Winter 2012 - 2013

THE MAINE SUN

NEWSLETTER of the Maine Solar Energy Association

Ghana and Malaria

By Richard Komp

Last December I taught a photovoltaic (PV) workshop in Albuquerque New Mexico. One of the participants, Peter Nardini belongs to a nonprofit (NGO) group that is putting mosquito bed nets in a remote village in Ghana, West Africa, a place with a major problem with malaria carried by these tiny mosquitoes. While were talking Peter told me that the people don't want to use the bed nets because the netting is so finely woven that air doesn't pass through them very well at night in that hot, muggy climate. Peter was working on a tiny 12 volt fan that could be put inside the nets to offer a small breeze all night so people would start using the bed nets they were getting from the Non-Governmental Organization (NGO). We discussed a design for a small PV system for each house that would not only run the tiny bed net fan but also furnish enough power to run a reading lamp and an overhead light for the one room grass huts using light emitting diodes (LEDs)

Peter and I kept in touch and when I went back to New Mexico this past May to give three week course to the Native Americans at the Gallup campus of the University of New Mexico, I arranged with Peter to stay at his house in Albuquerque while I taught another PV workshop for the people at Sandia Labs and others. We had a separate workshop session where we built prototype PV modules and worked out the general design of the entire PV system, which would use the new efficient, warm white LEDs the group planned to use. ***(Continued on Page 4)***

Soldering strings of PV cells to make solar cell phone and battery chargers in Portsmouth, New Hampshire.

MESEA Website: www.mainesolar.org

October 2012 Maine Solar Workshops

By Richard Komp

This October, MESEA had two photovoltaic (PV) workshops, one on the weekend of the 6th and 7th in Jonesport, Maine and the second in Portsmouth, New Hampshire on Saturday the 13th. In between these workshops we had a showing of the **Burning in the Sun** movie at the Portsmouth Public Library on the evening of Thursday the 11th.

At both workshops, part of a continuing set of joint workshops and short courses organized by MESEA Secretary John Burke, we made small solar cell phone chargers as well as the little solar battery chargers we have been making for years using the white cases made for us out of recycled plastic by the Penobscot Indians in Old Town.

The solar cell phone chargers, using a design we developed over the past five years, are as powerful as the "plug-in-the-wall chargers the come with the phones but are very inexpensive, costing the participants only $15 each for the parts *(See the Spring 2012 Maine Sun at www.mainesolar.org for do-it-yourself instructions).*

The Portsmouth solar workshop and movie showing was organized in conjunction with Kevin Beane and a "solar barnraising" group promoting solar energy in New Hampshire. The group has also gotten two large rolls of ethylene-vinyl acetate (EVA) used in encapsulating PV modules and we plan to have more joint PV workshops in the future. I came down with malaria during the first workshop at my home *(See Ghana story on this page)* but the group was very considerate and gathered around my bed on Saturday night while I lectured about the new developments in the PV industry while lying down. My fever broke in the middle of the night so I was able to make a pancake breakfast for everybody on Sunday morning. We continued the PV a workshop until early afternoon, when everybody left satisfied and I went back to bed. By Thursday, after the three day cure I was well enough to take the bus from Bangor to Portland and Amtrak to Durham New Hampshire for the second workshop.

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 P.O. Box 184 Harrington, ME 04643

Phone: 207-497-2204
E-mail: mainesolarenergyassociation @gmail.com
Website: www.mainesolar.org

Printed on recycled paper with soy-based inks.

Calendar of Events

MeSEA Website WWW.mainesolar.org

Jonesport, Maine - Do Yourself Solar & Earth Day 2013

April 12 – April 21. 2013 - A week at the Solar Home of Dr. Richard Komp, in Jonesport, Maine!

-Fri., April 12 thru Sun., April 21, including two weekend PV assembly workshops. We will also assemble a **Solar Oven** for PV lamination with EVA sheeting on the second weekend.

Site -17 Rockwell Rd, SE, Jonesport, ME 04649 - The program will be presented by experienced **MESEA** trainers including Richard Komp.

You are invited to attend a one day session (Sat or Sun) - **$75.** Or…

Two day extended sessions (Sat & Sun)- **$125.** Or…

Full TEN day intensive program - **$475.**

All noon meals included each day and limited space is available for overnight stay, or longer, (additional fee required). Local motel information is available for Jonesport and Machias, Maine…

We will try to keep the maximum number of participants to 12 per day.

Call to reserve space and arrange for $50. Dep. -207-546-1639, 516-669-2442, 207-497-2204

Full workshop fee balance is due upon arrival in April, thanks.

-Solar PV assembly - training for trainers and workshop intensive with **MESEA. (full 10 days)**

Program: (2-day weekend sessions, 9 am – 4 pm; Sat & Sun, – April 13 - 14, and April 20 - 21), will allow participants to experience the full assembly procedure, used by Dr. Komp in the developing world PV "Cottage Industry" programs. We will assemble a large Solar Oven, to laminate the module, using EVA sheets, the next generation of handmade PV. The PV moduleswill be available for sale to participants with the money going to raise funds for work in the developing world!

How to start a PV "Cottage Industry", Free Friday lecture and Powerpoint seminar, Apr 12 and 19, 7 – 9 pm.

How to assemble 65W PV modules in the jungle

2 weekend sessions, 9am – 4pm; Sat & Sun, April 13-14, & 20-21

Using developing world methods – with hands-on experience for all participants, including step by step PV assembly processes - with **solar oven** lamination in the second weekend, depending on the sun.

Full TEN day program (Apr 12-21), includes the two PV assembly sessions, as well as Friday lectures - power-point sessions and **solar oven assembly**… Plus our **Earth Day** focus session

How to assemble a Solar Oven! This session, during the week, (9 am to 4 pm, Mon – Thurs, Apr 15-18), will allow participants, hands-on experience, with the assembly of a large **solar oven**, to be used during the lamination process of the PV module, using EVA sheeting.

On Earth Day - Combatting Climate Change and Global Warming

Saturday April 20, learn how to work with local groups, in your community to raise awareness of our climate crisis.

A Brief History of the Science of Global Warming

By Julia Uppenbrink (*Edited by Richard Komp*)

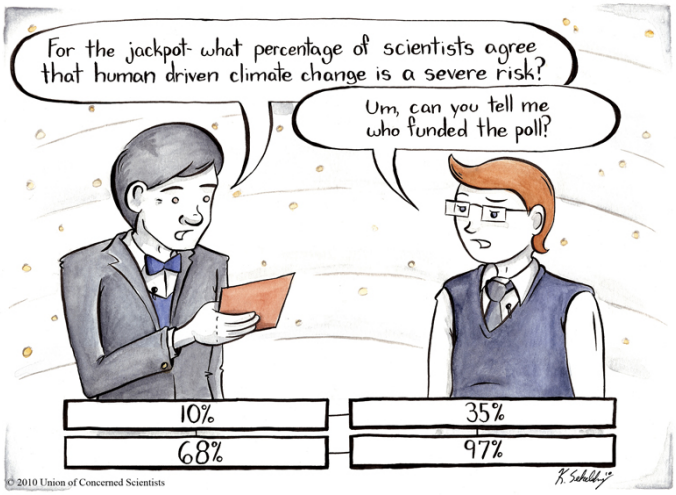
Although concern about global atmospheric warming has intensified in recent decades, research into the greenhouse effect actually began in the 19th century. Fourier compared the influence of the atmosphere on temperature to the heating of a glass-covered bowl with an interior coated with black cork (1827) and discovered the **greenhouse effect**. He and other scientists such as Tyndall (1861) and Langley (1884) appreciated that without heat-absorbing gases in the atmosphere, the temperature on the ground would be considerably lower, making life as we know it impossible. (*Back about 3 billion years ago when the sun was considerably dimmer than it is now, we had a "snowball earth with ice covering everything, even with lots of CO_2 in the atmosphere. RK*)

However, in 1896 the Swedish scientist Svante Arrhenius was the first to make a quantitative link between changes in CO_2 concentration caused by burning fossil fuels and climate. Arrhenius received the Nobel Prize in Chemistry in 1903 for his work in this area. In his work on the paper on the effect of CO_2 on global climate, Arrhenius made clever use of data provided by Langley (1890), who had measured the emission spectrum of the moon for different lunar heights and seasons. This data allowed the calculation of the absorption coefficients of CO_2 and H_2O and of the total heat absorbed in the atmosphere of the Earth for a variety of CO_2 concentrations, as well as the corresponding temperature change. After an estimated 100,000 calculations by hand, Arrhenius predicted a temperature rise of 5º to 6°C for a doubling of CO_2, not too different from recent estimates of 2.5º to 4.5°C. (*Since Arrhenius lived in Sweden in the 19th Century when it was a lot colder there than it is now, he thought global warming would be a good thing. You can see that the "conspiracy" is well over 100 years old.*)

Arrhenius's work, and that of his contemporaries, showed remarkable insight into many factors influencing climate, such as aerosols, ice fields, clouds, and the oceans as a sink for CO_2. In the 1930s, human forcing of climate through fossil fuel emissions began to be considered as a cause of significant temperature increases in the short term. Today, sophisticated atmospheric models (general circulation models) incorporate a growing number of factors. Compared to the real climate, these models are still rather crude: typical parameters are a time step of 1 hour, a spatial grid size of around100 km, and up to 20 vertical levels. Reliable long-term observational data of climate system variables and detailed physical understanding of feedback mechanisms associated with, for example, clouds, oceans, and vegetation are often lacking.

However, there is general agreement among many different studies about the detection of change and its attribution to natural or human-induced influences. The Intergovernmental Panel on Climate Change (IPCC) concluded that "the balance of evidence shows that there is a major human influence on climate". Despite uncertainties in climate predictions and a highly political climate, perhaps it is reassuring that more than 100 years of research have affirmed Arrhenius's initial considerations.

While I knew about global warning before that time, I was a skeptic until I went to graduate school at Wayne State University in Detroit in 1960. Gilbert Plass (the head of Ford Motor Company's research labs back then) had been doing a lot of work studying the global warming caused by burning fossil fuels; and the whole automotive industry research community was talking about how this would affect the use of gasoline and diesel fuels in their products. They convinced me on just how important global warming was for our planet. This is one of the reasons why I decided to work on solar energy as a profession. Of course in 1960, it took a scientist to see the effects of global warming on climate change but now that we are in the middle of the climate change, the effect is all around us and hitting us in the face so everybody can see it. The Carbon Establishment is still spending billions on the propaganda to convince us that we should believe them instead of "our lying eyes" (as Groucho Marx put it) but we now know better. Rich Komp



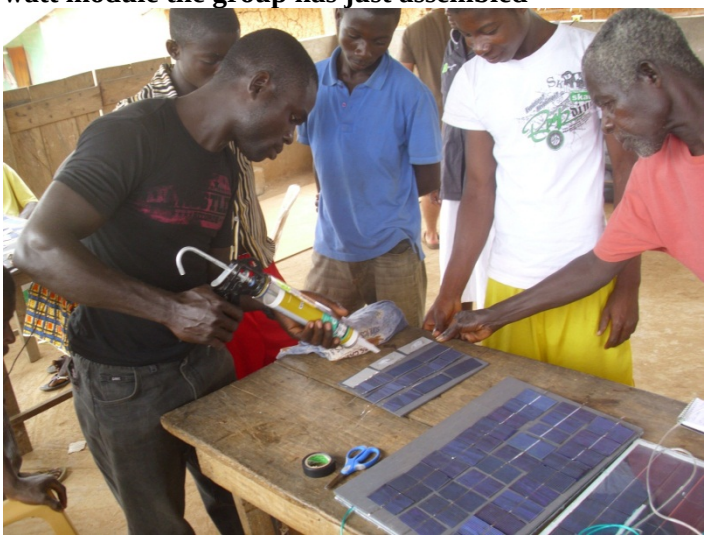
Last September I went to Ghana to teach the PV workshop. The trip started off badly by my not being allowed to board the Ghana bound plane from JFK airport in New York. I had been told that I would get my visa at the airport when we reached Ghana but the man at the Delta ticket counter said that wasn't true and wouldn't give me a boarding pass. After ten days of dealing with the Ghanaian consulate in Manhattan, I finally got to fly to Ghana. *(I didn't just sit and wait in Manhattan; I visited friends in Woodstock NY and kept myself busy by rewiring the living room of my friend's house and fixing the large PV system on the Woodstock Museum. I also spend time with the Whole World Botanicals company, bringing them up to date on the work on the lightweight, portable solar oven design they are financing with a grant to the Grupo Fenix in Nicaragua)*

Ghana is one of a set of small countries on the Bight of Benin in West Africa. Peter arranged for a friend to meet me at the airport in Accra and he put me on an express bus for the five hour trip to Takoradi on the western part of the Ghanaian coast, where Peter met me and took me to Busua Beach, where he has a surf camp. Takoradi is the closest city to the remote costal area where we were going to work so we went back there the next day to shop for the materials we would need to build the PV systems for the bed net fans and homes. Since we would mostly be building small 16 watt PV modules, I used a design that uses ordinary silicone caulk as the encapsulant so the only things I brought in my checked luggage were a box of Evergreen Solar cells and a large shampoo bottle of the liquid silicone encapsulant we would need for the bigger 65 watt PV modules for the community PV system in the middle of the village. International oil companies are starting to drill for oil off the coast of Ghana so Takoradi is a boom town with terrible traffic jams and lots of foreign workers (of course the average Ghanaians will see no benefit from all this "job creation" [except for the women and girls who end up working in the brothels]). We had a native Ghanaian with us who knew the street markets and helped us find a very good glass place where we bought all the glass needed for making the various size modules. We bought enough glass to make a total of 20 modules including two 65 watt modules for only $25 in Cedes (less than what I paid in Florida for glass for one 65 watt module). We also found a good price for marine deep cycle batteries and picked out the vinyl table cloth material to use for the module back sheets.

On Monday we started working in the village. I first gave a PowerPoint presentation to explain a bit on how solar cells work and how we were going to wire up houses and other buildings in the village. We started by sorting and assembling two 65 watt modules.

Passing fishing boats on the way to the village

Getting ready to encapsulate with liquid silicone, a 65 watt module the group has just assembled



Assembling 16 watt home chargers and 5 watt cell phone chargers using ordinary silicone caulk.

From Page 1

We needed to build those modules first since the village had no electricity and we were using two 80 amp hour 12 volt batteries to power the soldering irons and other tools and had to finish these modules before the batteries were dead, so we could recharge the batteries and keep working (this is called bootstrapping).

The villagers also learned how to sort and cut the Evergreen Solar cells I had brought, to make the smaller modules. We cut the broken and cracked PV cells in quarters for the 16 watt, 12 volt modules we were going to use on the roofs of the homes. Most of these are one room grass huts with one or two beds so the small modules with 32 amp hour batteries are sufficiently powerful to run two bed net fans all night as well as power an overhead LED lamp to light the hut. The workers also learned how to build their own lamps using strings of LEDs that one of the Bednet Fan people brought in his suitcase. The smaller pieces of broken PV cells were used to assemble solar cell phone chargers, which are very popular in the 3rd World.

I spent the first week living in the village, getting back to Busua Beach only on Wednesday night to take a shower. This village is one of the most primitive places I have been; they didn't even have outhouses; everybody simply went in the bushes along the beach. Although I was trying to be careful, I got giardia so I came back from the village on Friday afternoon feeling quite sick, although I had been taking the doxycycline for that and as an anti-malaria prophylactic. The Bednet Fan group went back to the village on Saturday to start making the holders for the tiny 12 volt fans; I rested up so that I would be ready for the PV system installation work that would start on Monday. I did get to swim in the nice Atlantic Ocean surf off the beach, but didn't try out one of the surf boards.

The second week was devoted to teaching the villagers who were still part of the class, how to design, install, maintain and repair PV systems. The village carpenter did a very nice job of making wooden frames for the PV modules, since extruded aluminum frame material was unavailable in that part of Ghana. Using a method of installation we developed for the work with the Garifuna people in Honduras last February, we used bailing wire to tie the modules to the thatch roofs of the village huts.

A couple of the villagers had done some electrical wiring so the installations went quickly. On Wednesday, the last day I was at the village, the workers had instructions to install the PV system and wire up one house before we would get there in the morning. That was one of the days when I took one of the little minibuses to a neighboring village and walked to the village with one of the Ghanaians a Sufi from north Ghana who was also taking the solar course. When we got to the village about 10:30, they had already finished installing the PV modules and wiring up two huts, and everything was working perfectly.

Mounting a 16 watt PV module on the roof of one of the grass huts, using bailing wire. Notice the wood frame.

We spent the rest of the day with my final lectures (English is the Official language in Ghana, which made my work easier); and then we did the permanent installation of the two 65 watt modules and started wiring up the microgrid community system for the central part of the village. When I explained how PV systems were grounded, they wondered why that was necessary since they said they rarely ever have lightning; but shortly after that was said, a big thunder storm blew up with lightning all around us. They installed the grounds as soon as the rain stopped (*welcome to climate change*). After all the 16 watt home PV modules we could build were finished, everybody switched to making more solar cell phone chargers.

On Thursday morning we started the trip back to Accra to go to the airport. We got a taxi to Takoradi and caught an express but back to Accra. Ghana is in the part of Africa where the slave forts were arranged along the coast. We passed two of them on the way back to Accra. During my stay at the village we discussed this part of West African history. The village chiefs would raid a nearby village to capture people to sell to the Arabs, but mostly to the Europeans and Americans (including the God-Fearing Mainers). I suspect that that left a heritage of self-centered behavior. (Ayn Rand would admire this). For example, when we were making the solar cell phone chargers, all the men wanted to start their own separate business and make a bunch to sell to make money. When I suggested that it would be better if they formed a company (or cooperative) together, they seemed rather uninterested in working with each other. While the women do things like cooking communally, the men never seem to want to do such things like form a team to fix up the village paths, or build outhouses. ***(continued on Page 7)***

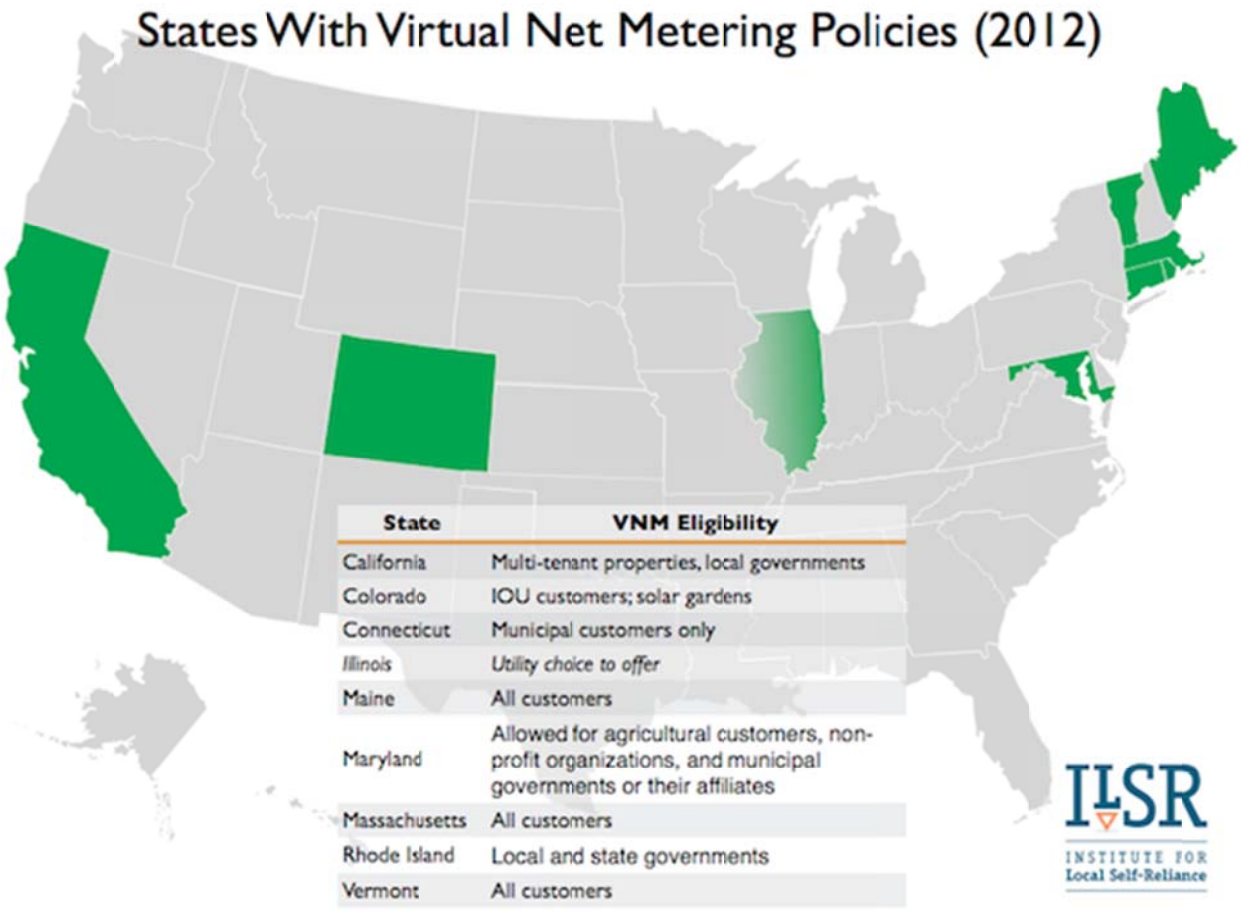
A Policy That Unlocks Community Renewable Energy

By John Farrell | November 14, 2012

Net metering is a common distributed renewable energy policy in the United States, allowing individuals to "turn back" their meter (and reduce their electric bill) by generating on-site electricity. But utility accounting systems typically prevent people from sharing the output from a single, common "community" solar or wind project.

Virtual (or group or neighborhood) net metering is the solution. This rule allows utility customers to share the electricity output from a single power project, typically in proportion to their ownership of the shared system. For community renewable energy projects, typically relying on offsetting electricity at the retail price, virtual net metering is essential.

The following map illustrates which states (as of August 2012) support virtual net metering.



State	VNM Eligibility
California	Multi-tenant properties, local governments
Colorado	IOU customers; solar gardens
Connecticut	Municipal customers only
Illinois	*Utility choice to offer*
Maine	All customers
Maryland	Allowed for agricultural customers, non-profit organizations, and municipal governments or their affiliates
Massachusetts	All customers
Rhode Island	Local and state governments
Vermont	All customers

There's some hope for expansion. The California legislature recently debated expanding virtual net metering to all customers, but the bill failed in late 2012. Other states have also considered virtual net metering legislation.

There are other solutions, too, that get away from net metering entirely. Under a CLEAN Program, distributed renewable energy projects have a separate meter, so that consumption and production are independent. In 14 states, individuals or groups can install a community solar project, get a good price for their electricity and share the revenue (rather than, as with virtual net metering, sharing electricity bill credits). All participants pay for their own electricity use separately, as do regular utility customers.

A CLEAN Program has some other advantages, but when it comes to simplifying the path for community renewable energy, virtual net metering is a good step in the right direction.

(*Notice that Maine is one of the states where this idea can be implemented. If you are interested in working on this, contact MESEA at 207-497-2204 or John Burke at 516-674-9090 RK*)

From Page 5 A Canadian missionary who had come to our solar course in the village lives in Accra with his wife and had invited us to come there to visit so we spent the afternoon with them before they took us to the airport. The flight back from Ghana to New York was 11 hours but uneventful and I arrived at 5 am New York time. I went straight to Penn Station, took the train to Boston and the bus to Bangor, where a friend drove me in my car back to Jonesport the same afternoon.

A few days after I got back, if felt bad and then during the PV workshop and solar tour at my house in Jonesport on the following Saturday, I got very sick with a fever and shaking badly. I had malaria, in spite of taking some anti-malaria drugs. We talked to a doctor from Panama and between his instructions and my collection of malaria drugs, I came up with what turned out to be a successful three day cure. While I didn't have exactly what was recommended for malaria in that part of Africa (where the parasite has evolved immunity to most of the common anti-malaria drugs), I guessed that the village was so remote and had evolved so slowly in its culture, that the malaria had also not evolved all the immunity. I took a mixture of proguanil (which is recommended as part of a cure) and chloroquine (which is not) every four hours and probably overdosed a bit, but now after my free Obamacare checkup I have no traces of the malaria. I haven't heard from the Bednet Fan people so I don't know if I will be going back to Ghana or not. Although I don't want to disappoint the people in the village, at 74maybe I am getting abit old for these adventures.

Coming:TheThird 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

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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.

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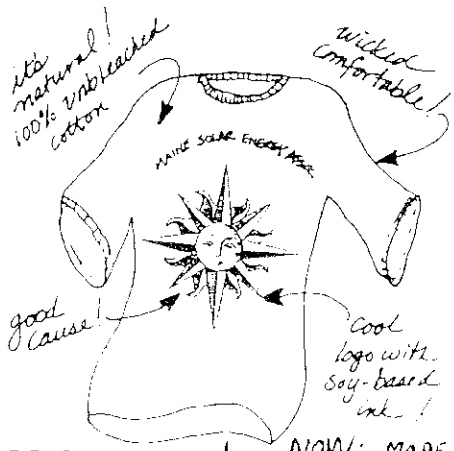

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