



Interstate Renewable Energy Council Inc.



IREC is 30 — accelerating renewable energy since 1982

2012 ANNUAL UPDATES & TRENDS REPORT

ANNUAL MEETING

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UPDATES & TRENDS

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Opening Comments

2012 ANNUAL UPDATES AND TRENDS REPORT

We have reached the 30-year mark! Not bad for a nonprofit that started as a small group of concerned state energy officials committed to increasing the procurement and safety of solar energy systems. Back in 1982, we called ourselves the Interstate Solar Coordination Council. A decade later, we kicked into a higher gear, changed our name, broke out of our quiet shell, and built a strategic underpinning that carries us to where we are now.

Yet, it is not the same playbook as it was 20 years ago, 10 years ago or even just five years back. Changing markets, increased quality demands by consumers, on-again/off-again policies and goals, inconsistent practices — all contribute to a dynamic environment that keeps us forward thinking.

Today, IREC is broadly respected for its credibility and substance. Our work facilitates a healthy marketplace for clean energy.

IREC is a well-established leader in shaping policy and practices around the country. Rulemaking achievements that support distributed renewable energy are led by IREC's talented and proficient team of experts. Regulatory success in one state provides replicable examples for others.

IREC's determination to raise the bar for training and educational programs fostered the creation of defined quality benchmarks, now part of the foundation that is building and supporting a highly-skilled workforce.

Holding ourselves to high standards, we tackle traditional and emerging barriers, and we don't shy away from the long haul it might take to overcome them. We are proud of our role in exploring new and creative energy solutions that need to be considered, and promoting consensus views among a diverse group of stakeholders. We are persistent in our efforts. And our without-walls structure allows us to follow the talent, to operate efficiently and precisely.

The chapters in this Annual Updates & Trends Report present the facts and reasoning behind our most current work — all backed up by our best practices, model procedures and standards, which can be found on IREC's web site. Interestingly, we have moved these works into second and in some cases third-generation versions. With deep expert and stakeholder involvement, a new series of best practices for training is now available, offering a compendium of national curriculum models and instructional methods. IREC's new

Standard 14732 is used to ensure that training programs issue market value "certificates" recognized by employers. The *Freeing the Grid* report card is now free of paper on its new web platform, making it easier to use, understand and share states' progress on renewable energy policies.

Through our multiple advisory boards, IREC works with many stakeholders, gaining from their on-going input and direction. On a regular basis, we sit with more than 30 organizations. This ensures there is relevancy and currency in our activities, leading to measurable impact and demonstrative results.

We have broadened our circle of partners who gain from joint activities and shared goals, including the American National Standards Institute, the International Association of Electrical Inspectors, and Affordable Comfort, Inc., to name a few. We are redefining what partnerships mean, looking at common agendas and collective impact among organizations and communities.

Each year, we applaud trendsetting projects and people with our annual innovation and special recognition awards. Please join us in congratulating the 2012 recipients, detailed on our website.

We send our thanks to all of our funders and supporters who have confidence in our work and encourage us to move forward. My personal thanks to the incredible, truly amazing IREC Team, including those on the front line and the many behind the scenes. All are in the forefront of making good things happen.

IREC believes that enabling greater use of clean energy in a sustainable way is the single most important strategy for the future. Creating this sustainable, clean energy future requires a culture that embraces the two most important elements — energy efficiency and renewable resources.

Starting today, IREC moves forward with a national challenge we're calling *Closing the Divide: Bridging Energy Efficiency and Renewable Energy*. No longer should it be an either/or decision. We'll be working with new partners and communities to bridge this gap. Will you help us?

Jane Weissman

September 2012

**IREC USES A COLLABORATIVE AND
CONSTRUCTIVE APPROACH IN EVERY
REGULATORY UNDERTAKING. THIS
ALLOWS US TO ACHIEVE THE MOST
PROGRESS AND DRIVE POLICIES
FORWARD TO MEET THE DEMANDS
OF CHANGING MARKET CONDITIONS.**



REGULATORY EFFORTS

IREC has been dramatically ramping up its regulatory efforts, working with a diverse set of stakeholders to develop and implement best practices in net energy metering rules (NEM or net metering) and interconnection standards. We are advancing innovative solar policies and financing mechanisms such as third-party ownership, community solar and the Morris Model. We are also looking at ways to implement successful wholesale market programs and improve land use and permitting processes.

IREC focuses on this mix of policies because, collectively, they facilitate a healthy marketplace for renewable energy in the U.S., particularly for distributed energy resources that interconnect to our nation's electric distribution systems. IREC often tackles these issues in state proceedings that take place over a span of months or years. Together, our long-term view of solar policy issues and the close working relationships we have developed with local stakeholders allow IREC to bring both continuity and comprehension to each of our active regulatory engagements.

Our efforts on these issues have been and continue to be funded by the U.S. Department of Energy (DOE), the Energy Foundation, the Tilia Foundation and numerous additional donors both large and small. Beginning in the fall of 2011, IREC began working under the DOE's SunShot Initiative in five key solar topic areas: net metering, community solar, interconnection, energy storage and transmission. This significant opportunity has allowed us to further IREC's efforts to build sustainable markets for renewable energy across the country, by expanding our focus beyond IREC's historical emphasis on developing and implementing best practices in net metering policies and interconnection procedures. For all of this support, we are sincerely grateful. We simply could not do all of the work described here without such generous and widespread support.

A New Evolution For Mainstay Policies

IREC has helped facilitate the development and expansion of net metering policies and interconnection procedures in 40 states since 2007. Over the past year, we have seen a new set of challenges and issues arise as market conditions continue to evolve and diversify. This new set of challenges

has compelled IREC to address jurisdictional issues surrounding both NEM and interconnection and steered interconnection rule modification processes to allow higher penetrations of photovoltaics (PV) on electric utility systems. As a result, we have discovered a new realm of success that results from collaborative work and defending the interpretation of state rules or laws. Moreover, IREC is continually pushing for improvements that allow the solar industry and utilities to proficiently respond to new market conditions that have come about largely due to the success of net metering and other distributed generation (DG) market programs. In short, now that most states have implemented net metering and interconnection rules, IREC is ensuring they work as they were originally intended and that they can adapt to new conditions.

Net Metering Policies

2011 was a successful year for net metering across the United States, and the trend has continued into 2012. As of August 2012, over 180,000 net-metered systems have been installed in the United States. On the policy front, IREC's most significant achievement grew out of an ongoing effort since 2009 to seek clarification from the California Public Utilities Commission (CPUC) concerning how the state's net metering cap should be calculated. IREC sought clarification of the meaning of a key phrase in the net metering statute, "aggregate customer peak demand," arguing that the 5% cap on net metering should be calculated using non-coincident peak demand rather than the coincident peak demand metric. The CPUC decided in favor of IREC's interpretation of state law in May 2012. This decision is projected to nearly double the amount of net metering capacity available in the state, expanding the aggregate cap to over 5,000 MW.

Throughout the first half of 2012, IREC also participated as a member of PJM's Net Energy Metering Senior Task Force, which was created to provide recommendations to PJM's senior management committee. In this role, IREC assured that the mid-Atlantic's regional transmission operator would not require costly monitoring of smaller renewable energy facilities, and to avoid a premature determination regarding PJM's jurisdiction over certain types of facilities. IREC sought to avoid a determination that PJM has jurisdiction over the interconnection of community solar, virtual net metering and meter

IREC has helped facilitate the development and expansion of net metering policies and interconnection procedures in 40 states.

aggregation facilities, a measure that would undoubtedly create an undue burden for these systems. The PJM Task Force's final report reflects IREC's position and preempts potentially costly burdens on small solar facilities in the PJM territory.

Interconnection Procedures

The overwhelming growth of solar over the past few years is leading to new considerations regarding the most efficient manner in which to interconnect large volumes and high penetrations of solar PV to our nation's electric distribution systems. In several states, solar generating capacity on individual distribution circuits is starting to reach penetration levels that bump up against the 15% penetration screen that most state interconnection procedures, as well as the federal Small Generator Interconnection Procedures (SGIP), specify as one of the cutoffs for allowing expedited interconnection review. Revisiting the 15% penetration screen, and other aspects of the interconnection process, has increasingly become an issue. Accordingly, IREC has worked with states facing high penetration issues to help them rethink their approach to penetration screens in interconnection standards. Hawaii served as the country's first example of this work.

Hawaii is well on its way to seeing multiple regions of high penetration solar deployment and, in fact, solar generation has occasionally met more than 50% of customer demand on some islands.¹

For nearly two years, IREC was highly involved in drafting and building consensus for modifications to Hawaii's interconnection process to ensure it addresses high penetration issues while also maintaining the safety, reliability and stability of the electric utility system.

In a late-2011 final decision, the Hawaii PUC allowed generators to avoid a detailed and costly study if the aggregate generation on a utility line section does not exceed 50% of minimum daytime load on that feeder. As a result, Hawaii now considers a minimum load calculation that can increase penetration levels on many distribution feeders without requiring an interconnection study. In addition to other important improvements, this modification establishes a national best

practice for interconnection and has already proven to be a useful precedent for California and other states experiencing high PV penetration. IREC expects Hawaii's *Freeing the Grid* score for interconnection to increase from an "F" to a "B" as a result of this work.

Drawing from the success of Hawaii's impressive outcome, IREC has been playing a critical role in California's interconnection reform process. In this work, IREC assisted the California PUC by collaborating with the state's largest investor-owned utilities (IOUs) and a diverse group of stakeholders to draft key interconnection reforms that will help California manage the growing demand for solar energy. IREC was able to play a key role in the California interconnection reform process when the CPUC asked IREC to be part of the small team drafting the tariff language. Through this role, IREC was able to act as a critical intermediary between the IOUs and the solar community to help facilitate constructive compromises that moved the state's interconnection procedures dramatically forward. The tariff revisions include a number of new national best practices, particularly with respect to expediting the interconnection of PV systems on distribution feeders at penetration levels up to 100% of minimum daytime load.

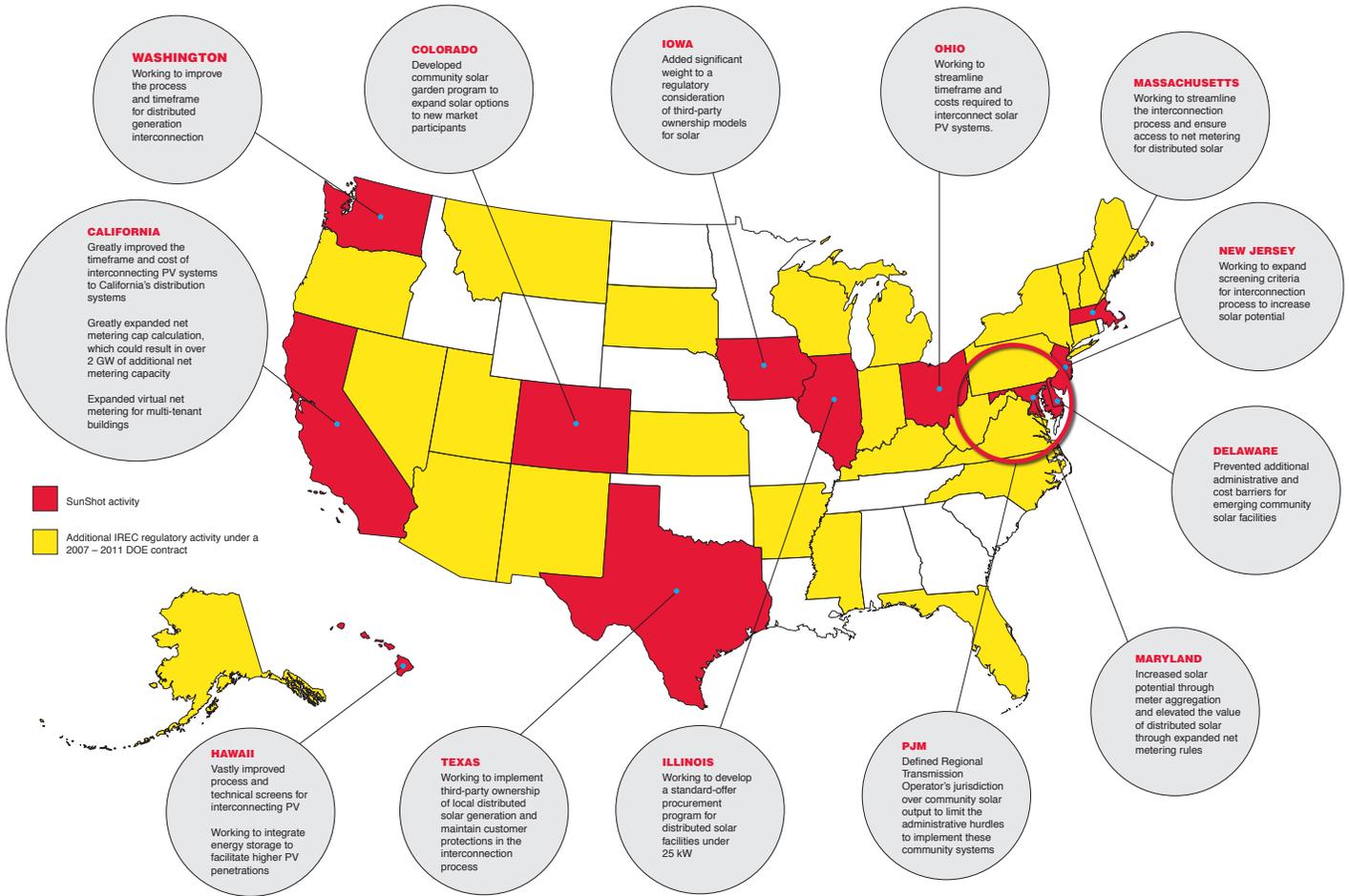
The examples of Hawaii and California provide a glimpse of what will inevitably transpire in other trendsetting states. IREC is presently active on interconnection reform in Massachusetts and New Jersey and continues to be active in addressing additional reforms in California and Hawaii. IREC has also been an active participant in the Federal Energy Regulatory Commission's review of the federal SGIP.

Connecting to the Grid

Since 2007, IREC has been working to raise awareness about the importance of sound net metering policies and interconnection procedures by collaborating with a number of solar stakeholders, including The Vote Solar Initiative, to annually produce *Freeing the Grid: Best Practices in State Net Metering Policies and Interconnection Procedures*. This report grades states relative to national best practices and objective grading criteria. This year, we made the transition from a static, once-a-year report to an interactive website with up-to-date grading, a video introduction to net metering and interconnection, action alerts and an education center

¹ https://solarhighpen.energy.gov/article/first_irradiance_sensor_network

Regulatory Achievements at a Glance



for policymakers and stakeholders. The objective of *Freeing the Grid* remains the same: to encourage states to improve their policies, applaud those that do and provide resources for those that want to affect positive change.

This past year IREC has also continued to publish its long-running *Connecting to the Grid* Newsletter. This newsletter brings news and analysis of net metering, interconnection and related solar policies from across the country. It also contains in-depth articles about policy and technical topics that make an impact on the solar market. *Connecting to the Grid* makes it quick and easy to stay informed in the quickly changing world of state and federal solar policies.

Increasing Options, Expanding Markets — Community Renewables Programs

Community renewables programs continue to multiply in the U.S., providing novel ways for a new pool of customers — those who would not normally be able to host a renewable energy system on their property — to participate in renewable energy markets. There are numerous barriers to hosting

a renewable energy system, including shaded or structurally unsound roofs, a lack of roof ownership (i.e., rental housing or multi-tenant buildings) or simply a lack of interest or ability to operate and maintain an onsite system. Yet, customer interest in solar continues to escalate. With some studies showing over 2/3 of the residential market potentially unable to host an onsite system, there is a clear need for more egalitarian, market-expanding options. Bridging this gap in offerings is not only smart business for solar companies seeking to reach customers eager for their product, but is also a matter of fairness as all utility ratepayers deserve an opportunity to participate in the renewable energy programs they support.

Over the past year, IREC has helped spread awareness about community renewables by providing educational resources for utility program managers and other community renewables stakeholders. In addition to speaking engagements and one-on-one assistance to program designers and other stakeholders, IREC has been heavily engaged in researching and re-evaluating its community solar model program rules and recommendations. As part of this effort, IREC has collected

Pioneering, problem-solving ideas are clearing the way for
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at the state and local levels.

information about community renewables programs across the country including their retail or wholesale design, how they value their bill credits or payments and whether participation is transferable and portable, among other criteria. By understanding the way new programs are being designed, IREC can better understand the evolution of these programs and how they are continuing to innovate, which in turn helps us to better serve community renewables stakeholders.

In the regulatory arena, IREC was very active in helping to implement Colorado's community solar gardens (CSG) statute and develop rules for community solar gardens in 2011-12. Statewide enabling legislation like Colorado's has spurred widespread innovation and development across the United States as IOUs, municipal utilities, towns, counties and private developers all have the ability and incentive to design programs. As a result of Colorado's efforts and similar early efforts, interest in community renewables continues to increase and innovative community renewables programs have sprouted up across Colorado in places like Colorado Springs, Fort Collins, Leadville, and the Paradox Valley.

Making Room for Distributed Generation — Transmission

Transmission planning often involves a much longer timeframe than do individual state proceedings, with planning processes that look 10, 20, even 50 years into the future. Transmission work is a relatively new domain for IREC, resulting from a real need to inject DG considerations into the overall transmission planning process in the western region of the U.S. IREC's effort on this front involves tracking various stakeholder processes and participating in a way that provides the most benefit to DG technologies.

Transmission work is, among other things, an exercise in acronyms. IREC has been engaging a number of stakeholder groups including the Western Electricity Coordinating Council (WECC), the Western Governors' Association (WGA), the Scenario Planning Steering Group (SPSG), the Transmission Expansion Planning Policy Committee (TEPPC), and the Regional Transmission Expansion Project (RTEP), among others. IREC has also been participating in proceedings of the California Independent System Operator (CAISO), which address the integration of variable renewables, the CAISO's own

regional transmission plan development and a new initiative to develop cost allocation principles. In these efforts, IREC has been stressing the role that localized DG can play in supporting the transmission system and deferring or mitigating costly transmission upgrades.

Sharing Successful Ideas to Streamline Solar — Land Use and Permitting

Over the past year, IREC has been working to catalog innovative ideas to streamline permitting that are popping up in city and county planning departments and state and local governments around the country. These pioneering, problem-solving ideas are clearing the way for a more streamlined approach to solar permitting at the state and local levels.

In March 2012, IREC shared its findings in a seminal report titled, *Sharing Success: Emerging Approaches to Efficient Rooftop Solar Permitting*. The report aims to serve as both a vehicle for discussion of permitting challenges, and as a source of inspiration for communities looking for realistic and effective ways to improve solar permitting while ensuring safe solar installations. The report examines the different stages of the permitting process. It starts by looking at the pre-application stage and the importance of providing clear and accessible information to installers so that system design and applications can be done accurately from the start. It looks at the three main methods of submitting and processing permit applications and highlights innovations from cities such as San Jose, California; Honolulu, Hawaii; and Portland, Oregon to expedite review. It also looks at innovations in scheduling and conducting inspections that finalize the permitting process. The report is available on the IREC website and provides real-life examples of improvements jurisdictions across the United States have implemented.

IREC was also an active participant in a collaborative effort lead by the California County Planning Directors Association to draft a Model Ordinance and Guide to address ground-mounted solar permitting. This effort focused on providing guidance to localities responsible for the land use and environmental review of solar projects. IREC drafted sections of the Guide that provided municipalities with information they need to consider the role that interconnection and procurement program requirements play in facility siting decisions. IREC also helped



evaluate methods of facilitating quick review for projects located in environmental responsible, cost-effective and low-conflict locations. IREC has continued to do outreach on this work and is helping to spread the lessons learned in California to other states such as Hawaii and New Jersey.

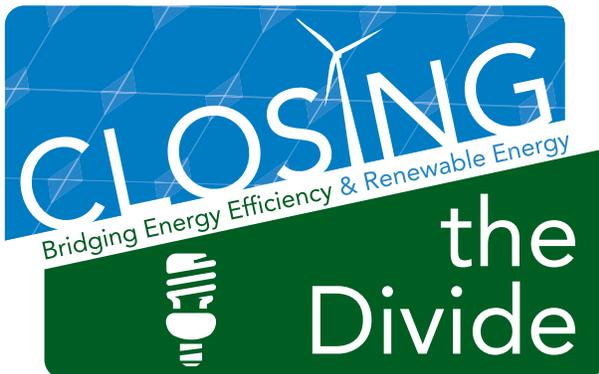
**Facilitating Market Diversity —
Educating Policymakers on the Benefits of DG**

IREC strives to facilitate a healthy and diverse renewable energy market for distributed resources. A diverse market requires policies and incentives that encourage and enable entry for generators of all types and sizes. Well-designed DG policies benefit all ratepayers; over the past year, IREC has helped to push an understanding of DG benefits to the forefront of policy discussions around the country.

IREC recently released a report that analyzes the ambitious goal set forth by California Governor Edmund Brown’s office to spur 12,000-MW of DG. *12,000 MW of Renewable Distributed Generation by 2020* provides a careful analysis of the benefits, costs and policy implications of the 12,000-MW goal to help inform decision-making on the development of the plan and to help ensure its effective implementation. IREC’s analysis advocates for a range of policy options that support each segment of the California solar market.

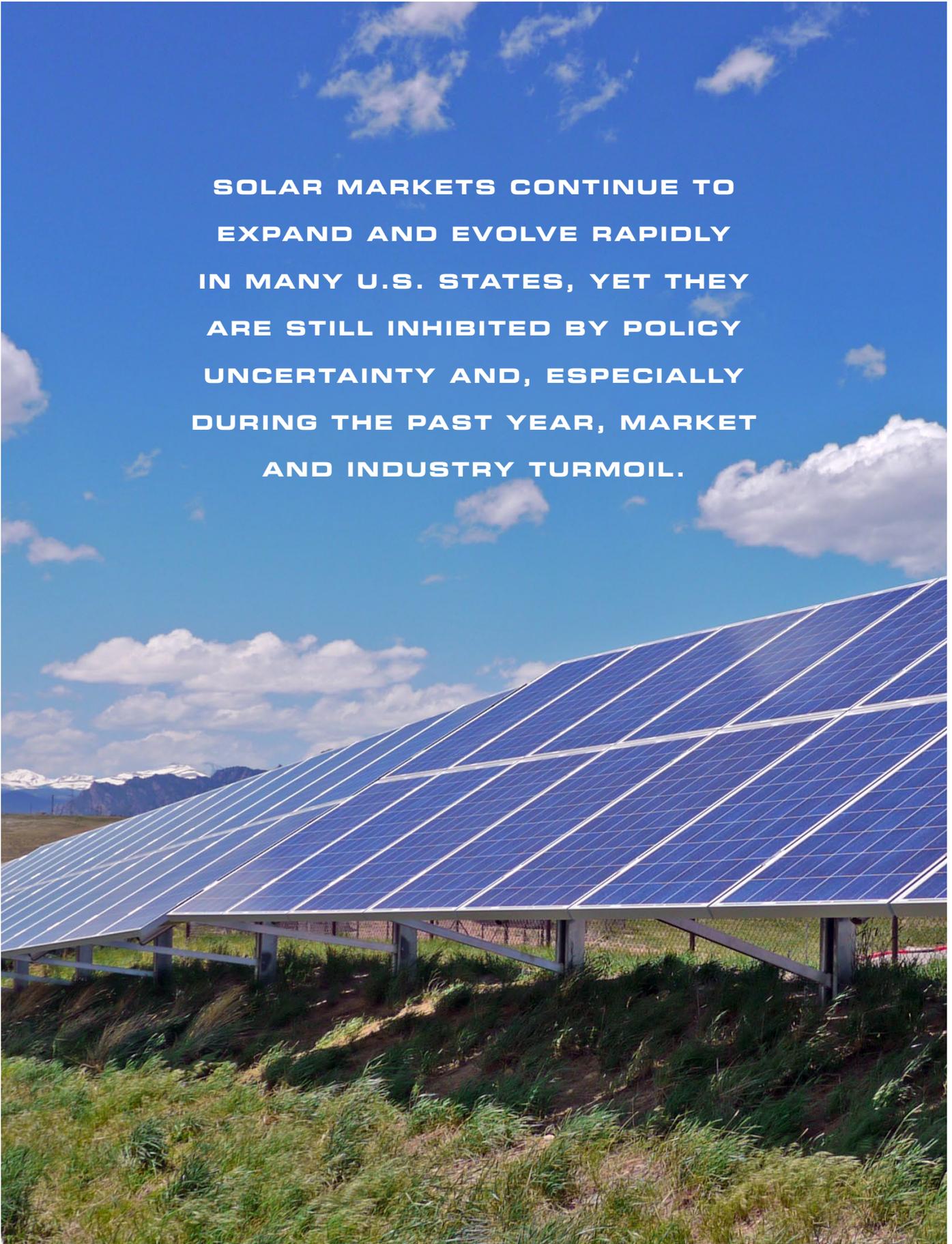
IREC has also engaged in state outreach intended to promote policies that facilitate market diversity around the U.S. For example, IREC assisted stakeholders in Oregon as they developed that state’s feed-in tariff based on the value of solar. This feed-in tariff policy should help to expand participation in solar energy by a broader range of Oregon citizens. Likewise, IREC is working with stakeholders in Vermont to help inform a mandatory report to that state’s legislature by the Vermont Department of Public Service on the costs and benefits of net metering. The ultimate report could have significant implications for the continued success of net metering in Vermont.

IREC has engaged in similar outreach and informational efforts in a number of other states, including Arizona, California, Colorado, the District of Columbia, Maryland, Nevada and Washington, among others. To assist with these efforts, in January 2012 IREC released a paper through the Solar America Board for Codes and Standards (Solar ABCs) entitled *A Generalized Approach to Assessing the Rate Impacts of Net Energy Metering*. This paper provides state agencies and other entities a consistent methodology with which to analyze the potential rate impacts of net metering, and has proven very effective at facilitating a better understanding of these complex issues. 🌞



While both renewable energy and energy efficiency are making great progress, government, energy industries, educational organizations and consumers typically view them separately. ***Closing the Divide — Bridging Energy Efficiency & Renewable Energy*** is IREC’s national challenge for Americans to rethink their personal and collective energy use to embrace these two most important elements of a sustainable, clean energy future.

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AND INDUSTRY TURMOIL.**



Chelsea Barnes, Justin Barnes, Rusty Haynes, Amy Heinemann, Kim Kooles and Brian Lips

The DSIRE Project

(Database of State Incentives for Renewables & Efficiency)

North Carolina Solar Center / North Carolina State University

STATE SOLAR INCENTIVES AND POLICY TRENDS

Introduction

Solar markets continue to expand and evolve rapidly in many U.S. states, yet they are still inhibited by policy uncertainty and, especially during the past year, market and industry turmoil. In some states, policymakers have moved proactively to ensure that growing solar markets remain strong, while in others, policy inaction has contributed to a shriveling market. The DSIRE project staff keeps a close watch on solar policy developments. IREC and DSIRE periodically publish descriptions of these developments, and the DSIRE web site (www.dsireusa.org) provides summaries of policies as they currently stand.

This Chapter provides an overview and analysis of solar policy developments during the past year. However, rather than cataloging, describing and attempting to make sense of the hundreds of separate solar policy developments that occurred at the state, local and utility levels, we have chosen to describe what we believe to be the 10 most-important state policy developments and to indicate specifically why each development made the cut. (These 10 developments are presented alphabetically; they do not appear in order of perceived importance.)

California's Continued PV Policy Leadership

California policymakers have developed and are implementing a strategy to incentivize all segments of the state's photovoltaic (PV) market separately. The state's net-metering policy and the California Solar Initiative (CSI) support customer-sited systems up to 1 megawatt (MW), whereas the state's feed-in tariff (FIT) and Renewable Auction Mechanism (RAM) provide streamlined procurement processes for systems between 1 MW and 20 MW. The state's RPS promotes investment in utility-scale renewables. With all of these pieces in place, policymakers are turning their attention to fine-tuning them.

California's customer-sited sector was given a shot in the arm when \$200 million was added to the original CSI budget, which had already been fully allocated for certain systems. Furthermore, the California Public Utilities Commission clari-

fied in May 2012 how the state's investor-owned utilities must calculate the aggregate capacity limit for net metering, effectively doubling the aggregate capacity — in MW — of systems that may net meter in the state. For mid-sized projects, the FIT and the RAM were both revised during the past year. The FIT revisions provide a mechanism for price adjustment based on the market's response to the program, and the RAM was altered to offer greater flexibility to developers bidding into the program. Lastly, state policymakers amended the RPS Eligibility Guidebook to, among other things, allow certain facilities serving on-site load to be RPS-certified and generate renewable-energy credits (RECs).

Why it's important: California is still the largest market for PV in the United States. By continuing to scrutinize and modify various programs and policies as different sectors of the solar market evolve, and by implementing innovative changes to keep the state's overall PV market healthy, California policymakers continue to lead by example, even amidst a strong but turbulent solar market.

Connecticut's New Programmatic Support for PV

Connecticut launched two major programs — both stemming from legislation enacted in July 2011 (Public Act 11-80¹) — to support the development of renewables, with a strong emphasis on PV. Under one program, the state's two investor-owned utilities, CL&P and UI, periodically conduct competitive solicitations for RECs from zero-emission "Class I" renewables to comply with the state's RPS. Utilities will enter into 15-year contracts with a set price per megawatt-hour (MWh) for "Zero-Emissions Renewable Energy Credits" (ZRECs), capped at \$350 per ZREC in 2012, from customer-sited facilities larger than 100 kW and up to 1 MW. Utilities will spend \$8 million annually on ZREC contracts; the program aims to support high-quality proposals that require the lowest subsidies. In addition, the two utilities will develop plans to procure ZRECs from smaller projects under a separate standard-offer program.

¹ <http://www.cga.ct.gov/2011/ACT/PA/2011PA-00080-R00SB-01243-PA.htm>



Connecticut's Residential Solar Investment Program aims to provide \$40 million to support at least 30 MW of residential PV by 2022. It provides a rebate for systems up to 10 kilowatts (kW) based on the system's design and expected performance. For third-party-owned systems, the program currently offers a performance-based incentive of \$0.30 per kilowatt-hour (kWh) for six years. There is a bonus payment for systems that incorporate major components principally manufactured in Connecticut.

Why it's important: Connecticut has never had an SREC market. However, the availability of long-term ZREC contracts will make the economics of PV much more attractive, especially given that Connecticut has the second-highest average retail electricity price in the United States² (as well as an ongoing need to alleviate grid congestion). The long-term contract design avoids the potential uncertainty and volatility of SREC trading markets. In developing these two new programs, policymakers have demonstrated their recognition that the solar market is extremely dynamic, and that it is critical to engage developers and third-party owners in order to maximize private investment.

Delaware's SREC Pilot Program

In December 2011, the Delaware Public Service Commission approved Delmarva Power's proposal to establish a pilot program for long-term SREC contracts, which was launched in 2012. Because Delmarva Power is currently the only utility participating, the procurement estimates were based on its projected need for SRECs to comply with the state's RPS.

Delmarva Power's April 2012 solicitation under this pilot program invited bids from four tiers of systems that vary by capacity, ranging from 50 kW or less to 2 MW. Fixed SREC prices were offered for the two smaller tiers, while bids under the two larger tiers were subject to competitive pricing, with an implied SREC ceiling of \$280 per MWh. The term for

all contracts is 20 years. Systems with Delaware-sourced equipment and/or Delaware-sourced labor, which are granted modest compliance multipliers under Delaware's RPS, were given preference in the project-selection process.

Why it's important: Delaware is a small state in which relatively little electricity is consumed, but it has established one of the most aggressive solar carve-outs — 3.5% PV x 2026 — in the country. This pilot program will help ensure that suppliers meet SREC obligations under the state's RPS and bolsters market confidence by creating long-term SREC price certainty. In addition, the preference for systems with Delaware-sourced equipment and labor led to an interesting outcome for the fixed-priced tier in that only projects including both Delaware equipment and labor were selected.

Illinois's Distributed Generation Whirlwind

Illinois made major changes to both its RPS policy and its net metering policy in 2011. The new law (S.B. 1652³) created a distributed generation (DG) carve-out within the state's RPS. This new provision requires investor-owned utilities to acquire 1% of their renewable energy from DG by the 2015-2016 compliance year, at least half of which must come from systems smaller than 25 kW. The new law also established the basis for the aggregation of DG resources for the purpose of REC transactions, and multi-year REC contracts with a minimum length of five years.

S.B. 1652 and H.B. 3036⁴ nominally increased the individual system capacity limit and aggregate capacity limit for net metering. However, for customers in competitive classes and/or on time-of-use tariffs, the law prescribes a system of dual metering and bill crediting that did not meet the definition of net metering as the term is generally defined. This new arrangement was less favorable to customers than standard net metering. Subsequently, new legislation enacted in July 2012 (S.B. 3811⁵) re-addressed this issue by requiring utilities to offer net metering to customer classes based on their competitive status as of July 2011.

Why it's important: When all customer classes in Illinois are declared to be competitive, which likely will occur within

2 <http://www.eia.gov/electricity/state>

3 <http://www.ilga.gov/legislation/97/SB/PDF/09700SB1652lv.pdf>

4 <http://www.ilga.gov/legislation/fulltext.asp?DocName=&SessionId=84&GA=97&DocTypeId=HB&DocNum=3036&GAID=11&LegID=60385&SpecSess=&Session>

5 <http://www.ilga.gov/legislation/BillStatus.asp?DocNum=3811&GAID=11&DocTypeId=SB&LegID=65914&SessionID=8>

the next two years, true net metering would no longer have been available in the state if S.B. 3811 had not been enacted. The two contradicting bills from 2011 created confusion and uncertainty for DG in Illinois because net metering represents a significant incentive for customer-sited generation. On the other hand, the DG carve-out and its facilitating measures (i.e., DG aggregation, longer-term contracts) represent a very positive development for solar developers.

Maryland Recalibrates RPS to Strong Solar Market

Maryland enacted a suite of bills amending the state's RPS in May 2012. Perhaps the most significant was S.B. 791, which accelerated the state's solar carve-out compliance requirements from 2013 to 2020 and made a minor change related to how energy production from solar water-heating systems is measured under the standard. Under the new law, the solar compliance requirement for 2013 was increased from 0.2% to 0.25%. Increases in later years range from 0.05% (in 2014) to 0.55% (in 2019), and the ultimate 2% target was moved forward from 2022 to 2020.

Beyond changes to the solar requirements, two other new laws allow geothermal heating and cooling systems commissioned after January 1, 2013, and thermal energy from biomass systems fueled primarily by animal waste to qualify as Tier I resources under the RPS.

Why it's important: The acceleration of Maryland's solar carve-out, although modest in the near term, represents a pre-emptive strike against SREC oversupply and plummeting SREC price problems currently plaguing other Mid-Atlantic states. The inclusion of geothermal and biomass systems is an example of what appears to be a slowly growing interest in incorporating thermal energy resources into RPS policy. Both of these policy actions put Maryland at the forefront of RPS policy.

New Hampshire's Solar-Electric Slide

New Hampshire made major changes to its RPS policy in June 2012, creating a new carve-out for "useful thermal energy" from renewables (including solar water heating), but drastically reducing — by a whopping 67% — the alternative compliance payment (ACP) level for solar-electric energy under the state's existing solar-electric carve-out. The new law (S.B. 218⁶) also raised New Hampshire's RPS from 23.8% by 2025 to 24.8% by 2025, expanded the list of eligible resources, and allows utilities to claim ownership of RECs associated with net-metered generation if a customer does not.

To qualify for the new thermal carve-out, energy must be metered and derived from a list of eligible renewables. Thermal energy must account for the equivalent of 0.2%

⁶ <http://www.gencourt.state.nh.us/legislation/2012/SB0218.html>



of retail electricity sold to end-use customers in 2013; the share increases by 0.2% annually through 2025. The New Hampshire Public Utilities Commission must adopt procedures for metering, verifying and reporting thermal output.

S.B. 218 reduced the ACP levels for three of the four “classes” of resources that comprise New Hampshire’s RPS. The rate for solar-electric energy (Class II) plummeted from \$168.13/MWh to \$55/MWh — the same level as the ACP for general renewables (Class I). The ACP level for thermal energy has been set at \$25/MWh for 2013.

Why it’s important: These changes, which created the first thermal carve-out within a state RPS, will benefit the biomass industry significantly and could also benefit the solar-thermal industry. However, the economic viability of solar-electric projects in New Hampshire will suffer. After years of steady progress on the solar carve-out front, this new law represents the most-serious watering-down yet of such a policy, and it could embolden similar efforts in other states.

New Jersey’s SREC Market Emergency Surgery (and Lengthy Recovery)

New Jersey enacted legislation in July 2012 (A2966⁷) designed to remedy severe oversupply in the state’s SREC market. The law revised the state RPS policy’s solar compliance schedule by more than doubling the requirements beginning in Energy Year (EY) 2014 and extending increased requirements through roughly EY2023, after which point the requirements dip below the former targets. The new law also specifies a 15-year solar alternative compliance payment (ACP) schedule through EY2028, starting at \$339 per MWh in EY2014 (a reduction of the former level of \$625 per MWh) and declining steadily to \$229 per MWh in EY2028.

Other provisions generally limit grid-supply projects to 80 MW annually in aggregate and 10 MW per facility for EY2014 to EY2016, and increase the lifetime of SRECs from three to five years. The law also allows aggregated net metering of solar facilities by a single public entity, such as a school or local government.

Separately, the New Jersey Board of Public Utilities has cleared the way for the state’s investor-owned utilities to file new long-term SREC contracting and solar loan programs to support up to 180 MW of net-metered projects over three years. All of the utilities have signaled their intent to submit proposals.

Why it’s important: New Jersey is the second-largest solar market in the United States, but its recently chaotic SREC market (in 2012) is wreaking havoc on new projects. The acceleration of the state’s solar carve-out and related changes will eventually help remediate SREC oversupply in New Jersey, provided that installation rates are lower than last year’s rates. The new utility programs will provide an attractive option for some net-metered projects and likely will lead to heavy competition among eligible projects, while aggregated net metering will create additional public-sector opportunities that may be less sensitive to the volatile SREC market.

New York’s NY-SUN Initiative

New York announced the NY-SUN Initiative in April 2012, espousing a goal of quadrupling the amount of customer-owned solar by 2013, compared to the amount installed in 2011. The initiative has spawned a multi-pronged effort by the New York State Energy Research and Development Authority (NYSERDA), the Long Island Power Authority (LIPA), and the New York Power Authority (NYPA) to meet the targets.

As a direct consequence of the Initiative, the New York Public Service Commission approved \$90 million in additional funding for NYSEDA’s two PV incentive programs through 2013. At the same time, the NYPA launched the Solar Market Acceleration Program (Solar MAP), a \$30 million, five-year effort intended to support solar technology research, demonstration projects, and soft-cost reduction strategies. Not to be outdone, LIPA also unveiled a new feed-in tariff program offering 20-year contracts at an initial rate of \$0.22/kWh to facilities from 50 kW to 20 MW, with an aggregate program cap of 50 MW.

Why it’s important: New York’s new solar initiative does not involve new legislation. In aggregate, NYSEDA projects that its programs will support a total of 108 MW of PV during 2012 and 2013,⁸ while the LIPA FIT may add up to 50 MW of PV by mid-2014. In addition, the NYPA Solar MAP meshes neatly

⁷ <http://www.gencourt.state.nh.us/legislation/2012/SB0218.html> <http://legiscan.com/ga/text/653569>

⁸ <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=ID060E857-2A37-494D-A64F-13307397AC18>

Expediting and streamlining PV permitting processes across all jurisdictions in Vermont is extremely beneficial because it minimizes confusion among installers and reduces the soft costs of PV installations.

with the overarching technological advancement and cost-reduction goals of the U.S. Department of Energy's SunShot Initiative.⁹

Texas's 3rd-Party Ownership Ruling

In May 2012, the Public Utilities Commission of Texas (PUCT) adopted a final ruling¹⁰ implementing S.B. 981,¹¹ commonly known as "the third-party ownership bill." The ruling established new parameters for the ownership of distributed renewables in Texas. First, it exempts an owner of a "Distributed Renewable Generation" (DRG) system from the definition of an electric utility if electricity production does not exceed the customer's annual consumption. Second, the definition of a DRG owner was expanded to cover customers with behind-the-meter DRG systems, regardless of ownership, and to persons assigned ownership rights to energy produced by customer-sited DRG systems. Lastly, the PUCT affirmed that the rule applies to investor-owned-utility territories both inside and outside of ERCOT.

Why it's important: Texas is the largest electricity market in the United States; more electricity is consumed in Texas than in any other state. The reduction of major regulatory barriers related to third-party ownership will greatly benefit the Texas solar-electric market and likely will attract significant private investment in solar throughout the state, especially in the residential sector, where third-party ownership is growing swiftly nationally. Notably, the PUCT's ruling does not apply to municipal utilities or electric cooperatives, so its impact will not be statewide.

Vermont's Increasing SPEED Program and Expedited PV Permitting

Vermont's Standard Offer for "SPEED" Resources, an incentive program similar to a feed-in tariff, was originally designed to support a total of 50 MW of renewables projects. The program filled up almost immediately after funding became available. In June 2012, Vermont raised the program total to 127.5 MW and

also specified that projects that provide a "discernible benefit" to the operation and management of the electric grid will not count towards the cap. During the next 10 years, the capacity available under this program will increase annually. The Vermont Public Service Board will develop new pricing levels and a screening process for non-cap projects by March 2013.

Vermont is also moving swiftly to facilitate the deployment of small PV. Legislation enacted in 2011 (H. 56¹²) changed the process for securing a "Certificate of Public Good" for PV systems up to 5 kW. Beginning in January 2012, PV systems up to 5 kW that will be net-metered and comply with utility interconnection procedures follow an expedited and streamlined process to obtain Certificate of Public Good. In June 2012, a new law (H. 475¹³) raised from 5 kW to 10 kW the cap for expedited and streamlined permitting for PV systems.

Why it's important: The expansion of Vermont's SPEED program — the first state-level feed-in tariff in the United States — opens up new opportunities and sets a clear, long-term path forward for the development of new renewables in the state. The revised program represents a stark improvement over the unpredictable, open-and-shut nature of many incentive programs that support PV (including the initial version of the SPEED standard offer) and could serve as a test case for state policies that emphasize the potential grid benefits of PV. Expediting and streamlining PV permitting processes across all jurisdictions in Vermont is extremely beneficial because it minimizes confusion among installers and reduces the soft costs of PV installations. Especially with respect to permitting, Vermont policymakers have demonstrated strong leadership that could be replicated by other states. 🌞

Acknowledgment: This Chapter was funded by the U.S. Department of Energy. The authors appreciate the feedback and guidance provided by Sarah Busche, of the National Renewable Energy Laboratory (NREL), during the composition of this update.

⁹ <http://www1.eere.energy.gov/solar/sunshot>

¹⁰ <http://www.puc.state.tx.us/industry/projects/rules/39797/39797.aspx>

¹¹ <http://www.capitol.state.tx.us/BillLookup/History>

¹² <http://www.leg.state.vt.us/docs/2012/Acts/ACT047.pdf>

¹³ <http://www.leg.state.vt.us/docs/2012/Acts/ACT125.pdf>

THE SOLAR MARKET, WHILE RELATIVELY
YOUNG, IS AN INCREASINGLY
IMPORTANT AND VITAL PART OF THE
AMERICAN ECONOMY.



SOLAR MARKET TRENDS

Introduction

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?

This report provides public data on U.S. photovoltaic installations by state and market sector. Public data on solar installations help industry, government and non-profit organizations improve their efforts to increase the number (and capacity) of solar installations across the United States. Analysis of multi-year 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.

For photovoltaic installations, the United States is only a small part of a robust world solar market. Globally, Germany is the strongest market for PV. In North America, Ontario, Canada, ranks as one of the largest PV markets and is discussed briefly in Section 2. (Other than Ontario's market, this report does not analyze markets outside the United States.)

The information here is a summary of information included in the report *U.S. Solar Market Trends 2011*, available on the IREC web site at [add web address](#). In addition to more analysis, the full report contains details of the data collection methods and assumptions.

Installation Trends

Solar enjoyed another banner year in 2011, with large increases in both the number and average size of PV installations. The capacity of PV installations in 2011 more than doubled, compared with 2010 installations. More utility-scale systems and an increase in the average system size accounted for this dramatic growth. The total installed capacity of utility and non-residential systems increased by 145% and 132% respectively compared with 2010. Residential installations only grew by

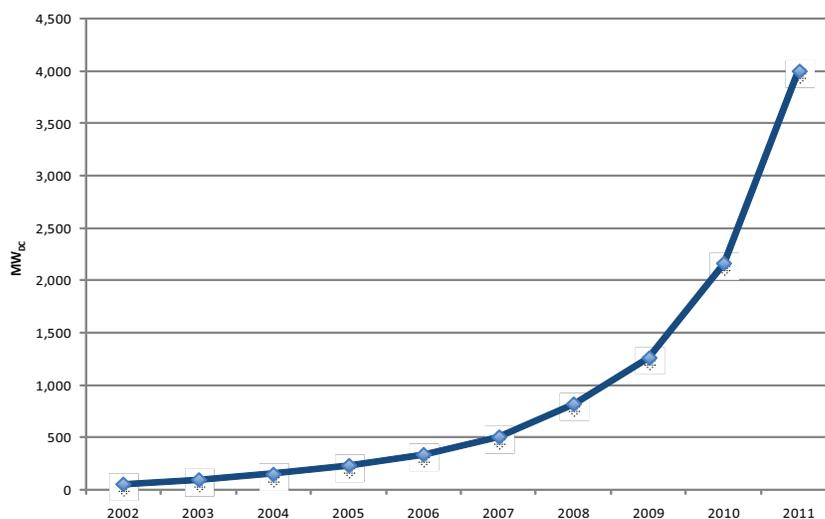


Figure 1: Cumulative U.S. Grid-tied Photovoltaic Installations (2002-2011)

24% on a capacity basis. The average size of all PV installations grew 64% in 2011, to 29 kW_{DC} compared with an average size of 18 kW_{DC} in 2010.

The cumulative installed grid-connected PV capacity increased to 4 GW_{DC} (see Figure 1). The capacity of PV systems installed in 2011, 1,845 MW_{DC}, was more than ten times the capacity of PV installed in 2007, just four years earlier. In 2011, 324 MW_{DC} were installed on residential buildings, 822 MW_{DC} at non-residential sites and 698 MW_{DC} in the utility sector (see Figure 2).

More than 64,000 grid-connected PV installations were completed in 2011, a 30% increase over the number of installations in 2010. Residential systems accounted for 88% of these installations (see Figure 3). By contrast, residential systems accounted for only 24% of the PV capacity installed in 2011, as discussed previously. At the end of 2011, nearly 220,000 PV installations were connected to the U.S. grid, of which 188,000 were residential installations.

The average size of grid-connected PV installations varies from state-to-state, depending on available incentives, interconnec-

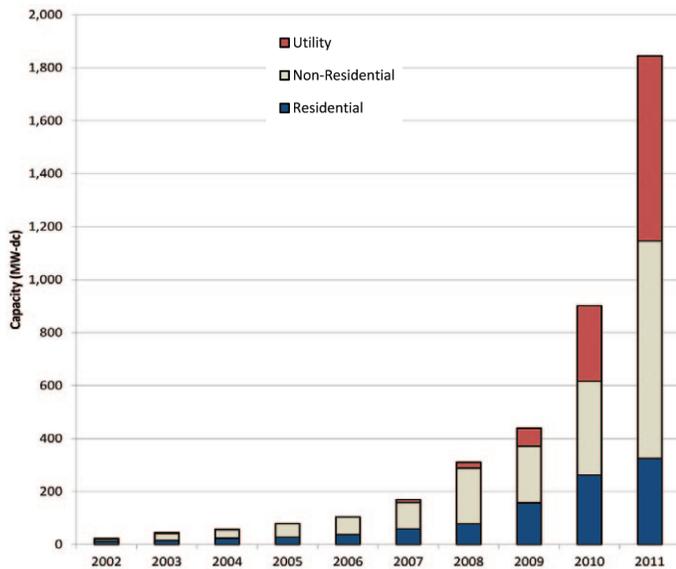


Figure 2: Annual Installed Grid-Connected PV Capacity by Sector (2002-2011)

tion standards, net metering regulations, solar resources, retail electricity rates, and other factors. The Interstate Renewable Energy Council provides summary tables of state net metering and interconnection policies, and the Database of State Incentives for Renewables & Efficiency (DSIRE) provides summary tables of state and utility financial incentives.

In 2011, photovoltaic installations were 7% of new electricity generation installed that year. In 2010, photovoltaic installations were 4% of new additions. The electricity generated by photovoltaic and CSP installations were 0.12% of all electricity generation in the U.S. during 2011.

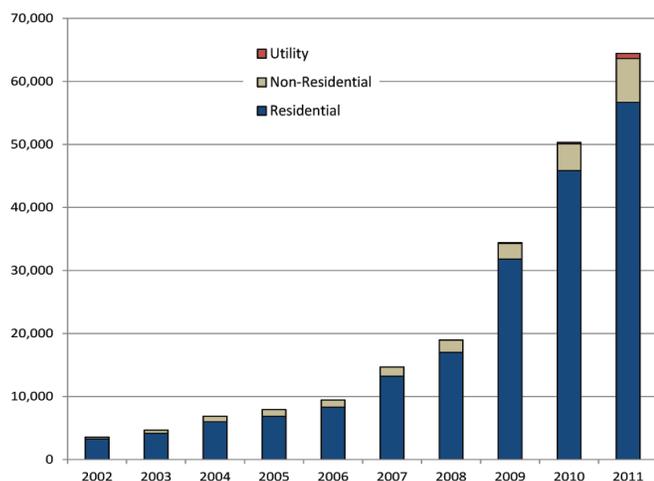


Figure 3: Number of Annual U.S. Grid-Connected PV Installations (2002-2011)

The following factors helped drive PV growth in 2011: There was stability in federal tax credits. Tax credits for both residential and commercial installations are currently in place through 2016. Developers and installers can plan and market their products and consumers can make rational decisions without arbitrary incentive deadlines.

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, provides 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 was extended through the end of 2011. This expiration caused many projects to begin construction late in 2011 to qualify for the program, with completion scheduled in 2012 or later. Congress could decide to re-instate the 1603 Treasury Grant Program, though those prospects are uncertain at best. In 2011, 2,235 completed projects were awarded \$795 million in cash grants (Treasury 2012). This is more than double the number in 2010 and represents 29% of all non-residential and utility sector installations. Solar projects received 17% of 1603 Treasury Grant funding in 2011. Most such funding went to wind projects.

State renewable portfolio standard (RPS) requirements are encouraging investments in utility-scale solar plants. Utility sector investments increased by 2-1/2 times in 2011 compared to 2010, and this sector seems poised to continue its rapid growth over the next several years. In some states, RPS requirements have led to solar renewable energy credit (SREC) markets, which in turn have resulted in increased demand for and installation of distributed solar installations. In some states, SREC prices fell in 2011 and this could reduce future installations. Of the 2011 Annual Top Ten States (see Table 2), eight have RPS requirements.

State financial incentives continue to be an important factor, especially for residential and commercial distributed installations. Of the 2011 Annual Top Ten States (see Table 2), nine have state or utility rebate programs, though the magnitude of the impact of these rebates varies greatly from state to state. In general, rebates per watt have decreased as the cost of a PV installation has decreased. The federal incentives are important, but they are generally insufficient to create a market by themselves.

The price of PV modules declined. Based on cost data for a sample of 2011 installations, total installed cost dropped by 14% for residential installations and 20% for non-residential installations. The actual cost decline was likely even larger.

Grid-Connected Installations by Sector

The growth rate of grid-connected PV varied by market sector: residential, non-residential and utility. Distributed installations

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

Table 1: Sample Installations by Sector

are on the customer's side of the meter and produce electricity used on-site and include both residential and non-residential facilities. Examples of non-residential facilities are government buildings, retail stores and military installations. In contrast, utility installations are on the utility's side of the meter and produce bulk electricity for the grid. Table 1 shows examples of installations in each sector.

Utility-Sector Installations

Utility-sector PV installations more than doubled in 2011 compared to 2010. The utility sector's share of all U.S. grid-connected PV installations grew from virtually none in 2006 to 15% in 2009, to 32% in 2010, and to 38% in 2011. Of the 10 largest PV installations in the United States, five were installed in 2011. In 2011, 81 utility-sector installations larger than 1 MW_{DC} were installed with a total capacity of 640 MW_{DC}. These large installations were 92% of the utility-sector installations in 2011.

The two largest U.S. PV installations installed in the U.S. in 2011 were the 49 MW_{DC} Mesquite Solar 1 Plant in Arlington, Arizona, which supplies power to Pacific Gas and Electric Co. customers in northern California, and the 35 MW_{DC} plant in Webberville, Texas, which supplies power to Austin Energy.

State RPS requirements with solar carve-outs are encouraging investments in utility-scale solar plants in some states. In 2011, 626 MW_{DC} or 90% of the utility-sector installations are in states with RPS requirements. Federal tax incentives, grants and

State renewable portfolio standard (RPS) requirements are encouraging investments in utility-scale solar plants.

the lower cost of PV modules also made these investments attractive. Construction began in 2011 on many additional utility-sector installations, and utilities and developers have announced plans for even more projects to be built in the next few years. Installations in this sector seem poised for continued growth.

Figure 4 shows the ownership status of utility-sector installations. About two-thirds of these installations utilize utility power purchase agreements (PPA). In this arrangement, a third-party builds and owns the PV facility and the electricity is sold to a utility, through a long-term power purchase agreement. Most of the remaining installations are owned by utilities. More than 99% of the utility-sector installations owned by utilities are owned by investor-owned utilities. This is because federal tax incentives are available to investor-owned utilities, which are tax-paying corporations, and not available to tax exempt entities such as public utilities.

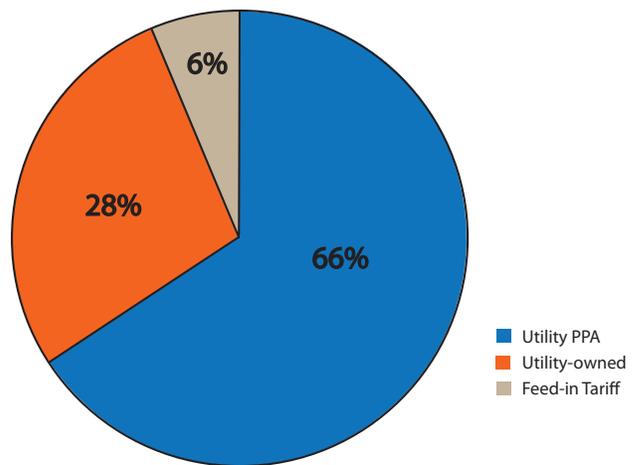


Figure 4: Ownership Status for 2011 Utility Sector PV Installations

About 6% of the utility-sector installations are through feed-in tariff programs or similarly structured programs. In these programs, the utility pays the customer for the PV electricity produced and then sells the electricity as part of their regular electricity sales. These are defined as utility-sector installations because the electricity serves utility customers generally

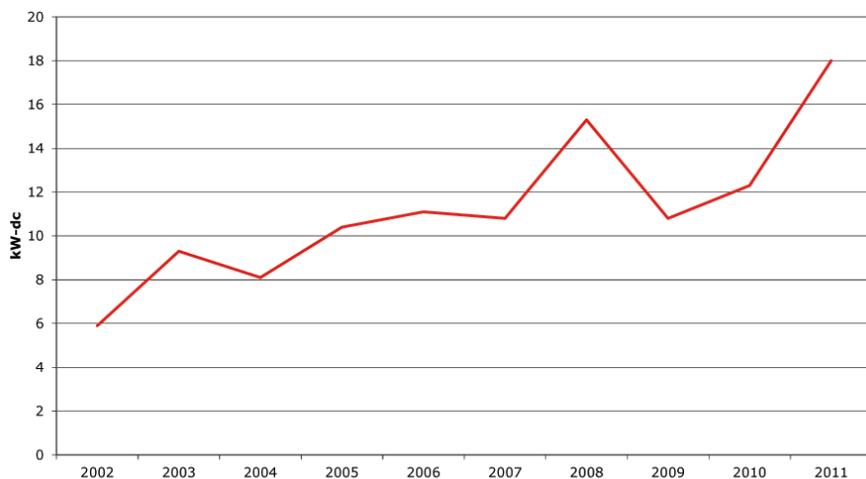


Figure 5: Average Capacity of Distributed Photovoltaic Installations (2002-2011)

The 1603 Treasury Grant Program expired at the end of 2011. This expiration caused many projects to begin construction late in 2011 to qualify for the Program. Projects begun in late 2011 will be completed in 2012 or later.

In contrast to the explosive growth in non-residential PV installations, the number of residential installations increased by 21%, accounting for only 16% of all PV capacity in 2011 (See Figure 2). While still very healthy, this growth rate is the lowest for any of the PV market segments. Federal incentives for residential installations remained stable in 2011, and incentive levels are set through 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. Because the tight economy makes large capital purchases more difficult for many Americans, the residential sector has seen a large shift toward leases or third-party power purchase agreements over the past several years. For example, in the California Solar Initiative, the percentage of residential systems owned by a third-party has increased from 7% in 2009 to 25% in 2011. The average size of a residential PV system was unchanged in 2011 and remains 5.7 kW_{DC}.

rather than the customer where the installation is located. However, the size of these installations is more similar to the size of distributed installations with an average size of 54 kW_{DC}. By contrast, the average size of the other utility-sector installations is 4,600 kW_{DC}.

Distributed Installations

Distributed installations provide electricity for use at the host customer's site, like a home or business. In 2011, the amount of distributed grid-connected PV capacity installed annually in the United States doubled to 1.3 GW_{DC}. More than 64,000 distributed PV systems were installed in 2011, a 24% increase over the number of distributed PV systems installed in 2010. The distributed growth was heavily concentrated in larger, non-residential installations. The average size of distributed installations increased by 46% to 18 kW_{DC} (See Figure 5).

The capacity of non-residential sector installations, which includes sites such as government buildings, retail stores and military installations, increased by an astounding 236% in 2011 compared with 2010 (see figure 2). The average size of a non-residential distributed installation grew by 43%. The largest installations in 2011 in this sector were a 9 MW_{DC} installation at Gloucester Marine Terminal in Gloucester City, New Jersey, and a 6 MW_{DC} installation at the U.S. Air Force Academy in Colorado Springs, Colorado. Favorable economics for consumers and a rush to complete installations before the expiration of the 1603 Treasury Grant Program at the end of 2011 fueled this explosive growth.

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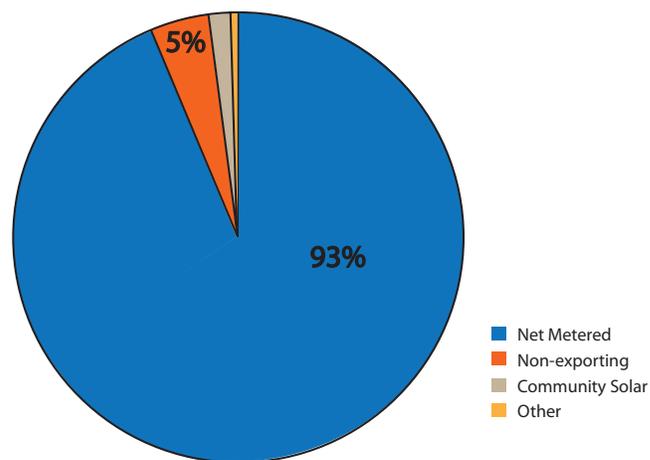


Figure 6: Generation Status for 2011 Distributed PV Installations

2011 Rank by State	2011 (MW _{DC})	2010 (MW _{DC})	10-11% change	2011 Market Share	2010 Rank
1. California	537.8	255.6	110%	29%	1
2. New Jersey	306.1	132.4	131%	17%	2
3. Arizona	287.8	63.6	352%	16%	4
4. New Mexico	122.1	40.9	199%	7%	7
5. Pennsylvania	78.2	46.5	68%	4%	6
6. Colorado	75.5	62.0	22%	4%	5
7. New York	68.3	21.6	217%	4%	11
8. Texas	51.1	25.9	97%	3%	10
9. North Carolina	45.5	28.7	59%	2%	9
10. Hawaii	40.5	18.5	119%	2%	14
All Other States	232.0	208.5	11%	13%	--
Total	1,844.9	904.1	104%	--	--

2010 and 2011 columns include installations completed in those years. "2011 Market Share" means share of 2011 installations. "2010 Rank" is the state ranking for installations completed in 2010.

Table 2: 2011 TOP TEN STATES

Ranked by Grid-Connected PV Capacity Installed in 2011

In 2011, more than 93% of the distributed PV installations were net-metered as shown in Figure 6. In a net-metered system, electricity provided by the customer to the utility can be used to offset electricity purchased from the utility. The rules governing net metering transactions vary widely from state-to-state and utility-to-utility. In states where net-metering data was unavailable, IREC assumed that systems meeting the local rules for net-metered systems were net-metered. About 5% of the distributed PV systems are non-exporting, meaning that all of the solar generated electricity is used on the customer's site.

About 1.5%, or 17 MW_{DC} of distributed PV systems use a Community Share Solar model. A Community Share Solar installation is a facility interconnected to the utility distribution system and the electricity generated is credited to subscribers of the installation. Community share solar allows customers who are otherwise unable to have a solar system, such as renters or property owners with poor solar access, to receive solar electricity.

Grid-Connected Installations by State

In 2011, more than two-thirds of grid-connected PV system installations were concentrated in California, New Jersey, Arizona and New Mexico, as shown in Table 2. Of the 2011 Annual Top Ten States, Arizona had the highest growth, with more than 4-1/2 times as many installations as the year before. The capacity installed in 2011 more than tripled in New Mexico and New York, and more than doubled in California, New Jersey and Hawaii. New York and Hawaii rejoined the Annual Top Ten States list this year.

With the exception of Texas, all states on the 2011 Annual Top Ten States list have strong state renewable portfolio or financial incentive programs or both. Texas made the 2011 Annual

Top Ten States list because of the 35 MW_{DC} utility installation constructed for Austin Energy. Nevada, which was ranked #3 last year, fell from the Annual Top Ten this year. Nevada has a small number of large installations in 2010 and did not have any such installations in 2011. However, large installations are under construction and planned, so we can expect to see Nevada return to the Annual Top Ten in the future.

Although the market remains concentrated in a few states, the number of states with significant markets is slowly increasing. On a per capita basis, six states — Arizona, Colorado, Delaware, Hawaii, New Jersey and New Mexico — had more instal-

	MW _{DC}	Market Share
1. California	1,564	39%
2. New Jersey	566	14%
3. Arizona	398	10%
4. Colorado	197	5%
5. New Mexico	165	4%
6. Pennsylvania	133	3%
7. Nevada	124	3%
8. New York	124	3%
9. Florida	95	2%
10. Texas	86	2%
All Other States	560	14%
Total	4,011	--

Table 3: CUMULATIVE TOP TEN STATES

Ranked by Grid-Connected PV Cumulative Installed Capacity through 2011

	Cumulative through 2011 (W _{DC} /person)	2011 Installations (W _{DC} /person)
1. New Mexico	80.4	59.3
2. New Jersey	64.4	34.8
3. Hawaii	62.6	29.7
4. Arizona	62.2	45.0
5. Nevada	45.9	7.2
6. California	42.0	14.4
7. Colorado	39.1	15.0
8. Delaware	29.4	23.2
9. District of Columbia	19.3	11.9
10. Vermont	18.7	12.4
National Average	13.0	6.0

Table 4: PER CAPITA TOP TEN STATES
Ranked by Cumulative Installed PV Capacity per
Capita (W_{DC}/person) through 2011

lations than California in 2011, demonstrating how the market is diversifying across the country. On a cumulative basis, New Mexico, New Jersey, Hawaii, Arizona, and Nevada each now have more per capita installed capacity than California. (See Table 4)

2010 and 2011 columns include installations completed in those years. “2011 Market Share” means share of 2011 installations. “2010 Rank” is the state ranking for installations completed in 2010.

Prospects for 2012

What can we expect in U.S. solar markets this year? As of June 2012, indicators pointed to continued growth in grid-connected PV, and the continuation of the 2011 trend of higher growth rates for larger installations. Reductions in PV module prices, continuation of the federal investment tax credit and strong state RPSs will help drive market growth.

Many large solar projects began construction in 2011 in order to take advantage of the 1603 Treasury Grant Program. Most of these installations, both distributed and utility-sector projects, will be completed in 2012 through 2016. Since projects that begin construction in 2012 will no longer have the cash grant option, developers will need to find entities, such as banks and insurance companies, with tax bills large enough to take advantage of remaining tax credits.

Prices for PV installations fell at least 14% in 2011, and all indicators point to a continued decline in 2012. Lower PV prices raise the potential for installations in states without state or local incentives. The number of states with strong solar markets is increasing, although installations in 2012 will continue to be concentrated in states with strong solar policies.

Conclusion

Photovoltaic markets continue to grow in the United States. More than 1.8 GW_{DC} of photovoltaic installations were completed in 2011 at 64,000 sites. The capacity installed was more than twice the amount installed in 2010. The markets for each solar technology are concentrated in a few states. These markets depend on the combination of federal and state policies and financial incentives, the most significant of which include:

- Federal Investment Tax Credit
- U.S. 1603 Treasury Grant Program
- State Renewable Portfolio Standards with solar requirements State, utility or local rebates or other financial payments
- State or utility net metering.

PV installations are getting larger. The average size of a distributed PV installation grew by 46%. The average size of a utility-sector installation (excluding feed-in tariffs) grew by 2-1/2 times to 4,620 kW_{DC}. At the same time, the price of PV installations fell by at least 14% in 2011.

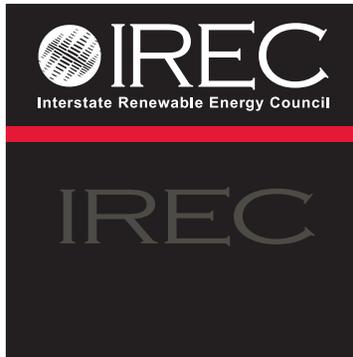
U.S. PV market growth will continue in 2012, with larger utility-sector projects leading the way. 🌞

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IREC CREDENTIALING PROGRAM UPDATE

The IREC Credentialing Program has achieved several significant milestones in the last 12 months. Our efforts have been devoted to following through on the growth and innovation initiatives that we started in 2010. All of our activities are focused on expanding the program to support quality training in new technologies and raising the bar for the growing number of certificate-awarding training programs.



IREC Accreditation Program for certificate-awarding training programs with the goal of strengthening workforce readiness for the clean energy economy. The program design, policies and procedures were completed by the end of 2011 and the pilot program was launched in January 2012. Pilot participants were selected in February 2012 and full applications for accreditation were submitted by April 2012.

Standard Development: Standard 14732

The IREC 14732 Standards Committee, seated in May 2011, completed and released the *IREC Draft Standard 14732:2012 General Requirements for Renewable Energy & Energy Efficiency Certificate Programs*. The draft Standard was released for two rounds of public comment, and feedback from stakeholders throughout North America was reviewed and incorporated as needed by the Standards Committee. It is now being used as the foundation for the ANSI-IREC Accreditation Pilot Program.

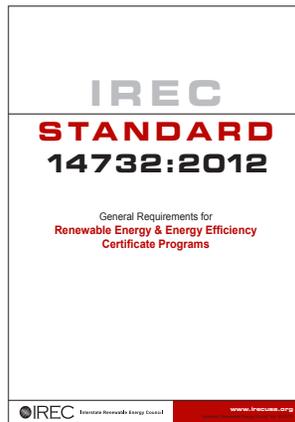
IREC Standard 14732 provides accreditation requirements that energy-efficiency and renewable energy programs must meet and document to earn and maintain ANSI-IREC accreditation. It forms the foundation for the accreditation of certificate-awarding entities that develop and administer credit or non-credit energy efficiency and renewable energy-related programs offered in formal educational institutions and other legal entities. The purpose of accreditation is to determine if the program meets the requirements for issuing a market-valued certificate.

In partnership with The American National Standards Institute (ANSI), IREC has participated in the development of the ANSI-

The organizations selected for the pilot program are CalCERTS based in California, Clean Tech Education based in North Carolina, Building Science Institute based in Illinois, and the Midwest Renewable Energy Association based in Wisconsin. The training programs offered by these organizations which are being assessed for ANSI-IREC accreditation cover photovoltaic, solar hot water and energy efficiency related job categories.

To assess these applications, the ANSI-IREC program assigns two assessors. One brings program and education expertise to the table while the other brings expertise in the technology or subject being taught. This teaming approach to assessment supports the uniqueness of the Standard in that it focuses on the management and program design and execution as well as the specific technology and skills required to be taught to prepare a student for the clean energy workforce.

The assessment period for the ANSI-IREC Accreditation Program Pilot is expected to conclude in August 2012. At that time, accreditation rulings will be made by the ANSI-IREC Program Accreditation Committee (AIPAC). The AIPAC is an eleven-member





committee with representatives from certificate-awarding entities, education and training, a government agency and workforce development organizations. In addition to the AIPAC meeting, a summit will be held to assemble the pilot candidates, the Standards Committee, the assessors, the AIPAC and staff from IREC and ANSI to review and discuss lessons learned from the pilot. Using this feedback, IREC Standard 14732 will then be finalized and the ANSI-IREC Program rolled out by the end of 2012.

IREC ISPQ Credentialing Program: Standard 01022

The focus of the IREC ISPQ Credentialing Program over the last twelve months has been to expand to weatherization and energy efficiency training programs and to continue to build and improve our infrastructure. The achievements in each of these areas have been significant.

First, in June 2012, the IREC Award Committee awarded IREC ISPQ Training Program Accreditation to New River Center for Energy Research and Training (NRCERT) as the first weatherization training center to successfully achieve this credential. Through the desk and onsite assessment their application for accreditation met all of the requirements of IREC Standard 01022 with a curriculum covering the tasks defined in the NREL Job Task Analysis for Retrofit Installer. In July, Southface Energy Institute was awarded IREC ISPQ Training Program Accreditation for their curriculum which covers all of the tasks for an Energy Auditor.

As of August 2012, there are 117 active IREC ISPQ credential holders (Figure 1) with 21 applications in process and 27 letters of intent in the queue. Growth is expected to continue in the weatherization and energy efficiency technologies, while applications related to photovoltaics, solar hot water and small wind remain steady. With the changes in funding for renewable energy, training programs for solar have begun to consolidate across the country and several solar

training programs have discontinued their offerings. The credentialing program has seen no new applications this year for those offering small wind training.

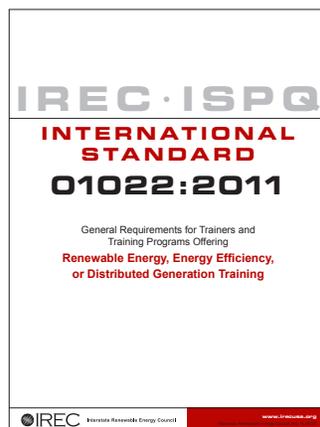
Finally, we have implemented an online Credentialing Management System (CMS). Moving to an online system will help streamline the process for candidates, credential holders, assessors, and IREC staff.

Building the Program

To support the expansion into new technologies, IREC began recruiting new assessors in the fall of 2011. In support of this effort, the training for IREC assessors was redesigned to include a self-paced online modular program, a basic training using an interactive webinar, a mentoring program, and a requirement to attend quarterly webinar trainings. As of this writing, IREC has 18 qualified and trained assessors. Five of these assessors have been trained by and work for both the IREC program and the ANSI-IREC program.

Outreach has been a significant activity over the past year to raise awareness of the IREC ISPQ credentials and the value of IREC Standards 01022 and 14732. The

primary focus has been participation in weatherization and energy efficiency conferences and events, national conferences for state officials involved in workforce funding, and involvement with the American Association of Community Colleges. To add to these outreach activities, IREC, with support from the New York State Energy Research and Development Authority (NYSERDA), produced a video of interviews with IREC ISPQ credential holders speaking about the value they have experienced from their credential. The video can be accessed through the IREC website, <http://www.irecusa.org/irec-programs/credentialing/ispq/>.



Breakdown By Technology

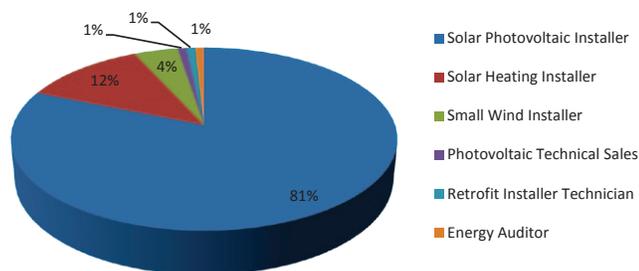


Figure 1: Current IREC ISPQ Awards

Looking Forward

The IREC Credentialing Program has continued to keep its focus on supporting and promoting quality training as a foundational element in developing an effective workforce for the clean energy economy. In the last 12 months, we have made considerable strides in expanding the reach of this mission, most significantly through expanding the IREC ISPQ Credentialing Program to weatherization and energy efficiency, and through the development of IREC Standard 14732 to be used in the ANSI-IREC Accreditation Program for Certificate Programs.

As we look forward, the IREC Credentialing Program is committed to the challenge of fortifying and expanding our programs. Accreditation and certification of training providers offers high-quality training programs a mark of distinction and offers the student, funders, and consumers assurance of value. IREC will continue to build and expand these programs in the coming year. 🌞

Job Task Analysis Guidance Document

A primary purpose of the new IREC Standard 14732 is to determine if programs issue a market-valued certificate. An aspect of demonstrating that a certificate has market value includes the relevance and the currency of the Job Task Analysis used as a basis for the curriculum. To help applicants demonstrate compliance in this area, the IREC Credentialing Program produced the “Job Task Analysis Guidance Document.”

The document provides guidance for conformity with IREC Standard 14732:2012. It provides a roadmap to key elements applicant organizations should consider in conducting or selecting JTAs on which to base their education/training curricula.

The document outlines:

- The definition of Job Task Analysis
- JTA requirements under Standard 14732
- Acceptable evidence for meeting the requirements
- The relationship between the Systematic Program Plan and the JTA
- Components of a Job Task Analysis study
- Report of the Job Task Analysis

This guidance document is of value to anyone who is developing a training curriculum to prepare students for jobs in the clean energy economy. It will be made available through the IREC website once the ANSI-IREC Pilot Program is completed and the document is finalized.

Clean Energy Workforce Education Conference

Trends and Best Practices for Renewable Energy and Energy Efficiency

ALBANY, NY

November 13-15, 2012

PRE-CONFERENCE WORKSHOPS: NOVEMBER 13, 2012

IREC is pleased to present the fifth national conference on workforce education in energy efficiency and renewable energy. The Clean Energy Workforce Education Conference is expected to draw 500 participants to Albany, NY— bringing together the nation’s most innovative educators who are training today’s clean energy workforce. Over three days, the latest information and insight on instructional strategies, curricula development, credentialing and best training practices will be discussed. The national conference will be held at the Albany Marriott on November 13-15, 2012.

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**THE SITN CREATES A
GEOGRAPHIC BLANKET OF
QUALITY SOLAR TRAINING
THROUGHOUT THE
UNITED STATES.**



THE SOLAR INSTRUCTOR TRAINING NETWORK

Introduction

For two years now, the Solar Instructor Training Network has been fulfilling a critical need for high-quality, local, and accessible training in solar system design, installation, sales, and inspection. In support of the U.S. Department of Energy's SunShot Initiative, nine Regional Training Providers (RTPs) are conducting train-the-trainer programs in first-class training facilities across the country. RTPs are targeting full-time and part-time community college instructors within their regions and providing resources that support and guide these 'Instructor Trainees' to develop quality solar training programs. During this time, more than 700 Instructor Trainees received training from the RTPs, and nearly 10,000

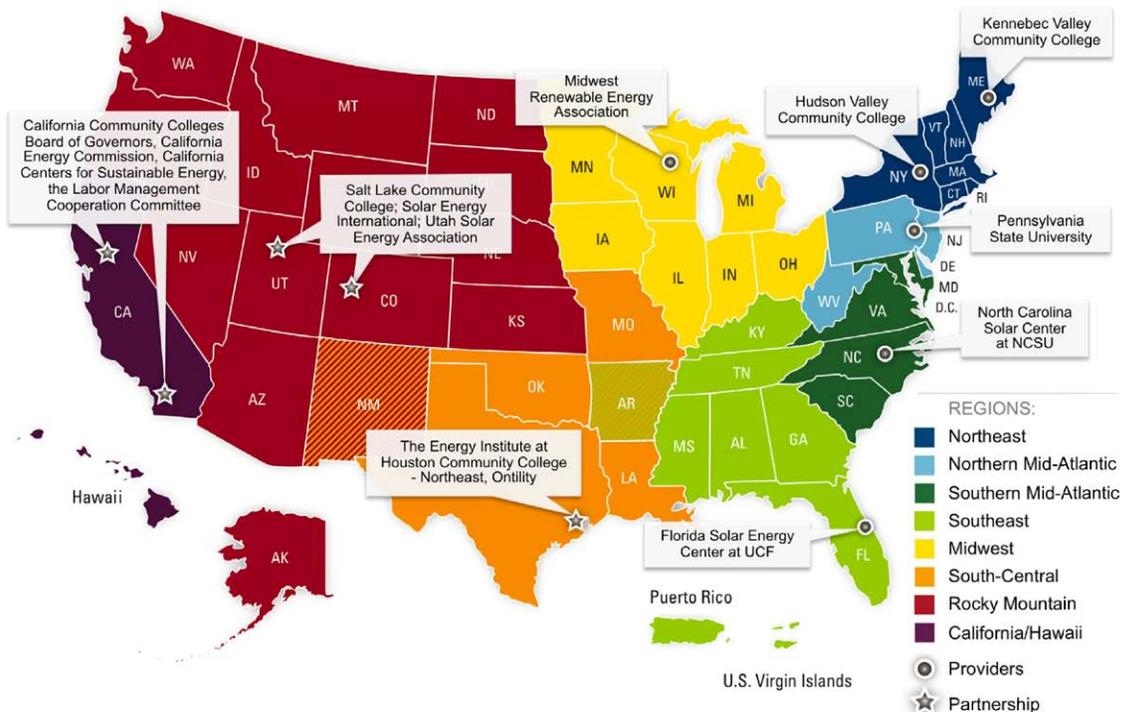
individuals have received training through the Solar Instructor Training Network.

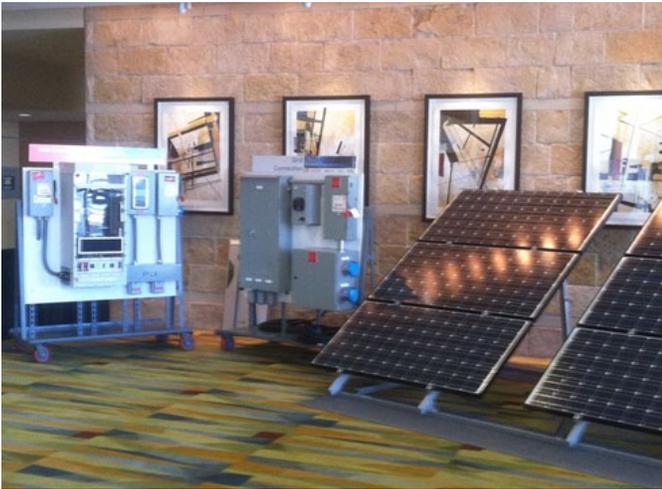
Each RTP provides training through a variety of innovative methods — from online courses and open-source learning platforms like Wiki, to enhanced hands-on training, webinars, mobile training, and mentoring. In addition, Instructor Trainees receive significant resources to help them build effective solar-training programs at their respective institutions. The mobile units are a perfect example of the time and expertise devoted to giving Instructor Trainees a superior simulated teaching experience.

Solar Instructor Training Network

1 National Administrator, 8 regions, 9 Regional Resource and Training Providers

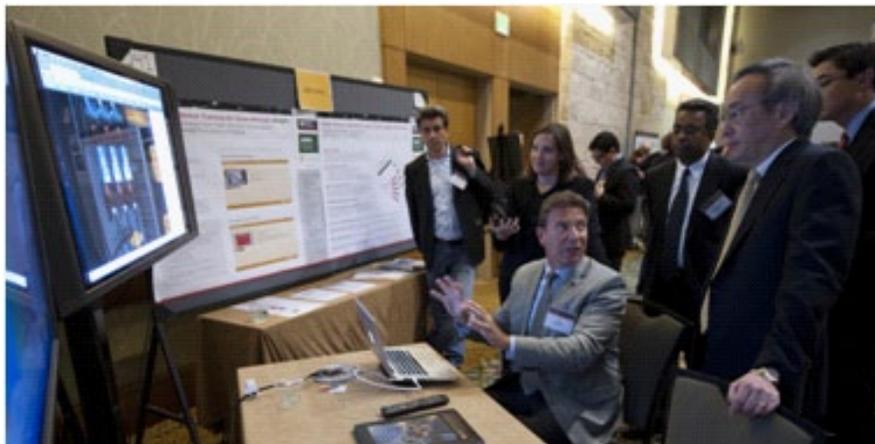
U.S. DEPARTMENT OF **ENERGY** Energy Efficiency & Renewable Energy





As National Administrator of the SITN, IREC is supporting the RTPs' efforts regionally as well as working nationally to harmonize the RTPs, and improve the quality of solar training throughout the country. IREC's subject matter experts (SMEs) play a vital role in developing resources to improve training, and many of those resources are listed below. IREC's SMEs have also provided critical guidance and expertise to the RTPs and the Department of Energy (DOE) in a highly coordinated effort. Whether it's through leading a working group, participating in weekly and monthly conference calls, or in-person meetings, the SMEs have been IREC's rapid-response team that has had a major impact on solar training.

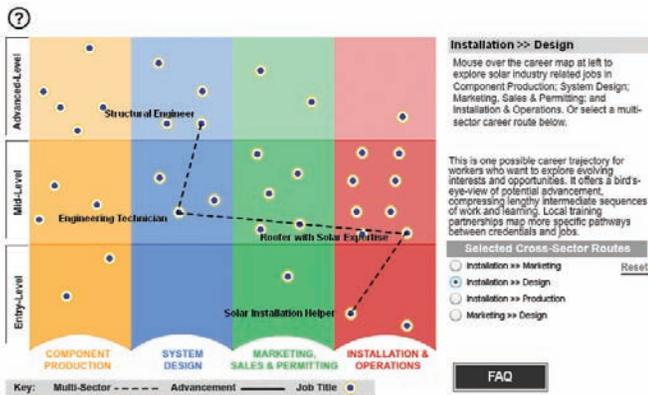
The successes of IREC and the SITN are quite tangible, and catching the attention of DOE's Leadership. In June of this year, the SITN attended a Summit and Technology Forum for the SunShot Initiative. SITN's display included informational posters, computer demonstrations of the Solar Career Map, the online training platform for code officials, and a live set-up of mobile solar equipment from Pennsylvania State University, which is the RTP for the Northern Mid-Atlantic Region. This event provided an excellent opportunity for the SITN to showcase the important steps its taking to support solar workforce development and industry cost reductions.



More than **700** Instructor Trainees
have received solar training
through courses offered
by the SITN.

Developing Resources

Throughout this past year, IREC has focused on the development of several resources that support the work of the Solar Instructor Training Network.



Solar Career Map

Released in October of 2011, the Solar Career Map is an interactive, visual roadmap that identifies solar-energy related jobs and associated education and training routes for career advancement across the solar industry. The Map explores the expanding universe of solar-energy jobs by describing 36 jobs and charting possible progression from one job to another. This lattice helps create an integrated system of solar education and training across regions and sectors.



Best Practices

In May of 2012, IREC released five Solar Energy Education and Training Best Practices documents. These documents are a compendium of national best practices for instructors in solar training, education and workforce development written by leading experts in the solar industry and education fields. These in-depth resources support instructors in 1) developing new solar programs; 2) integrating solar content into related

trades programs; and 3) enhancing existing solar education and training programs. Additional best practices will be released.

Solar Energy Education and Training Best Practices:

- *Curriculum and Program Development:* An overview of the curriculum development process, with special attention to DACUM (Developing a Curriculum) methodology and Job Task Analysis (JTA).
- *Becoming an Effective Teacher:* Shares teaching and learning strategies that promote effective instruction.
- *Developing a Quality Course:* Describes, using the instructional systems design (ISD) model and the ADDIE Model, how to design and develop a course or workshop.
- *Solar Content Integration:* Shares strategies to educating and training individuals by integrating or infusing solar content into existing education and training programs.
- *Exemplary Solar Education and Training Programs:* Details six exemplary solar education and training programs in the U.S.

Online Training for Code Official

Code officials and authorities having jurisdiction (AHJs) provide a critical link in the process of PV installation applications and the permitting process. The Photovoltaics Online Training (PVOT) will substantially increase the reach and scale of solar training available to code officials and AHJs throughout the U.S. Continuing education units (CEUs) for PVOT will be offered through the International Association of Electrical Inspectors.

This free online training uses the U.S. Department of Energy's National Training Education and Resource (NTER) online training platform and features six 'page-turner' lessons with assessment quizzes on 1) Roof Mounted Arrays & Wire Management, 2) Electrical: Roof & Ground Mounted Arrays, 3) Ground Mounted Arrays, 4) Appropriate Signs, 5) Equipment Ratings, and 6) Expedited Permitting. The training also includes a 'capstone' lesson that utilizes an immersive, 3-D learning platform and an information icon (i-button) with references to the National Electrical Code.



The PVOT 'capstone' lesson is a unique training tool that engages the student with a virtual house and roof-mounted PV installation.



The lesson includes three different simulation options:

Guided Instruction - provides the user with layover text screens that provide the necessary information for the selected object within the environment

Exploration - provides the user with the ability to discover correctly or incorrectly installed PV components without being tested or graded.

Assessment (or testing) - mirrors the Exploration option but includes a quiz at the end, testing the ability of the student to identify correctly or incorrectly installed PV components.

Additional Resources

- SITN Website at www.sitnusa.org
- SITN Quarterly E-Newsletter
- SITN Seminar Series
- Regional Training Providers Meetings



On-site Companion Workshop for Code Officials

In support of the PVOT online training, IREC assembled a team of solar and building and electrical code experts to develop an on-site companion workshop. This six-hour companion workshop gives code officials further opportunity to gain knowledge and experience with PV installations by reinforcing information presented in the online training as well as delving deeper into several topics. Code officials will benefit significantly from an on-site workshop that allows for real-time question and answer, opportunities for idea sharing with other code officials, and information on state, regional, and local codes affecting the installation and operation of PV systems. The workshop will be given through the SITN Regional Training Providers and SolarTech's Solar 3.0 Initiative.

By the Numbers — Solar Instructor Training Network Metrics

The SITN continues its overarching goal to create a geographic blanket of quality solar training throughout the United States, and the RTPs have devised detailed plans of action that use different means to achieve the same end. At first glance, such diversity might appear to inhibit productivity and effectiveness. But having multiple training programs and approaches have benefitted the SITN and its outcomes. Through ongoing collaboration, RTPs gain first-hand knowledge of the activities in each region, and the Network has fostered the sharing of ideas and best practices, leading to stronger programs across the country.

To demonstrate the extensive reach of the SITN, IREC collected quantitative metrics under four categories: (1) the number of Instructor Trainees who received solar training from the RTPs; (2) the number of courses offered to Instructor Trainees; (3) the number of courses developed and taught by Instructor Trainees at their respective institutions; and (4) the number of students who received training from Instructor Trainees at their respective institutions.

Further analysis of the metrics data shows the SITN had significant reach across the country with respect to the number of individuals who received solar training. At least half of the

Region	# Of Instructor Trainees*	# Of Courses Taught by RTPs*
Northeast (HVCC)	46	3
Northeast (KVCC)	42	4
Northern Mid-Atlantic	76	9
Southern Mid-Atlantic	68	4
Southeast	115	11
Midwest	89	9
South-Central	33	4
Rocky Mountain	48	13
California/Hawaii	211	15
Total:	728	72

*Data reflects training data through February 2012. Most instruction takes place during the summer months when community college instructors are available. Future reports will reflect additional data.

RTPs collected data regarding: (1) how many courses were taught by Instructor Trainees at their respective institutions; and (2) how many students (at these institutions) received solar training from the Instructor Trainees. Because half of the RTPs provided data for these two metrics, IREC believes there is a representative sample from which it can make defensible extrapolations regarding the rest of the RTPs. The following data was collected by the Southeast, Rocky Mountain, South Central, and Midwest regions and reflects training data through February 2012.

Instructor Trainees who received training by Southeast, Rocky Mountain, South Central, and Midwest RTPs	285
Courses taught by Southeast, Rocky Mountain, South Central, and Midwest Instructor Trainees	314
Average number of students per class of Courses taught by Southeast, Rocky Mountain, South Central, and Midwest Instructor Trainees	12.27

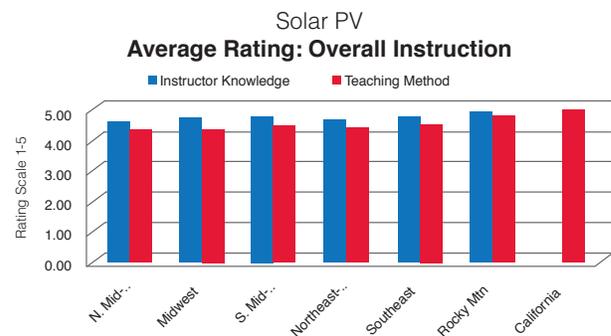
Since some Instructor Trainees had the opportunity to teach more than one solar class in Phase 1, the data in the table above suggests that approximately 1.10 courses were taught per Instructor Trainee ($314/285 = 1.10$). With a total of 728 Instructor Trainees, one can infer that approximately 800 courses have been taught by Instructor Trainees in Phase 1 ($728 \times 1.10 = 800$). With an average class size of 12.27 students per class, a further inference can be made that approximately 9,816 students have received solar training and education in Phase 1 ($800 \times 12.27 = 9,816$).

It stands to reason that, as more instructors receive training from the SITN, the numbers of individuals receiving training will also continue to increase. Assuming a modest 5% increase in Instructor Trainees in the first year of Phase 2, and a 3% increase in Instructor Trainees in the second and third years of Phase 2, the extrapolations reveal the following:

Number of individuals receiving training:	Phase 1	Phase 2			Total
	9,816	Year 1	Year 2	Year 3	
		10,306	10,615	10,933	

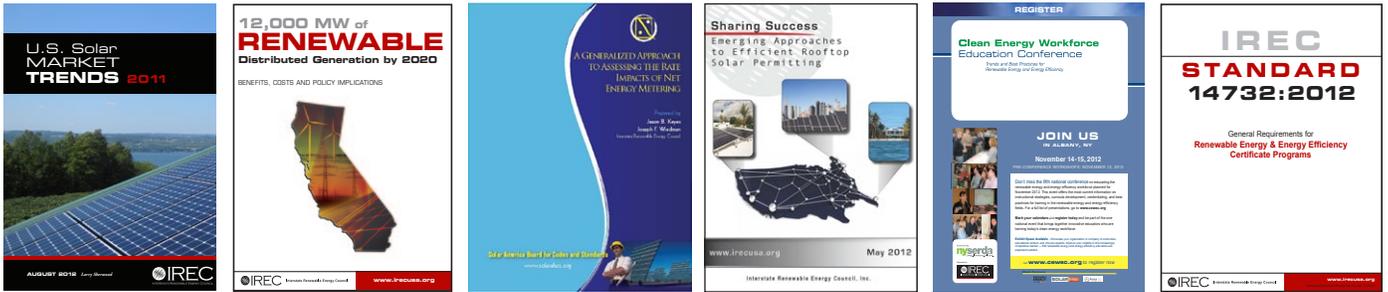
In addition to the quantitative data called regarding numbers of trainings, IREC also aggregated data collected from RTP end-of-training evaluations. Ratings were aggregated into six categories on topics important to the SITN: (1) training content; (2) training organization; (3) hands-on activities; (4) resources provided; (5) overall instructor knowledge; and (6) overall teaching methods. The RTPs supplied end-of-training evaluation data from nearly 50% of all the trainings taught during Phase 1. This provides a realistic and representative sample of the opinions of the Instructor Trainees.

The table below is an example of the categories surveyed. On a scale of 1-5, where 5 represents the best rating, the high quality of overall instruction provided by the RTPs is clearly demonstrated. The metrics of all six categories averaged around 4.5 out of 5, demonstrating that the RTPs are providing high-quality instruction for both solar PV and SHC.



Next Steps

Quality installations are derived from a highly-skilled workforce. The creation of such a workforce originates from quality instruction — an overarching goal of the Solar Instructor Training Network. As we look ahead, IREC is moving full-force into SITN Phase 2. We will be releasing additional best practices documents later this year. We will be working with the Solar Electric Power Association, the National Renewable Energy Laboratory, and other stakeholders toward the development of a pilot for utility-scale solar training. In November, IREC plans to convene another in-person meeting for the Regional Training Providers during the Clean Energy Workforce Education Conference. We will continue to look at enhancements for the online training for code officials and ways to bring hands-on workshops to as many code officials as possible. Our work forward will be thoughtfully developed based on market conditions and the input from our team of experts, industry stakeholders and the experienced and knowledgeable Regional Training Providers. 🌞



The Interstate Renewable Energy Council is a non-profit organization accelerating the use of renewable energy since 1982. IREC's programs and policies lead to easier, more affordable connection to the utility grid; fair credit for renewable energy produced; best practices for states, municipalities, utilities and industry; and quality assessment for the growing clean energy workforce through the credentialing of instructors and training programs.

ADDITIONAL PARTNERING ACTIVITIES

The Solar America Board of Codes and Standards — Solar ABCs

Michael Sheehan

The Solar America Board of Codes and Standards (Solar ABCs) identifies current issues, establishes a dialogue among key stakeholders, and catalyzes appropriate activities to support the development of codes and standards that facilitate the installation of high-quality, safe photovoltaic systems. Since the summer of 2007, IREC has been one of 11 partners in the Solar ABCs, which is managed by New Mexico State University and funded by the U.S. Department of Energy.

The IREC team completed two studies this year for Solar ABCs; *A Generalized Approach to Assessing the Rate Impacts of Net Energy Metering* and the *Photovoltaic Generation: Temporary Overvoltage Impact and Recommendations*.

A Generalized Approach to Assessing the Rate Impacts of Net Energy Metering

The establishment of Net Energy Metering (NEM) programs has not been without resistance. The most significant resistance comes from investor-owned utilities concerned that a large NEM program in their service territory may result in increased rates for nonparticipating customers and a loss of profit for investors. At present, a detailed analysis of the potential rate

impacts of NEM has only begun to be developed. There is disagreement over the appropriate inputs needed for such an analysis. Despite this disagreement, efforts to rigorously quantify the rate impacts of NEM programs have begun to move forward in Arizona, California, Texas, and elsewhere. It is anticipated that these efforts will facilitate the development of a consensus view of the components that need to be considered in the valuation of renewable energy resources such as distributed solar energy systems.

This report presents a thorough examination of the impact of net-metered solar facilities on non-participating customers' utility rates. It puts forward a methodology for the valuation of net energy metering (NEM) focused on best practices. Information in this report assists state policy makers, utility planners, utility regulators, and all other stakeholders who evaluate the potential rate impacts of NEM in their states. The report centers on the impact of net-metered solar facilities (because solar facilities comprise the majority of net-metered generation) and does not address economic impacts, environmental impacts, or impacts on participating customers investing in distributed generation (DG) resources. The report also includes an analysis of the methodology used to determine rate impacts but does not undertake a review of any particular state renewable energy program. This report can be found at: http://www.solarabcs.org/about/publications/reports/rateimpact/pdfs/rateimpact_full.pdf

Other Publications written by the IREC Team for Solar ABCs

- Comparison of the Four Leading Small Generation Interconnection Procedures
- Utility External Disconnect Switch: Practical, Legal, and Technical Reasons to Eliminate the Requirement
- Sustainable, Multi-Segment Market Design for Distributed Solar Photovoltaics
- Updated Recommendations for Federal Energy Regulatory Commission - Small Generator Interconnection Procedures Screens

Photovoltaic Generation: Temporary Overvoltage Impact and Recommendations.

The aim of this report is to lay out a roadmap within the rulemaking process to guide PV generators and utilities in reviewing applications for interconnections. The focus of the framework is on mitigating the risk of temporary overvoltage (TOV). Although the IEEE Standard 1547-2008 acknowledges the need to control the risk of TOV, the Standard provides little guidance on how this requirement should be met.

The report compares and contrasts screens pertinent to transformer connections from the three published processes: Federal Energy Regulatory Commission (FERC) Small

Generator Interconnection Procedures (SGIP); California Rule 21; and California Wholesale Distribution Access Tariff (WDAT). The content of these earlier screens is condensed into a two-step process for selecting the interface transformer to minimize overvoltage by balancing various three-phase transformer arrangements with the inverter and utility grounding.

This report recommends a two-step process through a technical review that details utility grounding practices, PV generation grounding, inverter configuration, and various possible interface transformer connections. It also identifies tradeoffs between each recommended transformer connection and its alternatives to mitigate adverse impacts of TOV, and warns of the potential for undesirable impacts to the electric power system when grounded-wye/grounded-wye connections are employed. The report can be downloaded at www.solarabcs.org/tov

Technical Outreach for Cities and Counties Working with ICLEI — Local Governments for Sustainability

Jane Pulaski

Since 2010, the Interstate Renewable Energy Council has been a member of the ICLEI-Local Governments for Sustainability Team for developing and delivering a comprehensive set of tools designed to help local governments go solar. Cities and counties are a natural marketplace for solar energy. Their regulatory powers, coupled with their ability to incentivize solar energy, offer broad opportunities for solar energy production and consumption among all of their energy consumers — residential, commercial, and industrial.

With the U.S. Department of Energy's (DOE) SunShot Initiative as the backdrop, the International City-County Management Association (ICMA) and ICLEI formed a collaborative effort. Known as the Solar Outreach Partnership (SolarOPs), it enables local governments to replicate successful solar practices and quickly adopt solar energy in their communities. SolarOPs taps a range of resources from educational workshops, to peer-to-peer sharing opportunities, to research-based reports and online materials.

Along with IREC, ICLEI's Team includes the North Carolina Solar Center at NC State University, the Solar Electric Power Association, The Solar Foundation, and Meister Consultants Group. It is a talented group of technical experts. With deep expertise in and experience with transforming municipal policies, education, policy analysis, workforce development, and technical assistance, the SolarOPs team's rich body of

resources is helping local communities better understand the issues, develop local solutions, and borrow best practices in their pursuit of solar energy.

One of SolarOP's main tools is the *Solar Powering Your Community: A Guide for Local Governments*. This DOE publication covers relevant issues including innovative financing mechanisms, the latest regulatory best practices, converting contaminated lands into power producing solar fields, and dispelling long-standing solar myths and misconceptions. To date, more than 3,000 copies of the guidebook have been handed out to local governments, and more than 775 attendees representing 282 local governments have attended workshops and sessions.

Since there is no one path to solar market development, communities can tailor their approach to fit their particular needs and market conditions. The 2011 edition of the *Guide* also covers recent lessons and successes from DOE's original 25 Solar America Cities and other communities promoting solar energy. The guidebook introduces a range of policy and program options that have been successfully field tested in cities and counties around the country.

Since 2011, the SunShot SolarOPs team has been on the agenda at national conferences like the National Association of Regional Councils, the National Association of Counties, the American Planning Association, New Partners for Smart Growth, Brownfields 2011, and Transforming Local Governments. Beginning in the Fall of 2012, the SolarOPs team will be on the road presenting at regional workshops in Iowa, Indiana, Missouri, and Ohio — areas that may not be the top sunshine destinations but offer ample opportunities for solar applications.

The SolarOPs team tailors agendas on topics important to the local community. For some of those communities, it is basic Solar 101 — how to get started with solar energy in a community. For others, it is a deeper dive on issues like permitting, interconnection, financing, installing solar on public buildings. Wherever the community, whatever the need, the SolarOPs team helps local governments increase their local solar inventories.

A series of ICLEI SolarOPs webinars also provide tips, resources and case studies to help local governments ramp up solar in their communities. To date, these webinars have reached more than 2,278 attendees, 550 of which represent local governments. Topics have included: working with your local investor-owned utility; addressing solar myths and misconceptions; improving the efficiency of rooftop solar

permitting process; firefighter safety and PV systems; and understanding retail solar power purchase agreements. Additional ICMA webinars have covered comparable topics: such as economic development and solar; installing solar on municipal facilities; regional collaborative solar procurement; and innovative solutions for solar financing.

Since the mid 90s, IREC has worked with many cities and towns across the country through its earlier Workshop-In-A-

Box program, *Neighborhood Power — Building Communities with Solar Energy* and *Going Solar* campaigns. These technical outreach tools provided guidance for the use and procurement of renewables into every aspect of community building — housing, recreation facilities, open spaces, and businesses. The SunShot SolarOPs strategy gives us an advanced generation of tools and targets as solar energy becomes a more ingrained and valuable part of the clean energy pool. 🌞



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ANNUAL UPDATES & TRENDS REPORT

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