

# Trends Shaping Our Clean Energy Future

**THE 2014 IREC PERSPECTIVE**



Interstate Renewable Energy Council Inc.

# Trends Shaping Our Clean Energy Future



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From President/CEO Jane Weissman

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# 2014 Perspective

from Jane Weissman

It is with great pride and little fanfare that we bring you the following recap of the Interstate Renewable Energy Council's (IREC's) work over the past year. This snapshot gives you a tour of the issues on the table and some perspective on how IREC approaches them. The end results are solutions that we have put into play.

I hope those of you who know us through our regulatory and policy work will read about our workforce and credentialing programs. Those of you who are familiar with our training standards and national workforce networks, please read about our work on rules for distributed generation and connection to the electric grid. All of these points of action are linked and promote a responsive, safe and resilient clean energy economy.

Common themes and commonsense logic run through all our projects and programs. Interconnection and integration are two such shared themes. The Federal Energy Regulatory Commission's significant modifications to the federal Small Generator Interconnection Procedures late in 2013 are already filtering into state procedures. Integrating distributed generation resources into the grid prompts cutting-edge action as innovation and customer engagement contribute to reliability and operational efficiency. And integrating solar skills into existing education and training programs is one way to ensure long-term workforce stability.

Strategies to efficiently inspect and permit residential solar rooftop systems have been a staple on IREC's to-do list and bridge both our regulatory and workforce teams. With guidance from code officials and solar experts, we developed tools that have been field tested and proven. Checklists, toolkits and hands-on resources minimize overlap in the installation approval processes. IREC's online course for code officials brings accessible training to individuals and groups of code officials spanning urban and rural jurisdictions. IREC's *U.S. Solar Market Trends* publication reports that residential photovoltaic capacity grew by 68 percent in 2013. With this impressive growth, IREC's tools and online training help accelerate the inspection and permitting process and reduce costs while ensuring that installations are high quality and safe.

Quality assurance is also central to our credentialing schemes and training standards. This year, our training certificate standard received approval as an American National Standard. In addition to meeting multiple requirements, this standard was built with industry and subject matter expertise and went through a number of public comment periods. It was well-vetted.

Workforce issues — and they are many and complicated — do not always attract the attention they deserve. Even with a perfect balance of good products, profitable pricing and proactive policies, poor workmanship can crash a market in no time. Capable and competent workers with the right skill sets provide a solid foundation for market stability, acceptance and growth. That is why IREC has been a vocal proponent over the years for credible credentials that are based on industry needs. Competency-based accredited training and certification programs lead to indicators that make recruitment, screening and hiring straightforward and result in less overtime, less downtime and fewer callbacks.

The reasoned consistency that inspires IREC's networks, best practices and standards also applies to solar value methodology. IREC's *A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation* presents standardized approaches and calculations for solar benefits and costs. This report offers methodology for the value that distributed generation brings to utilities and consumers regardless of the program or rate. Our goal is to develop a consistent methodological framework that moves some of the headline debates into well-structured conclusions.

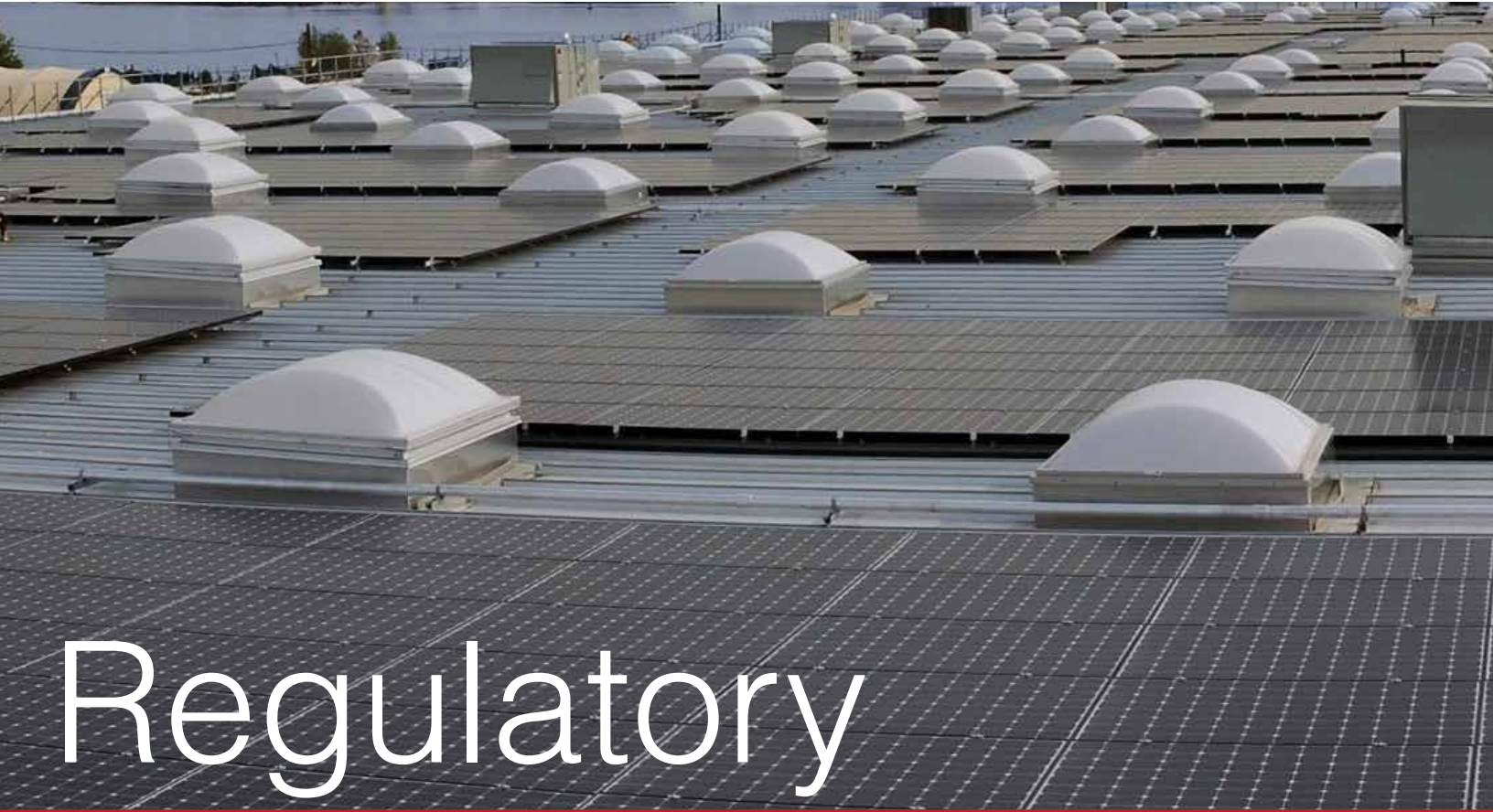
Going forward, IREC will continue to be part of the national dialogue and collective action involving valuation practices, expanded opportunities for energy consumers to participate and invest in shared solar, grid modernization and its many potential policy and technical innovations, and other developing regulatory issues in a transforming market. We will continue to be at the national table as disruptive innovation is also filtering into workforce strategies with a new look at education and training, seat time vs. competency-based learning, credit for prior experience and demonstrated market value of credentials.

Our expectation is that we will be as busy and productive as ever. I base this statement on the gift of talent IREC receives every day from our smart, energetic, passionate but practical team of experts. Our funders and donors give us the ability to shape positive trends, meet challenges head on, solve problems and make progress.

To both our team and our supporters, I send my deep appreciation and thanks.



President and Chief Executive Officer  
October 2014



# Regulatory

## REFORM

Making clean energy more accessible  
and affordable through independent  
expertise and best practices.

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by Sara Baldwin Auck  
and Laurel Passera

## Use the word “impossible” with great caution

When the Interstate Renewable Energy Council (IREC) started working in the regulatory space in 1994, we measured progress in inches.

Looking back at our efforts and successes over the past year, we are making headway in leaps and bounds, keeping up with the fast-paced development and changing needs of the renewable energy market.

**Net Metering and Solar Valuation** — *show me the numbers*  
IREC has long championed the simplicity and market-expanding benefits of net energy metering (NEM). If one thing has proven true over the past two decades, however, it’s that change is the only constant in the regulatory arena. Over the past year, many states have begun discussions and opened dockets in an attempt to calculate the value that solar brings to the distribution grid, utilities and their customers. IREC has been helping states to frame these discussions by bringing an objective benefit-cost methodology to the table, along with lessons learned by other states. To this end, last October, IREC published *A Regulator’s Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation*. From these efforts and our continued support of NEM, we’ve noted many successful outcomes that position distributed energy resources (DER) on a path to continued growth.

California’s unparalleled success in distributed solar has prompted a NEM transition. As the state moves toward the next iteration of NEM (no later than mid-2017), the California Public Utilities Commission (CPUC) sought to determine ground rules for the transition period. IREC participated in this process, advocating for a transition period that would create sufficient certainty for existing NEM customers that their investment will be respected. The CPUC agreed and granted customers who participate under the current NEM program a 20-year guarantee from the year they install their system.

Moving eastward a state, Nevada made waves in the realm of solar valuation when, in July 2014, the Nevada PUC released a report it had commissioned to determine the net effect of distributed solar on the state’s electric grid. IREC sat on the review committee of the report, which ultimately found that grid benefits of new net metered solar facilities installed through 2016 will exceed costs by \$174 million. And this was a conservative estimate that did not account



## At the Table and With a Healthy Appetite:

### IREC’s Regulatory Team Takes on a Full Plate

by Regulatory Director Sara Baldwin Auck


Despite its omnipresence in our daily lives and our economy, the inner workings of our centuries-old electricity system remain an enigma to most. Certainly, most of us prefer not having to give much thought to flipping a switch or plugging in.

With that said, the decision-making, analysis, and debates taking place ‘behind the switch’ are shaping our energy system for centuries to come. And, as we enter a new era of energy challenges, opportunities, risks and changes, we all benefit from having some of the country’s brightest minds sitting at the table, sleeves rolled and hungry for the challenge.

Enter the IREC regulatory team. Often found sitting around tables of all shapes and sizes, IREC’s relatively small Regulatory Team has an active presence in nearly every state, as one of the nation’s leading independent expert voice on renewable energy integration and interconnection, permitting, distributed energy resource (DER) valuation, net metering, shared renewables and grid modernization.

Surveying the smorgasbord of issues, the emerging trends reflect a notable shift. Historical modes of operation and business-as-usual approaches to investments and decision making are confronting a swiftly changing paradigm. Innovative technologies, consumer preferences, investor interests and new regulations are beckoning a more expedient transition to clean energy. Policy and regulatory decisions, infrastructure investments, business models, ratemaking principles and regulatory frameworks are all on the table for discussion (and revision). And, a growing number of states, utilities, consumers and regulators are looking for ways to strike the proverbial balance on some pretty meaty issues.

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**“The most prominent theme we see emerging across the country is a growing call to examine the regulatory framework that governs energy decision-making and investments.”**

## Healthy Appetite continued

As renewable energy and DER become more cost-effective and more accessible, we see movement toward developing a better understanding of the challenges and opportunities of higher penetrations. Leading this effort are Hawaii, California, Massachusetts and New York with their respective grid modernization and energy storage investigations. We anticipate that these high-profile efforts will be far-reaching, as other states monitor the process and outcomes.

Similarly, the growing trend to evaluate DER's impact on the grid is prompting several states to undertake quantitative solar PV valuation studies for net metering, while a handful of others are exploring alternative approaches. As a long-standing player in these discussions, we continue to call for sound analysis and appropriate methodologies to ensure that decisions are well-informed, fact-based and transparent. Looking ahead, we see the synergies of DER and distributed energy storage starting to take shape in these analyses, and we're excited to be engaged in some ground-breaking work on this front.

Across multiple jurisdictions, an uptick in rooftop solar installations is prompting the need for streamlined and coordinated permitting and interconnection processes. Thankfully, IREC's work on solar permitting best practices and on the FERC Small Generator Interconnection Procedure (SGIP) is making the reform process easier (and cheaper) for governments and utilities alike. On the latter, we expect to see more states follow the lead of Ohio and Massachusetts in adopting similar reforms in the coming year.

But, perhaps the most prominent theme we see emerging across the country is a growing call to examine the regulatory framework that governs energy decision-making and investments. Although it won't be easy, we think the time is ripe for such an undertaking. To that end, IREC's report, *Updating the Regulatory Compact: Reconsidering the Roles of Electric Utilities, Energy Consumers and Utility Regulators*, identifies some initial practical approaches for regulators to consider as they tackle the tough job of updating this framework to enable the transition to a more modernized, clean and resilient electricity grid. And, we look forward to the next phase of these discussions in the coming year(s).

As IREC continues our important regulatory work in pursuit of a clean energy future, we bring a healthy appetite for complexities and a steadfast commitment to proffering workable solutions to spur more renewable energy development in a sustainable way. And, sometimes, if you're lucky, we bring dessert. —

## Regulatory Reform

for grid update deferrals, health benefits and a number of other factors that would further increase the net benefit of DER. This outcome, along with other positive studies being done around the country, will keep customer-sited solar and DER shining bright well into the future.

### **Interconnection** — *an ounce of prevention worth a pound of cure*

Interconnection is a highly technical topic, but one in which careful reform can benefit all parties, creating a true win-win result. It equally benefits utilities that are overwhelmed by applications or unfamiliar with DER integration best practices and developers who must wade through lengthy, often onerous application requirements. And experience in states such as California, Massachusetts and Hawaii tells us that the “ounce of prevention” adage certainly rings true. Interconnection reform can help address these issues before utilities become overburdened and it can increase standardization across markets to reduce solar costs for everyone.

IREC has celebrated a number of victories over the past year, at both the federal and state levels. Notably, in November 2013, the Federal Energy Regulatory Commission (FERC) adopted significant modifications to the agency's Small Generator Interconnection Procedures (SGIP), which IREC had recommended. The FERC order was heavily based upon approaches pioneered by IREC's work in several leading states and included much-needed reforms to the “Fast Track” size limit and supplemental review process as well as the creation of a pre-application report. FERC's action on this increases the efficiency and transparency of federal jurisdiction interconnections, but also opens the door for state reform, as so many state procedures are based on the FERC SGIP. As a nod to this federal influence, Ohio approved similar interconnection procedures (largely based on IREC's Model Interconnection Procedures) within two weeks of FERC's decision.

We've also noted progress and successes in several states over the past year. A technical working group in Massachusetts, made up of engineers from the state's four major utilities, the renewable industry and the Department of Energy Resources, was able to reach consensus and formally recommend a supplemental review penetration screen of 100 percent of minimum load on a distribution line, consistent with the FERC SGIP and advocated by IREC. This approach, combined with the other supplemental review screens, will allow higher penetrations of DER and pose fewer administrative requirements for developers while still ensuring the safety and reliability of the grid.

And in California, the CPUC issued a decision that creates a new study tier for projects that do not result in impacts on the transmission system but are electrically related to other queued projects on the distribution system. IREC supported this decision and worked to incorporate a number of its principles. The adoption of this approach has the potential to make the study process more efficient while also allowing for the sharing of some interconnection upgrade costs. IREC has also been active in Massachusetts on this topic, where the technical working group has supported a similar approach.



**Shared Renewables** — *the more we share, the more we have*

What's not to love about shared renewables? It enables DER participation among utility customers who would not normally be able to participate in renewable energy (i.e. renters, low-income customers and those with shaded roofs). Shared renewables expands and diversifies the entire DER market, making the pie bigger. Because shared renewables is still fairly new to the regulatory realm, however, the challenge is choosing the most appropriate structure for a program and figuring out how to value the energy that a shared facility produces.

As with anything else, the economics of a shared renewables program have a tremendous impact on a program's success and adoption rates. IREC has engaged in extensive outreach on this topic, speaking at national conferences, working directly with utilities on program implementation and engaging in the regulatory process in California and Minnesota.

IREC has been particularly active in Minnesota over the past year, participating in the development of a shared renewables program for

the state's largest investor-owned utility. In an April order, the Minnesota PUC agreed with IREC on several important program design elements that will improve and expand the program. These elements include the removal of a cap on program participation; accepting applications on a first-

*IREC also continues to drive the discussion on how shared renewables are well-suited for participation among low-income customers.*

ready, first-served basis; valuing a participant's bill credits at the retail rate until a tariff can be developed; compensating solar garden operators for unsubscribed energy at avoided-cost rates; and compensating solar garden operators for the renewable energy credits associated with their generation at fixed rates, if they choose to sell them.

IREC also continues to drive the discussion on how shared renewables are well-suited for participation among low-income customers.

Notably, IREC has gained further traction regarding our CleanCARE pilot program proposal developed for consideration by the CPUC.

This novel approach would modify the existing California Alternative Rates for Energy (CARE) program, allowing low-income CARE customers the option of energy efficiency improvements coupled with shared renewables bill credits to reduce their monthly bills. Regarding a successor tariff to NEM, the CPUC asked for feedback on ideas for low-income involvement, citing CleanCARE as a viable option and indicating that the CPUC is still considering it closely.

Shared solar will likely experience continued growth, in large part due to its ability to access a wide range of utility customers. In Colorado,

**What are shared renewables?**

Individuals and businesses unable to host an onsite renewable energy system — for example renters, low-income customers and those with shaded roofs — are able to participate in the renewable energy market through shared renewable energy programs. Multiple customers can share the economic and environmental benefits from one renewable energy system, while maintaining their individual utility bills. The success of shared renewables is critical to expanding renewable energy access to more Americans.

where IREC engaged in the regulatory process for shared renewables, more than 75 percent of utility customers now have access to a shared renewables program. Our goal is to see adoption rates like this in more states in the near future.

**Energy Storage** — *imagination means nothing without doing*

We've long heard about the magic of energy storage — how it will revolutionize the grid and extend DER capabilities. This past year we finally saw some real and innovative action on the regulatory front. Last October, in California, the CPUC established a groundbreaking energy storage target of 1,325 megawatts for the state's investor-owned utilities, to be installed by 2020.

Throughout the regulatory process, IREC supported the CPUC's proposal. We weighed in with recommendations for how the proposal could be enhanced to better facilitate the CPUC's goal of market transformation, to assist in the elimination of some perceived barriers to the cost-effective deployment of energy, and to help meet Governor Brown's 12,000 megawatt distributed generation goal cost-effectively for both utilities and ratepayers.

California has also been working to ease the burden on smaller energy storage systems. In May 2014, the CPUC issued a decision to extend an interconnection cost waiver to joint renewable plus storage net metering systems. IREC offered an approach that would limit the size of storage systems in order to preserve the integrity of NEM, which the decision adopted. This approach will pave the way for the adoption of more customer-sited storage and will allow California to gather information on the costs and benefits of these systems.

Based on our experience, IREC is publishing a report that provides regulators with an overview of the potential for distributed storage. The report also identifies some concrete near-term steps that regulators should consider if they want to foster growth of the storage market in a way that captures the greatest benefits for customers and the system as a whole.

**Grid Modernization** — *plan for the future, where you'll spend the rest of your life*

The integration of sufficient DER to help meet the nation's clean energy goals requires transformative thinking on how the electrical grid is currently operated and planned. IREC has been participating in several innovative and path-charting proceedings that cover a wide range of issues related to grid modernization, including customer engagement, system reliability, DER integration, rate design and infrastructure updates.

Notably, IREC participated in comprehensive grid modernization dockets in Massachusetts and New York. In June, the Massachusetts Department of Public Utilities (DPU) issued an order finalizing a mandate to the Massachusetts utilities to develop 10-year grid modernization plans (GMPs), which must include a short-term investment plan addressing incremental grid modernization capital expenditures over the next five years. IREC provided input regarding the components of the GMPs and the goals for grid modernization in the state, particularly the integration of DER and energy storage. In its order, the DPU incorporated several of IREC's suggestions, including a requirement to explore distribution grid mapping and integrated planning. New York's *Reforming the Energy Vision* proceeding is still underway, and the large scope and impressive goals of the proceeding make it one to watch over the next year.

In Hawaii, IREC had yet another success. The Hawaii PUC required utilities to adopt a "proactive approach" to distribution planning,

which IREC was deeply involved in developing. Given the state's high electricity rates, solar energy is largely cost-effective without subsidies. As a result, the pace of installations has led to more than 20 percent of circuits being deemed "closed," because they exceed the peak load threshold that triggers a hold on applications. Many more are expected to close in the coming year. With a proactive approach to planning, the utilities will likely consider system upgrades, demand response, battery storage and curtailment to allow greater solar photovoltaic (PV) penetration.

**Permitting** — *a great success comes from an aggregation of little ones*

One of IREC's main roles in the solar permitting sphere is to identify common ground across the vast range of local jurisdictions in the United States. To this end, IREC added two important resources to our growing suite of permitting and inspection resources: *Minimizing Overlap in PV System Approval Processes: Case Studies and Analysis*, and *Model Inspection Checklist for Rooftop PV Systems*.



IREC has also been working one-on-one with communities to assist them in evaluating their solar rooftop permitting processes and to discuss streamlining efforts that other jurisdictions across the country have found effective. IREC planned and held day-long permitting workshops in Eastern Alameda County and Mono County, CA; in Westchester County, NY; and in the Charlotte, NC, region. We will continue to work with these communities on an ongoing basis, with the goal of helping them meet or exceed all nine of the permitting best practices that IREC and the Vote Solar Initiative have identified. IREC also conducted several well-attended permitting and inspection webinars, to disseminate some of this information beyond the classroom.

And in Oregon and Washington, IREC worked with the U.S. Department of Energy's Solar Rooftop Challenge Partners to draft much-needed model rules for townhome and single-family homeowners' associations (HOAs), and prepared guidance documents for condominium HOAs and unit owners. The model rules are based on the statutory requirements of each state and attempt to strike a balance between the goals of renewable energy generation and the aesthetic and architectural concerns of HOAs.

**Transmission** — *the road to success is always under construction*

IREC continues to make inroads into the various transmission planning processes in the western United States, in an effort to make the DER

**SOLD OUT**  
in Florida



A NEW COMMUNITY solar program was unveiled by the Orlando Utilities Commission (OUC) in October 2013 as a new way to bring solar to its customers without the typical upfront expense or maintenance requirements.

Orlando's first "Community Solar Farm" gave OUC customers the option to buy 1-kilowatt blocks (up to 15) from a large solar installation to offset their household consumption.

"It was such a hit among customers that it took only six days to sell out to 39 subscribers," according to Jen Szaro, IREC board member and OUC renewables director.

OUC's president, Dan Kirby, was the first customer to sign up for a share. "The response to this was exciting and with a waiting list in place we're already looking at doing a second community solar project," said Kirby.

IREC has provided outreach and assistance to this and many other shared renewables programs as the model has gained popularity around the country.



# New Battery Storage Policy in California **Saves Fees**

BATTERIES DON'T ALWAYS make for the most interesting pictures, but those quiet boxes attached to a customer-sited, net metered renewable energy system represent an encouraging recent policy change in California. In May, the California Public Utilities Commission issued a decision that will exempt certain net metering systems with a battery component from extra fees, and streamline the interconnection process.

This is especially good news for net metering customers with uneven electricity usage or high demand charges, as batteries can help them store their renewable power, typically from a rooftop solar system, until they're ready to use it.

IREC participated in the California proceeding and provided technical recommendations regarding feasibility and safety that supported this positive outcome.



voice heard in the din of transmission planning groups and activities. IREC sees the need to de-silo the three worlds of generation, transmission and distribution to create a more holistic, integrated and responsive grid, and there is considerable work ahead.

We saw several accomplishments over the past year. Significantly, IREC helped secure a nonprofit position on the California Independent System Operator energy imbalance market (EIM) transitional committee, which will lead the effort to develop a governance structure for the new EIM. The EIM is particularly relevant to this integration effort because it will create the easiest and fastest method to allow for the movement of power around the Western Interconnection region, and will facilitate the integration of increasing amounts of renewable energy at the lowest possible cost.

IREC also succeeded in establishing more realistic cost assumptions in 10- and 20-year transmission planning efforts in the West. As a result, the Western Electricity Coordinating Council will now recognize that several thousand additional megawatts of DER will be developed based on favorable economics rather than just on state renewable portfolio standard requirements, as it previously had. In other words, by assuming more DER will be deployed, there will be less need for new transmission, a major savings that can be attributed to DER. These capital cost assumptions have an important bearing on the perceived viability of renewable technologies and assure that they will remain a key resource category in the West's planning process.



## **Toolkit on Tap** — ICLEI Solar Outreach Partnership

IREC is known for its notable work in rooftop solar permitting. We believe communities improve their solar permitting processes when permitting authorities and the solar industry share the responsibility for change. Equally important, changes to permitting policies should benefit local governments, solar installers and their customers.

Toward that end, IREC and its partners host workshops and webinars for communities considering permitting reform. The successful programs IREC and Local Governments for Sustainability U.S.A (ICLEI) hosted in 2012 for the U.S. Department of Energy's SunShot Solar Outreach Partnership paved the way for 2013 events.

IREC experts in permitting and inspection presented a series of three webinars targeting municipal permit review staff and inspectors and others interested in seeing changes to the permitting processes in their communities. More than 600 participants registered for these webinars. This was followed by a free, day-long workshop by IREC and ICLEI on planning, regulating, permitting and inspection for local governments in North Carolina. The workshop focused on solar zoning codes and ways to improve their solar permitting processes.

What's learned in programs like these? Best practices are shared, and practical tools, such as permitting checklists, which help improve and streamline the permitting process for local governments, installers and their customers. When workshops are localized, existing solar codes and standards can be examined, paying special attention to achieving regulatory goals and developing appropriate ordinances and enforcement. Additional experts and partners can also be brought in. In North Carolina, participants benefitted from expertise by the Solar Foundation and Don Hughes, senior building inspector, Santa Clara County, CA, a leading expert on solar photovoltaic system permitting, inspecting, codes and standards, including training.

## The Need for a **Solar Development Toolkit**

THE USE OF RETAIL solar power purchase agreements (PPAs), sometimes referred to as solar service agreements (SSAs) or just solar PPAs, has become increasingly common over the last several years among local government entities that wish to go solar. The trend has not been without bumps in the road, however.

The Solar Development Toolkit was designed to provide a full suite of resources that can be used by local governments interested in pursuing solar under a PPA arrangement, based on the review and analysis of a geographically diverse set of successful projects as well as other existing resources on the topic of solar PPA procurement. Specifically, it includes:

- Annotated model PPA and site right agreement documents with numerous examples of how different provisions were addressed by individual local jurisdictions.
- "Clean" templates of these documents that can be customized for local use.
- General guidance on request for proposal design and implementation with numerous local examples.
- Short case studies of the individual projects surveyed and links to project documents.
- Summaries of the various existing resources, such as previously published reports and fact sheets, other model PPAs and prior webinars.

The Toolkit can be used as a comprehensive source of guidance for local governments interested in pursuing PPA arrangements or in a piecemeal manner that serves a specific need (e.g., a model site lease).



# Workforce

## DEVELOPMENT

Closing the skills gap between workforce training and jobs, IREC drives quality, market-valued education, training and credentialing for a clean energy economy.

# Credentialing

The IREC Credentialing Program accredits clean energy training providers and certifies instructors and master trainers.

by Laure-Jeanne Davignon and Kristen Ferguson

IREC continues to lay a strong foundation for the clean energy economy through training standards and credentials that foster a high quality workforce. Increasingly, IREC's emphasis on industry validated, credible credentials as a key factor in closing the skills gap between education and industry is mirrored and reinforced by national activities. And this is true not only in the clean energy industry, but across the workforce credentialing landscape.

## **A Higher Standard** — *building on excellence*

*"IREC credentialing programs are about something more than benchmarking post-secondary educational pathways; they are about the effective and sustainable development of a robust clean energy economy in the United States. An emerging industry can't afford to have a vacuum in standards. The U.S. cannot build a clean energy industry to scale in the absence of some scheme for assuring the quality of its products and services, which includes measuring and documenting the quality of workers and the institutions that train them.*

*"It is not so much that we need to have a standardized credentialing infrastructure in place once the industry matures; rather, the clean energy industry will never get to scale without some standardized quality assurance system in place to develop and assess the skilled workforce required to build it."* Sarah White, Ph.D., Center on Wisconsin Strategy

This year, IREC has built on our national standards and competency-based credentials, while expanding our reach with potential credential holders, employers and other stakeholders through a number of strategic initiatives.

## **Diversification and Expansion** — *spotlight on the stars*

As of August 2014, there are 138 active IREC credentials: 24 Certified Master Trainers, 14 Certified Instructors, 87 Accredited Training Providers and 13 Accredited Continuing Education Providers (Figure 1). Seventy-nine of IREC's credentials are in the area of renewable energy technologies (photovoltaics [PV], solar thermal and wind); 59 credentials

Build It. They Will Come.

## National Trends in Credentialing

by IREC Credentialing Program Director  
Laure-Jeanne Davignon

This year has been characterized by an increased focus on the value of credible, competency-based credentials, not only in the clean energy industry, but across sectors.

In President Obama's 2014 State of the Union address, he tasked Vice President Biden with leading an "across the board review of America's job training programs to ensure they share a single mission: providing workers with the skills they need to secure good jobs that are ready to be filled."

As of May 2014, there are 4.6 million open jobs in the United States, but according to Matt Slaughter, Dean of Dartmouth's Tuck School of Business, "Companies are not finding the right kind of technical or other skills they need to fill some of the jobs they are looking to hire for."

Our country is in a watershed moment, and the Interstate Renewable Energy Council (IREC) provides a key solution to close this "skills gap" in the clean energy sector. Here are just a few of the national efforts highlighting the pivotal role credible credentials play.

IREC was invited to join the newly established National Network for Business and Industry Associations (NNBIA) formed by the ACT Foundation, which seeks to bridge the "skills gap" by clarifying the skills, training and credentials employers are



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Fig. 1 IREC Credentials by Designation

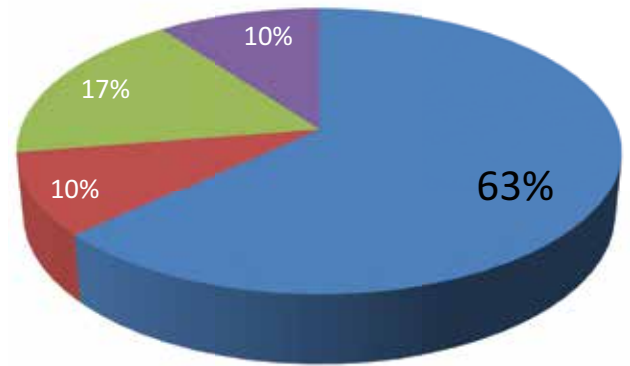
are awarded to training organizations and trainers in the energy efficiency field (Figure 2). The energy efficiency/weatherization sector continues to realize rapid growth, with twice as many organizations in this sector holding the IREC credential compared to just one year ago.

In 2014, IREC accepted four multifamily energy efficiency “job task analyses” in order to assess training organizations and trainers training workers for this sector.

Raising visibility for our credential holders is critical to the value of the mark of quality they’ve earned and the advancement of the program. A newly launched online Public Registry contains features such as an interactive map and search capabilities. The registry ensures that students, employers and funders can locate and view accurate, current information and easily identify programs and instructors holding independent, third-party verification of their quality.

**Accreditation and Certification** — *improving the standard*

A fundamental tenet of any valid credentialing program is an emphasis on continuous improvement. In that spirit, IREC completed a year-

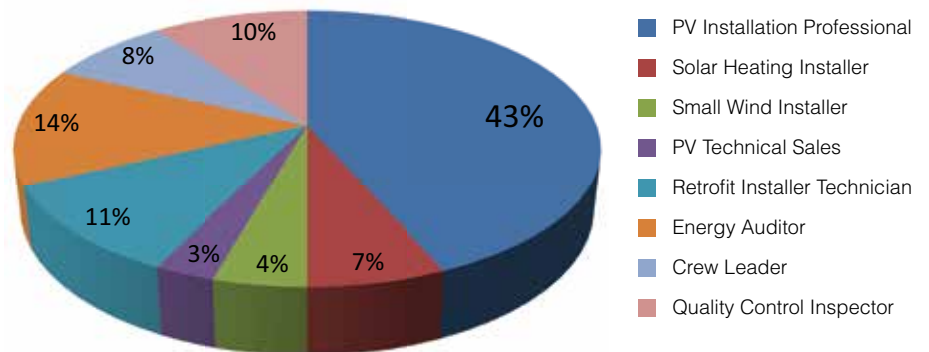


- Training Providers
- Continuing Education Providers
- Master Trainers
- Instructors

*“The time and attention to detail provided by the trainers, training program administrators and industry representatives involved in this process will support the responsible growth of our clean energy industries moving forward. The quality of training in various markets has a profound impact on the reputation of these industries. I trust the work we have put into these standards will continue to make IREC credentialing a huge asset in the sustainable development of our renewable energy and energy efficiency industries.”*

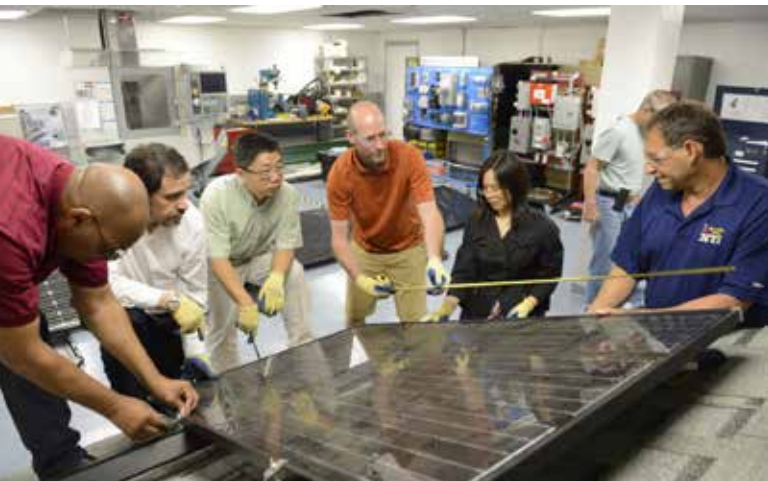
**Vaughan Woodruff**, Insource Renewables, working group member

Fig. 2 IREC Credentials by Job Task Analysis



- PV Installation Professional
- Solar Heating Installer
- Small Wind Installer
- PV Technical Sales
- Retrofit Installer Technician
- Energy Auditor
- Crew Leader
- Quality Control Inspector





long project to revise the standard used for accreditation of training programs and certification of instructors. The project was undertaken to keep the standard current with the industry, increase the value of credentials based on it, and better distinguish between requirements for accreditation and certification. The process resulted in two standards — one for accreditation of training providers, the other for certification of master trainers and instructors.

IREC recognizes the need for diverse input from all sectors of industry, so the new standards are the product of a working group of subject matter experts from across the United States. Although IREC managed and supervised the process, the standards represent what the clean energy community defines as “a high-quality training provider” and “an exceptional instructor.” To ensure the project was open and transparent, the working group solicited industry’s feedback throughout the process, including a formal public comment period.

The new standards were adopted for use by the IREC Credentialing Program in November 2013. With this important step, we are advancing excellence through an increased emphasis on assessment of student learning outcomes. Training providers are required to develop and maintain their own examinations to demonstrate that learning objectives have been met, both to gain information and drive program improvements. This is compatible with other national initiatives around competency-based credentials and is one way to provide assurance that clean energy training holds market value.

In addition, IREC certified instructors and master trainers now have the opportunity to carry their portable credential to more than one training organization.

“When developed correctly, credentials bring value to all stakeholders.”

## National Credentialing Trends continued

looking for; improving the learning opportunities associated with those qualifications; and defining pathways to careers in their industries. We then received a first-round NNIA grant from ACT to produce a video about the importance of quality training and credible credentials, aimed at clean energy employers.

Through the Better Building Workforce project, the U.S. Department of Energy (DOE) and the National Institute of Building Sciences (NIBS) are working with industry stakeholders to develop voluntary national guidelines that will improve the quality and consistency of commercial building workforce credentials for five key energy-related jobs.

Spearheaded by IREC, the newly formed Clean Energy Credentialing Coalition, made up of five highly-respected credentialing organizations, created a national campaign to communicate “Why Credentials Matter” to a broad range of stakeholders, from state incentive programs and education/training organizations to industry — including solar in all its forms, energy efficiency and small wind. The campaign will gain traction with a new website, case studies and upcoming social communications launch.

We’ve also been working closely with the Solar Energy Industries Association (SEIA) to launch an industry effort that results in SEIA members signing a Quality Pledge, a commitment to quality training.

And as if these efforts weren’t enough of a sign that quality credentials are in the national spotlight, IREC co-chaired a cross-sector working group of 30 organizations to develop a chapter on workforce credentialing in ANSI’s Energy Efficiency Standardization Coordination Collaborative Standardization Roadmap, which provides “a national framework for action and coordination on energy efficiency standardization to advance energy efficiency in the built environment.”

The roadmap recognizes that a strong and competent workforce provides the underpinning for growth and consumer acceptance, and that credentials play a crucial role in developing that workforce. It puts forth key recommendations focused on clearing up confusion in the credentialing space and ensuring that credentials “hold demonstrated market value for workers, employers and consumers.” It also challenges industry, government and other stakeholders to sit up, pay attention and support the quality framework developed for their benefit and that of their workforce.

With this roadmap in hand, IREC continues to focus on the goal that industry recognize what the roadmap states: “When developed correctly, credentials bring value to all stakeholders.” —



## Amanda Hatherly is a Woman to Follow

AS DIRECTOR of the New Mexico EnergySmart Academy (NMESA) and Center of Excellence for Green Building and Energy Efficiency at Santa Fe Community College (SFCC), Amanda is professionally and personally committed to leaving the world a better place, and she's doing it full time. Make that more than full time.

She teaches at NMESA — SFCC is an IREC Accredited Training Provider — and regularly speaks about energy efficiency, healthy homes and green building training issues. She sits on the boards of numerous organizations and is a former member of the U.S. Department of Energy Weatherization Plus committee.

"I had my own home performance company and then, when the federal American Recovery and Reinvestment Act (ARRA) funding for weatherization training centers came through and New Mexico was awarded a grant, I became the training center director here in Santa Fe," she explains.

"We offer high-quality, consistent energy efficiency and green jobs professional training throughout New Mexico," says Amanda. "We stress reduced energy and water use as well as reduced greenhouse gas emissions in our curriculum and on campus. We're very proud of our state-of-the-art lab, mobile field rig and network of nationally recognized trainers. Our training benefits industry professionals, residents and business owners in New Mexico; this keeps us engaged with our local community and the greater professional green industry."

So why did a program with such high standards still want the IREC credential?

"We knew having the IREC credential would demonstrate our commitment to quality and differentiate us from other programs. We created a strong program with the ARRA funding and have continued with not only weatherization training but also other courses."

*"We knew having the IREC credential would demonstrate our commitment to quality and differentiate us from other programs."*

## Credentialing Program

As existing credential holders and new applicants work to demonstrate conformity with the new standards, they can be assured that the requirements were developed with the full participation of industry and lead to safe, accurate and current technical content that covers industry needed skill sets.

### **IREC Earns Prestigious Designation** — *first American National Standard*

In its role as an American National Standards Institute (ANSI) accredited standards developer, in 2014 IREC undertook the process to have IREC Standard 14732 recognized as an American National Standard (for Accreditation of Clean Energy Technology Training). Supported by IREC's Standards Committee, composed of a diverse group of industry stakeholders, IREC performed outreach across the industry to ensure that the standard truly reflects industry best practices, and that all impacted parties had an opportunity to weigh in.

This balanced and transparent consensus process is important because it ensures that IREC standards and programs will be accepted and used by industry, with the ultimate goal being greater consumer confidence in and demand for clean energy work products. These efforts are also aligned with best practices for standards developers as described by ANSI, evidenced by official recognition on June 18, 2014, of IREC Standard 14732 as an American National Standard.

### **Outreach Efforts** — *success = excellence + persistence*

IREC continues strategic outreach with a broad cross section of the clean energy industry, with the following objectives:

- Identify and cultivate potential credential holders.
- Speak with employers about how the IREC credential can help with the challenges of hiring and training their workers.
- Educate state and regional workforce investment boards and utilities about the value of the IREC credential as a quality indicator.
- Initiate relationships with constituents in emerging clean energy sectors, to bring our quality credentialing framework to a more diverse offering of programs.





*“Portable credentials are key to advancing and improving our industries. IREC credentialed instructors and master trainers have proven themselves, through the credentialing process, to be experts in their training fields. Credential portability will allow IREC certified instructors and master trainers to share their expertise more broadly in our industry.”* **Carla Maxwell**, working group member

**Credibility Breeds Credibility** — state workforce websites cite IREC Credential

Third-party endorsements offer the highest level of credibility. That’s the power of the voluntary, educational actions taken by California and Colorado to help raise the bar for quality training in their states. Both added formal language to their state workforce websites encouraging all training organizations to consider accreditation through IREC.

The website portals now include this language: “In the interest of quality training and improved outcomes, we encourage all energy efficiency or renewable energy training organizations to be accredited through the Interstate Renewable Energy Council.”

All energy efficiency and renewable energy training organizations interested in being listed on the California or Colorado Eligible Training Provider Lists will see this new mention of IREC when they enter either state’s primary workforce portal. Over time, the messages will drive organizations and job seekers to IREC-accredited training programs.

**Webinars, Presentations and Exhibits** — put a “face” on IREC’s Credentialing Program

- American Association of Community Colleges Workforce Development Institute, January 2014
- National Association of Workforce Boards Forum, March-April 2014
- American Council for Energy Efficient Economy, April 2014
- ACI National Conference, April-May 2014
- CERES Conference (sustainability leadership), May 2014
- PV America Conference, June 2014
- 8<sup>th</sup> Annual Rocky Mountain Utility Exchange, September 2014
- Solar Power International, October 2014



**Have Solar Training Will Travel:**  
KVCC’s Mobile Solar Lab Hits the Road

IF YOU WERE ON THE HIGHWAYS in the Northeast during the summer of 2014, you may have noticed a silver van pulling a very large, brightly decorated trailer, complete with logos and images advertising Kennebec Valley Community College’s (KVCC) renewable energy training program.

Behind the wheel: IREC Certified Master Trainer Michael Paradis, en route to deliver advanced hands-on training to KVCC’s instructor trainees throughout seven states in the northeast region of the Solar Instructor Training Network.



# Workforce Education and Training

Leading national development and sharing of best practices for educational and training programs that build a well-qualified clean energy workforce.

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by Joseph Sarubbi and Mary Lawrence

**E**ducators face numerous challenges as they develop new education and training programs, particularly as technological advances often outpace educators' ability to prepare a workforce in support of the new technology.

The questions are many. Do educators have the right skill sets to develop and teach the course? How do they connect with industry to ensure they are developing a program to support industry needs? Where do educators get the resources needed to build high quality education and training programs?

IREC provides leadership, guidance and resources at the national and state levels to support educators and institutions through two U.S. Department of Energy (DOE) SunShot initiatives, the Solar Instructor Training Network (SITN) and Grid Engineering for Accelerated Renewable Energy Deployment (GEARED), which is building a



national framework to grow training for power system workers. And in New York state, IREC works through a statewide initiative of the New York State Energy Research and Development Authority (NYSERDA).

## Solar Instructor Training Network

**1,031** — total # of Instructor Trainees who received training

**489** — # of Partnering Institutions/Organizations

**30,000** — estimated # of students who have gone through courses taught by Instructor Trainees (as of Sept. 2014)

Yes, the numbers are impressive. And behind them are many solar success stories. They start with the nine Regional Training Providers (RTPs) who have been conducting train-the-trainer programs in training facilities across the country. These efforts target mostly full-time and part-time community college instructors within their

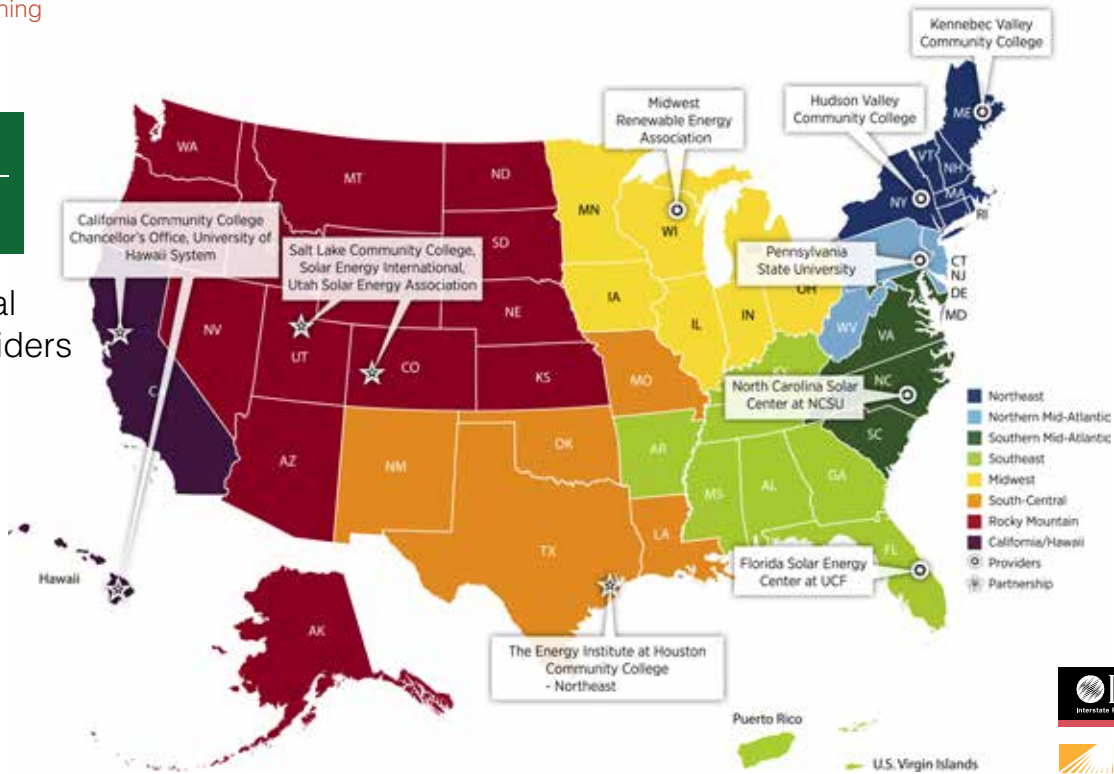
*"To enable a skilled workforce to support the growth of solar deployment across America, the DOE's Solar Instructor Training Network will support training programs at community colleges across the country that will assist 50,000 workers to enter the solar industry by 2020. This builds upon SunShot's existing Solar Instructor Training Network of nearly 400 community colleges in 49 states that have trained over 22,000 people to join the solar industry since 2010." – President Obama (May 9, 2014)*







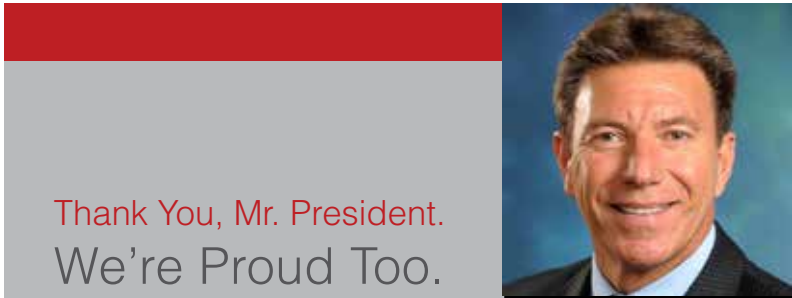
### SITN Regional Training Providers



regions, and provide resources that support and guide these “Instructor Trainees” to develop quality solar training programs.

And the stories continue. IREC, as National Administrator of the SITN, has worked hard to forge strong relationships with the RTPs and continues to provide leadership, guidance and instructional resources for the advancement of the solar education and training industry.

The RTPs are doing their part to improve the solar education and training acumen of instructors across the country, and IREC is ensuring that these instructors have the necessary tools to develop effective solar programs.



## Thank You, Mr. President. We're Proud Too.

by SITN Project Manager Joe Sarubbi

By almost any standard, the Solar Instructor Training Network (SITN), U.S. Department of Energy SunShot initiative, is a huge success. And IREC, as the national coordinator for the SITN, is very proud. Attracting the attention of the President of the United States, with a directive to continue and expand the program for several more years, only reinforces what “the Network” already believes — that the creation and ongoing activities of the SITN brings tremendous value to the wide-scale deployment of solar nationwide.

Yes, the SITN should be recognized for its efforts! And here's the rest of the story.

Thanks to the market-valued online learning programs developed by the Regional Training Providers (RTPs) of the SITN, solar education and training has had a transformational effect — individuals around the country are getting the right training and finding jobs, and the solar industry continues to expand with the confidence that the SITN is working hard to provide a qualified, readied workforce. The flexible schedule of online learning, coupled with the speed at which people can achieve their educational goals, allows for more rapid career changes or advancement. And this has greatly benefitted the solar industry.

continued on pg. 18



## We're Proud continued

Educational institutions and organizations across the country have provided solar education online to thousands of individuals seeking to gain an understanding of solar technology. In fact, the exponential growth of solar installations was possible in part due to solar companies finding individuals with the necessary skill sets to support this growth.

How did educational institutions ratchet up so quickly with training that meets high standards and industry needs? They trained the trainers through the SITN.

The SITN has played a huge role over the last four years in providing the necessary skill sets to instructors seeking to develop their own solar programs throughout the country. The nine RTPs created exceptional solar online programs to support the learning of these instructor-trainees, which expedited the delivery of quality solar education and training at their respective institutions. A “hybrid learning” approach, in which online programs are followed by participation in hands-on training at RTP facilities, helped round out instructors’ knowledge and understanding.

The fast-paced growth of the solar industry also created a need for code inspectors to quickly become knowledgeable in solar installations. To support the tens of thousands of code officials in more than 16,000 jurisdictions throughout the country, IREC created the photovoltaic online training (PVOT) for code officials for the SunShot Initiative. PVOT is a self-paced, self-directed online program, consisting of six page-turner lessons and a game-based 3-D immersive capstone lesson that takes inspectors through a virtual inspection of a residential home. PVOT has helped thousands of code officials and authorities having jurisdiction (AHJs) gain an understanding of residential solar installations.

As word continues to get out about PVOT, IREC is receiving more inquiries from stakeholders seeking to provide PVOT to large groups of inspectors in a particular region, and IREC is helping facilitate these efforts. To further enhance the knowledge of code officials and AHJs, the RTPs, in conjunction with the International Association of Code Inspectors, have been offering one-day code workshops throughout jurisdictions across the United States.

What’s next as we expand our horizons? Led by IREC subject matter experts, representatives from the RTPs and IREC continue to collaborate regularly through three working groups. Two groups are working to enhance two existing resources: the Solar Career Map and the Solar Content Integration Best Practice document. A third working group is creating a new best practice tool that will help solar instructors develop online solar courses.

All of these efforts work together as we build a well-qualified solar workforce through sound solar educational and training programs offered by knowledgeable and experienced instructors. —

*Workers have the best chance for long-term employment when solar skills are incorporated into existing education and training programs — making solar technology a stackable skill.*

### **Stackable Skills** — solar content integration

One of the biggest challenges for educators is to determine what skill sets employers are seeking to ensure long-term workforce stability. It has become increasingly apparent that workers have the best chance for long-term employment when solar skills are incorporated into existing education and training programs — making solar technology a stackable skill. For example, adding solar education and training to an electrical program that trains electricians, or a business program that prepares individuals to enter sales and marketing, provides multiple employment paths. The ultimate goal is to create a “*readied workforce*” — one that is nimble and responsive to market demands.

The SITN’s Solar Content Integration Working Group developed a new, more advanced online guide to help instructors and administrators enrich existing courses, curricula and programs. They accomplished this through solar content integration to meet the fluctuating demand for highly trained and well educated solar tradespersons, technicians and professionals.

The IREC Solar Content Integration Guide includes 18 case studies, which describe the processes used, the obstacles encountered, and the keys to success. The case studies are based on interviews with faculty and/or administrators who have successfully spearheaded and championed the integration of solar content. The online guide is a useful complement to both the SITN Solar Career Map and the IREC best practices document on solar content integration.

### **Teaching Solar Online**

To meet the employment needs of the growing solar industry, additional online education and training will be needed to allow more people to pursue new solar careers and for job advancement of individuals already working in the industry. The Online Training and Education Working Group is designing a tool to describe how best to teach solar content in an online environment. This type of resource has the added benefit of giving the online “instructor-students” many examples of successful online solar content they can use or adapt for their own classes. To be hosted on the

IREC website, this solar online training best practice tool will address these questions:

- What is effective online instruction?
- What content lends itself to online instruction?
- What are the key skills for effective online teaching?

The online training will be developed using Moodle, an open source learning management system popular with educators as a

tool for creating websites for their students. Examples are being incorporated from as many varied solar online courses and modules as possible, representing many different aspects of the solar industry. The working group is soliciting examples from RTPs and SITN partnering institutions.



## Resources to Support Solar Instructors



Using nationally recognized subject matter experts, IREC has developed a suite of resources to support solar instructors:

**Best Practices — The Series**, a compendium of national curriculum models of solar training, education and workforce development curriculum, in web-based and PDF versions.

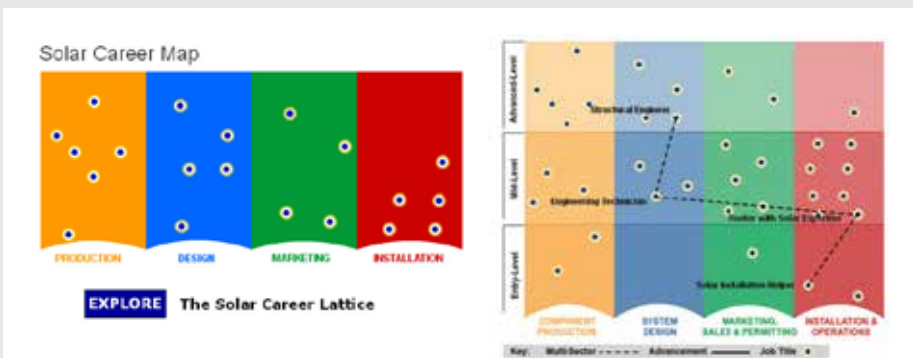
- Curriculum and Program Development
- Becoming an Effective Teacher
- Developing a High Quality Course
- Solar Content Integration

- Exemplary Solar Education and Training Programs
- Textbooks, References and Instructional Resources
- Photovoltaic Labs

**Solar Career Map**, a lattice of 36 solar occupations in four sectors including occupational information, skills, competencies, education and training pathways.

**The Photovoltaic Online Training (PVOT) for Code Officials**, a program that instructs users in reliable field inspection practices and endorses efficient permit processes for residential PV installations.

**The SITN Seminar Series**, an informative series that educates and informs SITN instructors and others in the solar community on timely and relevant topics presented by subject matter experts in solar, education and training.



### Where are the Jobs? Solar Career Map part two

It's an ongoing question often heard by those in the solar education and training arena: "where are the jobs?" The nascent solar market has created confusion regarding job opportunities as individuals seek to understand what skills are needed and where the onramps are to solar employment. To meet this challenge, IREC created the Solar Career Map. An online interactive tool, the map explores 36 occupations and accompanying career pathways available in the solar industry. The group is giving the map a more interactive, real-world feel using photographs and short video clips. The videos contain brief interviews with students, instructors and industry representatives about career pathways and the skills and training needed for specific occupations to help guide individuals seeking to enter the solar workforce.

### Benefits of a Skilled Workforce

- Improve results of products and services
- Ensure safety
- Reduce costs
- Increase consumer confidence and market demand



From the PV Online Training for Code Officials

## A City of Inspectors Train “Virtually” at the Same Time

WHEN THE NUMBER of solar residential permit applications jumped from “a few here and there” to 4,000 in one year, Los Angeles Chief of Green Building Osama Younan knew he had to do something to get more of the city’s residential building inspectors prepared with the right knowledge to meet that demand. That’s when he approached IREC and asked for help.

Local building inspectors spend most of their time in the field so carving out time for in-depth training is always a challenge. That’s the beauty of photovoltaic online training for code officials — the training can be done remotely at whatever time is convenient. But Chief Younan had a unique request: could a training be set up so all of the city’s 70-plus “combination inspectors” responsible for one- and two-family dwellings could take the online course at “virtually” the same time?

As is common, the inspectors have varied backgrounds, from electrical and plumbing to roofing and framing. The city has a robust ongoing training program, but only a few inspectors had experience with solar installations. So in most cases, a general inspector had to call in a specialized colleague when solar was involved — which added to the time and cost of the inspection process. Chief Younan’s goal was to get all of them the quality training they needed in solar.

“The solar training program is simple and to the point — and makes it fun and understandable,” says Younan. “I now have great confidence in the quality of our work and the ability to handle the volume of solar work we get. IREC helped us make this happen.”

*“I now have great confidence in the quality of our work and the ability to handle the volume of solar work we get. IREC helped us make this happen.”*



U.S. DEPARTMENT OF **ENERGY**

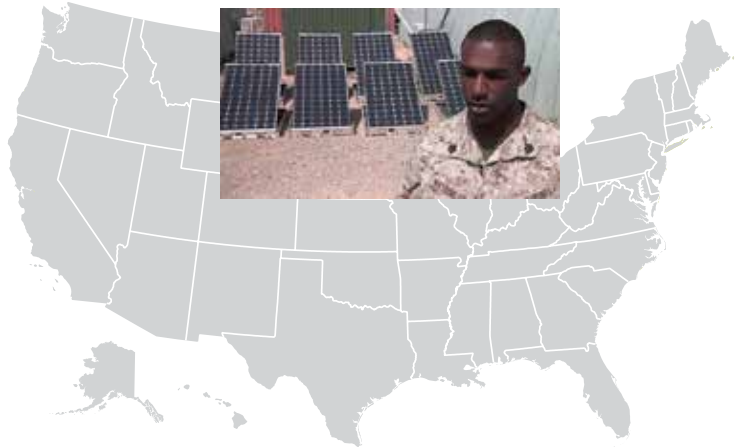
Solar Instructor Training Network

## Help for Returning Veterans, Students and Grads

— *Clean Energy Training Directory*

DOE and the U.S. Department of Defense have been collaborating on how best to provide employment opportunities for returning veterans who might be interested in working in the clean energy environment. One of the challenges to vets is learning where to find the appropriate clean energy education and training.

This is a primary goal of IREC’s newly enhanced Clean Energy Training Directory, which identifies training programs within the renewable energy and energy efficiency environment. Using an interactive map of the United States, the Clean Energy Training Directory provides details on training and education programs within each state, and is the ideal tool to help veterans, high school and college graduates, or those individuals seeking career changes.



## IREC Helping New York — identify gaps in quality clean energy education/training

New York state, like most of the nation, faces numerous challenges in scaling up the adoption of renewable energy, emerging and advanced energy technologies, and energy efficiency services. One of the most significant challenges is the lack of a readied workforce. In response, the New York State Energy Research and Development Authority implemented a robust workforce development program, designed to help facilitate the demand for reliable clean energy technologies and the workforce to support them.

The goal is to build, coordinate and share expertise among training providers in New York — including colleges and universities and other entities granting training certificates — so that best practices can be developed and duplicated. In December 2014, IREC was awarded a two-year implementation contract to provide guidance and ensure the

effective deployment of the NYSERDA Workforce Development (WFD) Program. The ultimate goal is to ensure that clean energy training meets the highest standards, and that training matches industry needs and job tasks associated with current and future jobs.

IREC has been working with NYSERDA to coordinate and promote quality workforce training across the network of more than 70 NYSERDA-subsidized training providers, at college, university and private training partner locations throughout the state. IREC is also responsible for collecting, analyzing and reporting a wide range of WFD program metrics, and conducting informational sessions and webinars for training providers. Through site visits, IREC provides an assessment of needs and gaps in quality clean energy training in the state.

Building a statewide network that shares expertise among training and education providers, third-party certification and credentialing organizations, and other stakeholders, including industry, is an important part of IREC's work with NYSERDA. With its national insight, IREC is also able to offer valuable, independent guidance and suggestions on state, regional and national trends in clean energy workforce training and education.



### PSU Immersive Internship Program

— hands-on & in-class solar training

The Penn State University Northern Mid-Atlantic Solar Education and Resource Center (NMA SERC) offered an Immersive Leadership Experience Internship program in conjunction with the GridSTAR Center at the Philadelphia Navy Yard. The 12-week program included a solar PV design and construction course component. A total of 16 students from engineering, business and marketing majors participated in the internship program. PSU is a SITN Regional Training Provider.



## IREC's Todd Venetz A Veteran of the Iraq War — helps bridge quality training and jobs

TODD is IREC's field coordinator for NYSERDA's Renewable Energy, Energy Efficiency and Advanced Energy Technologies Workforce Development Program. He works primarily with NYSERDA's 76 workforce development training providers, reviewing and reporting information to identify program needs and new training opportunities that will match skills with today's and tomorrow's clean energy jobs. He is also a 10-year veteran of the United States Marine Corps.



Through site visits to each college, university or certificate-awarding training program accredited by NYSERDA, Todd is contributing to an understanding of the gaps that exist in quality clean energy training in the state as well as the building of a readied workforce.

Through the GI Bill, Todd earned a degree in Energy and Sustainability Policy from Penn State University. That education has proved to be invaluable, in combination with his experience as a platoon sergeant, where he had to effectively communicate with all types of people. "Today, I might meet with a dean of engineering in the morning and a room full of students in the afternoon," says Todd.

"As New York mandates increase demand, renewable capacity and job opportunities, veterans are in the best position to benefit," Todd says, "particularly veterans who are trained plumbers or electricians, who can add clean energy as a stackable skill."

By going through training programs that are funded in part by NYSERDA, veterans can become certified in a particular area of renewable energy or energy efficiency, he explains. "There's minimum investment with a huge return."

IREC sees that as a win/win for everyone — a chance to help our veterans, providing quality training that results in employment, and building a workforce skilled to meet our future clean energy needs.

# Grid Engineering for Accelerated Renewable Energy Deployment (GEARED)

**Building a National Framework** — to grow training for power system workers

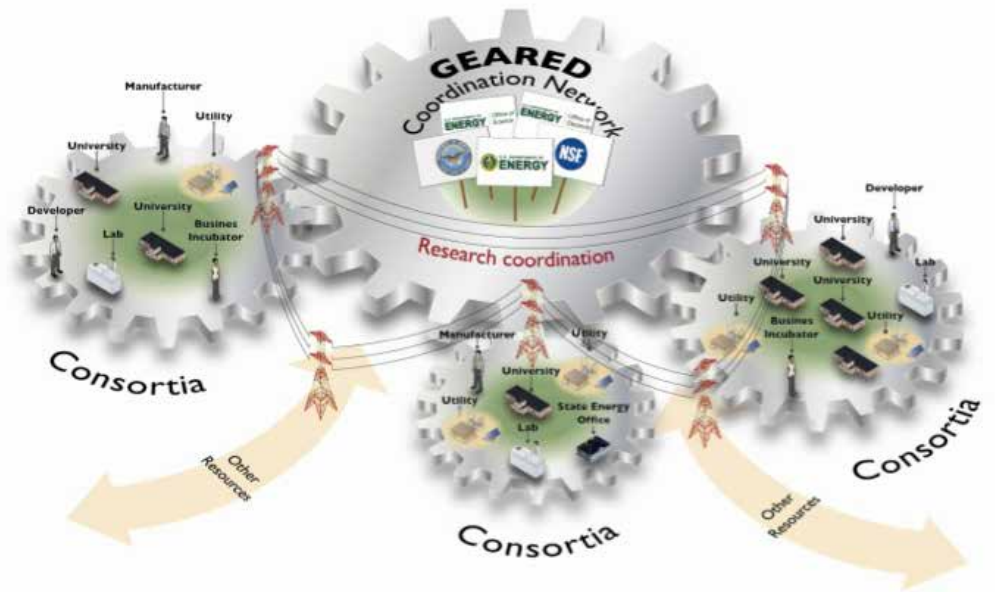
IREC is working in collaboration with DOE and the Solar Electric Power Association (SEPA) to build a national framework for power systems training and curriculum. The impetus for the GEARED project comes from several challenges: an aging utility workforce, the large number of imminent retirements of utility engineers, a decline in power engineering programs and faculty retirements in U.S. universities, and the need to significantly upgrade the curriculum of power systems engineering programs to address projected needs.

IREC and SEPA are working together to present innovative approaches and networking strategies to grow the expertise and preparedness of current and future electric utility sector professionals for high penetrations of solar and other distributed technologies. This unique partnership of



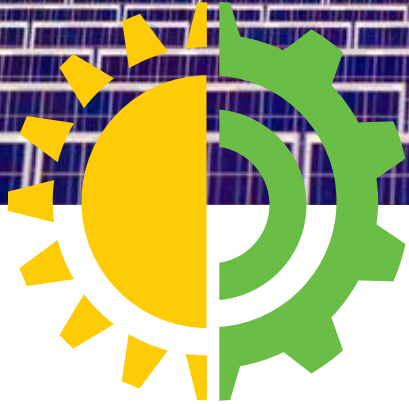
utility and workforce expertise brings years of experience with the utility business, educational institutions, credentialing and coordination of multi-sector national stakeholders.

Nearly one year into a five-year DOE SunShot Initiative, IREC and SEPA, as the National Network Administrator (NNA) for GEARED, are helping to facilitate and support efforts of the Distributed Technology Training Consortia (DTTC). The goal



*A national framework for power systems training and curriculum.*





### The 4Cs

The IREC/SEPA team calls their objectives the four-Cs: coordination, connections, consistency, and accountability. Significant inroads have already been made toward meeting these objectives, as DTTCs continue to forge their university and utility partnerships.

### Objectives

- Provide effective coordination of consortia activities through clear and easy communication channels that promote two-way flow of information.
- Promote DTTC connectivity through a national website; social media; a yearly, student-centered conference; and an online directory of power engineering courses.
- Ensure nationwide program and course consistency, and encourage innovation through the identification of best practices, industry workforce standards and national credentialing pathways.
- Provide nationally coordinated accountability of consortia activities through standardized, network-wide evaluation and assessment metrics.

is to accelerate growth of power systems programs and workforce capacity, working closely with four DTTCs:

- **University of Central Florida:** Foundations for Engineering Education for Distributed Energy Resources
- **Missouri University of Science and Technology:** Mid-America Regional Microgrid Education and Training Consortium
- **The Electric Power Research Institute:** The Center for Grid Engineering Education
- **Electricore, Inc.:** Southwest United States of America Distributed Technology Training Consortia

Each DTTC comprises university and utility partners that together create a national network of centers to support power systems training and curriculum development based on research and development, data generation, collection, analysis and/or simulation to support the growth of expertise in power systems.

IREC and SEPA are also helping foster student interest and expertise in the utility sector. To accomplish this, the IREC/SEPA team and DTTCs will look to several guiding principles:

- All DTTC training and education programs must be aligned with industry-endorsed skills and standards.
- The NNA must provide the most effective channels of communication for sharing innovative best practices.
- The DTTCs must establish strong industry ties.
- Where applicable, the DTTCs must seek to integrate solar technology into existing education and training programs.
- The DTTCs must be responsive to industry trends.
- The NNA must explore opportunities for articulation and transfer of credit from high schools to two-year colleges to four-year schools.



The IREC/SEPA team believes its role as NNA is to support the consortia in a way that moves the country toward a unified solar education and training platform, with realistic onramps to industry recognized credentials and jobs, and promotes the goals of DOE's SunShot Initiative.

### The 1st GEARED Student Centered Conference

The IREC/SEPA team convened the first Student Centered Conference in April 2014, in conjunction with SEPA's Utility Solar Conference. Through a generous donation from Pacific Gas and Electric, a student from each of the 17 GEARED universities nationwide participated in the student centered conference, which included a poster session, an industry lead presentation and panel discussion, an evening networking reception with the utility industry conference attendees, and participation in the first day's sessions. An additional eight students participated from two local universities: San Diego State University and University of California at San Diego. Post-conference surveys were extremely positive, and discussions are already underway about next year's student centered conference.



# U.S. Solar Market

## TRENDS

Excerpts and Insight from

IREC's Solar Market Trends Report

published July 2014

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by Larry Sherwood



The solar market, while relatively young, is an increasingly important and vital part of the American economy. What are the trends in this market and what forces are at work? Which sectors of the market are strongest and why? What are the prospects for solar energy in the near future?

The Interstate Renewable Energy Council (IREC) collects and publishes public data on U.S. solar electric installations by state and market sector. Public data on solar installations help industry, government and nonprofit organizations improve their efforts to increase the number (and capacity) of solar installations across the United States. Analysis of multiyear installation trends and state installation data helps these stakeholders learn more about state solar markets and evaluate the effectiveness of marketing, financial incentives and education initiatives.

The following is a summary of information included in the IREC report *U.S. Solar Market Trends 2013*. In addition to more charts and analysis, the full report contains details of the data collection methods and assumptions.

### Highlights: 2013 Market Trends

- In 2013 solar installations, including both photovoltaics (PV) and concentrating solar power (CSP), accounted for 31 percent of new electricity generation installed during the year (Figure 1).

#### Photovoltaics

- **California was the most important market in 2013.** Fifty-seven percent of U.S. capacity installed in 2013 occurred in the Golden State, and the capacity installed during 2013 increased by 161 percent compared with 2012.
- **Residential capacity installed in 2013 grew by 68 percent in the United States,** fueled by the increasing use of leases and third-party ownership of these systems. More than 145,000 residential PV systems were installed.
- **Utility sector capacity installed grew by 47 percent.** Ten PV installations, each larger than 100 megawatts (MW), were completed in 2013.
- **Hawaii had the highest per capita installed capacity of PV systems.** More than 75 percent of grid connected PV system capacity installed in 2013 was concentrated in California, Arizona and North Carolina.

#### Concentrating Solar Power

Three new CSP solar plants with a total capacity of 766 MW<sub>AC</sub> were completed in 2013. These were the first CSP plants completed in the United States since 2010 and, by far, the most CSP capacity ever installed in the United States in a single year. (Note that the output of CSP plants is reported in alternating current [AC] watts.)

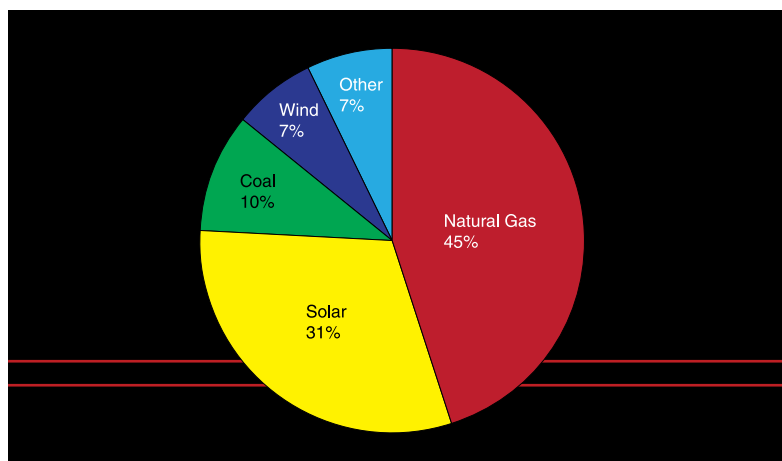


Figure 1: New U.S. Electric Generation Installed in 2013 by Technology

Source: Energy Information Agency (EIA 2014) with IREC PV data

#### Photovoltaics

##### PV Installations and Capacity

2013 was another banner year for PV, with large increases in both the number and capacity of facilities. The capacity of 2013 PV installations increased by 34 percent to 4.6 gigawatts direct current (GW<sub>DC</sub>) compared with 2012 (Figure 2). However, while the annual capacity growth rate was strong, it was the lowest rate since 2006. The compound annual growth rate for the last 10 years is an astounding 55 percent. The total installed capacity of utility installations increased by 48 percent, and distributed installations, largely on residential, commercial and government buildings, increased by 17 percent. The residential portion of distributed capacity increased by 68 percent in 2013. California led national growth with a 161 percent increase in capacity installed in 2013 (compared with 2012). In fact, without California, the installation trends were not positive — 18 percent less PV capacity was installed outside California in 2013 compared with 2012.

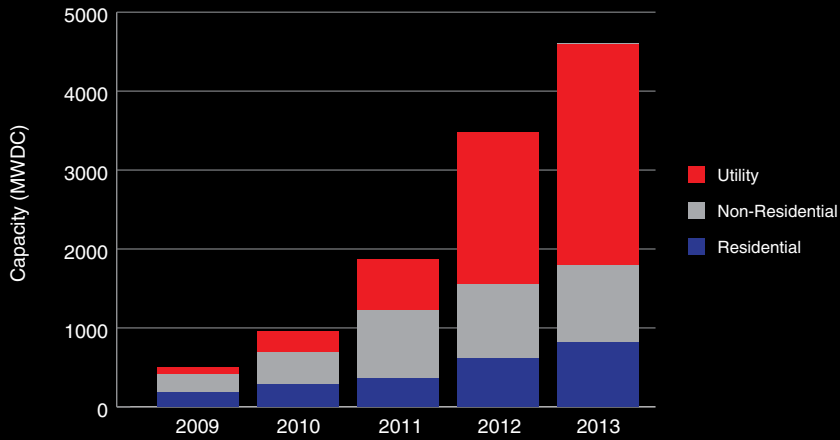


Figure 2: Annual Installed U.S. Grid-Connected PV Capacity by Sector (2009-2013)

The cumulative installed grid connected PV capacity increased to 12.1 GW<sub>DC</sub> (Figure 3), 82 percent of which was installed in just the last three years. In 2013, 0.9 GW<sub>DC</sub> were installed on residential buildings, 1.0 GW<sub>DC</sub> at nonresidential sites, and 2.7 GW<sub>DC</sub> in the utility sector (Figure 2).

Almost 155,000 grid connected PV installations were completed in 2013, a 64 percent increase over the number of installations in 2012. At the end of 2013, 471,000 PV installations were connected to the U.S. grid, including 420,000 residential installations.

The important factors driving PV installation growth vary by sector and state. The following factors helped drive PV growth in 2013:

■ **Federal Investment Tax Credit (ITC).** The federal ITC remained stable at 30 percent, and the accelerated depreciation schedule for commercial installations was unchanged. Tax credits for both residential and commercial installations are in place at current levels through the end of 2016. Then the residential ITC will expire and the commercial ITC will revert from 30 percent to 10 percent. With this stable incentive, developers and installers can plan and market their products, and consumers can make rational decisions without arbitrary incentive deadlines.

■ **Lower Installed Costs.** The total installed cost for distributed PV installations fell 11 percent in 2013 and has fallen 44 percent over the past four years. The cost decline is even greater for utility installations. Falling module costs is the primary reason for cost declines over the long term, but all cost components have fallen, including inverter costs and soft costs such as permitting.

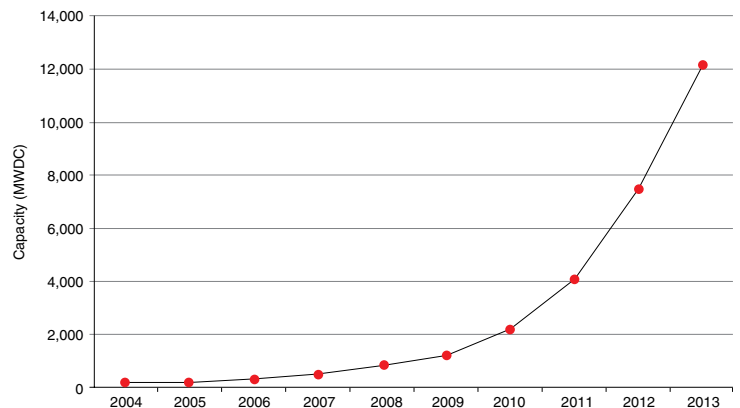


Figure 3: Cumulative U.S. Grid-Connected PV Installations (2004-2013)

■ **Federal Cash Grants.** In February 2009, as part of the American Recovery and Reinvestment Act (ARRA), Congress enacted the U.S. Treasury Grant in Lieu of Tax Credits Program. This program, commonly known as the 1603 Treasury Grant Program, provided commercial installations with the alternative of a cash grant instead of the tax credit. The program was originally scheduled to expire at the end of 2010, but it was extended through the end of 2012. The expiration of this program inspired many project developers to begin construction late in 2012 in order to qualify, with project completion scheduled in 2013 through 2016. In 2013, 981 completed solar electric projects were awarded \$1.8 billion in cash grants. These totals reflect 70 percent fewer projects and 16 percent fewer grant dollars than the 2012 totals. Solar projects received 41 percent of 1603 Treasury Grant funding in 2013, compared with only 17 percent in 2011.

■ **State Renewable Portfolio Standard (RPS) Requirements.** States encourage investments in utility-scale solar plants with RPS policies. An RPS generally requires utilities to generate or procure a

certain percentage of electricity from renewable energy. Some states have a “solar carve-out” that also requires that a certain percentage of the renewable generation come from solar energy. The terms of each state’s RPS are different, but this policy is generally most important for utility sector installations. In some states, RPS guidelines have led to solar renewable energy credit (SREC) markets, which in turn have resulted in increased demand for and installation of distributed solar. SREC markets are most developed in the Mid-Atlantic states and in Massachusetts. Of the 11 states and territories with more than 10 MW of utility sector installations in 2013, nine have an RPS, usually with a solar carve-out.

■ **Federal Loan Guarantees.** As part of ARRA, the U.S. Department of Energy was authorized to offer loan guarantees for renewable energy and other energy projects. The program expired in September 2011, but projects that received loan guarantees by that date are still being completed. In 2013, all three CSP installations and three of the four largest PV installations received \$7.2 billion in loan guarantees from this program for at least a portion of the project’s capital cost.

■ **Third-Party Ownership.** The dominant ownership model for utility and nonresidential distributed installations has long been third-party ownership. In recent years this ownership model has expanded to the residential sector, and it is now the dominant ownership model in all sectors. This structure may take the form of a lease or a power purchase agreement (PPA). In each case, a third party owns the system, and the system user makes regular payments to the owner. For distributed systems, the system is located at the consumer’s facility or home, and the consumer uses the electricity generated on-site. Under third-party ownership, the consumer avoids paying the large up-front capital cost of a PV system.

■ **Net Metering.** Net metering is a simple option for consumers to offset their monthly electricity bills by producing their own energy. It allows customers to send excess energy from an on-site renewable energy system back to the grid, and receive a 1:1 kilowatt-hour credit for that energy. In 2013, 95 percent of distributed installed capacity was net metered.

■ **State and Utility Rebates.** State and utility financial incentives have historically been one of the most important factors driving PV growth, especially for residential and commercial distributed installations. However, the importance of rebates is declining. The impact of these rebates varies greatly from state to state and, in general, rebate levels have dropped as the cost of PV installations has decreased, and some states have eliminated rebate programs. The largest rebate program in the country, the California Solar Initiative, methodically reduced rebates for years. Although rebates for this program ended in 2013, PV markets continue to grow in California.

Table 1: SAMPLE U.S. PV INSTALLATIONS BY SECTOR

Sector	Example Installations
Residential	<ul style="list-style-type: none"> <li>Residential installation owned by homeowner or building owner; electricity generated is used on-site.</li> <li>Residential installation owned by third party, with electricity sold to or used by the homeowner or building owner.</li> </ul>
Non-Residential	<ul style="list-style-type: none"> <li>Non-residential installation owned by building owner; electricity generated is used on-site.</li> <li>Non-residential installation owned by third party, with electricity sold to the building owner and used on-site.</li> </ul>
Utility	<ul style="list-style-type: none"> <li>Installation owned by utility; electricity generated goes into bulk power grid.</li> <li>Installation owned by third party; electricity generated goes into bulk power grid.</li> <li>Installation owned by building owner (residential or commercial); electricity generated goes into bulk power grid through a feed-in tariff, PPA or other agreement.</li> </ul>

### Grid Connected PV Installations by Sector

The growth rate of grid connected PV varies by market sector: residential, nonresidential and utility. Distributed installations on the customer’s side of the meter produce electricity used on-site; these include both residential and nonresidential facilities. Examples of nonresidential facilities are government buildings, retail stores and military installations. In contrast, utility installations are on the utility’s side of the meter (if a meter is involved) and produce bulk electricity for the grid. Table 1 shows examples of installations in each sector.

### Utility Sector Installations

Utility sector PV installations increased by 48 percent in 2013 compared with 2012. Factors that influence the large growth in utility sector installations include RPSs, lower installed costs and federal loan guarantees.

In 2013, 77 utility sector plants larger than 5 MW<sub>DC</sub> were installed, with a total capacity of 2.6 GW<sub>DC</sub>. These large facilities accounted for 93 percent of the utility sector installations in 2013. An additional six facilities of 5 MW<sub>DC</sub> or larger were installed in the nonresidential sector, with a combined capacity of 53 MW<sub>DC</sub>.

In total, these 83 generators larger than 5 MW<sub>DC</sub> account for 57 percent of the total PV capacity installed in 2013. Of the 10 largest PV installations in the United States, eight were completely or partially installed in 2013, and all provide electricity for California customers.

State RPS requirements are encouraging investments in utility-scale solar plants. California is, by far, the most important utility sector market; 71 percent of 2013 utility sector PV installations were in California. In 2013, 1.6 GW<sub>DC</sub> or 94 percent of the utility sector facilities were installed in states with RPS requirements. Eighty-nine percent of utility installations are located in only three states: Arizona, California and North Carolina. The three CSP plants completed in 2013 are also located in California and Arizona.

Financing is also important. Five of the six largest PV installations received a federal loan guarantee for at least a portion of their installation costs, and these loan guarantees supported 779 MW<sub>DC</sub> of PV in 2013. In addition, all three CSP installations described above received a federal loan guarantee. Although this federal program is known for high-profile failed loan guarantees to Solyndra and other manufacturers, none of the guaranteed loans for specific solar installations has failed, and these loan guarantees are a crucial component of the overall financial package for these projects. Federal tax incentives, grants and the lower cost of PV modules also made these investments attractive.

### Distributed Installations

Distributed installations provide electricity for use at the host customer's site, such as a home or business. In 2013, the amount of distributed grid connected PV capacity installed annually in the United States increased 17 percent to 1.9 GW<sub>DC</sub>. More than 154,000 distributed PV systems were installed in 2013, a 65 percent increase over the number of distributed PV systems installed in 2012. For the second year in a row, distributed PV growth was strongest in the residential sector. On a capacity basis, installations declined in the nonresidential sector compared with 2012. Residential capacity installed in 2013 accounted for 47 percent of distributed installations. Just two years ago, in 2011, residential installations accounted for only 28 percent of distributed installations.

The top five states for distributed capacity installed in 2013 were California, Massachusetts, New Jersey, Arizona and Hawaii. The only state in the top ten for distributed capacity installed with a drop in installations compared with 2012 was New Jersey, where installed capacity sank by 37 percent. SRECs are an important factor in the New Jersey market; the price fell significantly in 2012,



which lead to a decrease in new capacity installed in 2013 (compared with 2012). However, residential capacity in New Jersey installed increased by 3 percent in 2013.

In 2013, 95 percent of the residential and nonresidential distributed PV installations were net metered. This market share for net metered systems has remained consistent for several years. The rules governing net metering transactions vary widely from state to state and from utility to utility. Some states are currently reviewing their net metering policies and considering changes. Depending on which, if any, changes are implemented, the future of the distributed solar market could change.

### Residential Sector Installations

The number of residential installations increased by 68 percent in 2013 compared with 2012. Residential installations accounted for 19 percent of the total U.S. market on a capacity basis in 2013, but they accounted for 94 percent of the number of installations in the same year. The average size of a residential PV system decreased two percent, to 6.1 kW<sub>DC</sub>. Factors that influence the growth in residential installations include the federal ITC, lower installed costs, retail PPAs and solar leases, net metering and state and utility incentives. In addition, installers are becoming more sophisticated in marketing and generating leads; this has helped expand the market.



## Rebates to Debates: Shaping the Future of Solar Markets



by IREC Vice President/COO  
Larry Sherwood

The impact of rebates on the total market is declining. Five years ago, owners of most photovoltaic (PV) installations received a cash rebate from a state or utility incentive program, and this rebate was arguably the most important element of the financial package. In that era, no state had a significant number of installations without a rebate program. For the past three years, incentive expenditures have been declining, in part because incentive levels have declined and in part because some states have phased out these programs. Despite lower incentive expenditures, the installed capacity of PV facilities with rebate support continues to increase. When PV is less expensive, less incentive money is necessary to encourage installations.

Similar to rebates, state renewable portfolio standard (RPS) requirements have encouraged investments in utility-scale solar plants. In some states, enough solar plants are under construction to meet RPS requirements.

In 2013, Xcel Energy announced plans to purchase electricity from a 170 MWDC PV plant to be built in Colorado. The decision to purchase electricity from this plant is based on economics — not on RPS requirements. This may signal a change in the utility sector market in state and regional markets that are not based upon RPS requirements, similar to the change happening in the residential markets as state incentive programs are phased out.

What can we expect for the future of U.S. solar markets? The short-term prospects for continued strong growth are good. As the federal investment tax credit expires for residential installations and declines for commercial installations at the end of 2016, we can expect that implicit deadline to impact the market in both positive and negative ways.

Growth continues in the residential sector. Although the market is concentrated in several states, many states have growing residential markets. The future of net metering will be studied in many states, and the outcomes of numerous cost/benefit studies and policy debates will impact residential markets.

The nonresidential distributed PV sector was the weakest sector in 2013, and that trend will likely continue. Changes to the New Jersey program will help stabilize the market in that important state and may help fuel modest growth in 2014.

Numerous utility PV projects under construction or approved mean that this sector will continue to grow in 2014. However, the growth in this sector is extremely concentrated in a few states. As those states meet their RPS requirements, future installations will need to be justified on economics. The slow growth of U.S. electricity consumption means that most utilities will not be aggressively pursuing new power options.

Concentrating solar power projects face a similar market dynamic. A number of plants are under construction and will be completed over the next few years. New orders will require a different market model than installations in the pipeline now. —

In California, the capacity of residential installed PV doubled compared with 2012, and California installations constituted 45 percent of the nation's total residential PV installations for 2013. Outside California, residential capacity installed increased by 49 percent in 2013 compared with 2012. Beyond California, the states with the most residential capacity installed in 2013 were Hawaii, Arizona, New Jersey and Colorado. In Hawaii, 12 percent of all single-family residential dwellings had PV by the end of 2013.

For residential consumers, the federal tax credit for PV remained stable in 2013 and is set to remain in effect through the end of 2016. Stable incentives encourage more homeowners to purchase solar. In addition to federal incentives, most residential installations occur in states with state or local incentives.

### Nonresidential Sector Installations

The capacity of nonresidential sector installations, which includes government buildings, retail stores and military installations, decreased by 8 percent in 2013 compared with 2012. The average size of a nonresidential distributed installation decreased 11 percent to 109 kW<sub>DC</sub>. The largest 2013 installation in this sector was a 20 MW<sub>DC</sub> installation at an Apple data center in North Carolina. This installation complemented a similar-size facility installed for Apple in 2012.

Table 3: 2013 ANNUAL TOP TEN U.S. STATES RANKED BY GRID-CONNECTED PV CAPACITY INSTALLED IN 2013

2013 Rank by State	2013 (MW <sub>DC</sub> )	2012 (MW <sub>DC</sub> )	2012-2013 Percent Change	2013 Market Share	2012 Rank
1. California	2,608	998	161%	57%	1
2. Arizona	424	732	- 42%	9%	2
3. North Carolina	261	122	114%	6%	6
4. Massachusetts	223	138	62%	5%	5
5. New Jersey	202	417	- 52%	4%	3
6. Hawaii	153	120	28%	3%	7
7. Georgia	89	8	974%	2%	24
8. Texas	76	55	38%	2%	11
9. New York	61	56	9%	1%	10
10. Maryland	59	80	- 26%	1%	9
All Other States	460	727	- 37%	5%	--
<b>Total</b>	<b>4,615</b>	<b>3,453</b>	<b>34%</b>	<b>--</b>	<b>--</b>

2012 and 2013 columns include installations completed in those years. "2013 Market Share" means share of 2013 installations. "2012 Rank" is the state ranking for installations completed in 2012.

Of the top ten states for 2013 installations in this sector, only Massachusetts, Arizona and North Carolina saw growth in the number of installations completed in 2013. The drop in nonresidential installations was severe in New Jersey, Ohio and Pennsylvania. With the end of the Treasury Grant Program in 2012, projects that began construction by the end of 2012 remain eligible for the program, but no new projects can now be accepted. When incentive programs end, it is typical to see a surge of applications before the deadline and then a drop off in installations after the deadline has passed. Falling PV prices and continued availability of the federal ITC meant that the loss of this incentive resulted in only a small drop in installations, but not a dramatic drop. This shows the underlying strength of the market.

#### Grid Connected Installations by State

In 2013, more than three-quarters of grid connected PV capacity installed was concentrated in California, Arizona, North Carolina and Massachusetts (Table 3). California represents 57 percent of all U.S. PV capacity installed in 2013. In the rest of the country, 18 percent less PV capacity was installed in 2013 than in 2012.

Of the top ten states for 2013 capacity installations, California, North Carolina and Georgia more than doubled their totals from the prior year. Georgia and Texas joined the top ten installation list for 2012, replacing Nevada and Maryland.

State policies affect PV installations, with most installations happening in the few states with favorable solar policies. All states in the top ten for distributed installations have established an RPS, which tends to

encourage larger installations (although RPS requirements and structures vary widely from state to state). California's RPS had the biggest impact of any state's RPS, but it does not have a solar carve-out. Most of the other top ten installation states have RPSs with solar carve-outs.

Cumulatively, 66 percent of PV capacity is installed in just three states — California, Arizona and New Jersey (Table 4). These three states have had large totals of capacity installed year after year.

2012 and 2013 columns include installations completed in those years. "2013 Market Share" means share of 2013 installations. "2012 Rank" is the state ranking for installations completed in 2012. Data updated from data included in *U.S. Solar Market Trends 2013*.

Table 4: CUMULATIVE TOP TEN U.S. STATES RANKED BY GRID-CONNECTED PV CUMULATIVE INSTALLED CAPACITY THROUGH 2013

	MW <sub>DC</sub>	Market Share
1. California	5,183	43%
2. Arizona	1,563	13%
3. New Jersey	1,185	10%
4. North Carolina	469	4%
5. Massachusetts	445	4%
6. Nevada	424	3%
7. Colorado	360	3%
8. Hawaii	358	3%
9. New Mexico	257	2%
10. New York	241	2%
All Other States	1,635	13%
<b>TOTAL</b>	<b>12,120</b>	<b>--</b>

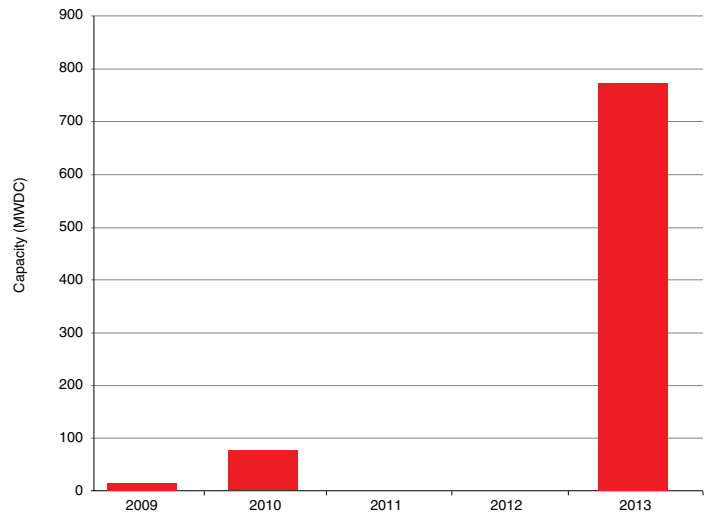


Figure 10: Annual Installed U.S. CSP Capacity (2009-2013)

## Concentrating Solar Power

Three new concentrating solar power (CSP) solar plants with a total capacity of 766 MW<sub>AC</sub> were completed in the United States in 2013 (Figure 10). These were the first CSP plants completed in the country since 2010 and, by far, the most ever installed in a single year. The cumulative installed CSP capacity more than doubled in 2013, to 1275 MW<sub>AC</sub>. The three CSP plants are:

- **Solana Generating Station**, Phoenix, Ariz., 250 MW<sub>AC</sub>. Parabolic trough system developed by Abengoa Solar, with the electricity sold to Arizona Public Service.
- **Genesis Solar Plant**, Blythe, Calif., 125 MW<sub>AC</sub>. Parabolic trough system developed by Genesis Solar, with the electricity sold to Pacific Gas and Electric Company (PG&E).
- **Ivanpah Solar Electric Generating Station**, San Bernardino, Calif., 391 MW<sub>AC</sub>. Three power towers developed by BrightSource, with the electricity sold to PG&E and Southern California Edison.

The Ivanpah plant is the first large-scale commercial use of power tower technology in the United States. In 2014, CSP plants generating more than 300 MW are likely to be completed in California and Nevada. Additional plants are under construction for completion in future years.

## 2014 AWARD WINNERS

Presented at Solar Power International October 21, 2014



### **IREC Certified Clean Energy Trainer of the Year** Sean White

Sean is an IREC Certified Master Trainer for PV installation, and his company, Sean White Solar, is an IREC Accredited Training Provider. In addition, he's also a NABCEP certified solar PV installation professional and a NABCEP PV entry level program provider. In fact, Sean was on the NABCEP PV Installer Exam Committee and helped author the NABCEP PV Installer Task Analysis. Sean is a licensed electrician and a licensed solar contractor in California. He's also on the energy storage committee of the Solar ABCS PV industry stakeholder group. A community college PV professor since 2008, Sean has conducted solar energy courses that combine classroom education and hands-on workshops internationally for a wide variety of clients. Sean teaches classes on a regular basis for Diablo Valley College (CA), MERALCO (the main utility in the Philippines), Solar Universe (CA), Kaplan across the USA and students in Canada, China, South Africa, Mongolia, South Africa and Qatar.

### **Community Renewable Energy Project of the Year** City of Creve Coeur, MO EPA Green Power Community Challenge

In 2008, the City of Creve Coeur, Missouri signed the U.S. Mayor's Climate Protection Agreement and was the first municipality in the St. Louis region to complete a Greenhouse Gas (GHG) Emissions Inventory, resulting in a resolution to reduce GHG Emissions by 20 percent by 2015. In 2013, the city teamed up with Ameren Missouri Pure Power and Microgrid Energy to start an EPA Green Power Community Challenge. Support came from large and small businesses, schools, non-profits and residents. Today, they are matching 3.2 percent of the energy consumed within the community with green power coming from renewable energy certificates (RECs) and the installation of solar. There have been 23 commercial and 26 residential solar projects installed, totaling 805 kWh's. Businesses and residents are purchasing RECs and matching 15,390,128 kWh annually, for an environmental impact equivalent to reducing 10,612 metric tons of CO<sub>2</sub>. That's equal to removing 2,234 cars from the road.

### **State/Local Government Achievement of the Year** MassCEC Internship Program

The Massachusetts Clean Energy Center (MassCEC) Internship Program helps prepare the next generation of clean energy workers by connecting students and recent college graduates with Massachusetts clean energy companies for internships. This program has seen hundreds of students and recent graduates placed at clean energy companies across the Commonwealth, with successful internships regularly resulting in full time positions at host companies. In summer 2014, MassCEC received 993 student applications and placed 212 in summer internships at 125 clean energy companies across Massachusetts. More than 50 students have permanent employment since the inception of the program. In 2013, 46 percent of program participants were women and 26 percent were from a minority background. A total of 79,994 clean energy workers and 5,557 clean energy firms operate in MA (MassCEC's 2013 Clean Energy Industry Report).

*IREC's coveted 3iAwards recognize  
exemplary people, projects and programs  
for their innovation, ingenuity and inspiration  
in renewable energy and energy efficiency.*

### **IREC Accredited Clean Energy Training Provider of the Year** North Carolina Clean Energy Technology Center

The NC Clean Energy Technology Center, formerly the North Carolina Solar Center, has been at the forefront of clean energy technologies and training for more than 25 years. Its award-winning Renewable Energy Technologies Diploma Series (RETDS), a continuing-education program, provides numerous professional continuing education credits and pathways to industry-recognized certifications. The programs address the workforce needs of the industry on multiple fronts, from installers to instructors, inspectors to project developers, and beyond.

### **IREC Accredited Clean Energy Training Provider of the Year** Kankakee Community College

Kankakee Community College's (KCC) renewable energy program integrates a market development component into its solar PV training program. This component includes training local electrical inspectors in PV, partnering with U.S. equipment manufacturers, local installers, lenders, and community organizations to support a local solar job market. An objective of KCC's PV program is to positively impact local economies by helping overcome common barriers, and developing a pipeline for students from underrepresented and minority groups.



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### Special Acknowledgment

For four years, Pat Fox guided IREC's Credentialing Program. This year on July 1, Pat resigned from IREC to allow her full time focus on health issues. The good news is that we continue to gain from Pat's leadership. She took IREC's credentialing and standards work from a small start-up to a nationally recognized and accredited operation. Pat and her amazing team boosted clean energy training onto a quality platform, making sure that the clean energy workforce is a competent one. We thank Pat for all that she did. She will always be an integral part of IREC.

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# IREC - More 2014 Highlights



IREC at SunShot Solar Summit: Students Demo PV Install for SITN

IREC regulatory and workforce successes were featured at the 2014 SunShot Summit and Technology Forum in Anaheim in May. SITN's Region 8 (California and Hawaii) team arranged for students from Santa Monica Community College to demonstrate a PV installation on a mock roof. The SunShot Solar Summit drew more than 800 solar industry leaders. One participating student, Dawn Davis, found the Technology Forum fun and challenging. "I was amazed by the number of people who stopped by and asked questions about the installation process."



IREC's 3iForum at Solar Power International

After a standing-room-only crowd attended many of our 2013 sessions over three days at SPI in Chicago, we once again brought some of the nation's most involved clean energy thought leaders directly to the leading solar industry gathering in North America for SPI October 2014 in Las Vegas. In 30-minute sessions, hundreds of attendees benefited from information and insight to keep up with the fast-paced changing issues, successes and challenges.

President Obama Recognizes Rocky Mountain Solar Instructor Trainee as 'Solar Champion'

Congratulations to Henry Red Cloud, a partnering instructor through the Solar Instructor Training Network, who was named by President Obama as a Solar Champion on April 17, 2014 at a White House ceremony. Henry is part of the SITN Rocky Mountain Region and participated in training through Solar Energy International in 2012.



Jane Weissman interviewed by Renewable Energy World on How and Why Quality Matters, at PV America 2014 in Boston.



IREC's 3iAward recipients were honored at Solar Power International with more than 10,000 attendees.

## 13 NY Electrical Worker Training Locations Earn IREC Accreditation



IREC announced in September 2014 that 13 training centers across New York state operated by the International Brotherhood of Electrical Workers (IBEW) – National Electrical Contractors Association JATCs received the prestigious IREC Training Provider Accreditation for photovoltaic systems content in their Inside Journeyman Wireman program.

## Case Studies Help Others Integrate Solar Content

A new, more advanced online guide now exists to help instructors and program administrators enrich existing courses, curricula and programs to include solar. For example, adding solar education and training to a program that trains electricians, or a business program that prepares individuals to enter sales and marketing, provides multiple employment paths. The IREC Solar Content Integration Guide includes 18 case studies, which describe the processes used, the obstacles encountered, and the keys to success to integration of solar content.



PHOTOS COURTESY OF: Cover (L to R): Kennebec Valley Community College, RGS Energy, Dennis Schroeder/NREL, Abengoa Solar, US Dept. of Energy. Pg 2 left: Clean Energy Collective; center top: GRID Alternatives; lower: KVCC; right: Ross Solar Group. Pg 3 top: SunPower Corporation. Pg 4: Ross Solar Group. Pg 5: SunPower Corporation. Pg 7: Circular Energy. Pg 8: Orlando Utilities Commission. Pg 9 left: Dreamstime. Pg 10: GRID Alternatives. Pg 12: Dennis Schroeder/NREL. Pg 13: Kennebec Valley Community College. Pg 14 left: Santa Fe Community College; right: Dennis Schroeder/NREL. Pg 15: top: Dennis Schroeder/NREL; lower: Kennebec Valley Community College. Pg 16: White House; Erwin Technical Center. Pg 17 left: Pennsylvania State University; right: Calhoun Community College; lower: Solar Energy International. Pg 19: Dreamstime. Pg 20 lower left: Kennebec Valley Community College; inset: Imagery Distribution System. Pg 21: Pennsylvania State University. Pg 22-23: Meridian Solar. Pg 24: Abengoa Solar. Pg 26: GRID Alternatives. Pg 28: RGS Energy. Pg 31: Abengoa Solar. Pg 34 center right: Solar Energy International; center left: Renewable Energy World; lower right: Florida Solar Energy Center. Pg 35 top left & center: US Dept. of Energy; lower left: Bergye Windpower; top right: Dreamstime. REPORT DESIGN: Brownstone Graphics

# IREC Resources

www.irecusa.org



## PUBLICATIONS 2013-2014

- A Guide to Preparing Solar Permitting Checklists
- A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation
- Blueprint for the Development of Distributed Generation in California
- Integrated Distribution Planning Concept Paper
- IREC's Annual Updates & Trends Report
- Minimizing Overlap in PV System Approval Processes: Case Studies & Analysis
- Model Inspection Checklist for Rooftop PV Systems
- Model Interconnection Procedures
- Model Rules for Shared Renewable Energy Programs
- Residential Solar Permitting Best Practices Explained
- Simplifying the Solar Permitting Process: The Importance of Consistency
- Solar Career Map
- Solar Energy Education and Training Best Practices: The Series
- Solar Permitting Best Practices
- Unlocking DG Value: a PURPA-Based Approach to Promoting DG Growth
- U.S. Solar Market Trends 2013 (released July 2014)

## VIDEOS

- PVOT for Code Officials  
A brief introduction to IREC's Photovoltaic Online Training course.
- Accelerate your success!  
An industry-targeted video encouraging clean energy employers to commit to quality training and recognize that credible credentials count.



### Jane Weissman Moderates White House Solar Champs of Change Panel

Speaking about the importance of quality standards and credentials to the confidence of employers and consumers, Jane told attendees: "black eyes in the industry have a long shelf life." She added: "Quality is invisible; mistakes are not." Solar Jobs Training and Workforce was the first panel of the Solar Champions of Change White House Summit. Announced at the summit were 10 Solar Champions of Change who are driving policy changes at the local level to expand energy choices for Americans, grow jobs, and add new clean energy to the grid.



Larry Sherwood featured in U.S. Department of Energy SunShot Summit opening video.



### IREC published newsletters in 2014

- The IREC Report
- Credentialing Chronicle
- Connecting to the Grid
- SITN Quarterly
- Small Wind News



### Blogs Broaden IREC's Reach

IREC's blogs, posted at least 3 or 4 times each month, are shared with thousands, often millions of followers with information and independent insight about actions that make clean energy more accessible and affordable to more people, and initiatives and tools to keep workforce training standards high.

# Trends Shaping Our Clean Energy Future



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