National Solar Energy Conference

SOLAR 2004
A Solar Harvest Growing Opportunities

July 9–14, 2004
Portland, Oregon

Preliminary Program
and Registration Information

Come join us in Portland Oregon for the 2004 National Solar Conference. We offer you a solar bounty, while we entertain you with knowledge, great food and a vibrant and sustainable city.

SOLAR 2004 is the ONLY conference that brings together ALL solar disiplines and solar enthusiasts. We will lift your spirits, connect you with familiar and new colleagues in the solar field and energize you to continue doing your vital work!

Featuring

- 33rd ASES Annual Conference
- 29th National Passive Solar Conference
- ASME International Solar Energy Conference
- SEIA Industry Updates
- SBSE Annual Meeting
- IREC/DOE Million Solar Roofs Partnerships Annual Meeting
- SRCC Annual Meeting
- Workshops, Tours, Special Events

Presented by the **American Solar Energy Society**, the **Solar Energy Association of Oregon** and **Solar Washington**

Participating Organizations

The American Institute of Architects Committee on the Environment (AIA)
The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)
The American Society of Mechanical Engineers (ASME) Solar Energy Division
Interstate Renewable Energy Council (IREC)/DOE Million Solar Roofs (MSR) Partnership
The Oregon Solar Energy Industries Association (OSEIA)
The Society of Building Science Educators (SBSE)
The Solar Energy Association of Oregon (SEAO)
Solar Energy Industries Association (SEIA)
The Solar Rating and Certification Corporation (SRCC)

Sponsored by

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy
Energy Trust of Oregon
Eugene Water and Electric Board
Oregon Department of Energy
Northwest Energy Efficiency Alliance
PacifiCorp
Portland General Electric
TriMet
Bonneville Power Administration
Emerald People's Utility District
Kettle Foods
Northwest Power Planning Council
Northwest Solar Center
PowerLight Corporation
Portland General Electric Foundation
SRG Partnership, Inc.
Yost Grube Hall Architecture, Inc.

AIA Continuing Education System

SOLAR 2004 Attendees may earn AIA Learning Units, including Health, Safety and Welfare units, for attending many of the conference sessions and workshops. More information about specific LUs for each session will be available at the conference.

Table of Contents

Cover photo courtesy POVA/Larry Geddis

Featured Speakers

David Garman

David Garman is the Assistant Secretary for Energy Efficiency and Renewable Energy at the U.S. Department of Energy. Assistant Secretary Garman previously served in a variety of positions on the staff of two U.S. Senators and two Senate Committees during a career spanning nearly 21 years. He also served as a U.S. Senate observer at virtually all of the major negotiations under the United Nations Framework Convention on Climate Change from 1995 - 2000. Mr. Garman holds a Bachelor of Arts from Duke University and a Master of Science in Environmental Sciences from Johns Hopkins University.

Donald Aitken, Ph.D.

Dr. Donald Aitken is currently principal of his own consulting company, Donald Aitken Associates, Affiliate Faculty Member at the Frank Lloyd Wright School of Architecture, and Senior Consulting Scientist for the Energy Department of the Union of Concerned Scientists.

David L. Block, Ph.D., P.E.

Dr. David Block is Director Emeritus of the Florida Solar Energy Center (FSEC) having resigned as Center Director in November 2002 after serving for 25 years.

Peter Clegg, MA(Cantab), MEnvD, RIBA

Peter Clegg is a Senior Partner of Feilden Clegg Bradley Architects having established the practice with Richard Feilden in 1978. The practice has 25 years experience in environmental design in architecture. He is also visiting Professor at the University of Bath School of Architecture.

Christine A. Ervin

Christine A. Ervin joined the U.S. Green Buildings Council in April 1999 as President & CEO. She has served as Assistant Secretary for the U.S. Department of Energy's energy efficiency and renewable energy programs, Director of the Oregon Department of Energy, Assistant Director for Missouri's planning and budget agency, and a project director at the Conservation Foundation & World Wildlife Fund. She is a founding board member and officer for the Oregon Energy Trust.

Denis Hayes

Denis Hayes is President of the Bullitt Foundation. He was national coordinator of the first Earth Day in 1970, and remains the chair of the International Earth Day Network. He also practiced law for several years and served as Director of the National Renewable Energy Laboratory. Time magazine selected Hayes as one of its "Heroes of the Planet," and the National Audubon Society included him in its list of the 100 Environmental Heroes of the 20th Century.

Stan Ovshinsky

Stan Ovshinsky is ECD Ovonic's founding president/CEO. His amorphous/disordered materials pioneering work (1955) is the enabling technology in energy generation, energy storage, and information systems. Ovshinsky was named "Hero for the Planet" by *TIME* and profiled in *Inventing Modern America* for helping shape the modern world.

Schedule at a Glance

SOLAR 2004
A Solar Harvest Growing Opportunities

Friday, July 9

ALL DAY

Workshops
- Preparatory Course for NABCEP PV Installer Certification Exam
- Project Sun: Professional Development for Teachers
- Solar Home Heating and Natural Cooling Strategies
- Renewable Energy for the Developing World (day 1)
- PV Design and Installation for Women (day 4)

Saturday, July 10

ALL DAY

Meetings
- IREC/MSR Annual Meeting

Workshops
- PV Markets, Technology, Cost, Performance and BIPV
- PV Design and Installation for Women (final day)
- Renewable Energy for the Developing World (day 2)

Tours
- Central Oregon
- Gorge Wind Farm
- Oregon Coast

MORNING

Workshops
- Daylighting by Design
- Integrated Solar/ Radiant Floor Heating Systems
- Natural Ventilation for Non-residential Buildings

AFTERNOON

Workshops
- Green Building: Guidelines for Homes
- Solar Advocacy: Municipal Campaigns

Tours
- PV Manufacturing Plant & Cool School
- Wine Country

EVENING

Meetings
- ASES Chapters' Caucus
- SRCC Board Meeting

Sunday, July 11

MORNING

Meetings
- ASES Chapters' Caucus
- ASME Divisions Executive Committee
- SRCC Board Meeting

Workshops
- Basics of Using Solar Energy in a Disaster
- Designing High Performance Sustainable Buildings
- Zero Net Energy Homes

Tours
- Green City Walking Tour
- Green Home Sampler

AFTERNOON

Events
- Exhibit Hall Opens
- Press conference

*** * Conference Opening Plenary * ***

Forums
- Promoting Solar Energy Through Green Power Markets: An Array of Options
- Real Stories from Real Buildings
- Sustainable Development – Successful Strategies

Technical Sessions
- PV Case Studies
- PV Local and City Programs
- Residential Systems
- Solar Heating and Cooling
- Solar Thermal Power Design Concepts

EVENING

Events
- Opening Reception
- Emerging Opportunities

Monday, July 12

ALL DAY
- Exhibit Hall Open

MORNING

Events
- Annual Plenary
- Passive Plenary

Forums
- Bringing Water to the World
- Net Metering and Interconnection
- Industry Update
- WISE Forum

Technical Sessions
- International Case Studies and Applications
- PV State Programs
- Solar Hydrogen I
- Solar Thermal Power Systems and Components
- Time Honored Spaces and Places
- Whole Building Analysis

MIDDAY

Events
- ASME General Membership Meeting
- Student Poster Contest Judging
- WISE Luncheon

AFTERNOON

Forums
- Helping the Family-Owned Wind Farm find its Niche
- Making the Transition to the Hydrogen Economy
- Monitoring and Displaying Home Energy System Performance
- Industry Update: Export Financing and Opportunities
- State Solar Program Coordinators

Technical Sessions
- Comparisons and Contrasts
- Daylighting Case Studies
- Natural Ventilation
- Passive Cooling
- PV Balance of Systems
- PV Concentrators I
- PV Concentrators II
- PV Monitoring
- Solar Hydrogen II
- Solar Thermal Collectors I
- Solar Thermal Collectors II
- Solar Thermal Power Materials and Testing

EVENING
- Awards Banquet

Tuesday, July 13

MORNING
- Exhibit Hall Open

Forums
- EnergySmart Schools and EnergySmart Students
- Local & State Initiatives for Sustainable Energy Development
- Regulatory Leadership for Renewable Inroads
- Solar Thermal Electric International Project Development

Technical Sessions
- Building Integrated PV I
- Building Integrated PV II
- Daylighting – Prediction
- Energy Security/Blackouts
- Fuels
- Growing Renewable Energy Markets
- Solar Chemistry and Bio-Conversion
- Solar Cooling I
- Solar Cooling II
- Sustainability Curriculum
- Thermal Comfort – Prediction
- Thermal Performance - Residential Buildings

MIDDAY
- Exhibit Hall Open

Meetings
- SBSE Annual Meeting

Events
- Student and Professional Poster Q&A

AFTERNOON

Forums
- ASME Tutorial – Solar Production of Hydrogen
- Off the Shelf: Retrofitting Existing Housing for Solar Applications and Energy Efficiency
- Promoting the Benefits of Renewables
- Solar is Going to Schools
- Solar Vehicle Competitions

Technical Sessions
- Approaches to PV Analysis
- Building Assessments
- Campus Buildings/School Buildings
- Microclimate
- Policy I
- Policy II
- PV Applications
- Solar Energy Applications in the Caribbean: In Memoriam to Dr. O. Headley
- Solar Thermal Industrial and Agricultural Applications
- Solar Water Heating I
- Solar Water Heating II
- Testing and Monitoring

EVENING

Events
- ASES Annual Meeting
- Dinner at the Classical Chinese Garden

Wednesday, July 14

MORNING

Forums
- 1974 - 2004: Thirty Years of the Solar Heating and Cooling Demonstration Act - Recapturing the Legislative Vision
- Academic Programs for Preparing Students for Careers in Solar Energy/Alternative Energy in the 21st Century
- Building the Framework for Jobs & Workforce Development
- BetterBricks Daylighting Labs: A Northwest Design Assistance Network for Energy Efficient Buildings

Technical Sessions
- Benchmarking Evaluation and Assessment Tools
- Building Performance
- China Supermarket
- Daylighting – Shading
- Growing PV Markets
- Integrated Sustainable Design
- PV Market NGO Programs
- Renewable Energy Systems Analysis
- Resource Assessment Irradiance Modeling
- Resource Modeling for Applications
- Solar Exotica
- Thermal Energy Storage

MIDDAY

Events
- Closing Luncheon & Plenary

AFTERNOON

Workshops
- Inverter Technology Comparison
- Rainwater Harvesting and Ecoroof Rainwater Management
- Roofpond Building Design: Heating and Cooling Applications
- Terrestrial Solar Spectral Modeling for Renewable Energy Applications

Tours
- Daylighting in Large Buildings
- Energy Trust of Oregon Homes

*** * SEATTLE * ***
POST-CONFERENCE TOURS

THURSDAY
- The IslandWood Learning Center on Bainbridge Island

FRIDAY
- Walking Tour of Seattle LEED Buildings

SATURDAY
- Seattle City Light's Skagit Hydroelectric Project

Collegiate Poster Presentation Contest

Are you a student or intern in the field of engineering, environment or architecture? We invite you to enter one of the SOLAR 2004 student poster contests.

SOLAR 2004 will feature a student poster contest open to all university/college students enrolled for nine or more credit hours in architectural and/or engineering programs. The SOLAR 2004 registration fee will be waived for all students whose posters are accepted for presentation at the conference.

There will be two separate contests for SOLAR 2004.

Building Technologies Student Poster Contest

The Society of Building Science Educators (SBSE) is sponsoring the contest focusing on building technologies. Poster presentations should address topics related to the integration of passive design strategies in buildings (heating, cooling, daylighting), the use of renewable resources in buildings (solar, PV, wind, geothermal, biomass, daylighting), energy efficiency through architectural design, and/or green/sustainable practices for buildings. We are particularly interested in case studies, studio projects, and other research, analysis and/or design projects that demonstrate the integration of technologies and design and/or address building/system performance. This contest compliments the existing ASES student poster contest for Active Solar Technologies.

Active Technologies Student Poster Contest

The contest focusing on active solar technologies is being organized by Byard Wood, head of the Mechanical and Aerospace Engineering department at Utah State University. Poster presentations should address subjects related to active solar energy generation technologies, such as PV and thermal, wind, geothermal and biomass.

Posters will be on display from noon on Sunday, July 11 through Tuesday, July 13. Judging will take place on Monday, July 12, and an author Q&A session is scheduled for noon on Tuesday, July 13.

The following prizes will be awarded for each contest (six prizes in all):

1st place
ASES membership for one year
+ ASES 2004 Conference Proceedings CD
+ $500

2nd place
ASES membership for one year
+ ASES 2004 Conference Proceedings CD
+ $300

3rd place
ASES membership for one year
+ ASES 2004 Conference Proceedings CD
+ $200

SBSE Contestants will also receive free SBSE membership for one year.

For specific requirements and submittal instructions, please go to the ASES website, www.ases.org.

Portland has 37,000 acres of parks in the metro area. It is home to Mill Ends Park, which at 24 inches, is the world's smallest dedicated park. Portland is also home to the nation's largest city park—the 5,000 acre Forest Park.

POVA/Steve Terrill

Peninsula Park Rose Garden

POVA/Janis Miglavs

World Forestry Center-Memorial Fountain Area

POVA/Larry Geddis

Japanese garden

Sunday, July 11 Conference Program

Pioneer Courthouse Square - Close-up of Weather Machine
Oregon installed the first PV system on the roof of a state Capitol on Earth Day 2002.

Sunday, July 11, 2:00 to 3:30 pm

FORUMS

Promoting Solar Energy through Green Power Markets: An Array of Options

Recent years have seen the emergence of a significant market for environmentally-preferred power in the form of voluntary, retail green power products being offered by utilities and non-utility providers alike. Generally, however, these green power programs have resulted in relatively little investment in solar energy, favoring other technologies (particularly wind energy) instead. This forum brings together representatives from a variety of constituent groups—including green power marketers, federal energy laboratory researchers, environmental advocates, and solar industry representatives—to describe green power programs that have successfully promoted solar power, and to discuss how green power programs might be better designed to promote a higher percentage of solar energy in the resource mix.

Real Stories from Real Buildings

Students, faculty, and practitioners throughout North America (and internationally) have used methods and equipment from the Vital Signs and Agents of Change curriculum projects to examine the performance of buildings in use. These examinations take a scientific look at building performance and have produced innumerable intriguing findings. 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. This session will present methods and findings from selected building case studies.

Sustainable Development – Successful Strategies

Sustainable development and renewable energy go hand in hand and successes are being seen on many levels. This forum highlights some examples of success at the community and project levels. Participants will explore what activities are achieving success and why and will discuss broader applications of these successful strategies to other parts of the country and world.

Participating Organization

The American Institute of Architects Committee on the Environment (AIA) has represented the professional interests of American architects since 1857. The Committee on the Environment is the Institute's forum for the compilation, exchange, and dissemination of environmental information integral to the design and practice of architecture.
www.aia.org/cote

TECHNICAL SESSIONS

PV Case Studies

Historic Building Owner Goes Green: A Case Study of a 25KW PV System Installed on a Historic Building in Eugene, Oregon
D. Spiek and A. Fraser, Eugene Water & Electric Board

A Grid-Tied Residential PV Case-Study
A. Jackaway, Spruce Design Group

PV Local and City Programs

Brownfield to Brightfield: Development of a Utility-Scale Solar Generating Facility in Brockton, MA
L. Colombo, City of Brockton and J. Abe, KEMA-XENERGY, Inc.

Profitable Solar Electric System Performance Guarantees
A. Black, REgrid Power

Using Theory-based Evaluation to Help Plan Improvements for LIPA's Solar Pioneer Program
A. Clarke, Long Island Power Authority, T. Pettit and L. Hoefgen, Nexus Market Research; D. Hill, Vermont Energy Investment Corp; C. Jaskot and A. Clarke, Long Island Power Authority; M. McRae, Research Into Action and R. Prahl, Prahl & Associates

Energy Ratings for Site-Built Fenestration Products: Seattle's Experiences with NFRC Label Certificates
J. Hogan, AIA, PE, Seattle Department of Planning and Development (DPD)

Designing a Performance-Based Incentive for the Residential PV Market
T. Starrs, Bonneville Environmental Foundation

Solar Eugene: Developing a Distributed Photovoltaic Resource in Eugene, Oregon
K. Grey, B. Lorenzen and M. Northway, Eugene Water and Electric Board

Municipal Energy Policy: Acting Locally to Advance Renewables
A. Mason, SunJuice

Residential Systems

Comparative Environmental Performance of Wall Systems
M. Tobin and G. Franta, ENSAR Group

Integrated Solar Systems for Thermal Comfort, Water Heating, and Electrical Production
A. Lutz, AJL Resources LLC

Use of Insulated Concrete Form (ICF) Construction for Energy Conservation in Residential Construction
J. Arthur, Virginia Military Institute and R. Ribando, University of Virginia

Zero Energy House for the Southern Nevada Area
E. Wilkenson and R. Boehm, UNLV

Natural Climatization of a House Located in a Mild-rain Climate to Obtain Thermal Comfort
J. Morales, National Autonomous University of Mexico

Value Analysis of Building Energy Conservation Options
A. Kumpanon, and R. Boehm, UNLV

POVA/Janis Miglavs

Sunday, July 11 Conference Program

Solar Heating and Cooling

Overview of a District Heating and Cooling Project for the City of Tucson
N. Saman and U. Shami, APS Energy Services

Development of Exhaust Heat Exchange Muffler (EHEM) for Gas-Engine Heat Pump (GEHP)
Z. Yang, Tianjin University

The Pentagon Challenge
F. Mahjouri, Thermo Technologies

Field Study of an Unglazed Transpired Solar Collector System at an Industrial Facility in North Carolina
C. Maurer and K. Creamer, North Carolina Solar Center

By-pass Blending Station: An Innovative Secondary In-Build Pump System for District Heating and Cooling Systems
M. Liu, University of Nebraska

Devising and Developing the Equipment for a Solar Collector Heating System
D. Li and X. Gao, Beijing Institute of Civil Engineering and Architecture

Optimal Heat Recovery Control of Laboratory Air Handling Unit System (LAHU) for Laboratory Buildings
M. Liu, and Y. Cui, University of Nebraska-Lincoln

Solar Thermal Power Design Concepts

Experimental Verification of a Combined Power and Cooling Thermodynamic Cycle
C. Martin and D. Goswami, University of Florida

Solar Chimney Multiple Turbine Performance
A. Gannon, G. Milandri and T. vonBackstrom, University of Stellenbosch

Sun Tracking Photo-Sensor for Solar Thermal Concentrating System
K. Nakamura and M. Nakamura, Mitaka Kohki Co., Ltd. and K. Yoshida, K. Aiuchi, and Y. Katayama, The Institute of Applied Energy

Development of Parabolic Trough Technology in Mexico
C. Ramos, J. Lagunas and R. Ramírez, Instituto de Investigaciones Eléctricas

Multivariable Generalized Predictive Control of the Yazd Solar Power Plant
A. Saidi and H. Taghirad, I&C Engineering

The Green Energy Fraction Parameter for Solar Thermal Power Systems
A. Roy, Ben-Gurion University

Sunday, July 11, 4:00 to 6:00 pm

Conference Opening Plenary

Welcome and Opening Remarks
John Reynolds, SOLAR 2004 National Organizing Committee Chair, University of Oregon

Welcome and State of the Society Address
Tom Starrs, American Solar Energy Society Chair, Bonneville Environmental Foundation

Welcome to Oregon
Michael Grainey, Director, Oregon Department of Energy

Mystery Guest

Keynote Speakers

Christine A. Ervin, President and CEO, U.S. Green Buildings Council

Donald W. Aitken, Ph.D., Principal, Donald Aitken Associates and Senior Consulting Scientist for the Energy Department of the Union of Concerned Scientists

Sunday, July 11, 7:30 to 10:00 pm

Emerging Opportunities

This session will bring together architects and transportation experts to discuss renewable energy opportunities and successes in both fields.

Speakers will include:
Peter Clegg, MA, MEnvD, RIBA, Fielden Clegg Bradley Architects, London
Edward J. Cazayoux, AIA, EnvironMental Design
Richard Schoen, Solar Integrated Technologies
Stanford Ovshinsky, Energy Conservation Devices, Inc.

Participating Organization

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. www.ashrae.org

Monday, July 12 Conference Program

POVA/Janis Miglavs

Monday, July 12, 8:30 to 10:00 am

PLENARIES

Annual Conference Plenary

Speakers will include:

Federal Perspectives and Policy on Renewable Energy
David Garman, U.S. Department of Energy

Hydrogen Technologies, Facts and Myths
David Block, Florida Solar Energy Center

Integrating Wind Power the Federal Columbia River Power System
Elliot Mainzer, Bonneville Power Administration

Despite the Rain, Prospects are Bright for Solar in Oregon
Christopher Dymond, Oregon Department of Energy

Passive Conference Plenary

Speakers will include:

Oregon Innovative School Designs
Heinz Rudolph, AIA, BOORA

BIPV, Daylighting, Night and Cross Ventilation at the U of Oregon Lillis Business School
Kent Duffy, SRG Partnership, Inc.

Report of Performance on Oberlin's Building
David Orr

Monday, July 12, 10:30 am to Noon

FORUMS

Bringing Water to the World

Adequate supplies of clean potable water are becoming an increasing problem around the world, especially in developing countries. A report prepared for the recent World Summit on Sustainable Development in South Africa found that 40 percent of the earth's population is facing serious shortages of safe fresh water, particularly in North Africa and western Asia. Water and energy supply are, of course, intertwined, because it takes energy to produce fresh water from salt water, and clean water from polluted water. This session will preview the theme of the next ASES Conference – the Solar World Congress 2005. Experts from water organizations as well as NGO's and international funding agencies will address "Bringing Water to the World." Further information on the water topics related to the 2005 Congress can be found at http://www.swc2005.org.

Net Metering and Interconnection

The rights to interconnect and net meter small renewable resources go hand in hand. Each is important to the owners of small renewable energy systems in its own right, but neither is particularly valuable without the other. A right to net meter an energy generation resource does not mean much if the resource can't be interconnected to the grid; and a right to interconnect is not valuable without a concurrent right to net meter. This forum will discuss how to arrive at mutually agreed-upon principles on renewable energy net metering and interconnection policies, how a model net metering and interconnection agreement can be created, and present successful net metering and interconnection policies being implemented now.

Women in Solar Energy (WISE) Forum

This session explores the advances being made by women in the renewable energy field, as well as the challenges and rewards women encounter working in a non-traditional field. Panel members will describe their work in different aspects of solar energy.

SEIA Industry Update

Organized by the Solar Energy Industries Association, this Industry Update will focus on providing industry with up-to-the-minute knowledge of national markets and policies, along with the skills needed for success.

TECHNICAL SESSIONS

International Case Studies and Applications

Performance Analysis of a 15KW Photovoltaic Grid Connected System under Equatorial Conditions
Y. Abakr, Taylor's College and A. Ismail, International Islamic University

Five-year Reliability Assessment for SoListo Photovoltaic Home Lighting Systems in Chihuahua
R. Foster, A. Cota and L. Estrada, New Mexico State University

Renewable Energy in Cuba: A Country-wide Whole Systems Approach to Implementing Photovoltaics
L. Stone, Solar Energy International

Current Promotion and Subsidy of the Solar Water Heating System in Taiwan
K. Chung, K. Chang and T. Lee, National Cheng Kung University

Antarctica Renewable Energy Systems
J. Yarkin, Raytheon Polar Services

Ten Year Reliability Assessment of PV Water Pumping Systems in Mexico
A. Cota, R. Foster and L. Estrada, New Mexico State University; A. Romero, EyNT and C. Hanley and M. Ross, Sandia National Labs

PV State Programs

Photovoltaic System Cost Evaluation for Arizona's Environmental Portfolio Standard
R. Williamson, Arizona Corporation Commission

The Stable of Renewable Energy Programs in New Jersey: How Policy and Incentives Can Transform the Marketplace
C. Kling, New Jersey Board of Public Utilities

Evaluating Increasing Wisconsin's Renewable Portfolio Standard
D. Wichert, Wisconsin Division of Energy and S. Clemmer, Union of Concerned Scientists

The New Jersey RPS Reservation for Solar Energy: An Innovative Approach to Ensuring Solar Energy's Representation in the Portfolio
C. Cook, ASES/IREC; C. Kling, New Jersy BPU; L. Rawlings, First Solar and Tom Lyden, PowerLight

Building a Sustainable PV Market Infrastructure in New York State
A. Ferranti, NYS Energy Research and Development Authority and V. Colello, IREC

Columbia River Gorge
Only 45 minutes from Portland, Columbia Gorge National Scenic Area is a place of breathtaking beauty which includes 620 foot Multnomah Falls.

Monday, July 12 Conference Program

Solar Hydrogen I

Development of a Reactor for Solar H_2 Production with Two-Step Water Splitting of Ni-ferrite System Using Concentrated Solar Radiation
A. Suzuki, H. Ishihara, H. Aoki, H. Kaneko, N. Hasegawa, and Y. Takahashi, Tokyo Institute of Technology

Combining Technologies of Fossil Fuels with Concentrated Solar Thermal Energy for Solar Hybrid H_2 Production
A. Suzuki, H. Aoki, H. Kaneko, N. Hasegawa and Y. Tamaura, Tokyo Institute of Technology

Dye-Sensitized Photocatalyst System for Water Splitting into H_2 and O_2 under Visible Light Irradiation
H. Arakawa, K. Sayama and R. Abe, National Institute of Advanced Industrial Science and Technology

Hydrogen Production by Solar Reforming of Natural Gas: A Cost Study
C. Sattler and S. Moeller, DLR - German Aerospace Center and D. Kaucic, University of Flensburg

Producing Solar Hydrogen on a Large Scale for Energy Needs
C. Etievant, Compagnie Européenne des Technologies de l'Hydrogène

Rapid Solar-thermal Decarbonization of Methane in a Fluid-wall Transport Tube Reactor
A. Weimer and J. Dahl, University of Colorado; A. Steinfeld, Paul Scherrer Institut and ETH-Swiss Federal Institute of Technology; A. Lewandowski and C. Bingham, NREL and A. Z'Graggen, ETH-Zurich

Solar Thermal Power Systems and Components

Modeling and Design of Direct Solar Steam Generating Collector Fields
M. Eck and W. Steinmann, DLR - German Aerospace Centre

Design and Construction of a Parabolic Dish in Mexico
C. Ramos, I. Vilar, J. Lagunas, J. Huacuz, R. Ramírez, Instituto de Investigaciones Eléctricas and E. Brown, San Juan College

Developments in High Temperature Parabolic Trough Receiver Technology
H. Price and M. Hale, NREL

EES Heat Transfer Model for Solar Receiver Performance
R. Forristall, NREL

Addition of Thermal Storage Models to SEGS Plants Using TRNSYS
J. Braithwaite, and R. Boehm, UNLV

Solar Thermal Power Generation Using Free-Piston Stirling Engines: Revisited
J. Wood and N. Lane, Sunpower Inc.

Assessment of Thermal Energy Storage for Parabolic Trough Solar Power Plants
D. Kearney, Kearney & Associates and H. Price, NREL

Detailed Design of a Trough-Powered Organic Rankine Cycle
R. Gee, Solargenix Energy and B. Hawkins, Barber-Nichols

Time Honored Spaces and Places

Laurie Baker's Low-Cost Passive Cooling Strategies for India
A. Robins, M. Arch

The Smiley Building
C. Shaw and J. Shaw, Smiley Building and R. Udall, Aspencore

Solar Architecture: 20 Years - 3 Demonstration Projects - 1 Site
C. White, Banwell Architects, Inc.

Natural Light and the Italian Piazza: Siena, as a Case Study
S. Davis Lakeman, California Polytechnic State University

Emerald People's Utility District Headquarters: 15 Year Operational History of a High Performance Building
B. Mieger, Emerald People's Utility District

The Traditional Indian House: Its Rhythms and Rituals
R. Knowles and K. Rodrigues, University of Southern California

Whole Building Analysis

A Sequential Search Technique for Identifying Optimal Building Designs on the Path to Zero Net Energy
C. Christensen, NREL, S. Horowitz, University of Colorado and G. Barker, Mountain Energy Partnership

Low Cost Zero Net Energy Home Design Using a Solar Heat Pump
C. Dymond, Oregon Dept. of Energy; C. Brockman, SERA Architects and B. Rogers, Oregon Institute of Technology

Emerging Technology Application of Renewable Energy and Energy Efficiency in the Future Design of Super High Efficiency Heating and Cooling Systems
R. Rogers and R. Dela, Oregon Renewable Energy Center

Optimal Building Designs on the Path to Zero Net Energy
C. Christensen, NREL, K. Tupper, University of Colorado and G. Barker, Mountain Energy Partnership

Geographical Variation of the Performance of Unglazed Solar Systems for Domestic Hot Water and Space Conditioning
J. Burch, J. Salasovich and C. Christensen, NREL and J. Thornton, TESS, Inc.

Monday, July 12, 2:00 to 3:30 pm

FORUMS

Helping the Family-owned Wind Farm Find its Niche

The commercial wind industry is on the brink of becoming the exclusive province of large corporations. But it is possible for individual farmers, ranchers, landowners and small investors to find a niche in the wind business. In fact, it could save thousands of family farms. This forum will discuss the corporatization of the U.S. wind business and the need for legal and financial adjustments to allow small players an even chance at keeping the wind crop as a public, rather than a corporate, resource. We will also discuss the on-going controversies over the siting of wind power projects, most importantly the hotly contested wind farm proposed for the "golden triangle" between Cape Cod, Martha's Vineyard and Nantucket. We will further discuss the prospects for municipal-owned wind power, now becoming a factor in places like northern Ohio, where the city of Bowling Green has installed its first two turbines.

State Solar Program Coordinators

Many states manage solar programs. Each approaches solar market transformation uniquely. Yet, all have enormous impacts in their area—and they serve as models for other solar programs throughout the U.S. and the rest of the world. Who's doing what? What's working? What isn't? Why? And how can the programs "talk" to each other to achieve common goals? Panelists will present a brief case study highlighting the key elements of their program's design, program results to date, future program plans and lessons learned. Presentations will be followed by discussion, to help guide future program investments and solar-supporting policies.

Participating Organization

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 Solar Tour, 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. www.ases.org

Monday, July 12
Conference Program

TECHNICAL SESSIONS

Daylighting Case Studies

Analysis of Daylighting Benefits for Office Buildings in Egypt
M. Krarti, University of Colorado

Achieving a Measure of Effective Daylight Efficacy: In The Mint Hill Middle School Classrooms
D. Brentrup, University of NC-Charlotte

Evaluating the Daylight Performance of Three Museum Galleries
L. Beltran, U. Atre, C. Chongcharoensuk and B. Martins, Texas A&M Unversity

High Lumens Screening Test Setup for Optical Fiber Used in Hybrid Solar Lighting System
B. Wood, Utah State University; D. Dye and J. Kretschmer, University of Nevada, Reno and H. Currin, Oregon Institute of Technology

Bring Down The Light: Building Professionals' Attitudes Towards Top Lighting in Commercial Buildings - A Survey of the Northwest Region of the Continental USA
I. Elzeyadi, University of Oregon

Transforming the Marketplace for Daylighting and Energy Efficiency in the Commercial Buildings of the Pacific Northwest
J. Loveland, C. Meek and K. Van Den Wymelenberg, University of Washington

Passive Cooling

Innovative Cooling Systems for Humid Climates
V. Sami and V. Olgyay, Ensar Group Inc

Analysis, Design, and Preliminary Testing of Solar Chimney for Residential Air-Conditioning Applications
G. Wang, University of Nebraska

Analysis, Design and Testing of an Earth Contact Cooling Tube for Fresh Air Conditioning
B. Chen, G. Wang, J. Henkel and M. Liu, University of Nebraska

Solar Driven Earth Coupled Cooling System: An Integrated Passive Cooling System
B. Chen, University of Nebraska

Preheating Ventilation Air Using Earth Tubes
T. Lee, University of Calgary

Water Consumption of Passive and Hybrid Cooling Strategies in Hot Dry Climates
H. Bryan, Arizona State University

PV Concentrators I

Performance Measurements of a Slat-Array Photovoltaic Concentrator
V. Vasylyev, S.V.V. Technology Innovations

Parquet Fresnel Lens Increases Efficiency of Solar Concentration Through Balanced Spectral Distribution of Light
R. Morgal and B. Morgal, HelioTrax

Pontoon Solar Collection System Reduces Cost of Concentrated Solar Electricity Generation
R. Morgal and B. Morgal, HelioTrax

New Solar Combined Concentrator Technology in Oregon
F. Vignola, University of Oregon; R. Rogers, OIT; S. Clouston, Sidney Clouston Research and I. Tyukhov, All-Russian Research Institute for Electrification of Agriculture

PV Monitoring

Performance Evaluation of Photovoltaic Power Generation System Equipped with a Special Cooling Device Utilizing a Siphonage
K. Furushima, and Y. Nawata, Yatsushiro National College of Technology

SunViewer.net™: A Widely Available, Easy to Use, Internet Based, Distributed Energy Monitoring and Tracking Database
C. Handleman, Heliotronics, Inc.

Real-Time, Web Based Energy Monitoring System for a Solar Academic Building
J. Scofield, Oberlin College and P. Cohen, Stanford University

Monitoring PV System Performance at California State Fairgrounds
J. Augustyn, Augustyn + Company and T. Baker, California Construction Authority

Enabling Performance Monitoring and Education Through a New Datalogger Architecture
S. Wiese, Conservation Services Group

Solar Hydrogen II

Solar Hydrogen and Carbon Nano-filaments Production by Thermal Decomposition of Natural Gas Using a Vortex-Flow Reactor
A. Steinfeld, ETH - Swiss Federal Institute of Technology

Simulation of Thermal and Chemical Processes in Annular Layer of ZnO-C Mixtures
I. Vishnevetsky, M. Michael and R. Rubin, Weizmann Institute of Science

Carbonate Composite Catalyst with High-Temperature Thermal Storage for Use in Solar Tubular Reformers
T. Kodama and T. Hatamachi, Niigata University

Photoelectrochemical Water Splitting for Hydrogen Production Using Multiple Bandgap Combination of Thin-Film Photovoltaic Cell and Photocatalyst
A. Jahagirdar, N. Dhere, and U. Avachat, Florida Solar Energy Center

Back to the Roofs: The Solarchemical Production of Fine Chemicals with Sunlight
C. Jung and J. Ortner, Deutsches Zentrum für Luft- und Raumfahrt e.V.; C. Schiel and J. Mattay, Universität Bielefeld; E. Zimmermann, Universität zu Köln and M. Oelgemöller, Bayer CropScience

A Two-Step Thermochemical Water Splitting by Iron-oxide on Stabilized Zirconia
T. Kodama, Niigata University

Solar Thermal Collectors I

Numerical Simulation of the Effect of Thickness and Distance in Cover Glasses Used in Heating of Water
H. Terrés Peña and M. Gordon Sánchez, Universidad Autónoma Metropolita

Mechanical Polymer Tubes in Hot Chlorinated Water: Accelerating the Degradation Effect of an Oxidative Environment
A. Freeman D. Mantell and J. Davidson, University of Minnesota

Impact of Wind Speed on Unglazed Solar Collector Performance
M. Thornbloom, Florida Solar Energy Center and G. Palomino, Salt River Project

Integral Stagnation Temperature Control for Solar Collectors
L. Mesquita, Q. Lin and S. Harrison, Queen's University

Scaling in Polymer Tubes Used in Solar Water Heating Systems
J. Davidson, L. Francis and Y. Wang, University of Minnesota

Monday, July 12 Conference Program

Monday, July 12, 4:00 to 5:30 pm

FORUMS

Making the Transition to the Hydrogen Economy

This forum will address the transition from fossil fuels to hydrogen. How do we develop a system and infrastructure? How do we integrate the new system into existing systems?

Monitoring and Displaying Home Energy System Performance

Most efforts aimed at improving home energy efficiency have focused on improving the efficiency of traditional energy systems (envelope, HVAC, water heating, lighting, etc.) and on improving the performance and integration of renewable energy systems (solar electric and hot water). This session will discuss monitoring devices that enhance a home's energy performance by addressing an often overlooked element: home residents' behavior. Several system manufacturers will address domestic hot water, electricity and space conditioning monitoring.

Industry Update—Export Financing and Opportunities

Export financing and opportunities will be a practical session with Export-Import Bank of U.S., the Commerce Department's Trade Development Authority and others. Learn how the U.S. government can help you close foreign deals, provide low-cost and innovative finance, and even find dealers and markets—all for low or no cost. This session will include a hands-on opportunity to deal with the forms, procedures and people you will need to know to have the U.S. government help you make foreign deals a reality.

TECHNICAL SESSIONS

Comparisons and Contrasts

Comparative Evaluation of Indoor Thermal Comfort for Green and Conventional Office Buildings
M. Krarti, University of Colorado

English Green Building
B. Haglund, University of Idaho

Is Purely Passive Conditioning for Assembly Spaces Possible? Three LEED Projects of Different Scales for the Central California Coast
P. Cooper and K. Haggard, San Luis Sustainability Group Architects

A Study on Thermal Environment and Methods to Save Cooling Energy for Small Glass-Skin Office Buildings
B. Kim and K. Kim, Yonsei University

Daylight Design and Regulations for High Density Cities
E. Ng, The Chinese University of Hong Kong

Natural Ventilation

Cooltowers, Passive Cooling and the Case for Integrated Design
M. Yoklic, University of Arizona

Buoyancy Assisted Ventilation for Classroom Design
V. Potnis, Arizona State University

Displacement Natural Ventilation in an Enclosure with a Convective/Radiative Heat Source and Non-adiabatic Walls
G. Jun, G. Fusheng and Z. Jianing, Harbin Institute of Technology

Using Computational Fluid Dynamics to Analyze Natural Ventilation in Classrooms
V. Sami and G. Franta, Ensar Group Inc

Hood River County Library: A Case Study of a Design Process for Natural Ventilation
M. Shea, Fletcher Farr Ayotte, PC and A. Solberg, CH2M Hill

Exploring Design Solutions for Natural Ventilation of a Typical Office Building with Open Atrium in the U.S.
M. Mehta, Graduate Student/Intern Energy Specialist

PV Balance of Systems

Improved Efficiency in Photovoltaic Systems for Homes
J. Pfeifer, Apollo Solar, LLC

Optimization of Hybrid Village Power System Operation
C. Sullivan, Dartmouth College; J. Cloyd, Appian Corporation; K. Tupper, University of Colorado at Boulder; R. Wills, Formerly of Advanced Energy Inc. and R. Jensen, Massachusetts Institute of Technology

Innovative Direct Current (DC) Applications for PV Generated Energy
D. Crudele, EPRI PEAC Corp

Renewable and Hybrid Energy Options for Tactical Power Generation
D. Massie and J. Kang, U.S. Military Academy

Monitoring and Charge-Control of Lead-Acid Batteries in Photovoltaic Applications
A. Rivera, C. Ortega-Sanchez, J. Orozco and O. Pacheco, Inst. of Electrical Research

Hysteresis Current Control of a Permanent Magnet Brushless DC Motor PV Pumping System
A. Terki and M. Ammar, University of Biskra and G. Asher, Universty of Nottingham

Outdoor Performance Characterization of Grid-Connected Inverters
K. Lynn, Florida Solar Energy Center and J. Wagner, APS Energy Services

Participating Organization

The American Society of Mechanical Engineers (ASME) Solar Energy Division is the premier organization for promoting the art, science and practice of mechanical engineering. The ASME Solar Energy Division serves its members in the fields of renewable energy and energy conservation by organizing the annual ASME International Solar Energy Conference, publishing the ASME Journal of Solar Energy Engineering and sponsoring the Solar Splash intercollegiate solar boat competition. www.asme.org/divisions/solar

Monday, July 12
Conference Program

PV Concentrators II

Modeling and Experimental Evaluation of Passive Heat Sinks for Miniature High-Flux Photovoltaic Concentrators
A. Reddy, J. Sun and T. Israeli, Drexel University and D. Feuermann and J. Gordon, Jacob Blaustein Institute for Desert Research

Simulation of Concentrated Photovoltaic Cooling System
C. Halford, and R. Boehm, UNLV

Four Years of Operation of the Amonix High Concentration PV System at Arizona Public Service Utility
H. Hayden, Arizona Public Service and K. Stone, Amonix, Inc.

Compact and Low Cost Solar Concentrator System
E. Shifman and M. Dror, SRS technology 2000

A Miniature Concentrated PV System for Distributed Generation
A. Kribus, Tel Aviv University and D. Kaftori, DiSP

Solar Thermal Collectors II

Long-Term Performance of a First Generation Commercial External Reflector Evacuated Tube CPC
J. O'Gallagher, University of Chicago, Enrico Fermi Institute; R. Winston, U of California, Merced and T. Dallas, Texas Tech University

Vacuum Tube Liquid-Vapor (Heat-Pipe) Collectors
F. Mahjouri, Thermo Technologies

Transient Conjugated Entropy Generation Minimization in a Flat Solar Collector
F. Méndez, UNAM and I. Campos and O. Bautista, ITESM-CCM

Six Year Evaluation of the Novel ICPC Sacramento Demonstration
W. Duff, Colorado State University

Thermal Analysis of a Concentrating Photovoltaic Receiver
I. Mahderekal, UNLV and R. Boehm, UNLV

POVA/Edward Nugent

Participating Organization

IREC
Interstate Renewable Energy Council

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. www.irecusa.org

Solar Thermal Power Materials and Testing

Comparative Flux Measurement and Raytracing for the Characterization of the Focal Region of Solar Parabolic Trough Collectors
A. Neumann, K. Riffelmann and S. Ulmer, DLR German Aerospace Center and E. Luepfert, DLR Plataforma Solar de Almeria

Photogrammetry: A Powerful Tool for Geometric Analysis of Solar Concentrators and Their Components
E. Lüpfert and K. Pottler, German Aerospace Center (DLR); G. Johnston, Excelsia Accomplis and M. Shortis, RMIT University

Testing of Thermocline Filler Materials and Molten-Salt Heat Transfer Fluids for Thermal Energy Storage Systems in Parabolic Trough Power Plants
B. Emms, D. Brosseau, J. Kelton, K. Chisman, and R. Edgar, Sandia National Labs

Lifetime of Imidazolium Salts at Elevated Temperatures
D. Rudnicki, University of Colorado and D. Blake, H. Pilath and L. Moens, NREL

Cost Analysis of Solar Reflective Hard-Coat Materials Deposited by IBAD
C. Kennedy, NREL and R. Swisher, Swisher and Associates

Optical Durability of Candidate Solar Reflectors
C. Kennedy and K. Terwilliger, NREL

Development of Composite-Based Structural Facets for Parabolic Trough Concentrators
R. Gee, Solargenix Energy LLC and T. Wendelin, NREL

Downtown-Old town Neighborhood
Downtown Portland blocks are just 200 feet long, with cafes, restaurants, bookstores, galleries and specialty stores waiting around every corner.

Tuesday, July 13 Conference Program

Tuesday, July 13, 8:30 to 10:00 am

FORUMS

EnergySmart Schools and EnergySmart Students

Learn about three exciting national programs to encourage the integration of renewable energy technologies, energy efficiency, and energy education. Celebrate the successes of solar schools programs from a national perspective and find out how your local school district can participate.

Regulatory Leadership for Renewable Inroads

This session introduces the regulatory framework needed to support significant renewable energy development. For example, there has been recent state and federal regulatory action to create objective standards to facilitate quick review and approval of small distributed energy proposals and assure safe and reliable interaction of distributed generation with the electricity grid. In addition to interconnection standards, there are electricity reliability issues, rate designs, and other regulatory rulemaking decisions that can strengthen or weaken the widespread use of renewable energy resources. This session invites regulators to discuss key issues with the ASES community.

TECHNICAL SESSIONS

Building Integrated PV I

Detailed Monitoring and Preliminary Evaluation of a Large Façade-Mounted PV Array
A. Driesse, Queen's University

Capturing the BIPV Advantage with Flexible Thin Film
S. Heckeroth, Homestead Enterprises

Building Integrated Photovoltaics (BIPV) and the "Cool Roof"
T. Ellison, Energy Conversion Devices, Inc.

Solar Photovoltaics as a BIPV Roofing Technology
R. Schoen, Solar Integrated Technologies

Flat Roof Thin-Film PV Compared to Tilted Thin Film and Crystalline PV
R. Swenson, SolarQuest

Energy Security/Blackouts

Blackout 2003: Renewable Successes, Renewable Failures
J. Gordes, Environmental Energy Solutions

Availability of Dispersed Photovoltaic Resource During the August 2003 Northeast Power Outage
R. Perez and M. Kmiecik, ASRC, University at Albany; T. Hoff, Clean Power Research; J. Williams, New York State Legislature; C. Herig, Segue Consulting; S. Letendre, Green Mountain College and R. Margolis, NREL

Assuring Power in a Disaster and Providing Energy Security
W. Young Jr., Florida Solar Energy Center

Cost Benefits of Using Photovoltaics in Disasters
J. Haggard and W. Young Jr., Florida Solar Energy Center

Fuels

Role of Biogas in Energy Conservation and Environment Protection
F. Huang, Rochester Institute of Technology

Review of Solar Thermochemical Studies at the University of Minnesota, 1973-2003
E. Fletcher, University of Minnesota

Alternative Fuel Demonstration Facility PV System
B. McGuffey and S. Fitzpatrick, North Carolina Solar Center

Distributed Solar Electricity and Distributed Renewable Hydrogen: Some Initial Experiments for Vehicular Transportation
R. Schoen, Solar Integrated Technologies

Solar Thermochemistry
V. Anikeev, Institute of Catalysis

Solar Cooling I

Replacing Inefficient Equipment: An Engineering and Financial Analysis to Justify Purchasing New, More Efficient Equipment
H. Bruner Jr., Texas A&M University

Solar Driven Liquid Desiccant Cooling for Commercial Building Applications
L. Mesquita,Q. Lin and S. Harrison, Queen's University and B. Sibbit and D. McClenahan, Natural Resources Canada

Implementation Issues of Fan Airflow Station
G. Liu, I. Joo, L. Song and M. Liu, University of Nebraska

Application of Radiant & Conductive Strategies to Task / Ambient Conditioning (TAC)
A. Deshmukh, Arizona State University

Theoretical and Experimental Study on the Performance of Desiccant Dehumidification Rotating Bed
A. Hamed, Mansoura University and A. Elzahabi, Tanta University

Development of In-situ Fan Curve Measurement for VAV Systems
G. Wang, G. Liu, I. Joo, L. Song, and M. Liu, University of Nebraska

Humidity Control in Confined Building Spaces Using Liquid Desiccant Dehumidifier-Conceptual Investigation
D. Dong and M. Liu, University of Nebraska

Prediction of the Vertical Temperature Distribution in a Large Enclosure Under Combined Air Conditioning and Natural Ventilation
G. Jun, G. Fusheng, L. Xiaodong and Z. Jianing, Harbin Institute of Technology

Participating Organization

OSEIA

The Oregon Solar Energy Industries Association (OSEIA) is a nonprofit trade association consisting of contractors, architects, engineers, utilities, and solar consultants. OSEIA was founded in 1981 to promote the use of solar energy in Oregon, inform the public of the benefits of solar energy, serve as the central organizing association for Oregon solar energy professionals, establish and maintain a business code of ethics for the industry, and sponsor legislation affecting solar energy in Oregon. www.OregonSEIA.org

Tuesday, July 13 Conference Program

Thermal Comfort – Prediction

Mapping Annual Outdoor Thermal Comfort Conditions Using the Energy Balance Equation
A. Sharag-Eldin, Kent State University

Occupant Behavior: A Crucial Component of the Inside-Out Approach to Solar Building Design
J. Seryak and K. Kissock, University of Dayton

The Use of Predictive Formulas for Environmental Control in Museological Spaces
E. Kroger, Departamento de Constructo Civil, Centro Federal de Educa_o Tecnologica do Paranß and B. Givoni, UCLA

Experimental Analysis of Thermal Comfort-Based Controls
M. Krarti, University of Colorado

Comfort Formula for Thailand
B. Givoni, UCLA and J. Khedari & J. Hirunlabh, KMUTT, Thailand

Energy Zoning
G. Brown, L, Kessler, J. Kline and D. Northcutt, University of Oregon

Thermal Performance – Residential Buildings

21 Zero Energy Houses, Etten-Leur
T. Reijenga, BEAR Architects

Ecohousing for the Majority Market at the Eden Renewal Community
I. Panzarella, Consider Design, PA

Experimental Passive Solar House Requires Active Living: Homeowners Share Their Experience with the Kelbaugh House
S. Schultz

Ecological Remodeling: Making Homes Deliciously Sustainable
K. Lerner, One World Design and C. Venolia, Venolia Studios

Issues in Achieving a Solar Sustainable House
V. Soebarto, University of Adelaide

The Johnson House: Twenty Years Later
C. Theis, Louisiana State University

Participating Organization

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 web site at www.sbse.org.

Tuesday, July 13, 10:30 am to Noon

FORUMS

Local & State Initiatives for Sustainable Energy Development

Carefully crafted and well implemented incentives can have a profound impact on sustainable energy development. Effective initiatives can reduce technology costs, increase available capital for projects, encourage consumer action, and support business expansion. However, initiatives need to be designed to promote price reduction, provide market certainty for both private and public investment, and be part of a coordinated package of incentives. This session will take a critical look at local and state initiatives and discuss their effectiveness on market growth.

Solar Thermal Electric International Project Development

This forum will discuss the accelerating activity in Concentrating Solar Power (CSP) development, particularly in parabolic trough systems. In a nutshell, technology advances are impressive and there is a very active global effort to expand the deployment of the technology.
Presentations will include

- a summary of the CSP Global Market Initiative, results of the Bonn conference and a snapshot of the status of project development.
- an overview of and perspectives on all international CSP project development plans and active developments.
- the status and overview of the 50MWe Nevada parabolic trough project – scheduled for operation in 2005 in Eldorado valley just south of Boulder City.
- the status of the two 50MWe parabolic trough projects scheduled for operation in 2006 in Spain and Andalusia.
- status and overview of the 1 MWe Arizona parabolic trough project scheduled for operation in 2005 at a location north of Tucson.
- overview of the 1000 MW CSP Southwest Initiative which is being enthusiastically endorsed by the Western Governors Association and Bill Richardson, governor of New Mexico.

TECHNICAL SESSIONS

Building Integrated PV II

Building Integrated Photovoltaics for Low-Slope Commercial Roofs
R. Livezey, TVA Public Power Institute and W. Miller, Oak Ridge National Laboratory

Thermal Analysis of a Wall-Mounted Building Integrated Photovoltaic System
S. Harrison and A. Driesse, Queen's University

Measured Performance of Building Integrated Photovoltaic Panels - Round 2
A. Fanney, B. Dougherty and M. Davis, NIST

Active Cooling of Building Integrated Photovoltaics
J. Kreider and Z. Yewdall, University of Colorado; and P. Curtiss, Kreider and Associates

Heat Recovery of Building Integrated Photovoltaics for Domestic Hot Water Preheating
J. Kreider and Z. Yewdall, University of Colorado; and P. Curtiss, Kreider and Associates

An Alternative Approach to PV Life Cycle Cost Analysis
C. Larsen, Larsen Consulting and J. Szaro and W. Wilson, Florida Solar Energy Center

Tuesday, July 13
Conference Program

Daylighting – Prediction

The Effects of Common Daylighting Strategies on Thermal Comfort and Energy Consumption in a Typical Office Environment
M. Wassmer, NREL

LightSim: A New Tool For Estimating Natural Lighting Potential in Factories
K. Kissock, University of Dayton

Evaluating the Performance of the Daylighting Calculation in DOE-2
A. Dang, Arizona State University

Suitability of the LEED Daylighting Credit in Different Climates
A. Sayyed and P. Vaidya, The Weidt Group

TRNSYS Modeling of a Hybrid Lighting System: Building Energy Loads and Chromaticity Analysis
F. Burkholder, W. Beckman, S. Klein and D. Reindl, University of Wisconsin-Madison

Photocontrols and Daylighting Savings: Urban Myths and Realities from a Field Study
S. Denniston and A. Pande, Heschong Mahone Group, Inc.

Growing Renewable Energy Markets

Expanding Solar and Wind Markets Through Green Tag Financing and Marketing Models
J. Grove, Northwest Sustainable Energy for Economic Development; D. Boleyn, Cascade Solar Consulting and R. Harmon, Bonneville Environmental Foundation

Changing The Mix: Meeting Customer Expectations in the Green Power Market
R. Harmon, T. Starrs and A. Duncan, Bonneville Environmental Foundation

Making Solar Energy Cost-Effective Today is a SNAP
J. White, Chelan County Public Utility District

Commercial Customers and Market Drivers to Early Solar Adoptions
S. Grover, ECONorthwest and R. Margolis, NREL

Market Transformation for Solar Commercial/Institutional Applications
J. Yudelson, Interface Engineering, Inc.

Solar Chemistry and Bio-Conversion

Rotary Multi-Tube Chemical Reactor for the Industrial Solar Production of Lime
A. Meier, D. Wuillemin and W. Lipinski, Paul Scherrer Institute (PSI) and E. Bonaldi and G. Cella, QualiCal Srl

Thermal Gasification of Village Rice Husk in Fluidized Bed: Effects of Fluidization Velocity and Equivalence Ratio on Gas Quality, Gas Yield and Carbon Conversion
B. Prasad and I. Mishra, IIT-Roorkee and P. Gangavati, B.E. College

A Techno-Economic Assessment of Sugarcane Bagasse Gasification for Power Generation Purposes in North-Eastern Brazil
O. Badr, Cranfield University and P. Anselmo Filho, Universidade Federal de Pernambuco

Degradation of VOCs With Pt-TiO_2 Photocatalyst and Concentrated Sunlight
T. Sano, K. Takeuchi, N. Negishi and S. Matsuzawa, National Institute of Advanced Industrial Science and Technology (AIST)

Performance Evaluation of an IC Engine (SI) Using Bio-Gas as Fuel with Petrol Blends: A Case Study
M. Tayyab and S. Mehdi, Muffakahm Jah College of Eng & Technology and S. Yousufuddin, Vasavi

Monte Carlo Radiative Transfer Modeling of a Solar Chemical Reactor for the Co-Production of Zinc and Syngas
A. Steinfeld, Paul Scherrer Institut and ETH-Swiss Federal Institute of Technology and S. Kräupl, Paul Scherrer Institut

Solar Cooling II

Generalized A/C and H/P Transcritical R744 Compressor Performance in Wet and Dry Regions
Y. Abdel-Rahim, Mech Eng Dept

Experimental Evaluation of Barium Chloride-Ammonia in an Intermittent Solar Absorption Refrigeration System
C. Rivera, Universidad Veracruzana

Optimal Variable Chilled Water System Control and Operation
L. Song, University of Nebraska-Lincoln

Development of Heat Storage System Using Metal Hydrid Experiment of Performance by the Actual Loading Condition
H. Takeda and M. Murai, The Japan Steel Works, Ltd.; H. Matsufji, K. Iijima and T. Koseki, Sanki Engineering Co., Ltd. and O. Kawaguchi, Keio University

Feasibility of Usage Possibility in Turkey of Solar Driven Ejector-Absorption Cooling System
A. Sozen and S. Yucesu, Gazi University

Performance Analysis of Cooling Capacity Output for Rotary Adsorption Refrigeration Systems
B. Li, Harbin Institute of Technology

Passive Cooling vs. Solar Air Conditioning: The SWOT Analysis Approach
A. Papadopoulos, and S. Oxizidis, Aristotle University Thessaloniki

Sustainability Curriculum

Teaching Sustainable Design: Examples of Collaboration between Academia and Practice
S. Ubbelohde and G. Brager, University of California, Berkeley

M'lama Hawai'I, an Educational Experience
J. Williams and K. Mansy, Oklahoma State University

Evaluation of a Sustainable Design Competition as a Teaching Tool
R. Powell, NC A&T State University

Designing a Way Out of the Box: Design Problems in Building Technology Education
D. Posada, University of Oregon

The Memnon Competition: Design for Solar Thermal Music
M. Duffey, George Washington University

The Agents of Change Project: The Power of Peer-to-Peer Teaching
A. Kwok, F. Docker, S. Goenner, J. Meendering, R. Ota, D. Posada and K. Simon, University of Oregon; W. Grondzik and B. Haglund, University of Idaho

If Hanford Nuclear Reservation was turned into a solar electric farm it would produce as much power as the Columbia River Hydro system.

Tuesday, July 13 Conference Program

Downtown-Skidmore District
It's easy to get around in downtown Portland

Tuesday, July 13, 12:30 to 2:00 pm

Poster Session

Solar in Vermont: New Lessons from the Green Mountain State
D. Hill, Vermont Energy Investment Corporation

Solar Water Heaters for Social Housing Projects in Brazil
E. Pereira and J. Figueiredo, CEMIG; L. Mesquita, Queen's University and M. Agostini and W. Concalves, PUC-MG

Colorado Acres: Solar Powered Reverse Osmosis
R. Clemes, Bob J. Johnson & Associates, Inc.; J. Niehaus, SWPV and P. Groce, Texas State Energy Conservation Office

Collectorless Solar Hot Water Heater
J. Theisen, Renew Science, Inc.

The Birthplace of Evolution
R. Swenson, SolarQuest

Twenty-year Analysis of a Passive Solar Water Heater in Cold Climates
D. Thayer, Darryl Thayer & Associates

Numerical Analysis on the Thermal Performance of the Glass Evacuated Tube Solar Collector Adopting a Finned Tube
Y. Kim, T. Seo and C. Yim, Inha University and Y. Kang, Korea Institute of Energy Research

PV Production in Hawaii with Different Inverters and Owners
T. Haas, Homeowner

Schools with Sol: Purchasing Solar Energy for New Mexico Schools
B. Johnson, New Mexico Energy

Grid-Tied PV Opportunities in Suburban Western Washington: A Tale of Two Systems
A. Cochrane, Power Trip Energy Co and J. Smithson, Puget Sound Solar

Solar Air Heating: Promising Applications of a Tried and True Solar Technology
A. Mason, SunJuice

Growth and Opto-electronic Properties of n-CdZn(S1-xSex)2/p-CuIn(S1-xSex)2 Thin Film as a New Semiconductor Heterojunction for Low Cost and High Efficiency Solar Cells Applications
S. Chavhan and R. Sharma, G.T. Patil College

Comparison of Actual and Predicted Performance Parameters of Ideal CPC
P. Shah, L. D. Engineering College and L. Patel, S.P. College of Engineering

An Owner-Built Solar Swimming Pool Heater and the Associated Do-It-Yourself Manual, After 31 Years of Operation and Experience
F. deWinter, F. de Winter & Associates

Design of a Building Integrated Solar Air Heating, Solar Thermal Air Conditioning, Ventilation, and Electric Power System for a Pentagon Guard Station
J. Archibald, American Solar, Inc.

Electrolyzer Photovoltaic Panel Interaction and Capital Minimization
M. Shimko, Avalence LLC

Tuesday, July 13, 2:00 to 3:30 pm

FORUMS

ASME Tutorial – Solar Production of Hydrogen

This tutorial session reviews the underlying science and describes the technological advances of solar hydrogen production. Emphasis will be given to the thermochemical production routes: thermolysis, thermochemical cycles, gasification, reforming, and cracking processes. Tutorial material will be distributed to attendees. The lecturers are Prof. Alan Weimer (University of Colorado), Prof. Tatsuya Kodama (Niigata University), and Prof. Aldo Steinfeld (ETH-Swiss Federal Institute of Technology).

Off the Shelf: Retrofitting Existing Housing for Solar Applications and Energy Efficiency

Let's face it: Most Americans live in housing that was built with no consideration for solar potential and until relatively recently, little attention to energy efficiency. This forum will present a number of retrofits of existing housing that incorporate solar applications and energy upgrades. Emphasis will be placed on evaluating existing buildings to identify good potential retrofits, design solutions that enhance daylighting and passive solar heating and cooling, solar electric and water heating, and off-the-shelf technologies that can be incorporated into any home. Examples will range from an 1895 house on the Washington coast to a 1950s home in Buffalo, NY and will include performance data.

Solar Vehicle Competitions

This forum will introduce the various solar vehicle competitions to conference participants. Descriptions of the competition events/activities and the competing vehicle parameters (size, cost, team composition, etc.) will be presented. Attendees will gain information and contacts through which they may become involved in these activities.

TECHNICAL SESSIONS

Approaches to PV Analysis

Using Sun Path Charts to Estimate the Effect of Shading on PV Arrays
F. Vignola, University of Oregon

Optimum Orientation for Fixed Photovoltaic Panels for Time-of-Use Pricing
G. Henry, Georgia Institute of Technology and G. Vliet, University of Texas at Austin

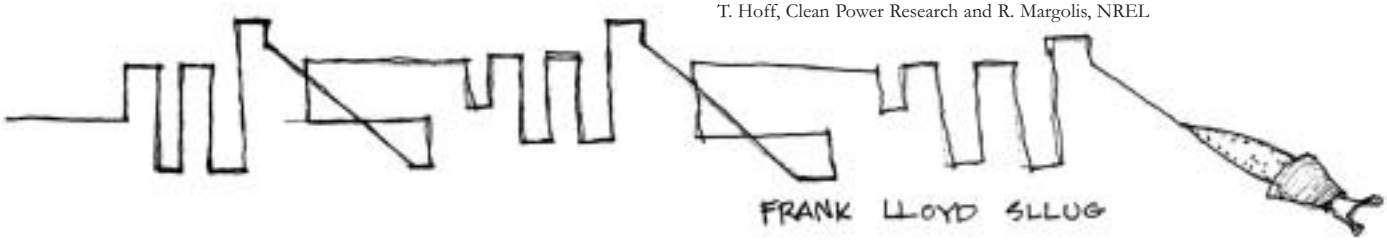
The Highest Valued Grid Tied Photovoltaics
J. McCabe, Energy Ideas

PV Potential in Residential New Construction
M. Keesee, Sacramento Municipal Utility District

Solar Irradiation on Tilted Surfaces under Asia Subtropical Climate
T. Chow, City University of Hong Kong

Community Solar Resource Assessment Using GIS Analysis Tools
D. Armanino and G. Johnson, County of Marin Community Development Agency

Are Photovoltaic Systems Worth More to Residential Consumers on Net Metered Time-of-Use Rates?
T. Hoff, Clean Power Research and R. Margolis, NREL



POVA/David Falconer

Tuesday, July 13 Conference Program

Campus Buildings/School Buildings

Oasis in the Desert: Passive Heating and Cooling Design for the Paleo Center, Oregon Paleo Lands Institute, Fossil, Oregon
J. Rowell and J. Young, Rowell Brokaw Architects PC

Beyond Architecture: Real Buildings Real People
K. Janda, Oberlin College

Prince Lucien Campbell Hall: Take My Air Conditioner, Please!
G. Brown, L, Kessler, J. Kline, D. Northcutt, N. Rajkovich and E. Wright, University of Oregon

Taejon Christian International School
C. Hyman, Deca Architecture, Inc.; R. Yancey, FWL Architects and R. Shroeder, Glumac & Associates

Sailing Draper Hall: Evaluation of a Mixed-Mode Climate Responsive Building
R. Pena, Cal Poly State University

Dream Seeding: Case Study of the University of Oregon Business School's BIPV Project in Eugene, Oregon
B. Hawley and S. Still, Eugene Water & Electric Board

Microclimate

Evaluating the Evolution of Garden Office Typology and Determining its Performance
S. Narayan, Arizona State University

Design of a Linear Waterway for Outdoor Comfort using Computational Fluid Dynamics
N. Kapoor, Arizona State University

The Role of Landscape Elements in Passive Cooling Strategies for Buildings
S. Sandifer, UCLA

Developing a Simple Parametric Model for Predicting Natural Ventilation in Shielded Environments
A. Sharag-Eldin, Kent State University

Urban Climatology, Street Configurations and Thermal Comfort
V. Agarwal, Arizona State University

Using Leaf Temperature Data to Understand Vegetation-Microclimate Relationships
S. Sandifer, UCLA

Policy I

Policies Supporting PV Deployment: Status and Trends
S. Gouchoe, V. Everett and R. Haynes, NC Solar Center

Recent Developments in Distributed Generation Interconnection Standards
C. Cook, ASES/IREC

The Technical Impact of Code and Incentive Policies: A US-EU Comparison
B. Farhi, Fronius, USA, LLC

Modeling the Potential Impact of Clean Air Financial Benefits on Photovoltaic System Economics
C. Sherry, New Jersey Department of Environmental Protection

States and PV: An Assessment of the Combined Effects of State-Based Policies on Installed PV Capacity Growth in the United States
A. Thurlow, University of Delaware

Solar Energy Applications in the Caribbean: In Memoriam to Dr. O. Headley

Ultraviolet Solar Radiation over the Caribbean Island of Puerto Rico
K. Altaii, James Madison University and R. Rivera, Georgia Institute of Technology

Solar Radiation over the Caribbean Island of Puerto Rico
K. Altaii, James Madison University and R. Rivera, Georgia Institute of Technology

Design and Construction of a Compact Air-Cooled Absorption Machine for Solar Energy Applications
H. Sánchez, HS Mechanical Works Corporation; J. González, Santa Clara University; L. Alva Solari, Caribbean Thermal Technologies Inc. and R. Pérez, University of Puerto Rico

Design and Simulation of a Control System Unit for a Solar Assisted Air Conditioning System (SAACS) Prototype
C. GonzalezL. and G. Beauchamp, University of Puerto Rico-Mayagüez and J. González, Santa Clara University

Energy Management Strategies in Transitional Developing Economies
E. Green, Chevron Texaco Caribbean Inc.

Design of a Flat Plate Solar Collector for Absorption-Cooling Applications and Weather Data for Puerto Rico
H. Sánchez, HS Mechanical Works Corporation; J. González, Santa Clara University and L. Alva Solari, Caribbean Thermal Technologies Inc.

Parameter Estimation for an Absorption Chiller in a Solar Assisted Air Conditioning System
C. GonzalezL. And G. Beauchamp, University of Puerto Rico-Mayagüez and J. González, Santa Clara University

Solar Water Heating I

The Design of Solar Energy Heating System and Running Analysis
D. Li, Beijing Institute of Civil Engineering & Architecture

Potential and Use of Solar Energy in Primorye Region (Russia)
O. Kovalev, Institute of Marine Technology Problems

Solar Heating of Recirculation Loop in a Federal Building (SSA Philadelphia)
A. Walker, NREL; F. Mahjouri, ThermoTechnologies and R. Stiteler, Social Security Administration

Field Investigation of 18 Residential Solar-Assisted Domestic Hot Water Systems with Integrated Collector Storage
W. Rittelmann, IBACOS, Inc.

Testing and Evaluation of Solar Water Heaters in South Africa
A. Sliep, ESG Renewable Energies (Pty) Ltd; N. Ijumba, University of Durban Westville and O. Dintchev, Tswane University of Technology

Participating Organization

a member of Earth Share

The Solar Energy Association of Oregon (SEAO) is dedicated to increasing the use of solar energy in Oregon. SEAO was founded in 1979, and is Oregon's chapter of the American Solar Energy Society. SEAO has been a leader in the creation and passage of landmark utility restructuring, global warming, conservation planning, energy-efficiency and solar access legislation, policies and programs. These have kept Oregon in the forefront of renewable energy activity nationwide. SEAO's programs give Oregonians timely, accurate and useful information so they can "go solar" in their homes and businesses. www.solaror.org

Tuesday, July 13 Conference Program

POVA/Janis Miglavs

Tuesday, July 13, 4:00 to 5:30 pm

FORUMS

Solar is Going to Schools

Schools and solar energy are a natural match, and that fact is evident from the continued pace of growth in popularity of these programs across the country in K-12 as well as colleges and universities. This forum will feature presentations on some of the newest programs, including the approach taken in getting a program started, funding, the educational component, hardware, community outreach and involvement, and other associated issues. Attendees will leave this session with contacts, good ideas, and information and outreach materials on schools and solar energy.

Promoting Benefits of Renewables

How well are renewable energy strategies being promoted around the country and the world? This forum will explore a variety of communication strategies aimed at promoting the multiple benefits of renewable energy and its pivotal role in sustainable development. In addition to some entertaining presentations, the participants will brainstorm about getting the word out during the upcoming political campaigns and other timely public education venues.

TECHNICAL SESSIONS

Building Assessments

RP Performance: A Design Tool to Simulate the Thermal Performance of Skytherm North Roofpond Systems
A. Fernandez-Gonzalez, UNLV

Qualitative and Quantitative Evaluation of Energy Conversation Measure (ECM) over Baseline as Given by ASHRAE
H. Sozer, M. Elnimeiri, P. Chaisparasmkul and V. Thomas, Illinois Institute of Technology

Monitoring Energy Measures and Conservation Awareness: Benchmarking the Capital Building Process
D. Brentrup, G. Thomas and G. Wixkliff, University of NC-Charlotte

Campus Energy Usage Website
G. Brown, J. Kline, T. Sekuguchi and D. Northcutt, University of Oregon

Thermal Diary: A Day in the Life of an Architecture Student
R. Ota, K. Simon and A. Kwok, University of Oregon

BEAM: Shedding Light on Building Performance Education
I. Elzeyadi, University of Oregon

Policy II

Sustainability Assessment of Solar Power Plants
M. Carvalho and N. Afgan, Instituto Superior Tecnico

Solar Hot Water in Commercial Buildings: Mapping the Breakeven Turnkey Cost
C. Herig, Segue Energy Consulting; S. Gouchoe, North Carolina Solar Center; R. Perez, ASRC, the University at Albany and T. Hoff, Clean Power Research

Emission Allowances for Renewable Energy and Energy Efficiency Projects
E. Mercado, U.S. Environmental Protection Agency; E. Franconi, Nexant, Inc.; S. Kumar, Lawrence Berkeley National Laboratory; S. Schiller, Nexant

Energy Metering of Solar Domestic Hot Water Systems for Inclusion in Green Power and Renewable Portfolio Standard Programs
T. Cleveland and K. Creamer, North Carolina Solar Center and R. Johnson, North Carolina State University

Are Rebates, Grants, and Incentives for Homeowners and Businesses Taxable?
S. Gouchoe, North Carolina Solar Center and C. Herig, Segue Energy Consulting

Participating Organization

SEIA Solar Energy Industries Association (SEIA) is the national trade association of solar energy manufacturers, dealers, distributors, contractors and installers. SEIA's primary mission is to expand the use of solar technologies in the global marketplace. National members combined with members in 22 states exceed 500 companies providing solar thermal and solar electric products and services. www.seia.org

Northwest Portland-Nob Hill Neighborhood
Portland has more movie theaters and restaurants per capita than any other city in the United States.

Tuesday, July 13 Conference Program

PV Applications

Effect of Panel Temperature on a Solar-PV AC Water Pumping System
B. Vick and R. Clark, USDA-ARS

Novel Concrete Tile Roof Mounting Method For PV Utilizing Adhered Brackets
O. Bartholomy and J. Bertolino, Sacramento Municipal Utility District

Impact of Inverter Line Voltage Window on a Utility Interactive PV System
S. Fitzpatrick, North Carolina Solar Center

Low Cost Inverter Integrated IV Curve Tracer and its Applications
C. Handleman, Heliotronics, Inc.

Developing a Non-Penetrable Mounting System for Photovoltaic Modules
S. Taylor, A. Thurlow and S. Johnson, McConnell Energy Solutions

Solar Thermal Industrial and Agricultural Applications

Design and Testing of an Improved Solar Oven
M. Thornbloom and J. Harrison, Florida Solar Energy Center

Continuous Flow Density Driven Passive Solar Water Pasteurization
D. Hodgson and W. Duff, Colorado State University

The State of the Art of Solar Cooking in the World's Nations: Existing and Potential
B. Knudson, University of Minnesota

Parametric Study of a Vacuum Enhanced Solar Still
Y. Abakr, Taylor's College

Breaker Chicken with a Solar Thermal Storage
H. Terres and M. Gordon, Universidad Autonoma Metropolitana

Development and Testing of a Tilted Basin Solar Still
R. Polka and K. Stevens, New Mexico State University and R. Wareham, Sunstove Organization

Experimental and Analytical Study of Drying by Convection and Solar Radiation
M. Cui, HeBei Institute of Architectural and Civil Engineering

Reducing the Thermal Inertia in a Conventional Solar Still to Increase its Productivity
E. Jaguaribe, F. Ferraz and M. Andrade, Universidade Federal da Paraíba

Solar Water Heating II

Thermal Characterization of a Prototypical ICS System with Immersed Heat Exchangers
F. Kulacki and J. Davidson, University of Minnesota and W. Liu, Thermo Systems Inc.

Derivation of Simulation Model Inputs for Storage Tank Water Heaters from Test Results
J. Burch, NREL, P. Erickson, University of Colorado and G. Barker, Mountain Energy Partnership

Torture and Field Testing of a Low Cost ICS Solar Water Heater
D. Bourne, D. Callaway and E. Lee, Davis Energy Group

An Empirical Assessment of Heat Exchangers for Application in Photovoltaic Pumped Solar Water Heating Systems
H. Reichmuth and D. Robison, Stellar Processes

Pipe Freeze Probability for Passive Solar Water Heating Systems in the United States
J. Salasovich and J. Burch, NREL and G. Barker, Mountain Energy Partnership

Performance Evaluation of an Advanced Roof Integrated Solar Hot Water Heating System and Roof-Mounted Solar Photovoltaic Power System in New Home Construction
R. Houser, Consultant and R. Mahoney and T. Moss, Sandia National Labs

Testing and Monitoring

Comfort and Thermal Performance of Passive Solar Test Rooms in Muncie, Indiana
A. Fernandez-Gonzalez, UNLV

Thermal Performance of Passive Solar Systems in Three Experimental Test Houses in Chicago, IL
D. Ogoli, Judson College

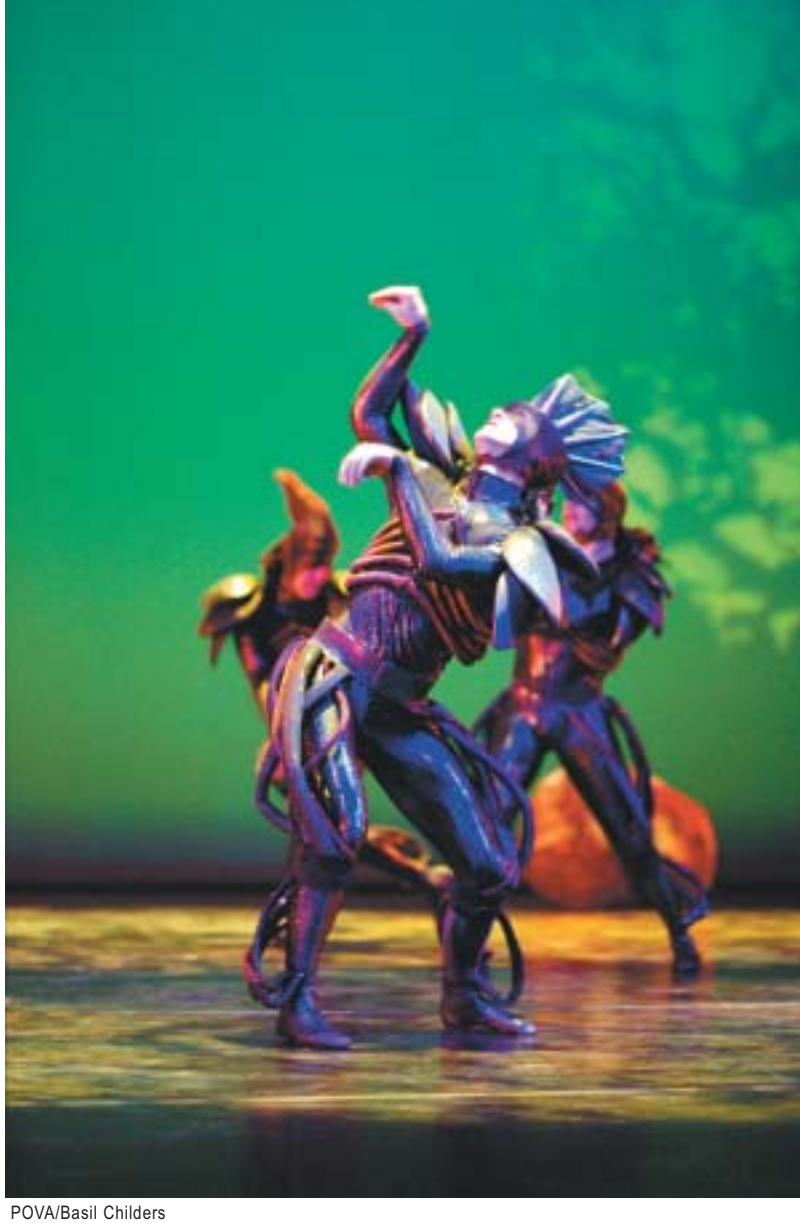
Numerical and Experimental Analysis of Convection Heat Transfer in a Lean-to Type Greenhouse
W. Chen and W. Liu, Huazhong University of Science and Technology

Incubator Building as a Metaphor for a Green Campus: Measurements at the Lyle Center for Regenerative Studies
H. Wu and B. Cavin, Cal Poly State University, Pamona

Solar Engineering Using Infra Red Scanners
S. Baer, Zomeworks Corporation

Experimental Predictive Formulas of Indoor Temperatures with Minimum Climatic Data
B. Givoni, UCLA

Wednesday, July 14
Conference Program



POVA/Basil Childers

Wednesday, July 14, 8:30 to 10:00 am

FORUMS

1974 – 2004: Thirty Years of the Solar Heating and Cooling Demonstration Act – Recapturing the Legislative Vision

As a response to the oil embargo in 1973, in September of 1974 the U.S. Congress approved the Solar Heating and Cooling Demonstration Act. A month later the Solar Energy Research, Development, and Demonstration Act was also approved. The Congressional findings and declaration of policies of these two acts signed thirty years ago are today as valid and relevant as they were thirty years ago! This discussion panel will bring together experts from four different areas (legislators, researchers, manufacturers, and architects) to provide historic insights on what was done at the time, and how legislative interest in passive solar energy might be renewed so that in the near future passive solar heating and cooling systems are heavily implemented until they become mainstream practice.

Building the Framework for Jobs & Workforce Development

This session will introduce a workforce development framework that connects labor market needs, occupational and training standards, educational providers, and third-party verification of predetermined qualifications. A labor market survey that presents information about what kind of jobs are in the renewable energy industries; what are the trends and where the employment opportunities are will be presented. In addition, the discussion will include professional standards development and NABCEP exam administration results. And finally, educational providers will provide information about their programs.

TECHNICAL SESSIONS

Building Performance

Shadow Tracker: A Tool for Tracking Sun through Architectural Models
A. Kwok, J. Boosinger and V. Cartwright, University of Oregon

Testing Performance of Experimental Building Systems in Early Modern Architecture
G. Thomson, Goody, Clancy & Associates

Design, Construction, Calibration and Uniqueness of a Mirror-Box Artificial Sky and Heliodon
G. Brown, L. Jensen, L. Kessler, J. Kline, D. Northcutt and G. Thomson, University of Oregon

The Hathaway "Solar Patriot" Home: Performance Testing and Simulation Results
P. Norton, NREL; E. Hancock and G. Barker, Mountain Energy Partnership and P. Reeves, Partnership for Resource Conservation

Southern Comfort: Observations from an Instrumented Tour of Savannah and Charleston
W. Grondzik; A. Kwok, University of Oregon and C. Chun, Yonsei University

Green Roof Turning White
V. Lerum, Arizona State University

Daylighting – Shading

West Facing Toward Mt.Fuji: Sunshading Device Performance in IGES
Y. Yanagisawa, University of Oregon

Hybrid Photovoltaic Shade Elements: Passive and Active Benefits
J. Henson, College of Architecture and Design, Arizona State University

282 kWP BIPV, Bioclimatic Sports Centre Wageningen (Nl)
T. Reijenga, BEAR Architects

Calculating an Optimal Sun Angle for Window Shading
V. Sami and V. Olgyay, Ensar Group Inc

Automatic Sun Shades, An Experimental Study
P. La Roche, California Polytechnic University and M. Milne, UCLA

An Integrated Evaluation of Building Energy, Lighting, Power Production, Avoided Emissions and Cost for a Skylight Photovoltaic Installation
A. Malkawi, E. Baimpwi and Y Yi, University of Pennsylvania and G. Lewis, University of Michigan

BodyVox
Wherever you go in Portland, you're never far from an art house cinema, performance space or gallery.

Wednesday, July 14 Conference Program

PV Market NGO Programs

The Development and Implementation of the Georgia Solar Schools Program Pilot Project
T. Blackwell

Green Energy Ohio: Growing Clean Energy Opportunities from the Grassroots Up
C. Panoska and B. Spratley, Green Energy Ohio

Sun Power for the Town of Westwood
J. Jackson, J. Hoffner and D. Porrazzo, CSG Services, Inc.; L. Hoke, Massachusetts Interfaith Power & Light and P. Kane, Evergreen Solar

Good News for Renewables in the Northwest
R. Shimshak, Renewable Northwest Project

Implementing Quality Control for Florida's PV for Schools Program
K. Lynn and W. Wilson, Florida Solar Energy Center

Solar Market Transformation Requirements: A Case Study from the Pacific Northwest
C. Rollier, M. Quaid, K. Brockman and P. West, Energy Trust of Oregon

Renewable Energy Systems Analysis

Analysis of Loads and Wind Energy Potential for Remote Power Stations in Alaska
M. Devine and J. Manwell, University of Massachusetts; I. Baring-Gould, NREL and B. Petrie, Alaska Village Electric Cooperative

Storage Options and Sizing for Utility Scale Integration of Wind Energy Plants
A. Ingram, Bonneville Power Administration

A 7 Year Solar-Wind Hybrid Electric System Analysis from Actual Data
D. Thayer, Darryl Thayer & Associates

The Influence of Utility Rate Structures on the Economics of Photovoltaic Systems
E. Coffman and W. Steigelmann, Aspen Systems Corporation

Optimization of Photovoltaic/Thermal Collectors
J. McCabe, California Energy Commission

Resource Modeling for Applications

Update of Algorithm to Correct Direct Normal Irradiance Measurement Made with a Rotating Shadow Band Pyranometer
J. Augustyn and T. Geer, Augustyn + Company; R. Little, Schott Applied Power Corporation; T. Stoffel, NREL; F. Vignola, University of Oregon and B. Boyson, Sandia National Laboratory

Trends in Solar Radiation over Germany
H. Power, University of South Carolina

Solar Resource Assessment in the Foggiest City on Earth
J. Augustyn and T. Geer, Augustyn + Company and F. Schwarz, M. Kim and K, Knox, San Francisco Public Utilities Commission

Investigations of Short-term Solar Radiation Data for Eight U.S. Locations
G. Vijayakumar, S. Klein and W. Beckman, University of Wisconsin-Madison Solar Energy Laboratory

Generation of Monthly Average Hourly Ambient Temperatures from Monthly Average Daily Temperature
P. Ravikumar, Indian Institute of Technology

Cumulative Frequency Distributions for Daily Global Illuminance
P. Ravikumar and S. Varanasi, Indian Institute of Technology

Thermal Energy Storage

Parametric Analysis of Active and Passive Building Thermal Storage Utilization
G. Henze, University of Nebraska - Lincoln and G. Zhou and M. Krarti, University of Colorado at Boulder

Thermal Performance of Shape-stabilized Phase Change Material Floor or Wallboard - Part I. Model and Simulation
H. Di, K. Lin, R. Yang, X. Xu and Y. Zhang, Tsinghua University

Thermal Performance of Shape-stabilized Phase Change Material Floor or Wallboard - Part II. Experimental Research
H. Di, K. Lin, R. Yang, X. Xu and Y. Zhang, Tsinghua University

Trade-off Between Energy Consumption and Utility Cost in the Optimal Control of Active and Passive Building Thermal Storage Inventory
G. Henze, University of Nebraska - Lincoln

Thermal Energy Storage Systems Utilizing Solar Energy for Building Applications: A State of the Art Review
A. Papadopoulos and S. Oxizidis, Aristotle University Thessaloniki

Effect of Design Parameters on the Performance of Thermal Energy Storage Systems
G. Henze, University of Nebraska - Lincoln

Solar Ground-Source Heat Pump Application in Severe Cold Climate
M. Zheng, Harbin Institute of Technology

Wednesday, July14, 10:30 am to Noon

FORUMS

Academic Programs for Preparing Students for Careers in Solar Energy/Alternative Energy in the 21st Century

This forum will address how to design the ideal program, what to emphasize, what to avoid, lessons learned from successful programs and how to maximize success. Career prospects in solar/alternative energy will also be discussed. Participants will be from well-established and new academic programs.

Participating Organization

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.
www.solar-rating.org

Wednesday, July 14
Conference Program

MAX rail downtown
Although Portland's downtown area is "foot friendly," it also boasts a mass transit system that is a national model of efficiency.

BetterBricks Daylighting Labs: A Northwest Design Assistance Network for Energy Efficient Buildings

The Northwest is blessed with not one but five BetterBricks daylighting labs through cooperative agreements with the Northwest Energy Efficiency Alliance and the schools of architecture at the Universities of Washington, Oregon and Idaho and Montana State University. The Northwest network of BetterBricks Daylighting Labs offers daylighting classes, consulting, modeling and connections to other design assistance resources. The network's goal is to assist in transforming the Northwest architectural design market toward greater energy efficiency. The strategy uses daylight as an entry point for a broader design dialogue about health, productivity and energy efficiency. Architects can bring projects into a lab for a quick daylighting consultation, or modeling a particular daylighting concern. Modeling commonly includes physical or digital modeling of overcast sky performance, and/or the assessment of shading performance with a sun simulator. In this session, two directors from the Labs and several architects will share their experience on how the daylight modeling helped them make better design decisions leading to more effective use of daylighting and reducing building energy use. Participants will also discuss the relative merits of simulation and modeling and applications in the early conceptual design stage.

TECHNICAL SESSIONS

Benchmarking Evaluation and Assessment Tools

Leading Barriers: Unveiling Constraints to LEED Certification in Oregon
T. Hanby and I. Elzehadi, University of Oregon

Integrated Building Design: What are Architects Overlooking in Green Houses?
D. Ogoli, Judson College

Application of Life Cycle Assessment Methods for Evaluating the Environmental Impacts of Buildings
V. Agarwal, Arizona State University

Assessment of Solar Energy Applications on U.S. Military Bases
G. Kolb, Sandia National Laboratories

Customizing HEED for a Small Utility District
M. Milne, UCLA and J. Barnett, SMUD

Creating a Green Builder Program with a Strong Renewable Energy Focus
D. Stankus, North Carolina Solar Center

China Supermarket

Study of Supermarket Energy and Thermal Comfort Performance in China
W. Lixia, Z. Jianing and Z. Wang, Harbin Institute of Technology

Maximize Variable Flow System Performance through Integrated Design, Balance and Operation Control
B. Zheng and M. Liu, University of Nebraska

Measured Impacts of Consumers' Density on the Supermarket
J. Zhao, Harbin Institute of Technology

Impacts of Consumers' Density on the Supermarket HVAC System Design and Operation in China
F. Xiumu, W. Lixia, Z. Jianing and Z. Wang, Harbin Institute of Technology

Growing PV Markets

A Case Study for Projected Utility Savings under Possible Interconnection Schemes for Photovoltaic Systems in North Carolina
C. Maurer and A. Hobbs, North Carolina Solar Center

Financial Payback on Residential California Solar Electric Systems after the State Rebates are Gone
A. Black, REgrid Power

Why is a Solar Electric Home Worth More?
A. Black, REgrid Power

Payback and Currencies of Energy, Carbon Dioxide and Money for a 45 kW PV Array
M. Murray and J. Petersen, Oberlin College

Cost Effective Contributions to New York's Greenhouse Gas Reduction Targets from Energy Efficiency and Renewable Energy Resources: How Big a Role for Solar?
D. Hill, Vermont Energy Investment Corporation; L. Pakenas, New York State Energy Research and Development Authority; R. Perez, ASRC University at Albany, A. Shapiro, Energy Balance Inc.

Facilitating PV Aggregation Through a PV Registry
J. Pepper, Enertron Consultants and S. Swanson, Pace Law School Energy Project

Integrated Sustainable Design

A Roofpond System for Natural Air-Conditioning in a Habitat for Humanity Home in Muncie, Indiana
D. Overbey, Ball State University

The Evolution of a Model Sustainable Development Center Project
O. Jackson, Sustainable Systems and Design International

Introducing "Solar Ready" Manufactured Housing
M. Lubliner, WSU Energy Program and A. Hadley, Bonneville Power Administration

The Habitat Research and Development Centre: Building Sustainably in a Developing Country
N. Maritz, Nina Maritz Architect

Dale and Pat Bulla Residence: A Sustainable Residence on a Steeply Sloping Infill Lot in a Hot Humid Climate
L. Holder III, FAIA, L. Holder III, FAIA

Designing an Energy-Efficient Border Crossing Station for the Department of Homeland Security
A. Jackaway, Spruce Design Group and D. McLaughlin, Place Architecture

Participating Organization

Solar Washington is a private not-for-profit association of solar energy equipment manufacturers, system integrators, distributors, dealers, designers, consultants, students, and interested people. Solar Washington's mission is to promote the development and effective use of solar and renewable energy, and the related arts, sciences, and technologies with concern for the economic, environmental, and social fabric of Washington State through education, facilitation and training. Solar Washington is a chapter of the American Solar Energy Society. www.solarwashington.org

POVA

Wednesday, July 14 Conference Program

Solar Exotica

Demonstration of Thermophotovoltaics for a Full-Spectrum Solar Energy System
B. Wood, Utah State University; D. Dye and J. Kretschmer, University of Nevada, Reno and L. Fraas, J.X. Crystals

Ocean Thermal Energy Conversion (OTEC): A Source of Unlimited Power without Burning Fuel
E. Beck

Comprehensive Simulation of a Metal Hydride McKibben Actuator for Solar Space Applications
G. Lloyd and K. Xia, University of Illinois at Chicago and K. Kim, University of Nevada at Reno

Effect of Annealing and Film Stoichiometry on Structures and Optoelectronic Properties of Cu2ZnSnS4Thin Films Deposited by RF Magnetron Sputtering
K. Kim, Yeungnam University

Automated Detection and Control of Soldier Power Management
B. Owens, D. Massie and M. Kurtti, U.S. Military Academy

Development of Tribological Coatings for Cryocoolers
A. Pai, and N. Dhere, Florida Solar Energy Center

Wednesday, July 14, Noon to 1:30 pm

Closing Luncheon and Plenary

Join us for lunch and an inspiring talk by Denis Hayes, President of the Bullitt Foundation, national coordinator of the first Earth Day in 1970, and current chair of the International Earth Day Network.

Resource Assessment Irradiance Modeling

Status of High Resolution Solar Irradiance Mapping from Satellite Data
R. Perez and M. Kmiecik, ASRC, University at Albany; K. Moore, Integrated Environmental Data; S. Wilcox, R. George and D. Renné, NREL; F. Vignola, University of Oregon and P. Ineichen, University of Geneva

Sensitivity of Spectroradiometric Calibrations in the Near Infrared to Variations in Atmospheric Water Vapor
D. Myers, A. Andreas and K. Emery, NREL

Progress on an Updated National Solar Radiation Data Base
S. Wilcox, M. Anderberg, R. George, W. Manion, D. Myers and D. Renné, NREL; W. Beckman, University of Wisconsin-Madison; A. DeGaetano, Northeast Regional Climate Center; C. Gueymard, Solar Consulting Services; R. Perez, SUNY Albany and M. Plantico

High Performance Model for Clear-Sky Irradiance and Illuminance
C. Gueymard, Solar Consulting Services

A solar electric array on 70 acres of gently sloping land in Grant County would produce more power on an annual basis than is used by all the businesses and homes in the city of John Day.

Exhibit Info & Special Events

Exhibit

The SOLAR 2004 Exhibit Hall will be the hub of conference activity. The Exhibit Hall will feature

- displays of solar and other renewable energy products and services;
- the Solar Café with reasonably priced box lunches to buy at lunch and yummy treats every afternoon, sponsored by PowerLight Corporation;
- high-speed Internet access for conference attendees;
- all of the conference poster presentations, including Student Poster contest entrants and winners;
- and the Opening Reception at 6:00 pm on Sunday evening.

The Exhibit Hall will be free and open to the public from noon to 5:00 pm on Sunday, all day on Monday, and until 2:00 pm on Tuesday.

We invite your company to be a part of the excitement! For exhibiting information, contact:

Don Serfass
McNeill Group, Inc.
385 Oxford Valley Road, Suite 420
Yardley, PA 19067
Phone: 215-321-9662, ext. 30
Fax: 215-321-9636
e-mail: dserfass@mcneill-group.com
web site: www.mcneill-group.com

Special Events and Meetings

Interstate Renewable Energy Council (IREC) Board of Directors Meeting
Friday, July 9, 3:00 pm *For Board members and invited guests*

Joint IREC & MSR Annual Meeting
Saturday, July 10, 8:30 am – 5:00 pm
Members of the Interstate Renewable Energy Council (IREC) and partnerships of the Department of Energy's Million Solar Roofs Initiative (MSR) will be holding their joint annual meeting at the Solar 2004 Conference. This all-day event allows MSR and IREC participants to find out the latest developments on local, state, and national activities, exchange news and results of implementation strategies, and discuss current renewable energy issues and trends.

ASES Chapters Caucus
Saturday, July 10, 6:00 to 9:00 pm
Sunday, July 11, 8:30 am to Noon
$25.00 includes dinner on Saturday evening, breaks and materials. Pre-registration is required.
For representatives of ASES Chapters and forming chapters, a networking and training program. Representatives are encouraged to bring brochures and newsletters to share.

Solar Rating and Certification Corporation Board Meeting
Saturday, July 10, 6:30 pm
Sunday, July 11, 7:30 am

American Society of Mechanical Engineers Solar Energy Division Executive Committee Meeting
Sunday, July 11, Noon to 2:00 pm

Exhibit Hall Opening Press Conference
Sunday, July 11, Noon
Dignitaries and congressional representatives from the Pacific Northwest will be on hand to open the exhibit hall to the media and the public. Come and help us celebrate renewable energy's successes and opportunities!

Opening Night Reception
Sunday, July 11, 6:00 – 7:30 pm

American Society of Mechanical Engineers Solar Energy Division General Membership Meeting
Monday, July 12, Noon to 2:00 pm

Come see what the Solar Energy Division is about. Discussion of current and future activities followed by informal SED Technical Committee meetings. Light lunch available for purchase at the door while supply lasts.

Student Poster Contest Judging
Monday, July 12, Noon

Women in Solar Energy (WISE) Luncheon
Monday, July 12, Noon to 2:00 pm *$25.00 per person includes luncheon*
Opportunities to network with your peers and discuss the challenges and rewards women encounter working in a non-traditional field.

Awards Banquet
Monday, July 12, Cash bar opens and seating begins at 7:00 pm
Included in full conference registration. Extra tickets can be purchased for $50.
Larry Kazmerski, Ph.D., Director of the National Center for Photovoltaics at the National Renewable Energy Lab will take us on a solar journey after we honor recipients of this year's awards. Good food, peppy program, great company!

Journal of Solar Energy Engineering Editor's Lunch
Tuesday, July 13, Noon – 2:00 pm *(invited guests only, please)*

Poster Session
Tuesday, July 13, 12:30 – 2:00 pm
This is your opportunity to talk to the author of the posters you have been admiring since Sunday. Student poster contest participants and winners, as well as professional poster authors will be at their posters.

Society of Building Science Educators Annual Meeting
Tuesday, July 13, 12:30 – 2:00 pm

American Solar Energy Society Annual Meeting
Tuesday, July 13, 5:30 – 6:30 pm
All ASES members and potential members are invited. Come and hear about the activities of your society, contribute your ideas, and listen to some exciting new proposals.

Dinner at the Classical Chinese Gardens
Tuesday, July 13, 7:00 – 9:30 pm *$50 includes admission to the Garden and dinner, cash bar available*
"Most cherished in this mundane world is a place without traffic: truly in the midst of a city there can be mountain and forest." Wen Zhengming (1470-1559)
Created to nurture and inspire all who visit, this Garden offers a glimpse into the Ming Dynasty. Please join us for an evening of excellent food, drink and company in this unique setting. Take the free Max light rail to the event with your friends and experience the garden, which embodies the duality of nature, yin and yang. Stroll the serpentine walkways, cross the lotus pond, and enjoy the various pavilions. Enjoy the meticulously arranged landscape of plants, water, stone, poetry, and buildings. Several docents will be available during the evening to answer any questions you might have about the Garden. Downtown Portland awaits, just blocks away.

Closing Luncheon and Plenary
Wednesday, July 14, Noon – 1:30 pm
Included in full conference registration. Extra tickets can be purchased for $30.
Join us for lunch and an inspiring talk by Denis Hayes, President of the Bullitt Foundation, national coordinator of the first Earth Day in 1970, and current chair of the International Earth Day Network.

All workshops will be held at the Doubletree Hotel Portland-Lloyd Center.

Workshops

#W01

PV Design and Installation Workshop for Women

Tuesday, July 6 through Saturday, July 10
8:30 am – 5:30 pm each day
Fee: $550 includes lunch each day and handouts
Minimum, 15; Maximum, 25

A photovoltaic design and installation workshop geared specifically towards women! In this five-day workshop learn how to use photovoltaic technology to produce electricity from the sun through practical design and installation of a PV system. Participants will learn system sizing, site analysis, hardware specification and component selection. The workshop covers typical applications and case study examples. Install an operational system in the field and learn the proper use of tools and safety precautions.

Why Women Only? The workshop is intended to provide women with a supportive learning atmosphere. Many women have little or no hands-on construction or electrical experience and may be wary of attending a coed course with men who have grown up using power tools. Even women with hands-on experience already working in technical fields find it helpful and rewarding to network with other women interested and/or working in renewable energy.

Presenters: *Justine Sanchez, Solar Energy International*
Marlene Brown, Sandia National Labs

#W02

Renewable Energy for the Developing World

Friday, July 9 and Saturday, July 10
8:30 am – 5:30 pm each day
Fee: $195 includes lunch each day and handouts
Minimum, 20; Maximum, 40

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, rural health care, and micro-enterprises utilizing renewable energy.

Presenters: *Laurie Stone and Johnny Weiss, Solar Energy International*
Michael Royce and Walt Ratterman, Green Empowerment

#W03

Preparatory Course for NABCEP PV Installer Certification Exam

Friday, July 9, 9:00 am – 5:00 pm
Fee: $165 includes handouts
Minimum, 20; Maximum, 50

The all day course will focus on the NABCEP Task Analysis for the Solar PV System Installer. The purpose of the task analysis is to define a general set of knowledge, skills and abilities typically required of practitioners who install and maintain PV systems. This course will be organized into four 90-minute sessions, with each consisting of a combination of content review of topics on the task analysis, sample testing and discussion of solutions. The purpose of the course is to prepare candidates for the NABCEP certification exam via review and practice with sample questions. The workshop is organized by the Interstate Renewable Energy Council.

Presenter: *Kevin Lynn, Florida Solar Energy Center*

#W04

Project Sun: Professional Development for Teachers

Friday, July 9, 8:30 am – 5:30 pm
Fee: $60 includes lunch and handouts and samples of materials used in Project Sun
Minimum, 15; Maximum, 30

Project Sun is a National Science Foundation funded program designed to improve the science and technology skills of elementary teachers and college students through the study of solar energy. This session is designed to be hands-on and instructive. Participants will get to experience some of the elements of Project Sun, as well as learn how such a program functions. Information on securing funding, finding partners, recruiting teachers and other essential components will be covered. This session would be for anyone interested in teacher or student education and renewable energy.

Presenter: *Susan Schleith, Florida Solar Energy Center*

#W05

Solar Home Heating and Natural Cooling Strategies

Friday July 8, 8:30 am – 5:30 pm
Fee: $120, includes a paper write-up of the workshop (about 20 pages), an $8 Casio fx-260 scientific solar calculator, and a CD-ROM containing several thousand pages of relevant information. (lunch is not included)
Minimum, 10; Maximum, 50

Many people have heard of Ohm's law in connection with photovoltaics, but they may not be aware that it also applies to heatflow in houses (with different units) and that solar heating can be enormously cheaper per peak watt than solar electricity. This workshop is a two-part tutorial: a morning session covering the basic physics of home heating and cooling: power and energy and their units, thermal resistance and capacitance, Ohm's law for heatflow, superinsulated houses, time constants, and evaporative and nocturnal cooling, and an afternoon session exploring ways to build houses with high solar heating fractions with configurations beyond direct gain, i.e. passive mass and glass. We will use calculators and NREL weather data to design houses that are close to 100% solar heated, on paper, and verify their performance with simple laptop TMY2 simulations. Promising techniques include solar closets and shelfboxes, soap bubble foam insulation, and 2:1 concentrating solar attics that collect heat and electricity from standard PV panels under drain-down water-filled lay-flat poly film ducts on the attic floor. Participants are expected to relax, and have some recollection of high-school algebra.

Presenters: *Steve Baer, Zomeworks Corp.*
Drew Gillett, P.E.
Rich Komp, Sunwatt Corp.
Nick Pine, Pine Associates, Ltd.

#W06

Photovoltaics Markets, Technology, Cost, Performance and Building Integrated PV

Saturday, July 10, 8:30 am – 5:30 pm
Fee: $165, includes materials and lunch
Minimum, 10; Maximum, 60

This comprehensive course will provide historical perspective, present status, and forecast the future for: cell technology, performance and manufacturing cost: balance of systems performance and cost (batteries, charge controllers, inverters, safety, and power quality), systems design (stand alone to grid connected) with emphasis on the details of Building Integrated PV systems; with a detailed analysis of the present world markets, and a forecast to 2010.

Presenters: *Paul D. Maycock, PV Energy Systems, Inc.*
Steven Strong, Solar Design Associates

Workshops

#W07

Daylighting by Design

Saturday, July 10, 8:30 am – 12:30 pm
Fee: $50, includes materials
Minimum, 10; Maximum, 35

In this workshop, participants will gain the knowledge and tools necessary to realize the design enhancing potential of daylighting in their projects by engaging the following questions: Why, when and how to daylight buildings? Which daylighting strategies work, and which do not?

Participants will learn how daylighting affects human performance, and how to answer detailed questions regarding productivity, and payback from investments in daylighting. How to determine when daylighting can be used as an energy conservation strategy, and how to overcome barriers of using daylighting will also be covered. Participants can expect to understand strategies and tools to develop the best siting for your building, develop its organization and massing, and shape the room, windows, form the skin, and integrate electric lighting.

Presenters: *G. Z. Brown, University of Oregon Energy Studies in Buildings Laboratory*
Joel Loveland, Lighting Design Laboratory, Seattle

#W08

Integrated Solar/Radiant Floor Heating Applications

Saturday, July 10, 8:30 am – 12:30 pm
Fee: $50, includes copy of presentation
Minimum, 10; Maximum, 50

Explore how to integrate solar hot water collection systems with radiant floor heating. The workshop will focus on collection, storage, and control methods. Solar thermal and radiant heating basics, other heating methods, and integrated systems and control strategies will be covered. The workshop will also include a discussion of potential problems and ways to avoid them. There will be a primer for interested new homeowners and builders. Detailed schematics and actual applications will be also be presented.

Presenter: *Douglas Railton, Cascade Sun Works*

#W09

Natural Ventilation for Non-Residential Buildings

Saturday, July 10, 8:30 am – 12:30 pm
Fee: $50 includes handouts
Minimum, 20; Maximum, 30

This interactive seminar will provide a primer on the use of natural ventilation for cooling buildings in the Pacific Northwest. The workshop will start with the basics including using climate data and the physics of air movement to optimize natural ventilation in Architecture. We'll discuss the advantages and disadvantages of natural ventilation along with the design challenges. We'll also discuss how you can work with clients to increase the acceptable temperature range and provide information on the percentage of time spaces may be outside traditional temperature ranges. We'll build on these fundamentals by sharing case studies of projects that we've worked on and the lessons learned from those projects. Finally, we'll discuss how you can use modeling to predict and refine your designs for naturally ventilated buildings.

Presenters: *Ian Theaker, PE, Interface Engineering*
Paul Schwer, PE, PAE Consulting Engineers

#W10

Green Building Guidelines for Homes

Saturday, July 10, 1:30 – 5:30 pm
Fee: $75, includes the Sustainable Building Industries Council's "Green Building Guidelines" reference manual, and hard copy of the PowerPoint presentation
Minimum, 20; Maximum, 30

The Green Building Guidelines workshop, presented by the Sustainable Buildings Industries Council, has been well attended and well received by builders all over the country. The workshop provides the builder with the details and specifics they need to produce low energy, low resource consuming, and low-toxic homes that cost little or no more to build than conventional houses. Lowering energy consumption by 30-50% is common, with no sacrifice in comfort. By applying a whole building approach to the design and development of homes, improved comfort, water efficiency savings, improved indoor environmental quality, and a more material efficient home can be realized. The Green Building Guidelines, created by home builders for home builders, can help achieve these goals. Attendees are welcome to join an open-house event on Saturday from 6:30 pm until 8:30 pm at the Rose House, an 800 ft^2 zero net energy home in NE Portland built in the spring of 2003. Transportation will be available from the conference hotel.

Presenter: *Chris Herman, recovering carpenter, longtime green home designer (17 yrs.), Certified Building Designer, Co-Founder of the NW Eco-Building Guild and President of Solar Washington*

#W11

Solar Advocacy—Municipal Solar Campaigns

Saturday, July 10, 1:30 – 5:30 pm
Fee: $50, includes handouts
Minimum, 12; Maximum, 50

This workshop will describe practical policy options for municipal governments to support solar, and discuss techniques by which solar advocates can help get such policies implemented. In particular, the workshop will discuss techniques that can bring down solar's effective costs, from bundling solar installations with energy efficiency to third party solar service providers. Also covered will be policy options that municipalities may pursue to facilitate and encourage solar on commercial and residential space, and for the new construction market.

Presenter: *Adam Browning, The Vote Solar Initiative*

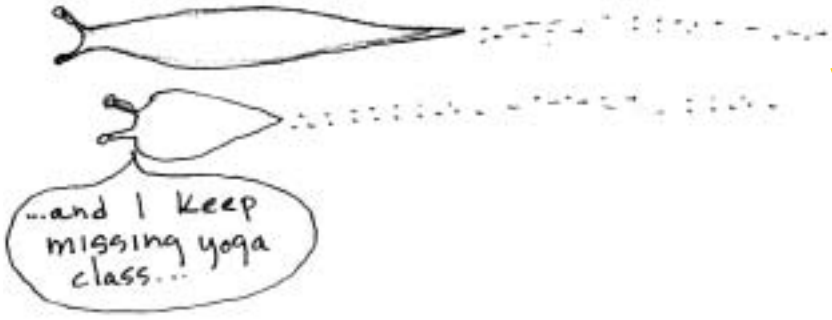
#W12

Basics of Using Solar Energy in a Disaster

Sunday, July 10, 8:30 am – 12:30 pm
Fee: $50, includes booklet "Photovoltaic Applications for Disaster Relief" and presentation materials and handouts
Minimum, 7; Maximum, 50

Manmade and natural disasters, such as those caused by weather, introduction of hazardous materials and terrorism, can happen at any time. The loss of electrical power severely impacts emergency management and relief operations during disaster response and recovery. This workshop provides an overview of the history of successful use of photovoltaics in response, recovery and mitigation activities. The viability of various solar energy sources to satisfy energy needs will be reviewed and the operation and maintenance of photovoltaic systems will be presented. The benefits of photovoltaics as a backup power source for buildings will be discussed in terms of establishing disaster-resistant, energy secure communities.

Presenter: *William Young, Florida Solar Energy Center*



Workshops

#W13

Designing High Performance Sustainable Buildings

Sunday, July 10, 8:30 am – 12:30 pm
Fee: $75, includes a short HEED Users Manual with technical support data, plus installation of the software for those who bring a notebook computer, and access to the web site to download free copies in the future. CDs will be available for those with no access to the internet.
Minimum, 8; Maximum, 40

High Performance Sustainable Buildings 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 "fine-tune" your building's design for optimal performance using the latest release of HEED, a free user-friendly micro-computer design tool. Each participant will have the chance to design a building using HEED and then create a series of design alternatives, comparing its performance using 8760 hour TMY2 climate data. Please bring a notebook computer running any version of Windows; we will install HEED for you. HEED stands for Home Energy Efficient Design, but this workshop will also show you how to use it for non-residential buildings and how to load in data for other climate stations around the world.
Presenters: *Murray Milne and Carlos Gomez, UCLA*
Bruce Haglund, University of Idaho

#W14

Zero Net Energy Homes

Sunday, July 12, 8:30 am – 12:30 pm
Fee: $65, includes snacks, transportation and presentation materials
Minimum, 15; Maximum, 40

The workshop presents technical and financial strategies of designing homes that are net energy producers rather than net energy consumers. Load calculation and minimizing annual energy consumption strategies will be presented. New and emerging technologies that reduce the cost and complexity will be presented. Target audience is designers, developers, and equipment suppliers. The National Renewable Energy Lab will provide an update that they and their Zero Energy Home Teams are currently working on. Attendees are welcome to join an open-house event on Saturday from 6:30 pm until 8:30 pm at the Rose House, an 800 ft^2 zero net energy home in NE Portland built in the spring of 2004. Transportation will be available from the conference hotel.
Presenters: *Christopher Dymond and Charlie Stephens, Oregon Department of Energy*

#W15

Inverter Technology Comparison

Wednesday, July 14, 1:30 – 5:30 pm
Fee: $50, includes handouts
Minimum, 15; Maximum, 60

The workshop presents the assets and liabilities of the current crop of utility interactive inverters. The basic premise is there is no best inverter, each come with strengths and weaknesses which a good system designer/installer must understand to get the best value for their customer. Which inverters are better suited for conditions of rapidly changing sky conditions? Which ones are best suited for conditions where there is frequent partial shading or where ambient temperatures vary from hot to cold? In addition to evaluating inverter specifications, the workshop will cover basic topography and safety mechanisms and preview emerging inverter features. The target audience is design professionals and installers of photovoltaic systems.
Presenters: *Christopher Dymond, Oregon Department of Energy*
Joe Schwartz, Home Power Magazine
Sam Vanderhoof, SMA America

#W16

Rainwater Harvesting and Ecoroof Rainwater Management

Wednesday, July 14, 1:30 – 5:30 pm
Fee: $50, includes handouts
Minimum, 10; Maximum, 50

This workshop presents strategies for using rainwater harvesting for toilet flushing in commercial buildings of various sizes, high rise residential, and single family residences. It also explores integrated rainwater applications combining ecoroofs, bioswales and cisterns in projects at different scales.
Presenters: *Kathy Bash, GBD Architects, Inc.*
Greg Acker, City of Portland Office of Sustainable Development

#W17

Roofpond Building Design: Heating and Cooling Applications

Wednesday, July 14, 1:30 – 5:30 pm
Fee: $65, includes CD containing a copy of RP_Performance and the companion file Weather_Database along with a reference manual
Minimum, 13; Maximum, 30

Passive solar research has demonstrated on repeated occasions the many thermal advantages of roofpond systems. Roofponds, unlike other passive solar systems, can provide the majority of the heating and cooling needed by one- or two-story buildings. More recent studies at Ball State University show that even in colder climates with hot and humid summers like Muncie, Indiana, roofponds can contribute significantly to the heating and cooling of buildings. During the first part of the workshop the participants will learn the fundamentals about the history of roofponds and the ways in which the system has to be modified to make it work in different climatic regions. Once the basics have been covered, the participants will engage in a design exercise using an interactive user-friendly program to design Skytherm/North type roofponds.
Presenters: *Alfredo Fernández-González, University of Nevada, Las Vegas*
Harold R. Hay, Skytherm Inc.

#W18

Terrestrial Solar Spectral Modeling for Renewable Energy Applications

Wednesday, July 14, 1:30 – 5:30 pm
Fee: $75, includes CD-ROM with SMARTS and SPCTRL2 manuals, workbook and references, workshop examples and hard copy of presentation
Minimum, 5; Maximum, 25

This workshop will identify, demonstrate, and teach examples of available tools for participants to compute terrestrial solar spectra for renewable energy engineering and research applications. Applicable areas include Photovoltaics, Daylighting, and Materials Performance (absorbers, reflectors, degradation). The workshop will include a historical overview of atmospheric spectral transmission models; the extraterrestrial solar spectrum; constituents of the atmosphere and their spectral transmission; radiometry versus photometry; descriptions and demonstrations of MODTRAN/LOWTRAN high-resolution model [Commercial Product version] (direct beam transmittance and sky radiance); SERI SPCTRL2 model low-resolution model [QuickBasic and Excel Spreadsheet]; and FSEC Simple Model of Atmospheric Radiative Transfer of Sunshine (SMARTS) [FORTRAN]. Students may bring a Laptop with CD-ROM reader, so they can follow along as the examples and demonstrations are presented.
Presenter: *Daryl R. Myers, NREL*

Tours

All tours will leave from and return to the Doubletree Hotel Portland-Lloyd Center.

#T01

Gorge Wind Farm Tour

Saturday, July 10, 7:00 am – 7:00 pm
Fee: $100 includes transportation, snacks and 2 meals
Minimum, 18; Maximum, 52

Travel the scenic Columbia River Gorge, site of international wind surfing and spectacular waterfalls. Visit the largest commercial wind farm in the U.S. and the Bonneville Dam. This full day bus trip will take you from the green temperate Portland climate to the high plateaus of eastern Oregon through some of the most interesting geologic landscape in the Northwest. On-bus guides will provide background on the Columbia River, history, native populations and geology.

#T02

Central Oregon Tour

Saturday, July 10, 7:00 am – 9:00 pm
Fee: $100 includes transportation, snacks and 2 meals
Minimum, 25; Maximum, 52

This trip covers over 300 miles of spectacular scenery through a variety of Oregon's terrains, heading east from Portland, crossing the Cascade Mountain summit near Mt. Hood, spending much of the day in the high desert sunshine of Central Oregon, visiting two renewable energy homes, a RE committed business and a new and exciting grid tie inverter manufacturer. Lunch in Bend, with a return over the Cascade summit via Santiam Pass, with a brief stop at the PV display at Oregon's state capital building in Salem. Then return to Portland—all with a seasoned interpreter AND a long-time "solar bozo" on board!

#T03

Oregon Coast Tour

Saturday, July 10, 8:30 am – 6:00P pm
Fee: $70 includes transportation, snacks and lunch
Minimum, 25; Maximum, 52

Travel the short two hour distance from Portland to another world—the spectacular Oregon Coast. Visit new solar heated homes with outstanding views, sample cheese and ice cream at the Tillamook factory, take a short hike in the tall trees, have lunch on the beach, and visit a sustainably designed bank with unique timber framing and daylighting. Learn about solar installations in a coastal climate including passive solar heated projects, new homes with cutting edge wood/cement building blocks, green roofs, PV and ground source heat pumps.

#T04

PV Manufacturing Plant & Cool School Tour

Saturday, July 10, 1:30 – 5:30 pm
Fee: $45 includes transportation and handouts
Minimum, 13; Maximum, 53

The tour starts at the Zero Energy Home Display which will be located in the parking lot of the conference hotel. The PV powered home on wheels features structurally insulated panel construction, U.32 energy star windows, insulated doors, energy efficient lighting and appliance displays. Then we will take a short bus ride from Portland to Vancouver, Washington and visit the Shell Solar silicon ingot manufacturing plant, where a large percentage of the nation's solar crystals are grown; 11 million millimeters per year! Also in Vancouver, we will visit the Ogden Resource Center, designed to provide an efficient envelope to house the Braille Production/Instructional Resource Center for the state of Washington.

#T05

Wine Country Tour

Saturday, July 10, 1:30 – 6:00 pm
Fee: $50 includes transportation, snacks, admission fees and handouts
Minimum, 13; Maximum, 53

Visit beautiful rural Yamhill County wine country just outside Portland, site of over 60 wineries. Sample some great wines from several winemakers including Sokol Blosser, and the Carlton Winemaker's Studio. Tour samples of energy efficiency and LEED™ Silver Rated sustainable design used in new winery structures incorporating earth tube cooling, earth berming, eco-roofs, passive solar design and sustainable materials.

#T06

Green City Walking Tour

Sunday, July 10, 8:30 am – 12:30 pm
Fee: $25 includes guided tour and handouts
Minimum, 4; Maximum, 50

Travel by light rail, by foot, and by street car from the conference site to downtown Portland's revitalized Pearl District. The Pearl District has gone from a degenerating warehouse district to a burgeoning mixed use neighborhood in the past two decades. The neighborhood has become a hotbed for sustainability in Portland with its walkable combination of housing, retail and commercial ventures. Tour the Jean Vollum Capital Center—the first Gold LEED rated remodel, and tour several new mixed use buildings. Features include eco-roofs and innovative Building Integrated PV systems.

#T07

Green Home Sampler Tour

Sunday, July 11, 8:30 am – 12:30 pm
Fee: $45 includes transportation, snacks and handouts
Minimum, 10; Maximum, 53

Tour a wide range of homes from traditional neighborhoods, urban infill, Queen Anne cottages, an accessory dwelling, to a 20 year old solar community. Tour the National Association of Home Builders, Green Project of the Year award for 2003. Examples include new homes, solar technologies-PV, thermal and passive systems, a net-zero energy home, green materials, unusual building systems, beautiful gardens and rainwater catchment systems.

#T08

Energy Trust of Oregon Homes Tour

Wednesday, July 14, 1:30 – 5:30 pm
Fee: $45 includes transportation, snacks and handouts
Minimum, 10; Maximum, 53

Tour a wide range of Portland-area homes and businesses that have recently invested in solar. View both PV and solar water heating installations that meet the Energy Trust's quality and performance standards. Learn how public purpose fund incentives and state tax credits have helped build a solar market in Oregon.

#T09

Daylighting in Large Buildings Tour

Wednesday, July 14, 1:30 – 5:30 pm
Fee: $45 includes transportation, snacks and handouts
Minimum, 11; Maximum, 53

Tour exemplary samples of daylighting design in learning institutions. Enjoy the classic lines and curves of an Alvar Aalto building—the Mt. Angel Abbey Library. Tour the first LEED™ certified school building in the U.S. and learn about its natural cooling, natural lighting, and how the design team used performance based fees to split the energy savings with the owner. And, have a refreshment stop at the Mt. Angel Brewing Co. before heading back to Portland.

SEATTLE TOURS

While you're in the Northwest, why not extend your trip a few days and come see the best solar and sustainable sights Seattle has to offer! For more information on the logistics of getting to Seattle, please go to www.ases.org or call 303-443-3130, ext. 100, and request the Seattle tour logistics.

#T10

The IslandWood Learning Center on Bainbridge Island

Thursday, July 15, 11:00 am – 5:30 pm
Fee: $25 includes ferry ride, admission donation and handouts (transportation on your own to Seattle)
Minimum, 4; Maximum, 15

Bainbridge Island is in Puget Sound—a 35 minute ferry ride from Seattle. The ferry ride is considered by some to be worth a trip to Seattle all by itself. The Island is mostly wooded-residential today. IslandWood is a unique outdoor learning center that provides kids, adults and families with hands-on learning experiences. The experiences combine science, technology, and the arts. IslandWood operates from sustainably designed facilities on a 255 acre campus. IslandWood has many innovative features including solar hot water, photovoltaics, daylighting and onsite tertiary treatment of wastewater. Persons participating in this tour must be on board the Bainbridge Island ferry that leaves from Seattle's Colman Ferry Terminal at 11:25 am. They can take an earlier ferry if they wish, and meet just outside the Bainbridge Ferry terminal at Noon. For more information about this tour visit www.ases.org.

#T11

Walking Tour of Seattle LEED Buildings

Friday, July 16, 9:00 am – 3:00 pm
Fee: $45 includes meals and handouts (transportation on your own to Seattle)
Minimum, 10; Maximum, 22

Come see Seattle's sustainable central core taking shape. During this walking tour of downtown Seattle, we will tour several new silver rated LEED™ buildings. Seattle has gained national recognition with the City's Sustainable Building Policy that calls for new City-funded projects and renovations with over 5000 square feet of occupied space to achieve a Silver Rating using the US Green Building Council's (USGBC) LEED Rating System™. Seattle is in the midst of an ambitious series of public projects, many of which fall under the new Sustainable Building Policy's purview. This represents an unprecedented opportunity to leave a legacy of resource efficient, healthy, and community-oriented buildings for the citizens of Seattle. Seattle currently has sixteen city-owned projects participating in the LEED™ program, representing 2.75 million square feet of space, not to mention a strong commitment to the Sustainable Building Policy and environmental stewardship.

Washington produces roughly 20% of the worlds silicon for solar power.

#T12

Seattle City Light's Skagit Hydroelectric Project

Saturday, July 17, 9:00 am – 6:00 pm
Fee: $100 includes transportation and lunch (transportation on your own to Seattle)
Minimum, 10; Maximum, 14

Seattle City Light has three major dams on the Skagit River. These are high dams, more like small Boulder-Hoover dams than most of the Columbia River dams. They adjoin the North Cascades Highway, which many people feel is one of the most beautiful and interesting drives in the U.S. The Skagit tour site is approximately 125 miles from Seattle. The three hour drive from Seattle to the site is about half freeway with scenic flat lands, and half scenic mountain country. The tour explores historic Newhalem, Washington, the home of Seattle's Skagit River Hydroelectric Project. The Skagit Project is rich with the legacy of public power and is listed in the National Register of Historic Places. The dam tour is described on the web site www.skagit-tours.com. This site includes history and video links. Participants will be picked up at a downtown Seattle hotel, for transport via bus or car to the dam site. A box lunch will be provided. A local person who is familiar with the territory will be on board to point out items of particular interest along the way. For more information about this tour see www.ases.org.

POVA/Larry Geddis

Oregon coast—Heceta Head Lighthouse
Go clamming at the beach, then have dinner in Portland that night.

Committees & Logistics

National Organizing Committee

Chair: John Reynolds, FAIA, SOLAR 2004 NOC Chair, University of Oregon

Elly Adelman, Bonneville Power Administration
Carl Bingham, ASME Solar Energy Division and NREL
Doug Boleyn, P.E., Cascade Solar Consulting LLC
Becky Campbell-Howe, American Solar Energy Society
Brad Collins, American Solar Energy Society
Christopher Dymond, Oregon Office of Energy
Glen Friedman, Evergreen Design Group
Glenn Hamer, Solar Energy Industries Association
Bruce Hunn, Ph.D., ASHRAE
Mark Johnson, Bonneville Power Administration
Margot Kally McDonald, AIA, Cal Poly Architecture Department
Heather Mulligan, USDOE Seattle Regional Office
Mike Nelson, Northwest Solar Center
Jane Pulaski, Interstate Renewable Energy Council
Lona Rerick, Yost Grube Hall Architecture
Ken Sheinkopf, Florida Solar Energy Center
Tom Starrs, Bonneville Energy Foundation
Frank Vignola, University of Oregon

Annual Technical Review Committee

Chair, Frank Vignola, University of Oregon, Eugene, OR

Agami Reddy, Drexel University, Philadelphia, PA
Craig Christensen, NREL, Golden, CO
David Kearney, K & A, Vashon, WA
Dave Renné, NREL. Golden, CO
Paul Savage, Nextek Power Systems, Inc., Hauppauge, NY
Ron Swenson, Solar Quest, Santa Cruz, CA

Additional Reviewers

John Archibald, American Solar Inc.
Gilbert Cohen, Solargenix Corporation
Lane Garrett, ETA Engineering, Inc.
Mark Thornbloom, Florida Solar Energy Center
Lorin Vant-Hull, University of Houston
Cecile Warner, National Renewable Energy Lab
Charlie Whitlock, Science Applications International Corp.

Passive Technical Review Committee

Chair, Margot Kally McDonald, AIA, Cal Poly Architecture Department, San Luis Obispo, CA

Kristine Chalifoux, AIA, Architectural Spectrum, Champaign, IL
Martin Gold, University of Florida School of Architecture, Gainesville, FL
Rob Nelson, Heliakos, Berkeley, CA
Jim Wasley, University of Wisconsin – Milwaukee Arch Department, Milwaukee, WI

Additional Reviewers

Harvey Bryan, Arizona State University
Alfredo Fernandez-Gonzalez, University of Nevada, Las Vegas
Walter Grondzik
Onaje Jackson, Sustainable Systems and Design International
Alison Kwok, University of Oregon
Pablo LaRoche, California Polytechnic University
Victor Olgyay, ENSAR Group
Steve Sargent, U.S. DOE
Blanche Sheinkopf, EnergySmart Schools

Program designed by Patty McIntyre, McIntyre Communications Inc.
Slug artwork by Michael Cockram

Conference Location and Lodging

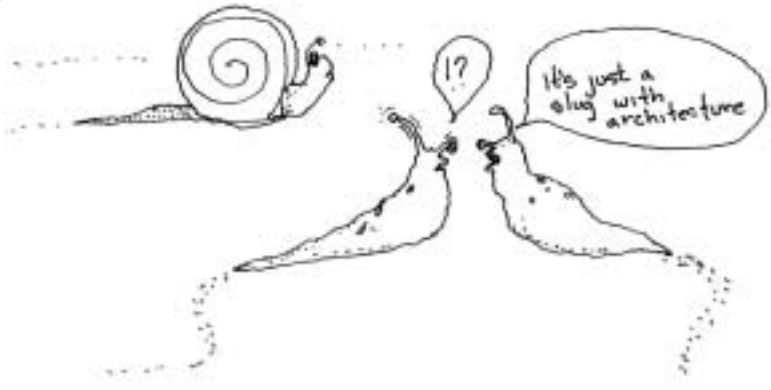
Doubletree Hotel Portland – Lloyd Center
1000 NE Multnomah
Portland, OR 97232
Phone: 503-281-6111
Fax: 503-284-8553

We have reserved a block of rooms for SOLAR 2004. Please call the Doubletree Hotel Portland directly at the number above to reserve your room. To get the special SOLAR 2004 rate of $128 per night (plus 12.5% tax), please use the code ASE. Government rates are available as well if you can provide a valid government agency ID upon arrival. Room rate is guaranteed through June 21, 2004.

We encourage you to stay at the Doubletree Hotel. Attendees staying at the conference hotel help ASES keep conference costs low, including the costs of meeting space, exhibit hall rental and the many other expenses associated with our meetings, from tables and chairs, to power, air, heat and lighting.

Transportation

The Doubletree Portland Lloyd Center is located near the heart of downtown Portland, and accessible by the MAX light rail from Portland International Airport (PDX). The fare from the airport is currently $1.60. The hotel is within the MAX light rail free zone. Travel in the free zone is, as you might have guessed, free, and many other downtown Portland attractions are located within this zone, including the Classical Chinese Garden, site of the social event on Tuesday evening.



American Solar Energy Society
2400 Central Ave, Suite A
Boulder, CO 80301
303.443.3130 • FAX 303.443.3212
e-mail: ases@ases.org
Web site: www.ases.org

SOLAR 2004 Registration Form

Name (appears on your conference name badge)

Company or Affiliation(appears on your conference name badge) Job Title

Address

City State Zip Country

Phone Fax e-mail

Please check all memberships that apply:
___AIA ___ASES ___ASHRAE ___ASME ___IREC ___OSEIA ___SBSE ___SEA of O ___SEIA ___Solar Washington ___SRCC

Registration Fee

Full Conference registration includes:
- Attendance at conference sessions beginning Sunday, July 11 through Wednesday, July 14.
- Welcome Reception, admittance to exhibits, Grand Awards Banquet, Closing Luncheon and Conference proceedings on CD-ROM.
- Student and one day registrations do not include banquet, closing luncheon or proceedings.
- Conference registration does not include travel, meals, lodging, workshops, tours or special events.

	Before June 21	*After June 21*	
Member *(checked above)*	$395	$475	
Non-Member	$475	$550	
Student *(with ID)*	$25	$25	
One Day	$225	$265	(___Sunday ___Monday ___Tuesday ___Wednesday)

Registration $ _____

Proceedings

Conference proceedings are available in book format or on searchable CD-ROM. A copy of the CD-ROM is included with full Conference registration. Additional proceedings may be purchased. The CD-ROM version includes papers from both the ASES Annual and Passive Conferences and the ASME Solar Energy Division International Solar Energy Conference. The book version includes only ASES Annual and Passive Conference papers.

___Proceedings in book format (paper) $75
___Proceedings on CD-ROM $75

Proceedings $ _____

Membership *(Joining ASES or SEA of O now entitles you to register for the conference at the Member rate.)*

___ASES Membership $70 (USA), Canada $85, Other non-U.S. countries $95
___ASES Student (with proof of student status) Membership $25
___Solar Energy Association of Oregon Membership $35 (Individual)

Membership $ _____

Special Events

___ASES Chapters Caucus, includes dinner $25
___Women in Solar Energy (WISE) Luncheon $25
___Grand Banquet $50 (included in full registration)
___Social Event - Dinner at the Classical Chinese Garden $50
___Closing luncheon $30 (included in full registration)
___Please serve me vegetarian meals

Special Events $ _____

Workshops *(circle choices)*

#W01	PV Design and Installation Workshop for Women	$550
#W02	Renewable Energy for the Developing World	$195
#W03	NABCEP PV Installer Exam Prep Course	$165
#W04	Project Sun: Professional Development for Teachers	$60
#W05	Solar Home Heating and Natural Cooling Strategies	$120
#W06	PV Markets, Technology, Cost, Performance and BIPV	$165
#W07	Daylighting by Design	$50
#W08	Integrated Solar/Radiant Floor Heating Applications	$50
#W09	Natural Ventilation for Non-Residential Buildings	$50
#W10	Green Building Guidelines for Homes	$75
#W11	Solar Advocacy—Municipal Solar Campaigns	$50
#W12	Basics of Using Solar Energy in a Disaster	$50
#W13	Designing High Performance Sustainable Buildings	$75
#W14	Zero Net Energy Homes	$65
#W15	Inverter Technology Comparison	$50
#W16	Rainwater Harvesting & Ecoroof Water Management	$50
#W17	Roofpond Building Design	$65
#W18	Terrestrial Solar Spectral Modeling	$75

Tours *(circle choices)*

#T01	Gorge Wind Farm	$100
#T02	Central Oregon	$100
#T03	Oregon Coast	$70
#T04	PV Plant & Cool School	$45
#T05	Wine Country	$50
#T06	Green City Walking Tour	$25
#T07	Green Home Sampler	$45
#T08	Energy Trust of Oregon	$45
#T09	Daylighting in Large Bldngs	$45
#T10	The IslandWood Learning Ctr	$25
#T11	Seattle LEED Buildings	$45
#T12	Skagit Hydroelectric Project	$100

Workshop $ _____
Tour $ _____

Payment

___Visa ___MasterCard ___Amex ___Check Enclosed

Total Amount Paid $_____

Card Number Expiration Date

Signature

___If you or anyone in your party has a disability and require accommodation in order to fully participate, please check here.

Refunds: Cancellation requests must be made in writing and will be charged a $50 handling fee. No refunds will be made after June 21, 2004.

Register online and get the latest program information at www.ases.org

Welcome to Portland

Portland—city of Roses—City of Fountains—City of Bridges—River City— Rip City. It is a hub of international trade, and the gateway to a natural wonderland. Nestled in the heart of the Willamette Valley, Portland sits squarely between the Pacific Ocean and the 10,000-feet-plus peaks of the Cascade Mountain Range. You can literally go clamming at the beach, have dinner in Portland that night, and go snow skiing in the mountains the next day.

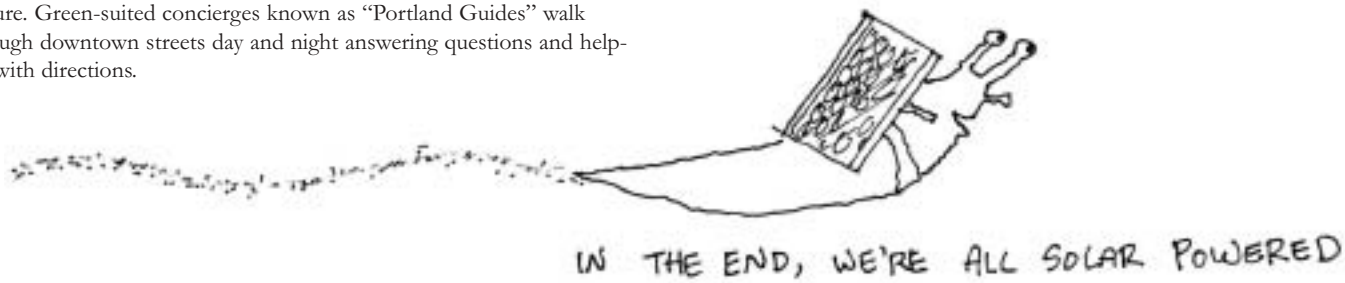
Portland does not have everything you have come to expect in a major metropolis—sales tax, gridlock, smog. It is a large city that has managed to maintain its small town charm. Packed into a convenient natural environment, Portland is accessible and complete.

Portland's downtown area is scaled to human dimensions. It is "foot friendly" and was recently named among the Top 10 American Walking Cities by *Walking Magazine*. The visitor who explores downtown Portland is never overwhelmed, but rather intrigued and amused. The blocks are short—just 200 feet long. Cafes, restaurants, bookstores, galleries and specialty stores are waiting around every corner. Words of wisdom from famous thinkers are carved in the brickwork under one's feet. Bronze sea lions and bear cubs frolic among award-winning architecture. Green-suited concierges known as "Portland Guides" walk through downtown streets day and night answering questions and helping with directions.

City attractions include Pioneer Courthouse Square, designed after the ancient Greek and Roman public squares. Portland's mass transit system is a national model of efficiency and includes "Fareless Square," which encompasses much of downtown, including the Oregon Convention Center. Dozens of parks in all shapes and sizes dot the entire city, from 24 inch Mill Ends Park to the 5,000 acre Forest Park.

But Portland's greatest asset has nothing to do with mountains, oceans, parks, roses, bronze bears or economics. Portland's greatest asset beats in the hearts of everyone who resides there. Portland's spirit is its people. "Quality of Life" is not a current buzzword in Portland, it is a philosophy that has endured since the city's founding. Part old west pride, part entrepreneurial spirit, the character of Portland pays homage to the hearty individuals who first traveled here in wagon trains along the Oregon Trail.

Thanks to the Portland Oregon Visitors Association (POVA) for photos, Portland area information and never-failing friendly assistance.



Printed with vegetable-based inks on Recycled Paper

American Solar Energy Society
2400 Central Avenue, Suite A
Boulder, CO 80301

NON-PROFIT
ORGANIZATION
U.S.POSTAGE
PAID
Permit No. 798
BOULDER, COLORADO