



Sustainable Energy
Puts America To Work

Final ★ Program

SOLAR 2007

Cleveland

★ July 7 – 12, 2007

Featuring

36th ASES National Solar Energy Conference
32nd National Passive Solar Energy Conference
2nd Annual Renewable Energy Policy, Advocacy and Marketing Conference
Green Energy Ohio Annual Meeting
Society of Building Science Educators Annual Meeting
Solar Ratings and Certification Corporation Annual Meeting

Welcome



On behalf of the American Solar Energy Society (ASES), Green Energy Ohio (GEO), and the other sponsoring organizations, I welcome you to **SOLAR 2007**. We are pleased to feature 160 displays at the Cleveland Convention Center Renewable Exhibits as the nation's leading clean energy experts convene for the 36th time in dialogue and networking.

Be sure to enjoy the city's and region's vibrant cultural centers while you are here as Clevelanders and GEO roll out the green carpet for this National Solar Energy Conference along with hundreds of dedicated members of the American Solar Energy Society (ASES) under the theme "**Sustainable Energy Puts America to Work.**"

Green energy works every day in Ohio and it can put Ohioans, and Americans everywhere, to work in good paying jobs.

GEO has spent the past 7 years as an ASES Chapter building statewide Solar Tours to reach Ohio's 11 million residents. The local tours and workshops for **SOLAR 2007** showcase solar, wind, and biomass energy and efficiency measures. See these at work in large and small scale applications at Oberlin College; a major photovoltaic cell production plant, research labs at NASA Glenn Research Center and the University of Toledo; in typical urban, suburban and rural businesses and in homes with systems that vary from Amish Country to the Ohio Governor's Residence.

Cleveland's local governments, businesses, unions, foundations, nonprofit and educational communities are proud to unveil for **SOLAR 2007** new solar electric and thermal systems at the Great Lakes Science Center, the Cleveland Indians Jacobs Field, the John Hay High School and a city fire station.

How do we put many more Americans to work in renewables and energy efficiency? Until **SOLAR 2007**, no comprehensive study of these U.S. industries has measured the number of potential jobs using rigorous definitions. ASES and its partners will unveil a major report of the economic potential of renewable energy and energy efficiency industries using Ohio, a leading manufacturing state, as the initial case study.

As Ohio goes, so goes the nation when it comes to electing U.S. Presidents. Re-tooling Ohio's economic engine to run on and produce clean energy products can also drive a national commitment for advanced technologies to create new jobs and world-class industries. This sustainable energy path can recover our climate, as well as renew our economic future. Let this early 21st Century Renaissance take hold during **SOLAR 2007** at *Cleveland, Ohio—the "Green City on the Blue Lake!"*

Bill Spratley

Chair, SOLAR 2007, National Organizing Committee

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Cover photo

Kurt Krejny, KTKmedia



Conference Information

Location

Nearly all workshops, conference sessions and the Renewable Energy Products and Services Exhibit are being held at the Cleveland Convention Center. The Awards Banquet and Closing Luncheon will be at the Renaissance Cleveland Hotel.

Off-site events will depart from and return to the Cleveland Convention Center.

Conference Registration Counter Hours

Saturday, July 7, 7:30am — 5:00pm

Sunday, July 8, 7:30am — 7:00pm

Monday, July 9, 7:00am — 6:00pm

Tuesday, July 10, 7:30am — 6:00pm

Wednesday, July 11, 7:30am — 5:00pm

Thursday, July 12, 8:00am — 12:00pm

Name Badges and Tickets

Please check in at the SOLAR 2007 Registration counter for your name badge, tickets and totebag. Your name badge is your admission to all conference sessions, and your tickets will admit you to the special events, workshops and tours for which you registered.

Messages

The Conference message board will be near the registration area. You may leave messages on the board for other attendees.

Speaker Ready Room

The Speaker Ready Room will be R225. A computer will be available to help you prepare for your presentation. The room will be open the following hours:

Monday, July 9, 9:30am — 5:00pm

Tuesday, July 10, 9:30am — 5:00pm

Wednesday, July 11, 9:30am — 5:00pm

Thursday, July 12, 9:30am — 10:30am

Speakers' Breakfasts

Speakers, Session Chairs and Moderators should attend the Speakers' Breakfast on the day of their presentation to meet with other speakers in their sessions and receive last minute updates. Please bring biographical information. Speakers' Breakfasts will be from 7:00 am – 8:00 am Monday through Thursday in R212B.

SOLAR 2007 Publications

All Technical Session papers are published in the Conference Proceedings, which are free to conference registrants. Forum presenters generally do not write papers, and are not included in the Proceedings. Your copy of the proceedings is in the totebag you received when you checked in at registration. You may purchase additional copies at the ASES Publications Store.

In addition to Conference Proceedings, the SOLAR 2007 Publications Store will offer books and merchandise at special conference prices.

Smoking

Smoking is not allowed in meeting rooms or hallways. Your cooperation is appreciated.

AIA Learning Units

Many Conference sessions can be used by AIA members to meet AIA Learning Unit and Health, Safety and Welfare related requirements. To receive continuing education credit for eligible sessions attended at SOLAR 2007, AIA members must complete the AIA/CES Program Conference Participation Form C-1. Copies of these forms, which are specific to SOLAR 2007, are available at the Conference registration desk. Forms must be completed and returned to the Conference registration desk by noon on Thursday, July 12. **Forms must be completed and correct BEFORE you leave the Conference.**

Conference Policies

The Conference organizers do not condone discrimination against any individual on the basis of sex, sexual preference, creed, religion, race, national affiliation or physical ability. The organizers do not necessarily condone the policies, political affiliation or opinions of the authors or sponsors. Robert's Rules of Order will govern the Conference. According to these rules, "any person who attempts to disrupt the proceedings in a manner obviously hostile to the announced purpose of the meeting can be . . ." required by the session chair "to leave the hall and they have no right to appeal such an order."

Solar Café

The Solar Café is located in the Exhibit Hall and is open during regular exhibit hours. Coffee and soda breaks will be served in the Café, as well as special goodies each afternoon.

Internet Café

High-speed and wireless internet access, sponsored by RenewableEnergyAccess.com, will be available to all Conference attendees in the Exhibit Hall. Use our computers or your own!

Exhibits

The Solar and Renewable Energy Products and services exhibit will feature 160 booths and displays. The Exhibit Hall will open at 10:00am on Sunday, July 8.

The Exhibit Hall is free and open to the public. For more information about the Exhibits and other special events associated with the Exhibit Hall, please see the Exhibit Program provided in your registrant totebag and available in the Exhibit Hall.

Hours are:

Sunday, July 8, 10:00am — 5:00pm

Monday, July 9, 10:00am — 5:00pm

Tuesday, July 10, 10:00am — 4:00pm

Leading the world to better energy

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at booth
#143**

Powering a cleaner planet

Conergy is one of the world's largest renewable energy companies, with operations in more than 23 countries. We are 100% dedicated to renewable energy. Through our R & D efforts and supplier network, we bring innovations that make renewable energy accessible, dependable, and easy to use. Our global strength and expertise make us your reliable partner in powering a cleaner planet.

Pioneering renewable energy solutions

Our mission is to provide the best renewable energy solution for every energy demand worldwide. We take pride in what we do and it shows. Everyone at Conergy is passionate about renewable energy. We were recently recognized as one of the world's top 20 sustainable companies. We are proof that today's companies can be financially successful without compromising environmental responsibility.

Supporting our renewable energy partners

At Conergy, we pride ourselves on being a trusted partner to renewable energy installers. Our strong sales, technical, and customer service teams provide assistance with project modeling, system design, and technical support. We deliver key services including DealerNet, our online ordering system, and the Conergy Commercial Finance Program, a suite of finance options.

For more information:
www.conergy.us
or call (888) 396-6611



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Featured Speakers



David Beach,
Executive Director,
EcoCity Cleveland
David Beach is the founder and director of EcoCity Cleveland. He has built the organization into a respected center of thought and

practice about sustainability and the design of cities in balance with nature. Founded as a nonprofit organization in 1992, EcoCity Cleveland works in city neighborhoods to promote environmentally-friendly redevelopment that improves quality of life and economic competitiveness. It works in the countryside to promote sensitive development that preserves open space and the ecological integrity of the landscape. And, balancing city and country, EcoCity works to shape regional plans for land use and transportation. EcoCity Cleveland's projects, research, and publications have won national acclaim. Its journal has been nominated three times for national "Best of the Alternative Press Awards." And its web site, www.ecocity-cleveland.org, recently was named one of the 50 best web sites for planning and community development.



Dr. Roger H. Bezdek,
President,
Management Information Services, Inc.

Dr. Bezdek has 30 years experience in research and management in the energy, utility, environmental, and regulatory areas, serving in private industry, academia, and the federal government, and is the founder and president of Management Information Services, Inc.—a Washington, D.C.-based economic and energy research firm. He has served as Corporate Director, Corporate President and CEO, University Professor, Research Director in ERDA/DOE, Special Advisor on Energy in the Office of the Secretary of the Treasury, U.S. energy delegate to the European Community and to the North Atlantic Treaty Organization, and as a participant in the State Department AMPART program. Dr. Bezdek received his Ph.D. in Economics from the University of Illinois (Urbana), is an internationally recognized expert in energy market analysis, R&D assessment, and energy forecasting. He has served as a U.S. representative to international organizations on energy and environmental issues, and lectures frequently on energy research issues, economic forecasting, energy, and environmental topics.



Jason Bing,
Manager, Ann Arbor's Environmental House

Jason Bing manages Recycle Ann Arbor's Environmental House, a green building and energy efficiency education center. His work includes the promotion of healthy, energy efficient home and workplace construction in southeast Michigan. He has been involved in the development of a local green building network, an innovative urban reclaimed wood program, and is the coordinator for this year's first annual conference and expo, Remodel Green Midwest. As a member of the Ann Arbor Energy Commission, Bing has participated in the planning and development of community programs for the city in response to the Mayor's 2006 Green Energy Challenge—30% green energy for municipal operations by 2010; 20% green energy community wide by 2015. Bing holds a graduate degree in architecture from Kent State University, has several years of professional experience designing and detailing sustainable buildings, is a LEED (Leadership in Energy and Environmental Design) accredited professional, and is a certified ResNET HERS (Home Energy Rating System) rater.



Sherry Boschert,
Author, Journalist

Sherry Boschert has published more than 2,000 articles in her 27-year career as a journalist, and has published her first non-fiction book: *Plug-in Hybrids: The Cars that Will Recharge America*. As a medical news reporter and an environmentalist, she is acutely aware of the negative consequences of gasoline cars and the benefits of alternative-fuel vehicles, especially plug-in cars. She's had four electric cars, giving her first-hand experience of the technology, its advantages and its disadvantages. Solar panels on the roof of her home make enough electricity to power her car and house. She looks forward to the day when more cars will be driving on sunshine. For the past 14 years, she has devoted some of her off-work time to organizing the San Francisco Electric Vehicle Association (www.sfeva.org).



Travis Bradford,
Founder, President,
and Director of the Prometheus Institute for Sustainable Development

Bradford founded the Prometheus Institute in 2003 as a means to connect the vast reach and power of industrial and capital markets with the technologies necessary to sustain and develop long-term economic well-being for people around the world. Having spent time in nearly 40 countries, he has seen first-hand the state of economic development and the need to develop markets to make existing sustainable technologies more available and cost-effective. Travis authored of *Solar Revolution: The Economic Transformation of the Global Energy Industry* (MIT Press, 2006) as well as several industry reports and is the managing editor of *PVNews*TM, the solar energy industry's oldest newsletter. Prior to founding the Prometheus Institute, Bradford was a partner at Steel Partners II, L.P., a hedge fund based in New York City focused on the acquisition, growth, and sale of small publicly traded and privately owned businesses. In this capacity, Bradford served as both a board member and active management participant in businesses and industries ranging from industrial filters to fertilizer distributors. Bradford has worked for the Federal Reserve Bank, lectured at top Universities including Harvard University, MIT, Columbia University, Duke University, and New York University on finance, entrepreneurship, and renewable energy economics. He is also a partner at Atlas Capital, a hedge fund based in Cambridge, MA.

Featured Speakers



**Carol Campbell,
Vice President,
Human Resources,
First Solar, Inc.**

Carol Campbell joined First Solar in March 2006 as Director of Human Resources and was named Vice

President of Human Resources in March 2007. Prior to joining First Solar, she was the Regional Director of Human Resources for North America at the Dana Corporation, where she was responsible for all Dana plants in the U.S., Canada, and Mexico. She has her Professional Human Resources certification through the Society of Human Resources Management and has extensive experience successfully developing and running highly effective HR organizations in complex and rapidly changing environments. She graduated Magna Cum Laude from Heidelberg College with a B.S. in Business.



**Frank G. Jackson,
Mayor, Cleveland**

Frank G. Jackson, the 56th Mayor of Cleveland, grew up in Cleveland, attended public school here, received his associate's degree from Cuyahoga

County Community College and his bachelor's, master's, and law degrees from Cleveland State University. A Vietnam War veteran, Mayor Jackson was elected to Cleveland City Council in 1989 to represent Cleveland's Ward 5. He served as council member for 16 years. In 2002, Mayor Jackson was elected by the 21 member City Council to serve as Council President. During his tenure, City Council worked to retain jobs, encourage new businesses and growth in the city, and improve the quality of life for people in Cleveland. Mayor Jackson said he wants his time in office to be judged on "what we do for the least of us." He says he will know he has made a difference if his work unites the lives of children, seniors, disabled people, families, businesses and all who share this great city. He will know he has made a difference when we can all see "One People, One City, and One Mission."



**Bernie Kotlier,
Director, Green
Building Solutions,
IBEW-NECA Greater
Los Angeles**

Bernie Kotlier is the director of Green Building Solutions for the Labor Management

Cooperation Committee (LMCC), a joint effort of Local 11 of the International Brotherhood of Electrical Workers, and the National Electrical Contractors Association of Greater Los Angeles. Bernie is responsible for the development and implementation of green building education and training programs, as well as related green business activities. Bernie comes to the LMCC from Solectria Renewables where he served as director of business development for the Western United States. Before moving to the renewable energy industry, Bernie built a twenty year career in the bicycle business where he held top management positions in domestic and international markets. Educated at Bennington College and The University of California, Berkeley, Bernie went on to promote energy conservation in the transportation sector by developing, manufacturing, marketing, and distributing products like Mongoose Bicycles and Bell Helmets.



**Peter Lawson
Jones, Cuyahoga
(Ohio) County
Commissioner**

In February 2002, Peter Lawson Jones became a member of the Board of Cuyahoga County Commissioners

(BOCC). Jones, the only African-American county commissioner in the State of Ohio, is Vice President of the BOCC and represents the Board as President of the Cuyahoga County Arts & Cultural District, Vice Chairman of the Cuyahoga County Solid Waste District and as the BOCC's designee to the Community Partnership for Arts and Culture, Convention and Visitors Bureau of Greater Cleveland Executive Committee, Greater Cleveland Sports Commission and the World Trade Center-Cleveland/International Trade Alliance. He is also a member of the Executive Committee of the Northeast Ohio Area wide Coordinating Agency. Jones previously served two and one-half terms in the Ohio House of Representatives, where he was the ranking minority (Democratic) member of the House Finance and Appropriations

Committee and second vice president of the Ohio Legislative Black Caucus. Jones is a partner with the law firm of Roetzel & Andress, working in the firm's Cleveland office as part of the public law group. Jones is a graduate of Harvard College (Magna Cum Laude in Government) and Harvard Law School.



**Alexander "Andy"
Karsner, Assistant
Secretary for
Energy Efficiency
and Renewable
Energy (EERE), U.S.
Department of
Energy**

Alexander Karsner was

unanimously confirmed by the Senate as America's ninth Assistant Secretary for Energy Efficiency and Renewable Energy (EERE) and sworn in as a member of the sub-cabinet by Secretary of Energy Samuel W. Bodman on March 23, 2006. The Assistant Secretary manages the Department of Energy's \$1.47 billion applied science, research, development, and deployment portfolio, which promotes marketplace integration of renewable and environmentally sound energy technologies. Previously, Karsner served as an international infrastructure developer and energy entrepreneur in the private sector on a wide range of technologies including heavy fuel oil, distillates, natural gas, coal, wood waste/biomass, wind energy and distributed generation based upon renewable technologies. The Assistant Secretary is an accomplished scholar, was a Rotary International Fellow, and received an MA from Hong Kong University. He graduated with Honors from Rice University and subsequently received the prestigious Hugh Scott Cameron Award as Outstanding Alumnus.

Featured Speakers



Kathleen A. McGinty, Secretary, Pennsylvania Department of Environmental Protection

A native of Philadelphia, DEP Secretary Kathleen A.

McGinty earned a chemistry degree from Saint Joseph's University and a law degree from Columbia University School of Law. Since then, her career has taken her to the White House and around the world. Between 1989 and 2001, McGinty served in various capacities in national and international public policy leadership. In January 1996, she was designated a "Global Leader for Tomorrow" by the World Economic Forum in Davos, Switzerland. During her tenure in the U.S. Senate, Secretary McGinty worked to promote U.S. leadership in the manufacture of advanced technologies while also serving on U.S. delegations negotiating global environmental treaties. She chaired the White House Council on Environmental Quality—the first (and still only) women to head CEQ, an office established by law in 1969—and acted as Deputy Assistant to President Bill Clinton. She also created and headed the first-ever White House Office on Environmental Policy. In 2003, Secretary McGinty became the first woman to head the state Department of Environmental Protection. McGinty's emphasis is in creating approaches to environmental problems that generate economic growth and encourage advanced technology development in Pennsylvania.



Carl Pope, Executive Director, Sierra Club

Carl Pope was appointed Executive Director of the Sierra Club in 1992. A veteran leader in the environmental movement, Pope has been with the Sierra Club for nearly thirty years. In that time he has served as Associate Conservation Director, Political Director and Conservation Director. In addition to his work with the Sierra Club, Pope has had a distinguished record of environmental activism and leadership. He has served on the Boards of the California League of Conservation Voters, Public Voice, National Clean Air Coalition, California Common Cause, Public Interest Economics, Inc., and Zero Population Growth. Pope was also Executive Director of the California League of Conservation Voters and the Political Director of Zero Population Growth. Mr.

Pope is co-author—along with Paul Rauber—of *Strategic Ignorance: Why the Bush Administration Is Recklessly Destroying a Century of Environmental Progress*, which the New York Review of Books called "a splendidly fierce book." Pope's other books include *Sahib, an American Misadventure in India* (1971) and *Hazardous Waste in America* (1981). Pope graduated Summa Cum Laude from Harvard College in 1967. He then spent two years as a volunteer with the Peace Corps in Barhi, Bihar, India.



John S. Reynolds, FAIA, Professor Emeritus, University of Oregon, Chair, American Solar Energy Society

John S. Reynolds F.A.I.A. joined ASSES

in 1975, and served on the board from 1984–1990, and as Vice Chair 1985–1987. John received the American Solar Energy Society's Passive Pioneer Award in 1997, and was elected a Fellow in 2000. He served as Chair of three ASSES national conferences in Portland, Oregon: 1981, 1987, and 2004. A Professor of Architecture Emeritus at the University of Oregon, Reynolds was named a Fellow of the American Institute of Architects in 2003. He was also named Distinguished Professor by the Association of Collegiate Schools of Architecture in 1998. He is currently a board member and Vice President of the non-profit Energy Trust of Oregon. He is co-author of *Mechanical and Electrical Equipment for Buildings*, 6th through 10th editions. His grant from the Graham Foundation for Advanced Studies in the Fine Arts, 1995–96 resulted in *Courtyards: Aesthetic, Social, and Thermal Delight* © 2002, John Wiley and Sons.



Ronald "Ron" Richard, President and Chief Executive Officer, The Cleveland Foundation

Over the past 24 years, Mr. Richard has held a variety of senior management positions in government, the private sector, and the non-profit sector. Prior to joining the Foundation, Richard was the chief operating officer and managing partner of In-Q-Tel, the CIA's venture capital fund. In this role, he worked to ensure the prompt and effective delivery of In-Q-Tel-sourced technologies into the U.S. intelligence community. Before joining In-Q-Tel, Richard spent 13

years at Matsushita Electric (Panasonic) in senior management positions. Richard holds a Master's degree in international relations from the Johns Hopkins University School of Advanced International Studies, a Bachelor's degree in history from Washington University in St. Louis and an honorary doctorate from Notre Dame College.



Jerome Ringo, President, Apollo Alliance

Jerome Ringo's experience organizing environmental and labor communities and his drive to further diversify the environmental

movement bridges many of Apollo's partners to create a broad based coalition to provide real solutions for our energy crisis. In 1996, Ringo was elected to serve on the National Wildlife Federation Board of Directors and, in 2005, Ringo became the Chair of the Board. In so doing, he also became the first African-American to head a major conservation organization. Ringo was the United States' only black delegate at the 1998 Global Warming Treaty Negotiations in Kyoto, Japan. In addition to being present during Kyoto Treaty Negotiations, Ringo represented the National Wildlife Federation at the United Nations' conference on sustainable development in 1999.



Susan Roaf, Councillor, School of the Built Environment, Oxford Brookes University, UK

Sue Roaf is an expert in sustainability, benchmarking, solar technologies and design, eco-tourism, and traditional building technologies. She is also a Professional Training Advisor, and Oxford City Councillor for Wolvercote Ward, an ARB registered Architect, a member of the Worshipful Company of Chartered Architects, Fellow of the Royal Society of Arts, Fellow of the Schumacher Society, and Freeman of the City of London. She has recently been a part of The Oxford Solar Initiative—a project to encourage more people to reduce their carbon emissions, resulting in 132 energy efficiency house projects and 34 new solar hot water systems, the Universol EU project to promote Photovoltaics in Universities and the Asia IT project to promote Sustainable Buildings.

Featured Speakers



Danilo (Dan) Santini, Senior Economist, Section Leader, Technology Analysis, Center for Transportation Research, Argonne National Laboratory

Danilo (Dan) Santini obtained his Ph.D. in Urban Systems Engineering and Policy Analysis from Northwestern University in 1976. He began working at Argonne National Laboratory in 1974. Santini was chair of the Chicago Chapter of the International Association of Energy Economists from 1985–86. From 1992–2004 Santini was section leader of the Technology Assessments Section within the Center for Transportation Research at Argonne National Laboratory, and now is leader of the Technology Analysis section. He served as chair of the Alternative Fuels Committee of the National Research Council's Transportation Research Board from 1996–2002. In 2003 he was awarded the title senior economist. Since May of 2001 he has been the DOE's primary technical representative for the U.S. to the International Energy Agency Implementing Agreement on Hybrid and Electric Vehicles. In 2003 he became a member of the American Transportation Research Institute's Research Advisory Committee. Santini has authored, co-authored or edited 150 articles, reports, and conference papers.



Paul Scott, Environmental Activist, Co-Founder, Plug In America, Director of Business Development, Amalgamated Pixels, Sales Rep, Energy Efficiency Solar

Paul Scott, a lifelong environmental activist, co-founded Plug In America (PIA) in 2005 to galvanize support and advocate for the manufacture of electric vehicles and plug-in hybrids. As one of the organization's most visible leaders, he is regularly interviewed by media coast to coast and works with auto industry officials, consumers and local, state and federal policymakers to advance clean car technology. He is among the key figures featured in "Who Killed the Electric Car?" the 2006 documentary distributed by Sony Pictures Classics. Scott works professionally as Director of Business Development for Amalgamated Pixels, a visual effects company, and is a sales representative for Energy Efficiency Solar, a solar panel installation

firm. His Toyota RAV4 EV runs on sunshine generated by the PV on his own roof in Santa Monica. He is President of the Electric Vehicle Assn. of Southern California.



Bill Spratley, Executive Director, Green Energy Ohio

Spratley has led GEO since 2001 and is based in Columbus. Spratley lends a wealth of experience and knowledge in the utility and energy sector, having served as Ohio's first Consumer's Counsel and as a national utility consultant. His vast national and statewide network of contacts, including the U.S. DOE, Ohio Dept. of Development, national foundations and chairing SOLAR 2007 continue to gain new credibility and visibility for GEO. An attorney since 1973, Spratley was President of William A. Spratley & Associates Inc., a consulting firm, starting in 1993. He headed the photovoltaics4you National Consumer Project to assist state utility consumer advocates in understanding solar electric issues. As the State of Ohio's first Consumers' Counsel, 1977–1993, Spratley was founding president of the National Association of State Utility Consumer Advocates (NASUCA). He served on U.S. DOE advisory boards under Presidents Carter, Bush and Clinton. A College of Wooster graduate, Spratley's J.D. is from Ohio State University's College of Law.



George Sterzinger, Executive Director, Renewable Energy Policy Project

George Sterzinger has more than twenty years experience in energy policy and regulation. In the late 1980s, as Commissioner of the Vermont Department of Public Service, he initiated state efforts to secure an advanced gasifier that could use waste wood to power an advanced turbine generator. Sterzinger also worked extensively with the Corporation for Solar Technologies and Renewable Resources to establish a solar development zone in Nevada. He conducted the feasibility study for that project and wrote the initial request for proposals (RFP) that secured an agreement with Enron to develop up to 100 MW of photovoltaic (PV) capacity and sell the output at 5.2 cents per kWh (\$1995, adjusted for inflation), a price that would be competitive in today's power markets. At that time, an inability to look beyond short-term conditions precluded obtaining

project financing. This and other experiences with emerging technologies convinced Sterzinger that renewable energy development must rely upon more than strong research and technology development. To realize clean energy's full potential, technology development must be closely linked to, and enabled by, education, outreach, policy analysis and hands-on project development advocacy.



Congresswoman Stephanie Tubbs Jones, Representing Ohio's Eleventh Congressional District, U.S. House of Representatives

Stephanie Tubbs Jones is the first African-American woman elected to the United States House of Representatives from Ohio. Currently in her fifth term in office, the Congresswoman, a strong advocate for many issues, has championed wealth building and economic development, access and delivery of health care, and quality education for all. The Congresswoman chairs the Committee on Standards of Official Conduct (Ethics). Additionally, she serves on the powerful Ways and Means Committee and is an active member of numerous Congressional Caucuses, including the Congressional Black Caucus. Most recently, Congresswoman Tubbs Jones introduced the "Count Every Vote" Act of 2005 which seeks to provide an all-encompassing solution to a broad range of voting irregularities that occurred during the 2004 presidential election. She is an original co-sponsor of multiple significant pieces of legislation, including healthcare for low and middle-income families and community reentry for ex-felons.



Jeffery Wolfe, CEO, groSolar

Wolfe is a recognized leader in the solar industry and has led the design and installation of some of the largest solar projects in the U.S. He serves on the board of the Solar Electric Industry Association and chairs the PV division. While a partner at the engineering firm Bard, Rao & Athanas, he designed over four million sq. feet of construction and nine MW of power generation. He is a certified professional engineer and has a BSME degree from Cornell University.

Special Events

Special Events include luncheons, dinners, the conference social event, and other events that require separate registration. You do not have to register for the conference to register for a special event.

Friday, July 6

5:30pm – 8:30pm

'Cleveland From the Water' Evening Cruise

Registration Price: \$10

ASES chapter representatives and all early-arriving SOLAR 2007 participants are invited to enjoy an evening cruise on Lake Erie and the Cuyahoga River aboard Cleveland's largest sight-seeing vessel—the Goodtime III. This 1,000 passenger luxury ship offers plenty of room to mingle with spacious sun decks, large semi-opened second deck and the main glass enclosed lower deck which is air conditioned and heated for passengers' comfort. The sight seeing trip includes a fast changing panorama of Cleveland's skyline, capturing the special atmosphere of the Flats at night and the beauty of the city as it sparkles and glistens on the lakefront. A fine variety of sandwiches, snacks, soft drinks and spirits are available.

Saturday, July 7

8:30am – 5:00pm

ASES Chapters' Caucus Room R205

Registration Price: \$30, includes lunch

For representatives of ASES Chapters and forming chapters, a networking and training program. Representatives are encouraged to bring brochures and newsletters to share.

Sunday, July 8

8:30pm

Conference Opening Reception

Exhibit Hall (Public Auditorium)

Registration Price: Free to all conference registrants

Come meet new friends, greet old ones, and get an up-close look at the exhibit hall during this great food and cash bar reception. Entertainment provided by "The Rolling Blackouts."

9:30am – 5:30pm

Great Lakes Science Center

**Just behind the Wind Turbine
visible from the Convention Center**

The Great Lakes Science Center has generously offered free admission to all SOLAR 2007 attendees for the entire day! Visit the Science Center any time wearing your conference name badge and see one of America's largest interactive science museums. More than 400 exciting "hands-on" exhibits, breathtaking OMNIMAX® films, daily demonstrations and exciting educational programs show visitors the interdependency of science, environment and technology, particularly in the Great Lakes Region.

Monday, July 9

12:00pm – 2:00pm

Women in Solar Luncheon Room R212B

Registration Price: \$25, includes lunch

Join us for a networking lunch after the Women in Solar Forum. Come and hear amazing women tell their amazing stories—and maybe tell one of your own!

6:00pm – 7:00pm

Reception

Renaissance Cleveland Hotel, Grand Ballroom Foyer

Included in Banquet Registration (see below)

Start your festive evening with a drink and light appetizers, sponsored by Southwest Windpower. One drink provided by Southwest Windpower, cash bar thereafter.

7:00pm – 10:00pm

Awards Banquet

Renaissance Cleveland Hotel, Grand Ballroom
Registration Price: \$25

Join your colleagues and friends for the Annual Awards Banquet. A brief awards presentation will be followed by a command performance of the Petroleum Pop Princess and the Crude Oil Dancers. Come to recognize and honor the Award winners, stay for the delicious dinner and all of the surprises in store!

Southwest Windpower

Renewable Energy Made Simple

Thursday, July 12

12:30pm – 2:00pm

Conference Closing Luncheon

**Renaissance Cleveland Hotel,
Grand Ballroom**

Registration Price: Free to conference registrants; extra tickets \$50

We'll wrap up the conference with an update on a major new study being conducted by the American Solar Energy Society on the potential for the renewable energy industry to create jobs in Ohio. The first of its kind, the ASES Jobs Study will look at all of the potential jobs related to the Renewable Energy and Energy Efficiency industries—manufacturing, sales, service and many more. The first study will focus on Ohio, but ASES plans to use this study as a model for studies to be conducted in several other states. Also, come see what we have in store for SOLAR 2008 being held in San Diego in May 2008.

Tuesday, July 10

7:00pm – 10:00pm

Party at the Rock and Roll Hall of Fame and Museum

Registration Price: \$45

Since its opening in 1995, the Rock and Roll Hall of Fame and Museum has established itself as the preeminent home for the celebration and study of rock and roll music. Its exhibits, educational programs and performance events have made the Museum a Mecca for fans, scholars and the artists themselves. In fact, research shows that the Museum is the most popular and best-attended hall of fame in the country. We will have the Rock Hall all to ourselves during this very special evening. Experience the museum's permanent collection, drawn from the most impressive and iconic rock and roll artifacts and a wide-ranging roster of on-going and temporary exhibits. The Museum continually augments its own collection of thousands of artifacts with items on loan from artists and collectors from around the world. In addition to these items, the Museum's exhibits utilize film, video, interactive kiosks and, of course, music. Your ticket price for this event will include admission to the Museum and a buffet dinner. A cash bar will be available. The Rock and Roll Hall of Fame and Museum is within easy walking distance of the Cleveland Convention Center and the Renaissance Hotel, but for your convenience a shuttle will run continuously between all three during the event. Vegetarian dinner selections sponsored by Chagrin Wild Oats Market Natural Marketplace.



Business Meetings

Business Meetings are conducted by participating organizations. Any meetings listed in the final SOLAR 2007 printed program are open to all conference registrants.

Saturday, July 7

8:00am – 5:30pm
ASES Chapters Caucus **Room R205A**

Sunday, July 8

11:00am – 5:00pm
ASES Divisions Caucus **Room R205A**

Monday, July 9

7:00am – 8:00am
ASES Membership Committee **Room R212B**

12:30pm – 1:30pm
ASES Renewable Fuels and Transportation
Division **Room R208**
ASES Meetings & Conferences Committee
Room R201

4:00pm – 5:00pm
ASES Solar Buildings Division **Room R230B**
ASES Solar Thermal Division **Room R211**

5:00pm – 6:00pm
ASES Small Wind Division **Room R205A**

Tuesday, July 10

7:00am – 8:00am
ASES Fundraising Committee **Room R212B**

12:00pm – 2:00pm
Society of Building Science Educators
Annual Meeting **Room R230B**

12:30pm – 1:30pm
ASES Ethics and Members Concerns
Committee **Room R201**
ASES Resource Applications Division
Room R211

5:30pm – 6:30pm
ASES Solar Electric Division **Room R204**
ASES Sustainability Division **Room R203**

Wednesday, July 11

7:00am – 8:00am
ASES Policy Committee **Room R212B**

12:30pm – 1:30pm
ASES Annual Meeting **Room R230B**

5:30pm – 6:30pm
ASES Awards Committee **Room R203**
ASES Clean Energy and Water Division
Room R204

Thursday, July 12

7:00am – 8:00am
ASES Divisions Committee **Room R212B**
ASES Nominating Committee **Room R212B**

3:00pm – 6:00pm
ASES Board of Directors Meeting (Day 1)
Renaissance Cleveland Hotel
– Superior Room

Friday, July 13

8:00am – 3:00pm
ASES Board of Directors Meeting (Day 2)
Renaissance Cleveland Hotel
– Superior Room

courtesy of travelcleveland.com



Schedule at-a-Glance

Saturday, July 7

7:30am – 5:00pm
Registration Open

8:00am – 6:00pm

Tours

Central Ohio Sustainability Tour **Off-Site**
Ohio Amish Country Tour **Off-Site**

8:30am – 12:30pm

Workshops

The Basics of Solar Heating **Room R202**
Legal Issues in Structuring Solar Projects **Room R203**

8:30am – 5:30pm

Meeting/Special Event

ASES Chapters Caucus **Room R205A**

Workshops

First Things First: Efficiency and Conservation, a Hands-On Approach to Personal and Company Energy Audits and Renewable Energy Planning **Room R210**
Green Building: The Materials, Techniques, and Technologies Required to Build Energy-Efficient, Solar-Powered Green Homes **Room R211**
Introduction to Distributed Power Systems **Room R205C**
Photovoltaic Power Systems and the National Electrical Code **Room R205B**

1:30pm – 5:30pm

Workshops

“What Are They Thinking?” Insights into the Consumer Mindset on Energy Efficiency and Renewable Energy **Room R204**
Design and Installation Guidelines for Solar Hot Water Systems **Room R202**
Disaster Lab: Applications of Portable Multi-function Solar Energy Systems for Disaster Relief and the Developing World **Room R203**

Buses for off-site workshops and tours depart from and return to the Cleveland Convention Center

Sunday, July 8

7:30am – 7:00pm
Registration Open

8:00am to 12:00pm

Tour

Downtown Cleveland Public Demonstration Sites **Off-Site**

8:30am – 12:30pm

Workshops

Bringing Renewables to Life: Public Installations, Education, Exhibits, Interactives and Data **Off-Site**
PV Payback **Room R230A**

8:30am – 5:30pm

Tour

Northwest Ohio Technology Sites **Off-Site**

Workshops

Building Solar: Solar Design Fundamentals for Building Professionals **Room R202**
Course Development for Renewable Energy Dealer/Installer Training Programs **Room R206**
Photovoltaic Markets, Technology, Cost, Performance with Emphasis on Building Integrated PV **Room R210**
Renewable Energy for the Developing World **Room R201**
Small Wind Power for Homes, Farms, Business, and Schools **Room R204**
Solar & Radiant Floor Heating Systems Design Workshop **Room R203**

9:30am – 5:30pm

Public Event

Great Lakes Science Center
Just behind the Wind Turbine visible from the Convention Center

10:00am – 12:00pm

Public Event

Film Screenings (*see Exhibits Program for schedule*) **Room R212B**

10:00am – 5:00pm

Exhibit Hall

Exhibits Open **Public Auditorium**

Public Events

Consumer Presentations (*see Exhibits Program for schedule*) **Room 212A**
Consumer Presentations **Room R205B**
Consumer Presentations **Room R211**
Consumer Presentations **Room R208**

11:00am – 5:00pm

Meeting

ASES Divisions Caucus **Room R205A**

1:00pm – 2:30pm

Meeting/Public Event

GEO Annual Meeting **Room R212B**

1:00 – 3:00pm

Dealer/Installer Training

Solectria Commercial Grid-Tied Inverter Dealer/Installer Training Session **Room R209**

1:00 – 6:00pm

Tour

Oberlin College and Community Tour **Off-Site**

1:30pm – 5:30pm

Workshop

Designing High Performance Sustainable Homes **Room R204**

2:30pm – 3:30pm

Public Event

Book Signing **Registration Area**

3:00pm – 5:00pm

Public Event

Film Screenings (*see Exhibits Program for schedule*) **Room R212B**

Dealer/Installer Training

Solectria Residential Grid-Tied Inverter Dealer/Installer Training Session **Room R209**

3:30pm – 5:30pm

Workshop

Find Your Dream Job in Solar **Room R230A**

6:30pm – 8:00pm

Plenary

Conference Opening Plenary **Music Hall**

8:30pm – 10:00pm

Special Event

Opening Reception **Public Auditorium**
Come meet new friends, greet old ones, and get an up-close look at the exhibit hall during this great food and cash bar reception. Entertainment provided by “The Rolling Blackouts.”

Schedule at-a-Glance

Monday, July 9

7:00am – 8:00am

Monday Speakers' Breakfast **Room R212B**

7:00am – 6:00pm

Registration Open

8:30am – 10:00am

Plenary

The Economic Development Potential of Renewable Energy **Music Hall**

10:00am – 5:00pm

Exhibits Open **Public Auditorium**

10:30am – 12:00pm

Forums

Bringing "Solar Convection" Technology into the Mainstream: Small Wind Turbine Installer Forum **Room R205A**

Overcoming State Regulatory Barriers to the Successful Development of Solar Projects **Room R205B**

Real Stories from Real Buildings **Room R202**

Women in Solar Forum **Room R210**

Technical Sessions

Solar Thermal Technical Advances **Room R211**

Innovation in Solar Financing **Room R230A**

Design Strategies and Tools **Room R230B**

12:00pm – 2:00pm

Special Event

Women in Solar Luncheon **Room R212B**

12:00pm – 5:30pm

Dealer/Installer Training

AEE Solar **Room 206**

12:30pm – 1:30pm

Meetings

ASES Renewable Fuels and Sustainable

Transportation Division **Room R208**

ASES Meetings & Conferences Committee **Room R201**

Technical Sessions

Poster Session: Annual Conference Papers **Room R202**

Poster Session: Policy and Marketing and Passive Conference Papers **Room R210**

2:00pm – 2:30pm

Special Event

Heliodon Demonstration **Registration Area**

2:00 – 3:30pm

Forums

Growing Renewable Energy Markets Through State Policy: A Look at What's Happened, What's Happening and Where to Go From Here **Room R202**

JOB CREATION & YOU: Job Opportunities in Renewable Energy and Energy Efficiency **Room R210**

Residential BIPV Installation Details **Room R205A**

The Importance of Demonstration Projects in Providing Education and Awareness of Renewable Energy to the Public **Room R205B**

Technical Sessions

Solar Thermal Applications **Room R211**

Wind Power Markets and Trends **Room R230A**

High Performance Building Case Studies **Room R230B**

3:00pm – 4:00pm

Dealer/Installer Training

Solveox Installation Dealer/Installer Training or How to Connect Solar in Under an Hour **Room R204**

3:30pm – 5:30pm

Dealer/Installer Training

Renewable Performance Monitoring **Room R205C**

4:00pm – 5:00pm

Meetings

ASES Solar Buildings Division **Room R230B**

ASES Solar Thermal Division **Room R211**

5:00pm – 6:00pm

Meeting

ASES Small Wind Division **Room R205A**

6:00pm – 7:00pm

Special Event

Banquet Reception **Renaissance Cleveland Hotel Grand Ballroom Foyer**

7:00pm – 10:00pm

Special Event

Awards Banquet **Renaissance Cleveland Hotel Grand Ballroom**

Noel Clark



Schedule at-a-Glance

Tuesday, July 10

7:00am – 8:00am

Tuesday Speakers' Breakfast **Room R212B**

Meeting

ASES Fundraising Committee **Room R212B**

7:30am – 6:00pm

Registration Open

8:30am – 10:00am

Plenary

State and Private Programs and Jobs Created by Them **Music Hall**

10:00am – 4:00pm

Exhibit Hall

Exhibits Open **Public Auditorium**

NOTE – This is the last day the Exhibit Hall will be open – tear down begins at 4:00pm

10:30am – 12:00pm

Forums

Educational Programs That Are Moving the Midwest Renewable Energy Market

Forward **Room R210**

Legacy Schools **Room R205A**

Seeing is Believing: Going Mainstream with Small Wind **Room R202**

Technical Sessions

Resource Measurements **Room R211**

Solar Thermal Design **Room R230A**

Designing Comfort **Room R230B**

12:00pm – 2:00pm

Meeting

Society of Building Science Educators

Annual Meeting **Room R230B**

12:30pm – 1:30pm

Meetings

ASES Ethics and Members Concerns

Committee **Room R201**

ASES Resource Applications Division

Room R211

2:00pm – 3:30pm

Forums

Eliminating Skepticism in the Economical Application of Solar Energy

Room R205B

Greening the Curriculum: Process, Practice and Potential **Room R210**

Home Grown Bio-Fuels **Room R205A**

Spirit and Sustainability **Room R202**

Technical Sessions

Resource Modeling **Room R211**

Maximizing Solar and Efficiency **Room R230A**

Daylighting Tools and Case Studies **Room R230B**

3:00pm – 4:00pm

Dealer/Installer Training

Solveox Installation Dealer/Installer Training or How to Connect Solar in Under an Hour **Room R204**

4:00pm – 5:30pm

Forums

The Basics of Successful Passive Solar Design **Room R210**

Community Wind and the USDA Farm Bill **Room R202**

Opportunities for Solar Thermal in Industrial

Process Applications **Room R205B**

Traction Battery Development **Room R205A**

Technical Sessions

Resource Data Applications **Room R211**

Policy Perspectives **Room R230A**

Daylighting and Glare **Room R230B**

5:30pm – 6:30pm

Meetings

ASES Solar Electric Division **Room R204**

ASES Sustainability Division **Room R203**

6:30pm – 10:00pm

Special Event

Rock & Roll Hall of Fame and Museum

Off-Site

Wednesday, July 11

7:00am – 8:00am

Wednesday Speakers' Breakfast

Room R212B

Meeting

ASES Policy Committee

Room R212B

7:30am – 5:00pm

Registration Open

8:00am – 10:00am

Dealer/Installer Training

Solectria Commercial Grid-Tied Inverter Dealer/Installer Training Session

Room R205C

8:30am – 10:00am

Plenary

Workforce Development

Music Hall

10:00am – 12:00pm

Dealer/Installer Training

Solectria Residential Grid-Tied Inverter Dealer/Installer Training Session

Room R205C

10:30am – 12:00pm

Forums

The PV Experience Curve: What Technology Will Bring Us the Lowest Cost Panels and Grid Competitive Electricity?

Room R205A

Solar Thermal Economic Development

Strategies for Cities and Public Utilities

Room R210

Talkin' About Peak Generation: Could a Renewable Capacity-Based RPS Rock?

Room R202

Technical Sessions

PV Systems and Cells **Room R230A**

Education and Training **Room R211**

Getting to 2010 **Room R230B**

12:30pm – 1:30pm

Meeting

ASES Annual Meeting

Room R230B

Schedule at-a-Glance

Thursday, July 12

2:00pm – 3:30pm

Forums

As Green as it Gets? Working to Make Green Jobs Even Greener **Room R205A**

The Cost of Tackling Climate Change with Energy Efficiency and Renewable Energy **Room R205B**

Solar Thermal: An Untapped Market Solution **Room R210**

Utility Solar Programs: Finding a Model that Works **Room R202**

Technical Sessions

PV Performance Evaluation **Room R230A**

Building Components **Room R230B**

Design Narratives **Room R211**

4:00pm – 5:30pm

Forums

The Aesthetics of Energy: Art, Public Participation, and Education **Room R205B**

Creating Solar “Buzz”: How to Market Solar On the Grassroots Level **Room R202**

A Look at Net Metering **Room R210**

Quality Assessment for Renewable Energy Practitioners, Products & Services: Update & Trends on Certification Activities **Room R205A**

Technical Sessions

PV Code and Grid Interactions **Room R230A**

High Performance Residential Case Studies **Room R230B**

5:30pm – 6:30pm

Meetings

ASES Awards Committee **Room R203**

ASES Clean Energy and Water Division **Room R204**

6:30pm – 8:00pm

Plenary

Emerging Transportation **Room R230**

8:15pm – 10:00pm

Plenary

Emerging Architecture **Music Hall**

7:00am – 8:00am

Thursday Speakers’ Breakfast **Room R212B**

Meetings

ASES Divisions Committee **Room R212B**

ASES Nominating Committee **Room R212B**

8:00am – 12:00pm

Registration Open

8:00am – 5:00pm

Workshop

Women’s Utility Interactive Photovoltaics (day 1 of 4) **Off-Site**

8:30am – 10:00am

Forums

Policies Needed to Tackle Climate Change with Energy Efficiency and Renewable Energy **Room R210**

Solar Water Heating: Installation Issues **Room R205A**

Teaching Sustainability in Schools of Architecture: Models from the Ecology and Design Report **Room R202**

Update on the New Version of the National Solar Radiation Database (Session 1) **Room R205B**

Technical Sessions

Renewable Conversions and Hydrogen **Room R211**

Expanding U.S. Solar Markets **Room R230B**

Sun, Sky and Urban Environments **Room R230A**

10:30am – 12:00pm

Forums

Advanced Solar Thermal’s Potential to Meet California’s Global Solutions **Room R205A**

Education for Sustainable Energy Careers **Room R210**

National Renewable Energy Incentives **Room R202**

Thin-Film Photovoltaics in Ohio: Activities of the Wright Center for Photovoltaics Innovation and Commercialization **Room R211**

Update on the New Version of the National Solar Radiation Database (Session 2) **Room R205B**

Technical Sessions

Water Pumping and Purification **Room R230B**

Assessing Building Impacts **Room R230A**

12:30pm – 2:00pm

Special Event

Closing Luncheon **Renaissance Cleveland Hotel Grand Ballroom**

2:00pm – 6:00pm

Tour

NASA Glenn Research Center Tour **Off-Site**

3:00pm – 6:00pm

Meeting

ASES Board of Directors Meeting (Day 1) **Renaissance Cleveland Hotel Superior Room**

Friday, July 13

8:00am – 3:00pm

Meeting

ASES Board of Directors Meeting (Day 2) **Renaissance Cleveland Hotel Superior Room**

8:00am – 5:00pm

Workshops

Cleveland Tool Day: A Hands-On Building Performance Analysis Workshop **Off-Site**

Women’s Utility Interactive Photovoltaics (day 2 of 4) **Off-Site**

Buses for off-site workshops and tours depart from and return to the Cleveland Convention Center

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Solar Energy Technologies Program

U.S. Department of Energy
Energy Efficiency and Renewable Energy
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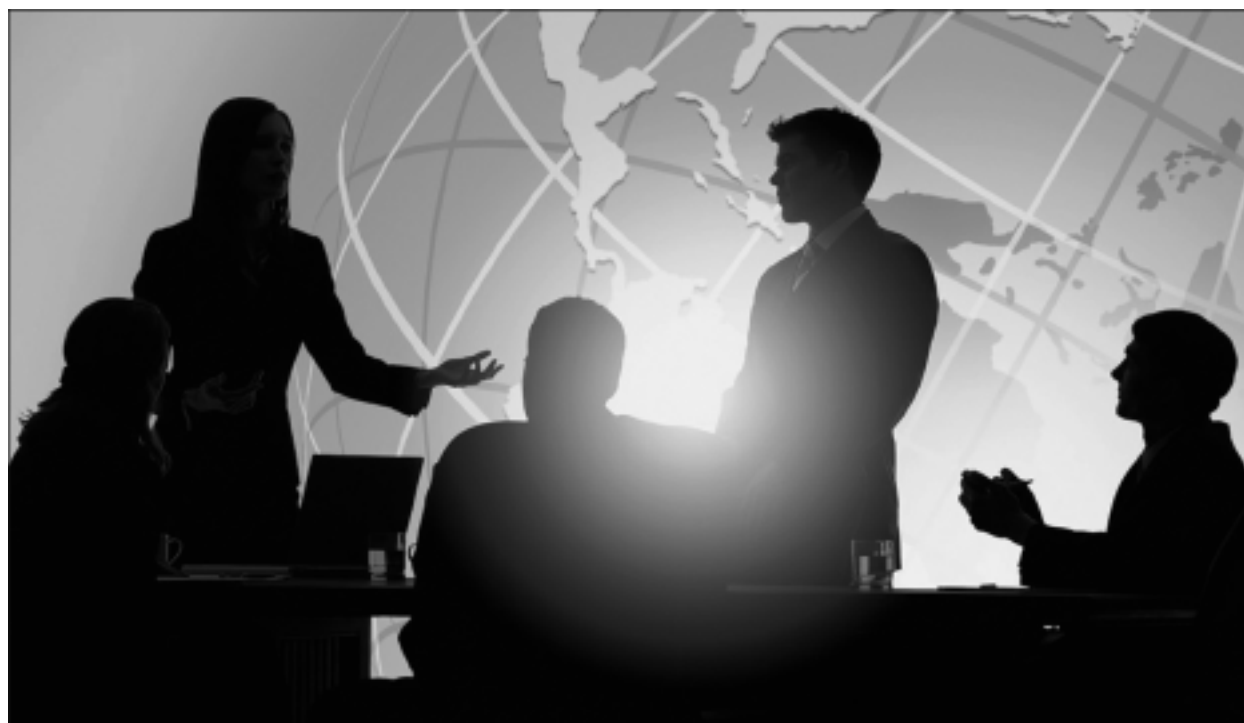
To learn more about the Solar Program and
the State American Initiative please visit
www.solar.energy.gov/solar

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Convention and Visitors Bureau of Greater Cleveland

Conference Program

Saturday, July 7

7:30am – 5:00pm

Registration Open

8:00am – 6:00pm

Tours

(for more information, see page 57)

Central Ohio Sustainability Tour

Off-Site

Ohio Amish Country Tour

Off-Site

8:30am – 12:30pm

Workshops

(for more information, see page 50)

The Basics of Solar Heating

Room R202

Legal Issues in Structuring Solar Projects

Room R203

8:30am – 5:30pm

Meeting/Special Event

(for more information, see page 10)

ASES Chapters Caucus

Room R205A

Workshops

(for more information, see page 50–51)

First Things First: Efficiency and Conservation; a Hands-On Approach to Personal and Company Energy Audits and Renewable Energy Planning

Room R210

Green Building: The Materials, Techniques, and Technologies Required to Build Energy-Efficient, Solar-Powered Green Homes

Room R211

Introduction to Distributed Power Systems

Room R205C

Photovoltaic Power Systems and the National Electrical Code

Room R205B

1:30pm – 5:30pm

Workshops

(for more information, see page 520)

“What Are They Thinking?” Insights into the Consumer Mindset on Energy Efficiency and Renewable Energy

Room R204

Design and Installation Guidelines for Solar Hot Water Systems

Room R202

Disaster Lab: Applications of Portable Multi-function Solar Energy Systems for Disaster Relief and the Developing World

Room R203

Saturday



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Conference Program

Sunday, July 8

7:30am – 7:00pm

Registration Open

8:00am – 12:00pm

Tour

(for more information, see page 57)

Downtown Cleveland Public Demonstration Sites **Off-Site**

8:30am – 12:30pm

Workshops

(for more information, see page 53)

Bringing Renewables to Life: Public Installations, Education, Exhibits, Interactives and Data **Off-Site**

PV Payback **Room R230A**

8:30am – 5:30pm

Tour

(for more information, see page 57)

Northwest Ohio Technology Sites **Off-Site**

Workshops

(for more information, see pages 53 – 55)

Building Solar: Solar Design Fundamentals for Building Professionals **Room R202**

Course Development for Renewable Energy Dealer/Installer Training Programs **Room R206**

Photovoltaic Markets, Technology, Cost, Performance with Emphasis on Building Integrated PV **Room R210**

Renewable Energy for the Developing World **Room R201**

Small Wind Power for Homes, Farms, Business, and Schools **Room R204**

Solar & Radiant Floor Heating Systems Design Workshop **Room R203**

9:30am – 5:30pm

Public Event

Great Lakes Science Center **Just behind the Wind Turbine visible from the Convention Center**

10:00am – 12:00pm

Film Screenings *(see Exhibitor Program for schedule)*

Room R212B

10:00am – 5:00pm

Exhibit Hall

Exhibits Open

Public Auditorium

Public Events

Consumer Presentations *(see Exhibitor Program for schedule)* **Room 212A**

Consumer Presentations **Room R205B**

Consumer Presentations **Room R211**

Consumer Presentations **Room R208**

11:00am – 5:00pm

Meeting

ASES Divisions Caucus *(for more information, see page 10)* **Room R205A**

1:00pm – 2:30pm

Meeting/Public Event

Green Energy Ohio Annual Meeting **Room R212B**

Join GEO as we celebrate our 7th Annual Meeting. The program will feature GEO's 2006–2007 Program Report, and Annual Recognition Awards, as we congratulate outstanding individuals, businesses, and others working to further sustainable energy projects and practices in Ohio. Annual Meeting attendees will receive the commemorative, full color **2006–2007 GEO Annual Report / Annual Meeting Program** publication.



Conference Program

Sunday, July 8

1:00 – 3:00pm

Dealer/Installer Training

Solectria Commercial Grid-Tied Inverter
Dealer/Installer Training Session **Room R209**

- For PV solar contractors, installers, designers, engineers, consultants, architects, and system integrators
- Complete commercial technical inverter training covering 13, 15, 60, 82, and 95 kW inverters
- Q&A to answer your specific questions on inverters and systems.
- NABCEP Continuation credit available (4 points)

1:00 – 6:00pm

Tour

(for more information, see page 57)

Oberlin College and Community Tour **Off-Site**

1:30pm – 5:30pm

Workshop

(for more information, see page 55)

Designing High Performance Sustainable Homes
Room R204

2:30pm – 3:30pm

Public Event

Book Signing **Registration Area**

3:00pm – 5:00pm

Public Event

Film Screenings *(see page Exhibitor Program for schedule)*
Room R212B

Dealer/Installer Training

Solectria Residential Grid-Tied Inverter
Dealer/Installer Training Session **Room R209**

- For PV solar contractors, installers, designers, engineers, consultants, architects, and system integrators
- Complete commercial technical inverter training covering 13, 15, 60, 82, and 95 kW inverters
- Q&A to answer your specific questions on inverters and systems.
- NABCEP Continuation credit available (4 points)

3:30pm – 5:30pm

Workshop

(for more information, see page 56)

Find Your Dream Job in Solar **Room R230A**

6:30pm – 8:00pm

Plenary

Conference Opening Plenary **Music Hall**

Moderator: Bill Spratley, Executive Director, Green Energy Ohio and SOLAR 2007 Conference Chair

- Peter Lawson Jones, Cuyahoga County Commissioner
- Honorable Stephanie Tubbs Jones, United States Congresswoman
- Ohio Governor Ted Strickland (invited)
- John Reynolds, FAIA, Chair, ASES Board of Directors
- Ronn Richard, President and CEO, the Cleveland Foundation
- Ohio Senator Sherrod Brown (invited)
- Andrew Karsner, Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy

8:30pm – 10:00pm

Special Event

Opening Reception **Public Auditorium**

Sunday

Looking for a career in renewable energy?

First Solar is looking for enthusiastic and dedicated team players to fill positions at our locations around the world. We offer competitive compensation, an attractive benefits package and a fast-paced environment.

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SMUD and Sacramento area home-builders now offer SMUD SolarSmart Homes—energy-efficient homes with state-of-the-art rooftop solar electric generation systems. Buyers save up to 60% on the average SMUD electric bill. SolarSmart Homes - affordable, comfortable and quiet...making it easy for homebuyers to do the right thing for the environment.

For information, contact Wade Hughes at 916-732-5858.

*Based on GREENE Homes' Carson Crookings of "Palmey Roads" also data reported by Business for week ending Feb. 18, 2007.





Conference Program

Monday, July 9

7:00am – 8:00am

Monday Speakers' Breakfast

Room R212B

7:00am – 6:00pm

Registration Open

8:30am – 10:00am

Plenary

The Economic Development Potential of Renewable Energy

Music Hall

- Cleveland Mayor Frank Jackson
- Carl Pope, Executive Director, Sierra Club
- Bernard Kotler, Trainer, Los Angeles National Electrical Contractors Association/IBEW Local 11
- Alan Waxman, Managing Director, Goldman Sachs (invited)

10:00am – 5:00pm

Exhibit Hall

Exhibits Open

Public Auditorium

10:30am – 12:00pm

Forums

Bringing "Solar Convection" Technology into the Mainstream: Small Wind Turbine Installer Forum

Room R205A

Moderated by: Paul Gipe, Ontario Sustainable Energy Association

Attendees will gain insight on the current strategies employed by successful small wind installers, answer questions on the challenges of installing small turbines and discuss the upcoming NABCEP certification for small wind installers.

Presentations will describe advantages and expenses of installing with various utilities and counties and identify winning strategies they have used to open up the local market. Speakers will briefly review the turbines they install and identify the site-specific factors that can affect installation and turbine performance (obstructions, tower height, setback requirements, etc.), recommendations for properly remanufacturing used equipment, required maintenance, and safety requirements (including work platforms, fall-arrest anchors, and fall-arrest systems). Attendees will be given ample time for questions and interactive discussion with panel members.

Speakers include:

- Erika Weliczko, REpower SOLUTIONS
- Geoff Greenfield, Third Sun Solar & Wind Power Ltd.
- Aaron Godwin, The Renaissance Group

Overcoming State Regulatory Barriers to the Successful Development of Solar Projects

Room R205B

Moderated by: Janine Migden-Ostrander, Office of the Ohio Consumers' Counsel

Many states face barriers to the development of solar energy— inflexible net metering laws, lack of support in the state legislature and lack of interest by utilities. Various regulatory strategies have been successful at overcoming these barriers and promoting solar energy implementation in the electricity sector. Renewable portfolio standards (RPS) have been in effect in several markets for a number of years. Favorable net metering laws, interconnection standards and standby rates have allowed technology such as photovoltaics to become a viable option for distributed generation market development. This session will review experiences with RPS and solar distributed generation to date, focusing on challenges and efforts to overcome them.

Speakers Include:

- Colin Murchie, SunEdison Corporate Headquarters
- Joshua Bar-Lev, BrightSource Energy, Inc.
- Erica Morgan, The Citizenre Corporation

Monday

Conference Program

Monday, July 9

10:30am – 12:00pm (cont)

Forums (cont)

Real Stories from Real Buildings **Room R202**

Moderated by: Nicholas Rajkovich, Society of Building Science Educators

This session will present findings from selected building case studies conducted by students, faculty and practitioners using methods and equipment from the Vital Signs and Agents of Change curriculum projects. This session is jointly sponsored by the Society of Building Science Educators (SBSE). The projects to be presented take a scientific look at building performance. The concept is simple: visit real buildings; make observations; develop questions and hypotheses about performance; make measurements and talk to building users; develop understandable conclusions that can inform future design efforts and building operations.

Presentations include:

- *Full Scale Experimentation for Natural Ventilation*
Macy Miller, Tristan VanSlyke, Ery Djuanedy and Kevin Van Den Wymelenberg, University of Idaho College of Art & Architecture
- *Living Learning Center Shading Devices*
Hayley Blair, Anna Felver, Shayan Sagari and Alison Kwok, University of Oregon
- *Cool at the Top*
Truc Bui, Sean Landry, Shawn Glad and Alison Kwok, University of Oregon
- *No Pane, No Gain*
Aaron Sherbany, Summer Sutton, Damon Wake, Kerianne Wells and Martha Bohm, Cornell University
- *Living in a Sustainable Home: The Give and Take of a Navajo Family Living in an Experimental House*
Ernesto Fonseca, Stardust Center for Affordable Homes and the Family, Arizona State University

Women in Solar Forum **Room R210**

Moderated by: Marlene Brown, New Mexico Solar Energy Association

Calling all you women in solar! This year's "Women in Solar" Forum will highlight amazing women from Ohio and listen to their successes in solar. Are you working in the solar industry or interested in getting started? We are again honored to be in a beautiful state with many women working in the solar industry. The forum will be followed by an exciting "Women in Solar" luncheon. The luncheon will have a keynote speaker and there will be plenty of time to network. All are welcome to attend.

Speakers include:

- Erika Weliczko, Owner, REpower SOLUTIONS
- Michelle Greenfield, Owner, Third Sun Solar and Wind Power, Ltd.
- Sara Ward, Chief, Ohio Dept. of Developments Office of Energy Efficiency
- Holly Harlan, Founder & Director, Entrepreneurs for Sustainability
- Debbi Perkul, Executive Director, Hard Hatted Women

Technical Sessions

Solar Thermal Technical Advances **Room R211**

Session Chair: Gary Vliet, University of Texas

- *Design and Testing of a Direct Photovoltaic Powered Drainback Solar Thermal Hot Water System*
J. Dontje, Berea College
- *A New, Unique, and Inexpensive Solar Hot Water Heater*
V. Mehler
- *Discharge Experiments in a Vertical Storage Tank with an Immersed Baffled Heat Exchanger*
J. Haltiwanger and J. Davidson, University of Minnesota
- *Optical Durability of Candidate Solar Reflectors for Concentrating Solar Power*
C. Kennedy and K. Terwilliger, National Renewable Energy Laboratory
- *Characteristic Curves of Solar Tower*
S. Khoshmanesh, Sharif University of Science and Technology, Iran

Innovation in Solar Financing **Room R230A**

Session Chair: Steven Letendre, Prometheus Institute for Sustainable Development

- *Transitioning from Solar Rebates to Market and Performance-Based Incentives: A Review of Alternative Transition Models*
N. Wobus and K. Cooney, Summit Blue Consulting;
J. Anderson, Rocky Mountain Institute; B. Hunter, New Jersey Board of Public Utilities and M. Ambrosio, Ambrosio Associates
- *Solar Shares Business Model*
J. McCabe, Ascent Solar Technologies, Inc. and J. Bertolino, Sacramento Municipal Utility District
- *Brokering For Reducing Costs and Increasing Customer Satisfaction In Solar Sales*
A. Black, OnGrid Solar Energy Systems
- *Solar RECs in the Pacific Northwest: The NW Solar Cooperative Results*
C. Boleyn, Cascade Solar Consulting LLC
- *Mosier Creek Townhomes: A Unique Solar Ownership Model*
D. Boleyn, Cascade Solar Consulting, LLC

Conference Program

Monday, July 9

10:30am – 12:00pm (cont)

Design Strategies and Tools

Room R230B

Session Chair: Pablo La Roche, Cal Poly Pomona

- *Climate Consultant 3.0: A Tool for Visualizing Building Energy Implications of Climates*
M. Milne, R. Liggett and R. Alshaali, UCLA Department of Architecture and Urban Design

- *Appropriateness of Natural Ventilation for Thermal Comfort in Different Climatic Regions*
G. Mehta, Arizona State University

- *Passive Environmental Control Strategies for a Cold Climate: The Eugene-H-Kruger Building at Laval University*
A. Potvin, and C. Demers, Université Laval, Canada

- *Direct Use of Solar Energy for Lighting: Results of the Hybrid Solar Lighting Field Trial Program*
M. Lapsa, D. Beshears, L. Maxey, and C. Ward, Oak Ridge National Laboratory

12:00pm – 2:00pm

Special Event

Women in Solar Luncheon

Room R212B

Registration Price: \$25, includes lunch

Join us for a networking lunch after the Women in Solar Forum. Come and hear amazing women tell their amazing stories—and maybe tell one of your own!

12:00pm – to 5:30pm

Dealer/Installer Training

AEE Solar

Room 206

AEE Solar has 28 years' experience in RE sales and distribution, including Solar, Wind, Hydro, Commercial Projects and Industrial Remote Power Solutions. We are teaming up with top manufacturers in this Solar Power training. You will learn about product capabilities and installation of solar modules, inverters, racking, and monitoring systems. A light lunch will be available for participants.

12:30pm – 1:30pm

Meeting

ASES Renewable Fuels and Sustainable Transportation Division

Room R208

ASES Meetings & Conferences Committee

Room R201

Technical Sessions

Poster Session: Annual Conference Papers

Room R202

Session Chair: Byron Winn, Colorado State University

- *Laser Welded Aluminum-Copper Absorbers for Thermal Flat Plate Collectors*
C. Brändle, Alanod Aluminium Veredlung GmbH & Co KG, Germany and U. Duerr, LASAG AG, Switzerland
- *Photovoltaic Pumping System Applied in Family Agriculture for Irrigation of Organic Cultivations*
J. Bione de Melo Filho, Universidade de Pernambuco and N. Fraidenraich and O. de Castro Vilela, Universidade Federal de Pernambuco, Brazil
- *Prototype Evaluation of Low-Temperature, Solar-Powered Desalination System*
V. Gude and N. Nirmalakhandan, New Mexico State University and C. Asbill and A. Rosenthal, Southwest Technology Development Institute
- *Photocatalytic Destruction of Water Pollutants Using a TiO₂ Film in PET Bottles*
M. Heredia and J. Duffy, University of Massachusetts Lowell
- *Photovoltaic Cell Based Portable Lighting Scheme Specially for Rural Areas*
B. Aprameya Swarup, S. Raghavendra, R. Anandamurthy and S. Deshpande, S.J. College of Engineering, India
- *Development of The Renewable Energy Research Laboratory for Academic Purpose in Thai University*
N. Watjanatepin, Rajamangala University of Technology, Thailand
- *Addition of a Photovoltaic (PV) Option to an Electric Golf Car*
B. Franks, R. Barthel and K. Remmel, College of Mount St. Joseph
- *Power Fluctuations from Large Solar Photovoltaic Arrays*
A. Curtright and J. Apt, Carnegie Mellon University
- *Embedded Instrumentation For Grid Interfacing of Photovoltaic Power Using Maximum Power Transfer Technique*
A. Krishnaa and J. Nagaraju, Indian Institute of Science, India
- *High Power Orthogonal Wind Power Units on the Surface of Lake Erie*
M. Lyatkher and V. Lyatkher, Clean Energy Co. Inc.

Monday

Conference Program

Monday, July 9

12:30pm – 1:30pm (cont)

Technical Sessions (cont)

Poster Session: Policy and Marketing and Passive Conference Papers **Room R210**

Session Chair: TBD

- *A Plan to Develop a Megawatt Solar Farm and Co-Located Solar Manufacturing Facility for Oregon*
C. Schrock and K. Nelson, Sun Oregon
- *PV Supply Chain Development in Ohio*
R. Schwerdtfeger, J. Hager and M. Martin, Edison Materials Technology Center
- *Energizing the Sylvania United Church of Christ with Solar Power*
A. Compaan, A. Lindsley and D. Finn, Sylvania United Church of Christ
- *Green Globes Assessment of Sustainable Architecture in Claremont California*
S. Clements, Z. Tucker and T. Lininger, California State Polytechnic University Pomona
- *Green Buildings In Massachusetts: Comparison Between Actual and Predicted Energy Performance*
J. Barrientos, U. Bhattacharjee, T. Martinez and J. Duffy, University of Massachusetts Lowell
- *Sensible Design: Investigating The Thermal Environment of the Public Gardens and Alleys of Boston's Back Bay*
G. Thomson, University of Wisconsin - Milwaukee and K. Settlemyre, The Green Roundtable
- *Truly Zero Energy Home: Grid-Tied PV, Solar Hybrid Cooking, Plus Other Unique Energy Conserving Features*
L. Schlussler, Sun Frost
- *Wind Turbine Integration: A Study of Building Shape and Orientation for Peak Power Generation*
J. Ritter-Lopatowski, University of Southern California
- *A Nature-Based Shower Cooling System*
C. Gavina and P. La Roche, California State Polytechnic University Pomona
- *Residential Passive Solar Heating and Geothermal Cooling Using a Novel Internally-Vented Trombe Wall*
R. Pearl, The Pearly Gates

2:00pm – 2:30pm

Special Event

Heliodon Demonstration

Registration Area

2:00 – 3:30pm

Forums

Growing Renewable Energy Markets Through State Policy: A Look at What's Happened, What's Happening and Where to Go From Here

Room R202

Moderated by: Bernadette Del Chiaro, Clean Energy Advocate, Environment California

Supreme Court Justice Louis Brandeis said state legislatures were the "laboratories of democracy" because of their willingness and ability to address urgent issues with new and innovative policy approaches. No issue area better elicits this dynamic than energy. For better and sometimes for worse, the states have been the incubators of new initiatives to change the way we consume, use, generate and sell the energy needed to run our modern world. While the tides are changing in D.C., leadership will continue to come from the states in the years to come. Much can be learned from the states that have taken the lead in promoting clean energy alternatives. This forum will study 3-4 state clean energy initiatives evaluating them for policy impact and political strategy.

Presentations include:

- *Action in the States: A Bird's-Eye View of State-Based Renewable Energy Policy*
Jeff Deyette, Energy Analyst, Union of Concerned Scientists
- *From Zero to Sixty in Six Seconds Flat: The Colorado Clean Energy Experiences*
Matthew Baker, Executive Director, Environment Colorado
- *State of California's Renewable Energy Programs: From the RPS to the Million Solar Roofs Initiative,*
Bernadette Del Chiaro, Clean Energy Advocate, Environment California
- *Why Steelworkers Support Renewable Energy Standards*
Tom Conway, International Vice President, United Steel Workers



Conference Program

Monday, July 9

2:00 – 3:30pm (cont)

JOB CREATION & YOU: Job Opportunities in Renewable Energy and Energy Efficiency

Room R210

Organized by: Paulette Middleton, Panorama Pathways

Welcome students and others looking for new opportunities!! The ASES Divisions Committee is providing the most up-to-date information on general job possibilities in a wide array of sectors.

- Clean Energy and Water
- Renewable Fuels and Sustainable Transportation
- Resource Applications
- Solar Buildings
- Solar Electric
- Solar Thermal
- Sustainability

Come with interest and questions. ASES division representatives will make brief presentations about current and near term job opportunities in their topical areas. Handouts with summary information and contact information will be provided.

Residential BIPV Installation Details **Room R205A**

Moderated by: Steve Heckeroth, ASES RFT Division

Residential BIPV products have the ability to provide distributed generation (DG) with zero emissions. The cost, weight and aesthetics of traditional PV panels mounted on top of common roofing products have presented significant barriers to their wide-spread application. New combination PV-roofing products have the potential to provide low-cost aesthetically pleasing residential DG solutions for the mass market. The forum will include brief presentations by several cutting edge residential BIPV installers and experts followed by a discussion on products that can turn homes into zero emission net energy producers.

Presentations include:

- *The Role of BIPV in Residential New Construction*
Aaron Nitzkin, Old Country Roofing
- *PVIC Activities in BIPV in Northwest Ohio*
Robert W. Collins, University of Toledo, Department of Physics and Astronomy
- *Decker Homes Activities in BIPV in Northwest Ohio*
Bill Decker, Sr., Decker Homes
- *Integrating PV with Roofing*
Dan Perkins, Dan Perkins Roofing

The Importance of Demonstration Projects in Providing Education and Awareness of Renewable Energy to the Public

Room R205B

Moderated by: Richard Stuebi, The Cleveland Foundation

Demonstration projects are an effective way to educate the public on renewable energy. Such projects are often installed in high profile locations which are accessible to large numbers of people and attract media attention. In this forum several demonstration projects will be presented. Learn about the marketing tools and educational programs which have been implemented by these high profile projects. Interactive displays, tours, websites and printed media are some of the strategies covered. Best practices and recommendations will be offered.

Presentations include:

- *The Cleveland Indians Pitch Solar Energy at Jacobs Field*
Bob DiBiasio, Vice President, Public Relations, Cleveland Indians
- *The Ohio Governor's Residence Solar Showcase*
Julie Stone, Facilities Manager, Ohio Governor's Residence
- *Benefits of Public Demonstration Projects to your local ASES Chapter*
Scotte Elliott, Green Energy Ohio
- *The Role of Real-Time Energy Monitoring and Online Data Display and Access in Education*
John Edmund Petersen, Assistant Professor of Environmental Studies and Biology, Oberlin College
- *Wind and Solar Power at the Great Lakes Science Center*
Blake Edward Andres, Vice President, Education and Exhibitions, Great Lakes Science Center

Monday

Conference Program

Monday, July 9

2:00 – 3:30pm (cont)

Technical Sessions

Solar Thermal Applications

Room R211

Session Chair: Cheryl Kennedy, National Renewable Energy Lab

- *Field Evaluation of an Unglazed, Building-Integrated, Solar Domestic Water Heating System*
R. Aldrich and D. Owens, Steven Winter Associates, Inc.
- *Solar Water Heating Improvement Project*
W. Bennett, University of Hawaii
- *Recent Progress in the Reliability and Degradation Study of the Sacramento Demonstration Novel ICPC Solar Collectors*
W. Duff and J. Daosuhko, Colorado State University
- *Experimental Investigation on Rehydration Characteristics of Solar Dried Potato Samples*
P. Tripathy and S. Kumar, Indian Institute of Technology, India
- *Evaluation of Mass Transfer Coefficient at Air-Food Interface During Drying Using Natural Convection Mixed-Mode Solar Dryer*
S. Kumar and P. Tripathy, Indian Institute of Technology, India
- *Evaluation of Ultra-Portable, Low-Cost, Multifunction, Inflatable Dish-Type Solar Concentrators for Disaster Relief, the Developing World, Education, and Recreation*
J. Essig and J. Essig, Radiant Apparatus, Inc.

Wind Power Markets and Trends

Room R230A

Session Chair: Trudy Forsyth, National Renewable Energy Lab

- *U.S. Distributed Wind Installation Trends*
L. Sherwood, Interstate Renewable Energy Council and Sherwood Associates and T. Forsyth, National Renewable Energy Laboratory
- *North American Certification for Small Wind Turbines: Establishing a Consumer-Friendly Rating System*
L. Sherwood, Interstate Renewable Energy Council and H. Rhoads-Weaver, eFormative Options, LLC
- *How to Build a Small Wind Energy Business: Lessons from California*
K. Sinclair, National Renewable Energy Laboratory
- *Wind Power and Economic Development: Real Examples from the Pacific Northwest*
J. Jenkins and T. Gagliano, Renewable Northwest Project

High Performance Building Case Studies

Room R230B

Session Chair: Liliana Beltran, Texas A&M University

- *Peak Electric Savings Raise the Importance of Increased Thermal Mass and Passive Solar*
B. Baccei, ConSol/BIRA
- *"A Generation Beyond" Office Update, Mason City, Iowa, USA: Integrating Renewable, Sustainable, Conservation and Environmental Design*
T. Hurd, Spatial Designs
- *To Inhabit the Device: A Sustainable Dwelling in Tenerife, Spain*
P. La Roche, California State Polytechnic University, Pomona; F. Mustieles, Universidad del Zulia, Venezuela and I. Oteiza, Instituto de Ciencias de la Construcción Eduardo Torroja, Venezuela
- *A High Performance School Case Study: Northern Guilford Middle School*
B. Koh and M. Nicklas, Innovative Design, Inc.

3:00pm – 4:00pm

Dealer/Installer Training

Solvevox Installation Dealer/Installer Training or
How to Connect Solar in Under an Hour

Room R204

Of the many parts involved in installing a solar hot water system the most time consuming is sourcing, sizing and connecting the valves, pumps, and controls. Spend 45 minutes with us and learn how you can reduce the time involved in your installs. This installation training applies to glycol and drain-back systems installed on either flat plate collectors or evacuated tube collectors.

3:30pm – 5:30pm

Dealer/Installer Training

Renewable Performance Monitoring **Room R205C**

Commercial renewable energy installations require reliable real-time performance monitoring solutions that are engineered for the 20-30 year lifetime of the power system. Sophisticated field data acquisition hardware, broad telecommunications support and data management services linked to web based information delivery are all part of a complete performance monitoring solution. If this sounds difficult to install and operate, please attend this session and learn how Draker's performance monitoring solutions make energy visible and installation simple!

Conference Program

Monday, July 9

4:00pm – 5:00pm

Meetings

ASES Solar Buildings Division

Room R230B

ASES Solar Thermal Division

Room R211

5:00pm – 6:00pm

Meetings

ASES Small Wind Division

Room R205A

6:00pm – 7:00pm

Special Event

Banquet Reception **Renaissance Cleveland Hotel
Grand Ballroom Foyer**

Included in Banquet Registration (see below)

Start your festive evening with a drink and light appetizers, sponsored by Southwest Windpower. One drink provided by Southwest Windpower, cash bar thereafter.

Southwest Windpower
Renewable Energy Made Simple

Kristen Baumliar as the Petroleum Pop Princess and the Crude Oil Dancers.

7:00pm – 10:00pm

Special Event

Awards Banquet

**Renaissance Cleveland Hotel
Grand Ballroom**

Registration Price: \$25

Join your colleagues and friends for the Annual Awards Banquet. A brief awards presentation will be followed by a command performance of the Petroleum Pop Princess and the Crude Oil Dancers. Come to recognize and honor the Award winners, stay for the delicious dinner and all of the surprises in store!



Monday



Overview of PVIC

PVIC was created as a Wright Center of Innovation in January 2007 through funding by the Ohio Department of Development. It is comprised of:

3 Ohio Universities:

The University of Toledo
The Ohio State University
Bowling Green State University and
17 Ohio Companies and Not-for Profits

Benefits of PVIC Membership

- ◆ Access to world-class researchers in 2nd and 3rd gen. photovoltaics (beyond silicon wafers)
- ◆ Access to world-class facilities for device fabrication, characterization, and lifetime testing
- ◆ Connections to new industrial partners
- ◆ Collaborators on federal grants (STTR, SBIR,...)
- ◆ Connections to licensing of university intellectual property
- ◆ Co-development of new products, patents
- ◆ Connection to the Alternative and Renewable Energy Business Incubator Megan Reichert, Director [megan.reichert@utoledo.edu]

Contact information

The Univ. of Toledo hub:

Dr. Robert W. Collins
Robert.Collins@utoledo.edu

The Ohio State University hub:

Dr. Robert J. Davis
Davis.2316@osu.edu

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Conference Program

Tuesday, July 10

7:00am – 8:00am

Tuesday Speakers' Breakfast

Room R212B

Meeting

ASES Fundraising Committee

Room R212B

7:30am – 6:00pm

Registration Open

8:30am – 10:00am

Plenary

State and Private Programs and Jobs Created by Them

Music Hall

Moderated by: David Renné, National Renewable Energy Lab

- George Sterzinger, Executive Director, Renewable Energy Policy Project
- Kathleen McGinty, Secretary, Pennsylvania Department of Environmental Protection
- Dennis Canavan, Senior Director, Global Energy, Johnson & Johnson

10:00am – 4:00pm

Exhibit Hall

Exhibits Open

Public Auditorium

NOTE: This is the last day the Exhibit Hall will be open.
Tear down begins at 4:00pm.

10:30am – 12:00pm

Forums

Educational Programs That Are Moving the Midwest Renewable Energy Market Forward

Room R210

Moderated by: Katy Matthai, Midwest Renewable Energy Association

Midwest chapters of the American Solar Energy Society (ASES) share the secrets of their successful educational programs. Four ASES chapters will highlight their programs that link renewable energy experts with consumers, professionals, and policy makers. The innovative initiatives include introductory-level community courses, intensive training for installers, and advocacy programs. Learn about their best practices, and walk away with tools and resources to help move the renewable energy market in your area.

Presentations include:

- *Solar 101 Program*
Mark Burger, Illinois Solar Energy Association
- *MREA Certification & Training Programs*
Katy Matthai, Midwest Renewable Energy Association
- *Solar Challenge in Northeast Ohio*
Athan Barkoukis, Green Energy Ohio
- *Go Solar Michigan*
Jennifer Alvarado, Great Lakes Renewable Energy Association

courtesy of travelcleveland.com



Conference Program

Tuesday, July 10

10:30am – 12:00pm (cont)

Forums (cont)

Legacy Schools

Room R205A

Moderated by: Blanche Sheinkopf, The Sheinkopf Group

This forum will address the components that make the ASER Legacy School program an educational success. Topics will include the school selection process, funding and donations, teacher training, classroom connections and curriculum, technical/installer training, installation of photovoltaics at the school and ongoing data monitoring.

Speakers include:

- Mary Spruill, The NEED (National Energy Education Development) Project
- Erika Weliczko, REpower SOLUTIONS
- Kenneth Hale, John Hay H.S.
- John Fellenstein, John Hay H.S.

Seeing is Believing: Going Mainstream with Small Wind

Room R202

Moderated by: Meg Gluckman, eFormative Options, LLC

In 2006, *Time Magazine* named a small wind turbine as one of its Top 100 Inventions of the Year. Does this mean small wind has made it mainstream? Maybe not yet, but there are many efforts underway to continue moving in that direction. This panel will look at the work underway to: help customers compare products and learn about financial incentives, use high-visibility media like popular magazines and TV for marketing, and incorporate wind energy, the science and the social issues, into education. Audience members will be invited to offer additional suggestions for helping small wind move into the mainstream market.

Speakers include:

- Scott Cronk, Energy Matters LLC
- Wayne Barringer, Porter Novelli
- Michael DiGrazia, American Solar Energy Society
- Megan C. Amsler, Cape & Islands Self-Reliance Corporation

Technical Sessions

Resource Measurements

Room R211

Session Chair: Richard Perez, Atmospheric Sciences Research Center, SUNY Albany

- *Performance Assessment of Routine Solar Radiation Measurements for Improved Solar Resource and Radiative Modeling*

C. Gueymard, Solar Consulting Services and D. Myers, National Renewable Energy Laboratory

- *Clear-Sky Shortwave Surface Radiation Intensities over the Globe*

C. Whitlock, S. Gupta, T. Zhang and W. Chandler, Science Systems and Applications, Inc.; P. Stackhouse, NASA Langley Research Center; L. Hinkelman, National Institute of Aerospace and C. Long, DOE Pacific Northwest National Laboratory

- *Measurements of Central Ohio Shortwave Cloud Radiative Effect: Assessment of Solar Power Potential*

J. Box, A. VanLoocke, E. Sautter, and J. DeGrand, The Ohio State University

- *Characterization of Wind Resources in Oberlin, OH for Potential Commercial Wind Power*

J. Scofield, M. Roth, J. Harrow, M. Stamas, E. Barker and R. Myers, Oberlin College and V. Oefftering, Oberlin Municipal Power & Light Systems

- *Solar PV in Coastal Pacific Northwest: The Real Picture*

V. Potnis and A. Scott, Green Building Services, Inc.

Solar Thermal Design

Room R230A

Session Chair: William Bennett, University of Hawaii

- *Experimental Results from Solar Cooker Modifications*

L. Hanna, E. Urban, C. Eger, C. Schreier and M. Pinnell, University of Dayton

- *Optimization of Solar Field Design for Single Axis Tracking Collectors*

D. Weinstock and J. Appelbaum, Tel Aviv University, Israel

- *Towards Development of an Algorithm for Mains Water Temperature*

J. Burch and C. Christensen, National Renewable Energy Laboratory

- *Test and Rate Methods for Thermosiphon Solar Water Heaters*

J. Burch, National Renewable Energy Laboratory and G. Shoukas, M. Brandemuhl and M. Krarti, University of Colorado at Boulder

- *Alternative Methods for Performance Testing of Solar Thermal Collectors*

S. Klein, D. Reindl and J. Beerman, University of Wisconsin

- *Evolution, Commercialisation and Success of Solar Concentrators in India: From Solar Cooking to Process Heating/ Cooling Applications*

D. Gadhia, Gadhia Solar Energy Systems Pvt. Ltd., India



Conference Program

Tuesday, July 10

10:30am – 12:00pm (cont)

Designing Comfort

Room R230B

Session Chair: James Wasley, University of Wisconsin - Milwaukee

- *Neutralising the Canadian Climate: The Double-Façade System at the New CDP Building in Montreal*
A. Potvin, C. Demers and D. Bourgeois, Université Laval, Canada
- *Thermal Comfort Performance Tests of Three Libraries at USC Using Dataloggers*
J. Suk and M. Schiler, University of Southern California
- *An Open-Source Program to Animate and Visualize the Recorded Temperature and Relative Humidity Data from Dataloggers Including the Building's 3D Geometry*
T. Baker, M. Schiler and K. Kensek, University of Southern California and M. Milne, University of California, Los Angeles

12:00pm – 2:00pm

Meeting

Society of Building Science Educators Annual Meeting

Room R230B

12:30pm – 1:30pm

Meeting

ASES Ethics and Members Concerns Committee

Room R201

ASES Resource Applications Division

Room R211

2:00pm – 3:30pm

Forums

Eliminating Skepticism in the Economical Application of Solar Energy

Room R205B

Moderated by: Kenneth Borah, Karpinski Engineering

Presentations include:

- *Maneuvering the Solar Energy Grant Process*
Richard Stuebi, The Cleveland Foundation
- *Getting Your Solar Energy Projects Built*
Alan Frasz, Dovetail Solar & Wind
- *Educating the Solar Energy User*
Christina Panoska, Green Energy Ohio
- *The Integration of Solar Energy into the Building Design Process*
William "Bill" Doty, Doty & Miller Architects

Greening the Curriculum: Process, Practice and Potential

Room R210

Moderated by: Michael Zaretsky, University of Cincinnati - DAAP

In the last ten years, the design and planning professions have fundamentally transformed as a response to client demand, recognition of short and long-term financial benefits and consciousness of the impacts of design and construction on climate change. The proliferation of the LEED building rating system has given the populace a measurable sign of success in the muddy waters of "green design." However, curricular change in architectural education has not responded as quickly. Students are demanding more courses in green design, qualified and enthusiastic faculty, and tools, resources, and better facilities. This forum will address curricular change and attempt to provide some tangible solutions for design educators, students and practitioners.

Speakers include:

- Leonard Bachman, Associate Professor of Architecture, University of Houston
- Mary Guzowski, Associate Professor of Architecture, University of Minnesota School of Architecture in the College of Design
- Bruce Haglund, Professor of Architecture, University of Idaho
- Tom Kimmerer, AASHE

Tuesday

Conference Program

Tuesday, July 10

2:00pm – 3:30pm(cont)

Forums (cont)

Home Grown Bio-Fuels

Room R205A

Moderated by: Dr. Jack Martin

This forum will examine several examples of how biofuel groups got started, and quickly grew into diverse programs expanding ways of making biodiesel available to people. The forum members will illustrate their trials and tribulations of their initial start up and growth. Attendees will listen to their shared history and support, present dilemmas and vision for the future.

Presentations include:

- *Evolution of a Concept*
Eric Henry, Burlington Biodiesel LLP
- *TBD*
Evan Ashworth, Piedmont Biofuels
- *Closing the Loops*
Jeremy Ferrell, Appalachian State University
- *Our Story*
Blue Ridge Biofuels

Spirit and Sustainability

Room R202

Moderated by: Stephen Sargent, Sargent Associates

Sustainability has many elements. Some of these involve the physical world, such as population, resources, and environment. There are also non-physical, spiritual elements, well described in the recent book by David Korten, *The Great Turning: From Empire to Earth Community*. It provides a guide to the changes in thinking that will be necessary to move us toward a more sustainable planet. This forum will examine some of those concepts, as well as other spiritual aspects of sustainability. This year, as every year for the past ten, it will provide a lift to those who continue to work towards a sustainable future.

Speakers include:

- Laurie Stone, Instructor, writer and international program manager, Solar Energy International
- Neil Collins, Marketing and Sales Specialist, Akeena Solar
- Jennifer Szaro, Renewable Energy Project Engineer, Orlando Utilities Commission
- Glenn Kizer, President, Foundation for Environmental Education

Technical Sessions

Resource Modeling

Room R211

Session Chair: David Renné, National Renewable Energy Lab

- *Completing Production of the Updated National Solar Radiation Database for the United States*
S. Wilcox, M. Anderberg, R. George, W. Marion, D. Myers and D. Renné, National Renewable Energy Laboratory; N. Lott and T. Whitehurst, National Climatic Data Center; W. Beckman, University of Wisconsin; C. Gueymard, Solar Consulting Services; R. Perez, State University of New York at Albany; P. Stackhouse, National Aeronautics and Space Administration and F. Vignola, University of Oregon
- *National Solar Radiation Database (NSRDB): 10 Km Gridded Hourly Solar Database*
R. George, S. Wilcox and M. Anderberg, National Renewable Energy Laboratory and R. Perez, State University of New York at Albany
- *NASA's Surface Meteorology and Solar Energy Web Portal (Release 6.0)*
W. Chandler, Science Systems and Applications, Inc.; P. Stackhouse, NASA Langley Research Center and C. Whitlock, J. Hoell, D. Westberg and T. Zhang, Science Systems and Applications, Inc.
- *Enhancing the Geographical and Time Resolution of NASA SSE Time Series Using Microstructure Patterning*
R. Perez and M. Kmiecik, Atmospheric Sciences Research Center; S. Wilcox, NREL and P. Stackhouse, NASA Langley Research Center
- *Relative Performance of Multiple Solar Radiation Resource Assessment Data Sources*
D. Myers, National Renewable Energy Laboratory

Conference Program

Tuesday, July 10

2:00pm – 3:30pm (cont)

Maximizing Solar and Efficiency **Room R230A**

Session Chair: Irene Stillings, The California Center for Sustainable Energy

- *Zero Peak Residential Electric Demand: An Evaluation of Strategies for Eliminating Peak Residential Demand in California Climate Zone 10*
C. Buntine, M. Schiler and T. Spiegelhalter, University of Southern California and M. Milne, University of California, Los Angeles
- *Turning Solar Consumers into Solar Citizens: Strategies for Wise Energy Use*
K. Janda, Oberlin College
- *Putting It All Together: Aggregating Benefits, Selling To Stakeholders—The Benefits of Zero Energy Homes Reach Far Past Homeowners*
R. Kerr, B. Baccei and R. Hammon, Building Industry Research Alliance (BIRA)
- *Making Solar Thermal Fit In: The Key to Ann Arbor's 5000 Solar Roofs Program or Was Farrington Daniels Wrong?*
W. Appleyard, Sunstructures Architects and D. Konkle, City of Ann Arbor
- *A Comparative Market and Utility Analysis of New High-Performance Homes in San Diego*
B. Farhar, University of Colorado and T. Coburn, Abilene Christian University
- *Modeling of Rural Energy Sector for Use of Renewable Energy Systems In India*
J. Mathur, Malaviya National Institute of Technology, India

Daylighting Tools and Case Studies **Room R230B**

Session Chair: Harvey Bryan, Arizona State University

- *Predicting Daylight Availability Based on Predicted Forecast of Weather Observatory for Better Daylight Design*
E. Ng, A. Gadi, F. Wong and J. He, The Chinese University of Hong Kong, PR China
- *Visualizing the Daylight Systemic: Measuring the Value of the Architectural Envelope + Continuous Dimming Strategies with HDR Photography in Existing Classroom Settings*
R. Lowe, M. Parker and D. Brentrup, University of North Carolina – Charlotte
- *The Influence of Daylighting on Occupants: Comfort and Diversity of Luminous Ambiances In Architecture*
C. Dubois, C. Demers and A. Potvin, Université Laval, Canada
- *An Assessment of Aiding DOE-2's Simplified Daylighting Method With DAYSIM's Daylight Illuminances*
R. Koti, BNIM Architects and M. Addison, Arizona State University
- *A New Daylighting Strategy for a Middle School in North Carolina*
H. Eckerlin and M. Manning, North Carolina State University and U. Atre, and J. Zubizarreta, Innovative Design Inc.

3:00pm – 4:00pm

Dealer/Installer Training

Solvelex Installation Dealer/Installer Training or How to Connect Solar in Under an Hour

Room R204

Of the many parts involved in installing a solar hot water system the most time consuming is sourcing, sizing and connecting the valves, pumps, and controls. Spend 45 minutes with us and learn how you can reduce the time involved in your installs. This installation training applies to glycol and drain-back systems installed on either flat plate collectors or evacuated tube collectors.

4:00pm – 5:30pm

Forums

The Basics of Successful Passive Solar Design

Room R210

Moderated by: Dan Chiras, Sustainable Systems Design, Inc.

Passive solar design provides year-round comfort and cost-saving performance with little or no additional upfront cost. Although passive solar design is simple in concept, there are many ways designers and builders compromise the performance and comfort of their homes. In this workshop, we'll explore passive solar design guidelines; design options, common design "mistakes," and energy software that can help us achieve optimal performance and comfort at minimal cost.

Presentations include:

- *Passive Solar Design Guidelines and Passive Solar Options*
Ron Judkoff, National Renewable Energy Laboratory
- *Lessons Learned: Avoiding Common Passive Solar Design Mistakes*
Dan Chiras, Ph.D., Sustainable Systems Design, Inc.
- *Energy Software to Optimize Designs: BGW2004*
Fred Roberts, Solaequis, Inc.

Community Wind and the USDA Farm Bill

Room R202

Moderated by: Trudy Forsyth, National Renewable Energy Lab

- *Community Wind & Economic Development*
Dan Juhl, Dan Mar Associates
- *Community Wind and USDA Farm Bill*
Lisa Daniels, Windustry
- *Small Wind and USDA Farm Bill*
Trudy Forsyth, NREL, National Wind Technology Center

Tuesday

Conference Program

Tuesday, July 10

4:00pm – 5:30pm(cont)

Forums (cont)

Opportunities for Solar Thermal in Industrial Process Applications

Room R205B

Moderated by: Lori Glover, SOLID Energy, Inc., Arizona

What things to the solar community, industry, utilities, engineers, and government entities need to know to apply solar thermal to industrial processes? The forum will discuss how best to achieve: 1) reliability, 2) cost-effectiveness, and 3) financial support. The forum will also provide examples of effective industrial applications and general guidance on self-assessment for industrial companies. The forum will also address the value of indirect benefits such as RECs (renewable energy credits), carbon credits, NOx allowances, offsets, and benefits to local economies and the evolution of a market for emission offsets that solar thermal systems generate.

Presentations include:

- *Commercial Solar Thermal for Industrial Processes: Lessons from the EU*
H. John Ellers, S.O.L.I.D. International, GmbH
- *Financing and Incentive Sources for Commercial Solar Thermal Process Applications*
Carlo La Porta, Capital Sun Group, Ltd.
- *On-Site Concentrating Solar Thermal for Industry*
Arnold Leitner, SkyFuel, Inc.

Traction Battery Development

Room R205A

Moderated by: Steve Heckerth, ASES RFT Division

Plug-in vehicles have the ability to reduce CO₂ emissions when they are plugged into the grid and eliminate emissions altogether when they are charged from renewable energy resources like photovoltaics and wind. The cost and weight of portable electronics batteries has quickly created whole new industries, yet heavy lead-acid traction batteries have remained the same for over 100 years. The forum will showcase exciting new developments in traction battery technology. Several cutting edge traction battery manufacturers and Argonne National Labs will make brief presentations that will be followed by a discussion on developments that have the potential to make our transportation system zero emission.

Speakers include:

- Michael E. Reed, Electro Energy Inc.
- Dr. Mark Daroux, Stratum Technologies, Inc.
- Evan House, Ph. D., Altair Nanotechnologies, Inc
- Naoki Ota, EnerDel, Inc.

Technical Sessions

Resource Data Applications

Room R211

Session Chair: Frank Vignola, University of Oregon

- *NASA's Support of Integrated Renewable Energy Systems through Provision of Solar and Meteorological Resource Information*
P. Stackhouse, NASA Langley Research Center and C. Whitlock, W. Chandler, J. Hoell, D. Westberg and T. Zhang, Science Systems and Applications, Inc.
- *Evaluation of PV Generation Capacity Credit Forecast on Day-Ahead Utility Markets*
R. Perez, M. Kmiecik, J. Schlemmer and L. Root, Atmospheric Sciences Research Center; K. Moore, Integrated Environmental Data and P. Stackhouse, NASA Langley Research Center
- *A Comparison of Three Free Computer Models for Evaluating PV and Hybrid System Designs: HOMER, Hybrid2, and RETScreen*
P. Gilman
- *Better Hybrid Renewable Energy System Design through Numerical Modeling and Site Monitoring*
A. Rossman, Draker Solar Design, LLC

Policy Perspectives

Room R230A

Session Chair: Rusty Haynes, North Carolina Solar Center

- *Learning from Others: Comparing U.S. and German Renewable Energy Policy*
F. Laird, University of Denver and C. Stefes, University of Colorado-Denver
- *Why Do States Adopt Renewable Portfolio Standards (RPS)?*
L. Villaire, Northern Illinois University
- *Designing PV Incentive Programs to Promote System Performance: A Review of Current Practice*
G. Barbose, R. Wiser and M. Bolinger, Lawrence Berkeley National Laboratory
- *Solar Power on Tribal Lands*
M. O'Connell, Stoel Rives LLP
- *California Solar Initiative: Status Update*
P. Shaw, California Public Utilities Commission
- *The Use of "Energy Parks" to Balance Renewable Energy in the San Diego Region*
R. Caputo, San Diego Renewable Energy Society and B. Butler, Butler Sun Solutions

Conference Program

Tuesday, July 10

4:00pm – 5:30pm (cont)

Daylighting and Glare

Room R230B

Session Chair: Murray Milne, University of California Los Angeles

- *A Classification of Daylighting Qualities Based on Contrast and Brightness Analysis*
C. Demers, Université Laval, Canada
- *Development of Two Heliodon Systems and Recommendations for Their Use*
R. Osser, M. Andersen and L. Norford, Massachusetts Institute of Technology
- *Interior Glare Problems of Watt Hall 3rd floor in University of Southern California*
J. Suk and M. Schiler, University of Southern California
- *Daylighting and Thermal Strategies In An Integrated Design Approach: Case Study of Laval University's New Medical Faculty Building*
C. Demers and A. Potvin, Université Laval, Canada

5:30pm – 6:30pm

Meetings

ASES Solar Electric Division

Room R204

ASES Sustainability Division

Room R203

6:30pm – 10:00pm

Special Event

Party at the Rock and Roll Hall of Fame and Museum

Registration Price: \$45

Since its opening in 1995, the Rock and Roll Hall of Fame and Museum has established itself as the preeminent home for the celebration and study of rock and roll music. Its exhibits, educational programs and performance events have made the Museum a Mecca for fans, scholars and the artists themselves. In fact, research shows that the Museum is the most popular and best-attended hall of fame in the country. We will have the Rock Hall all to ourselves during this very special evening. Experience the museum's permanent collection drawing from the most impressive and iconic rock and roll artifacts and a wide-ranging roster of on-going and temporary exhibits. The Museum continually augments its own collection of thousands of artifacts with items on loan from artists and collectors from around the world. In addition to these items, the Museum's exhibits utilize film, video, interactive kiosks and, of course, music. Your ticket price for this event will include admission to the Museum and a buffet dinner. A cash bar will be available. The Rock and Roll Hall of Fame and Museum is within easy walking distance of the Cleveland Convention Center and the Renaissance Hotel, but for your convenience a shuttle will run continuously between all three during the event. Vegetarian dinner selections sponsored by Chagrin Wild Oats Market Natural Marketplace.



Tuesday

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Conference Program

Wednesday, July 11

7:00am – 8:00am

Wednesday Speakers' Breakfast

Room R212B

Meeting

ASES Policy Committee

Room R212B

7:30am – 5:00pm

Registration Open

8:00am – 10:00am

Dealer/Installer Training

Solectria Commercial Grid-Tied Inverter

Dealer/Installer Training Session

Room R205C

- For PV solar contractors, installers, designers, engineers, consultants, architects, and system integrators
- Complete commercial technical inverter training covering 13, 15, 60, 82, and 95 kW inverters
- Q&A to answer your specific questions on inverters and systems.
- NABCEP Continuation credit available (4 points)

8:30am – 10:00am

Plenary

Workforce Development

Music Hall

Moderated by: Jane Weissman, Interstate Renewable Energy Council

- Mark Conroy, Global Sales and Marketing Leader for GE Energy's Solar Technologies business
- Jerome Ringo, Executive Director, Apollo Alliance
- Jeffrey Wolfe, CEO, groSolar
- Carol Campbell, Vice President, Human Resources, First Solar, Inc.

10:00am – 12:00pm

Dealer/Installer Training

Solectria Residential Grid-Tied Inverter

Dealer/Installer Training Session

Room R205C

- For PV solar contractors, installers, designers, engineers, consultants, architects, and system integrators
- Complete commercial technical inverter training covering 13, 15, 60, 82, and 95 kW inverters
- Q&A to answer your specific questions on inverters and systems.
- NABCEP Continuation credit available (4 points)

10:30am – 12:00pm

Forums

The PV Experience Curve: What Technology Will Bring Us the Lowest Cost Panels and Grid Competitive Electricity?

Room R205A

Moderated by: Alvin Compaan, Department of Physics and Astronomy

PV module manufacturing has followed a learning curve that shows the cost of PV panels drops to about 80% for each doubling of cumulative production. This forum will review the learning curve data and then will attempt to predict how much additional module cost reduction can occur and which technology will be the first to provide consumer electricity that competes successfully with traditional central-station power. Will it be modules assembled from silicon wafers (first generation)? Thin-film modules of amorphous silicon, cadmium telluride, or copper indium diselenide (second generation)? Or will it be self-assembled organic PV or some other third generation material?

Presentations include:

- *The Photovoltaics Experience Curve*
Robert Margolis, Senior Analyst, National Renewable Energy Laboratory
- *High Efficiency Silicon Wafer Technology*
Richard Swanson, President & Chief Technical Officer, SunPower Corp
- *Ultra High Efficiency Cells for Concentrators*
Raed Sherif, Head, Terrestrial Products Div., Spectrolab, Inc.
- *Flexible Thin-Film PV Modules For Building Integration*
Subhendu Guha, President, United Solar Ovonic
- *Thin-Film Modules for Utility Scale Power*
Chip Hambro, Chief Operating Officer, First Solar, LLC

Wednesday

Conference Program

Wednesday, July 11

10:30am – 12:00pm (cont)

Forums (cont)

Solar Thermal Economic Development Strategies for Cities and Public Utilities **Room R210**

Moderated by: Stephanie Strong, Entrepreneurs for Sustainability

The growth of the solar thermal industry can provide a region with high quality jobs, increased revenues from taxes and a reduction in dependency on foreign oil. Municipalities and public utilities have an interest in trying to encourage the growth of this industry. Developing strategies to help expand the growth of this industry is good for the environment, economy, and society. This forum will explore various models developed by a water utility, city and electric utilities to promote economic development and jobs in their local communities.

Speakers include:

- Andrew C Watterson, City of Cleveland, Department of Public Utilities
- Jeff Curry, Lakeland Electric
- Jay Hasheider, City of Columbia MO

Talkin' About Peak Generation: Could a Renewable Capacity-Based RPS Rock? **Room R202**

Moderated by: Jill Cliburn, Cliburn and Associates and Electric SUN

Even as Renewable Portfolio Standard policies begin to sweep the nation, solar PV remains an underutilized peak-focused resource. That's because RPS is typically geared toward kilowatt-hours, not kilowatts. In fact, some utilities are building new, carbon-emitting power plants, even as they meet RPS targets. This forum will explore prospects for a utility peak-capacity based RPS as an adjunct or enhancement to current strategies. The forum will address technical and political parameters of a capacity-base RPS, which could advance cost-effective solar development, maximize integrated solar/load management and solar/efficiency strategies, and build a stronger constituency for an aggressive national RPS.

Presentations include:

- *Solar as a Cost-Effective Utility Resource to Meet RPS Goals*
Chris Robertson, Electric SUN
- *Integrated Solar and Load Management Strategies: Going to the Grid Today*
George Simons, Itron
- *RPS in Motion: How Current Progress Might Accommodate or Limit a Capacity-Based Strategy*
Alan Nogee, Clean Energy Program Director, Union of Concerned Scientists
- *A Third Way: Working with Compatible Renewable, Energy Efficiency, and Load Management Strategies*
Bill Prindle, Deputy Director, American Council for an Energy Efficient Economy

Technical Sessions

PV Systems and Cells

Room R230A

Session Chair: Richard King, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy

- *PV Thermal Systems: Capturing the Untapped Energy*
J. Hollick and B. Barnes, Conserva Engineering Inc., Canada
- *Shading on PV Systems: Estimating the Effect*
F. Vignola, University of Oregon
- *Growth and Study of CuIn1-xAlxSe2 Thin Film Solar Cells*
K. Dhananjay, J. Nagaraju and S. Krupanidhi, Indian Institute of Science, India
- *Florida's Emergency Shelters Go Solar*
W. Young and S. Schleith, Florida Solar Energy Center

Education and Training

Room R211

Session Chair: Blanche Scheinkopf, The Scheinkopf Group

- *Renewable Energy Disaster Relief Fund Gives a Helping Hand*
W. Young, Florida Solar Energy Center and R. Reinarts, National Energy Foundation
- *Workforce Education for Renewable Energy: Lessons Learned from a National Gathering of Educators*
J. Weissman, Interstate Renewable Energy Council;
A. Ferranti, New York State Energy Research and Development Authority and K. Laflin, Partnership for Environmental Technology Education
- *Small-Scale Solar Photovoltaic Program for K-12 Schools*
L. Starks, Illinois Clean Energy Community Foundation
- *Discussion of PV Lab Equipment and Photovoltaic Systems for Teaching the Science of Photovoltaics*
I. Tyukhov, VIESH & MPEI(TU), Russian Federation and F. Vignola, University of Oregon
- *Creating Jobs for Women in Rural Nicaragua Through Grupo Fenix Participatory Solar Energy Projects*
S. Kinne and R. Komp, Universidad Nacional de Ingenieria, Nicaragua and C. Borrowman, Natural Resources Communications

Conference Program

Wednesday, July 11

10:30am – 12:00pm (cont)

Getting to 2010

Room R230B

Session Chair: Elizabeth Lewis, Florida A&M University

- *A Design Tool for Meeting the 2030 Challenge: Measuring CO₂, Passive Performance, and Site Use Intensity*
M. Milne, UCLA Department of Architecture and Urban Design
- *McCall Field Campus: A Pioneering Carbon-Neutral Studio Project*
B. Haglund, University of Idaho
- *The Interdisciplinary Energy and Sustainable Design Studio: A New Paradigm for Sustainable Design Education*
S. Johnston, Miami University
- *Green Building Advocacy Through the Design Studio: The SoHE Comprehensive [Green] Design Studio*
J. Wasley, University of Wisconsin-Milwaukee

12:30pm – 1:30pm

Meeting

ASES Annual Meeting

Room R230B

2:00pm – 3:30pm

Forums

As Green as it Gets? Working to Make Green Jobs Even Greener

Room R205A

Moderated by: Paulette Middleton, Panorama Pathways

Looking for new ways to green-up your work life? Wondering what others are doing to accelerate use of renewable energy, increase energy efficiency, and expand conservation practices on the job? Join in this interactive forum guaranteed to generate new ideas for greener transportation to work and getting greener at your office be it a home business, large company, small business, university / college / K-12 setting, government facility, or something in between. We will start with a few introductory comments and questions (15 minutes tops) and then get down to serious discussion. Bring your ideas, questions and contact information for continued e-exchanges. We will bring food for thought.

Speakers include:

- Erin Middleton, University of California Santa Cruz
- Rebecca Valentine
- Rob Nelson, Heliakos

The Cost of Tackling Climate Change with Energy Efficiency and Renewable Energy **Room R205B**

Moderated by: Chuck Kutscher, National Renewable Energy Lab

In January, ASES released a landmark report, "Tackling Climate Change in the U.S.," that describes how energy efficiency and renewable energy can provide the needed reductions in U.S. carbon emissions. But what will this cost and how does it compare to the cost of not acting? Speakers will address these issues from several perspectives. The presentations will be followed by a panel discussion.

Speakers include:

- *Climate Change: The Cost to the U.S. of Not Acting*
Frank Ackerman, Tufts University
- *Impacts on U.S. Energy Expenditures of Increasing Renewable Energy Use*
Jay Griffin, RAND Corporation
- *The Cost of Large Scale U.S. Deployment of Energy Efficiency and Renewable Energy*
Chuck Kutscher, NREL

Solar Thermal: An Untapped Market Solution

Room R210

Moderated by: Tim Merrigan, National Renewable Energy Lab

Get into hot water! Solar thermal heating is attracting renewed attention in today's renewable market, and with good reason! Equipment is reliable, cost-effective, and available off-the-shelf. Advanced metering allows accurate measurement and reporting of system performance. Innovative business models are creating new market opportunities. These factors make solar thermal a strong contributor for meeting RPS requirements, supplying green energy and creating RECs. Come and hear what the major players from utilities, industry and trade associations see as the future of solar water heating. Back by popular demand—RECs from Lakeland Electric's solar program will be given away to 10 lucky participants during this forum.

Presentations include:

- *Green Equality!*
Bob Reedy, Florida Solar Energy Center
- *Greenhouse Gas Reduction Potential of Solar Water Heating*
Paul Denholm, National Renewable Energy Laboratory
- *Solar Thermal Energy Production: The Next Generation*
Jeff Curry, Lakeland Electric
- *Metering Solar Hot Water: New Trends, Perspectives, and Revenue Opportunities*
David Kopans, Fat Spaniel Technologies

Wednesday

Conference Program

Wednesday, July 11

2:00pm – 3:30pm (cont)

Forums (cont)

Utility Solar Programs: Finding a Model that Works

Room R202

Moderated by: Mike Taylor, Solar Electric Power Association

The Solar Program Options Tool (SPOT) is a new online tool designed to help electric utilities assess and prioritize solar programs, activities, and incentives. Users take a short online survey that evaluates options based on conditions specific to their utility's solar motivation. A utility under a regulatory solar requirement will have a very different SPOT assessment (utility ownership, third-party contract, customer incentives, solar energy credits) than one looking to improve customer relations (green pricing, customer incentives, solar schools). SPOT ultimately helps electric utilities and stakeholders prioritize the wide variety of potential solar programs, incentives, and actions for further investigation.

Speakers include:

- Mike Taylor, Solar Electric Power Association
- Carl Siegrist, WE Energies
- Julia Blankenship, American Municipal Power-Ohio
- Jon Bertolino, Sacramento Municipal Utility District

Technical Sessions

PV Performance Evaluation

Room R230A

Session Chair: Marlene Brown, Sandia National Labs

- *Performance Assessment of Thin-Film Photovoltaic Modules in Hot and Humid Climate of Florida*

N. Dhere, A. Kaul, B. Kumar, S. Khatri and S. Pethe, Florida Solar Energy Center

- *Development of a Retractable PV Array for Easy Retrofitting of Existing Homes*

D. Heidenreich, IPESol Inc. EBO Group Inc. and PT Tech Inc.

- *The First Major Application of Photovoltaics to the Broiler Poultry Industry*

C. Sherring, D. Williams and M. Ingles, WorldWater & Power Corp.

- *Experience with Light-weight Solar Powered Electric Vehicles Running on Less than 5 Horsepower*

A. Schoenberg, Sunzeecar LLC

- *Solar Energy Project for Nonprofit Housing*

R. Tinker, Kelly-Tinker Architects/Archipolis, LLC and B. Lowstuter, Clean Energy Systems

Building Components

Room R230B

Session Chair: Bruce Haglund, University of Idaho

- *Full-Building Radiation Shielding for Climate Control in Desert Regions*

J. Abraham and C. George, University of St. Thomas

- *Options for an Energy Efficient Panelized Residential Roof*

J. Davidson, S. Mantell, C. Briscoe, B. Schoenbauer,

D. Huang and J. Carmody, University of Minnesota

- *The Effect of the Optical Properties of Roofs and Walls on the Thermal and Energy Performance of Commercial Buildings*

A. Fanchiotti, S. Braconi and C. Gentile, Università degli Studi Roma Tre, Italy and M. Zinzi C.R.E Casaccia - ENEA, Italy

- *New Methods for Assessing Spectral, Bi-Directional Transmission and Reflection by Complex Fenestration Systems*

N. Gayeski and M. Andersen, Massachusetts Institute of Technology

Wednesday

Conference Program

Wednesday, July 11

2:00pm – 3:30pm (cont)

Design Narratives

Room R211

Session Chair: Marc Schiler, University of Southern California

- *Eco-Aesthetics: Bridging Architectural and Ecological Motivations*
L. Bachman, University of Houston
- *The Solar Decathlon: The Aesthetics of the Solar House*
A. Denzer and K. Hedges, University of Wyoming
- *Is Beauty Only Skin Deep? The Building Envelope and Its Impact on Daylighting Design*
M. Guzowski, University of Minnesota
- *Production and Consumption of Electricity in Oberlin College's Lewis Center for Environmental Studies: Realizing the Goal of a Net Zero Building*
J. Petersen, Oberlin College

4:00pm – 5:30pm

Forums

The Aesthetics of Energy: Art, Public Participation, and Education

Room R205B

Moderated by: Kathryn Janda, Oberlin College

Public acceptance of renewable energy systems is a critical part of increasing their adoption. Although many solar enthusiasts believe that renewable technologies are innately more beautiful than the smokestacks they replace, any changes to the status quo must successfully weather public debate and discussion. This forum describes new forms of art and music that articulate the nuances of renewable energy in ways the public can interpret and use.

Speakers include:

- Roopali Phadke, Assistant Professor of Environmental Studies Policy & Politics, Environmental Studies Department, Macalester College
- Michael Duffy, Associate Professor, Engineering Management and Systems Engineering, School of Engineering and Applied Science, George Washington University
- Donna Cohn, Visiting Assistant Professor of Applied Design, Lemelson Assistive Technology Development Center (LATDC), Hampshire College
- Tom Lopez, Associate Professor, Technology in Music and Related Arts, Oberlin College Conservatory of Music
- Aaron Godwin, Founder, The Renaissance Group

Creating Solar "Buzz": How to Market Solar On the Grassroots Level

Room R202

Moderated by: Kathleen Cunningham Faraone, Renewable Energy Long Island

As early adopters, solar home-owners are generally tech savvy, informed individuals. Their testimony and word of mouth recommendations are very influential in promoting solar energy on the grassroots level. They are a credible, trustworthy and free marketing tool for solar advocates and industry alike, especially when their talents are organized through a variety of effective programs.

Based on the notion that product users benefit the overall economics of that product by generating a positive feedback loop, this forum will demonstrate the success of "buzz" campaigns as educational and marketing outreach in the Northeast.

Presentations include:

- *Reinforcing the Obvious with Buzz*
Ron McDaniel, Founder, Buzzoodle, Buzz Marketing Company
- *Utility Support for Solar in the Community*
Mark J. Dougherty, Manager of Distributed Generation and Renewable Program, Long Island Power Authority
- *Word of Mouth Marketing: Harnessing the Contagious Power of Solar Pioneers*
Gordian Raacke, Executive Director, Renewable Energy Long Island
- *Successful Strategies for Renewable Energy Workforce Development in New England*
Megan C. Amsler, Self-Reliance Corporation

A Look at Net Metering

Room R210

Moderated by: Tom Starrs, PPM Energy

This forum will consist of 4 short presentations: An overview and highlights of net metering programs around the country; first-hand insights into working through net metering issues with utilities and utility commissions; how to design effective net metering campaigns; and a look at net metering from an installer's perspective. The presentations will be followed by a moderated discussion and audience Q&A session.

Presentations include:

- *37 States Down, 13 To Go*
Rusty Haynes, NCSU Solar Center
- *View from the Trenches*
Christopher Cook, SunEdison
- *Effective Net Metering Campaigns*
Adam Browning, The Vote Solar Initiative
- *Net Metering: An Ohio Installer's Perspective*
Geoff Greenfield, Third Sun Solar & Wind Power Ltd.

Wednesday

Conference Program

Wednesday, July 11

4:00pm – 5:30pm (cont)

Forums (cont)

Quality Assessment for Renewable Energy Practitioners, Products & Services: Update & Trends on Certification Activities **Room R205A**

Moderated by: Jane Weissman, Interstate Renewable Energy Council

Certification schemes for solar and small wind products, installers and training programs have raised the bar for professional services for the renewable energy industries. Some of these third-party certification corporations have been operating for a long time, others are relatively new and establishing a track record, and still others are on the drawing boards. This forum will provide an update on quality assurance programs and plans for photovoltaic practitioners, solar thermal practitioners, solar thermal collectors and systems, photovoltaic modules, small wind turbines, small wind practitioners, and training programs and instructors.

Presentations include:

- *Solar Thermal Hardware Certification*
Les Nelson, Solar Rating and Certification Corporation - c/o FSEC
- *Photovoltaic Testing and Certification at Arizona State University Photovoltaic Testing Laboratory*
G. Tamizh-Mani, Photovoltaic Testing Laboratory, Arizona State University
- *Small Wind Turbine Certification*
Larry Sherwood, Interstate Renewable Energy Council
- *Installer Certification Programs*
Jane Weissman and Les Nelson, North American Board of Certified Energy Practitioners
- *Training Program Accreditation & Instructor Certification*
Jane Weissman, Interstate Renewable Energy Council

Technical Sessions

PV Code and Grid Interactions **Room R230A**
Session Chair: William Young, Jr., Florida Solar Energy Center

- *The Evolution of PV & Its Effect on the Electrical Industry*
J. Egan, Kyocera Solar Inc.
- *Photovoltaic Power Systems and the 2008 National Electrical Code*
J. Wiles, Southwest Technology Development Institute and W. Bower, Sandia National Laboratories
- *Photovoltaic System Interconnections to Spot and Grid Networks*
J. Bing, New Energy Options, Inc.
- *Photovoltaic System Maintenance: How To Make Your PV System Last 40 Years*
G. Canough, ETM Solar Works

High Performance Residential Case Studies **Room R230B**

Session Chair: Lew Pratsch, US DOE, Office of Energy Efficiency and Renewable Energy

- *Solar Decathlon 2007*
R. King, Department of Energy and C. Warner, National Renewable Energy Laboratory
- *Premier Gardens & Cresleigh Rosewood: A Zero Energy Community Case Study*
R. Kerr, B. Bacceti and R. Hammon, Building Industry Research Alliance
- *Affordable Green Housing: Transparent vs. Transformative Approaches*
L. Iulo, The Pennsylvania State University and B. Quigley, Office for Planning and Architecture
- *Low Cost Sustainable House Prototype for Tijuana*
R. Hansanuwat, M. West, M. Lyles and P. La Roche, Cal Poly Pomona
- *Greenkit: A Modular Variable Application Cooling System*
E. Ezell, L. Felton, P. LaRoche and M. Fox, Cal Poly Pomona

Conference Program

Wednesday, July 11

5:30pm – 6:30pm

Meetings

ASES Awards Committee

Room R203

ASES Clean Energy and Water Division

Room R204

6:30pm – 8:00pm

Plenary

Emerging Transportation

Room R230

Moderated by: Steven Heckerroth, Chair, ASES Renewable Fuels and Sustainable Transportation Division

- Paul Scott, Environmental Activist, Electric Vehicle Owner, appeared in “Who Killed the Electric Vehicle”
- Sherry Boschert, author of *Plug-in Hybrids* and President of the San Francisco Electric Vehicle Association
- Danilo J. Santini, Senior Economist, Section Leader, Technology Analysis, Center for Transportation Research, Argonne National Laboratory
- Travis Bradford, author of *Solar Revolution* and President, Prometheus Institute for Sustainable Development

8:15pm – 10:00pm

Plenary

Emerging Architecture

Music Hall

Moderated by: Adil Sharaq-Eldin, Kent State University

- David Beach, Director, EcoCity Cleveland
- Susan Roaf, Councillor Professor, School of the Built Environment, Oxford Brookes University
- Jason Bing, Manager, Recycle Ann Arbor’s Environmental House



Wednesday

Conference Program

Thursday, July 12

7:00am – 8:00am

Thursday Speakers' Breakfast

Room R212B

Meetings

ASES Divisions Committee

Room R212B

ASES Nominating Committee

Room R212B

8:00am – 12:00pm

Registration Open

8:00am – 5:00pm

Workshops

(for more information, see page 56)

Women's Utility Interactive Photovoltaics (day 1 of 4)

Off-Site

8:30am – 10:00am

Forums

Policies Needed to Tackle Climate Change with Energy Efficiency and Renewable Energy

Room R210

Moderated by: Chuck Kutscher, National Renewable Energy Lab

ASES has shown that energy efficiency and renewable energy can provide all or most of the carbon reductions needed in the U.S. to fight global warming. But what policy measures are needed to support this level of deployment. Experts from the different technologies and from the financial world will cover both broadly beneficial and technology-specific policy measures that are needed.

Speakers include:

- *Legal and Policy Tools for Efficiency and Conservation*
John Dernbach, Widener University Law School
- *Policies that Support Large-Scale Deployment of Renewable Energy in the U.S.*
Steve Clemmer, Union of Concerned Scientists
- *Recommendations Developed by the ASES Policy Task Force*
JP Ross, The Vote Solar Initiative

Solar Water Heating: Installation Issues

Room R205A

Moderated by: Alison Mason, SunJuice

This forum will address system installations and lessons learned, solar system overheating protection, system working fluids and corrosion prevention, installation training, heat exchanger technology, use of PEX, reliability of subcomponents (flow meters, check valves, etc.), roof penetrations and packaged systems/ preferred products.

Panelists include:

- Jeff Gilbert, Chesapeake Wind & Solar LLC
- Odes Armijo-Caster, Sacred Power Corp
- Tom Lane, ECS Solar Energy Systems, Inc.
- Viktor Tchernikov, Solarnetix Inc.
- Jason Streit, Kentucky Solar Living LLC

Teaching Sustainability in Schools of Architecture: Models from the Ecology and Design Report

Room R202

Moderated by: James Wasley, University of Wisconsin-Milwaukee

This forum will showcase innovative "green" architectural coursework recognized in Ecology and Design: Ecological Literacy and Architecture Education (AIA, 2006). The goal of the AIA Committee on the Environment's "Ecological Literacy Project" has been to assess the state of ecological literacy in architecture education as part of a long-term effort to inject sustainability principles into architecture education in the United States. The purpose of this forum is not to discuss any single curriculum effort in detail, but to present a mosaic of current activities as the basis for an ongoing discussion of the future of environmentally progressive architectural education.

Presentations include:

- *The Sustainable Environments Minor: Sustainable Environments and Implementing Sustainable Principles*
Margot McDonald, Cal Poly San Luis Obispo
- *Comprehensive Green Design Studio and Professional Practice Seminar*
James Wasley, University of Wisconsin-Milwaukee
- *The Master of Science in Architecture: Sustainable Design Track*
Mary Guzowski, University of Minnesota School of Architecture in the College of Design
- *The Master of Science in Architecture: Sustainable Design Track*
Bob Koester, Ball State University
- *The Agents of Change Project*
Alison Kwok, Ph. D., AIA, LEED AP, University of Oregon



Conference Program

Thursday, July 12

8:30am – 10:00am (cont)

Update on the New Version of the National Solar Radiation Database (Session 1) **Room R205B**

Moderated by: James Bing, New Energy Options, Inc.

The newly updated 1991–2005 National Solar Radiation Database (NSRDB) is now available to designers, engineers, educators, and researchers. The update of the old 1961–1990 NSRDB includes hourly data for more than 1400 sites in the U.S., Caribbean, and Guam, and features a new multi-year 10km gridded data set for most areas. The NSRDB Update Forum will present background on the design and production of the data set, a discussion of the data quality and its uncertainty, demonstrations of NSRDB applications, and methods of data access.

Presentations include:

- *Background and Overview of NSRDB Development*
Steve Wilcox, National Renewable Energy Laboratory
- *Overview of the SUNY Satellite Model*
Richard Perez, State University of New York at Albany
- *Development of Aerosol, Water Vapor, and Ozone Data Sets*
Chris Gueymard, Solar Consulting Services and Ray George, National Renewable Energy Laboratory
- *NSRDB Validation and Uncertainties*
Daryl Myers, National Renewable Energy Lab and Paul Stackhouse, National Aeronautics and Space Administration

Technical Sessions

Renewable Conversions and Hydrogen

Room R211

Session Chair: Susan Hock, National Renewable Energy Lab

- *The Effect of Temperature on the Efficiencies of the Electrolysis Process for Hydrogen Production*
T. Hand and B. Wood, Utah State University
- *Running the World on Renewables via Hydrogen Transmission Pipelines and Firming Geologic Storage*
W. Leighty, The Leighty Foundation
- *Solar Thermocatalytic Decomposition of Ammonium Sulfate*
C. Huang, N. Mohajeri, N. Muradov and A. T-Raissi, Florida Solar Energy Center
- *The Concept of Efficiency in Solar Conversion Technologies*
J. Torchia-Núñez, J. Cervantes-de Gortari and J. Navarrete-González, University of Mexico, UNAM, Mexico

Expanding U.S. Solar Markets

Room R230B

Session Chair: Sara Ward, Ohio Department of Development's Office of Energy Efficiency

- *U.S. Solar Market Trends*
L. Sherwood, Interstate Renewable Energy Council
- *The Impact of Retail Rate Structure on the Economics of Customer-Sited PV: A Study of Commercial Installations in California*
R. Wiser, A. Mills and G. Barbose, Lawrence Berkeley National Laboratory and W. Golove, Chevron Energy Solutions
- *Maximizing the Utility Role: An Economic Approach to Universal Solar Service*
J. Cliburn, Cliburn and Associates and C. Robertson, ElectricSUN
- *Wisconsin's Renewable Energy Site Assessment Process and Value*
D. Wichert, Wisconsin Energy Conservation Corporation, T. Parker, Midwest Renewable Energy Association and E. Hannigan, Wisconsin Energy Conservation Corporation
- *A Simplified Cost Model for Photovoltaic Energy*
J. Bing, New Energy Options, Inc.

Sun, Sky and Urban Environments **Room R230A**

Session Chair: Gregory Thomson, University of Wisconsin - Milwaukee

- *Microclimates and Thermal Comfort in Outdoor Pedestrian Spaces: A Dynamic Approach Assessing Thermal Transients and Adaptability of the Users*
F. Ahmed-Ouameur and A. Potvin, Université Laval, Canada
- *Post-Treatment Analysis of the Glare Remediation of the Walt Disney Concert Hall*
J. Suk, M. Schiler, and K. Kensek, University of Southern California
- *Defining Standard Skies for Better Daylight Design in Hong Kong*
E. Ng, V. Cheng, A. Gadi and Z. He, The Chinese University of Hong Kong, PR China
- *Applications for Light Weight Flexible Thin Film Photovoltaics*
J. McCabe, Ascent Solar Technologies, Inc.

Thursday

Conference Program

Thursday, July 12

10:30am – 12:00pm

Forums

Advanced Solar Thermal's Potential to Meet California's Global Solutions **Room R205A**

Moderated by: V. John White, Center for Energy Efficiency and Renewable Technologies (CEERT)

Nearly seventy percent of California's green house gas (GHG) emissions come from fossil fuels. Under AB 32 the use of fossil fuels must decline while demand for energy will grow due to the state's population increases. Non-fossil resources must increase rapidly in the electricity and thermal sector to meet the state's climate change goals. The forum will address: 1) GHG reduction potential for distributed advanced solar thermal technologies in CA and selected states 2) current solar thermal programs in CA and AZ and 3) the European Union's solar thermal plan and 4) projections for broader application in the United States.

Speakers include:

- Ken May, IST/Solucar
- Lori Glover, Solid USA
- Rachel McMahon or Paul Veracruz, CEERT
- Sanford Klein, Solar Energy Laboratory, University of Wisconsin Madison
- Jan McFarland, Americans for Solar Power (ASPV)

Education for Sustainable Energy Careers

Room R210

Moderated by: Debra Rowe, U.S. Partnership for Education for Sustainable Development

How do you know where the educational opportunities are in sustainability? How can you learn about the existing careers and the new careers that need to be created? How can we teach sustainability literacy and engagement to all? Come hear from experts in sustainability education and community engagement. Learn about resources to locate educational programs that relate to emerging careers. Hear about a continuum of educational opportunities, including K-12, higher education in multiple disciplines, education for the built environment, and professional organizations' initiatives. See how sustainability education can be useful in collaboration with the government, consumer and business sectors to create award winning community and regional partnerships for sustainability.

Speakers include:

- Debra Rowe, President, U.S. Partnership for Education for Sustainable Development
- Margot McDonald, Professor of Architecture, Cal Poly – San Luis Obispo, ASES Board
- Norman Christopher, Director, Sustainability Initiative, Grand Valley State University
- Blanche Scheinkopf, K-12 Sustainability Education Expert and President, The Scheinkopf Group

National Renewable Energy Incentives

Room R202

Moderated by: Brad Collins, American Solar Energy Society

A number of countries have instituted incentives to promote the deployment of renewable energy technologies. By looking at Germany, Japan and Canada, we have the opportunity to reflect on potential incentives for the U.S.

Presentations include:

- *Ontario RE Incentives*
Paul Gipe, Ontario Sustainable Energy Association
- *Japan RE Incentives*
Dan Bihn, Bihn Systems
- *German RE Incentives*
Wilson Rickerson, Rickerson Energy Strategies, LLC

Thin-Film Photovoltaics in Ohio: Activities of the Wright Center for Photovoltaics Innovation and Commercialization **Room R211**

Moderated by: Bob J. Davis, Nano-Tech West Laboratory, Ohio State University

This forum will highlight recent activities of the Center for Photovoltaics Innovation and Commercialization (PVIC), established with the support from Ohio's Third Frontier Project. PVIC includes three universities and seventeen industries and non-profits in Ohio whose efforts span the value chain for thin-film photovoltaics (PV). The forum will focus on the downstream activities of the center including opportunities for market expansion in polycrystalline and amorphous thin film technologies, installation approaches for these technologies, as well as public policies required to lower the barriers to market expansion and lower costs by exploiting the favorable economies of scale for automated thin-film PV production.

Presentations include:

- *Overview of the Wright Center for Photovoltaics Innovation and Commercialization*
Prof. Rob W. Collins, Co-Director, Center for Photovoltaics Innovation and Development of Low
- *Cost of Thin Film Photovoltaics Modules on Glass for Utility-Scale Applications*
Dr. Norm W. Johnston, President and Chief Executive Officer, Solar Fields, LLC
- *Development of Low Cost Thin Film Photovoltaics Cells and Modules on Flexible Stainless Steel*
Prof. Xunming Deng, President and Chief Executive Officer, MWOE Solar, Inc.
- *Installation of Thin Film Photovoltaics Modules in the Midwest*
Mr. John Witte, Vice-President, Advanced Distributed Generation, LLC
- *Status of Public Policy Issues in Photovoltaics within the State of Ohio*
Mr. Bill Spratley, Executive Director, Green Energy Ohio



Conference Program

Thursday, July 12

10:30am – 12:00pm (cont)

Update on the New Version of the National Solar Radiation Database (Session 2) **Room R205B**

Moderated by: James Bing, New Energy Options, Inc.

The newly updated 1991–2005 National Solar Radiation Database (NSRDB) is now available to designers, engineers, educators, and researchers. The update of the old 1961–1990 NSRDB includes hourly data for more than 1400 sites in the U.S., Caribbean, and Guam, and features a new multi-year 10km gridded data set for most areas. The NSRDB Update Forum will present background on the design and production of the data set, a discussion of the data quality and its uncertainty, demonstrations of NSRDB applications, and methods of data access.

Presentations include:

- *NSRDB Products and Distribution*
Steve Wilcox, National Renewable Energy Laboratory and Tom Whitehurst, National Climatic Data Center
- *NSRDB Applications and Utilities*
Frank Vignola, University of Oregon and Steve Wilcox, National Renewable Energy Laboratory
- *NSRDB and Solar Resource Assessment Future*
Open Discussion

Technical Sessions

Water Pumping and Purification **Room R230B**

Session Chair: Stephen Sargent, Sargent and Associates

- *Development and Evaluation of Free-Convection Double-basin Solar Still with Increased Condenser Area.*
D. James, N. Holur Venkatesh, R. Hurt and H. Hay, University of Nevada, Las Vegas and C. Tefft, J-DECK, Inc.
- *Evaluation of Portable Rainwater Harvesting Systems with Optional Solar-Powered Water Purification for Disaster Relief, the Developing World, Recreation, and Education*
J. Essig and J. Essig, Radiant Apparatus
- *Dye Indicator for the Effectiveness of TiO₂ Water Purification*
P. Dubro, Solar Design Associates and J. Duffy, University of Massachusetts Lowell
- *Comparison of Solar Powered Water Pumping Systems Which use Diaphragm Pumps*
B. Vick and N. Clark, USDA-Agricultural Research Service
- *Technical and Economical Analysis of Photovoltaic Pumping Systems with V Type Concentrators in Irrigation System to Productive Chains*
J. Bione de Melo Filho, Universidade de Pernambuco and N. Fraidenraich and O. de Castro Vilela, Universidade Federal de Pernambuco, Brazil

Assessing Building Impacts

Room R230A

Session Chair: Walter Grondzik, Florida A&M University

- *Is LEED Really Broken? Isn't It About Time To Improve It? The Need to Transform LEED from a Universal Comparative Value Analysis to a Contextual Design Tool*
K. Mansy, Oklahoma State University
- *Beyond Energy Star: The Next Step in Benchmarking K–12 School Building Energy Use*
J. Seryak, Go Sustainable Energy, LLC
- *An Analysis of Two Proposed CO₂ Calculation Protocols for Buildings*
H. Bryan, Arizona State University
- *Comparison of Daylighting Strategies For Schools*
M. Nicklas and U. Atre, Innovative Design Inc.

12:30pm – 2:00pm

Special Event

Closing Luncheon **Renaissance Cleveland Hotel
Grand Ballroom**

Registration Price: Free to conference registrants; extra tickets \$50

We'll wrap up the conference with an update on a major new study being conducted by the American Solar Energy Society on the potential for the renewable energy industry to create jobs in Ohio. The first of its kind, the ASES Jobs Study will look at all of the potential jobs related to the Renewable Energy and Energy Efficiency industries – manufacturing, sales, service and many more. The first study will focus on Ohio, but ASES plans to use this study as a model for studies to be conducted in several other states. Also, come see what we have in store for SOLAR 2008—being held in San Diego in May 2008.

2:00pm – 6:00pm

Tour

(No on-site registrations will be accepted for this tour)

NASA Glenn Research Center Tour

Off-Site

3:00pm – 6:00pm

Meeting

ASES Board of Directors Meeting (Day 1)

**Renaissance Cleveland Hotel
Superior Room**

Thursday

Conference Program

Friday, July 13

8:00am – 3:00pm

Meeting

ASES Board of Directors Meeting (Day 2)

**Renaissance Cleveland Hotel
Superior Room**

8:00am – 5:00pm

Workshops

(for more information, see page 56)

Cleveland Tool Day: A Hands-On Building Performance
Analysis Workshop

Off-Site

Women's Utility Interactive Photovoltaics (day 2 of 4)

Off-Site

Mark Your Calendar

**Saturday
October 6, 2007**



Real Places for Real People

- ☼ See homes and buildings with installed solar, wind and other renewable energy systems
- ☼ Learn about building components and appliances that save energy
- ☼ See the brighter future available with sustainable energy choices

Sponsored by:

U.S. Department of Energy, Office of
Energy Efficiency and Renewable
Energy (EERE)

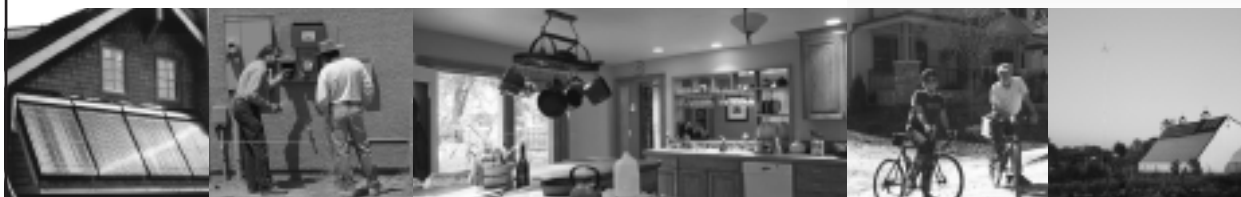
Fronius USA

RenewableEnergyAccess.com

SOLAR TODAY magazine

FindSolar.com

Solar2007.com



Additional dates & local tour information at

www.NationalSolarTour.org

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Dan Bihn; Dan Bihn; Green Energy Ohio

Greening SOLAR 2007

ASES is committed to holding a sustainable annual conference.
With your help, ASES will leave the smallest possible environmental footprint in Cleveland.

Green Tags

Green Tags are created when solar or wind power or other renewable energy is substituted for traditional power. Green Tags represent the real savings in carbon dioxide and other pollutants that occur when green power replaces burning fossil fuel.



ASES purchases enough Green Tags from the Bonneville Environmental Foundation to offset all of the electricity and fuel used at the National Solar Conference, including energy used at the Convention Center for the meetings, sessions, trade show and events and the electricity used by our attendees staying at the Renaissance Cleveland Hotel.



In addition, Lakeland Electric, the first producer of Solar Thermal Green Tags in the country, supplies enough tags to offset the fuel for the tour buses.



How You Can Help

We also provide several ways for attendees to green their own travel.

- You can purchase Green Tags right on your SOLAR 2007 registration form.
- We had an on-line system to help you find a carpool - either all the way to the conference, or to the airport or train station.
- We also had an on-line system to help you share a hotel room.
- You can take public transportation from the airport to downtown Cleveland – the stop at Tower City Center is connected to the Renaissance Cleveland hotel and about 4 blocks from the Convention Center.

Other Green Activities

- We communicate mainly via e-mail with our presenters and our attendees.
- We make it easy for you to register on-line.
- We selected a venue and a hotel that are easy to get to on public transportation, and are within walking distance of each other and a plethora of area attractions. No need to rent a car for SOLAR 2007!
- We selected a hotel that utilizes green housekeeping practices—making linen and towel changes less often or by request.
- We publish all of the information about our conference on our website.
- We are offering our exhibitors a paperless lead tracking system.
- We are providing water coolers rather than water bottles for our attendees.
- We are contracting with the City of Cleveland to recycle as much of the waste generated by the conference as possible.
- We provide the conference proceedings on a CD-ROM rather than in paper format.
- We carefully analyze our food usage from past years to better estimate our usage this year—less waste and helps us keep the costs down.

Dealer/Installer Training

Sunday, July 8

1:00 – 3:00pm

Solectria Commercial Grid-Tied Inverter Dealer/Installer Training Session

Room R209

- For PV solar contractors, installers, designers, engineers, consultants, architects, and system integrators
- Complete commercial technical inverter training covering 13, 15, 60, 82, and 95 kW inverters
- Q&A to answer your specific questions on inverters and systems.
- NABCEP Continuation credit available (4 points)

3:00pm – 5:00pm

Solectria Residential Grid-Tied Inverter Dealer/Installer Training Session

Room R209

- For PV solar contractors, installers, designers, engineers, consultants, architects, and system integrators
- Complete residential technical inverter training covering 1.8kW & 2.5kW inverters
- Q&A to answer your specific questions on inverters and systems.
- NABCEP Continuation credit available (4 points)

Monday, July 9

12:00pm – 5:30pm

AEE Solar

Room 206

AEE Solar has 28 years' experience in RE sales and distribution, including Solar, Wind, Hydro, Commercial Projects and Industrial Remote Power Solutions. We are teaming up with top manufacturers in this Solar Power training. You will learn about product capabilities and installation of solar modules, inverters, racking, and monitoring systems. Light lunch will be available for participants.

3:00pm – 4:00pm

Solvelex Installation Dealer/Installer Training or How to Connect Solar in Under an Hour

Room R204

Of the many parts involved in installing a solar hot water system the most time consuming is sourcing, sizing and connecting the valves, pumps, and controls. Spend 45 minutes with us and learn how you can reduce the time involved in your installs. This installation training applies to glycol and drainback systems installed on either flat plate collectors or evacuated tube collectors.

3:30pm – 5:30pm

Renewable Performance Monitoring

Room R205C

Commercial renewable energy installations require reliable real-time performance monitoring solutions that are engineered for the 20–30 year lifetime of the power system. Sophisticated field data acquisition hardware, broad telecommunications support and data management services linked to web based information delivery are all part of a complete performance monitoring solution. If this sounds difficult to install and operate, please attend this session and learn how Draker's performance monitoring solutions make energy visible and installation simple!

Tuesday, July 10

3:00pm – 4:00pm

Solvelex Installation Dealer/Installer Training or How to Connect Solar in Under an Hour

Room R204

Of the many parts involved in installing a solar hot water system the most time consuming is sourcing, sizing and connecting the valves, pumps, and controls. Spend 45 minutes with us and learn how you can reduce the time involved in your installs. This installation training applies to glycol and drainback systems installed on either flat plate collectors or evacuated tube collectors.

Wednesday, July 12

8:00am – 10:00am

Solectria Commercial Grid-Tied Inverter Dealer/Installer Training Session

Room R205C

- For PV solar contractors, installers, designers, engineers, consultants, architects, and system integrators
- Complete commercial technical inverter training covering 13, 15, 60, 82, and 95 kW inverters
- Q&A to answer your specific questions on inverters and systems.
- NABCEP Continuation credit available (4 points)

10:00am – 12:00pm

Solectria Residential Grid-Tied Inverter Dealer/Installer Training Session

Room R205C

- For PV solar contractors, installers, designers, engineers, consultants, architects, and system integrators
- Complete residential technical inverter training covering 1.8kW & 2.5kW inverters
- Q&A to answer your specific questions on inverters and systems.
- NABCEP Continuation credit available (4 points)

Saturday, July 7

W02: The Basics of Solar Heating

8:30am – 12:30pm

Room R202

Registration Price: \$80 by June 1, \$90 after June 1

Presented by: Mark Thornbloom, Kelelo Engineering

Description: Is solar water heating for you? How about heating your house with solar? Solar water heating is one of the most cost-effective RE technologies, it is covered under the federal tax credit, and today's installations are as easy for the homeowner to use as any major appliance. Space heating is a natural extension of the technology, yet both are often forgotten by homeowners and even installers. This workshop will help attendees make an informed decision about solar heat, focusing on water heating with a discussion of space heating. It will introduce attendees to the basics of water heating, including a discussion of site selection, technology selection, and resources like the new federal tax credit, certification, and reliable installers.

Who should attend? This workshop is for homeowners interested in purchasing and/or installing a solar water heating or space heating system and installers interested in the SRCC OG300 workshop but unfamiliar with the basics of solar water heating.

Materials provided to attendees: Hard copies of the presentations, including contact details for further information and product literature from a sampling of manufacturers.

W03: Legal Issues in Structuring Solar Projects

8:30am – 12:30pm

Room R203

Registration Price: \$80 by June 1, \$90 after June 1

Presented by: The Legal Firm of Squire Sanders Dempsey, LLC

Description: This workshop will address a broad array of the fundamental legal and structural issues related to the development of solar power facilities and manufacturing facilities. The workshop will begin with a look at the current context for solar power development in the US, including an update on current renewable portfolio standards, tax incentives and green credits. In the second part of the workshop we will review the fundamental contracts typically used in developing solar power projects, focusing on issues arising by virtue of the nature of solar technology and resources. Such contracts will include power purchase agreements (PPAs), engineering, procurement and construction (EPC) contracts, operation and maintenance (O&M) agreements, interconnection agreements. We will also look at finance issues and specific regulatory issues, including transmission issues. In the final session, we will look at contracts typically used in connection with the manufacturing of solar equipment, including resource procurement and equipment sales agreements.

Who should attend? Solar project developers (small, medium and large) looking for information about how to properly structure a financeable project; solar energy companies and conventional power companies looking to sponsor new solar projects; solar equipment manufacturers and financial institutions looking to become more familiar with solar project contracts and issues.

Materials provided to attendees: Each attendee will receive a binder with a copy of (i) presentation outlines, (ii) slides, (iii) hand-outs, and (iv) information about Squire Sanders.

W04: First Things First: Efficiency and Conservation, a Hands-On Approach to Personal and Company Energy Audits and Renewable Energy Planning

8:30am – 5:30pm

Room R210

Registration Price: \$175 by June 1, \$195 after June 1, includes lunch

Presented by: Aaron Godwin, Founder, The Renaissance Group, Kirtland, Ohio

Description: This workshop will guide the participants through conducting a personal or company energy audit and conservation and efficiency implementation plan. A focus will be placed on a low hanging fruit first approach. Short and long-term planning, as well as cost benefit analysis will be covered. Renewable energy generation and advance building project evaluations and planning will also be covered. This will be a hands-on workshop with plenty of practical information and guidance. Participants leaving the workshop should have the tools and understanding of key principles necessary to implement real change in their net energy use. Although not a requirement, participants will be given the opportunity to receive preplanning workshop materials before the conference to maximize the productivity of the actual workshop day. Although not a requirement, it may be beneficial for participants to bring their personal Excel loaded lap-top.

Who should attend? Home and business owners, building managers and energy professionals. May also be appropriate for educators looking for hands-on curriculum.

Materials provided to attendees: Energy audit materials including templates, power math cheat sheets and spreadsheets; access to demonstration rigs and audit tools and resource lists.

Workshops

Saturday, July 7

W05: Green Building: The Materials, Techniques, and Technologies Required to Build Energy-Efficient, Solar-Powered Green Homes

8:30am – 5:30pm Room R211

Registration Price: \$175 by June 1, \$195 after June 1, includes lunch

Presented by: Dan Chiras, Ph. D., *Green Building and Passive Solar Design Consultant, Sustainable Systems Design, Inc. and Visiting Professor of Environmental Science, Colorado College*

Description: This workshop will offer a comprehensive yet in-depth overview of green building. The presenter will explore the evolving definition of green building, the need for green building, and the growing popularity of green building. In addition, the workshop will survey numerous materials, techniques, and technologies used in green building from site selection to green building materials to energy and water efficiency to numerous renewable energy technologies and landscaping for energy and the environment.

Who should attend? Architects, builders, solar suppliers/installers, green building and solar design consultants, developers, building materials suppliers, homebuyers, owner-builders, architectural students, structural engineers, engineering students, planning department officials, investors and entrepreneurs

Materials provided to attendees: Handouts of recommended suppliers of green building materials and resources (books and magazines and organizations). Participants will also receive one free copy of Chiras' book, *The New Ecological Home*.

W06: Introduction to Distributed Power Systems

8:30am – 5:30pm Room R205C

Registration Price: \$175 by June 1, \$195 after June 1, includes lunch

Presented by: Jerry Ventre, *Energy Consultant and Former Director of the Photovoltaics and Distributed Generation Division of the Florida Solar Energy Center*

Description: This workshop will objectively compare solar and renewable power systems with fuel-based distributed power systems. This will be accomplished by: a) providing attendees with a fundamental understanding of the different system designs, principles of operation, and applications, b) comparing performance, economic and environmental data, including the benefits of combined heat and power systems, c) assessing the relative strengths, weaknesses and marketability of each type of system, and d) examining the potential of renewable hydrogen as a replacement for fossil fuels. Data will be presented for reciprocating engines, combustion turbines, microturbines, wind turbines, photovoltaic systems and various types of fuel cells. The workshop will identify technical and economic gaps that need to be addressed by competing energy technology suppliers. It should also help energy planners and decision makers in comparing, evaluating and selecting the distributed power systems that best meet their needs.

Who should attend? Solar and alternative energy professionals, utility representatives, energy planners and managers, energy systems engineers, building designers, and the interested public.

Materials provided to attendees: Workshop materials will consist of a compendium of all workshop slides, and a list of selected references and useful web sites.

W07: Photovoltaic Power Systems and the National Electrical Code

8:30am – 5:30pm Room R205B

Registration Price: \$175 by June 1, \$195 after June 1, includes lunch

Presented by: John C. Wiles, *SWTDI/NMSU*

Description: This workshop will inform the audience on how to design and install a PV system with respect to Code compliance. The workshop will include a Power Point Presentation with text and pictures with handouts and a detailed explanation of the requirements of the *National Electrical Code* as they apply to PV system design and installations. Materials for this workshop have been developed over 17 years of writing the Code and UL Standards as well as working with PV installers and electrical inspectors.

Who should attend? PV Professionals, electrical contractors and electrical inspectors.

Materials provided to attendees: Copies of Power Point Text Slides (about 118), *PV Power Systems and the National Electrical Code* (149 page manual) and Inspector/designer Checklist (6 pages).

Saturday, July 7

W08: What Are They Thinking? Insights into the Consumer Mindset on Energy Efficiency and Renewable Energy

1:30pm – 5:30pm

Room R204

Registration Price: \$80 by June 1, \$90 after June 1

Presented by: Suzanne Crofts Shelton, CEO, Shelton Group

Description: Participants in this workshop will gain an in-depth understanding of what motivations, messages and thought processes are currently driving the consumer mindset about energy efficiency and renewable products and services, including awareness of and demand for solar energy. Attendees will learn what kinds of marketing strategies, messages and campaign elements are most influential with today's consumer in order to advance awareness of and demand for solar energy. Much of the data will be derived from the Shelton Group's proprietary, annual national survey of consumers, Energy Pulse.

Who should attend? Senior management executives at the CEO level as well as marketing, communications, public relations and customer relationship management professionals, working with solar and other energy-related companies and organizations, will benefit most from this workshop. Key executives for this presentation will include leaders and managers who are seeking to implement a solar program – either at a utility that is trying to sell solar to end customers or at a retail level trying to sell solar to end consumers, or someone on the solar side trying to sell to utilities.

Materials provided to attendees: Energy Pulse 2006 abstract and a packet of specific cross-tabs detailing best messages for the solar buying audience, as well as a demographic profile of the most likely current and future solar buyer.

W09: Design and Installation Guidelines for Solar Hot Water Systems

1:30pm – 5:30pm

Room R202

Registration Price: \$80 by June 1, \$90 after June 1

Presented by: John Harrison and Jim Huggins, Solar Rating and Certification Corporation (SRCC).

Description: This workshop will provide information that will help to ensure the satisfactory installation of well-designed solar water heating systems. This workshop has been designed to provide participants with a working knowledge of OG-300 and its installation requirements. The long-range objective is to increase the quality of installed OG-300 certified systems.

Who should attend? This workshop is targeted at manufacturers, installation contractors, building inspectors, code officials and homeowners interested in installing a solar water heating system.

Materials provided to attendees: Two CDs, one of the workshop material and the second the CD for building inspectors, plus a paper copy of the workshop materials.

W10: Disaster Lab: Applications of Portable Multi-function Solar Energy Systems for Disaster Relief and the Developing World

1:30pm – 5:30pm

Room R203

Registration Price: \$80 by June 1, \$90 after June 1

Presented by: John R Essig, Jr., International Disaster Relief Laboratory (IDRL) & Radiant Apparatus, Inc.; William (Bill) Young Jr., Florida Solar Energy Center (FSEC)

Description: This workshop will provide participants with practical working knowledge including hands-on experience with portable, low-cost, multi-function solar energy collectors – one of the world's latest and most promising technologies for facilitating disaster preparedness and response, as well as for providing acute humanitarian assistance within the developing world. The program is intended to provide workshop participants with most, if not all, of the knowledge and skills necessary to effectively select, deploy, and operate these life-saving technologies in a setting of their choice.

Who should attend? Individuals and organizations interested in the latest technologies for disaster preparedness and response as well as general humanitarian relief – including but not limited to personnel and volunteers from Disaster Relief Agencies (federal, state, local, intergovernmental, NGOs); International Development Organizations; Global Health Agencies; National Guards; Military; Law Enforcement Agencies; Commercial Business Enterprises and Proactive Private Citizens

Materials provided to attendees: Attendees will be provided with several items including a copy of the workshop slides for future reference and to facilitate note taking, a System Selection and Operations Manual for the portable multi-function solar energy collector, and a commemorative portable multi-function solar energy collector to take home and demonstrate to other interested parties.

Workshops



Sunday, July 8

W11: Bringing Renewables to Life - Public Installations, Education, Exhibits, Interactives and Data

8:30am – 12:30pm **Off-site**
Farmpark – Kirtland, Ohio.
Transportation from Cleveland
Convention Center provided.

Registration Price: \$80 by June 1, \$90 after June 1

Presented by: Aaron Godwin, *The Renaissance Group*; Andrew Baker, *Lake Metroparks*; Bob Weinberg, *the Renaissance Group*; Ray Patacca, *Lake Metroparks* and John Robb, *Cleveland Metroparks*.

Description: The workshop will be comprised of a site tour and examination of four different aspects of public renewable energy education utilizing Farmpark's own renewable energy installations, exhibits and programs as workshop tools. Topics covered will include public installations of renewable energy production- an examination and discussion of the possibilities and programs; interactive exhibits - an examination of several different exhibits related to renewable energy and other possibilities; education programming - participation in several interactive education programs and discussion of materials and on-line interactives - using real time and historical data collection and web-posting for creating interactive distant learning opportunities to enhance science education.

Who should attend? Educators, public facility managers, renewable energy promoters and installers.

Materials provided to attendees: Copies of educational and interpretive materials will be provided.

W12: PV Payback

8:30am – 12:30pm **Room R230A**

Registration Price: \$80 by June 1, \$90 after June 1

Presented by: Andy Black, *OnGrid Solar Energy Systems*

Description: This workshop will help the audience make solid and accurate financial cases to their customers and help policy makers make informed decisions based on the strongest motivator in consumer behavior – Economics. Topics will include an overview of economic and system variables, incentive structures and types, rate structures and system performance factors. In addition, financial analysis methods and examples for residential, commercial, government and non-profit economics will be presented, including payback and lifecycle payback analyses, internal rate of return (IRR) and net present value (NPV) calculations, cash flow (with financing) and resale value.

Who should attend? Dealer/Installer owners & their salespeople, marketers, policy makers, and investors who need to understand better how and why solar can make economic sense, and how to use it effectively to increase sales and the acceptance of solar as an economically viable choice for many consumers.

Materials provided to attendees: Copies of the PPT slides as handout for note taking; copies of a popular article on the Payback for PV written by the presenter; a bibliography and list of links and online resources and tools such as the DSIRE Database, Clean Power Estimator/Quick Quotes, the OnGrid Solar Financial Analysis Tool, PVwatts, etc. and a one month demo use of the OnGrid Solar Financial Analysis Tool (license agreement required).

W13: Building Solar—Solar Design Fundamentals for Building Professionals

8:30am – 5:30pm **Room R202**

Registration Price: \$175 by June 1, \$195 after June 1, includes lunch

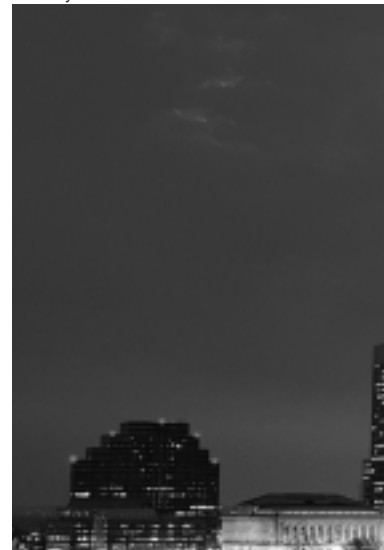
Presented by: Andy Walker, *Ambient Energy* and Alison Mason, *SunJuice Solar*

Description: This workshop will train building professionals in the fundamentals of solar energy design, enabling them to incorporate solar technologies (both photovoltaics and solar thermal) into their building projects. There are many designers who would like to use solar technologies in their projects but don't know where to start. This workshop takes solar awareness to the next level, giving professionals the tools to make design decisions about solar technologies early on in the planning of a building project.

Who should attend? Builders, architects, engineers, facility managers, energy managers, and developers.

Materials provided to attendees: Workbook with fundamentals by chapter and CD-ROM with presentations and supplementary material (articles and case studies).

courtesy of travelcleveland.com





Workshops

Sunday, July 8

W14: Course Development for Renewable Energy Training Programs

8:30am – 5:30pm

Room R206

Registration Price: \$175 by June 1, \$195 after June 1, includes lunch

Presented by: Barbara L. Martin, Ph.D., The University of Central Florida

Description: This workshop will walk participants through the essential steps of designing or revising a training course. Using the NABCEP task analyses as the foundation, the workshop will focus on analyzing the learners, creating goals and objectives, selecting materials and learning strategies, using good presentation skills, and creating tests or evaluation instruments. Participants should bring a topic or several learning objectives that they can use as the basis for designing a short segment of instruction.

Who should attend? Educators and trainers interested in creating and maintaining an energy efficiency and renewable energy training/education program.

Materials provided to attendees: A 60-page workbook that includes handouts, PowerPoint slides, and three NABCEP task analyses: Solar Photovoltaic System Installer, Solar Water and Pool Heating Systems, Small Wind Energy System Installer.

W15: Photovoltaic Markets, Technology, Cost, Performance with Emphasis on Building Integrated PV

8:30am – 5:30pm

Room R210

Registration Price: \$175 by June 1, \$195 after June 1, includes lunch

Presented by: Paul Maycock, PV Energy Systems, Inc. and Steven Strong, Solar Design Associates

Description: This comprehensive course will provide historical perspective; present status and forecast the future for: cell technology, performance, manufacturing cost; balance of systems performance and cost, systems design (stand alone to grid connected) with emphasis on the details of Building Integrated PV Systems; a detailed analysis of the world PV market including case studies of Japan and Germany; technology and market forecast to 2015.

Who should attend? Marketing, technology of manufacture, installers, government policy makers in energy, investors, planners, students, architects builders.

Materials provided to attendees: Handout of all quantitative market data, cost and performance status and forecast and one copy of Steven Strong's book *The Solar Electric House*.

W16: Renewable Energy for the Developing World

8:30am – 5:30pm

Room R201

Registration Price: \$175 by June 1, \$195 after June 1, includes lunch

Presented by: Laurie Stone, Solar Energy International

Description: This workshop explores different applications for renewable energy technologies in developing countries. Participants will learn how to successfully accomplish sustainable development projects with renewable energy. Effective technology transfer methods will be presented, as well as setting up infrastructure and the economics and financing of renewable energy projects. Case studies will be presented on solar cooking, rural household electrification, appropriate building technologies, rural health care and micro-enterprises utilizing renewable energy.

Who should attend? This workshop is geared towards people who would like to help bring renewable energy technologies to the developing world and to people and organizations already working in the developing world who would like to incorporate renewable energy technologies into their projects.

Materials provided to attendees: A notebook of the PowerPoint presentations and relevant articles.



Workshops



Sunday, July 8

W17: Small Wind Power for Homes, Farms, Businesses and Schools

8:30am – 5:30pm

Room R204

Registration Price: \$175 by June 1, \$195 after June 1, includes lunch

Presented by: Jim Green, National Renewable Energy Lab and Robert Preus, Abundant Renewable Energy

Description: This workshop will provide an overview wind power with an emphasis on small wind turbine applications. Attendees will understand the fundamental considerations of wind resource, wind turbine technology, and economics. Participants will understand the basic steps of a successful small wind project including system sizing, tower height, micro-siting, and permitting. The workshop will also explore the complementarity of solar and wind resources and will include case studies of successful project that combine wind and PV. The workshop will also include lunch and a half-day small wind turbine installation demonstration.

Who should attend? PV distributors/dealers/installers, educators, students, and renewable energy advocates. The workshop will be excellent for individuals considering wind power installations including homeowners, farmers, ranchers, small business owners, and managers of public facilities such as schools. The workshop will be valuable to anyone who wants an overview of small wind applications and of the current technology in the market.

Materials provided to attendees: Handout of PowerPoint slides covering the core material in the workshop and *Small Wind Electric Systems*, A U.S. Consumer's Guide.

W18: Solar & Radiant Floor Heating Systems Design

8:30am – 5:30pm

Room R203

Registration Price: \$80 by June 1, \$90 after June 1

Presented by: Peter Biondo, Oventrop Corporation

Description: This workshop will familiarize workshop participants with active solar heating systems for radiant floor heating and domestic hot water systems for residential and light commercial applications. Participants will receive the Solar Design Guidebook and learn to use the Solar Heating Calculator.

The workshop covers radiant floor construction methods for solar heating; solar closed loop and drain-back systems for space heating and domestic hot water combinations with the use of backup heating systems; a solar fundamentals presentation about capturing solar energy; evaluation of flat plate collectors and evacuated tube collectors, site planning and collector mounting systems and sizing collector arrays for heating loads.

Who should attend? Solar heating contractors, radiant heating contractors, mechanical contractors, architects, homebuilders, owner-builders, and general solar energy enthusiasts.

Materials provided to attendees: *The Solar & Radiant Heating Design Guidebook*, created specifically for the workshop, includes the presentation and color rendered designs for solar & radiant heating systems covered in the workshop. Also, the "Solar Heating Calculator" on CD-ROM, for sizing collectors and evaluating performance for flat plate and evacuated tube collectors.

W19: Designing High Performance Sustainable Homes

1:30pm – 5:30pm

Room R204

Registration Price: \$80 by June 1, \$90 after June 1

Presented by: Murray Milne, UCLA Department of Architecture; Bruce Haglund, University of Idaho, and Carlos Gomez, UCLA

Description: High Performance Sustainable Homes minimize their consumption of energy, their generation of greenhouse gasses, their contribution to air pollution, and their cost of operation. In this Hands-On Workshop you will learn how to design and then "fine-tune" a home for optimal performance using the latest release of HEED (Home Energy Efficient Design), a free user-friendly design tool. In this workshop you can use HEED's graphic input technique that lets you easily draw in buildings of any shape, attached or detached, including multi story courtyards. Because HEED is so fast and because you can compare up to nine schemes at once, in this workshop you will each have time to design a building using HEED and then create a series of design alternatives. With HEED you can compare each scheme's performance using full year (8760 hour) EPW climate data for over a thousand sites from around the world. Please bring a notebook computer, PC or MAC, and we will install HEED for you. AIA/CES Credits are available.

Who should attend? Architects, builders, homeowners, energy consultants.

Materials provided to attendees: Handouts, software will be loaded onto all the laptops brought to the workshop.



Workshops

Sunday, July 8

W20: Find Your Dream Job in Solar

3:30pm – 5:30pm Room R230A

Registration Price: \$70 by June 1, \$80 after June 1

Presented by: Andy Black, OnGrid Solar Energy Systems

Description: This workshop will discuss the importance of networking & education and how to get started by attending classes, tours, conferences, & other learning opportunities; reading & studying and getting involved, volunteering, contributing and participating in any number of ways. We will also discuss types of jobs opportunities & pay scales one can expect and the state of the industry, growth prospects, and where things are happening. Finally a brief discussion about the importance of staying connected in the industry and staying up to date on the incentive and legal issues relating to the business will ensue. Employers who are exhibiting at the conference will be encouraged to provide a brief job description handout.

Who should attend? Career changers, students and others looking for a job in the solar industry.

Materials provided to attendees: Resource list, job announcements conference exhibitors/vendors wish to provide and education catalogs and other sources & links to educational material schools and others wish to provide.

Friday, July 13

W21: Cleveland Tool Day: A Hands-On Building Performance Analysis Workshop

8:30am – 5:30pm Off-Site
Cleveland Environmental Center,
public transportation from the
conference hotel available

Registration Price: \$75 by June 1, \$85 after June 1

Presented by: Bruce Haglund, University of Idaho Department of Architecture; Walter Grondzik, Architectural Engineer; and Graduate Teaching Assistants

Description: This intensive, hands-on, full-day Tool Day workshop offers architects, engineers, educators, students, and design professionals experience in the use of relatively low-cost instrumentation (coupled with a structured methodology) to better understand building system and component performance. Participants will be taught appropriate use of such instrumentation and methods to foster confidence in their ability to address building performance concerns, and will develop a mini-case study to use as a template for future investigations.

Who should attend? Architects, Building Services and HVAC Engineers, Architecture and Engineering Faculty and Students. To optimize experiential opportunities, enrollment will be limited to five teams of six with a mentor and tool kit for each team.

Materials provided to attendees: We will provide a toolkit of handheld instruments for participants to use during the workshop. The workshop packet will include a price list for the instruments, examples of tool exercises, plans for and a description of the Cleveland Environmental Center and its systems. Participants are encouraged to bring a laptop computer and digital camera.

Thursday, July 12 – Sunday, July 15

W22: Women's Utility Interactive Photovoltaics

8:30am – 5:30pm Off-Site
John Hay High School

Registration Price: \$550 by June 1, \$600 after June 1, includes lunch each day

Presented by: Carol Weis and Soozie Lindbloom, Solar Energy International; Marlene Brown, Sandia National Labs

Description: This workshop will teach women how to use photovoltaic technology to safely produce their own electricity on-grid. Workshop participants will learn system sizing, site analysis, hardware specification, and component selection. We would also like to install an operational system at a school through the Legacy School Project. Workshop topics include: basics of electricity, system components, system sizing, energy efficient appliances, solar site analysis, electrical wiring, safety, tours of PV systems, industry guest speakers, laboratory exercises and field installation on a school.

Who should attend? Women interested in tying into the grid with their PV system. This market is expanding rapidly as the PV industry grows, and net metering laws across the country are passed.

Materials provided to attendees: Workshop materials to be provided include SEI's PV Design & Installation Manual and other relevant handout materials.

Tours



Saturday, July 7

T01: Central Ohio Sustainability Tour

8:00am – 6:00pm

Registration Fee: \$100 by June 1, \$110 after June 1, includes transportation and lunch

Take a trip to unique sites in the Columbus area that feature renewable energy and sustainable features. Malabar Farm State Park, built in 1939 by Pulitzer Prize winning author Louis Bromfield with a sustainable philosophy, features a new Bromfield Visitor Education Center with hands on exhibits, earth friendly construction, 1 kW Bergey wind turbine and 2.4 kW solar PV array. Visit and enjoy lunch with Ohio First Lady, Francis Strickland, at the Ohio Governor's Residence and Heritage Garden, a center of culture and education that features a 3.2 kW solar PV array. Finally, visit a unique farming enterprise—RainFresh Harvests, which is an off-grid, bio-integrated greenhouse powered by wind and PV systems and heated with solar thermal.

T02: Ohio Amish Country Tour

8:00am – 6:00pm

Registration Fee: \$100 by June 1, \$110 after June 1, includes transportation and lunch

Take a trip to the mid-Ohio region and visit the home the world's largest Amish/Mennonite settlement. The Amish people in America are an old religious sect, direct descendants of the Anabaptists of sixteenth-century Europe, and easily identified by their plain clothing styles that encourage humility and a practical expression of their faith.

Your first stop is the Warthens Carvings Museum and Gardens, which features an incredible display of ebony, ivory and walnut handcarvings by master carver Ernest "Mooney" Warther, appraised by the Smithsonian Institution as "priceless works of art." Lunch is a home-cooked Amish meal by a local Ohio Amish family in their home. Since food is one method of celebration among the Amish, and you will not go away hungry! In the afternoon, you will explore the scenic countryside of tranquil Amish farms, energy-producing windmills, and solar installations at many Amish homes and businesses. Before your trip ends, you will have the opportunity to shop for delicious bulk foods, mixes, spices and houseware items. Amish are known for their large, homemade assortments of jams, apple butter and cheeses. For more information, visit www.oacountry.com.

Sunday, July 8

T03 - Downtown Cleveland Public Demonstration Sites

8:00am – noon

Registration Fee: \$50.00 by June 1, \$60 after June 1, includes transportation

Cleveland's downtown landscape is transformed with new solar installations at high-profile sites. The Cleveland Environmental Center, featuring a 4 kW roof-mounted PV system, is a green building retrofit of a 25,000 square foot historic bank building that created a regional center for non-profit environmental organizations. The home of the Cleveland Indians, Jacobs Field, gets clean electricity from a 10 kW PV system completed by GEO and community partners. The Great Lakes Science Center, a showplace of technology, science and engineering demonstrations, features a 225 kW wind turbine and a 30kW solar installation. Finally, the City of Cleveland, which uses sustainability as a tool for economic development, is working to become a solar thermal utility. With a partnership with Green Energy Ohio (GEO), the city installed a solar thermal system at a fire station with a week-long training for the city-employed plumbers and pipe fitters. Learn how these projects are introducing renewable energy concepts to millions in Northeast Ohio.

T04: Northwest Ohio Technology Sites

8:30am – 5:30pm

Registration Fee: \$100.00 by June 1, \$110 after June 1, includes transportation and lunch

Northwest Ohio is home to the latest in technological advancements in thin-film manufacturing, commercial wind development, research and development of photovoltaics, and residential building-integrated solar.

Visit Ohio's first utility-scale 7.2 MW wind farm in Bowling Green, get inside the base of the 257-foot tower and use the solar-powered computerized kiosk that displays performance data. Next is the First Solar production facility, a 200,000 square foot highly automated manufacturing plant located near Toledo. A leader in the development of high quality thin film solar modules, First Solar has invested heavily in developing advanced, thin film semiconductor deposition and high volume manufacturing processes essential to achieve the low cost, high product quality and module efficiency required to make solar energy economically viable across a broad

range of applications. Then, visit the new Photovoltaics Innovation and Commercialization Center (PVIC) at the University of Toledo, which received a \$18 million grant from the State of Ohio, and see the research into advanced materials to be used in constructing solar cell arrays, development of those solar cell arrays, prototyping and demonstrating various system components, development and installation of a complete system, and graduate level education and consumer awareness. Finally, visit a subdivision of solar-powered homes built by Decker Homes. The homes are Energy Star rated and uses the SmartRoof solar shingles from Uni-Solar that are similar to typical roofing shingles. Lunch is included in the price of registration.

T05: Oberlin College and Community Tour

1:00pm to 6:00pm

Registration Fee: \$75 by June 1, \$85 after June 1, includes transportation

Visit Oberlin College, founded in 1833 as an independent coeducational institution, and the surrounding community of Oberlin for a hotbed of sustainable and renewable energy activity. Visit the world-renowned Adam Joseph Lewis Center at Oberlin College, conceived as an integrated building-landscape system that would function as a core component of Oberlin's Environmental Studies curriculum. Lessons of environmental stewardship embodied in its technology, including the largest PV system in Ohio at 160 kW, and design choices are intended to reinforce those taught in the classroom. Also highlighted will be the onsite waste water treatment system, restored native wetland ecosystem, and a sophisticated data monitoring and display system that tracks over 150 environmental sensors. Information and bus tour of other sites include wind assessment and monitoring facility, full circle fuels center, sustainable community associates and the new Agrarian Center. Don't miss the rare combination of architecture, cultural attractions and collegiate enthusiasm at Oberlin—"a jewel in Ohio's crown."

All tours depart from and return to the Cleveland Convention Center



SOLAR 2007 Awards

American Solar Energy Society Awards

The Charles Greeley Abbot Award is presented to an individual who has made a significant contribution to the society or to the field of solar energy. This year's Abbot Award is being presented to **Jane Davidson**. She is recognized internationally as an expert in solar energy systems, particularly solar thermal processes. Her area of specialty is solar thermal conversion for water and space heating. Most recently her research and development in the field of plastic materials for collectors has initiated large scale production of solar thermal hot water heaters in many countries. Professor Davidson has been a pioneer in the development of thermosyphon heat exchangers resulting in fundamental convective heat transfer correlations and practical heat exchanger designs. She has served as editor of the ASME Journal of Solar Energy Engineering for ten years. Jane Davidson was one of the first women to achieve international recognition in the field of solar energy at a time when few women were willing to compete in a profession traditionally dominated by men. Having been accepted into the honorary societies of Tau Beta Pi and Sigma Xi she serves as a role model for women interested in an engineering career. Her contributions as an educator, researcher and leader in the solar energy field have inspired her colleagues and served as a role model for her students. For her dedication, expertise, and reputation, the winner of the 2007 Charles Greeley Abbot Award is Jane Davidson.

The Passive Solar Pioneer Award honors a person whose pioneering work in the passive solar energy field has set the stage for others to follow. **Harvey Bryan** is one of the world's leading experts in the area of architectural daylighting including the development of design tools and urban design legislation. His enduring and transformative contributions to the field of daylighting have served educators, practitioners, students, building energy simulation, and green building assessment since the late 1970s. His dedication to the Arizona State University's Building Science Graduate Program has turned this into one of the top building research institutions in the nation. As an architect he helped write Standard 90.1, the most widely adopted building energy code, which became the de-facto measure of performance in the LEED energy rating system. Congratulations to Harvey Bryan, the winner of the 2007 Passive Solar Pioneer Award.

The Hoyt Clarke Hottel Award honors someone who has made a significant contribution to the technology in any area of the solar energy field. This year's award recipient, **Dr. Yogi Goswami**, has made pioneering contributions toward understanding solar photocatalytic detoxification and disinfection. His recent work on a thermodynamic cycle for power and cooling from low temperature energy sources and waste heat addresses an important application. The quality of his scientific work is reflected by his impressive publication record, which includes over 190 refereed papers, and the basic textbook "Principles of Solar Engineering" co-authored with Kreith and Kreider. Dr. Goswami is also the Editor-in-Chief of *Advances in Solar Energy—Annual Review of Research and Development*. As the Director of the Solar Energy and Energy Conversion Laboratory at the University of Florida for 16 years (1990–2005) and now the Co-Director of the Clean Energy Research Center at the University of South Florida, Dr. Goswami has had an immense impact on research in solar and other energy fields and has directed a large number of researchers in these fields that continue his work around the world. Dr. Goswami is a prolific inventor. He holds seven patents and has three patents pending. Five of these patents are in the area of Photocatalytic Air Disinfection, a field he pioneered as an outgrowth of his research into solar photocatalytic oxidation. With over 30 years of dedication and experience in solar energy, Dr. Yogi Goswami is the winner of the 2007 Hoyt Clarke Hottel Award.

The Women in Solar Energy Award was designed to recognize a woman who has contributed significantly to the acceptance and advancement of women in solar by any of the following means: advocacy, education, technical efforts, contracting or implementing social change. This year the award honors

Katherine Kent who is currently the president of The Solar Store LLC in Tucson, Arizona. Kent holds degrees in chemical engineering, nuclear and energy engineering, is a licensed professional engineer, and is NABCEP certified. She is regularly asked to make presentations on solar and energy efficiency to groups ranging from elementary school students to non-technical individuals and groups. Kent has been a member of the Greater Tucson Coalition for Solar Energy since its founding in 1997. She won the DOE Energy Innovation Award for work on passive cooling strategies for desert climates, was awarded the Distinguished New Engineer from the Society of Women Engineers, the Women's Commission Award and the ASHRAE Energy Award (Tucson Chapter). With more than 18 years of professional experience providing engineering design, construction, operations support and management of projects involving sustainable design and construction, Katherine Kent is the recipient of the 2007 Women in Solar Energy Award.

The Rebecca Vories Award recognizes special contributions to the American Solar Energy Society. It honors those whose volunteer efforts on behalf of the society have significantly advanced ASES' ability to meet its mission. **Darryl Thayer** recently developed a 48 hour training course for the local JATC (Minneapolis IBEW) training facility that would qualify students to sit for the NABCEP "PV Certificate of Knowledge" The course was so popular and successful that Darryl has been retained, and awarded full financing, by the JATC to develop the first ever coursework and installation lab recognized by NABCEP to meet additional requirements by students to sit for the full PV NABCEP Certificate. Darryl's most current activities include the design and construction of a wind turbine testing lab with a modified harnessed van to do controlled testing. Some of the results have already been presented at the MREF small wind conference in Stevens Point, WI. Darryl Thayer has served as a volunteer at ASES conferences since the late 1980s. He has been the Volunteer Coordinator for more than fifteen years. He is always ready to lend a hand and never tires of educating people he meets about ASES and the wisdom and ease of using renewable energy. Darryl embodies the spirit of volunteerism and is most deserving of the 2007 Rebecca Vories Award.

SOLAR 2007 Awards

Green Energy Ohio Awards

GEO Volunteer of the Year Award

Award given to a GEO volunteer that most embodies the ideals of public service and personal practice in the area of renewable energy.

Presented to Jerry Leard

A Columbus native, Jerry's growing city has always been a topic of concern to him. After graduating from North High School, he worked full-time in the family construction business. Over the past several years, Jerry has taken an active interest in renewable energy and has learned that a reliable and affordable energy supply enhances our economic growth and possibilities. In 2002, he started learning more about clean energy, and discovered Green Energy Ohio. Today, Jerry plays an integral part of the organization, volunteering long hours in the Columbus office and exhibiting at events throughout the year. By volunteering with GEO, Jerry says he can learn more about renewable energy and help other people decide to use it as a reliable and economical energy source.

Volunteer of the Year

Award given to a GEO volunteer that most embodies the ideals of public service and personal practice in the area of renewable energy.

Presented to Ruth Vandersall

A Green Energy Ohio member since 2003, Ruth is active in the group of Wayne County GEO volunteers she helped to organize, now called the Wayne County Sustainable Energy Network. She was instrumental in arranging and advertising the Wayne County Renew Ohio! Speaker's Bureau engagement, where GEO Executive Director Bill Spratley spoke to over 120 people in early 2006, one of the most successful talks given under the program. Ruth and the Wayne County GEO volunteers have organized many other events, including the 2006 Wayne County Solar Tour, a meeting with the architect of the new Wayne County library to discuss green building and energy efficiency, the Wayne County "Ethanol: From Waste Paper to Fuel" event, and a GEO tent at the 2006 Wayne County Fair.

Nonprofit of the Year

Award given to a nonprofit organization that actively promotes sustainable energy and develops programs/activities to achieve success.

Presented to Entrepreneurs for Sustainability

E4S is a diverse network of over 3,800 leaders who are putting the principles of sustainability into action. The E4S Network was started in 2000 with the classic entrepreneurs and have attracted the entrepreneurial thinkers, the change agents from business, government, academic and non-profit sectors of our community. E4S shares a belief that sustainability principles are drivers for new business opportunities and tools to improve our quality of life. Together they are building a sustainable economy in Northeast Ohio that will create prosperity and total community health.

Business of the Year

Award given to an Ohio business engaged with sustainable energy and example of best practices in the area of environment, economics, and social.

Presented to the Convention and Visitors Bureau of Greater Cleveland

When approached by GEO in 2004 about working to attract the SOLAR 2007 National Conference to Cleveland, little did the Convention and Visitors Bureau of Greater Cleveland (CVB) recognize that efforts to draw the Conference would help transform Cleveland's hospitality industry into one poised to support the city as a center for renewable energy growth. CVB made the commitment to ASES to establish green policies with the host hotel, and that commitment has grown to something of even greater value to this region — the development of an initiative to cultivate Cleveland as a green convention city. It is the CVB's goal for all of Cleveland's downtown hotels to take part in the program by summer 2008. Along the way, they plan to hone the program, working with the ever-growing network to build a program of sustainable practices to benefit all Convention and Visitors Bureau members — suburban hotels, regional attractions, transportation providers and others.

Public Official of the Year

Award given to an Ohio public official who takes a leadership role in promoting and developing sustainable energy in the community.

Presented to U.S. Representative Marcy Kaptur

Congresswoman Marcy Kaptur is a senior member of the U.S. House of Representatives and the leading Ohio public official on today's green energy frontlines. She is the first member of the Ohio Congressional Delegation to take the Ohio Solar Tour in 2006 sponsored by Green Energy Ohio. She also spent a day in early 2006 at an Ohio Wind Working Group meeting in Toledo, interacting with the two dozen wind energy stakeholders at the heart of wind energy development in the state. As a key legislator on the federal appropriations committees, over the past five years Marcy has delivered funding to her Northwest Ohio district to develop renewable energy resources at several locations, including the Bowling Green State University Firelands Campus in Huron, and the National Guard Base at Camp Perry on Lake Erie. She visited the National Renewable Energy Laboratory in Colorado to support the nationally recognized thin film photovoltaic research at the University of Toledo. In 2007, GEO will join the Lucas County Port Authority and other key stakeholders to provide a scientific investigation of the interaction of wildlife and wind turbines in the Western Basin of Lake Erie — another important project made possible by Marcy.



SOLAR 2007 Awards

Green Energy Ohio Awards

Ohio Clean Community of the Year

Award given to an Ohio community that makes significant progress in the area of sustainability.

Presented to City of Oberlin

Oberlin's commitment to energy and environmental sustainability can be measured by the green power, energy conservation, and energy education programs in place today, and future energy sustainability programs identified by the community. Oberlin is a joint owner of a 42 MW Ohio River hydro facility, a purchaser of additional hydroelectric power, a purchaser of renewable power by methane gas from a neighboring landfill, and joint owner of the 7 MW wind turbine generation project in Bowling Green. These four green power sources supply 17.5% of Oberlin's annual power requirements. In addition, Oberlin sells green power to Oberlin College at a premium of \$2 per MW. This premium funds a separate Sustainability Energy Reserve Fund, which is used for projects such as wind power research, tree planting, and energy conservation programs. In 2002, Oberlin was designated as an Energy Smart Community by the state of Ohio.

Presented to Oberlin College

Oberlin College has a history of leadership dating back to its founding in 1833 as one of the first colleges in the U.S. to accept African Americans, and the first liberal arts college to grant Bachelor's degrees to women. More recently, Oberlin has been gaining recognition as a leader in the campus sustainability movement. Even before it opened in 1999, the Adam Joseph Lewis Center for Environmental Studies has been regarded as one of the most advanced green buildings in the country. It has been named One of the 30 Milestone Buildings of the 20th Century by the U.S. Department of Energy, and One of the Top 10 Green Projects of 2002 by the American Institute of Architects. In December 2006 Oberlin was one of the first four schools in the country to join the American College and University Presidents Climate Commitment and has pledged to make the transition to a climate neutral society a major priority. Through a partnership with Oberlin Municipal Light and Power Systems, the College receives 50% of its electricity from green sources, offsetting 25% of its carbon dioxide emissions. Oberlin College is also home to the largest solar photovoltaic (PV) array in the state of Ohio.

Pioneer of the Year

Award given to an individual or entity that develops innovative programs or practices to advance sustainable energy in personal practice, in business, or in the community.

Presented to City of Cleveland Sustainability Program

The City of Cleveland's Sustainability Program was established in May 2005 with the hiring of Andrew Watterson as the first Sustainability Manager. The Program is designed to guide the City on projects related to energy, including efforts to: save energy; clean the City's fleet; develop green building and high performance building standards; create bicycle facilities; reduce waste and increase recycling; and cultivate renewable energy and advanced energy opportunities. Committee members include Andrew Watterson, Bill Spratley, Christina Panoska, Ciaccia, Julius, David Beach, Frances DiDonato, Holly Harlan, Julianne Kurdila, Linda Kimble, Marlene Sundheimer, Matt Zone, Melanie Kintner, Chris Nielson, Philena Seldon, Robert Jackimowicz, Edward Rybka, Scott Sanders, and Stuart Greenberg.

Award for Dedicated Service to the GEO Board of Directors

Presented to Michelle Greenfield

Michelle Greenfield was elected to the GEO Board in 2001, and has served on the Finance and Fundraising committees, and as President from 2005 to May 2007. Michelle, in partnership with her husband, own Third Sun Solar and Wind Power, an Ohio based renewable energy contractor. Michelle has lived with her family in a house they built, off the grid in Athens County since 1997. Because she has always felt strongly about educating the general public about solar and wind power, she began organizing the Southeast Ohio Solar Tour in 1998, and did so each year until GEO became the central organizer in 2003. Michelle is proud to remain an active member of the GEO Board because of all the great work that GEO has done and is doing to enlighten Ohioans about renewable energy.

Lifetime Achievement Award Presented to Fletcher Miller

Fletcher Miller first became interested in solar energy as a child during the energy crises in the 1970s. After earning a PhD in engineering from the University of California at Berkeley on an ASES scholarship, he went on to work for NASA in Cleveland, with a career in microgravity science. He continued to promote sustainable energy by helping to found Sustainable Energy for Economic Development (SEED) in Cleveland in 1992. Now 12 years later, after merging with a Columbus group and adopting the name Green Energy Ohio, the group has grown to have statewide offices and staff. Fletcher has served the GEO Board for many years, contributing service as Vice President and Treasurer, as well as to the Executive, Governance, and Membership committees. His most significant accomplishments was work on two proposals for major Ohio wind monitoring projects, including the first offshore wind monitoring tower on the Great Lakes.

Award for Best Renewable Energy Project—Northeast Ohio Science and Engineering Fair

Presented to Joseph Krivos

Joseph chose his science project: "Enlightenment: Does the Wavelength of Light Affect the Productivity of a Photovoltaic Cell" to learn more about photovoltaic (PV) cells. His goal was to see if different wavelengths of light increased or decreased the productivity of the cells. To test the experiments, Joseph built a housing unit for the PV cells, which included a fan placed behind the unit to reduce the temperatures of the cell, a light fixture, and gearing to turn a small wind mill to test the practical use of energy. Joseph recently completed his elementary education at St. Mary's in Olmsted Falls, Ohio, and will enter St. Ignatius High School in Cleveland as a freshman in August 2007.

Society of Building Science Educators Scholarship Program

The Society of Building Science Educators (SBSE) provides travel support for students who present papers at the American Solar Energy Society (ASES) conference. These travel awards are made possible through donations from Jane and Fuller Moore and John Reynolds. This year ASES offered reduced student registration for these students. The following students received travel awards this year:

Tareq A. Baker, University of Southern California

Truc Bui, University of Oregon

Nicholas Gayeski, Massachusetts Institute of Technology

Jae Yong Suk, University of Southern California

Participating Organizations



The American Solar Energy Society (ASES) is the nation's largest and oldest membership organization dedicated to promoting renewable energy. ASES publishes SOLAR TODAY magazine, organizes the annual National Tour of Solar Buildings, sponsors the annual National Solar Energy Conference and advocates for government policy initiatives to promote the research and deployment of renewable energy. ASES has regional and state chapters throughout the country.



Green Energy Ohio (GEO) is a nonprofit organization dedicated to promoting environmentally and economically sustainable energy policies and practices in Ohio. GEO is the Ohio Chapter of the American Solar Energy Society.



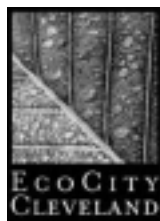
The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) is an international organization of more than 55,000 people with chapters throughout the world. ASHRAE is organized for the sole purpose of advancing the arts and sciences of heating, ventilation, air-conditioning and refrigeration for the public's benefit through research, standard writing, education and publications.

ApolloAlliance

The Apollo Alliance provides a message of optimism and hope, framed around rejuvenating our nation's economy by creating the next generation of American industrial jobs and treating clean energy as an economic and security mandate to rebuild America. America needs to hope again, to dream again, to think big, and to be called to the best of our potential by tapping the optimism and can-do spirit that is embedded in our nation's history.



The International Brotherhood of Electrical Workers Local Union 38 in conjunction with the Cleveland Chapter of the National Electrical Contractors Association (NECA) deliver the highest quality training for electrical apprentices available at the Cleveland Electrical Joint Apprenticeship and Training Center (CEJATC) in Valley View, Ohio.



EcoCity Cleveland is a nonprofit environmental planning organization that promotes the design of cities in balance with nature in Northeast Ohio.

Since being founded in 1992, EcoCity Cleveland has earned a national reputation for the quality of its work. We have been a key player in expanding public awareness of urban sprawl as a fundamental environmental problem. Our reporting in the EcoCity Cleveland Journal and other publications has been influential in supporting and shaping the local environmental movement. And our programs add value to the work of many other organizations promoting sustainability and ecological cities.

GLREA

The Great Lakes Renewable Energy Association is a non-profit organization that educates, advocates, promotes, and publicly demonstrates renewable energy technologies.



Hard-Hatted Women began in 1979 when three women—a telephone repair technician, a steelworker and a truck driver, formed a support group for tradeswomen. HHW was volunteer driven from 1979 to 1990, with a programmatic emphasis on education, outreach and advocacy. By 1990, HHW had established an office and hired an Executive Director. Hard Hatted Women is the only community non-profit organization dedicated to supporting women in high-wage, nontraditional, blue collar careers.



The Interstate Renewable Energy Council (IREC) has been working for over two decades as a non-profit organization committed to moving renewable energy resources into the marketplace by focusing on state and local governments and communities. IREC emphasizes education and outreach, stakeholder coordination, technical assistance, workforce development, the adoption and implementation of uniform guidelines and standards, consumer protection, and building networks to share experiences and information.

Participating Organizations



The Society of Building Science Educators (SBSE)

is an international association of university educators and practitioners in architecture and related disciplines who support excellence in the teaching of environmental science and building technologies. SBSE publishes a newsletter, conducts annual retreats and workshops, and maintains a website.



The Solar Energy Society of Canada (SESCI)

promotes the increased use of solar and other renewable energies in Canada. To promote these goals SESCO has developed programs in three broad areas: education, technical development and public policy. Through these programs SESCO supports energy conservation, industry, and all forms of renewable energy, such as active and passive solar, photovoltaic, micro hydro, biomass, wind and earth energy.



The Solar Electric Power Association (SEPA)

is a collaboration of utilities, energy service providers and the photovoltaic industry working together to create and encourage commercial use of new solar electric power business models. SEPA helps to establish standards for photovoltaic systems and their interconnection to the utility grid, hosts cross-industry workshops, and manages educational and outreach campaigns.



The Solar Energy Industries Association (SEIA)

located in Washington, D.C. is the national trade association of solar energy manufacturers, dealers, distributors, contractors, installers, architects, consultants, marketers and end users. Representing all solar technologies, including photovoltaics, concentrating solar power and solar thermal, we work to expand the use of solar technologies in the global marketplace.



Solar Energy International (SEI)

is a non-profit educational organization whose mission is to help others use renewable energy and environmental building technologies through education and technical assistance. SEI educates decision-makers, technicians and users of renewable energy systems. SEI's programs include the Renewable Energy Education Program (REEP), International Training courses, Solar in the Schools, and International Volunteers in Environmentally Sustainable Technologies (INVEST).



The Solar Rating and Certification Corporation (SRCC)

provides independent certification, national recognition, product credibility and standardized comparisons of solar energy products. SRCC Programs serve three primary constituencies - the solar energy industry, solar consumers and state and federal regulatory bodies. All three constituencies benefit from the SRCC programs by obtaining a national state-of-the-art rating system, a mechanism to develop consumer confidence and rational and defensible criteria for tax credit qualifications and other solar incentive programs.

Thank You



National Organizing Committee

Members of the National Organizing Committee are recruited as long as three years before the conference itself. Members of the NOC are responsible for the overall organization of the conference, including the program, marketing, and fundraising efforts. Members of the NOC organize all plenary sessions, and review and select Forum sessions for the conference. Members include:

Chair: Bill Spratley, Green Energy Ohio, Columbus, OH

Becky Campbell-Howe, American Solar Energy Society, Boulder, CO
Brad Collins, American Solar Energy Society, Boulder, CO
Trudy Forsyth, National Renewable Energy Lab, Golden, CO
Jack Hedge, Design Group, Columbus, OH
Bruce Hunn, ASHRAE, Atlanta, GA
Gabriela Martin, Environmental Law and Policy Center, Chicago, IL
David Panich, Panich + Noel Architects, Athens, OH
Christina Panoska, Green Energy Ohio, Columbus/Cleveland, OH
David Renné, National Renewable Energy Laboratory, Golden, CO
Adil Sharag-Eldin, Kent State University, Kent, OH
Robert J. Shaw, NASA Glenn Research Center, Cleveland, OH
Richard T. Stuebi, The Cleveland Foundation, Cleveland, OH
Blanche Sheinkopf, The Sheinkopf Group, Indian Harbour Beach, FL
Ken Sheinkopf, Florida Solar Energy Center, Cocoa, FL
Chris Theis, Louisiana State University, Baton Rouge, LA
Andrew C. Watterson, City of Cleveland, Cleveland, OH
Byron Winn, Solar Rating and Certification Corporation, Ft. Collins, CO

The Technical Review Committees

Members of the Technical Review Committees (TRCs) review all abstracts for their particular conference, make final decisions as to which authors will be invited to write papers and present their work at the conference, organize accepted abstracts into technical sessions, schedule the sessions, and recommend chairs for each session. In addition, they help to publicize the National Solar Energy conference to their own colleagues and networks. Members of the TRCs are experts in their respective fields, and are recruited early in the fall of the year before the conference.

Annual Technical Review Committee

Chair: David Renné, National Renewable Energy Laboratory, Golden, CO

Randy Gee, Reflectech, Golden, CO
Steve Sargent, Sargent Associates, Golden, CO
Michael Stav, Consulting Engineer, Chicago, IL
Lorin Vant-Hull, University of Houston, Elgin, TX
Brian Vick, U.S. Department of Agriculture, Bushland, TX

Passive Technical Review Committee

Chair: Adil Sharag-Eldin, Kent State University, Kent, OH

Harvey Bryan, Arizona State University, Tempe, AZ
Liliana Beltran, Texas A&M University, College Station, TX
Walter Grondzik, Florida A&M University, Tallahassee, FL
Kathryn Janda, Oberlin College, Oberlin, OH
Beth Lewis, Florida A&M University, Tallahassee, FL
Marc Schiler, University of Southern California, Pasadena, CA
Gregory Thomson, Wentworth Institute of Technology, Boston, MA

Policy and Marketing Technical Review Committee

Chair: Gabriela Martin, Environmental Law and Policy Center, Chicago, IL

Rusty Haynes, NCSU Solar Center, Raleigh, NC
Steven Letendre, Prometheus Institute, Middletown Springs, VT
Tom Maves, Ohio Department of Development, Office of Energy Efficiency, Columbus, OH
Jane Weissman, Interstate Renewable Energy Council & North American Board of Certified Energy Practitioners, Dedham, MA

Additional Abstract Reviewers

William Bennett, University of Hawaii
Terri Boake, University of Waterloo
Marlene Brown, Sandia National Labs
Milton Cecalet, Alternative Energy Group of Texas
Kevin Cooney, Summit Blue Consulting
Tom Cowing, Thomas Cowing & Associates
Glen Friedman, Evergreen Design Group
Mary Guzowski, University of Minnesota
Roshanak Hakimzadeh, NASA Glenn Research Center
Pablo LaRoche, Cal Poly Pomona
Margot McDonald, Cal Poly Architecture Department
Rob Nelson, Heliakos
Frank Vignola, University of Oregon
Gary Vliet, University of Texas at Austin
Steve Wilcox, NREL

The Local Organizing Committee

Members of the Local Organizing Committee (LOC) are responsible for organizing and publicizing the conference ancillary events, including workshops, tours, social event and any local chapter event(s) held in conjunction with the National Solar Energy Conference. LOC members are expected to attend and contribute their ideas to meetings, to do the actual work needed to put together the ancillary events for the conference, and to assist in identifying fundraising targets. In addition they are expected to publicize the conference to their own colleagues and networks. Members of the LOC are typically active members of the co-presenting chapter.

Chair: Christina Panoska, Green Energy Ohio, Columbus/Cleveland, OH

Cory Anderson, Society of Manufacturing Engineers NE Ohio, Parkman, OH
Athan Barkoukis, Green Energy Ohio, Cleveland, OH
Qadwi Bey, RA Energy Intl. Inc., Cleveland, OH
Blake Andres, Great Lakes Science Center, Cleveland, OH
Andy Baker, Lake County Metroparks, Chardon, OH
M. Kelly Brewer, Convention & Visitors Bureau of Greater Cleveland, Cleveland, OH
Karen Crandall, NASA Glenn Research Center, Cleveland, OH
John Fellenstein, John Hay High School, Cleveland, OH
Kellie Fiorello, Green Energy Ohio, Columbus, OH
Al Frasz, Dovetail Solar & Wind, Chagrin Falls, OH
Tiffany Gerber, Tuscarawas County Convention & Visitors Bureau, New Philadelphia, OH
Alaina Glitz, Glitz Associates, Cleveland, OH
Holly Harlan, Entrepreneurs for Sustainability, Cleveland, OH
Stephanie Kane, Green Energy Ohio, Cleveland, OH
Fletcher Miller, NASA, Cleveland, OH
Joe Perlaky, University of Toledo & GEO Board Member, Oregon, OH

Debbi Perkul, Hard Hatted Women, Cleveland, OH
Katherine Readey, American Greetings Corporation, Cleveland, OH
Geoff Rich, First Solar, Bowling Green, OH
Carl Scheutzow, IBEW & Mariner Energy Systems, Brunswick, OH
Jamie Smialek, John Hay High School, Cleveland, OH
Bill Spratley, Green Energy Ohio, Columbus, OH
Richard Stuebi, The Cleveland Foundation, Cleveland, OH
Stephanie Strong, Entrepreneurs for Sustainability, Cleveland, OH
Steve Talbott, Cleveland, OH
Bob Vance, The Shamrock Companies, Chesterland, OH
Linda Walls-Rominski, Office of the Ohio Consumer's Counsel, Columbus, OH
Erika Welizcko, REpower SOLUTIONS, Cleveland, OH

Volunteers

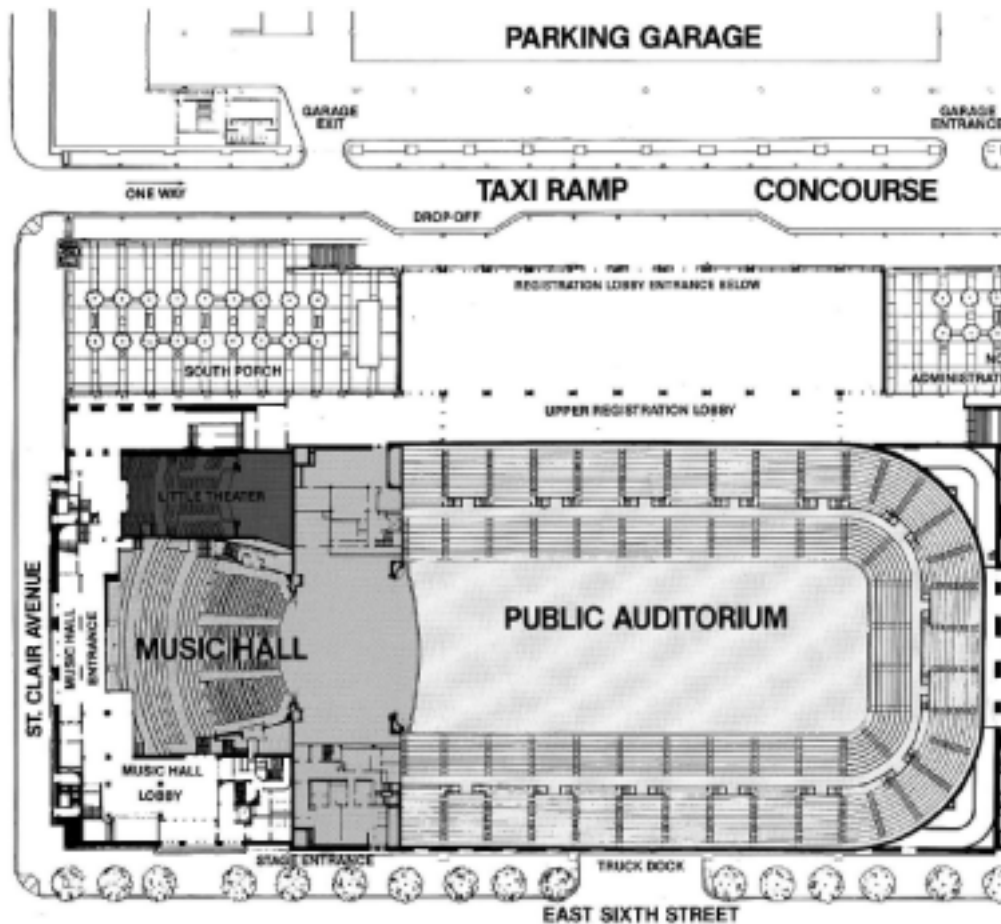
We couldn't run the National Solar Energy Conference without them! Volunteers work 20 hours during the conference, in return for free conference registration. They are hard-working, dedicated, and many return year after year.

Darryl Thayer is the on-site Volunteer Coordinator

Carl Adams
Dale Andreatta
Janice Arnold
Teny Bannick
Carolina Barreto
Valorie Bendor
Dale Bickenbach
Catherine Borrowman
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Paul Shircliff
Dave Simons
Matthew Smith
Faye Spratley
Jill Vagedes
Kate Williams
Bernie Woller
John Zagunis

Cleveland Convention Center

Floor Plans



Above: Exhibit Hall and Plenaries – entrance from Taxi Ramp between building and Parking Garage
Below: Forums, Technical Sessions, Registration Lower Level (under Exhibit Hall and Plenary Room)



ASES Business Members

We would like to thank all of our Business Members for their support!

Please patronize these businesses, as well as the Conference Sponsors!

Business Member Level IV

Arizona Public Service	Phoenix, AZ
Portland General Electric	Portland, OR
SunPower Corp.	San Jose, CA

Business Member Level II

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Analytic System	Surrey, BC, CANADA
Center For PV Innovation and Commerce	Toledo, OH
CMI Electric	Newark, DE
Conergy, Inc.	Santa Fe, NM
Direct Power and Water Corporation	Albuquerque, NM
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Duke Energy	Cincinnati, OH
ECD-Ovonics Solar	Rochester, NY
Energy Innovations, Inc.	Pasadena, CA
Evergreen Solar, Inc.	Marlboro, MA
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FuelCellStore.com	Boulder, CO
Gerding Edlen Development	Portland, OR
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JA Solar USA Inc.	Union City, CA
JK Solutions	New York, NY
KW Management, Inc.	Wilton, NH
Kyocera Solar, Inc.	Scottsdale, AZ
Lakeland Electric	Lakeland, FL
NASA Glenn Research Center	Cleveland, OH
Naugatuck Glass	Naugatuck, CT
Open Energy Corporation	Solana Beach, CA
Pronghorn Investors	Mountain View, CA
Regridpower	Campbell, CA
RenewableEnergyAccess.com	Peterborough, NH
SMA America	Grass Valley, CA
Sacramento Municipal Utilities Dist.	Sacramento, CA
Solar Works	Montpelier, VT
Solargenix Energy LLC	Chicago, IL
Southwest Windpower, Inc.	Flagstaff, AZ
Stiebel Eltron, Inc.	West Hatfield, MA
The Cleveland Foundation	Cleveland, OH
Tracy Rettig	Auburn Hill, MI
Xantrex Technology Inc.	Burnaby, BC, CANADA

Business Member Level I

AC Solar, Inc.	Florence, CO
Advanced Energy Conversion LLC	Malta, NY
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IMT Solar	Amherst, NY
Inland Energy	Newport Beach, CA
Integrated Energy Systems, Inc.	Riverton, UT
Island Energy Solutions	Kailua, HI
Carl Marley	Portsmouth, OH
Mechanical Energy Systems	Canton, MI
New Age Solar LLC	Clarksburg, NJ
NJ Solar Solutions, Inc.	Metuchen, NJ
North Texas Renewable Energy, Inc.	Fort Worth, TX
Ongrid Solar	San Jose, CA
Pacific Power Management LLC	Auburn, CA
Peckham & Wright Architects	Columbia, MO
Pioneer Valley Photovoltaics	New Britain, CT
Plant Solar	Penn Valley, CA
Practical Solar, Inc.	Boston, MA
Prairie Technologies	Rockford, MN
Puget Sound Solar	Seattle, WA
Quad State Solar	Plainview, NY
Quality Solar	Alamo, CA
Quoddy Head Solartec	Washington, ME
Realign Technology	Breckenridge, CO
Reflectech	Arvada, CO
Simple Solar Systems	Boulder, CO
Single Tree Power and Lighting	Greenwood Lake, NY
SkyFuel, Inc.	New York, NY
Small Power Systems	Covelo, CA
Solar Concepts LLC	Golden Valley, MN
Solar Energy Systems, Inc.	Brooklyn, NY
Solar Energy, Inc.	Jacksonville, FL
Solar Powerworks, Inc.	Tracy, CA
Solar Source	Largo, FL
Solar Wind Works	Truckee, CA
SolarH2ot	Cary, NC
Solectria Renewable LLC	Lawrence, MA
Solorado	Boulder, CO
Stellar Power & Heating	Twain Harte, CA
Sun Electric Systems	Lafayette, CO
Sundance Solar Systems	Red Lodge, MT
Sunstor	Greer, SC
The Energy Outlet, Inc.	Bunnell, FL
The Energy Store	Hollywood, FL
The Green Building Center	Salt Lake City, UT
Thermomax	Columbia, MD
Third Sun Solar & Wind Power	Athens, OH
Torpedo Specialty Wire, Inc.	Rocky Mount, NC



ASES National Solar Energy Conference

San Diego

SOLAR 2008

Catch the Clean Energy Wave!

May 3 - 8, 2008

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