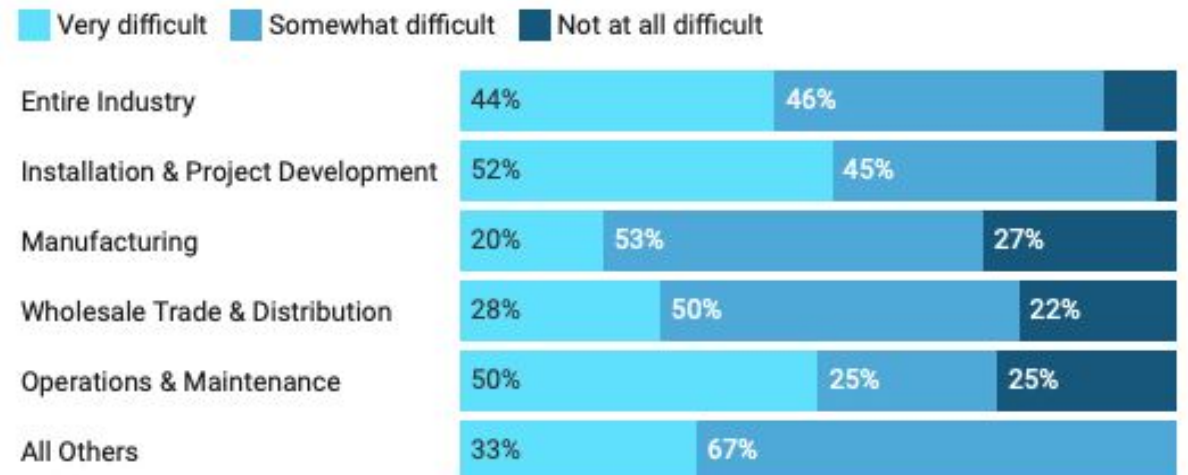
Workforce Services: Difficulty Hiring

- 44% of solar industry employers said it was "very difficult" to find qualified applicants, which is the highest ever recorded..
- Installation & project development, and operations & maintenance were reported as most difficult to find qualified workers.

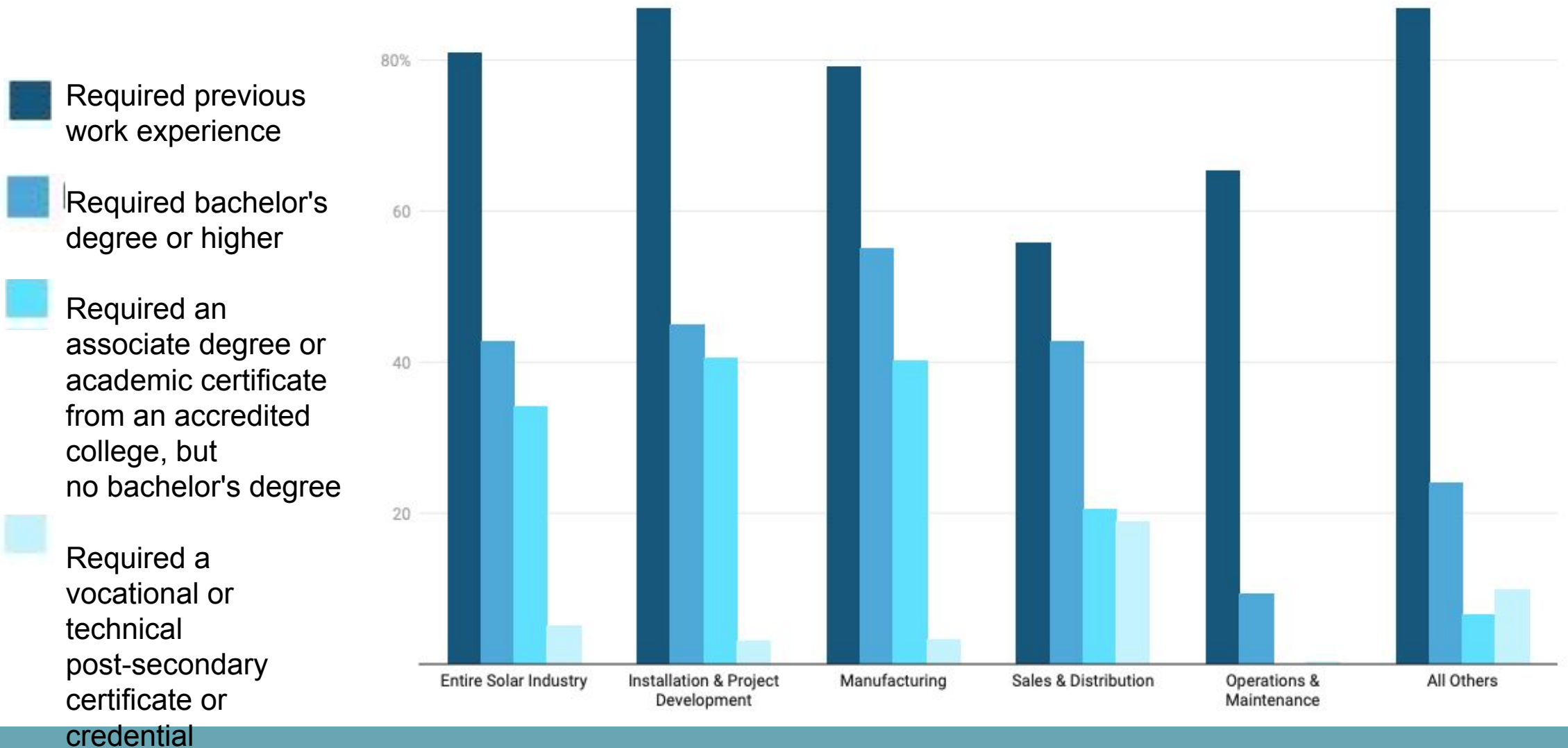
Top Reasons for Difficulty Hiring Solar Workers



Level of Difficulty Finding Qualified Solar Workers



Education, Experience Required for Solar Industry New Hires



Workforce Services: Wages

- Wages for solar workers are similar to, or higher than, wages for U.S. workers in similar occupations.
- Medium hourly wages for:
 - Construction Laborers: \$19.59
 - Solar PV installer: \$21.75
 - All U.S. Occupations: \$22.26
 - Roofers: \$23.04
- A provision in the Inflation Reduction Act requires that developers of projects over 1MW pay prevailing wage to laborers and mechanics to receive the full value of the investment tax credit. This provision, the apprenticeship ratio requirement, and similar state provisions that apply to residential and commercial projects should support continued increases in the average wage of PV installation workers.

Workforce Support Services

- **Targeted recruitment strategies** ensure diverse participation in solar training programs.
- **Career counseling services** help individuals navigate training options, job search strategies, and professional development pathways, ensuring they make informed decisions about their careers.
- **Wrap-around services** that support overcoming barriers like transportation and childcare improve retention and success rates in training programs.
- **Job placement services** connect trainees with employers, facilitating smooth transitions into the workplace.

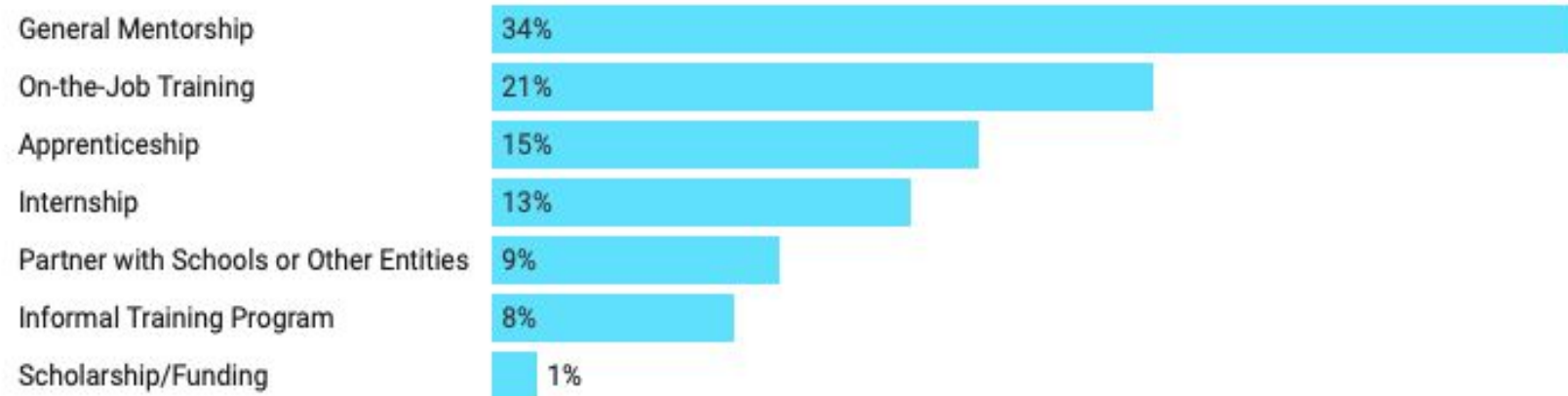
Workforce Services: Mentored Work Experience

Mentorship Programs are structured initiatives where experienced professionals guide & support individuals seeking to enter or advance in the solar industry.

IREC reports that 34% of solar firms offer a mentorship program.

Mentorship Programs at U.S. Solar Firms

Overall, 38% of U.S. solar firms offer a mentorship or sponsorship program. Among these, the types of programs offered include:



Source: IREC National Solar Jobs Census 2022 • [Get the data](#) • Created with [Datawrapper](#)

Justice, Inclusion, and Sustainability

- The demographic makeup of the solar industry has remained largely unchanged over the last few years.
- It is expected that recent federal funding will further diversify the demographic makeup of the solar industry.
- 31% of solar firms offer a training program on diversity and/or inclusion.

U.S. Solar Workforce Demographics, 2022

Category	Employees	% Workforce
Female	80,764	31%
Male	181,879	69%
Gender Non-Binary	1,240	1%
Hispanic or Latino	56,727	22%
American Indian or Alaskan Native	3,212	1%
Asian	23,862	9%
Black or African American	22,960	9%
Native Hawaiian or Other Pacific Islander	3,487	1%
White	193,788	73%
Two or More Races	14,331	5%
Veterans	21,533	8%
Disability	6,652	3%
Formerly incarcerated	3,769	1%

Diversity and Inclusion Strategies at U.S. Solar Firms

The chart below lists the percentage of solar firms that adopted the following diversity and inclusion strategies



Source: IREC National Solar Jobs Census 2022 • Created with [Datawrapper](#)

Source: IREC National Solar Jobs Census 2022 • Created with [Datawrapper](#)

Justice, Inclusion, and Sustainability

- The Justice40 initiative aims to ensure that 40% of the overall benefits of federal investments in clean energy reach disadvantaged communities.
- Formula funding and competitive funding opportunities resulting from the Bipartisan Infrastructure Law and Inflation Reduction Act include support infrastructure investment and workforce development for low to moderate income households and in specifically designated census tracts



JUSTICE40

A WHOLE-OF-GOVERNMENT INITIATIVE



ENVIRONMENTAL JUSTICE

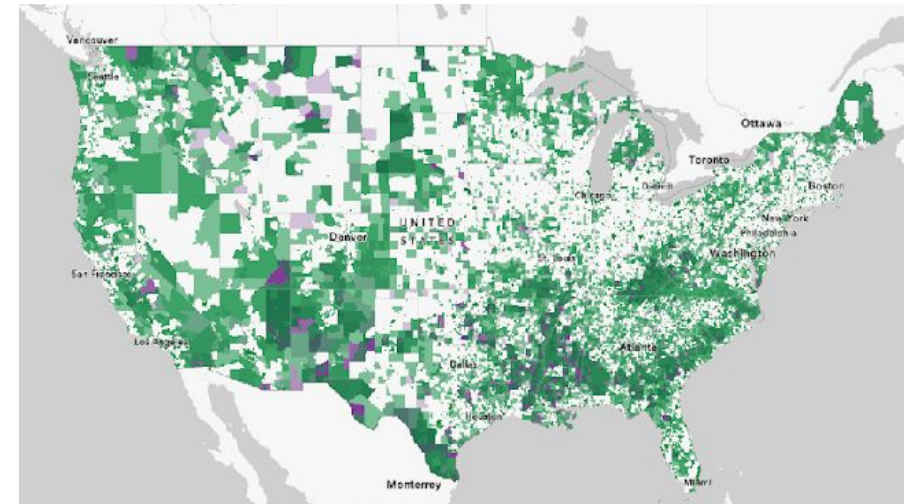
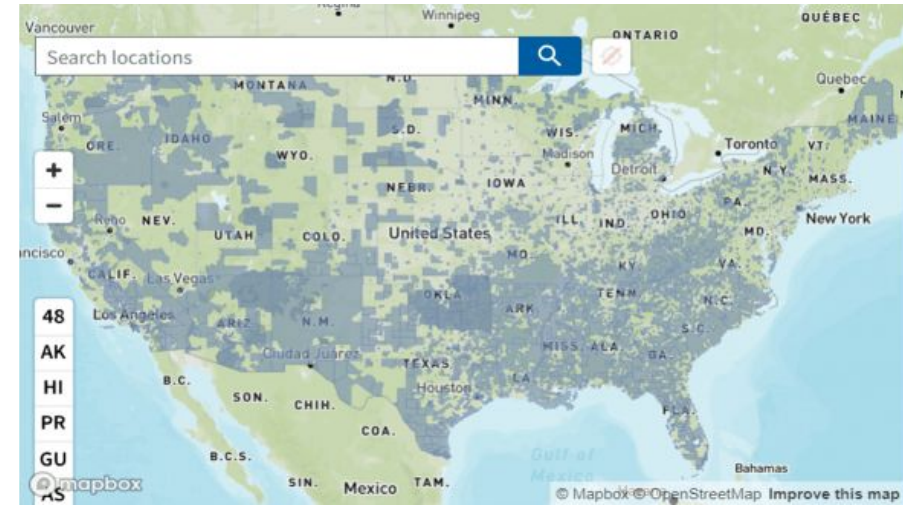
<https://www.whitehouse.gov/environmentaljustice/justice40/>

Justice, Inclusion, and Sustainability

- The workforce funding presents a significant opportunity to design training programs that best serve communities with persistent high unemployment and latent clean energy investment potential.
- To direct the benefits to communities in need, the programs leverage the Climate and Economic Justice Screening Tool (CEJST). The tool uses economic, demographic, and environmental factors to identify communities of priority for funding.
- Similar approaches have been adopted by states to increase solar employment and development initiatives (i.e. Illinois Environmental Justice Communities) and are incorporated into provisions in the IRA. Prominently in the Act, solar projects in designated low-income communities and energy communities qualify for additional investment tax credits.

<https://www.energy.gov/justice/justice40-initiative>

<https://www.energy.gov/justice/low-income-communities-bonus-credit-program>





Gap Analysis

Equitable Solar Workforce Development



Accessible and Employer-Responsive Training

- **Gap:** State-level data on related employment demand, training availability, and job placement with specific focus on jurisdictions as identified by the Climate and Environmental Justice Screening Tool (CEJST)
- **Gap:** Coordinated recruitment and career support services with participation from secondary schools, employers, local workforce boards, and post-secondary training providers.
- **Gap:** Training program instructors with sufficient industry and instructional experience.
- **Gap:** Availability of support services for at-risk students.

Employment Opportunities

- **Gap:** Opportunities for employment with defined pathways for advancement upon completion of training program.
- **Gap:** Apprenticeship program capacity to meet solar industry workforce needs.

Career Advancement

- **Gap:** Training programs support worker attainment of credentials and experience related to clearly defined career pathways in each state.



Best Practices

Equitable Solar Workforce Development



Accessible & Employer-Responsive Training

- State-level tracking and reporting of forecasted solar employment demand, and training provider availability with specific data on CEJST priority census tracts.
- Training provider tracking and reporting of training participant demographics, credential attainment, and job placement.
- Workforce partners provide career counseling and soft skills training to support training program placement.
- Workforce partners offer stipends to support travel, childcare, and other needs during the training program.
- Workforce partners offer coaching and tutoring services to support training program completion and credential attainment.

Accessible & Employer-Responsive Training

- Training provider and employer coordination on recruitment strategy and activities.
- Integration of employers and training providers into state and local workforce agency programming.
- Instructors have 5+ years of related professional experience and maintain continued relationships in the industry.
- Training providers have a formal instructor evaluation and development process that supports instructor professional networking, continuing education, and professional certification.
- Training providers recruit and train instructors that represent the populations served.

Employment & Career Advancement

- Training providers maintain relationships with employers and provide job vacancies to students.
- Workforce partners provide financial support to students/ employers to facilitate job placement through probationary period.
- Workforce partners support employer mentorship programs to onboard and provide continued education to new employees from target demographics.

Employment & Career Advancement

- Pre-apprenticeship programs are locally available to facilitate interest and preparedness for apprenticeship.
- Apprenticeship programs support workers that serve the residential and commercial solar markets.
- Workforce partners support student attainment of licenses and credentials needed to meet local, state, and national demand for skilled workers.

Questions & Open Discussion



Next Steps

Thank you for attending the Equitable Solar Workforce Development Community Convening!

Your insights and feedback are invaluable to us as we strive to advance our efforts in creating a more equitable solar workforce.

Please take a few moments to share your feedback with us by filling out the following Google Form. The MREA will be sending the link via email after the meeting, but you can also access it directly here:

https://docs.google.com/forms/d/e/1FAIpQLScPBXXztASoPTIJWkVrVJDdZLNZIMq6kFvhDOcwtsa-Ahok-xg/viewform?usp=sf_link

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