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CREATING THE CLEAN ENERGY WORKFORCE

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None.	
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None.	
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None.	

CREATING THE CLEAN ENERGY WORKFORCE

TUESDAY, OCTOBER 29, 2019

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SMALL BUSINESS,
SUBCOMMITTEE ON INNOVATION AND WORKFORCE DEVELOPMENT
Washington, DC.

The Subcommittee met, pursuant to call, at 10:03 a.m., in Room 2360, Rayburn House Office Building, Hon. Jason Crow [chairman of the Subcommittee] presiding.

Present: Representatives Crow, Finkenauer, Kim, Davids, Schneider, Balderson, Chabot, and Hern.

Chairman CROW. The Committee will come to order.

First, I want to thank everyone for joining us this morning. I want to especially thank the witnesses for being here today. You are all taking time out of your very busy schedules to talk about this important topic. Mr. Balderson and I appreciate that.

As you notice, there are a number of Committee hearings going on concurrently right now so members will be coming and going, so do not be deterred as you are making your statements and answering questions.

As the congressman for Colorado's 6th District, I understand the importance of clean and renewable energy for our environment and our economy. We know that climate change is impacting towns and communities across the country—from more intense and frequent wildfires and tropical storms, from the west to east coast in rising sea levels and coastal levels like Miami, to nonstop rain damaging crops and farms across rural America. In my home state, we know the impact on the summer and winter recreation economy very well.

Protecting our environment and public health was not always a partisan issue, and it should not be today. Not only does climate change pose a risk to our economy and the health and well-being of all Americans, but as a former Army Ranger, I also understand that this is an acute national security threat.

For these reasons, it is critical we move to more clean energy and away from fossil fuels by producing products and providing services supporting bold and practical environmental and energy policy for America's future.

Doing so will not only be good environmental policy but also help transform our economy to be more resilient in the future. Through innovation and entrepreneurship, we can address the harmful impacts of climate change while also creating millions of good paying jobs here in the U.S. that will lead to sustained economic growth.

And like they do in many other sectors, the clean energy economy presents an opportunity for small firms to lead the way by reducing emissions, supporting renewable energy, creating clean energy jobs, increasing efficiencies, and reducing their overall environmental footprint.

From producing biofuels and installing energy efficient equipment to manufacturing components and auditing buildings, clean energy businesses can be found across Colorado. In my home state, we now have over 65,000 jobs in the clean energy sector, creating a cleaner energy supply while growing the jobs of the future. In fact, Denver, neighboring my district, ranks 8th out of 75 large U.S. cities in clean energy. Across the country, there are over 3 million clean energy jobs and I believe renewable sources of energy such as geothermal, wind, and solar power, is the technology of the future.

And since many of the businesses in the clean energy economy take advantage of their local natural resources and do not require massive capital investment like traditional fossil fuels, this sector of the economy is ripe for innovators, entrepreneurs, and small businesses.

Of the nearly 360,000 energy efficiency businesses in the United States, roughly 45 percent of them have between one and five workers. The same goes for the solar industry, where 70 percent of businesses have fewer than 50 employees. But while clean energy jobs outnumber fossil fuel jobs nearly 3-to-1, clean energy still provides only 16 percent of the country's overall energy needs. Clearly, there is plenty more work to be done and room for these companies to grow and expand.

But that ability to expand is hindered by the ongoing problems we hear from many small businesses who are unable to find qualified workers to meet their needs. An aging workforce combined with a growing skills gap among our current workforce is keeping small and large firms from reaching their full potential.

So, while demand for clean and renewable energy has continued to grow—due to falling prices of wind and solar, better incentives and tax credits, and widespread support for environmental responsibility from individuals and corporations—businesses are having a harder time hiring the staff necessary to meet this demand.

This is why we are here today. To support the rapid transition of our energy sources and create a forward-looking economy, a massive workforce mobilization effort will be required. And to do that, we need to train Americans of all ages to do these jobs. This should include transitioning the current fossil fuel workforce to ensure that they continue to receive a paycheck, health care, pensions, and other necessities that comes from an energy job.

This can be done through targeted apprenticeships and job training programs supported by the Department of Labor and partnerships between local businesses, governments, and academia. It can also be accomplished with the support of labor unions that already have apprenticeship and certification programs in place to train current workers transitioning out of the fossil fuel industry and the next generation of workers for high paying jobs with high quality health care and retirement benefits.

We know that small businesses in a variety of industries, such as construction, manufacturing, architecture, and the STEM fields all contribute to the clean energy economy. This is a result of Federal support for renewables, as well as tax incentives for clean energy and energy efficiency.

But to reach its full potential, workforce development and training are essential components to creating and sustaining the clean energy of the 21st century.

I look forward to hearing from our expert witnesses today on how we can best train the next generation of clean energy workers and empower small businesses so the U.S. can once again be the world leader in energy development, innovation, and environmental protection.

And I would now like to yield to my Ranking Member, Mr. Balderson, for an opening statement.

Mr. BALDERSON. Chairman Crow, thank you very much. And thank you for your opening statement. I would like to also thank all of you as Chairman Crow said for the opportunity that you all are here and taking time out of your busy schedule. I, unfortunately, am one of those members that has a markup going on in another Committee, so I will be leaving. I apologize for that. But we are really grateful for your time and what it takes to be here. So thank you very much for your effort. Thank you, Mr. Chairman.

Today, our Subcommittee will explore the employment opportunities generated by the clean energy economy and examine the readiness of our Nation's workforce to meet industry needs. Energy modernization has stimulated innovation and revitalized core industries. Its economic impact is felt nationwide.

Last month, the Subcommittee on rural development, agricultural trade, and entrepreneurship held a hearing on small business participation in the clean energy economy. Witnesses emphasized the impact of public policies on clean energy industries and business opportunities. Increased financial incentives for energy efficient technologies and systems has increased demand for contractor that specialize in selling and installing and certifying these systems to homes and businesses. Yet, according to the 2016 Energy Efficiency Jobs in America, 70 percent of energy efficiency firms have only 10 employees or fewer. We can do more to drive skilled workers towards this emerging industry.

Building up that foundation laid in September, today, we will focus on how we can ensure that our country's workforce is meeting the diverse needs of clean energy employers. Clean energy small businesses are involved throughout the technology value change from research and development to manufacturing and installation. While tech startups need highly educated engineers, local contractors need construction tradesmen. Unfortunately, our workforce has not yet caught up with this rapidly expanding employer demand.

The Brookings Institution found that workers with no more than a high school diploma fill nearly half of clean energy production. Occupations earn higher median pay when compared to their peers in other industries.

The clean energy sector offers opportunities that are exceedingly rare in our economy, jobs with low educational entry barriers and

high-yielded pay. Filling said jobs would make a significant difference in low-income communities across Ohio, including my home state of Ohio.

A lively and dynamic workforce pipeline is critical to the future of growth of clean energy firms. To make this significant investment, firms need policy consistency and regulatory clarity. In that regard, I would also like to mention that I am co-sponsor of related legislation, the Blue Collar and Green Collar Jobs Development Act of 2019, which directs the Department of Energy to establish and carry out a comprehensive, nationwide, energy-related industry jobs program. I believe we can employ this same innovation thinking in today's hearing.

Thank you to our witnesses for introducing us to the clean energy workforce and strategies to meet the needs of small employers.

I yield back, Chairman.

Chairman CROW. Thank you, Mr. Balderson. The gentleman yields back.

And if Committee members have an opening statement prepared, we will ask that they be submitted for the record.

I would like to just take a minute to explain the timing rules. Each witness gets 5 minutes to testify and each member get 5 minutes for questioning. There is a lighting system to assist you so you know how much time you have left. The green light will be on when you begin, and the yellow light will come on when you have 1 minute remaining. The red light will come on when you are out of time, and we ask that you stay within that timeframe to the best of your ability.

I would now like to introduce our only witness.

Our first witness is Mr. Mark Jackson, the vice president of Energy Solutions at the Community Housing Partners, a nonprofit that provides weatherization assistance to low-income housing. He oversees the operations of the internationally renowned Weatherization Assistance Program Research and Training Center in utility energy efficiency programs. These programs have delivered weatherization services to more than 40,000 households and trained over 38,000 participants in building science and energy conservation techniques. Thank you, Mr. Jackson, for being here today.

Our second witness is Mr. Jason Wardrip, the business manager for the Colorado Building and Construction Trades Council in my district of Aurora, Colorado. The council is comprised of 24 craft local unions who represent 14 national and international unions and represent roughly 30,000 skilled working men and women in Colorado. Mr. Wardrip serves the building trades to promote pre-apprenticeships, apprenticeships, develop labor standards and procurement policies at all levels of government. He has decades of experience as a sheet metal worker before representing the Colorado AFL-CIO as president and the Building Trades Council as vice president. Thank you for joining us today, Mr. Wardrip.

Our third witness today is Mr. Neil James. Mr. James brings 38 years of experience in electrical utilities, alternative energy, and high-voltage operations. He has a long career working for BP Wind, NextEra Energy, and Texas New Mexico Power. He has held various roles in both construction operations and maintenance pro-

viding good perspectives to the challenges of the industry. Welcome, Mr. James.

I would now like to yield to our Ranking Member, who will introduce our final witness.

Mr. HERN. Thank you, Mr. Chairman.

Our final witness is Ed Gilliland, senior director for the Solar Foundation. In this role, he oversees multiple projects, including Solar Ready Vets, a national program to connect transitioning military personnel with solar training and employment opportunities. He was principal author for the 2015-2018 National Solar Jobs Corps census reports in the 2017 Solar Schools Report. Mr. Gilliland is a certified planner, economic development professional, and a project management professional. He holds two masters degrees from the University of Virginia, including an MBA from the Darden Graduate School of Business Administration. Welcome, sir.

Chairman CROW. Thank you, Mr. Hern.

Mr. Jackson, we will start with you. You are recognized for 5 minutes.

STATEMENTS OF MARK FARRAR JACKSON, VICE PRESIDENT, COMMUNITY HOUSING PARTNERS DBA CHP ENERGY SOLUTIONS; JASON L. WARDRIP,BUSINESS MANAGER,COLORADO BUILDING AND CONSTRUCTION TRADES COUNCIL; NEIL JAMES, VICE PRESIDENT, OPERATIONS AND MAINTENANCE,APEX CLEAN ENERGY; ED GILLILAND, CECD, AICP, PMP, SENIOR DIRECTOR, THE SOLAR FOUNDATION

STATEMENT OF MARK FARRAR JACKSON

Mr. JACKSON. Thank you for having me here today, Chairman Crow and Ranking Member Hern. I appreciate the opportunity to speak to you and the other members of this Subcommittee.

My name is Mark Jackson. I am the vice president of Energy Solutions at Community Housing Partners (CHP).

CHP was formed over 40 years ago to address the poor housing conditions of low-income families in Virginia. In 1976, CHP became one of the first practitioners of DOE's newly created Federal Weatherization Assistance Program. Through our participation in that program, we recognized the need for robust training opportunities to ensure quality energy efficiency work. Therefore, in 1999, we opened our research and training center to provide building science and energy efficient training to weatherization providers across the country.

In addition to this work, CHP is also an affordable housing manager and developer in seven states. CHP's scope of work makes us uniquely qualified to provide information on the energy efficiency workforce and the training opportunities that are available. We are an employer of energy efficiency workers. We contract with small businesses in the energy efficiency sector. We provide training to crews and agencies in the weatherization assistance program, and we have trained over 38,000 energy efficiency and building science workers from both public and private sectors including code officials, HVAC technicians, and small home improvement businesses.

There are reasons why we are talking energy efficiency businesses today. These businesses are primarily small businesses that

are located in every U.S. state. Of the almost 400,000 energy efficiency businesses in the U.S., nearly 80 percent employer fewer than 20 workers while accounting for over 2 million energy efficiency jobs in the U.S. And energy efficiency, as we all know, is the fastest growing segment in the energy job sector.

As one of the largest weatherization providers in the U.S., and in our role as an affordable housing manager and developer, CHP subcontracts with hundreds of small construction businesses across our service footprint. We are immersed in the challenges this industry faces every day.

The construction industry is thriving, but over 80 percent of energy efficiency businesses report hiring difficulties. Almost half cite the lack of applicants who are experienced, trained, or have the necessary technical skills to do the work. CHP has posted 10 weatherization technician jobs so far this year in Virginia, and although we have had many applicants for every posting, positions remain open as we struggle to find qualified applicants.

Compounding the issue is a lack of a skilled workforce. The expectation is that 40 percent of the current construction workers will retire in the next 12 years. CHP's experience aligns with this trend as well. Thirty percent of our current weatherization workers are over the age of 50. Those hiring challenges are even greater for small businesses as they lack the capital to invest in recruitment, hiring, and training programs.

Thus, the importance of quality training. DOE notes that the ability to develop high performance homes that are energy efficient, healthy, and durable relies on building science education and training. Also, as all levels of governments recognize the need for and implement energy efficient programs and policies, the success of those programs and policies relies on a robust and well-trained energy efficiency workforce. There is so much opportunity in this sector if these hiring and training challenges can be addressed.

The energy efficient sector also provides economic development benefits to its businesses' communities. Residents who have their homes weatherized by CHP see an average of a 30 percent savings on their utility bills and there is a benefit from the jobs created in the industry, of course. As I stated, these jobs are in a rapidly growing sector and they are local. They cannot be outsourced. And competition for workers ensures that these jobs pay a living wage if we can find those workers.

Less than 10 years ago, through a grant from the Department of Labor, CHP's training center successfully partnered with workforce development organizations, community colleges, and universities to provide green energy training to nearly 600 individuals. The CREATES program was incredibly successful, and similar programs may be one of the approaches in solving today's crisis.

I appreciate the time today you have given me. To restate the main points of my testimony, energy efficiency businesses are small businesses and the fastest growing segment of the energy jobs sector. Energy efficiency businesses are struggling to find and hire skilled workers. Workforce training is required to replace retiring employees and fill the new positions being created as the sector continues to grow, and energy efficient programs and policies pro-

vide benefits to workers and to the greater communities to which they are implemented.

Thank you, and I look forward to your questions.

Chairman CROW. Thank you, Mr. Jackson.

Mr. Wardrip, you are now recognized for 5 minutes.

STATEMENT OF JASON L. WARDRIP

Mr. WARDRIP. Thank you, Chairman. And the members of the Committee. I appreciate the opportunity to address you guys today. My name is Jason Wardrip. I am a Colorado native living in Aurora. I am the business manager of the Colorado Building and Construction Trades Council. Prior to my position, I was a business representative of Smart Union No. 9 for 10 years and have spent 24 years as a sheet metal worker.

Our members are construction workers working in residential, light commercial, commercial, industrial, and power industries. My role is to support local unions in the state of Colorado for pre-apprenticeships, apprenticeship standards, and procurement. We have developed registered apprenticeships to give people pathways to become construction professionals. Our apprenticeships recruit transitioning military with the Helmets to Hard Hats Program, adults changing careers, and technical schools. We have pre-apprenticeship programs for high school students in underserved populations. We are also developing re-entry programs for pre-release offenders in conjunction with the Colorado Department of Corrections.

The construction industry in Colorado is changing. Renewables are replacing coal in an amazingly fast pace. And this is causing a ripple effect through the construction industry. I never imagined as a young sheet metal worker that I would care about the economics of labor dynamics related to coal, gas, and renewables. However, my livelihood and the livelihood of our members depend on us understanding and adapting to the rapidly shifting market.

I am pleased to testify to you today that I see a great opportunity for our industry in the new energy economy. As the desire to reduce carbon emissions escalates, our union members will answer the call to retrofit older technology and build the infrastructure of the future.

There is a lot of work to create and modify our built spaces to be comfortable, efficient, and sustainable. Our union members are highly-skilled professionals. They get the job done right the first time. Our union workers are efficient and bring creative solutions to the table because we have been properly trained as on-the-job apprentices. Academic studies have proven the labor unions return the biggest bang for the buck. We are economic drivers of the Colorado economy. Our workers have health care and retire with dignity. We take pride in protecting each other's safety, reducing costly injuries, and deaths.

However, in our changing energy market, we are looking to adopt big changes. The renewable energy market frequently brings construction workers from out of the state at lower wages with little to no benefit packages. We understand the independent power producers run a tight budget. However, I know in-state union contractors can do the job better than the out-of-state labor being brought

in. We can show dollar for dollar how we finish renewable projects on time, under budget, using local workers first.

As these projects become larger, local hires will keep jobs in communities, particularly those losing jobs in the coal industry. Local workers maintain the economy they live in by purchasing goods and services, paying taxes, and homeownership in their communities. When out-of-state workers are brought in, the local economies suffer because the wages leave with the workers as the projects complete.

To keep our jobs local and high quality, Colorado has passed policies in the last year to ensure proper licensing on solar installation and enact best value processes for energy-generating projects.

Starting in 2020, Colorado requires solar farms that are larger than 300 kilowatts to employ workers that are licensed journeymen or in a registered apprenticeship program. Unions also worked with environmental groups to create the Office of Just Transition for coal-dependent workers in the communities they live in.

The new energy economy can provide high-quality jobs for all the trades. We train people to be safe and efficient in our registered apprenticeship programs. I ask you, Committee members, to look to our standards in Colorado as a solid start to creating good jobs in a zero carbon economy.

Thank you, and I look forward to your questions.

Chairman CROW. Thank you, Mr. Wardrip.

And Mr. James, you are now recognized for 5 minutes.

STATEMENT OF NEIL JAMES

Mr. JAMES. Chairman Crow, Ranking Member Hern, and members of the Subcommittee on Innovation and Workforce Development, thank you for the opportunity to testify on the topic of creating a clean energy workforce.

My name is Neil James, and I am vice president of Operations, Maintenance, and Monitoring at Apex Clean Energy. I have more than 38 years of experience in electrical utilities, alternative energy, and high-voltage operations, and feel I bring a unique perspective on workforce development as an operations and maintenance supervisor with Apex.

My remarks today will focus on the U.S. wind industry's rapid growth and the opportunities and challenges we face in recruiting, training, and developing the necessary workforce to meet the increased demand for an expanded clean energy economy. I will also touch on Apex's approach to workforce development.

Apex Clean Energy develops, constructs, and operates utility scale wind and solar power facilities across North America. Our mission driven team of more than 200 renewable energy experts use a data-focused approach and unrivaled portfolio of projects to create solutions for the world's most innovative and forward-thinking customers.

Headquartered 2-1/2 hours from here in Charlottesville, Virginia, Apex's work has led to over $7 billion in clean energy investment, equal to 5 gigawatts of clean energy being added to the grid and we operate nearly 2 gigawatts from our remote operations facility also in Charlottesville. Apex was built with a singular focus in mind, to accelerate the shift to clean electricity.

The U.S. wind industry is made up of manufacturing, construction, operations and maintenance, developers, engineers, and business-trained individuals. Currently, the industry comprises more than 114,000 workers across all 50 states. Industry experts predict that by 2020 the industry will support nearly a quarter million American jobs. Wind turbine technician is the second fastest growing job in the country. Only solar photovoltaic installers rank higher.

The wind industry employs more Americans than nuclear, coal, natural gas, or hydroelectric power generation.

At Apex, we have five core company values—entrepeneurship, integrity, professionalism, safety, and sustainability. When we are recruiting employees we look for individuals who embody these core values, and we strive to live these values both professionally and personally.

I want to take 1 minute to provide an example of what this looks like at Apex. My colleague, Marco Pineda, came to the U.S. from Honduras as a small boy. Marco went to college, received a degree in accounting, and at the time work was scarce, so he took a job in the oil field. Not long after he recognized an opportunity in clean energy near his home in South Texas and began working for Vestas as a wind technician, and soon site manager. In 2015, Apex brought him on board. He is managing our Cameron wind facility. He since has been promoted to a regional operations manager operating nine wind and solar assets across the U.S. and Canada. Marco has exemplified our core values. And to add, he became a United States citizen this year.

Apex also firmly believes that veterans bring some of the best talent to the wind business. The skills they learned defending our country transition well to positions in clean energy. At Apex, our company is veteran led at every level from our CEO, Mark Goodwin serving as a pilot with the Navy; COO, Ken Young, West Point, United States Army; our asset manager, Dan Wetzel, Marine Corps captain; operations, Aaron Strobel, Navy airman. The list goes on.

Meeting the growing demand of renewable energy will require additional investment in finding the necessary workforce. We must create more opportunities to educate and train individuals for careers in the clean energy economy. We need more schools to offer these training opportunities if we are going to meet the demand. Potential ways to achieve this include creating greater awareness of the opportunity, expanding public-private partnerships, and building out incentive structures for schools to initiate these programs. Where schools have programs, it creates incentives for them to collaborate broadly with the industry. Also, members can support the bipartisan Wind Workforce Modernization and Training Act introduced by Senators Ernst and King.

This is an exciting time to be in the clean energy sector. The industry is strong today and our future looks even stronger. And though we see challenges in establishing the necessary workforce to aid in the transition to a clearer energy economy, the opportunity is far too great for us to fall short.

Mr. Chairman, almost 2/3 of the Committee members have Apex facilities either in development or construction in their states. I invite you and your constituents to visit one of our projects.

Thank you again for the opportunity to testify. I look forward to answering your questions.

Chairman CROW. Thank you, Mr. James. And I know we all appreciate the invitation as well. And I am sure several of us will avail ourselves of it. So I appreciate that.

Mr. JAMES. We look forward to it.

Chairman CROW. Mr. Gilliland, you are now recognized for 5 minutes.

STATEMENT OF ED GILLILAND

Mr. GILLILAND. Thank you, Chairman Crow, Ranking Member Hern, and members of the Subcommittee. My name is Ed Gilliland. I am senior director at The Solar Foundation. I oversee our programs, including a number of workforce-related solar programs and am principal author of our National Solar Jobs Census.

For our census in 2018, we found that there were 242,000 solar jobs in the United States. Those jobs have grown 159 percent since 2010 when we first began conducting our census. The growth has primarily been due to declining prices and a favorable policy environment. Solar jobs are not just in installation but also include manufacturing, wholesale trade and distribution, law, design, finance and a host of other areas.

About 2/3's of the employment in the solar companies are in the installation sector, and that is the fastest growing sector. It has tripled its employment since 2010. But all of the sectors are experiencing growth. Even manufacturing has grown 35 percent since 2010. In the past 2 years we have seen an annual decline of about 3 to 4 percent in solar jobs, but we are expecting 2019 to resume employment growth.

Despite the recent decline though, there was growth in 29 states and the District in solar energy jobs. Some of the leading states include Florida, Illinois, Texas, Ohio, Washington.

Even with the recent decline in jobs, solar employers continue to struggle to find and retain qualified employees. In 2018, 26 percent of the solar employers reported that it was very difficult to hire qualified employees, and that is up from 18 percent the previous year. We generally credit this to the low unemployment rate and the very competitive construction industry that is also seeking many qualified employees.

Hiring challenges also vary by market segment. In the installation segment, 33 percent of employers reported that it was very difficult to hire qualified employees. Geographically, there is a lot of variation as well. So, for instance, in the south central region, which includes Alabama, Kentucky, Mississippi, and Tennessee, 43 percent of the solar employees reported that it was very difficult to find qualified employees. That is likely due to these states being emerging markets for solar, and so it is more difficult to for employers to find qualified employees in these states.

The solar industry offers a rewarding career and relatively low barriers for entry. Most solar jobs require experience, but a majority do not require a bachelor's degree. Training and certifications

are not required for entry level but are important for career advancement.

So, what are we looking for in the future? Well, if by 2030 we want solar to reduce the electric sector greenhouse gas emissions by 35 percent, we are going to need solar to provide 20 percent of the power to the grid. And that is going to require 600,000 employees, about 400,000 more than we currently have.

What will they be working on? There is going to be more automation, so there is going to be more need for higher skill levels. And despite the growing automation, we expect it to further drive down prices and drive up demand. There will be more operations and maintenance jobs. There will be more jobs in storage. And then there are going to be more jobs in these emerging states.

Thank you so much for the chance to testify. And may the Houston Astros strike out many times.

Chairman CROW. Thank you, Mr. Gilliland. I think you will find a lot of unanimity on that last statement, in this room in particular, so.

I will begin by recognizing myself for 5 minutes. I would like to begin with Mr. Wardrip. I introduced earlier this year a bill, the Save Energy Act, which will allow homeowners basically to have a $500 tax credit to make energy efficiency improvements to their homes. That could be insulation, energy efficient appliances, doors, windows, things of that nature. And I know in Colorado, we have had experience in the past when there have been tax credits along those lines, we have seen a vast increase in economic activity, particularly in the building trades as more people are employed to actually do that work, to make those improvements. And it also increases the value of homeowners' homes as well as they make those improvements.

So I would love to hear your thoughts and then go to Mr. Jackson as well, very briefly. I would love your thoughts on how you think that a tax credit like mine in the Save Energy Act would help promote your fields and accomplish what it is designed to accomplish.

Mr. WARDRIP. Thank you for the question.

I think that, in my opinion, that would help us certainly grow. We do not do a lot in residential, but we do have residential groups. It would be the next emerging opportunity for us in the state of Colorado. We have incredible apprenticeships, registered apprenticeships that are very versatile. We can change our training to whatever the necessities are. So I think for us, and I think it would be fantastic, but I think as a homeowner I would love to have that opportunity to retrofit my house with proper windows to save energy, so.

Mr. JACKSON. Thank you for the question.

I would echo what Mr. Wardrip also talked about. I think we have seen things like this over the last 10 years back when we had some economic struggles in the early part of this decade. We were seeing a lot of incentives out there from utility companies, through our state energy offices, and it definitely drove demand, especially around energy efficiency rebates and upgrades to homes. And we know that especially at the $500 level, that is actually driving work for small businesses to come into homes to actually do things like

insulation upgrades, air sealing, replacement of windows and doors and things like that to improve energy efficiency. So I think that would be a great win.

Chairman CROW. Mr. James and Mr. Gilliland, both of you talked about the challenges of finding qualified employees in the pipeline. So starting with Mr. James, I would love your thoughts, you know, as an employer. Where are you finding these folks, and what in your view is the biggest barrier to people going into this industry having careers?

Mr. JAMES. Thank you for the question.

Historically, we have looked to our veterans for our workforce. Obviously, the training that they receive is next to none, and they come in very well qualified to take the positions that we have available. Another avenue is the community colleges. They have excellent 2-year degrees, similar to apprenticeships, that they come in with the basics in electrical, mechanical, and hydraulics, which is the foundation of the wind turbines, and solar for that matter on the electrical side. So the community colleges are another point of emphasis.

AWEA is driving the development of the workforce as well through some qualified electrical worker programs and some different incentives that we are working on there as well. So it is a holistic approach to gathering the qualified personnel. And ensuring that they have a good base training to come aboard.

Mr. GILLILAND. Sure. So, we are seeing that there are a lot of opportunities for veterans and transitioning military to enter the solar field. The employers, as just evidence by Mr. James's comment, really favor the service experience. As I mentioned earlier, there is not a tremendous need for training for entry level jobs, although companies do express a need for some kind of standard template. But it is not—I mean, we are talking about a week or 2 weeks of training that is typically what the larger companies provide to entry-level employees. It is harder for smaller companies because they do not have those established programs. But there is certainly also a need for incumbent training. There are a lot of opportunities to advance from entry level to a crew, and consequently, a lot of need in that incumbent training.

Chairman CROW. Thank you. I appreciate that.

My time has now expired.

The Ranking Member, Mr. Hern, is now recognized for 5 minutes.

Mr. HERN. Thank you, Mr. Chairman. Thank you for the witnesses being here today.

You know, as a mechanical engineer and as a small business owner for over 34 years across multiple industries, as a person who has created thousands of jobs in my career, I understand the importance of developing high-skilled workers and certainly getting people in new industries and how important it is.

Additionally, you mentioned career centers. I was fortunate in high school to do 2 years and get a drafting certificate, so just a broad background and experiences in our vocational schools as well.

You know, given these programs' successes and the increased demand for skilled workers, it is vital that we utilize available work-

force development programs to educate workers' interests in the energy industry. However, we need to be realistic in our approach to increase reliance on renewable resources as we currently do not have the means to become 100 percent reliable on renewable injury without horrible effects on hardworking Americans. You are advocating a normal free market transition as I am hearing, so I appreciate that.

And I say this because I am also a member on the Natural Resources Committee, where I have seen a plethora of partisan, radical, socialist policies like we will talk about the Green New Deal. There are conversations going on about that. I am sure you are keenly aware of all the details there, which is outside the free market transition that do nothing but impose impossible mandates that would be even more difficult for you to fill those jobs as people are coming off other energy sectors.

So I have also talked about how bipartisan this Committee has been in finding solutions for small business men and women. I spoke to that on the floor just last week, to the Chairwoman and the Ranking Member of this Committee, about how we have moved forward to find workable bills that help benefit small business men and women who are trying to grow their businesses, find available employees, and put them to work.

So again, it is really important that we recognize we have all these resources and then also what you all are doing to make that work as well.

I am very interested, and I know Chairman Crow is based on his military background. I would like to expand on this Solar Vets program that you are part of. I think you are trying to bring that back, Mr. Gilliland?

Mr. GILLILAND. Yes.

Mr. HERN. Could you talk to us about the successes of that program and why it stopped and why it is starting back up and what your thoughts are?

Mr. GILLILAND. Sure. So the initial version of Solar Ready Vets was focused on setting up training programs for 10 military bases around the country. We worked with the Department of Energy on working with, say, nearby community colleges to set up training programs and recruit service members, the transitioning service members into these programs, and there were a number of successes. It varied depending upon base and on the quality of the programs. But a number of transitioning service members did matriculate through these programs and many got jobs in solar.

The newer version, the one we are working on now, is including veterans as well as transitioning services members. And it also is focused on some of the policy challenges that we ran into before. One of the issues we ran into before was that sometimes it was difficult for vets to use their GI bill for solar-related training. And so, on this version of the Solar Ready Vets program, we actually have a task, and one of our areas of focus is to work with community colleges on getting more acceptance of the GI bill.

Mr. HERN. Mr. Gilliland, if I could, just reclaiming some of my time here just so I do not want to run out of time, because I want to ask you a couple questions. I think you were starting to allude to it. If we could help out, you know, through this Committee, one

of the things this Committee does very well is to take where some of these bottlenecks are and help get this information and legislation pushed through other Committees. I think you were referencing TAPS, where you are transitioning out of the military and being able to get into some of these programs that are GI qualified. And as an example, we have a great, probably the second best—I would claim it would be the first best technical school program in Oklahoma, and we are also the number two wind producer in the country. And we also probably have one of the highest per capita of veterans, 115,000 in Northeast Oklahoma alone, one of the seven VA regional hospital programs. And so there are a lot of things around veterans, yet we do not have a program like this to help our military men and women transition into these high-paying jobs. As this industry continues to grow, again, in a state that relies on fossil fuels, as a major contributor to its budget, and so I would really appreciate as we go forward if we can get the information from you to the Chairman and to the Ranking Member of the Subcommittee and to Chairwoman Velázquez and to Ranking Member Chabot so that we can help you get this program back up and going in a timely fashion.

Thank you, all. I am sorry, I ran out of time. I have a ton of questions for you. Thank you so much for being here.

Chairman CROW. Thank you, Mr. Hern. The gentleman's time has expired.

And I will just reiterate his comments about, you know, the nature of this Committee and how bipartisan it is, and we take a lot of pride in that. Our approach traditionally has been we find areas of overlap and common agreement to get things done, and I think a great testament to that is the fact that we have actually passed dozens of bills this year unanimously out of this Committee. And we are very proud of that fact.

Now, the gentleman from Illinois, Mr. Schneider, is recognized for 5 minutes.

Mr. SCHNEIDER. Thank you, Mr. Chairman. And thank you for calling this hearing today. I want to thank the witnesses for joining us today and for sharing your experiences and perspectives in what is an increasingly important issue.

I come from Illinois. Actually, I come from Colorado, originally, Mr. Wardrip, a native, but I moved to Illinois. It is where I have had my home for the last, well, now 40 years, and it is where I have the privilege of representing.

In our state 3 years ago, we passed the Future Energy Jobs Act, which will help power our state's investment in the green economy in the future you touched about in Colorado which I will come to in a second.

We passed the bill because consumers want to be able to choose renewables, and utilities around the country are making investments in new green energy infrastructure. It is crucial that in our state, the Illinois Future Energy Jobs Act, one of the crucial things it did was to make the necessary investment in our workforce so that we can meet the demands over the next decade of the new types of jobs that the green energy economy is going to bring. To do this, our Illinois legislature brought together the educational infrastructure of community colleges, which we have many wonderful

ones, two in my district, and the know-how of the networks of organized labor. The legislation is expected to help create literally thousands of clean energy jobs in Illinois and hopefully create a pipeline through which we will train these future green energy workers. And that is because its success relies on one critical stakeholder, and that is organized labor.

And Mr. Wardrip, you mentioned you were part of SMART and a sheet metal worker. I would be interested in your perspective of how organized labor will be a critical resource as we move forward in the clean energy revolution. As you mentioned, in Colorado, renewables are replacing coal at an extraordinary rate and with my family all still there, I have watched it with keen interest. And how will labor be centrally enclosing the green energy skills gap?

Mr. WARDRIP. Thank you for the question.

So again, I go back to our registered apprenticeships are the most versatile training programs out there. We can train to what the necessities require. So without really much effort. We already have many wind opportunities with the IBW locals, as well as electrical, transmission lines, things of that nature. We already do hoisting and rigging, iron work, that type of thing. We are ready to be there. We are ready to do the work. We just have not done a lot of that work in there.

The other thing that we bring to the table is as the power plants are being closed and as the mines are reducing production substantially in the state of Colorado, we have a workforce available. They are going to be available starting in 2022 and going all the way up to 2040 due to the utilities cutting the coal production and going to solar rays and some gas and mostly wind and solar. So we have the workforce available. We are willing to train those people and transition them to be able to do and answer the call of the renewable futures.

Mr. SCHNEIDER. And maybe I will turn to Mr. James. You do industrial scale solar.

Mr. JAMES. That is correct, yes.

Mr. SCHNEIDER. You know, one of the concerns we have for the communities like in Colorado where there is a decline in demand for the coal, we just want to make sure that the people in these communities have opportunities. Are there opportunities for these folks to be trained and find employment in industrial scale solar that will allow them to stay close to home? As a father of boys in their twenties, I want my kids close to home. They are not now. We want our grandkids close to us. That is true where I live. I think it is true for every parent who hopes to be a grandparent, we want our kids close to us.

Mr. JAMES. That is right. And I failed to mention, Mr. Schneider, that as the more traditional generating technologies close for various reasons, efficiencies, and those types of things, the workforce that are left there are a very skilled workforce.

Mr. SCHNEIDER. Right.

Mr. JAMES. One that, you know, have the various skills that we are looking for, both in solar and in wind. So yes, that is another pipeline I failed to mention as we talked about the community colleges and the technical schools and the veterans. Already trained

employees from a downtrodden type of technology, that is a no-brainer. We will pick them up.

Mr. SCHNEIDER. Obviously, we can transition.

Mr. JAMES. Pick them up. Yes.

Mr. SCHNEIDER. With my few seconds left, I just want to go back and emphasize, I think it was you, Mr. Wardrip, who mentioned Helmets to Hard Hats with my colleague, Mr. Spano, from Florida, on this Committee, bipartisanship which the Chairman touched on. We are pushing legislation that will reauthorize and move forward the boots to business, working with our veterans and military personnel who are transitioning back into civilian life, there are a lot of great opportunities. And so I think making sure we have the workforce, making sure that people who want to be entrepreneurs see a pathway in this field. There is a lot of opportunity here. We should not let it pass us by.

And with that, I yield back.

Chairman CROW. Thank you. The gentleman yields back.

The gentleman from New Jersey, Mr. Kim, is now recognized for 5 minutes.

Mr. KIM. Great. Thank you, Mr. Chairman and Ranking Member for holding this hearing. And thank you to the witnesses. Thanks for coming on out and talking with us here.

I just have a couple questions I just want to jump into.

You know, my district in New Jersey, there are a lot of jobs that are related to what it is we are talking here. About 3,500 jobs when it comes to energy efficiency, a lot when it comes to solar manufacturing installation. And as I talked to the business owners there and the workers there, what we are trying to think about is just understand the trend lines and when we say what is our vision for our community, not just, you know, next year but 10 years down the road, 20 years down the road.

When I was looking through some of the material prepped for this hearing, you know, we are talking about how energy efficiency is the fastest-growing sector when it comes to energy sector and talking about the growth in that way. But I guess what I want to glean from you as sort of the big picture is where do you guys see things going from here? You know, especially, let's start with the energy efficiency side of things. You know, what kind of growth should we expect over the next 10 years? What particular types of jobs within there do you see being the ones that are in demand? And then are we keeping up with the training side of things to make sure that we are able to sustain that type of growth going forward?

So I am not sure if anyone particularly wants to speak to that.

Mr. Jackson, you are kind of nodding your head a bunch. Do you want to take the first crack?

Mr. JACKSON. Absolutely. That would be wonderful.

Actually, you bring up some great ideas and questions. So we actually see energy efficiency, like most do, as the cheapest fuel. It is the first fuel. And we look at energy efficiency as answering the call for most homes and buildings first before actually bringing in things like renewables, wind, solar, programs like that.

What we are seeing in Virginia over the last 5 years, so if we look back at 2014, specific to low income energy efficiency programs

just for utilities, we are around $500,000 in 2014. In 2022, we are projecting about $50 million in programs. That is a huge growth for our industry in Virginia around energy efficiency. Not around renewables. This is just around energy efficiency.

What we are doing to meet that demand is specifically in our training center, and we have been doing this for years, is we actually train and credential employees and provide career ladders within the Weatherization Assistance Program. And we train in 26 states. Most of the states that there is a representative from this Committee we train in, also. New Jersey, we have a state training contract, and we provide career ladders, but then those credentials are transferrable and portable between public and private sectors, and that is huge so employees can actually move between those sectors, especially for small subcontractors that will actually do work for the Weatherization Assistance Program and then also do private industry work for homeowners.

Mr. KIM. I am just going to add another element to this. Mr. James, I wanted to kind of seek some of your expertise on this. My district is a district with, you know, the Jersey Shoreline. There is a lot of talk in my state about offshore wind. And I am just trying to get a sense of the workforce side of things. Help me understand, you know, what are the differences in terms of the training needed, the expertise needed, for those working on installation of onshore versus offshore?

Mr. JAMES. Sure. That is a great question, Mr. Kim.

The similarities are very much alike with respect to the turbine once you get up off of the waterline and in the tower and the nacelle and what have you. Obviously, the resource to get to the tower is a little bit different, and cranes and those types of activities for some of the major correctives or maintenances might require a little additional training.

Safety is another aspect that is looked at a little bit different out on the water versus inland. But overall speaking, there are not a lot of differences in the qualifications or training requirements for a technician to work either inland or offshore.

Mr. KIM. And the last final question, Mr. Gilliland, over to you. I just wanted to kind of get your thoughts on something. I get asked a lot about just, you know, the installation of solar systems for folks in the district. And basically, what folks are just kind of asking me about is what kind of guarantee do they have, what kind of assurances do they have in terms of knowing that they are going to be able to reduce their energy bill over the long term, you know, just in terms of just the concerns they have about the high cost of utilities and other things like that? So I guess I just kind of wanted to hear from you, you know, what is sort of the best pitch here? What should I be saying to, or what should folks be saying to my constituents about that just in the few seconds we have left?

Mr. GILLILAND. Sure. So first of all, solar is an upfront investment. So, it is all cap X. And then it pays off over time. It is never going to vary. So, non-solar energy costs will go up and down. They could go way up but solar, once it is constructed, is a stable cost curve for the rest of the life of the system. And the cost is going down. The cost to develop solar, even in the last year, has dropped 7 to 11 percent.

Mr. KIM. Just in the last year?

Mr. GILLILAND. Just in the last year. So, it is a great deal. It is a terrific opportunity.

Mr. KIM. That sounds good.

Well, I yield back, Mr. Chair.

Chairman CROW. Thank you. The gentleman yields back.

Now, I would like to recognize Ms. Davids, from Oklahoma.

Mrs. DAVIS. Kansas.

Chairman CROW. Kansas. Sorry, Kansas.

Mrs. DAVIS. That is okay.

Well, thank you, Chairman. And I also appreciate all of the folks who came to offer testimony and help us better understand this.

I represent the Kansas 3rd Congressional District, which is the Kansas City Metro area. And there are a lot of folks in our community and in my district who are very concerned about making sure that we address issues of climate change and resiliency and I often cite a rather general climate index that puts the Kansas City Metro area as the likely fifth most to be impacted of 25 metro areas that they looked at because of climate change. And our area faces both drought and flooding issues, and that is only going to be exacerbated as we move forward.

So the transition to renewables is something that I am very interested in. And that is not just for buildings and structures, but also for transportation and infrastructure as I sit on that Committee.

One of the things that I am really proud of is that 40 percent of Kansas's energy comes from wind energy. We produce a lot of wind energy out there. And I am hoping that we can continue that push in that direction. But one of the things that I wonder about from you all is, how can our Committee and the SBA be helpful in making sure that we are providing incentives and investments into that space where it makes sense? And I think about that because wind is obviously in the Kansas area and the Plains area great, but solar is better in other places. So I want to make sure we are incentivizing but not restricting progress on that.

And I will open it up to—I see some head nodding, so.

Mr. James?

Mr. JAMES. All right. Ms. Davids, thank you.

I have had the pleasure of working on several Kansas wind farms and projects in the past, so you are right, there is a lot of wind in Kansas.

I think to your question, for us it is back to the growth that we are going to see in the next couple of years in both wind and solar is going to be staggering. And in developing that workforce is going to be key. Several have mentioned ideas and places to get that resource.

But I fall back to the community colleges and the grants and some of the support that maybe the military veterans can gather from the Committee in order to be directed in our way because the jobs are going to be there and definitely need filled.

Mrs. DAVIS. So Mr. Wardrip, I was wondering if you could talk a little bit about, I think the Armed Services is an amazing place for people to learn skills and leadership, and especially entrepreneurial skills that are going to be very beneficial as they move for-

ward after their time serving. But the trades, and I think about apprenticeship programs and very technical skills that folks who are part of various unions. Can you talk a little bit about the positive impact that those things can have as we move into a more renewable energy sector? And maybe what your vision for that is?

Mr. WARDRIP. Yes, on both.

So let me start with the second one first.

The vision that I have is that, of course, that we would make sure that the workers that currently hold the work in coal are able to transition into the work going into renewables. But there has to be a reality that those people make a very good living. And so to retrain at 50 percent of what they currently would make, that is unreasonable. So therefore, as you asked earlier, and sorry to go back to the previous question, I think if you are going to provide incentives, then that incentive must have a stipulation that states that these people are going to make dollar for dollar all the way to their pensions and health care. So I think that is something to my core is something that needs to be held, you know, that needs to be accountable for the renewable.

Secondly, we also see Helmets to Hard Hats, as well as other veterans' programs to bring veterans into our apprenticeships and grow in the renewable market knowing that that is really what the new power world is going to be about. And we welcome that. So hopefully I covered most of it.

Mrs. DAVIS. Thank you. I appreciate it. And I yield back.

Chairman CROW. Thank you. The gentlelady from Kansas yields back.

I would like to recognize myself for a few more minutes here for additional questions. And this relates to something that Mr. Hern, who unfortunately had to go off to another hearing, brought up, but it is a concern we have talked about.

Climate change is, of course, one of my top concerns, and I am doing a lot of stuff here to address it. At the same time, I do have a lot of conversations in my community and my district about people who are being caught up in that transition. And I know Mr. Wardrip, you talked about that earlier. These are folks that are, you know, sometimes working paycheck to paycheck. They have to be able to pay their rent and their mortgage. They are supporting families. We are experiencing firsthand in Colorado a transition from fossil fuels, from coal-fired power plants to renewable energy, and there is great opportunity there and there are tremendous careers available in that area. But we do want to make sure that it is just and it is equitable and it is seamless, and these people who are supporting their families have the ability to do it. And that is one of the reasons why I am a huge proponent of apprenticeships because people can learn on the job, they can be paid, they can continue to support their families while they are making that career transition.

So with that as background, starting with you, Mr. Wardrip, what do we have to do to expand the opportunities in those apprenticeships? Helmets to Hard Hats is obviously a clear example of people making the transition from military to civilian life, but other apprenticeship programs, how do we kind of change the mindset and increase that pipeline so people can actually do that

and do it in a way that supports our economy, supports the transition we need to make for our environment, but also can support their families as well?

Mr. WARDRIP. Thank you.

So first things first is get rid of the stigma that we are a closed shop. We welcome everybody. There is nobody that we would not welcome as long as they can, you know, they want to come to work, give us 40 hours, be there at 7 o'clock in the morning, we would welcome them all day, every day. I think that is the number one thing.

The other thing would be to partner with independent power producers. What we have seen in Colorado is we sadly have not had much of a partnership. We do some work but to the extent, it is very little. We would like to figure out how to make sure that when we are doing construction, that we have the opportunity to have the local workers, and I mean the people that live in the towns where the coal is being taken out of. And then solar rays and wind should be put back where those towns are losing the coal. Those worker should have first shots at that. And then, of course, going to the county and then expand out to the state. Whatever it takes. But make an outward circular motion to be able to have workers from the area do the work specifically in the state at the farthest, and then bring people in from out of state to participate doing that work. I think that helps the economy, and I think that helps the communities that are going to be frankly decimated in many parts of Colorado.

And then, also, again, we are versatile enough that we can train to do work in Craig from Grand Junction, which is about a 100-mile drive. We are versatile enough and willing to do that work. That is what construction workers do.

Chairman CROW. Thank you, Mr. Wardrip.

Any other comments or thoughts on that?

Yes, Mr. Gilliland?

Mr. GILLILAND. So, first of all, we did prepare a full report on solar workforce development that has a big section on apprenticeships and that is referenced in the material that we submitted. Despite saying that many entry-level solar jobs do not need a lot of training, we do see that there is a tremendous opportunity for apprenticeships in solar. In our new Solar Ready Vets program, we are actually looking at registered apprenticeships at the Department of Labor and seeing how we can fit solar into their system. So, we see that as a very good opportunity for solar.

Chairman CROW. Thank you.

It seems to me there is also a cultural mindset that needs to shift here, as well. Right? You know, for decades, we have a K-12 pipeline and we have a culture that tells young folks that to have a career and a middle-class life you have to go to a 4-year college or university, yet we see that we have a substantial deficit in America today on the trades, in crafts, and highly-qualified workers in this field that can have a very strong middle-class life and support their families in these industries.

So from a cultural perspective, what are you all doing on the ground to communicate that to people in your community and

young folks that you can build a life and have a career and do it in this way?

Mr. JAMES. I will start off, Mr. Crow.

In all of our development areas, different states across the U.S., we hold public forums. And those are very successful in spreading the word of the opportunity and the challenges that we have as an industry in the workforce, in the development. So that is a primary communication tool that we have is just talking to the public, making them aware of the opportunity and what it takes to get that started, and that has been received very well.

Mr. JACKSON. If I may for a moment.

So very similar. We spend time out in the field at community colleges and actually high schools. So what we are seeing and hearing a lot from the younger population generation is the concern about the burden of college debt. So I have to go to a 4-year college. Well, now I have to get a master's degree if I really want to have earning potential. And then I have that debt I am going to carry for 10 to 20 years. So we are actually starting to see younger population from the high schools that will finish and then come to us, actually, and our program is very much like an apprentice program. Most of our folks, they start out with one week of training, and then as you step up through the career ladder you take additional courses. Our energy auditors can take as much as 9 weeks of courses over a 2-year timeframe.

And I will tell you also, within our industry, especially Community Housing Partners, our average tenure is 18-1/2 years. Once folks start in our program, they stay in our program. And we see that over and over because it is a passion to save energy and to help people.

Chairman CROW. Thank you. Mr. Jackson, any other comments on that? All right.

Thank you to all of you and all of the witnesses today for taking time out of your busy schedules to be with us.

As we have heard today, small businesses are at the forefront of the clean energy economy, promoting new technologies in renewable energy and energy efficiency. Whether it be in the production of biofuels, renewable energy, or energy-efficient products, small businesses are playing a key role.

I want to thank our witnesses for being here and sharing the challenges and opportunities that they see out in the communities and on the ground every day. I look forward to working with my colleagues on this Committee, on both sides of the aisle, to address and pursue policies that we should consider to train workers and grow with this industry. I am glad we share the priority of energy independence in supporting small business growth and innovation in this new and exciting sector.

I would ask unanimous consent that members have 5 legislative days to submit statements and supporting materials for the record.

Without objection, so ordered.

And if there is no further business to come before the Committee, we are adjourned. Thank you.

[Whereupon, at 11:11 a.m., the Subcommittee was adjourned.]

APPENDIX

COMMUNITY HOUSING PARTNERS

United States House of Representatives
Committee on Small Business
Subcommittee on Innovation and Workforce Development
"Creating the Clean Energy Workforce"
Testimony by Mark Jackson, Vice President
Community Housing Partners (dba CHP Energy Solutions)
October 29, 2019

Thank you for having me here today, Chairman Crow and Ranking Member Balderson. I appreciate the opportunity to speak to you and the other members of this committee.

My name is Mark Jackson, and I'm the Vice President of Energy Solutions at Community Housing Partners. CHP was formed over 40 years ago to address the poor housing conditions of low-income families in Virginia. In 1976, CHP became one of the first practitioners of DOE's newly created federal weatherization assistance program. Through our participation in that program, we recognized the need for robust training opportunities to ensure quality energy efficiency work; therefore, in 1999, we opened our Research and Training Center to provide building science and energy efficiency training to weatherization providers across the country. Today CHP Energy Solutions is the largest weatherization provider in Virginia, and our Research and Training Center provides training not only to the national weatherization network, but to the residential building and energy efficiency sector internationally. CHP is also an affordable housing manager and developer in 7 states.

CHP's scope of work makes us uniquely qualified to provide you information on the energy efficiency workforce and the training opportunities that are available.

- We are an employer of energy efficiency workers.
- We contract with small businesses in the energy efficiency sector.
- We provide training to crews and agencies in the Weatherization Assistance Program.
- We have trained over 40,000 energy efficiency and building science workers from both the public and private sectors including code officials, HVAC technicians, and small home improvement businesses.

There are reasons why we're talking specifically about energy efficiency businesses here today. These businesses are primarily small businesses that are located in every U.S. state. Of the almost 400,000 energy efficiency businesses in the United States, nearly 80% employ fewer than 20 workers[1]—while accounting for over 2 million energy efficiency jobs in the United States—and energy efficiency is the fastest growing segment of the energy jobs sector. In fact, almost 20% of all construction jobs are in energy efficiency; that represents more than 1 in every 6 construction workers.[2] As one of the largest weatherization providers in the United States, and in our role as an affordable housing manager and developer, CHP sub-contracts with hundreds of

[1] E2 and E4TheFuture, *Energy Efficiency Jobs in America*, September 2019, accessed October 15, 2019, https://www.e2.org/wp-content/uploads/2019/09/Energy-Efficiency-Jobs-in-America-2019-Full-Report.pdf.
[2] Environmental and Energy Study Institute, *Fact Sheet – Jobs in Renewable Energy, Energy Efficiency, and Resilience (2019)*, July 23, 2019, accessed October 17, 2019, https://www.eesi.org/papers/view/fact-sheet-jobs-in-renewable-energy-energy-efficiency-and-resilience-2019#2.

small construction businesses across our service footprint. We're immersed in the challenges this industry faces every day.

The construction industry is thriving, but over 80% of energy efficiency businesses report hiring difficulties. Almost half of those cite the lack of applicants who are experienced, trained, or have the necessary technical skills to do the work.[3] CHP has posted 10 weatherization technician jobs so far this year, and although we've had many applicants for every posting, positions remain open as we struggle to find qualified applicants. We are also planning to expand our energy efficiency workforce over the next year with the addition of 10-12 new jobs, and we expect that finding quality applicants will continue to present a problem.

Compounding the issue of the lack of a skilled workforce is the expectation that over 40% of current construction workers will retire in the next 12 years.[4] CHP's experience aligns with this trend as well: 30% of our current weatherization workers are over the age of 50. Those hiring challenges are even greater for small businesses as they lack the capital to invest in recruitment, hiring, and training programs.[5]

Thus, the importance of quality training programs. DOE notes on their website that the ability to develop high-performance homes that are energy efficient, healthy, and durable relies on building science education and training.[6] Also, as all levels of government recognize the need for and implement energy efficiency programs and policies, the success of those programs and policies relies on a robust and well-trained energy efficiency workforce. There is so much opportunity in this sector if these hiring and training challenges can be addressed.

The energy efficiency sector also provides economic development benefits to its businesses' communities. Residents who have their homes weatherized by CHP see a 30% savings on their utility bills—and there's the benefit from the jobs created by the industry, of course. As I stated, these jobs are in a rapidly growing sector, and they are local. They can't be outsourced, and competition for workers ensures that these jobs pay a living wage. **If** we can find those workers.

Less than 10 years ago, through a grant from the Department of Labor, CHP's Training Center successfully partnered with workforce development organizations, community colleges, and universities to provide green energy training to nearly 600 individuals. The CREATES program was incredibly successful, and similar programs may be one approach to solving today's crisis.

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[3] Energy Futures Initiative and National Association of State Energy Officials, *The 2019 U.S. Energy and Employment Report*, https://www.usenergyjobs.org/2019-report.
[4] Liz Sheffield, "Construction Grows, But Baby Boomers Retiring Leaves Gap," *Spark* (blog), February 2019, https://www.adp.com/spark/articles/2019/02/construction-grows-but-baby-boomers-retiring-leaves-gap.aspx#
[5] Mary Shoemaker and David Ribeiro, *Through the Local Government Lens: Developing the Energy Efficiency Workforce*, June 14, 2018. (Washington, DC: American Council for an Energy-Efficient Economy)
[6] "Building Science Education," Department of Energy, Office of Energy Efficiency and Renewable Energy, accessed October 17, 2019, https://www.energy.gov/eere/buildings/building-science-education.

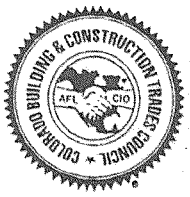
The business growth in the energy efficiency sector doesn't stop with construction technicians. The workforce demands created by energy efficiency programs and policies extend beyond them; these programs and policies also create an increase in demand for planners, engineers, bankers, and investors.[7] For example, CHP is hiring more program and project managers as a result of the growth in the energy efficiency sector, and as we continue to grow, so will those opportunities.

I appreciate the time that you've given me today. To restate the main points of my testimony today:

- Energy efficiency businesses are small businesses, and the fastest growing segment of the energy jobs sector;
- Energy efficiency businesses are struggling to find and hire skilled workers. Workforce training is required to replace retiring employees and fill the new positions being created as the sector continues to grow; and,
- Energy efficiency programs and policies provide benefits to workers and to the greater communities in which they are implemented.

Thank you, and I look forward to your questions.

[7] Shoemaker and Ribeiro, *Through the Local Government Lens*



COLORADO BUILDING AND CONSTRUCTION TRADES COUNCIL, AFL-CIO

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10/26/2019

Mr. Chairman and members of the committee:

Thank you for the opportunity to address you today. My Name is Jason Wardrip. I am a Colorado native living in Aurora. I am the Business Manager of the Colorado Building & Construction Trades Council. Prior to this position, I was a Business Representative for SMART #9 for ten years and have been a sheet metal worker for 24 years. I work for 24 unions with 14 different crafts and more than 10,000 members. Our members are construction workers working in residential, light commercial, commercial, industrial and the power industries. My role is to support the local unions in the State of Colorado for Per-Apprenticeships, Apprenticeship Standards, and Project Procurement.

We've developed apprenticeships to give people pathways to become construction professionals. Our apprenticeships recruit transitioning military with the Helmets to Hardhats program, adults changing careers and technical schools. We have pre-apprenticeship programs for high school students and underserved populations. We are also developing re-entry programs for pre-release offenders in conjunction with the Colorado Department of Corrections.

The construction industry in Colorado is changing. Renewables are replacing coal at an amazingly fast pace, and this is causing ripple effects through the construction industry. I never imagined as a young sheet metal worker that I'd care about the economics and labor dynamics related to coal, gas, or renewables. However, my livelihood, and the livelihood of our members depends upon us understanding and adapting to a rapidly shifting market.

I'm pleased to testify to you today that I see great opportunity for our industry in the new energy economy. As the desire to reduce carbon emissions escalates, our Union members will answer the call to retrofit older technology and build the infrastructure of the future. There's a lot of work to be done to create and modify our built spaces to be comfortable, efficient, and sustainable.

Our Union members are highly skilled professionals. We get the job done right the first time. Our Union workers work efficiently and bring creative solutions to the table because we've been properly trained as on-the-job apprentices. Academic studies have proven that Union labor returns the biggest bang-for-the-buck. We are economic drivers for Colorado's economy. Our workers have health care and retire with dignity. We take pride in protecting each other's safety, reducing costly injuries, and deaths.

However, in our changing energy market, we are looking to adapt to big changes. The renewable energy market frequently brings in construction workers from out of state at lower wages with little to no benefit packages. We understand independent power producers run a tight budget. However, I know in-state Union

contractors can do the job better than out-of-state labor. We can show dollar-for-dollar how we finish renewable projects on time and under budget, using local workers first.

As these projects become larger, local hire will keep jobs in communities, particularly those losing coal jobs. Local workers maintain the economies they live in by purchasing goods and services, paying taxes, and owning homes in their communities. When out of state workers are brought in, local economies suffer because the wages leave with the workers when the project is finished.

To keep our jobs local and high quality, Colorado passed policies last year to ensure proper licensing in solar installation and enacted best value processes for new energy generating projects. Starting in 2020, Colorado will require solar farms that are larger than 300 Kilowatts to employ workers who are licensed journeymen or in a registered apprenticeship program.

Unions also worked with environmental groups to create the Just Transition Office for coal dependent communities and workers.

The new energy economy can provide high-quality jobs for all trades. We train people to be safe and efficient in our apprenticeships. I ask you, committee members, to look to our new standards in Colorado as a solid start to create good jobs in a zero-carbon economy.

Respectfully submitted,

Jason L. Wardrip

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Testimony of Neil James, Vice President of Operations, Maintenance, and Monitoring, Apex Clean Energy

United States House of Representatives

Committee on Small Business

Subcommittee on Innovation and Workforce Development

Hearing on "Creating the Clean Energy Workforce"

October 29, 2019

Chairman Crow, Ranking Member Balderson, and Members of the Subcommittee on Innovation and Workforce Development, thank you for the opportunity to testify on the topic of creating the clean energy workforce.

My name is Neil James, and I am the Vice President of Operations, Maintenance, and Monitoring at Apex Clean Energy. I have more than 38 years of experience in electrical utilities, alternative energy, and high-voltage operations and bring a unique perspective on workforce development as an operations and maintenance supervisor with Apex.

My remarks today will focus on the U.S. wind industry's rapid growth and the opportunities and challenges we face in recruiting, training, and developing the necessary workforce to meet the increased demand for an expanded clean energy economy. I will also touch on Apex's approach to workforce development.

A bit of background on my company: Apex Clean Energy develops, constructs, and operates utility-scale wind and solar power facilities across North America. Our mission-driven team of more than 200 renewable energy experts uses a data-focused approach and an unrivaled portfolio of projects to create solutions for the world's most innovative and forward-thinking customers. Headquartered two and a half hours from here, in Charlottesville, Virginia, Apex's work has led to over $7 billion in clean energy investment—equal to 5 gigawatts of clean energy being added to the grid—and we operate nearly 2 gigawatts from our remote monitoring facility, also in Charlottesville.

Apex has been built with a singular focus: to accelerate the shift to clean electricity.

Overview of the Wind Industry in the United States

The U.S. wind industry is made up of manufacturing, construction, and operations and maintenance workers; developers; engineers; and business-trained individuals. Currently, the industry comprises more than 114,000 workers across all 50 states. Industry experts predict that by 2020, the industry will support nearly a quarter-million American jobs.[1] Wind turbine technician is the second-fastest-growing job in the country; only solar photovoltaic installer

[1] https://www.awea.org/resources/news/2017/navigant-consulting-wind-industry-could-drive-a-qu

ranks higher.[2] The wind industry employs more Americans than in nuclear, coal, natural gas, or hydroelectric power generation.[3]

The benefits of wind energy are widespread, with wind farms and manufacturing facilities spanning all 50 states. We tend to see most of the operating projects, with more to come, in the West, Texas, the Great Plains, and large sections of the Midwest. There is a significant manufacturing presence in both the Southeast and the Midwest, and with the emergence of offshore wind, we expect to see a localized and expansive manufacturing presence on the East Coast.

Apex Approach to Creating the Clean Energy Workforce

At Apex, we have five core company values: Entrepreneurship, Integrity, Professionalism, Safety, and Sustainability. When we recruit new employees, we look for individuals who embody these core values, and we strive to live these values both professionally and personally.

I want to take one minute to provide an example of what this looks like at Apex. My colleague, Marco Pineda, came to the United States from Honduras as a small boy. Marco went to college and received a degree in accounting, but at the time, work was scarce, so he took a job on an oil field. Not long after, he recognized an opportunity in clean energy near his home in south Texas and began working for Vestas as a wind turbine technician and site manager. In 2015, Apex brought him on to manage our Cameron Wind facility. He has since been promoted to regional manager, overseeing operations for nine wind and solar farms across the U.S. and Canada. From day one at Apex, Marco has exemplified our core values. Earlier this year, he became a U.S. citizen.

Apex also firmly believes that veterans bring some of the best talent to the wind business. The skills they learn defending our country transition well to positions in clean energy. At Apex, our company is veteran-led at every level—from our CEO Mark Goodwin, who served as a pilot in the Navy—to asset managers at our Remote Operations Control Center (or "ROCC") in Charlottesville.

The ROCC is where we oversee all operating projects under our management. This facility runs 24/7/365, with our data systems processing an average of 432 million data points per day to optimize these wind farms. Though computer algorithms dispense all this information, we rely on our workforce to assess, analyze and react to it. Our team needs to be able to not only respond to the activity within the ROCC, but also relay that information to colleagues in the field.

These are high-intensity, stressful situations that often require working proactively to optimize wind farm performance and troubleshoot unexpected problems that may not be found in a manual. Veterans have the mindset to excel in these situations.

Opportunities and Challenges for Meeting the Growing Demand

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[2] https://www.bls.gov/ooh/fastest-growing.htm

[3] https://www.energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf

Meeting the growing demand of renewable energy will require additional investment in finding the necessary workforce. We must create more opportunities to educate and train individuals for careers in the clean energy economy.

Current gaps we see in the workforce market include the need for additional skills in the mechanical, electrical, and computer fields; SCADA communications and fiber optics; and high-voltage systems. Technical schools provide a great basis for an associate degree in these disciplines, and a few examples of such schools across the country are Texas State Technical College, Iowa Lakes Community College, Columbia Gorge Community College, and Kalamazoo Valley Community College.

But we need more schools to offer these training opportunities if we're going to meet the demand. Potential ways to achieve this include creating greater awareness of the opportunity, expanding public-private partnerships, and building out incentive structures for schools to initiate these programs. Where schools have programs create incentives for them to collaborate more broadly with industry. Also, members can support the bipartisan Wind Workforce Modernization and Training Act, introduced by Senators Ernst and King.

Conclusion

This is an exciting time to be in the clean energy sector. The industry is strong today, and the future looks even stronger. And though we see challenges in establishing the necessary workforce to aid the transition to a cleaner energy economy, the opportunity is far too great for us to fall short.

If I can leave you with just one message, it's that this industry isn't just about creating jobs—it's about building careers.

Thank you again for the opportunity to testify, and I look forward to answering any questions.

TESTIMONY BEFORE THE HOUSE COMMITTEE ON SMALL BUSINESS

SUBCOMMITTEE ON INNOVATION AND WORKFORCE DEVELOPMENT

HEARING: "Creating the Clean Energy Workforce"

STATEMENT OF:

Ed Gilliland, CEcD, AICP, PMP
Senior Director, The Solar Foundation

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*. 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

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