



TESTIMONY BEFORE THE HOUSE COMMITTEE ON SMALL BUSINESS  
SUBCOMMITTEE ON INNOVATION AND WORKFORCE DEVELOPMENT

HEARING: “Creating the Clean Energy Workforce”

STATEMENT OF:

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Washington, D.C.  
October 29, 2019

Chairman Crow, Ranking Member Balderson, and Members of the Subcommittee:

Thank you for inviting me to testify on the solar industry workforce. My name is Ed Gilliland and I am the Senior Director of The Solar Foundation. I have been the lead author on the annual National Solar Jobs Census report since 2015 and oversee The Solar Foundation's growing portfolio of solar industry programs including workforce development programs.

The Solar Foundation is an independent, non-partisan non-profit organization focused on research and education to advance solar energy and solar-compatible technologies. The Solar Foundation produces renowned and reliable labor market research, and leads a range of cross-functional programs to build industry capacity as solar continues to evolve and emerge as a mainstream part of the American energy sector. While we work closely with solar industry partners and stakeholders, The Solar Foundation has no formal industry affiliation. Our work is driven by a belief that increasing access to clean, abundant, reliable and affordable energy will bring a prosperous future for all. Toward this goal, we support ambitious and data-driven solutions to expand solar markets and inform policy at all levels so that communities across the United States can realize the potential of a robust renewable energy economy.

My testimony will focus on The Solar Foundation's research and projects related to the American solar workforce, the opportunities and challenges facing solar employers related to training and hiring, and the potential for solar energy to catalyze sustainable, local economic development.

The Solar Foundation's flagship project is the annual *National Solar Jobs Census*, which has documented the rapid expansion of the solar jobs market in the United States over the past decade. Since 2010, the information provided in this annual report has helped to inform solar policy at all levels of government. Through an extensive and impartial review of the geographic and market trends across the solar jobs landscape, the *Census* presents data on solar industry job gains and declines, and analyzes trends by sector such as installation and project development, wholesale trade & distribution, manufacturing, and operations & maintenance. It also provides metrics such as solar jobs per capita, by industry segment (residential, nonresidential, & utility-scale), and by demographic at the national and state level. Sub-state level jobs are also provided as seen at [www.solarstates.org](http://www.solarstates.org). This information is updated annually and is provided to help decision-makers understand the valuable role and significant potential of solar energy and solar jobs as a driver of sustainable economic development.

The *Census* is widely recognized as the most comprehensive and reliable analysis of the U.S. solar workforce. Unlike economic impact models that generate employment estimates based on economic data or jobs-per-megawatt assumptions, the *Census* provides statistically valid and current data from actual employers, gathered through an extensive and rigorous survey of solar businesses. For the purposes of this research, we define a 'solar worker' as someone who spends at least 50 percent of their time on solar-related work. It's valuable to note that while solar job numbers are largely driven by the installation and project development sector, the industry is powered by diverse skill sets and a wide range of roles such as project management, engineering, sales, marketing, and distribution as well as education, finance, policy, legal, and research professions.

Beyond the jobs numbers, the *Census* examines industry trends since they underly the growth in the American solar workforce. This includes sector and segment analyses; demographics and diversity; hiring challenges; industry wages; and educational requirements.

Our most recent (2018) *Census* report indicates that the United States has 242,343 solar workers, marking an expansion of 159% since the first Census reported 93,000 jobs in 2010. Most solar jobs are generated by new solar development (installed capacity) and the value chain needed to support it. The past two years have seen continued, but slower growth in new installed solar capacity, resulting in overall fewer jobs in 2017 (-3.8%) and 2018 (-3.2%). This has been in part due to a slowdown from the record-setting industry expansion seen in 2016. Installed capacity doubled between 2015 and 2016 in anticipation that the 30% federal investment tax credit would expire. With the extension of the tax credit, solar installations continued at a more moderate pace in 2017 and 2018. Other factors that weakened growth include uncertainty surrounding the Section 201 trade case (causing utility-scale project delays), as well as policy uncertainty in well-established solar states such as California and Massachusetts. At the same time, 2018 saw solar job growth in 29 states and Washington, DC. Some of the states with the biggest solar job gains include Florida (+1,769 jobs), Illinois (+1,308), Texas (+739), and New York (+718). Other states with job gains include Ohio, Pennsylvania, Minnesota, and Tennessee.

Despite the national net loss in solar jobs over 2018, solar employers continue to struggle to find and retain qualified candidates: in 2018, 26% of all solar employers reported that it was “very difficult” to hire qualified employees. We generally attribute this increase to the low national unemployment rate and a competitive job market in the construction industry. This is a substantial increase over the 18% that reported such hiring concerns the previous year. When combined with employers who said hiring qualified employees was “somewhat difficult,” 82% of solar employers reported difficulty hiring in 2018. Hiring challenges also vary by market segment: the greatest difficulty is seen in installation and project management with 33% of establishments reporting that it was “very difficult” to find qualified employees in this segment, along with 26% for operations & maintenance and 17% for manufacturing. The wholesale trade and distribution sector reported the lowest difficulty hiring at 8%.

The gap between solar workforce supply and demand is affected by a multitude of factors and varies greatly over time and geography, but hiring challenges are especially acute in certain regions of the country: in the East South Central Region, which includes Alabama, Kentucky, Mississippi, and Tennessee, 43% of solar employers reported that hiring was “very difficult.” With the exception of Mississippi, these states all saw significant solar job growth in 2018. As the solar industry is less established in this region than others, it is likely more difficult for employers in these states to identify and recruit experienced candidates. In Florida, Pennsylvania, and Ohio, all states where the job market expanded in 2018, this figure was above 40%. But employers also reported hiring difficulty in major solar markets where solar jobs declined, such as in California (25% reporting “very difficult”) and Massachusetts (23%).

Over half of employers cite lack of experience, training or technical knowledge as a factor in difficulty hiring, followed by competition for talent or a small applicant pool, and business expenses and wages. Workforce challenges are costly in terms of recruitment, delayed hiring,

and lost business opportunities, and limit a company's capacity for growth, especially for small businesses. Improved efficiency across recruitment, training, and hiring processes is necessary to meet growing talent demands of the industry in the short term, and has the potential to greatly reduce long-term costs to employers.

For workers, the solar industry offers rewarding careers with relatively low barriers to entry, competitive wages for both entry-level and mid-career employees, and excellent opportunities for advancement across a wide range of skill sets, educational levels, and levels of experience. For full-time installers, the *Census* found that median entry-level wages were \$24.32/hour for solar PV electricians, and \$18.92/hour for non-electricians, with median wages for mid-level installer wages at \$32/hour and \$28/hour for electricians and non-electricians, respectively. For full-time manufacturers, median entry-level wages were \$24/hour, and mid-level wages were \$30/hr. These wages are all above the national median wage (\$18.12/hour) for all occupations. However, wages are considerably lower for part-time and non-permanent employees, with median entry-level wages of \$15/hour for both part-time and non-permanent installers.

Most solar jobs require some experience, but the vast majority do not require a bachelor's degree. For entry-level installation jobs, employers often look for candidates who have strong "soft" skills (such as professionalism and communication skills) and willingness to learn on the job. Overall, 21% of new openings require a bachelor's degree, and in the installation/project development sector only 15% of openings require it. For entry-level installers, prior-to-hire training such as through a community college program or for industry certification such as those offered by the North American Board of Certified Energy Practitioners (NABCEP) is certainly valuable. However, it is not typically required for an entry-level position. The relative value of industry certification varies by region and demand, as solar employers in more mature markets, such as in California tend to seek higher levels of experience or education. But overall, industry certifications hold greater value for career advancement beyond an entry-level installation job.

Hiring and workforce challenges seen across the industry are often acutely felt by small solar businesses with limited time and resources to dedicate to recruitment and training. A significant proportion of solar establishments are considered small businesses -- according to the 2018 *Census*, 58% of solar establishments had under 25 permanent employees, and 30% had five or fewer. Solar and solar-compatible technology, such as storage, is rapidly evolving, causing greater needs for specialized training. An ongoing investment by employers in work-based learning and up-skilling incumbent employees is a key success factor in ensuring a confident, adaptable and well-trained workforce. Continuing education makes the difference between a solar job, and a solar career.

State-level requirements can also create hiring challenges. As many states require electricians to be on-site for PV installations, electricians are in high demand. The state of Minnesota, for instance, currently requires at least one licensed electrician for every two unlicensed electricians, leading Minnesota solar companies to hire electricians from out of state in order to meet demand. Solar-specific licensing, which could include existing solar certifications such as those offered by NABCEP, is one potential solution.

As accelerated industry expansion has nearly tripled U.S. solar employment over the past decade, developing and maintaining a qualified workforce remains a priority and a challenge. From 2016-2019, with funding from the Department of Energy Solar Energy Technologies Office, The Solar Foundation led the Solar Training Network, a national solar workforce development initiative designed to strengthen coordination among industry, education and workforce development partners, particularly in relation to unmet demand for qualified installers. Through direct stakeholder engagement, regional network development, and original research and resources, the Solar Training Network articulated the processes and systems surrounding workforce development within the solar industry. Through this program, The Solar Foundation led and promoted efforts to: identify and address information gaps related to evolving solar workforce needs; integrate solar career pathways into the existing public workforce development system; expand work-based learning opportunities; and support solar talent development, recruitment and retention at regional scales.

To guide development and deployment of program resources, The Solar Foundation and project partners conducted research to analyze national solar training and hiring trends. This initial research explored major themes such as the business case for investments in solar workforce development, the role of industry credentials in solar career pathways, varied demand for workforce development across established and emerging markets, and the general lack of awareness or understanding among small and medium sized employers with regard to public workforce development resources and local business support services.

Findings and conclusions are compiled in the *2017 Solar Training and Hiring Insights Report*. This report aggregates survey data of over 400 U.S. solar employers, as well as case studies and in-depth interviews with dozens of solar employers, trainers, and workforce development boards to examine the installation workforce challenges associated with rapid industry growth. The findings of this study are based on 2015 and 2016 data, focused on entry-level installation jobs, and thus reflect the challenges of that sector in a time of heightened expansion, but the qualitative trends that emerged remain widely relevant, such as the value of practical training supplemental to theoretical instruction.

#### Key findings:

- Hiring difficulties are widespread in the industry, as many applicants lack relevant practical experience and training.
- Training and hiring challenges are costly, and are especially felt by small businesses. Strengthening train-to-hire pipelines could have a tremendous positive economic impact on the industry.
- Solar employers greatly value hands-on training, but (as of 2017) only about a third of solar companies nationwide offered work-based learning opportunities.
- Prior-to-hire training should maximize opportunities for hands-on worksite experience to develop safety and “soft” skills, as well as focus on providing a preliminary understanding of system components and electrical basics. Two thirds of respondents stated that industry-wide standardized on-the-job training would be highly valuable to their company,

with the top three most valuable topics for such a program to cover being: system installation and connection, system components, and electricity basics.

- In 2017, industry employers were almost evenly split on the importance of entry-level installers holding NABCEP PV Associate certification, with 48.1% considering it important and 51.9% considering certification unimportant; and while 62% of employers prefer it, less than 1% require it.
- Most employers surveyed felt that insufficient job placement services exist for solar that are available in adjacent, but more established industries (such as construction and electrical fields).

To address the information gaps and challenges identified by the *Solar Training and Hiring Insights Report*, The Solar Foundation produced *Strategies for Solar Workforce Development: A Toolkit for the Solar Industry*. It provides steps for solar employers to engage public workforce development resources, such as through the Workforce Innovation and Opportunity Act. It outlines how public resources and networks can expand solar recruitment efforts, and how solar employers can leverage labor market data to engage state and local workforce boards in their recruitment efforts and access business support services that are underutilized by the industry.

Workforce development is a process of leveraging networks, resources and partnerships to build strong and sustainable talent pipelines. The toolkit defines low-cost opportunities for streamlined training and hiring practices. It details steps for employers to establish high-quality and cost-effective work-based learning programs, and emphasizes the need for solar workforce development to be industry-led, with clearly defined objectives that are informed by, and adaptive to regional market dynamics.

Building on the successes and lessons learned from the Solar Training Network, The Solar Foundation has secured funding from the Department of Energy Solar Energy Technologies Office to launch a veterans-focused solar workforce initiative. This program is designed to expand and strengthen a nationwide pipeline of military talent into a range of technical and leadership roles in the solar industry. Veterans of the US Armed Forces are outstanding candidates for careers in the solar industry, as military service provides highly valuable technical competencies and leadership skills.

With a “two-tracked” approach, the Solar Ready Vets Fellowship and the Solar Opportunities and Readiness (SOAR) initiative will connect transitioning military personnel and veterans with solar industry career training and professional development opportunities. The program intends to expand solar career pathways through placing transitioning service-members into corporate fellowship programs for on-the-job training, expanding eligibility of solar training programs for GI Bill benefits, and developing expedited pathways for NABCEP certifications based on existing military experience and skills.

## **Conclusion**

A decade of accelerated industry expansion has challenged the U.S. solar workforce to keep pace

with demand. Similarly, the industry's anticipated continued growth presents substantial opportunity for local economic development. To ease the hiring difficulties felt across the industry and to improve the efficiency of solar workforce development, solar employers need to increase local and regional engagement efforts with training providers and the broader public education system. A commitment to diversity is essential for the solar industry to better reflect the communities they serve, broaden talent pools to meet their hiring needs, and position themselves for future growth.

Difficulty hiring is not a result of high barriers to solar jobs, but rather indicates a need for long-term, regionally focused workforce development strategies that entail stronger coordination by the industry across broader spheres of public resources and public awareness. Expanding partnerships and opportunities for work-based learning, and investing in the networks and skillsets of the current and future solar workforce are essential steps to navigate growth and stabilize the workforce at a pivotal time for the industry as solar markets evolve and solar continues to lead job growth of the American energy sector.

Thank you for your consideration and I look forward to answering the committee's questions.

## Appendix A

### Reports Cited:

#### **National Solar Jobs Census 2018**

2019, The Solar Foundation

<https://www.thesolarfoundation.org/national/>

#### **Solar Hiring and Training Insights**

2017, The Solar Foundation

[americansolarworkforce.org/wp-content/uploads/2018/09/sthr.pdf](https://americansolarworkforce.org/wp-content/uploads/2018/09/sthr.pdf)

#### **Strategies for Solar Workforce Development: A Toolkit for the Industry**

2018, The Solar Foundation

<https://www.americansolarworkforce.org/strategies-for-solar-workforce-development/>