Winter 2011- 2012

THE MAINE SUN

NEWSLETTER of the Maine Solar Energy Association

Workshops Maine and Elsewhere

2nd Fall PV Assembly Workshops in Jonesport
Oct 14 – 16 By JohnBurke

As the winter arrives in downeast Maine, reflecting back to the fall MeSEA programs at the Jonesport, ME, solar home, we are reminded of the fall hurricane season that hit our Sunrise Co. in Oct.! A few seminar participants were kept from traveling to the PV assembly intensive at the Jonesport facility. Two who did travel to the weekend program, hosted by Dr. Rich Komp and John Burke, were new professors at the UM Orono, who hadn't met each other before the solar weekend. Erika (Physics) and Sharon (Economics), were intent to learn the hands-on, PV assembly process, used by MeSEA and Skyheat Assoc., in the developing world, PV "cottage industry" programs.

Our local SEADS participants, Walther Wefel and Charlie Ewing, were in attendance, although the solar air collector re-build project had to be re-scheduled due to the high winds associated with the hurricane activity! We were lucky that the winds and rain allowed the solar energy to shine through, so we could check the out-put of the 60W PV module produced during the weekend program. Using the "developing world" method, the group soldered three strings of 11 solar cells, to produce the PV module that will be installed on the Jonesport seminar facility this coming spring. We all enjoyed the delicious lunches, prepared by Dr. Komp, both Sat and Sun. We are hopeful that this weekend activity will lead to a successful relationship with a solar group forming at the UM Orono campus.

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Building a 65 watt PV module at the October workshop

Solar Work in Colombia – 2011

By Richard Komp

At the American Solar Energy Society (ASES) Annual Conference in Phoenix, Arizona in May of 2010, John Burke and I gave a paper on the new methods the Grupo Fenix developed to encapsulate photovoltaic (PV) modules without an expensive laminating machine. The paper, which showed the work in 3rd World countries all over the world, was well received and afterwards we had a number of people came up to discuss the possibility of doing this kind of work in their country.

One of these people was Julian Lustig Gonzalez for Colombia, South America. During our box lunch together, I outlined to Julian just what would be required to start such a cottage PV industry in the part of Colombia where he lived. I explained that the first visit costs about $6000 for the materials and travel and living expenses. For work in 3rd World countries, I don't charge any honorarium, since the people I will be working with live on less than $2 a day.

The First Trip – March 2011

Julian stayed in touch with me and he and his mother (a language professor at Smith College) saved up the money for the first trip, which I made in March of 2011. I flew from Nicaragua, by way of Miami to Barranquilla, on the Caribbean coast of Colombia, where Julian was waiting to pick me up. I had brought the PV cells and he had the silicone encapsulant but we spent two days shopping for the rest of the parts (like the glass and aluminum frame material) that we would use to build the first PV modules assembled in Colombia. We also spent time swimming at the beautiful Caribbean beaches walking distance from his mother's new home and visiting the sacred native sites, which have beautiful rock carvings in a restful setting. The Juaruco naives told me that archeologists have not yet visited the site. ***Continued on Page 4***

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 100 Lubec, ME 04652

Phone: 207-733-1095
E-mail: mainesolarenergyassociation @gmail.com
Website: www.mainesolar.org

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Calendar of Events

MeSEA Website WWW.mainesolar.org

WORKSHOPS

PV Workshops in Jonesport, Maine – April 13-22

Sponsored by MESEA, SEADS and DAD Solar

A week at the Solar Home of Dr. Richard Komp, in Jonesport, Fri., April 13 thru Sun., April 22, including two weekend PV assembly workshops presented by experienced **MeSEA** trainers. **Location** -17 Rockwell Rd, SE, Jonesport, ME 04649
You are invited to attend one day session (Sat or Sun) - **$75.** Or… Two day extended session (Sat & Sun)- **$125.** Or..Full TEN day intensive program - **$475.** (All noon meals included each day). Limited space is available for overnight stay, or longer, (additional fee required). We plan to keep the number of participants to 12 per day. **Call to reserve space and arrange for $50. Dep: 207-546-1639 or 516-669-2442 or 207-497-2204**
Full workshop fee balance is due upon arrival in April, thanks.

Solar PV assembly Program: (2-day weekend sessions, Sat & Sun, – April 14 - 15, and April 21 - 22), This workshop will allow participants to experience the full asembly procedures, used by Dr. Komp in the developing world "PV Cottage Industry" programs using both liquid silicon and the new cottage EVA encapsulation. The first day will focus on the first half of PV assembly and encapsulation, the second will include information on PV systems and new developments in the PV industry.
The 60W PV modules we assemble will be available for sale to participants, to raise funds for work in developing world!

How to start a PV "Cottage Industry", Free Fri, lecture, Power-point, Apr 13 & 20, 7 – 9 pm. Developing world methods – with hands-on experience for all participants, includes step by step PV assembly process. Presented by Richard Komp.

Full TEN day program (Apr 13-22), includes 2 PV assembly sessions, as well as Fri. lectures / power-point sessions and solar thermal rebuild… Plus Earth Day focus!

How to rebuild a solar Hot-Air collector! This session, during the week, (Apr 16-19), will allow participants, hands-on experience, with the rebuilding of 2 thermosiphon hot-air collectors built into Rich Komp's solar home, including a seminal on passive solar architecture.

How to combat Climate Change and Global Warming! An Earth Day celebration!

Sat, April 21, learn how to work with local groups, in your community, to raise awareness of this climate crisis, we can all help to avoid the biggest effects and live with the others. (This will take place together with the Solar PV assembly workshop on this day.)

News about MeSEA and Other Groups in Downeast Maine

By John Burke

In other news, Downeast Alternative Design Solar (DADS), is now incorporated with the Maine Sec. of State, as a non-profit, Educational Corp. as of Sept, 2011. "To operate an educational facility at locations deemed appropriate by the board of directors, to promote awareness of solar and renewable energy capabilities, community economic development, including organic farming, self-sufficient lifestyles and renewable energy technologies, for a world at Peace." Our statement of purpose in the articles of incorporation, gives a wide range of activities for the new organization, centered at the solar home in Jonesport, ME. DADS, Inc., is interested in hearing from interested folks and families, who may want to get involved with alternative energy community economic development and renewable energy education, based in Maine, and supporting the solar "cottage industry" activities in the developing world. Contact us through www.dadsolar.com or email John Burke, dadsolar@yahoo.com.

Also in September, our dear friend, SEADS founder and consummate solar do-yourselfer, Charles Ewing, turned 80 ! A lively group helped with the celebration and dinner at the Columbia town hall, Columbia, ME. Charles is the SEADS Solar Seminar Center Coordinator, as well as the "Solar Tinkerer". We all wish "Charlie" the best and many more to come!

The effort of the MeSEA hands-on, PV assembly program with ASES and NESEA chapters, has taken a step toward a "life of its own". After a few solar PV workshops with MeSEA, the New York Solar Energy Society (NYSES) and City Solar (Brooklyn., NY), are now presenting PV assembly workshops in Brooklyn, NY and Newark, NJ, designed after the PV "cottage industry" process, developed by Dr. Rich Komp, Skyheat Associates & MeSEA and Marco Antonio, of Suni Solar & Grupo Fenix, Managua, Nicaragua. Our best for their successful operations and future collaborations! Also the Minnesota Renewable Energy Society (MRES), and their International. committee, will be heading to Nigeria, Africa, to help start a PV "cottage industry" this winter, with a local community group. John Burke, MeSEA & dadsolar.com, spent a week this past June with the MRES group, in Minneapolis, to train the Int'l. committee members and interested MRES solar enthusiasts, in all aspects of establishing a successful solar community-based business in the developing world. We do wish them all the positive energy for these efforts as well!

Join or Rejoin the Maine Solar Energy Association

Continued from Page 1.

MeSEA solar workshops in Florida and New Mexico

By Richard Komp

Florida- When I came back last November from my solar work in Niger, west Africa, I flew into New York; and after three days there (Including a stop at **Occupy Wall Street**) I took the train to Florida, not getting to visit my home in Jonesport, Maine. I was scheduled to give another workshop at the University of Florida's Ft Myers extension campus, but that got cancelled while I was traveling, so my Florida friends arranged a hands-on solar workshop in Sarasota for the 3rd and 4th of December. In 1987 I had installed a PV-Hot Water Hybrid collector on the home of my friend, Mike Holahan. Over the years, the system has worked well and paid for itself three times over in the savings in Mike's hot water electric bill. However, lately the corrosive Sarasota water had produced pinhole leaks in the copper tubes. We investigated the Hybrid module to see if we could repair the problems that have developed over the decades of its use, but the workshop participants from Haiti and Jamaica really wanted to build solar battery chargers so we ended up making five of them during the two day workshop.

We also had talks on the new developments in solar and how to wire up PV systems. At the workshop, we started construction on a solar oven designed for the latitude and climate of Florida but we didn't have time to completely finish it. That will happen next time I go to Florida.

New Mexico- Marlene Brown of the New Mexico Solar Energy Association (and Sandia Labs) asked me to come to Albuquerque to give a two day workshop. The two day workshop held at the shops of AAA Solar on the 10th and 11th of December was oversubscribed with 21 participants, all of whom took home small solar battery chargers. Since a number of the paricipans were electrical engineers from Sandia Labs, we got into the quantum mechanical details of how PV cells work and the new developments in thin-film, nanomaterial cells.

One of the reasons for coming to Albuquerque was to work with Marlene's friend Peter Nardini, who has a project in Ghana adding tiny fans to mosquito bed nets to cool the sleepers in off-the-grid villages. We worked up a design for a tiny 10 or 16 watt PV module that would charge up a 12 volt moorcycle battery to power the fans and also run two or three small LED lights. We came up with a design that can be built by the Ghanian villagers and cost less than he had budgeted for the units, which will be paid for by small microloans.

Please use the form on page 7 to pay your dues.

Continued from Page 1. We are working with the local Juaruco Native Americans, who have a village walking distance from the new group of homes being built overlooking the Caribbean. In fact most of the Juarucos work building the homes and then later become gardeners and maids, maintaining and cleaning the homes. Julian and his mother felt that they could do better things with their lives.

On the Monday after I go to Colombia I started the course on how to build PV modules and we quickly graduated from making tiny four cell solar battery chargers to bigger modules as they picked right up on the techniques of soldering and cutting the boxes of Evergreen Solar cells I had brought in my luggage from Nicaragua.

Learning how to sort and cut the Evergreen solar cells.

We took the cracked and broken PV cells and cut them into different size pieces to make the most efficient use of these cells. Some we cut exactly in half to make 32 watt modules, while others were cut into quarters for the solar cell phone chargers, which proved to be very popular. I spent some extra time teaching them how to make very flat solder joints so that when we went to encapsulate the PV cells into modules, perfectly flat modules would result and less of the expensive two part silicone would be needed.

During the course, I gave lectures on how PV cells work, how they are made and how to design PV modules for different purposes. I would mix up the working sessions with these lectures and sessions on how PV modules are used for powering homes, pumping water and as backup systems for businesses. This information is important since they will not only be building PV modules abut they also have to know how to design, install, maintain and repair PV systems. I also taught them some electricity theory like the meaning of power in watts and Ohm's law, and how to use millimeters to measure the voltage and currant outputs of the modules that are building Later in the course, we would go around to some of the fancy homes in the neighborhood, working out how to plan and install backup power systems for these vacation homes. This made some of the elite homeowners nervous, since while they are used to having the natives coming in and cleaning their homes, having them come as experts offering advice on how to get reliable electric power was a new thing for "los ricos".

The first home we wired up for backup solar electricity was Julian's mother Patricia's. Since several of my students worked on the tile roofs, it was easy for them to work out a system to mount the PV module on the roof without making any leaks or cracking any of the tiles. We put in a 65 watt module and four 11 watt 12 volt compact fluorescent lamps in the kitchen hall and bedrooms, and hooked everything up to a 12 volt battery in the laundry room. Once this was finished, we rarely ever used the home's regular 120 volt lights.

Checking the 65 watt PV module before installation on the roof

After installing two PV modules and finishing eight solar cell phone chargers, we then went on a troubleshooting job in a remote home site, to fix an existing PV system that wasn't working properly. We found that the modules were facing the wrong way; and after repositioning the modules and cleaning them, the electrical output of the system was doubled.

The homeowner was very happy and the students learned how to do this kind of work. As one of the last things we did during the first trip, the students designed a PV system for their village school. We designed two systems: one without and the other with PV power for a proposed air conditioner for the computer center the government promises for the school. The air conditioner uses up as much electricity as there rest of the entire school put together, doubling the system size.

While I was there, the Juaruco natives took me o their sacred place to show me all the very ancient rock carvings. They told me that no archeologist has studied them yet, but I took lots of photographs.

Installing a 32 watt PV module in the Juaruco village

The Second trip – September 2011

Julian, Patricia and I stayed in touch after the first trip and while we were together at the next ASES annual conference in Raleigh in 2011, we planned for my next trip back to Colombia. At the ASES conference, I gave a well received paper on using ethylene-vinyl-acetate (EVA) sheets for encapsulating PV modules instead of the expensive silicone we have been using. We decided to teach the Colombians how to use the EVA; but because that material is cured at above the boiling point of water, we would have to have some way to heat the modules during the curing process. A pizza oven would work, but since we will be working in a remote village (without pizza ovens), we decided that special solar ovens should be built like the ones we use in Nicaragua.

Therefore, Patricia and I arranged for Nimia, a young compesina (peasant woman) from the Grupo Fenix in Nicaragua would come in August to give her workshop on building and using solar ovens. Nimia has already given this workshop in Peru and the Dominican Republic as well as in Nicaragua and is very good at teaching the workshop.

Nimia (the grey T-shirt) with her students and cookers

Two of the solar ovens were built to an extra large size big enough to take the glass sheet for a 65 watt PV module. One of these ended up as a solar cooker for a restaurant on the beach while the second was used for our work making PV modules. There is about $90 worth of materials in each big cooker. Nimia and I got to spend only two days working together as she had to go back to Nicaragua shortly after I came, but we worked together designing a lightweight, portable solar oven that folds down and can be carried on the back of a llama for the compesinos on the top of the Andes in Peru, or on the back of a camel for the nomads in the Sahara desert in Niger. Both places have no trees for firewood. When I get to Nicaragua in December, we will start working together on the prototype.

I brought a roll of the EVA with me so we could start making PV modules using the new method. While I was gone, the students made about 25 of the 65 watt PV modules using the silicone but they were looking forward to using this new method. We put together the sandwich of the PV cells between two sheets of the EVA with a sheet of glass on the bottom (we build these modules upside down) and the vinyl backing sheet on the top and slid it into the solar oven with a sheet steel plate and concrete blocks on top of everything for weight.

Hugo and I with the successfully encapsulated 65 watt PV module right out of the oven. It worked perfectly.

This experiment worked very well, even though the oven temperature only got to 115º C and we had to finish the encapsulation the next day when clouds came over the first afternoon. This is the first time anybody in the world has made a full size PV module this way so we have a lot of details to learn, but this method can replace the half-million dollar automated laminating machine that normally does his work. ***Update:*** *We now have continued this work in Niger, West Africa where we made full size PV module using a solar oven made by the nomads. We will introduce this technique in the other 3rd World places. -RK*

The University course in Bucaramanga

On Friday of the first week I was in Colombia this time, the rector (president) and head of the engineering school of the Universitaria de Investigacion y Desarillo (UDi) in Bucaramanga came to visit us in Barrenquilla. They wanted me to come to their university and teach a short course on solar energy for the faculty and visiting engineers. They arranged to fly us there on the Sunday of the following week after we had finished the work with the Juaruco natives.

Hugo, one of the natives went with Julian and me to help teach the short course. I gave the lectures (in Spanish with Julian's help) and Hugo gave the hands-on workshops on how to build the PV modules. The university put us up in the three bedroom UDi downtown condominium so we had pretty palatial living quarters on the 9th floor. The elevator didn't work all the time so I got lots of exercise but they arranged for us to eat at a small restaurant near the university so we also ate well.

The course was lectures from 8 am till noon every day, then hands-on work from 2 until 5 in the afternoon. Since this was to be a higher lever course, I included the quantum physics of semiconductors and gave a lot of the equations I usually skip to not intimidate the students. Hard work in Spanish for me but Hugo did very well holding up his end considering he is a campesino with about a fourth grade education, teaching university professors.

Hugo (in the blue T-shirt) showing the university people how to test the PV cell strings prior to encapsulation.

We had split the 24 students into three groups and by the end of the week, they had made six 65 watt PV modules and about 8 solar cell phone chargers. We also went over the methods of designing PV systems with several examples; and I gave lectures on solar thermal systems including solar air conditioning.

This latter was important since one of the reasons why they wanted me to come was to help them design a ten story addition to the universityt hat they wished to be a "zero energy" building with all the electricity, hot water and air conditioning being furnished completely by solar energy.

Discussing the Zero energy building design with the architect

After the week long course, we spent Saturday going around the building with the Cuban architecture professor who is in charge of designing and building the building. He was already well versed in solar design and had included proper shading and solar daylighting to keep the heating and lighting load of the building to a minimum, so the PV array needed was about 144 of the 65 watt modules. We designed a lithium bromide absorption air conditioner that ran from heat from an array of 150 evacuated solar water heater tubes. The only electricity the air conditioner will need is to run the pumps and fans since the heat furnishes all the energy needed to produce the chilled water, which will be stored in large insulated tanks for use when cooling is need at night or cloudy days. All the hot water needed (and then some) will be from the waste heat from the air conditioner system; the first of its kind in Latin America.

The building will be connected to the university power grid and when it is producing more electricity than the building needs, the excess will go to other building in the university. Probably none of the electricity will end up in the national utility grid, which is not yet set up for anything like net billing. There is a lot of social and political work needed in Colombia to get to that point.

The plans are for me to come back as a consultant as needed during the construction of this system, but the $100,000+ price tag of the system had the university administration a bit scared; but they will go ahead anyway.

Solar Experts Rebut Fossil Fuel Industry Attacks

The fossil fuel industry likes to fund pundits and "experts" to talk about "expensive" clean energy. But this is just an attempt to shift attention away from the enormous handouts fossil energy received for many decades. Between 1950 and 2010, the three main fossil fuels – oil, gas and coal – received $594 billion in federal energy subsidies in the United States alone. In stark contrast, renewables (primarily wind and solar) received just $74 billion in federal energy subsidies during that time period, or just 12% as much as the fossil fuels received.

In addition, we know that the production, transmission, and consumption of fossil fuels has serious, adverse and very expensive effects. A Harvard study released earlier this year found that "the life cycle effects of coal and the waste stream generated are costing the U.S. public a third to over one-half of a trillion dollars annually." Oil, of course, has enormous costs in terms of air pollution, terrible spills such as the one we experienced in the Gulf of Mexico in 2010, the funding of dictatorships and terrorist groups around the world, and the huge economic cost entailed to the United States (e.g., in 2010 alone, the U.S. ran a $269 billion net trade deficit in oil, accounting for about 42% of the country's entire merchandise trade deficit in that year).Dirty energy industries' dirty little secret is that they are the expensive forms of energy. They have been on the dole for years, including access to public property that they always wreck. The public needs to know that its money is being given to these industries.

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.

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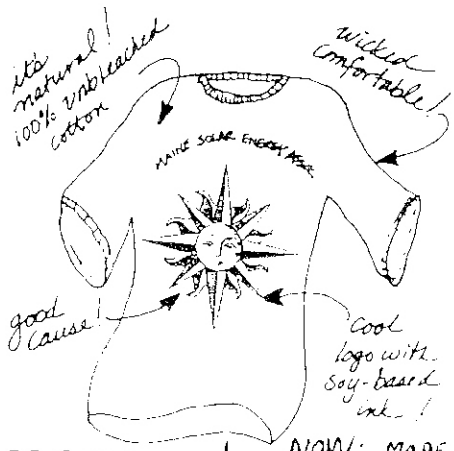

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