SUMMER 2016

THE MAINE SUN

NEWSLETTER of the Maine Solar Energy Association

MESEA-Dadsolar solar workshop trip to Guinee, West Africa

By John Burke

Tuesday April 26, 2016 … JFK airport, terminal 4, NYC. - I'm ready to depart for Paris, via Delta 404 at 6:52 pm. Breakfast at Paris, 8:25 am, Wednesday, 4-27-16 (CDG). 3 hour wait for the 11:10 am flight (AF724) to Mauritania and on to Conakry, Guinee, arrival at 5:05 pm for supper.

Rich Komp is in the hospital, Ellsworth, ME after his colon operation … a major set-back for his worldwide solar web. I'll try to get the next step for this endeavor. I'll have 30+ days to impart the detailed solar assembly work, with the help of a translator (French speaking).

I was the person who was to go to Guinee but when cancer was discovered, I ended up in the hospital in Ellsworth ME after an emergency operation. We arranged for John to go instead. After meeting with me here in Maine to fill him out about the new PV encapsulation methods, we arranged for us to talk in the mornings by Skype from Guinee to plan the next day's work (usually at 4 am my time). This worked out very well as the trip was a great success. R Komp.

10:15 am boarding, with Binta Terrier, *(the head of the PLAD group of African Diaspora, which is organizing and paying for the trip. RK)* Air France flight to Conakry, Guinea, arriving at 6:00 pm with sun setting in the west. Met the driver, after many folks want to 'help' us and take our money. We meet Binta's sister Kade, and come through the worst traffic in the world, **ever!** *(Actually the normal traffic in 3rd World cities – RK),* and it's like this every night. I'm reminded of Montego Bay, Jamaica, with the stalls, reckless drivers and folks selling ice water, bread and other goodies.

8:15 am, Thursday, 28 April 2016, waking up to the neighborhood sounds, and a coffee with bread breakfast. Back to the traffic and 'downtown' Conakry for a day, dealing with the small shops, stalls that sell everything and anything. A lesson in French speaking with our interpreter, Barry, who turns out to be a real 'bargainer'. We make deals on wood, glass, tools, aluminum framing pieces and hardware for the solar workshops and PV install at the dwelling Binta has and is restoring.

April 29, Friday, getting supplies and gathering for the first time with the 'solar' group, 3:00 pm is the expected time to begin the workshop, but 6 folks turn up at 12 noon, and we start early as another 4 add to the number. We are cutting solar cells for our 32 W PV module. A complete explanation of how and why is appropriate. An understanding is reached with the group as another 5 folks arrive at 2 pm. The sharing of the basic knowledge is developing between the first group and the others, as 3:00 pm arrives with another 15 and then we reach 35 folks, all with the enthusiasm necessary for a community organization. Our group is intent on expressing their desires and understanding as our French speaking group leaders try for a 'complete' description and a 'statement of purpose'. At 5:00 pm we decide that we should meet again on *Lundi* (Monday, May 2), since there is more work on the building scheduled for the weekend. The group is encouraged to follow through on Monday, 10:00 am to 3:00 pm. We will get the supplies needed on Saturday and relax on Sunday. The temperature and humidity affect the mood, as it may anywhere.

Group soldering strings of PV cells

Saturday, April 30. This day, we will return to the workshop space and check the shopping list for our trip to the 'market'. After many attempts, we do find the supplies and tools to round off the necessary items. Back to the glass dealer, we acquire the glass pieces for the 'solar oven' and on to the stalls and shops to find the 220 V soldering irons. ***Continued on Page 3***

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**

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Calendar of Events

MESEA Website WWW.mainesolar.org
Facebook: *Maine Solar Energy Association*

OFF-GRID Solar PV Installation Workshop in Maine

Date: Saturday – Sunday August 13-14 10 am-4 pm,
Rain date, August 20-20 (One or two days optional)
Location: A private home in Cambridge, Maine (details on receiving your reservation fee).
Description: A small, simple ***off-grid*** solar PV system, for lights and radio and TV, to be installed with the hands-on help of a limited number of participants. This PV array will be 12 V, approximately 130 watt total (2 x 65 W), with 12 V battery bank and charge controller, as well as inside and outside wiring, for lighting and to accomplish the simple goals of the home-owner.
Cost: $50. per day, for full hands-on participation (one or two day participation available), $25. per day, for limited participation (one or two day, without hands-on experience). ($10 non-refundable)
As always, lunch will be provided by the MESEA, free of charge
Reservation fee: Deposit required- balance on arrival at workshop.
Contact: John Burke, 207 546-1639, or Carol Gardener, 207 277-3191

Join us for our premier knowledge sharing and networking event!
American Solar Energy Society's 45th National Solar Conference
SOLAR 2016: *Progress Toward 100% Renewables*
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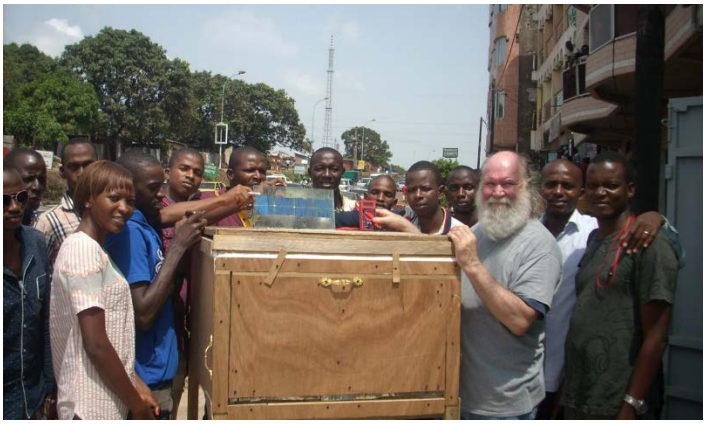
From Page 1 We also find the insulation as well as bubble-wrap for the solar oven *(wrong material for a solar oven insulation. John called me and we worked out where to get the correct insulating material – the shavings from planning the wood they bought. Fluffy, light weight and free. RK).* Some additional tools and items are found including the vinyl backing sheet for the PV modules. Looking forward to Sunday off.

The 'solar oven' assembly was a first for all involved, including John Burke. The oven transformed the solar thermal energy into an encapsulation / lamination process, to allow the EVA sheets to melt and sandwich the four 36 cell PV modules, for installation on the workshop building. The full cells (80 x 150 mm), were cut in half (80 x 75 mm), for each of the four 32W modules, producing a 'rated' 1.7 A. The details of the PV assembly and solar oven encapsulation are cherished by the group as well as the leaders.

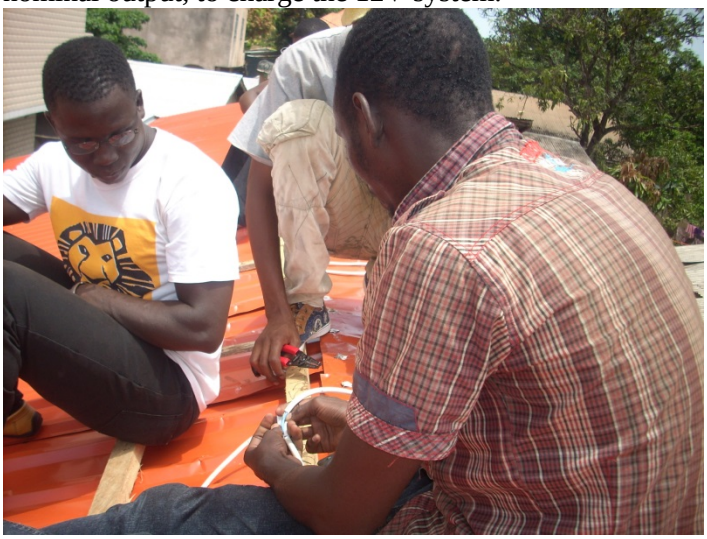


John Burke and the group testing the solar oven with a small PV module encapsulated with the EVA

Soldering the strings together, getting ready to encapsulate a 32 watt PV module to power the building.

The first 32 watt PV module assembled in Guinee All the participants autographed this module.

After framing the PV modules and testing for proper output, on June 6 and 7, the group had the enthusiasm to install the four PV modules on the roof of the building. This effort was watched from the ground by about 25 folks, as the five group members carried out the module wiring, with parallel connections, resulting in the 12V system. Simple screws with metal and rubber washers hold the PV modules to the wood rack. The workshop building now has a 128W PV array, to generate approximately 7.0 A, at 18V nominal output, to charge the 12V system.



Working on the roof to install and wire the PV system.

The group did successfully wire the PV array to the 20 amp charge controller in the front room of the workshop, to safely re-charge the 12 V, 'Solar Gel' battery (100 Ah). The controller will limit the voltage to the battery and cut off the charging when the battery is fully charged. More PV modules and batteries may be added in the near future. The group is now assembling another solar oven for use at the workshop, to cook food and make PV modules, hoping for higher temperatures. We're discussing a possible return trip in the fall. The country has many PV modules in disrepair, around the capital city, set up for street lights by E.U. NGOs, but lack of maintenance leaves only a small percentage that continue to shed light at night.

Recent Trends in the Valuation of Distributed Solar

ByConor Walsh

Whether we like it or not the policy and regulatory landscape of the US solar industry is in a constant state of flux. This evolving picture routinely delivers a combination of encouraging and sometimes disheartening developments. While the industry rejoiced with the extension of the federal Investment Tax Credit (ITC) in December of 2015, the following month saw a step backwards for rooftop solar in Nevada. Overall solar policy remains robust and supportive. The need for new solar capacity also remains strong as aging coal and nuclear plants go offline across the country. This article will serve as a synopsis of policy developments that occurred in the first quarter of 2016.

Maine

Maine is in the throes of a solar renaissance. With only 20 MW of solar currently installed new legislation proposes a revamped rate structure for distributed solar resources aimed at developing 248 MW through 2022. Under the current net metering scheme solar owners are compensated at a fluctuating kWh rate for excess generation. Under a new proposal solar installations under 250kW would enter into a 20 year fixed-rate contract with utilities for generation exported to the grid. The kWh contract price would change over time as the number of installations in the state increases and the 248 MW goal is approached. Larger commercial and community solar installations would sell their 20 year contracts at annual reverse auctions for the full output of their solar generation. Once the system is operational these customer will receive a bill credit. Under the proposed legislation 163 MW of the 248 MW program would be set aside for residential, small business and community solar systems. For systems of all sizes solar generation is to be aggregated and sold into the New England electricity market by the Maine utilities.

Segment	% of Market	Total MWs
Residential & Small Business	47%	118
Community	19%	45
Large Commercial & Industrial	10%	25
Grid Scale (up to 5 MW)	24%	60
Total		248

Although this new legislation initially received widespread support from a range of stakeholders, as of recently there has been a push to by Maine solar installers to embrace current net metering practices over adopting new legislation. Despite Maine representing a small segment of the US solar market, progress and developments to the state's solar policy will be watched closely on the national stage as many states face similar choices pertaining to their own net metering programs. *This legislation was vetoed by Governor Le Page and enough Republicans in the legislature voted with him so that the veto was upheld. We have a good deal of political work necessary to be able to take advantage of the benefits of distributed energy.- R Komp.*

Massachusetts

Massachusetts is home to one of the nation's most vibrant solar markets. The states hosts over 1GW of residential, community, commercial and utility scale installations. In recent weeks many of the larger projects have come to a screeching halt as two of the state's most impactful incentives reached their legislative limits. While net metering caps are impacting installations in National Grid territory, all projects over 25kW can no longer qualify to generate MA solar renewable energy credits (SRECs). Although only 1,000 MW of the 1,600 MW SREC allotment has been built, the remaining capacity has been fully subscribed. Until hard details emerge on the next SREC-based program larger solar developments are on hold in the state.

On a more positive note, over two-thirds of the MA House of Representatives has signed their support in favor of a bill that would increase the net metering caps. This pro-solar group has petitioned to maintain the full retail rate of compensation for excess generation from rooftop and community-shared solar projects alike.

Pennsylvania

Rooftop solar took off in PA with the launch of the Sunshine Solar Program in 2008. Rebates from this program paired with a healthy SREC market saw the number of solar installers increase by a full order of magnitude in a matter of a couple years. A glut of SREC supply paired with the exhaustion of the Sunshine rebate fund ultimately led to retrenchment of the solar industry in PA. The state of solar in PA may be on the cusp of a revival with the PA PUC recently voting to preserve full retail compensation for net metered solar energy fed back into the grid. Utilities also sought review of the capacity limit for distributed solar resources. Rather than bowing to the utilities request for systems limited to 110% of the facility's/home's historical usage, a compromise was struck at 200% or 50kW. These developments are first steps on the road to recovery for the PA residential solar market.

South Dakota

For a short period of time the state of solar in South Dakota seemed to be looking bright. In the absence of retail net metering common is many other US states, solar customers in South Dakota are compensated at the avoided cost of generation. Although this is good practice in attaining a partially accurate picture of the value of distributed solar, the rate of compensation in SD varies by utility provider. Last month legislators considered a bill that would standardize the avoided cost compensation across the state. Solar advocates hoped this standardization would pave the way for increased solar in the state by providing customers across the state with similar payback periods. Unfortunately a legislative committee squashed the bill in an 11-2 vote. Although SD is home to cheap electricity and little in the way of solar incentives, declining costs of solar and the shuttering of aging coal plants will spur solar growth in coming years and decades.

Energy Storage for Renewables Can Be a Good Investment Today, Study Finds

by David L. Chandler, MIT News Office

Utility companies or others planning to install renewable energy systems such as solar and wind farms have to decide whether to include large-scale energy storage systems that can capture power when it's available and release it on demand. This decision may be critical to the future growth of renewable energy.

The choices can be complicated: Would such a system actually pay for itself through increased revenues? If so, which kind of system makes the most sense, and which features of the system are most important? If not, how much cheaper do storage technologies need to be? ***Continued on Page 6.***

From Page 5. A new study by researchers at MIT shows how to evaluate the technology choices available, including batteries, pumped hydroelectric storage, and compressed air energy storage, and demonstrates that even with today's prices for these technologies, such storage systems make good economic sense in some locations, but not yet in others. The study, by Jessika Trancik, the Atlantic Richfield Career Development Assistant Professor of Energy Studies at MIT, and graduate students William Braff and Joshua Mueller, was just published in the journal *Nature Climate Change*.

"Researchers and practitioners have struggled to compare the costs of different storage technologies," Trancik explains, "because of the multiple dimensions of cost and the fact that no technology dominates along all dimensions. Storage technologies can only be compared by looking at the contexts in which they are going to be used." But the study found that regardless of the particular circumstances at a given location, certain features of how electricity prices fluctuate are common across locations and do favor some specific types of storage solutions over others.

Selling at the peak price

For example, the team found that in Texas today, pumped hydro systems can provide added value today for solar or wind installations. In these systems, excess power is used to pump water uphill to a reservoir for storage, and then the water is released through a turbine to generate power when it is needed. The increased revenue the plant can produce, by waiting to sell the power into the grid until spot-prices for electricity — the constantly-changing market rate that electricity distributors pay to producers — are at their peak, would exceed the costs of the added storage system.

Further, they found that such pumped hydro storage provides more value than a storage system using lead-acid batteries even though its power capacity components would cost several times more. This is because a pumped hydro system has lower energy-capacity costs than lead-acid battery system. (Energy capacity refers to the overall amount of energy that can be stored in the system, and power capacity refers to how much energy can be delivered at a given moment from that system). A compressed air storage system could also add value comparable to that of the pumped hydro system. However, batteries are attractive, the researchers note, because they can be installed essentially anywhere and do not rely on natural features that exist only in some locations.

The researchers point out that much research on storage systems for renewable energy sources has focused on using the systems to smooth out the intermittent outputs to better match fluctuating demand. But in practice, most of these wind or solar farms are feeding into the grid, so what matters to potential investors is the price curve rather than the demand curve. Surprisingly, it turned out that despite wide regional variations in the average prices and the amount of variability in demand and pricing, "the best storage technology in one location is also the best in the other," Trancik says. "This is because of the similarity across locations in the distribution of the duration of electricity price spikes. This pattern likely emerges because of constraints imposed by the daily cycle, and similarities in when people go to work and go home, and generally how they spend their time."

Whether an energy storage system is worth the cost today varies widely by location, because of large variations in the frequency and magnitude of spikes in the price and how the solar and wind resources fluctuate over time, she says. But the cost characteristics of the optimal storage systems are similar in all locations, the researchers found, because of certain common, emergent properties of electricity price fluctuations.

"This means that these results can be used to inform investments in storage technology development by the private sector and government, and can inform engineering efforts in the lab," Trancik says. "The results would have been less general and less useful to technology development efforts if we'd found that the direction of optimal cost improvement, trading off energy capacity and power capacity costs, was different across locations."

Costs still need to drop

At this time, the study found; the costs of such systems don't yet make them profitable enough without policy support to enable the kind of widespread adoption that is needed to make a large dent in global greenhouse gas emissions. But, Trancik says, this study does suggest that market adoption already makes sense in some locations, and could be boosted with modest public policy support, which in turn would stimulate technological improvement in storage to encourage further growth. The study also provides guidance on how much the costs of a given technology need to be brought down in order to enable such deployment, and which aspects of the system need the greatest improvement — and thus, where research needs to be focused. For example it provides cost targets for various flow batteries that are in development.

SPECIAL SALE of PV MODULES By The Maine Solar Energy Association

←II→-

In addition to the still available 250 watt Certified photovoltaic modules being sold by MESEA for only $1 per watt, we also have a few modules that are broken but still work perfectly.

These modules are half price at 50 cents / watt and can be used with either12 or 24 volt systems. Available for only $125 for the 250 watt size, and cheaper for those that are of smaller wattage.

You can pick them up at our Workshop Center at 17 Rockwell Rd, Jonesport ME 04649 or we can sometimes .arrange for them to be brought to your location in Maine for a small fee.

For information: 207-497-2204 or 516-679-9090
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Now 36 pages with new material

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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.

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