FALL 2013

THE MAINE SUN

NEWSLETTER of the Maine Solar Energy Association

Many Workshops This Summer

By Richard Komp

This summer the Maine Solar Energy Association had more workshops than ever before. While a number of these workshops were in nearby areas, we also had three events here in Maine. Here is a list, organized by location:

New Brunswick, Canada

In the first two weeks on June, my apprentice Mourra (a Palestinian refugee who wants to learn how to teach other Middle Eastern people how to make and install solar systems) and I gave a total of six solar workshops in New Brunswick. The first four workshops were in the countryside near Moncton and were organized by a family that wants to learn how to teach solar workshops themselves.

Solar Cookers - We started with a solar box cooker workshop, using the design contained in the **Maine Solar Primer** that is made from isocyanurate builders foam.

Putting the polyethylene double glazed window into one of the solar box cookers we are building.

After the cookers were finished, we tested them by baking cookies and lunch. They worked perfectly and only cost about $20 each for the materials.

Solar Water Heater – For the next, two day long workshop we built a solar water heater. I also gave PowerPoint lectures on how to design and install different types of solar water heater systems. We talked about the advantages of the simple thermosiphon collectors as well as the pumped systems powered by ***-Continued on Page 4.***

Bulk Purchase of PV Modules

MESEA Project - $1 per watt

The price of photovoltaic (PV) modules is at an all-time low so MESEA has arranged to purchase a pallet of these modules at a wholesale price so we can offer them to anybody for just $1 per watt in quantities of one module. The crystalline silicon modules are Chinese made **Canadian Solar** brand 245 watt modules that put out 8.2 amps at 30 volts. The modules are completely Certified for International work and UL Approved for use in the USA in grid intertied systems; so you can get a rebate if you have a Certified Installer connect them up to your electric system. They have a 25 year warranty. The Modules have the solar cells encased between two pieces of glass so they cannot be changed to use in a12 volt system.

Richard Komp with one of the 245 watt Canadian Solar PV Modules.

These modules cost $245 each and are at Rich Komp's home in Jonesport. You need to pay either cash or a check to MESEA for $245 and arrange to come to Jonesport to pick them up. Rich Komp's address is:
17 Rockwell Rd SE, Jonesport ME 04649 and you can contact him by phone: 207-356-0225 cell or e-mail: sunwatt@juno.com . We have 12 of these modules left but if these quickly get sold, we will buy more, and also have some smaller 12 volt modules made right here in Maine.

Inside

The Maine Sun

Newsletter of the Maine Solar Energy Association

The Maine Sun is published four times a year by the Maine Solar Energy Association (MeSEA), a non-profit organization (sister chapter to the North East Sustainable Energy Association).

Our Mission:

We are dedicated to promoting the public awareness and use of:

- solar energy
- energy conservation
- other renewable non-polluting energy sources
- environmental and health awareness building practices throughout the state of Maine

The Maine Sun welcomes articles, submissions, photographs, and letters. Please send editorial materials to the following address: MESEA PO. Box 184 Harrington, ME 04643
Phone: 207-497-2204
E-mail: **sunwatt@juno.com or mainesolarenergyassociation @gmail.com**
Website: **www.mainesolar.org**

Receive the Maine Sun by e-mail or at our website to be green.

Printed on recycled paper.

Calendar of Events

MESEA Website WWW.mainesolar.org

The 2013 Maine Solar Tour

Saturday, 5 October 2013 – 9 am to 4 pm -- Free

This year the Maine Solar tour is an abbreviated one with only three Tours; although ReVision Energy is also planning a Green Building Open House for the same date, in connection with NESEA.

Tour I: Downeast

Organizer: Richard Komp, 17 Rockwell Rd SE, JonesportME 04649, 497- 2204 sunwatt@juno.com www.mainesolar.org

Site III-1**. Harrington**, 44 Heron Cove Rd., Leonore Hildebrandt/Robert Froese, 610-2929
This 2500 sq.ft. home was designed and built in 1990 by the owners. It is off-grid with a 900 watt PV system and heated by passive solar energy backed by a wood stove. Robert and Leonore, both writers (www.flatbaycollective.org), have practiced sustainable living for over 20 years—harvesting firewood, caring for fruit trees, and growing a vegetable garden.

Site I-3. **Jonesport**, 17 Rockwell Road SE, Richard Komp, 497-2204
Home self –designed and built in 1988 with 500 watt off-grid PV, passive solar heating and 4 TAP air heaters, 'Hypocaust' under-floor thermal mass, wood backup, and PV/thermal hybrid for hot water. Featured in the May-June 1997 *Solar Today*. Look for signs.

Tour II: Central Maine

Organizer: Claudia Lowd, Orono,ME - ph: 949-5106 claudia@mainerural.org. **More sites added later.**

Site II-2**. Orono**, 22 Mill Street Owners: Roberta/John Bradson, 866-4110 The Store-Ampersand A commercial bakery and coffee shop with a large passive solar entrance. It works so well that the entire first floor of the store needs no heat all winter.

Tour III: Midcoast Saturday, October 13 only

Organizer:Michael Mayhew 60 Campbell St, Boothbay Harbor ME 04538, 633-1061 e-mail coolsolarguy@yahoo.com **More sites possible**

Site III-1 **St. George, The humble Farm, Sat. Oct 13** 785 River Road, Owners: Robert / Marsha Skoglund, 226-
7442 199 yr. old salt box farm house, on St. George peninsula, recently added home-built solar thermal, DHWsystem. Eight, flat-plate panels, collect the sun's rays to pre-heat hot water and heat the cellar floor with non-toxic anti-freeze mixture, two tank system. 1380 watt, grid-connect, PV system, installed by Revision Energy in 2009. Six, 230 W, Canadian Solar PV modules and Outback inverter, supply solar electricity all year long. Panels are on owner-built, PV rack on chicken house. Rack will accommodate additional home-made PV modules, as soon as possible. Humble is pleased with both systems and welcomes visitors anytime.

MESEA Website WWW.mainesolar.org

Paleoclimate: The End of the Holocene

by Stefan

Recently a group of researchers from Harvard and Oregon State University has published the first global temperature reconstruction for the last 11,000 years – that's the whole Holocene (Marcott et al. Science 2013).
A while ago, I discussed the new, comprehensive climate reconstruction from the PAGES 2k project for the past 2000 years. But what came before that? Does the long-term cooling trend that ruled most of the last two millennia reach even further back into the past? Over the last decades, numerous researchers have painstakingly collected, analyzed, dated, and calibrated many data series that allow us to reconstruct climate before the age of direct measurements. Such data come e.g. from sediment drilling in the deep sea, from corals, ice cores and other sources. Shaun Marcott and colleagues for the first time assembled 73 such data sets from around the world into a global temperature reconstruction for the Holocene, published in Science. Or strictly speaking, many such reconstructions: they have tried about twenty different averaging methods and also carried out 1,000 Monte Carlo simulations with random errors added to the dating of the individual data series to demonstrate the robustness of their results. To show the main result straight away, it looks like this: The "hocky stick" is just the last part of this graph

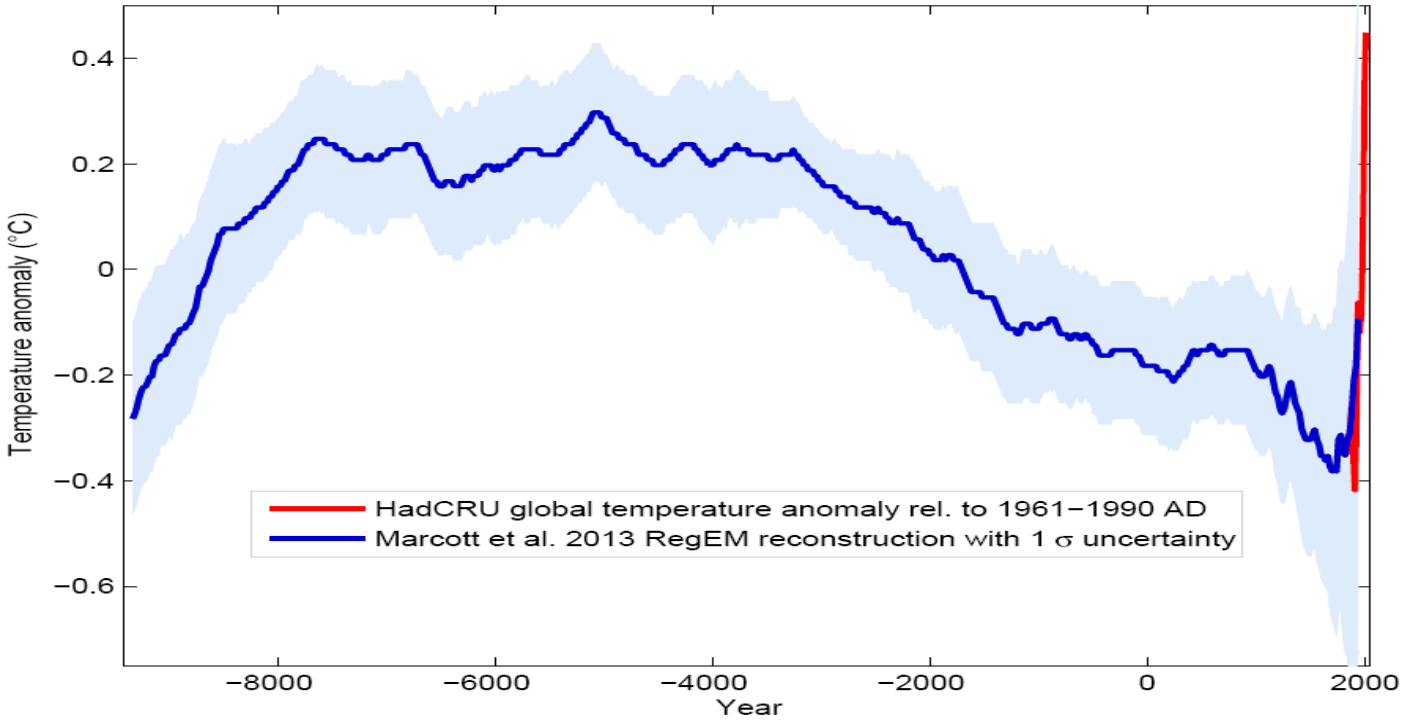


Figure 1 *Blue curve: Global temperature reconstruction from proxy data of Marcott et al, Science 2013. Shown here is the RegEM version – significant differences between the variants with different averaging methods arise only towards the end, where the number of proxy series decreases. This does not matter since the recent temperature evolution is well known from instrumental measurements, shown in red (global temperature from the instrumental HadCRU data). Graph: Klaus Bitterman.*

The climate curve looks like a "hump". At the beginning of the Holocene – after the end of the last Ice Age – global temperature increased, and subsequently it decreased again by 0.7 ° C over the past 5000 years. The well-known transition from the relatively warm Medieval into the "little ice age" turns out to be part of a much longer-term cooling, which ended abruptly with the rapid warming of the 20th Century. Within a hundred years, the cooling of the previous 5000 years was undone. (One result of this is, for example, that the famous iceman 'Ötzi', who disappeared under ice 5000 years ago, reappeared in 1991.)

The shape of the curve is probably not surprising to climate scientists as it fits with the forcing due to orbital cycles. . In the Marcott reconstruction the global temperature curve is dominated primarily by the large temperature changes in northern latitudes (30-90 °N) The summer maximum of the incoming radiation reduces massively during the Holocene – by more than 30 watts per square meter. (For comparison: the anthropogenic carbon dioxide in the atmosphere produces a radiative forcing of about 2 watts per square meter – albeit globally and throughout the year.) The climate system is particularly sensitive to this summer insolation, because it is amplified by the snow- and ice-albedo feedback. That is why in the Milanković theory summer insolation is the determining factor for the ice age cycles – the strong radiation maximum at the beginning of the Holocene is the reason why the ice masses of the last Ice Age disappeared. the new reconstruction does not reach the present but only goes to 1940, and the number of data curves used already declines before that. The Red line of accurate temperatures takes over after 1940 and shows the man-made CO_2 climate change.

From Page 1 a small PV array. We talked about the design and use of a heat exchanger for the cold Maritime Canada climate. The plans for the solar collector and the heat exchanger are part of the eight page solar water heater section of the **Maine Solar Primer, 2nd Edition**.

Soldering the copper tubing for the absorber plate made out of an old barn roof for the solar water heater.

The solar water heater is destined for a new "Earthship" partially buried solar home they are building in a hillside. The collectors will be several feet below the hot water tank so a thermosiphon system will work with no pump, even with a heat exchanger. The entire collector cost about $40, moostly for the copper tubing since most parts were recycled scrap.

Solar Food and Herb Drier – This one day workshop was really a seminar since we didn't actually build the drier. We looked at photos and diagrams of finished solar driers and I explained the difference between a direct and an indirect solar drier and explained the details of how they worked and were built. The indirect drier (plans for it are in the **Maine Solar Primer**) will dry medicinal herbs that are damaged by exposure to the direct sun.

Solar Cell Phone Charger This workshop for these very popular photovoltaic (PV) device was taught several times over the course of this summer. Mourra has learned how to teach this workshop so later in the summer, all I had to do was take photos.

We start by teaching people how to sort the cracked and broken PV cells, then cut them into standard size pieces and solder them together in series. A string of 12 cells produces a module that will put out 6 volts and almost 1 amp on a bright sunny day. It takes at least 5.1 volts to recharge the cell phone and the phone's internal charge controller will take the voltage and current necessary to recharge the 3.4 volt lithium battery in the phone; so that any voltage and current above that will be controlled by the internal circuit. These chargers will recharge any cell phone, including the smart phones, **except** the Apple iPhones. They have a special circuit inside them that checks to see if the charger is a Certified, Official, Authentic Apple Charger. If it isn't, the charger won't work. I am working on reverse engineering this circuit but don't have all the details yet.

Mourra explaining how to cut the PV cells with the small diamond discs, to make the solar phone chargers.

Falls Brook Centre near Heartland in western New Brunswick was our next destination. MESEA has been going to this environmental center for more than 20 years to give workshops and take part in their Fair. This year we spent a good part of the time refurbishing and fixing PV systems that had been installed over the years and checking that all the systems were working properly.

Falls Brook interns checking an older 1979 PV module to see if it was working properly, it was.

I also showed how the off-grid and on-grid PV systems are wired up and checked the batteries while explaining how to care for and clean batteries. Of course, we also made solar cell phone chargers.

Just last weekend, the 14th and 15th of September, I went back to the Falls Brook Centre for their **Fair**. The **Fair** which is in a new larger location was as much fun as always. I didn't teach a hands-on workshop this time but instead, talked about how to use solar energu in your one place and on the industry and politics of solar energy.

Our MESEA table at the Falls Brook Fair

Two Plutocrats, Failing (with the pearls) and Empire (with the top hat) slumming at the Falls Brook Fair.

Workshops in Maine

Robin's Nest Summer Camp This summer was the third year that MESEA has given a workshop at this small summer canp in Sullivan, Maine. This year, in addition to the usual solar cellphone charger assembly, we wired up the camp head cabin for solar electricity. We installed a 65 watt PV module we had made at a workshop in Jonesport last spring and put in a charge controller, two lights and a socket for a small radio or something. The children, mostly middle and high school age, were very receptive students, even talking about the politics of the Carbon Establishment and their anti-renewable propaganda.

The Solar Emergency Response Trailer Workshop

This workshop in mid-July, organized by John Burke, attracted participants from all over the world. We took a small two wheel trailer and built a cabinet on it with two compartments, one for the batteries and the other for the electronics. The PV modules will store flat on the roof of the chambers and open up like a flower on location.

Assembling the trailer at our workshop in Jonesport.

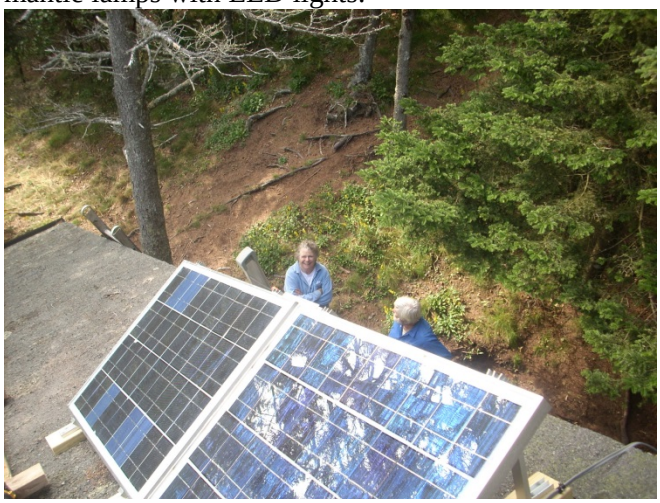
Among the people who attended were a couple from Pakistan and Gordon, who is my new intern from Jamaica. Another participant is Bill Young, who was the person at the Florida Solar Energy Center in Gainesville until he retired. He created the Solar Emergency Response Trailers for FEMA and gave a good PowerPoint about the design and use of those trailers. The MESEA trailer uses six of the 65 watt modules made for a project in Harlem NY, which couldn't be used there since they were "homemade" and not Certified. The trailer also has a 2500 watt Outback sine wave inverter feeding four golf cart batteries in series through a Phocos charge controller for the 24 volt PV system.

The participants at the Solar Emergency Response Trailer Workshop in Jonesport, Maine. ***Cont. on Page 6***

Continued from page 5

PV Installation at Yellowhead Island, Maine

Sometimes our workshops are delightful events. The trip John Burke, Gordon Dinnall and I took to Yellowhead Island to install a 130 watt off grid 12 volt PV system was on such a day. We drove to Bucks Harbor and got picked up in a small boat to be taken out to the island, which is on the Atlantic Ocean at the mouth of Machias Bay. The early September weather was clear and perfect for climbing up on the roof to install the two 65 watt modules made at previous MESEA PV workshops; to replace the cabin's gas mantle lamps with LED lights.

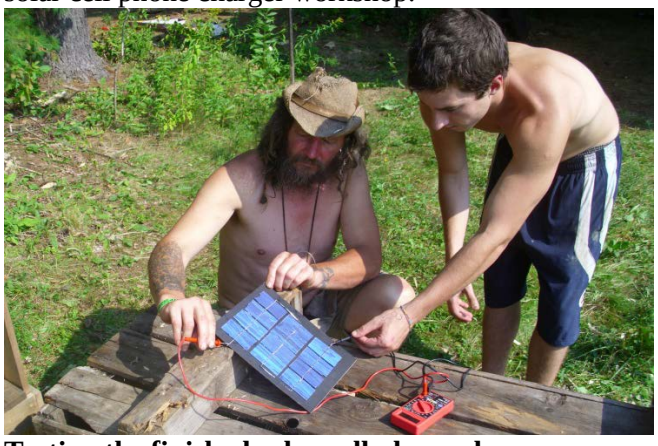


Checking out the PV modules on the cabin's roof.

The installation went quickly with everything working perfectly, so we had time in the afternoon to walk all around the island before taking the boat back to Bucks Harbor.

The Burdock Festival

The Burdock Festival is a 10 day summer event organized by a group of young people, mainly from Portland, Maine. MESEA has given solar workshops at several of these events and this August we went to their new campsite on the Kennebec River to give a solar cell phone charger workshop.



Testing the finished solar cell phone charger.

The young people were very interested in the potential and politics of the renewable energy revolution that is now taking place all over the world. Some of the participants were also aware of the quantum physics of the PV cells so we ended up with a wide ranging discussion about physics and cosmology while we walked down to go skinny-dipping in the Kennebec River.

Boston, Massachusetts

An urban garden group in the Boston area asked me to do a PV module assembly workshop to make two PV modules for a garden they have in Dorchester. The vacant lot will have a fish pond in the middle of the garden and they needed a PV powered pump to aireate the fish pond and to pump the water from the pond onto the garden to water and fertilize the plants. I got a small marine bilge pump and designed a custom 30 cell PV module to run the pump with no battery or controller needed (except for an on-off switch).

Looking over the urban garden to decide where the fish pond and PV array will be placed.

For encapsulation we used ethylene-vinyl-acetate (EVA)instead of the silicone we used to use. The material is what is used in the commercial Certified PV modules but requires heat and pressure in a half-million dollar laminating machine. Instead, we used a pizza oven in a neighborhood pizza parlor. While I had done the same thing in Nicaragua, this is the first time anybody in the US has tried to cook a PV module in a pizza oven. We had to fool the electronic controls on this oven so that we could get down to the 250ºF (120ºC) that the EVA needs as its crosslinking temperature. The first time we tried the temperature was too low so we had to put the PV module sandwich back into the oven and cook it again (which I have found out does no harm to the module. It worked perfectly on the second try.but then we had to give up the oven since the lunchtime crowd was coming in.

What is the Real Cost of Smart Meters in Maine?

Katherine Tweed: June 28, 2013

Making the business case for advanced metering infrastructure has been tricky business for many utilities, even when they received stimulus funds, as Central Maine Power (CMP) did. Despite a smart meter deployment to 600,000 customers, which CMP says came within 1 percent of budget, the state's public utility commission is auditing the utility for runaway project costs. CMP received $96 million from the federal government for smart meters as part of a larger smart grid project, which also includes distribution automation and transmission upgrades. The costs under scrutiny are operational benefits, such as fewer truck rolls, that will be realized over the next twenty years from the smart meters. In 2010, CMP, owned by Iberdrola USA, projected $25 million in savings over twenty years, but after a more recent calculation, the PUC said it would cost $80 million. CMP is complying with the audit, but noted to the PUC that it has already undergone ten audits since the program began in 2010.

The issue is actually pretty narrow, and does not include environmental or supply-side benefits, such as demand reductions, which are meant to save $338 million over twenty years and are not being debated by the PUC. But the reverberations of getting the cost/benefit wrong has been a public relations nightmare for CMP, which has to find a way to explain long-term benefits to customers while explaining why the technology doesn't mean rates will drop as soon as it's installed.

Coming: The Third Edition

Now 36 pages with new material

The Maine Solar Primer

A compilation of practical information and diagrams from past issues of THE MAINE SUN

The Maine Solar Energy association has published a sourcebook for solar and other renewable energy resources in Maine and New England.
This booklet includes do it yourself plans and basic solar information for everybody.

The Maine Solar Primer is available for $12 inc. postage from MESEA, PO Box 184, Harrington ME 04643

MeSEA Membership Form

Annual membership includes: a subscription to the quarterly MeSEA publication - *The Maine Sun,* 10% discount on workshop fees and MeSEA-sponsored events, networking with other like-minded people in Maine, contribution to the sustainability of our program, and the right to declare your donation to a 501(c)(3) on your taxes.

Name(s): _____

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_____

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Individual MeSEA membership - $20.

□ new □ renewal □ upgrading

Family MeSEA membership - $35. □

Lifetime MeSEA membership - $1000. □

Corporate MeSEA membership - $150.□ **

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