

Seattle Solar Day



June 19, 2011

# Seattle Solar Day Sponsors

## Platinum Level



NORTHWEST  
**HOME**

## Silver Level



**W** UNIVERSITY of WASHINGTON  
*Advanced Materials for Energy Institute*

## Bronze Level



SOLAR AMERICA  
**CITIES** 

Part of the Solar America Communities program



## **Seattle Solar Day High School Participants**

Ballard High School  
Sealth International High School  
Nathan Hale High School

## **Seattle Solar Day Participants**

Seattle Business Magazine  
Northwest Home Magazine  
enphase Energy  
University of Washington  
Seattle City Light  
National Renewable Energy Laboratory  
Puget Sound Energy  
Snohomish County PUD  
Community Energy Solutions  
Artisan Electric Inc.  
Winter Sun Design  
Edmonds Community Solar Co-op  
West Seattle Natural Energy  
Ranier Energy Inc.  
Nexcis  
University of Washington  
Sunergy Systems  
Solar Washington  
Glass Energy Systems

## **Ballard High School Projects**

### **Solar-charged Electric Car: The “Mule”**

A San Jose consortium originally built our “mule” almost 20 years ago as a prototype for a solar car that raced across Australia. My electric car acquired it in 1999 when I taught in Watsonville, Ca. It languished in a garage for almost a decade, but I recently brought it up to Seattle, and students & I have been restoring it and adding solar charging capability to its 72-volt system. We'll use it for sustainability demonstrations, and our long-term goals include a stylin' aerodynamic fiberglass body with integrated solar cells.

### **Solar Water Heating System**

We're installing a solar water heating system in an outdoor garden space at Ballard High School. The heating is “active” in the sense that water is pumped through a black hose inside an enclosed, glass-covered box in order to heat it. A photovoltaic panel powers the 12-volt pump. This system is similar in scale to one on my rooftop that heats my hot tub every summer. I wrote about this low-cost system for MAKE magazine.

### **Solar Tracker To Supply Power For An Electric Clock**

Photovoltaics are by far the most efficient when the sun's rays strike them perpendicularly. We've used a differential voltage sensor made by Vernier Software interfaced with a Lego Mindstorms robotics system to track the sun across the sky and point our main photovoltaic array so as to provide maximum power for an electric clock. This is a simple and elegant solution to an otherwise complex programming task of predicting the sun's track using astronomical tables, and moving the photovoltaic array accordingly.

## **Sealth International High School**

The theme for the Sealth International High School projects is “The power of solar energy in disasters”. Students were challenged to use solar energy to power devices that could be used in case of disaster. The following teams will build and prototype their products. They were chosen from 23 teams. Students explored solar energy, conducted experiments to help them understand solar power and how it can be used as a power supply. They then designed solar powered devices, created proposals and pitched the idea to

the class, who then voted on the top teams. Students will work with engineers and electricians to create prototypes of their projects.

1. Low-rider Cooler – A Solar Powered Cooler For Foods.
2. Solar Stakes- Solar Powered Stake That Charges Batteries To Power Devices.
3. Solar Powered Mug – Keeps Drinks Warm
4. Solar Powered Umbrella That Charges Cell Phones And IPods
5. Solar Powered Oven Using Both Solar And Passive Heating
6. Solar Powered Fans For Cooling Emergency Tents.

## **Nathan Hale High School**

Nathan Hale's High School physics students engaged in experimental research projects in subjects that were not addressed in our regular curriculum. Two groups of students studied photovoltaics to answer questions like:

- a. How can homeowners store photovoltaic energy to provide electrical energy at night?
- b. Where do photovoltaic cells make sense-creating a photovoltaic energy budget using small scale photovoltaic cells and a sphere to evaluate factors such as latitude, distance from sun, and cloudcover where photovoltaics make sense on a seasonally and yearly basis?

## SPEAKER'S CORNER SCHEDULE

Time	Speaker Track A	Speaker Track B
10:30	Photovoltaics 101	None
10:45	Q&A	PVWatts
11:00	Compatibility of Solar Thermal with Geothermal and Radiant Floor Heating	Q&A
11:15	Q&A	Seattle City Light
11:30	PV Myths	Q&A
11:45	Q&A	Solar Works!
12:00	Community Solar	Q&A
12:15	Q&A	Photovoltaics 101
12:30	Women In PV	Q&A
12:45	Q&A	PV Myths
13:00	Washington State Solar Incentives	Q&A
13:15	Q&A	Passive Solar
13:30	Turning Sunlight into Electricity	Q&A
13:45	Q&A	Solar Washington
14:00	Photovoltaics 101	Q&A
14:15	Q&A	PVWatts
14:30	Community Solar Projects in Washington State	Q&A
14:45	Q&A	None

## **Speaker's Corner Abstracts**

Photovoltaics 101  
Dr. Ryne P. Raffaele  
Director, National Center for Photovoltaics  
National Renewable Energy Lab

The solar cell industry has grown at an astonishingly high rate over the past decade. This growth has been both in what one could consider the “traditional” areas such as flat panel crystalline silicon solar arrays, as well as in “new” technologies such as thin films. A review of the basic fundamentals of photovoltaics, which highlights the past developments in the photovoltaic landscape, will be provided. The various technologies we have today will be compared and contrasted and some predictions on what we are likely to see in the future will be presented.

Solar Hot Water Systems  
Tim Connolly  
Pioneer Renewables/Rainer Renewable Energy

This talk will cover the basics of solar hot water system function, design, and operation, including controls and monitoring that ensure systems operate reliably and at maximum operating efficiency. Typical residential and commercial systems will be reviewed, including a recent installation at the Bill and Melinda Gates Foundation in Seattle, focusing on layout, control, and monitoring strategies. Standard controls and potential improvements will be discussed that can help customers understand payback, energy usage, energy delivered, and overall efficiency and get more from their systems.

PV Myths  
Brent Nelson  
National Center for Photovoltaics  
National Renewable Energy Lab

An overview of the most common criticisms of photovoltaic (PV) technologies will be presented, along with a short account of the actual facts for each criticism and references to technical details addressing those criticisms. The myths fall into the following general topics: significance of PV technologies, required area for large scale

deployment, environmental impacts, energy balance, PV economics, system siting, aesthetics, reliability, the intermittent nature of the solar resource, and overstatements of PV's potential.

Community Solar  
Chris Herman  
Winter Sun Designs

Community solar legislation was passed in Washington State 2 years ago, and authorizes double production incentives (up to \$1.08/kWh until 2020) for solar projects up to 75 kW, placed on local governmental and utility properties. Now solar enthusiasts with smaller budgets, shaded roofs and rented roofs can take advantage of federal incentives for commercial installations, sizable state incentives and economies of scale. The federal Dept. of Energy, through the 1603 grant program, will rebate 30% of the system's cost in lieu of a tax credit that is available to residential system owners. This has some real cash flow advantages and making use of big, flat, government building roofs is good for everyone. Edmonds may be the first community owned solar project in the state to develop this model using the co-op form of business structure. We researched the different business types and chose a cooperative corporation for some very sound reasons. Come find out about Community Solar and the possibilities for you and your community.

Women in Photovoltaics  
Veronica Bermudez  
Nexcis

During several critical moments all around history, women have been called to join the workforce to success in the challenge created by the situation. One of the clearest examples of this was during WWII, where women were running hard industry to keep economy alive and to supply needs generated by war. Many of them left their homes to become engineers, mechanicals, technicians, plumbers, and aviators... They proved their capacities and passed the exam with a really high note. At present humanity is facing one of the most important and amazing challenging in history, energy supply and energetic model should be changed to assure the capacity of the Earth of providing a green atmosphere for future generations. To cover the present and growing energetic demand and to success in implementing it within an energetic sustainable model, workforce has

been identified as one of the critical points. Within workforce women should assume their role given by the fact that they are at least half of the brains in the world. We, women need to be conscious that our male colleagues need us, challenge is really important to let it rely in half of existing population.

Washington State Solar Incentives  
Howard Lamb, President  
Sunergy Systems

Since 2005 Washington State has been a leader with our innovative solar incentive programs along with being one of the best States in the country for going solar. However, at first glance, these incentives can be confusing especially with the incentive levels being different for out-of-state versus in-state equipment. Each potential solar customer's site and goals will dictate which option suits their needs best. This presentation will explain the incentives along with the pros and cons of selecting the in state versus the out-of-state equipment. Also discussed will be potential new in-state solar manufacturers and how this will impact the incentive's financials and adoption of solar in Washington State.

Turning Sunlight into Electricity - The State-of-the-Art for Harnessing the Sun's Energy  
Hugh Hillhouse  
University of Washington

The presentation will introduce and educate the general public on the basic science of utilizing solar energy and give an overview of the current state-of-the art. The University of Washington in particular has a strong research effort focused on harnessing solar energy, with over half a dozen research groups pursuing breakthrough technology. The presentation will highlight some of this work and give the public a taste for how current research may shape the future.

Opportunities and Challenges of Community Solar Projects in Washington State  
Joe Deets  
Community Energy Solutions

In Washington State an innovative solution to increasing renewable energy utilization has been created. Nonutility-owned Community

Solar projects are privately financed solar energy systems placed on property owned by a local government entity. They literally empower communities, by using local dollars to create clean, secure, solar energy, as well as jobs and training opportunities. The local government entity also benefits, with a new revenue stream and the opportunity to acquire the solar energy system at an advantageous price. It shouldn't be surprising that there is interest in Community Solar. What is getting people's attention is that the production incentives are much higher than is provided for other renewable energy systems in Washington. The purpose of this presentation is not only to highlight the benefits of these projects, but also to bring attention to their challenges. For while the all-important financial barrier has been effectively lowered, there are challenges, which can adversely affect the outcome of the project. It is intended that awareness will lead to steps being taken to avoid or at least minimize the challenges.

Seattle City Light  
Jack Brautigam  
Seattle City Light

We will provide an overview of Seattle City Light's green power portfolio and customer solar programs. Topics include basic solar electric technology and terms, interconnection requirements, net metering, production metering and production incentives. Attendees will receive copies of SCL's "Guide to Installing Solar Electric Systems".

Solar Works!  
Keith Hughes  
West Seattle Natural Energy, LLC

Yes, even in Seattle - Solar Works. In this presentation we will be talking about how solar panels work on cloudy day as well as sunny days, and how Seattle compares to other major cities for sun-hours. We will also talk about the common myths and realities of Federal, State, and Utility rebates for Renewable Energy Systems, including some examples of actual installed initial system costs, and effective cost after the tax credits and rebates are gained.

Passive Solar  
Chris Herman  
Winter Sun Design

Passive solar naturally provides space heating, cooling and day lighting with no moving parts, no panels on the roof and no maintenance. It uses the architectural elements and features of the home (windows, doors, overhangs, walls and floors) and costs no more to build than a conventional house. Heating and cooling savings of 50% and more are achievable on both sides of the mountains in WA state. Direct gain, water walls and attached sunrooms are all passive systems that utilize south facing glass (or plastic), thermal storage mass, appropriate overhangs, natural ventilation, superior insulation and air sealing techniques to keep the home warm in the winter and cool in the summer. The same systems do both, and provide more even temperatures with less moving air and they eliminate the noise associated with conventional fossil fuel heating and electric cooling systems. Radiant heating allows comfort with cooler air temperatures, which reduces heat loss in the winter. Summer comfort is accomplished with natural convection and nocturnal cooling. Passive solar homes can be very inexpensive, low maintenance, energy and resource efficient, low toxic and provide superior comfort.

Who is Solar Washington?  
Howard Lamb, President  
Solar Washington  
(State Chapter of American Solar Energy Society)

Solar Washington is the State Chapter of the American Solar Energy Society whose purpose is to further the development and use of solar energy, and support related technologies; accomplished through the exchange of ideas and information, with concern for the economic, environmental, and social fabric of the state. Learn more about who Solar Washington is and what our goals are for the next year and a half. Also how you can become active with Solar Washington and help to increase the awareness and adoption of solar energy throughout Washington State.

Community Energy Solutions	Artisan Electric
Glass Energy	Sunergy Systems

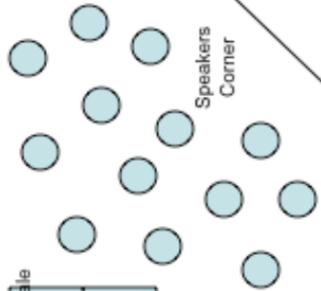
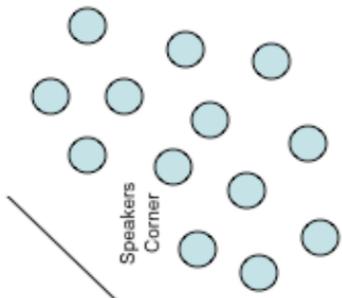
Ballard High School	Women in Photovoltaics
University of Washington	PUD

Ballard High School	Ballard High School
Seattle International High School	Seattle International High School

Nathan Hale High School	Nathan Hale High School
Seattle City Light	Puget Sound Energy

NREL General Informatics	Solar Washington
Emphasize Energy	NREL PV Stuff
	Seattle Business

Rainier Energy	West Seattle Natural Energy
Winter Sun Design	Edmonds Community Solar Coop



Refreshments

Refreshments