

Final Technical Report

Photovoltaics for You (PV4You) Project

Department of Energy Contract # DE-FGO3-00SF22116

Project Period: September 1, 2000 – June 30, 2005

Interstate Renewable Energy Council (IREC)

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Interstate Renewable Energy Council

August 14, 2005

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Executive Summary

In September 2000, the Interstate Renewable Energy Council (IREC) began its 5-year work on contract # DE-FGO3-00SF22116, the Photovoltaics for You (PV4You) Project. The objective was to develop and distribute information on photovoltaics and to educate key stakeholder groups including state government agencies, local government offices, consumer representative agencies, school officials and students, and Million Solar Roofs Partnerships. In addition, the project was to identify barriers to the deployment of photovoltaics and implement strategies to overcome them.

Information dissemination and education was accomplished by publishing newsletters; creating a base of information, guides, and models on the www.irecusa.org and www.millionsolarroofs.org web sites; convening workshops and seminars; engaging multiple stakeholders; and widening the solar network to include new consumers and decision makers.

Over the course of the grant, 219 newsletters were published, most of them electronically. They included 94 issues of the State Stakeholder E-Newsletters; 57 editions of the Interconnection E-Newsletters; 54 editions of the Schools Going Solar E-Newsletters; 10 issues of the Consumer Letter; and 4 editions of the PV4You Connections Newsmagazine.

Nine Conference Papers were published; 2 articles were printed in the Solar Today Magazine; 250 Schools Going Solar Workshop-in-a-Box were distributed; 7 Fact Sheets were prepared, packaged and distributed as part of the *Solar Means Safety* educational campaign; *Connecting to the Grid* Guide 4th Edition was published; and Model Interconnection & Net Metering Agreements were developed and distributed. In 2002, when the Department of Energy requested that IREC add Million Solar Roofs Communications and Outreach tasks to the grant, 26 regional peer-to-peer workshops were convened and 10 phone seminars were held.

Two major web sites were maintained throughout the project cycle. The www.irecusa.org web site housed dedicated pages for Connecting to the Grid, Schools Going Solar, Community Outreach, and Certification & Training. The www.millionsolarroofs.org web site was created to serve the MSR Partnerships with news, interviews, key documents, and resource material.

Through the course of this grant, the Interstate Renewable Energy Council has been supporting the Department of Energy's solar energy program goals by providing the Department with expertise services for their network of city, state, and community stakeholders.

IREC has been the leading force at the state and federal levels regarding net metering and interconnection policy for photovoltaic systems. The principal goal and benefit of the interconnection and net metering work is to lower both barriers and cost for the installation of PV. IREC typically plays a

leadership role among small generator stakeholders and has come to be relied upon for its expertise by industry and regulators.

IREC also took a leadership position in developing quality and competency standards for solar professionals and for training programs – critical components to bring the solar industry into step with other recognized craft labor forces. IREC's objective was to provide consumer assurances and assist the states and the solar industry in building a strong and qualified workforce.

IREC's Schools Going Solar Clearinghouse provided channels of information to educate students, teachers, parents and the community at large about the benefits of solar energy. Solar school projects enhance science and math education while creating an initial entry market for domestic PV.

And, IREC's community and outreach network got the right information out to capture the interest and met the needs of different audiences and reached groups that weren't traditionally part of the solar community.

IREC's PV4You project was effective because it resulted in reduced costs through easier interconnection and better net metering agreements and by raising the competency standards for solar practitioners. The project provided ways to eliminate barriers and constraints by providing technical assistance, offering model agreements based on industry consensus that were used by state and local decision makers. And, the project increased public acceptance by providing information, news and guidelines for different audiences.

All deliverables for this grant were on time and in budget. While this report summarizes the project activities for the period of funding, quarterly reports were delivered to the Department of Energy which provide further detail.

Introduction

Throughout the course of contract # DE-FGO3-00SF22116, the Interstate Renewable Energy Council focused its activities at information dissemination, public outreach, and education for communities and local and state government stakeholders. These tasks took on some of the current and often difficult issues impacting solar energy use such as connecting photovoltaics to the utility grid, developing quality credentials that indicate a level of knowledge and skills competency for solar practitioners, and getting the right information to the right people.

The Photovoltaics for You (PV4You) Project was organized into a series of project areas.

Connecting to the Grid Project which provided current information on technical and legal trends through a monthly newsletter and web site; provided targeted technical support to regulatory and policy state agencies and other stakeholders in the process of developing or refining PV interconnection standards and net metering rules; and (3) assisted in the development of national interconnection standards and models.

Workforce Development which focused on setting national standards for knowledge and skills competencies for solar energy installers; assisted in the formation of a national practitioner certification program; and promoted training programs be based on industry standards and verified through third-party assessment.

Schools Going Solar outreached to teachers, students, and school officials and served as a national information clearinghouse.

PV4You National Consumer Project which provided educational assistance to state-appointed consumer representatives in understanding technical aspects of photovoltaics in newly competitive electricity markets and residual regulated monopolies.

Community & Stakeholder Services which supported state and city networks, coordinated with national stakeholders, convened an annual state and city stakeholder meeting, held other state workshops and forums, maintained project-based web sites, prepared other outreach tools, and promoted new information channels.

In 2002, the Department of Energy added a new set of tasks to the grant for the Million Solar Roofs (MSR) Initiative. IREC was asked to provide communication and outreach activities for the MSR Partnerships. The tasks were:

E-newsletters delivered every other week with Million Solar Roof news, information from DOE, the National Renewable Energy Laboratory and Sandia National Laboratories, partnership news, and other national, state, and stakeholder news. This newsletter was combined with the IREC State Stakeholder newsletter.

MillionSolarRoofs.org web site which featured partnership contact information, interviews with MSR newsmakers, a calendar of MSR events, and a repository for technical papers, presentations, photos, workshop programs, and audio files of the MSR phone call seminar series.

MSRPeer-to-Peer Regional Workshops which were usually 1½ day workshops featuring network opportunities, expert speakers, and information on key issues.

MSR Phone Call Seminars which were interactive and intensive one-hour to one hour 30-minute seminars on a single subject for Partners in the Million Solar Roofs Initiative.

Other tasks are included developing and researching metrics for the MSR initiative.

IREC's five-year work on the Photovoltaics for You (PV4You) Project experienced many internal and external factors that influenced the project's scope of work.

Externally, the increase of state incentives changed the domestic market structure. System benefit funds provided needed capital resulting in buy-down opportunities. Renewable Portfolio Standards regulated generation resources. These two state policy actions probably had the biggest impact on domestic solar growth. In order to keep in step with the changing statescape, IREC was careful to respond to information and implementation needs as they arose.

Internally, at DOE's recommendation, the project's name changed from PV4You to Going Solar. This allowed for a wider approach to other solar technologies other than photovoltaics though PV was still the most targeted technology. In the fall of 2002, the PV Consumer Project was absorbed by the other outreach areas.

Throughout this grant period, IREC followed its guiding principles: To exceed expectations; to pay attention to the details; and to guarantee that the deliverables were always relevant and unique.

The following pages summarize the activities of the major project areas under this grant and include their accomplishments and assess their impact. A list of publications and conference papers are included as well as a description of the key web pages developed to support the contract's activities.

Connecting to the Grid Project

Prior and during the time of this grant, IREC has been the leading force at the state and federal levels regarding net metering and interconnection policy for both photovoltaic systems and other renewable and distributed electricity resources. IREC has provided expertise on the numerous and complex issues that are involved with the interconnection of small generation systems to the electricity grid. IREC played a leadership role among small generator stakeholders and was relied upon for its expertise by industry and regulators.

The principal goal and benefit of the interconnection and net metering work as part of this grant were to lower both barriers and cost for the installation of PV and other distributed systems. Tangible benefits include:

- Net metering saves on installation costs by avoiding an otherwise required second meter. Cost savings estimates are from \$50 to \$300 capital cost per system.
- Net metering increases the value of the installation of a grid-connected system by a general estimate of \$70 per year per kilowatt installed. The exact amount is dependent on the differential between utility retail rates and rates for qualifying facilities.
- Simplified interconnection rules can save thousands of dollars per system by avoiding the need for an expensive interconnection study for every system installed. In most areas the interconnection costs would vary with the size of the system but in some jurisdictions, the minimum cost would be well over one thousand dollars for even a one-kilowatt system. IREC has promoted as policy, and prevailed on interconnection rules that often eliminate any cost for the smallest systems.
- Elimination of extraneous interconnection equipment can save thousands of dollars per system as well. Interconnection rules that standardize the equipment requirements confer this benefit on the system owner. Focusing solely on the elimination of the external disconnect switch and the savings could run from \$50 to 200 per installation.
- Total estimated savings from IREC's past and present work is in the range of \$170 to \$570 per kilowatt per system excluding reduced or eliminated costs for interconnection studies.

IREC's interconnection work developed a deep understanding of the technical requirements of interconnecting small generation systems with utility grids as well as an analysis of the economics of net metering for the distributed installation. IREC also undertook the research and provided the expertise on the economic impacts on other parties involved in the transaction including utilities and ratepayers. IREC's experts were often called upon by regulators for this expertise.

To assist and inform decision-makers and end-users on interconnection issues, IREC published 57 issues of a monthly e-newsletter that tracked and detailed developments in the states and on the federal level. Over 900 people subscribed to the newsletter; this figure includes representatives from state and federal government agencies, representatives from industry and trade groups, university employees, interested individuals, and various other stakeholders.

One of the most significant undertakings of the IREC Interconnection Project during this grant period has been participation in the Federal Energy Regulatory Commission (FERC) stakeholder process on national

standardized interconnection rules. IREC has played a key role amongst the diverse but cohesive Small Generator Coalition developing consensus rules for the interconnection of generators up to 20MW in size. The rules, if promulgated by the FERC, would represent the only comprehensive effort to develop detailed rules that would be available to generators nationwide.

The stakeholder process bifurcated the interconnection effort into a class of generators less than 2 MW in size that met stringent certification and narrow grid interaction rules and the broader category of generators up to 20 MW in size that would undergo a more rigorous interconnection study. While the studies undertaken for the larger units are considered significant in the small generator community, they are nonetheless a streamlined version of the intensive study undertaken for the interconnection of large central station generation equipment.

In states where significant barriers or costs are imposed on interconnecting distributed generators, those generators will use the federal standard. In other states, where there are state-based incentives for interconnected small generators combined with simple interconnection rules, distributed generators will forgo the federal option in preference for the state interconnection standards. If the economics rule, the federal standard will effectively become the minimal threshold for all states.

One distinct advantage of federal interconnection standards is uniformity. At present, of the 39 different states that have some net metering and interconnection rules, none are the same. Manufacturers thus must track different capacity size limits, overall total installation difference, and differing requirements for safety, metering and interconnection equipment all of which prevent an effective national marketing opportunity.

In other national news, the IEEE Standards Board approved the IEEE 1547 "Standard for Interconnecting Distributed Resources with Electric Power Systems" in June 2003. Subsequently, in October 2003, IEEE 1547 was approved as an American National Standard. This standard establishes criteria and requirements for the interconnection of distributed resources with electric power systems, and is relevant to the performance, operation, testing, safety considerations and maintenance of interconnections.

The approval of IEEE 1547 is significant because it establishes the long-awaited technical foundation to allow the interconnection of all distributed generation (DG) technologies to the electric grid. It also ensures that major investments in DG technologies by the federal government and industry will result in real-world applications providing alternative sources of electric power to the electric utility grid. IEEE 1547 will affect the future operation of the U.S. electrical distribution system, and it is already being used by the federal and state governments in rulemaking procedures, as well as by utilities in developing technical requirements for interconnection agreements.

In the fall of 2003, IREC released the 4th Edition of the *Connecting to the Grid* Guidebook. This current version focused on state issues and the approved IEEE 1547 rule.

Also in the fall of 2003, IREC published two model rules for use as guidance by state policymakers considering net metering or interconnection rules. These rules had been reviewed by an extensive group of industry and policy experts, and became available on IREC's web site. IREC's model interconnection rules draws heavily from two different interconnection procedures: (1) the consensus interconnection documents filed in FERC's rulemaking on small generator interconnection and (2) the consensus

interconnection tariff filed with the Massachusetts Department of Telecommunications and Energy in the Massachusetts' interconnection docket.

In addition, the National Association of Regulatory Utility Commissioners (NARUC) issued a substantial modification of its model interconnection procedures and contracts. NARUC's updated model interconnection rules also drew from the consensus filing in FERC's docket on interconnection for small generators. NARUC's model is similar to the IREC model, and the standard form interconnection agreements of both models are nearly identical.

The timing of the release of these model rules was apt, as new developments in state-level interconnection rules have sprung up all over the country.

In June 2004, IREC updated and released two state-by-state tables which are available on the IREC web site.

In mid September 2004, the New Jersey Board of Public Utilities (BPU) unanimously approved amendments to the state's net metering and interconnection standards, an action that creates what is arguably the best net-metering policy in the United States. On September 13, 2004, the BPU expanded New Jersey's net-metering rules and interconnection standards to include all "Class I" renewable-energy systems (defined as wind, solar, fuel cells using renewable fuels, ocean, sustainable biomass and landfill gas), and increased the maximum capacity of these systems from 100 kW to 2 MW. The amendments are largely consistent with model net metering and interconnection guidelines developed by IREC, as well as model guidelines issued by NARUC.

Over the course of this grant, the Interconnection Project has provided technical assistance and guidance for many states. This assistance included interactions with the staff of public utilities commissions, industry members, consumers and state energy office representatives.

Arizona	Kansas	New York
California	Kentucky	North Carolina
Colorado	Louisiana	Ohio
Connecticut	Maryland	Oregon
Delaware	Massachusetts	Pennsylvania
Florida	Michigan	Texas
Georgia	Minnesota	US Virgin Islands
Hawaii	Mississippi	Utah
Idaho	Missouri	Virginia
Illinois	Nevada	Washington
Indiana	New Jersey	Wisconsin
Iowa	New Mexico	Wyoming

Workforce Development

During the course of this grant, IREC has taken a leadership position in developing quality and competency standards for solar professionals and quality assessment of training programs and instructors. Verifying installers and making sure that training programs are based on industry standards become the foundation for a qualified workforce.

The principal goal and benefit of certification for practitioners and accreditation for training programs are to lower installation and repair costs, and enhance consumer confidence leading to accelerated market adoption.

One of IREC's key objectives has been to make sure there were good communications among all stakeholders involved with certification and accreditation and to solicit state stakeholder input all along the way.

More than 65 people attended the state working session that IREC organized on Certification of Solar Practitioners which was held on Saturday, April 21, 2001. There were representatives from state energy offices and state renewable energy centers, state solar energy industries association chapters, the federal government and national laboratories, non-profits, the National Joint Apprenticeship & Training Committee (NJATC), the IBEW, and utility, solar, and consulting companies. The meeting was convened by the Interstate Renewable Energy Council in coordination with the National Renewable Energy Laboratory and Sandia National Laboratories. The purpose of this meeting was to bring together state stakeholders and have a focused discussion on certification of solar practitioners.

The outcome of this pivotal meeting was that participants strongly agreed that national recommended competency guidelines for solar practitioners were needed. Most states that participated in the meeting and responded to a pre-session survey said that it was likely they would adopt national, consensus-based recommended guidelines as long as they were adaptable to local conditions.

A second major national certification workshop was held on September 30, 2001 in Sacramento. The primary purpose of this workshop on *Developing PV Practitioner Certification & Training Accreditation Programs* was to discuss the steps and process in developing a national certification program.

On Saturday, June 15, 2002, a follow-up meeting was held for state stakeholders on certification and training. A Northeast Regional State Stakeholder meeting was also held on October 23, 2002.

All of these meetings and extensive planning resulted in the launching of the North American Board of Certified Energy Practitioners (NABCEP) Solar PV installer certification program on June 16, 2003 with the release of the application to qualify to sit for the first administration of the test. To get to this point, IREC were involved in many critical components of the program.

All due process and procedures needed to be in place prior to the launch of the program. As would be expected, test administration and security issues, grievance and appeals policies, the mark use policy, and about 100 other details needed to be discussed and put into place before the rollout of the PV credential. IREC was key in developing the Candidates Handbook, a single document with all the

resource information plus the application. This Handbook contains the eligibility requirements, information on preparing to take the test, fees, scoring notification, code of ethics, application, recertification information, and multiple other items that applicants would want to know.

In addition to the release of the Handbook and Application, IREC was active in the interviewing process for NABCEP's Executive Director. Interviews were conducted at the end of April 2003 and the new ED started at the end of May.

IREC also worked on the management and administrative plans for NABCEP, which included negotiations for administrative services and office space. NABCEP's office is located at the Saratoga Technology and Energy Park in Malta, New York (about 25 minutes north of Albany). And, IREC worked to develop the web strategy and provider for NABCEP.

As of the date of this report, there are now 177 PV Certified Installers.

IREC continued to work very closely with NABCEP as we sit on their Board of Directors, their Executive Committee and Entry Level Certificate Committee.

While NABCEP certifies installers, it is the Institute for Sustainable Power (ISP) that verifies training programs and instructors. To ensure continuity, consistency, and quality in the delivery of training, ISP has developed a framework of standards and metrics, along with a system of review and auditing, to provide a means to compare content, quality, and resources across a broad range of training programs. IREC worked closely with ISP to make sure that there is quality assessment of training programs in the US and that training is set to industry competency standards.

From high schools to universities and from community colleges to the building trades, there is a surge of interest and participation in renewable energy courses and practitioner training programs across the country. However, as more programs are being offered by a variety of educational providers, how do potential students know that they will be taught the skills and knowledge they will need to do a good job? Do the facilities include the right equipment and hardware for training? Are there procedures that ensure safety and safe practices? Are the programs managed in a fiscally responsible way? Are the teachers qualified? These are some of the questions that come to mind as more courses are offered and enrollment increases.

An important participant in building a strong and qualified workforce is the community and technical college network. Forty representatives from community colleges, state universities, technical schools, training organizations, and states came together on February 25, 2004 to discuss standard-based curriculum for solar and renewable energy practitioners and technicians.

The day-long meeting covered a review of existing courses and curricula across the country, a summary of content standards, an overview of labor trends, and included a facilitated discussion to identify learning gaps and curriculum needs.

The meeting was organized by the Interstate Renewable Energy Council in consultation with the Partnership for Environmental Technology Education (PETE) and the North American Board of Certified Energy Practitioners. It was hosted by the Connecticut Clean Energy Fund.

As a result of this February 2004 meeting with community colleges and training programs, IREC, the Partnership for Environmental Technology Education (PETE) and Lane Community College developed an on-line solar/renewable energy course catalog. The catalog lists over 145 training programs offered by 26 educational providers. The on-line catalog is housed at www.irecusa.org and provides prospective students with easy access to preliminary course information.

In response to Community Colleges' requests for labor market and job information to show that it makes sense to develop and offer renewable energy education courses and programs, IREC in September 2003, released Version #1 of the *Labor Forecasts & Job Trends for the Solar and Renewable Energy Industries*. This report catalogs some of the current data and reports dealing with the economic impacts – specifically employment – of solar and renewable energy deployment. It is a collection of information and does not attempt to extrapolate general job trends. This report was updated in February 2004, July 2004 and January 2005.

The Occupational Profiles for the Solar Industry report was published in July 2004 and presents an initial review of the occupational areas for the solar industry. This information defines the occupational titles and job descriptions within the PV market sector.

Schools Going Solar

The primary objectives of the School Going Solar project were to encourage the growth of K-12 solar school programs through education and outreach; make connections and linkages among the many people across the country involved in this work to share knowledge and avoid reinventing the wheel in creating and implementing programs; and especially, educate students, teachers, parents and the community at large about the benefits of solar energy.

To meet these objectives, IREC published the electronic monthly “Schools Going Solar Month in Review” newsletter – reporting on projects, lesson plans, resources, workshops and conferences. The publication was delivered to those involved in the education and learning professions.

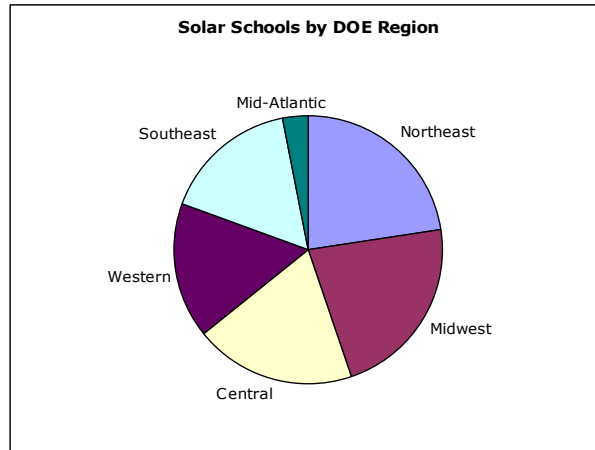
Another popular source of information was the Schools Going Solar Workshop-in-a-Box. From April 2002 - December 2002, IREC distributed 100 Schools Workshop Boxes to teachers, school board members, and other community groups. With continued high demand, another 100 boxes were assembled and distributed in 2003 and 2004. And, in the first quarter of 2005, 50 additional boxes were sent out. In all, 250 Workshop Boxes were circulated.

Inserts for the Schools Workshop Box included:

- Educational Materials for Teachers
- School Case Studies
- CDs: Neighborhood Power; Get Smart About Energy
- Videos: IREC’s Schools Going Solar and Environmental Energy Foundation’s Solar in Schools
- Brochures
- *Solar Power Is Going to Schools* Booklet
- NESEA’s “Northeast Sun” magazine edition for teachers
- Other handouts

Each year of this grant, except for 2005, IREC joined with DOE’s EnergySmart Schools Program and the National Energy Education Development Project to exhibit and hold workshops at the National Science Teachers Association (NSTA) annual convention. Average annual attendance at these conventions was about 20,000 teachers. In 2003, a new edition of the “Solar Power Is Going to Schools” booklet was published and 2,500 copies were distributed at the NSTA convention. Updated and expanded, this publication talked about tips to make solar school programs successful and presented case studies as models to follow.

All through the duration of the grant, IREC has been tracking school solar projects around the country for mostly K-12 grade levels. In 2004, an on-line database was placed on the IREC web site. As of the writing of this report, there are 460 programs listed. This was the only national database of solar schools projects.



The above chart shows that the distribution of solar schools is widespread across the country. The strategy of using schools as the locations for early solar installations is proving effective.

What makes a good solar school program? From IREC's experience with the School Going Solar project, we know that a successful program not only provides some amount of clean, self-generated electricity to the school building, but when hardware is integrated into studies, it might actually help raise math and science achievement scores. A good program also involves the entire community, creates civic pride, and provides an opportunity for public education and awareness.

What makes a solar school project successful? Through discussions and assessment with program managers of successful schools programs, IREC put together this list of tips:

- Find at least one enthusiastic "champion" for the project within the school, for example, a science teacher or science department advisor. But this person does not have to be a faculty member; it can even be a parent willing to volunteer the time and effort to make the project happen.
- Obtain buy-in up front from the school superintendent, school board and other stakeholder groups. Be sure all groups are informed and have a chance to ask questions BEFORE the proposal shows up as an agenda item at a meeting where decisions will be made.
- Be sure the school's custodial and maintenance staff are engaged and educated. This is a critical step.
- Establish partnerships with utilities, local business, educational, environmental and energy organizations -- this can also bring additional financial resources to these projects.
- Even if there are many parties involved, be sure that a single office or individual orchestrates the entire project.
- Make it a community-wide project; create community ownership....do the public outreach, hold educational events and do publicity.
- If possible, make it a learning experience that is national. Link the school via computer with a sister school and have the students in contact comparing output, weather conditions, etc.
- If installing a roof system, be sure that the roof is not due to be replaced in the next few years – and guarantee that the building is going to remain in use as a school for at least the next 10 years.
- To get the most out of the PV system, be sure that the school uses electricity as efficiently as possible.

The dedicated www.schoolsgoingsolar.org web site averaged 2,200 visitors per month and the project received close to 1,500 calls per year requesting information on solar projects in schools, educational materials and curricula, etc.

Million Solar Roofs Communication & Outreach

In 2002, the Department of Energy requested that IREC take on the Million Solar Roofs Communication and Outreach efforts as part of this grant. Tasks included operating and maintaining the MSR e-newsletter and web site; creating and maintaining the MSR list serve; organizing regional MSR workshops; organizing phone seminars; organizing the annual MSR awards; developing a way to collect and report on solar installation metrics; and combining the MSR annual meeting with the IREC annual meeting. IREC maintained close coordination with Headquarters and the Regional Offices and participated in the MSR semi-monthly conference calls.

The Million Solar Roofs website (www.millionsolarroofs.org) is the principal source of information for and about MSR partnerships and stakeholders. The site focused on educational materials, interviews, announcements and success stories that partners can use to improve the effectiveness of their outreach activities. The site is a repository for technical papers and Power Point presentations, the presentation materials and audio files from the Conference Call Seminars and Peer-to-Peer Workshops, a photo gallery, and a complete listing of all MSR partnerships. There was an average of 17,000-18,000 monthly visitors to the web site.

Since 2002, Regional Peer-to-Peer (P2P) Workshops provided information exchange among Million Solar Roofs partnerships, offered skills training, and included briefings on important issues. The workshops helped partnerships improve their local action plans for providing information to their targeted audiences in order to positively affect the widespread adoption of solar energy. They have proven to be a very effective way of providing communication and information to the Partnerships.

Since 2002, MSR conducted twenty-six Regional Peer-to-Peer Workshops. The Interstate Renewable Energy Council (IREC) primarily organized sixteen workshops through this grant and the DOE Regional Offices primarily organized the remaining ten workshops. More than 650 people attended the twenty-six workshops. Seventy-nine percent of the MSR partners have participated in at least one workshop. One hundred percent of the participants rated the workshops as Excellent or Good. Ninety-two percent felt that the workshop provided them with information they can use to strengthen their local MSR action plan.

Date	Region	Location	# Participants	Topics*
April 11-12, 2002	Western & Central	Tempe, AZ	36	Certification, Marketing Plan, New Technologies, Large Commercial Building Market, Financing, Working with Builders
May 10, 2002	Southeast	Raleigh, NC	26	Marketing Plan, Collaborations with Home Builders, Building Codes
Aug. 15-16, 2002	Midwest	Chicago, IL	30	Lessons from Chicago Partnership, Marketing Plan, Public Education Campaign, Selling Solar Thermal
Sept. 24-25, 2002	Mid-Atlantic	Philadelphia, PA	25	Certification, Marketing Plan, Zero Energy Homes, Solar on Schools
Sept. 25-27, 2002	Northeast	Block Island, RI	34	Block Island Community Case Study, Solar in Schools, State Funds, Marketing Plan, Certification and Training, Overcoming Local Barriers
Nov. 6-7, 2002	Western & Central	Seattle, WA	25	Zero Energy Buildings, Utility-Sponsored Green Metering Program, Marketing Plan, Writing Grant

				Proposals, Solar Schools
May 15-16, 2003	Western & Central	Golden, CO	28	Marketing Solar on a Budget, NREL Tour, Boulder Solar Thermal Program, Tucson Solar Workbook, Interconnection and Net Metering
Aug. 12-13, 2003	Mid-Atlantic	Baltimore, MD	20	Solar Schools Programs, Leveraging Media
Sept. 4-5, 2003	Western	Portland, OR	21	Ensuring Quality Installations, Consumer Education, Industry Panel, Impacts of Solar on Economic Development
Sept. 25-26, 2003	Northeast	Portland, ME	47	Solar Schools Programs, Solar Hot Water, Certification and Workforce Issues, Report from Europe
Oct. 22-23, 2003	Southeast	Coca, FL	34	Marketing Solar, Low-Income Solar Programs, Florida Utility Solar Programs, Solar Thermal Technology, Solar and Green Power Programs
March 24-25, 2004	Western & Central	Albuquerque, NM	25	Solar Schools Programs, Renewable Portfolio Standards, Code Issues
May 6-7, 2004	Western & Central	San Francisco, CA	39	Solar Home Tours, Solar on Public Buildings, San Francisco Bond Update, Solar in New Home Construction
Aug. 4-5, 2003	Mid-Atlantic	Newark, DE	22	Tour of solar installations, University of Delaware Briefings, Solar RPS and Solar Tradable Credits, Net Metering and Interconnection
Sept. 14-15, 2004	Midwest	Minneapolis, MN	18	EPA SEP Funding, Solar on Schools, Solar and New Home Development
Oct. 12-13, 2004	Northeast	Burlington, VT	42	Community-Based Social Marketing, Industry Panel, Building Successful Partnerships, Renewable Energy for Home and Business, Solar and Low-Income

Peer-to-Peer Workshops Organized Primarily by Regional Offices. Interstate Renewable Energy Council assisted with some of these workshops

Date	Region	Location	# Participants	Topics*
2002	Midwest	Columbus, OH		
Feb. 24-25, 2003	Southeast	Atlanta, GA		Southeast Success Stories, Marketing and the Solar Message, How to Measure Success, Solar Tour
April 10-11, 2003	Midwest	Des Moines, IA		Certification, Building Integrated PV, Interconnection, Solar Thermal, Solar Energy Promotion
2003	Midwest	Lansing, MI		
April 20-21, 2004	Midwest	Milwaukee, WI		Solar Thermal, Marketing and Information, Zero Energy Homes, Solar Tour
July 20-21, 2004	Southeast	Charlestown, SC		Marketing, Developing Effective Messages, Working with Utilities, Collaborating with State DOTs, Solar and LEED, Florida Front Porch Initiative, Regional Solar Water Heating Plan
Oct. 26-27, 2004	Southeast	Biloxi, MS		Mississippi Partnership Highlight, Solar in Schools, Departments of Transportation Marketing, Solar Tour, Solar Hot Water Regional Plan
Nov. 9, 2004	Central	Golden, CO	18	Colorado Renewable Portfolio

	(Colorado)			Standard, Net Metering, DOE Grant Process
Mar. 29-31, 2005	Midwest	St. Louis, MO	15	Solar Energy Assessment for Communities, USDA Funding, Energy Surety, Green Buildings/LEED, PV Industry Discussion
Mar. 31, 2005	Central (Colorado)	Golden, CO	19	Colorado Renewable Portfolio Standard, Education and Outreach

In response to partnership demand, IREC developed and implemented the Telephone Seminar Series. Launched in 2003, these Telephone Seminars are intensive one or 1-1/2 hour interactive seminars on a single subject. The Seminars inform partners on model programs that partners can use to positively affect the widespread adoption of solar energy.

Expert speakers give presentations accompanied by Power Point presentations sent to all participants in advance of the call. A question and answer session follows each presentation. From 2003 through 2005, ten telephone seminars were held. A total of 910 people attended the ten seminars. Seventy-eight percent of the partners participated in a least one Telephone Seminar. Eighty-seven percent of the participants rate the seminars as Excellent or Good. As with the Regional Workshops, topics and speakers were selected in conjunction with DOE Headquarters and the Regional Offices and based on input from MSR partners.

Date	Topic and Speakers	No. of Participants
2-19-2003	Public Sector Solar Financing <i>Keith Rutledge, Renewable Energy Development Institute</i>	57
4-16-2003	Solar for Affordable Housing <i>Angie Brooks, Pugh Scarpa Kodama</i> <i>Robin Raida, Community Corporation of Santa Monica</i> <i>David Bickham, Mississippi Development Authority</i>	87
7-31-2003	Utility Solar Hot Water Programs <i>Dell Jones, Sterling Planet</i> <i>Steve Still, Eugene Water and Electric Board</i> <i>Jib Wilson, Maui Electric</i>	97
11-6-2003	Energy Surety <i>David Menicucci, Sandia National Laboratories</i> <i>Valerie Rauluk, Greater Tucson Coalition for Solar</i>	89
1-29-2004	Interconnection and Net Metering <i>Christopher Cook, Interstate Renewable Energy Council and E3 Energy</i>	117
2-26-2004	Federal Resources from USDA and HUD <i>Terri Walters, National Renewable Energy Laboratory</i> <i>Robert Groberg, U.S. Department of Housing and Urban Development</i>	93
11-10-2004	Inspector Guidelines for PV Systems <i>Bill Brooks, Endecon Engineering</i>	83
1-13-2005	PV Industry Roadmap <i>Colin Murchie, Solar Energy Industries Association</i>	97
2-16-2005	Zero Energy Homes <i>Robb Aldrich, Steven Winter Associates</i> <i>Rob Hammon, ConSol</i>	130
3-23-2005	Inspector Guidelines for PV Systems <i>Bill Brooks, Brooks Solar Engineering</i>	75

Special Projects

Solar Means Safety

In June 2002, IREC kicked off the *Solar Means Safety* national educational campaign providing information and help for those interested in using solar energy for safer communities. It was a collaborative effort of the Interstate Renewable Energy Council, the Department of Energy, the National Renewable Energy Laboratory, the American Solar Energy Society, the Solar Energy Industries Association, and the Solar Electric Power Association.

Solar Means Safety featured a series of fact sheets including:

- Solar For Traffic Safety
- Solar for a Safer Energy Supply
- Solar for Safer Air and Environment
- Solar for Safer Public Buildings
- Solar for Disaster and Preparedness



Starting in the summer of 2003, IREC worked with David Menicucci, Sandia National Laboratories, and his focus on using distributed energy resources to improve energy surety in communities. This is a concept that employs full-time operating distributed energy resources to supply power to a group of buildings. In order to better inform and broadcast SNL's Energy Surety Methodology, IREC published an additional fact sheet on this approach.

PV Permitting Process

Installers of solar electric systems often cite local permitting as a barrier to the growth of the industry. Anecdotal evidence suggests that the process of obtaining local approval for such systems can be cumbersome, costly, time consuming and quite variable with requirements differing from jurisdiction to jurisdiction.

Since photovoltaics stakeholders have identified the streamlining and standardization of local permitting processes for PV systems as a priority objective, the Interstate Renewable Energy Council and Pace Law School Energy Project joined together to hold a special forum on "Understanding and Improving the PV Permitting Process." The forum was held on June 21, 2003 in Austin, Texas prior to the start of the Solar 2003 Conference. Thirty state stakeholders gathered to discuss ways of making PV permitting costs and procedures easier, faster, and less expensive.

With input from this group and from other stakeholder comments, Pace University (under a separate grant) published “Inspectors Guidelines for PV Systems.” IREC broadcasted this publication widely and posted it on the home page of the irecusa.org site. IREC encouraged state stakeholder to distribute the Guidelines to their local inspectors and to use it at workshops and seminars with code officials and inspectors.

Annual Publication of the PV CONNECTIONS Newsletter

One of the deliverables for this grant was the publication of a yearly newsmagazine that focused on state and local articles, national news, school news, and related stories. The newsmagazine usually ran between 45-55 pages and was distributed at the Annual Solar Conferences as part of the registration package. Copies of each year’s publication were previously submitted to DOE. As an example, here is the listing of articles from the 2003 edition.

- Opening Column
- *Racking Up Megawatts in Arizona*
- *Tucson Takes Solar Energy Seriously*
- *The Power of ‘We’ - Organizations Working Together Help Move Solar Energy Forward in California*
- *Bay Area Exceeds Goals 7 Years Early*
- The Good & Bad News from Connecticut
- Florida Utilities Go To School To Install PV
- Extension of the Tax Credit Keeps Solar Energy Shining In Hawaii
- Hard Work Moves Solar Ahead In Idaho
- Strategic Planning In Iowa Pays Off Resulting In New PV Consumer Tools
- Solar Education On the Move In Maine
- Solar, Wind, & Baseball Rock in Massachusetts
- *Local Boston Neighborhood Site for First Solar to Market Installation*
- *In Search of the 100th Monkey*
- Portfolio Standard Shows Its Impact in Nevada
- *Full Speed Ahead For Renewable Resources in New York*
- *The Tar Heel State is Going Green (North Carolina)*
- Solar Mo-Jo in Ohio
- Rhode Island Sets New Renewable Energy Goals
- Austin’s The Right Place to Hold a Solar Conference
- Wind Energy Takes Center Stage In Vermont
- The Ups & Downs in Virginia
- *It’s A SNAP in Washington*
- Renewable Energy Reaches New Heights in Wisconsin

- School Beat - Includes Introduction to School Beat, other school articles, student’s corner, and blurbs.
- Centerpiece Article -- An Inside View of the Solar Decathlon by Richard King, DOE.

- DSIRE News - Article plus one sidebar - Maps and Web snapshot embedded in file.
- Net Metering and Distributed Generation Interconnection - Reporting on News & Trends Around the Country
- Million Solar Roofs News with sidebar - Community Partnerships Clearing a Path for Solar Technologies
- News from the Solar Electric Power Association -Keeping Pace With Industry Changes
- News from the American Council for Renewable Energy - Putting Renewable Energy First
- News from the American Solar Energy Society - *Meeting the Challenge*
- Using Useful Technical Analysis
- Certification & Training News with sidebars and boxes - *Setting Professional Standards*

Overview of Publications & Annual Meetings

	IREC E-Newsletter	Interconnection E-Newsletter	Schools Going Solar Newsletter	PV4You Quarterly Consumer Letter	PV Connections Newsmagazine	Annual Meeting
Start September 2000	3	3	3	2	Published prior to September	Occurred prior to start of grant
2001	12	12	12	4	April 40-pages Distributed at Solar 2001 Forum	April 22 Washington DC
2002	21 Combined with MSR News as of April Went from monthly to semi-monthly	12	12	4 Project is phased out in the fall 2002	June 52-pages Distributed at the Solar 2002 Conference	June 16 Reno, NV IREC's Annual Meeting Jointly Held with MSR
2003	25	12	12		June 44-pages Distributed at the Solar 2003 Conference	June 22 Austin, TX
2004	26	12	12		July 52-pages Distributed at the Solar 2004 Conference	July 10 Portland, OR
End June 2005	7	6	3 Project is phased out in March 2004		Planned for after end of the grant: October 8, 2005	
Totals	94	57	54	10	4	4

Conference Papers & Articles

- *Measuring and Valuing Electricity Generation: Metering Options for PV Systems.* Thomas J. Starrs and Chris Larsen. Conference Proceedings, American Solar Energy Society (2001).
- *Goingsolar.Org - The Going Solar Campaign Becomes E-Based.* Jane M. Weissman and Jane Pulaski, Interstate Renewable Energy Council. Conference Proceedings, American Solar Energy Society (2001).
- *National Program for Certifying Solar Practitioners.* Barbara Martin, Jane Weissman, and Mark Fitzgerald. Conference Proceedings, American Solar Energy Society (2002).
- *Costs and Benefits of Practitioner Certification or Licensure for the Solar Industry.* Wendy Parker, Institute for Sustainable Power, Ward Bower, Sandia National Laboratories and Jane Weissman, Interstate Renewable Energy Council. Presented at the IEEE PV Specialist Conference, May 2002.
- *Schools & Solar Energy Programs: Designing and Implementing for Success.* Vicki Mastaitis Colello. International Symposium on Renewable Energy Education, August 2002.
- *Recent Developments in Distributed Generation Interconnection Standards.* C. Cook, Esq. ASES 2004 Solar Conference, July 2004.
- *Defining the Workforce Development Framework & Labor Market Needs for the Renewable Energy Industries.* J.M. Weissman, IREC. ASES 2004 Solar Conference, July 2004.
- *Moving Markets with Education & Outreach Strategies: IREC's Results with Getting the Right Information to the Right People.* J.M. Weissman, IREC. Prepared for the DOE Solar Review Meeting, October 2004.
- *U.S. Solar Market Trends.* Larry Sherwood, IREC. ISES/ASES 2005 Conference, August 2005.
- *Power Roofs...the Million Solar Roofs Initiative is Fostering Adoption Nationwide.* Jane Pulaski and Larry Sherwood. July/August 2004 Issue of Solar Today Magazine.
- *Assuring Quality Training.* Jane Weissman. May/June 2005 Issue of Solar Today Magazine. Web sites

Web Sites

- www.irecusa.org. This is IREC's main site that offered the PV4You network solar energy news, trends, resources, easy-access information, special features, and targeted links.
- www.irecusa.org/connect.htm. This was IREC's special section on interconnection issues and included the "Connecting to the Grid" Guide, monthly Interconnection Newsletters, the State-By-State Interconnection Table, and an on-line library.
- www.schoolsgoingsolar.org. This site included news about solar in schools, resources, links, and the Solar School Database.
- <http://www.irecusa.org/commout/index.html>. This site contained the e-newsletter, the Solar Means Safety fact sheets, and other community outreach resources and news.
- www.irecusa.org/certification.htm. This section brought news, resources, and links on training, certification and accreditation of solar practitioners and other certification topics. It also includes the on-line course catalog database.
- www.millionsolarroofs.org. This site brought Million Solar Roofs news to the partnerships and included a partnership listing, seminars and workshops presentations, outreach tools, reference documents, and contacts for solar information.

Final Note

The Interstate Renewable Energy Council would like to extend its deepest thanks to our colleagues at the US Department of Energy. What made this project successful was IREC's close coordination with Headquarters, the Regional Offices and the National Laboratories. We thank Dr. Ray Sutula, Richard King, Glenn Strahs, Heather Mulligan, Richard Michaud, Dwight Bailey, Margie Bates, Mindy Roberts, and Sandra Burton. A special thanks to Glenn Doyle at the Golden Field Office for handling our huge file from Oakland. We also want to thank Jim Rannels, Lynne Gillette and Steve Miller.