SOLAR RISING

Sept 2000 **Volume 3, Issue 4**

Quarterly Newsletter of the Oregon Solar Energy Industries Association (OSEIA)

Bringing you tomorrow's sustainable energy technologies today!

Collins Pine chooses PV to power new computer center

By Larry Elliot

Two kW array outside Collins Pine Products

Well it looks like Photovoltaic power systems have taken another step toward becoming a more mainstream power source. Collins Pine Products ,a wood products company with several plants around the country, has installed a PV power system in a new computer center located on the grounds of its Klamath Falls particle board plant. My company Solar Tech, was approached several months ago about the possibility of installing a PV system that would not only supply power to the computers but would also serve as a backup system when the gird went down.

After determining the amount of power the servers, PBX and phone systems would need a system was designed and is now installed and running. Twenty Siemens SR100 modules were selected for the 2 kW array. This selection was based on the modules rugged UL approved design, 25 year warranty, generous power production and competitive pricing. The modules are on a fixed pole mount that allows for easy installation and service as well as seasonal adjustment. The nominal voltage of 48VDC feeds a stacked pair of Trace SW5548 sine wave inverters. Because this is a computer backup system, inverter reliability was first and foremost. I selected Trace because of their excellent track record. Two racks of Trojan L16 lead acid batteries

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An Active Solar Summer

by Frank Vignola

OSEIA members have been busy this summer and it looks like there are plenty of activities coming this fall. Working with other Million Solar Roofs partners in the region through the Northwest Solar Alliance, the governors in the region proclaimed July as solar awareness month. This proclamation was accompanied by approximately twenty events in the northwest ranging from the Idaho Renewable Energy Fair in Coeur D'Alene, to solar events at libraries across Oregon, to the SolWest Renewable Energy Fair at John Day, to the inauguration of Oregon's first solar utility in Ashland.

In addition, OSEIA has been working with communities across Oregon to implement Oregon's net metering legislation. While PacifiCorp, PGE, Ashland, and many of the municipal utilities have implemented simple guidelines and rules for net metering systems, there has been some resistance to facilitating the installation of renewable energy systems among several of the small utilities in the state. Much of the concern stems from safety issues and the lack of information reaching these smaller utilities. OSEIA is working with citizens in small communities to implement fair

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SOLAR RISING is the newsletter of the Oregon Solar Energy Industries Association (OSEIA). OSEIA is Oregon's local chapter of the Solar Energy Industries Association. The information presented in this newsletter reflects the opinions of the authors and not necessarily those of OSEIA.

The success of the newsletter depends upon your contributions. This is an opportunity to tell the OSEIA members about your activities and to express your opinions. Photographs or figures to accompany articles are most appreciated. Articles of current and timely interest will be given highest priority. Otherwise, articles will be published on a first come basis as room allows.

Send your contributions to:

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Recognition should be given to Jennifer Barker, Chris Eames of Energy Service Company, Larry Elliot of Solar Tech, Heather Mulligan of US DOE, Steve Still of EWEB, and Carl Wamser of PSU for their contributions to the newsletter.Thank You!

OSEIA Meeting Agenda

States Land Building
775 Summer St.
Mill Creek Room
Salem, Oregon
Tuesday, October 10th, 2000

OSEIA/Oregon MSR Coalition Meeting
12:00 pm—4:00 pm

1. Welcome and Introductions: F Vignola
2. Approval of Minutes: Chris Eames
3. Treasurer's Report: Ray Pokorny
4. OSEIA Corporate Status: David Parker
5. OSEIA Bylaws: Doug Boleyn
6. Contractor Licensing Bob Maynard/ David Parker
7. Solar Tax Credit: John Patterson
8. OSEIA Brochure: Ray Pokorny
9. Status Reports MSR Tasks:
   Christopher Dymond
   Tom Scott
   Doug Boleyn
   Joe Savage
   David Parker
   Frank Vignola
10. SEA of O/OSEIA relationship
11. New business:

Directions to State Lands Building

To get to the state lands building, take the Market Street exit from I-5 and drive down to Summer St. Take a left and Summer St. and drive down about 4 or 5 blocks.

The meeting will start at 12:00 pm and pizza will be brought in. A small group will be meeting at the Oregon Office of Energy and walking over to the State Lands Building.

Thanks should be given to Christopher Dymond for making arrangements for the room.

President: Frank Vignola
Univ. of Oregon Solar Energy Center
Ph: (541) 346-4745

Vice President: Doug Boleyn
Cascade Solar Consulting
Ph: (503) 655-1617

Secretary: Chris Eames – Energy Service Company, Ph: (541) 302-6808

Treasurer: Ray Pokorny – Solar Interior Design, Ph: (503) 224-2322

OSEIA Member	Contact	Phone Number	OSEIA Member	Contact	Phone Number
Heliodyne, Inc	Bieri	(510) 237-9614	Oregon Conservancy Foundation	Marbett	(503) 637-6130
Cascade Solar Consulting	Boleyn	(503) 655-1617	Energy Outfitters	Maynard	(541) 592-6903
Solar Design & Construction	Bortz	(541) 753-8725	Solar Depot	Mizani	(916) 381-0235
Bobcat and Sun Construction	Claridge	(541) 389-7365	Read Goods Trading Company	Musser	(541) 334-6962
Mainline Electric	Cordeiro	(541) 535-9862	Mr. Sun Solar	Patterson	(503) 245-3722
Solar Collection, Inc.	Dawson	(541) 535-5364	Home Power	Perez	(530) 475-3179
Oregon Department of Energy	Dymond	(800) 221-8035	Solar Interior Design	Pokorny	(503) 224-2322
Energy Service Co., The	Eames	(541) 302-6808	Sun Earth, Inc	Reed	(909) 605-5610
SolarTech	Elliot	(541) 545-3201	Stellar Processes	Robison	(503) 827-8336
Gen-Con, Inc.	Gunderson	(503) 245-7657	Emerald PUD	Savage	(541) 744-7448
Sunlight Solar Systems	Israel	(888) 787-6527	Eastern Oregon Solar Electric	Slater	(541) 576-2478
Oregon Solar and Water	Johnson	(541) 344-1594	EWEB	Spiek	(541) 484-1125
Solar Energy Solutions	Koyaanisqatsi	(503) 238-4502	Summers Solar Systems	Summers	(541) 683-4014
Renewable Energy, Inc.	Larson	(503) 287-4777	U. of O. Solar Monitoring Lab.	Vignola	(541) 346-4745
Solar Assist	Loken	(541) 338-4957	City of Ashland	Wanderscheid	(541) 552-2061

Calendar of Events

For an up to date listing of events check the following website:

http://www.energy.state.or.us/solaware/solaware.htm

Sept 28th-29thNorthwest Green Summit—Seattle

Oct. 14th Oregon Solar Home Tour—Portland, Bend, Eugene

Oct 16-20th Utility Solar Summit III—Winthrop, Washington

5kW solar cell array on the roof of Ashland's Civic Center. Note that the array fits in with the architecture of the building.

Photovoltaics in Buildings Workshop—Eugene, Oregon November 9, 2000

By Steve Still

Steven Strong, international pioneer in the integration of solar electric systems with environmentally responsive building design, and President of Solar Design Associates, will conduct an all day workshop on Building Integrated Photovoltaics on November 9, 2000 in Eugene, Oregon. Architects, engineers, energy professionals, and educators are invited to this FREE workshop sponsored by Eugene Water & Electric Board (EWEB) and hosted by the Lane Community College Energy Management Program.

Photovoltaics (PV) are solid-state devices that make electricity directly from sunlight, silently with no maintenance, no pollution and no depletion of fuels. Interest in utilizing PV as an integral part of buildings is growing world-wide.

Development of this all day workshop was funded by the American Institute of Architects and is approved for 14 AIA Continuing Education Units (CEUs) in the Health, Safety, and Welfare area. It has been very well received by practicing architects and other professionals involved in the design and construction of buildings.

For details regarding this informative and practical workshop, contact Carol Rhodes at EWEB by calling 541-484-1125, or e-mail carol.rhodes@eweb.eugene.or.us. To those inquiring, a full brochure with registration form will be mailed in early October. Be sure to take advantage of this rare opportunity!

For the general public, students, and those unable to attend the all-day workshop, Steven Strong will present a two hour lecture with slide show on Building Integrated PV. The lecture will occur the evening of November 9, 2000, and will be held in Room 177, Lawrence Hall, University of Oregon, beginning at 7:00 PM.

Northwest Green Power Summit

September 28th & 29th
Sea-Tac, WA

by Heather Mulligan

The Department of Energy, Seattle Regional Office will host the Northwest Green Power Summit on September 28th and 29th in Seattle, Washington. The Summit will bring together key members of the renewable energy and green power industry with government agencies to develop partnerships and opportunities for facilitating green power purchases and renewable energy projects in the region. Participants will learn about new green power products, markets, and purchasing strategies from some key leaders in the industry. The Summit is targeted to Federal, state, and local government agencies, green power marketers and developers, electric utilities, and green power advocates in the southwest and northwest regions. For more information, or to register, go to www.eren.doe.gov/sro/.

A decorative solar garden light provides several hours of a warm amber glow in the evening after sunset. Solar cells charge a battery that powers two LEDs that provide light to a reflector lens arrangement.

MSR Coalition/OSEIA Meeting Minutes, Friday July 29, 2000—3:00-6:00 pm, John Day

by Chris Eames

John Day Senior Center
142 NE Dayton Street
John Day, OR

1. Welcome and Introductions

Attending were: Larry Elliot, Bob Maynard, Ray Ogden, Christopher Diamond, Frank Vignola, & Chris Eames.

2. Minutes of the April 11, 2000 General Membership Meeting

It was moved seconded and approved unanimously to approve the minutes as printed in the July 2000 issue of Solar Rising.

3. Treasurer's Report

Questions AND dues payments can be mailed to Ray at his home address: 242 NE 61st Portland, 97213.

4. OSEIA Corporate and Bylaws Status:

Frank Vignola reports that David Parker has said that he will take over efforts to complete the legal paperwork necessary to get registered with the state corporation commission.

5. Solar Licensing: Bob Maynard

August 7th is the next meeting of the committee that is working with Gary Wilson of the State Of Oregon Electrical Board to delineate eligibility requirements for licensing, curriculum for education requirements, naming of the specialty license, and trade practices to be included. The initial meeting took place in early July and gave attending members considerable optimism about introducing and passing a solar-license bill in the next legislative session.

David Parker is currently involved in preparation of the report commissioned by grant through the Million Solar Roofs.

6. OSEIA Brochure

Ray Pokorny is running into cost roadblocks for a new brochure. Christopher Dymond suggested that ODOE might be able to "donate" some quality color printing for an initial quantity of brochures once the copy and layout is decided upon.

7. Consolidating Solar Organizations in Oregon: "Solar Oregon"?

Christopher Dymond advanced an idea that has been circulating which proposes that since so many of the active membership of the boards of both OSEIA and SEA of O are the same people and since the overall goals of both organizations is the promulgation of solar technologies, it might be advantageous to both organizations to merge into a single entity, or alternatively, align with each other to work in concert under a mutual umbrella organization.

8. OOE Programs: Christopher Dymond

Christopher is in the process of simplifying the Tax Credit Program. His goal is to make $3.00 per kWh the standard regardless of geography (this would top-out at the $1500.00 for now, but Christopher is hopeful about expanding the program).

OOE will have a new Webpage up soon that will allow members to download ***and upload*** photos and documents related to solar projects and issues in Oregon. Look at: www.energy.state.or.us/SolarAware. and www.picard.odoe.or.us.

9. Northwest Solar Energy Alliance: Christopher Dymond

Christopher presented a draft "white paper" entitled "A Northwest Perspective on PV Market Development". It promotes Oregon, Washington, & Idaho as viable regions for industry focus for investment. It seeks co/signatures from a wide range of entities including state government energy offices, local & regional utilities, OSEIA, SEA of O, Home Power Magazine, and University & other educational entities.

10. Other Business

There was discussion about what to do with the 7 million dollars that is earmarked for renewables through the Utility Systems Development Fund. Peter West is trying to "lock-down" some identifiable programs to insure that these funds actually get spent for renewable energy. It can't be a demonstration project and must be economically reasonable. Photovoltaics project have good PR value but wind will certainly get a lions share.

The next meeting of OSEIA will be held October 10, 2000 in Salem. Location to be announced.

12. Adjourn

This fall National Park Service officials are expected to ask all park superintendents to come up with plans for limiting noise in national parks and protecting the "soundscape," or the natural sounds unique to each area. "All of a sudden, places that look the same as 100 to 200 years ago don't sound like they did," said Wes Henry of the NPS, who is leading a federal effort to restore quiet to parks. Part of the solution is to replace diesel generators with PVs.

Search for School Funding

I would like to inquire on whether there is any funding for purchase of solar exhibit equipment such as solar kits for kids, books, etc. for the Under the Sun Program I teach through Portland Public Schools. Any grants or other means that you know of please let me know, or if you guys have some monies available let me know how to apply. Thanks

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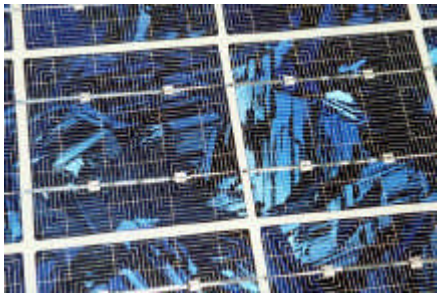
MSRI Fall Quarterly Meeting

The Fall Quarterly Meeting of the Million Solar Roofs Initiative will be held on the afternoon of Monday, October 1st at the Renaissance Harborplace Hotel in Baltimore, Maryland. The Quarterly Meeting is being held in conjunction with the Utility Photo-Voltaic Group's annual Utility Photovoltaic Experience (UPEx) Conference and Exhibition. For more information contact Deb West at (703) 921-1710 or via e-mail at dwest@mcneiltech.com.

Study Finds Solar Energy "Payback" Time Is Three Years or Less

Siemens Solar recently presented research findings on the energy payback time for photovoltaic modules. The study examined the manufacture of two types of solar panels, calculating the energy consumed including process energy and the energy used in producing both direct and indirect raw materials. Historical and directly measured data were employed, and sources included utility bills, monthly production data, measured energy consumption, and detailed bills of materials. The estimated break-even point is approximately two to three years, which means that over its lifetime, the panels are expected to generate from nine to seventeen times the energy required to produce them.

For more information contact Tina Nickerson at (805) 388-6519, or visit



DOE funds regional solar radiation database

The University of Oregon Solar Radiation Monitoring Laboratory in cooperation with the State University of New York at Albany was successful in its proposal to create a satellite derived solar radiation data set for Oregon, Washington, and Idaho. The database will be on a 10 by 10 kilometer grid and state energy offices will be assisted in integrating the database into their GIS system. This database will augment the 15 station net and enable a comprehensive evaluation of the region's solar potential.

An Active Solar Summer

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and understandable net metering rules and regulations.

The week of September 11, 2000, grid connected solar electric workshops are being organized and conducted by Christopher Dymond of the Oregon Office of Energy and Mike Nelson of the Washington State Energy Office. These workshops are one of the activities funded under the Million Solar Roofs Initiative and are designed to bring solar electric information to the utility door step.

On the political front, OSEIA is drafting legislation to create a renewable energy contractor's license. This will help ensure that contractors who install renewable energy equipment are educated and qualified. This legislation is receiving bipartisan support and OSEIA looks forward to working with all interested parties to ensure a sound piece of legislation is passed.

OSEIA is also working on legislation to continue and improve Oregon's solar tax credit. This legislation has helped over 20,000 Oregonians to install solar systems since 1978 and has play a big role in keeping Oregon's solar industry active.

The next meeting of OSEIA/Oregon Million Solar Roofs Coalition will be in Salem, Oregon on October 10, 2000 from 12:00-4:00 pm. Location of the meeting will be announced.

SolWest Renewable Energy Fair—2000

EORenew with many volunteers and the leadership of Jennifer Barker pulled off another successful renewable energy fair in John Day.

SolWest '00 was "the fair that could" as it

- Installed a grid-intertied PV system on the County Fairgrounds
- Hosted over 1,000 fairgoers in a community of 2,000 residents
- Presented 33 free workshops and several demonstrations
- Hosted their first Electrathon race, an exciting crowd-pleaser!

The Oregon Office of Energy brought their PV water pumping demonstration to the fair to boost the water pumping rebate program.

Besides attending the workshops and the demonstrations, many people came to the fair to purchase solar equipment.

There were several demonstrations of photovoltaic water pumping. A rancher can often save several thousand dollars by using solar cells to power a water pumping system as opposed to a generator or bringing in power from the utility.

As utilities look to replace aging power lines that go just to power a pump, the installation of PV power instead of replacing the wires and poles can save the utility money.

The fair had two excellent keynote speakers in Randy Udall and John Perlin. Randy Udall is the director of the

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Sunlight Solar did a brisk business selling PV panels.

While Mr. Sun catches a few rays, solar water heating sells itself.

SolWest Renewable Energy Fair—2000

There always seemed to be a crowd talking and asking questions around Home Power's tent.

Larry Elliot and Jim Slater discuss solar water pumping in Eastern, Oregon. Jim is one of the leading proponents for a renewable energy contracting license.

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Community Office for Resource Efficiency (CORE) in Aspen, Colorado, a non-profit organization established to promote water and energy efficiency. He has a positive, can-do attitude and a great message!

John Perlin, the author of **From Space to Earth, the Story of Solar Electricity**, does an excellent job of telling the history of solar electricity by focusing on the people and their needs, which helped drive its development. [*see book review on page 12 of this newsletter.*]

Two Honda Insights were shown at the fair. One is part of the state motor pool vehicles. Christopher Dymond drove the Honda from Salem to John Day and averaged 70 mpg. The high mileage results from the electric motor that kicks in when the accelerator is press. Instead of dumping gas into the carburetor, the electric motor supplies instant acceleration. Breaking and coasting recharge the battery that powers the electric motor.

Solar is a good match for the people in eastern Oregon where extending the power lines comes at a high price. And don't forget that eastern Oregon receives as much or more sunshine as Florida.

Plans are underway for next year's SolWest fair on July 28 & 29, 2001. It was a real pleasure to see all the interested and interesting people at the fair. If you really want to know what is happening with solar energy east of the Cascades, take a trip next July to John Day.

This Honda Insight is part of the state motor pool. It averaged nearly 70 mpg driving from Salem to John Day over the Cascades.

Artificial Photosynthesis: Next-Generation Photocells

by Carl C. Wamser (wamserc@pdx.edu)
Professor of Chemistry, Portland State University

Nature carries out solar energy conversion on a huge scale every day. Worldwide conversion of solar energy by photosynthesis has been estimated to be ten times the amount of energy, of all types, used by humans. Can we utilize some of this photosynthetic energy conversion? We certainly do, every time we reap the food sources that emanate from photosynthesis. Can we learn from natural photosynthesis as we struggle to develop alternative sources of energy? We certainly can, and much learning was in evidence at a recent meeting sponsored by the National Renewable Energy Laboratory in Colorado.

The 13th International Conference on Photochemical Conversion and Storage of Solar Energy (http://www.nrel.gov/ips2000/) was held at Snowmass, Colorado, from July 30 to August 4. The meeting drew about 400 attendees from 31 countries, with 77 oral presentations and 231 poster presentations. Topics ranged from new understandings of the steps involved in natural photosynthesis to theoretical models describing electron transfer between molecules. However, the most active focus was on dye-sensitized semiconductor electrodes, often called Grätzel cells. This represents one of the approaches sometimes called artificial photosynthesis because some of the strategies are based on Nature's methods for light harvesting and electron transport.

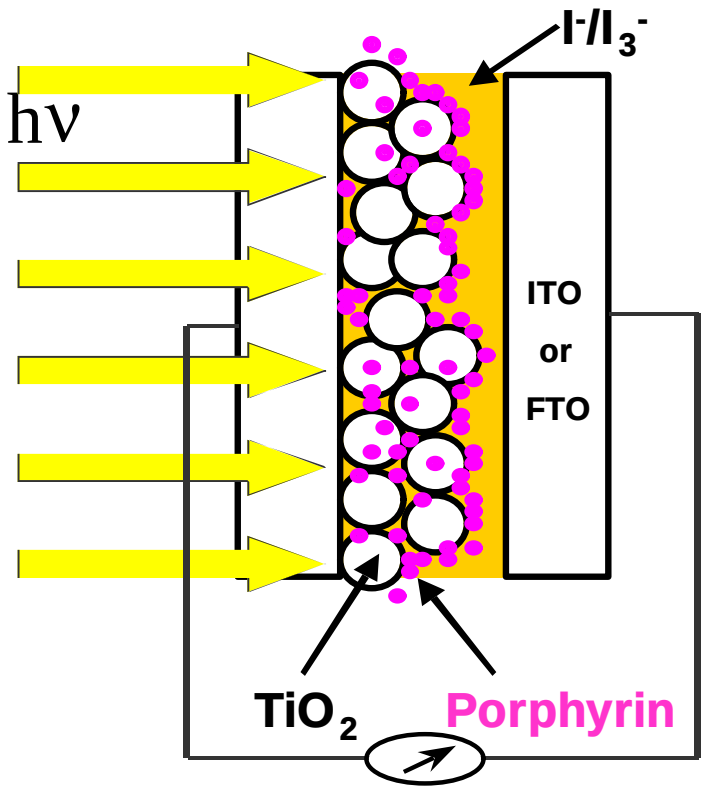

Figure 1 - Components of a Grätzel Cell

A Grätzel cell is contained between two transparent electrodes of indium/tin oxide (ITO) or fluorine-doped tin oxide (FTO). The active particulate material is only about 10 µm in thickness and consists of a layer of titanium dioxide particles (about 25 nm diameter) onto which have been coated a monomolecular layer of a light-absorbing dye, such as a porphyrin (a synthetic analog of chlorophyll). The spaces between the particles are filled with a redox electrolyte solution of iodide and iodine.

The specific method uses nanometer-sized particles of titanium dioxide (typically the anatase crystal form) fused to semiconductor electrodes. The fused particles provide an exceptionally high surface area, onto which a monomolecular layer of light-absorbing dye can be bound. Providing the dye has been carefully selected for an appropriate absorption spectrum, the large surface area allows just a monolayer to absorb a large fraction of the solar spectrum. Furthermore the electronic energy levels of the dye must be appropriate so that as each dye is excited by light absorption, it rapidly passes an electron into the semiconductor. This electron flow is a photocurrent.

The Grätzel cell has attracted a substantial amount of attention since it was first described in 1991 (B. O'Regan and M. Grätzel, *Nature*, *353*, 737-740). In particular, both light collection efficiency and electron collection efficiency are exceptionally good, nearly 100% in the visible light range. Overall solar-to-electric efficiencies are now over 10%, competitive with current silicon technologies. The Grätzel cell won a Popular Science "Best of What's New" Award in 1992, and the first companies to market it in niche applications have started recently in Switzerland (e.g., Swiss solar watches). The Grätzel cell is poten-

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Artificial Photosynthesis: Next-Generation Photocells

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tially much cheaper to produce than silicon and still has much room for further optimization of efficiencies. It has great promise to become the next generation of photovoltaic technology.

The major weakness of the Grätzel cell currently is its reliance on a liquid redox electrolyte, typically an iodide/ iodine solution. This component is required to complete the circuit by replenishing the electron that moved from the dye to the semiconductor electrode. This system for electron transport has several disadvantages, most notably the use of a liquid phase, which is subject to leakage or evaporation. In addition, there are kinetic limitations caused by diffusion and thermodynamic limitations related to the redox potential of the electrolyte. Recent reports, for example at IPS-2000, indicate that several laboratories are working on a variety of approaches to creating a solid-state cell, but it is clear that there is still nothing yet as effective as iodide solution.

The approach in our research group at Portland State University has been to create a completely solid-state cell by using a conductive polymer, such as polyaniline, polythiophene, or various derivatives, for electron transport instead of the liquid redox electrolyte. We have been growing polyaniline directly onto the surface of the dye-coated TiO_2, using a novel photoelectropolymerization technique. The resultant cell shows signs of generating a completed circuit with reasonable photocurrent efficiencies. We still have much to do to verify that the polyaniline is indeed properly attached to the dye and that it conducts electrons efficiently over the long term. When we have successfully replaced the liquid redox electrolyte with a conductive polymer, the Grätzel cell will be a durable, inexpensive, and efficient system that could very well replace silicon technology. The vision is an inexpensive thin plastic film that could be easily deployed in a variety of environments. Ongoing research in the Wamser Labs at Portland State University can be followed from the website at http://chem.pdx.edu/~wamserc/Research/ .

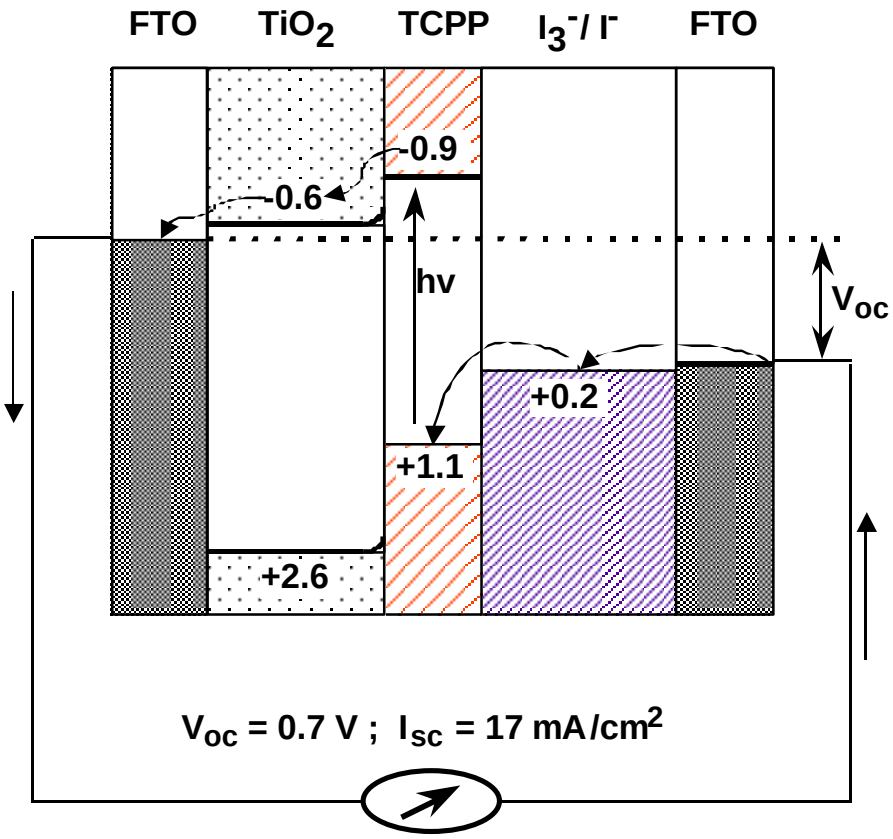

Figure 2 - Energy Diagram of a Grätzel Cell

The energy level diagram for a Grätzel cell illustrates its operation. Light is initially absorbed by a dye (TCPP represents tetracarboxyphenylporphyrin, a representative photosensitizer dye). The excited electron is rapidly injected into a TiO_2 semiconductor particle. Since all of the particles are fused together and to the underlying transparent electrode, electrons move quickly through the TiO_2 and are collected as photocurrent at the photoanode. The missing electron (or "hole") in the dye molecule must be replenished quickly in order to minimize the chances that the excited electron will recombine, a wasteful short-circuit or "back reaction". This is done very effectively by iodide ion (I^-) in solution, which is oxidized to iodine (I_2 or I_3^- in the presence of excess I^-). Electrons from the counter electrode reduce iodine back to iodide, completing the circuit. Note that iodine is formed at the irradiated surface and must diffuse to the counter electrode to regain its electrons and be returned to iodide. Thus the electrons necessary to complete the circuit are literally carried by iodide ions moving through the pores of the particles, one of the major limitations of the current version of this cell.

Northwest Solar Summit #3

Utilities Taking Action

Public power utilities are invited to the third annual solar-electricity technical conference. at Sun Mountain Lodge Winthrop, WA.

October 16 - 19, 2000

http://www.westernsun.org/aaawsun/SunConfAgenda.htm

Register now, **space is limited to 100 participants**. Registration covers the use of the conference rooms and meal at this 4 Star Resort. If your register on or before September 1, the registration fee is $210. Registration after September 1 is $240. Lodging arrangements and payments must be made separately. Grants and sponsors make this low cost possible.

Energy services staff, managers and board members from northwest public power utilities are invited to join Western SUN member PUD, co-op and municipal utilities, the Northwest Solar Alliance, and solar industry experts at this premier solar conference.

- Keynote Address: **John Perlin**, Author of From Space to Earth, the Story of Solar Electricity, A Forest Journey: the Role of Wood in the Development of Civilization, and A Golden Thread: 2500 Years of Solar Architecture and Technology.
- Guest lecturer: **Dr. Jack Dymond**, "Ocean Currents, the Atmosphere, and Global Warming" Dr. Dymond has journeyed on the Alvin into the Washington coastal trenches discovering new life forms in volcanic vents, but believes what the Ocean depths tell us about global arming is even more significant.
- Angus Duncan: The first round of renewables and wildlife grants from the Bonneville Environmental Foundation.- A round table on what is next.

Special manufacturers *hands on* training sessions; these and more:

- Trace - Inverter selection and installation, focusing on line tied systems.
- Siemens Solar - Marketing and installing the Earth Safe solar product line.
- Astropower - The Suntie and Sunline pre-packaged and pre-engineered for easy marketing and easy installation.
- BP - Putting systems together using the diverse BP Solarex product line.

Western SUN member purchasing, training and public education opportunities and our first annual meeting Presentations by utilities who are taking action - real world case studies and hard figures:

- Chelan County PUD: Remote home power and city green power ~ putting solar where it makes sense.
- Seattle City Light: Bike Tunnels, Seattle Center, Art Projects on the Skagit - a solar answer to every question.
- Clark County: Making solar work at Casee Center - if the Kids can do it, we should be able to....
- Orcas Power & Light: Green Power and grid interaction - a community affair.
- Okanogan County PUD: Cleaning up a red tagged solar installation ~ working with electrical inspectors.
- Okanogan County Electric Co-op: Installing remote home systems -

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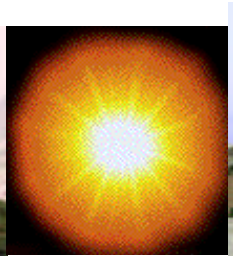

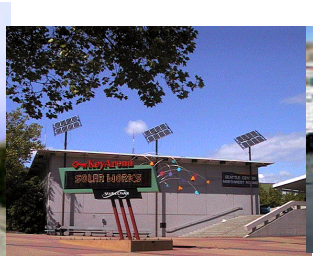


Collins Pine chooses PV to power new computer center

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give a total storage capacity of 700 amp hours or 33.5 kWhrs. This should give at least 24 hours of backup power even in cloudy weather.

Using a sub panel all of the critical loads in the building are supplied 110/220VAC through the inverters. They are programmed in the SELL mode so any excess power from the array not needed by the loads is fed back to the main grid connected panel. The grid serves as a battery charger at night and under cloudy skies. For extreme cases a propane powered 5 kW generator is connected to the inverters with auto start capability.

To prove to the skeptics that this system was no "light weight", the main breaker from the grid was turned off and all the power needed to keep two 2 ton heat pumps running came from only the batteries, inverters and solar panels. They didn't miss a beat. It proved to be a very good test load before all the computer equipment was installed.

Soon this entire system will be fully instrumented using a data logger from Brand Electronics. This data will be uploaded in real time to the company web page and graphically displayed. Not only will this serve to inform company personnel and others on how well the system is performing, it will also allow key employees to determine the status of their critical loads from any computer in the world. Future plans are for the addition of another 4 kW array.

The stacked pair of Trace SW5548 sine wave inverters and two racks of Trojan L16 lead acid batteries

Because the present array is located next to the main entrance gate, 725 employees can twice each day pass by and be reminded that PV power is a whole lot more than solar calculators and kids toys. As funding and needs allow additional uses of PV power at this and other plant sites is being explored. Lets thank the decision makers at Collins for taking another step toward bringing about a more sustainable energy future.

In spite of the fact that this is a grid connected system, PP&L, the local power supplier had little to say about the installation. They were not even curious. Seems when a company owns their own sub station little is said about grid connection or "net metering". No one in Collins maintenance or electrical departments felt any need for additional or lockable disconnects on this system.

Northwest Solar Summit #3—Utilities Taking Action

(Continued from page 10)

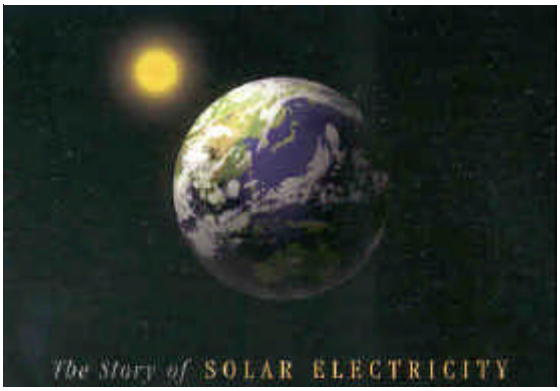
one step at a time, that and stock watering too!

- City of Ashland, Oregon: The Ashland Project - green rates to solar power - a community approach.

The conference opens the afternoon of October 16th with registration and reception. Dinner is at 6:30 p.m. There will be extended breaks at lunch time to visit and enjoy the fall colors and mountain views. The conference will wrap-up before noon on October 19th.

Sponsors: Western SUN Cooperative, WSU Energy Program, Bonneville Power Administration, Environmental Protection Agency, Northwest Public Power Administration, National Solar Association, Solar Washington, Okanogan County Electric Cooperative and Chelan County PUD.

From
SPACE TO EARTH



John Perlin

From Space to Earth:
The Story of Solar Electricity
by John Perlin. aatec publications, Ann Arbor, Michigan, 1999.
Review from Environmental Building News, Vol. 8, No 10.

From a co-author of *A Golden Thread: 2500 Years of Solar Architecture and Technology* comes a fascinating, fun-to-read, historical account of the struggles and development of the solar electric industry.

Bell Laboratories developed the first practical solar cells, but these photovoltaic (PV) cells languished on laboratory shelves until the space program came along. The space race created a need for PVs and demonstrated their reliability and potential. *From Space to Earth* traces the use of PVs in space, then follows the step-like emergence of terrestrial applications as dropping prices and improved module design opened new marks: warning lights on offshore oil drilling platforms, cathodic protection of oil pipelines, Coast Guard signal buoys, railroad signaling devices, microwave repeater stations, and remote power for rural villages. Key players and their roles in developing the product and market are highlighted along with some of the behind-the-scenes stories that brought PVs into these markets.

Near the end of the book is one of the best chapters: "Better Cells, Cheaper Cells," that very clearly explains the evolution of solar cells by tracing the changes in technologies and manufacturing—right up to the present. By providing this complex information in a story-like fashion, Perlin makes it very understandable and highly interesting.

[*From Space to Earth is well worth the read.—Ed*.]

[*Another review of the book can be found in the February/March 2000 Issue #75 of Home Power Magazine*.]

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