

Summer 2011

# THE MAINE SUN

NEWSLETTER of the Maine Solar Energy Association



## The Second trip to Niger

By Richard Komp

I am writing this in my Left Bank garret room in Paris. We had to leave the Sahara Desert region early, with army escort (insisted on by the American Embassy and the central government) because of the African unrest and the election which was held yesterday. The Nomad Foundation put me on an earlier plane to Paris so I have 3 more days here before I fly back to Nicaragua on Friday as planned. I'll enjoy my time here, the owners of the tiny hotel are from Peru and they gave me a special rate for this garret room. No heat at night but a great view of the Seine and Notre Dame and I am finally writing the second Niger report as well as walking around Paris.

This second trip almost didn't come about. Just before I was to fly to Niger from Nicaragua, the Al Qaida decided to kidnap two Frenchmen from a fancy bar in Niamey, the capitol of Niger; and the French special forces tried to rescue the men. In the firefight, the captives were killed and all the foreign people in Niger got very upset. The Nigerian Government finally let us go up to Agadez if we had a complete army escort, which the Nomad foundation had to pay for. Finally - before dawn three days late, we started the long 14 hour drive up into the Sahara Desert with an escort Toyota pickup mounting a big machine gun filled with soldiers. I think this must be a standard option from Toyota: "The Warlord Special" you see all over Africa. *(Continued on Page 3)*



A military "cowfrontation" - The nomads are discussing an upcoming cattle auction.

## MeSEA PV workshop and ASES Chapters - Cooperation

By John Burke

*An update of the cooperative efforts between the MeSEA and ASES Chapters.*

Since we have refreshed our focus, after last year's physical setback, there is a renewed enthusiasm for our PV "cottage industry" approach in the developing world. MeSEA has finally consummated the coop workshop series with the Minnesota Renewable Energy Society (MRES). On the 1<sup>st</sup> and 2<sup>nd</sup> of June, John Burke of MeSEA, held a 60w PV assembly workshop with the MRES Int'l. Committee, so the first step would be ready for the weekend "full" assembly workshop. (The turkey in the "oven").

Five participants, assembled a three string by twelve cell, 60w PV module, through the encapsulation step and ready for the weekend, two-day assembly workshop, June 4th and 5th. This was attended by sixteen Minnesotan participants, including the three MRES members from Nigeria, which will be the focus of the first International Committee endeavor into the developing world. Other Minneapolis / St. Paul residents from Ethiopia, Senegal and Pakistan, as well as ten local MN (American born) residents, were in attendance for the weekend intensive. Many thanks go to the MRES Int'l Committee organizers and the MRES Exective Director for a wonderful week of solar experiences for the MRES members and the MeSEA representative. The local "Midwest Mountaineering" facilities were superb and we are grateful for the host family who put up with John for the six day visit (Including a "baptism" in the St. Croix River, from a canoe, although not planned)! The tornadoes missed us and we did enjoy the solar energy! *(Continued on Page 6)*

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For more information check our [www.mainesolar.org](http://www.mainesolar.org) website.



## **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

Opinions expressed by authors or editors do not necessarily reflect the views of MeSEA. The publisher reserves the right to refuse advertising which is not consistent with the goals of this organization. Acceptance of advertising does not constitute endorsement of the advertiser, its products or services.

*The Maine Sun* welcomes articles, submissions, photographs, and letters. Please send editorial materials to the following

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## **Calendar of Events**

**MeSEA Website [WWW.mainesolar.org](http://WWW.mainesolar.org)**

### **WORKSHOPS**

#### **SOLAR MICRODRIP IRRIGATION WORKSHOP – Sankofa Farm 23-24 July 2011**

Water is one of our scarce resources - to be conserved instead of being fought over. Conventional irrigation represents one of the biggest uses of water in the world and is fast becoming unsustainable in this era of population growth and climate change..

At this workshop, we will spend Saturday assembling a solar powered well pump system and learning the basics of how solar photovoltaic modules can be connected directly to a 12 volt dc pump, without any batteries or controller except an on-off switch . We will also go over the details of how to install a solar water pump in different situations. We will have lectures on the basics solar energy and of microdrip irrigation, where the usual spray heads and pipes are replaced by small tubes with calibrated holes deliver water directly to the roots of the plants. This kind of irrigation not only saves a great deal of water; it also cuts down the need to weed, since only the food crops are directly watered. Often successful irrigation can be accomplished with 1/5 to 1/8 of the water needed with a conventional irrigation system.

On Sunday, we will learn the details of proper irrigation theory and practices, such as how to calculate how much water per square foot different plants require, when in the day and year to water different crops and how to decide when to water in dry seasons. We also will go over the basics of photovoltaics and how to use solar cells, ending with the new developments in both photovoltaics and irrigation.

RICHARD KOMP, the solar workshop instructor, has had over 50 years experience in working with solar energy at universities, industry and remote locations all over the world. He is the author of Practical Photovoltaics and has given numerous solar workshops in this country and overseas. He is the current president of the Maine Solar Energy Association.

CAROLINA BARRETO the microdrip instructor and agriculture expert from Nicaragua is finishing up her doctorate studies at the University of Massachusetts – Lowell, working on solar microdrip irrigation in the Andes in Peru. She has taught solar microdrip irrigation workshops and installed large irrigation systems in Brazil, Haiti, Belize and Nicaragua, and has worked with Dr Komp for many years.

**Workshop Dates:** Saturday and Sunday, 23-24 July 2011; 8:30 AM to 5:00 PM, at the organic Sankofa Farm in Washington County, on Rt. 193 just south of Rt. 9 (“the Airline”)

Sponsored by: Maine Solar Energy Association & Sankofa Farm

**Cost:** \$60 for either day or \$110 for the weekend, including lunch and refreshments

This workshop will be limited to 20 participants so register early.

FOR MORE INFORMATION CONTACT: Richard Komp, MESEA, 207-497-2204 [sunwatt@juno.com](mailto:sunwatt@juno.com) or Nathaniel Chism, Sankofa Farm, 207-638-2321 [www.theSankofaFarm.com](http://www.theSankofaFarm.com)



(From Page 1) About ten hours into the trip we were finally met with the second *Warlord Special* filled with still more troops and a second commander. This pair of trucks would follow us everywhere we went and I got to know both the commanders and the troops very well, since they were always around and were very interested in our solar work. The nomads even sold the soldiers solar cell phone chargers they had made.

Since this was the second workshop I had with the same Touareg and Wodaabe nomads, the students remembered almost every step needed to build photovoltaic modules and we could get right to work building two more of the special 30 cell PV modules needed to power the submersible well pump needed for our microdrip installation in a nearby oasis. I had brought 1000 more Evergreen Solar cells in my luggage and Leslie from the Nomad Foundation brought another kit of the special liquid silicone encapsulant so the nomads have enough material for many more PV modules. Even though the trip was cut short, we managed to build three 65 watt modules for powering 12 volt home systems, five small cell phone chargers and a special 55 watt 8 volt module to run a “swamp cooler” type solar air conditioner.

After three days making PV modules, we set off into the desert north of Agadez to the oasis where we installed the 24 volt Sunpump in an existing hand dug well. The well is right next to a dry waady that actually flooded the gardens a couple of months ago, so the water level is only 10 feed down. We assembled a tower I designed and we had had built in Agadez and quickly assembled the electrical and plumbing system to deliver the water. The army commander was extremely interested in this project and all the soldiers helped install the tower with him organizing the project. When we got the pump running the nomads treated the water coming out of the pipe like a precious fluid, it was almost a religious experience with them.

The next step in the project will be the construction of a 3 cubic meter (~700 gallon) water storage tank. Since the solar pump works hardest in the middle of the day and irrigation is normally done in the early morning and the evening, you have to store at least one day’s worth of water. The system has no batteries or controls except an on-off switch; when the sun shines, the pump runs.

***For more of this story, you can go to our MeSEA [www.mainesolar.org](http://www.mainesolar.org) website. Look at the International Work page.***



**Erecting the tower with the PV modules to power the solar water pump for the well.**

The next day, we installed a small solar lighting system in the Nomad Foundation office in downtown Agadez. This went very smoothly with the nomads learning how to hook up PV charge controllers and light switches to the 12 volt storage battery and PV module. With about a dozen people working at any one time, we had manpower enough to keep building the very popular solar cell phone chargers, utilizing the broken scraps of cracked PV cells. The nomads even sold one of the solar cell phone chargers to the army commander, who took part in the workshop to finish his own charger.

The final project we had time for before we had to leave early, was making an evaporative type “swamp cooler” solar air conditioner. One of the soldiers cut a deal with a used parts supplier to buy an electric radiator cooling fan from an old SUV. The air coolers, which used to be very popular in places like Arizona only work well in places where it is always very dry. The Sahara Desert certainly fits that description but the local people were pretty much unaware of this piece of technology. I measured the current draw of the fan and we decided that at 12 volts, it was too noisy so we went with an 8 volt system that gave a good air flow with a quiet fan. The same metal working shop that had built the irrigation system tower agreed to build the box I designed as the swamp cooler body and had the device finished the next day after I gave them the fan to mount on the front. We found an old burlap bag to use as the water soaked screen to get the evaporative cooling.



## Sunspots and Powerlines

By Richard Komp

We are heading into a solar maximum. This happens every 11 years or so but the last couple of solar sunspot cycles have been unusually calm. The sun seems to be getting more active again, which is its normal state; but the maximum might still not produce as many solar storms as we had 30 years ago when the storms knocked out the utility grid in Quebec (*see article below*). The EMF pulses produced when the solar particles hit the Earth's magnetic field create high voltage surges in the overhead power lines. (Home PV systems should not be affected since the wires connecting the PV array to the batteries or inverter are usually short and the equipment is low voltage dc in part of the system.) If our power lines were the new shielded coaxial dc systems now being installed in Europe and China, they would also be immune to the solar pulses; yet another reason why our antiquated Tesla three phase ac utility system needs to be upgraded. The utilities should start switching to the high voltage direct current (HVDC) lines, especially in places where nor'easters and hurricanes are known to visit.

The main reason for switching to the HVDC system is that wires carrying direct current don't radiate while the alternating current (ac) lines radiate continuously, unless they are coaxial cables (this is why the people who deliver your TV signal by wire always use coaxial cables). At the least, this radiation siphons off anywhere up to 10% of the power we generate when the power companies deliver it. There is also some concern about what all that electromagnetic radiation does to us and other living things.

The coaxial cables being installed by the electric utilities are actually *triaxial* cables. They have a large center conductor capable of carrying 1000 amps or more surrounded by very good soft plastic insulation capable of handling a million volts or more. Surrounding that is a sleeve of woven wire with the same cross section area to carry the return current back to the power source. To protect from hazards like backhoe drivers, another layer of insulation and a sleeve of high strength steel covered with a tough plastic sheath surrounds the whole cable. The Europeans are draping these HVDC cables across the North Sea to Scandinavia and have plans to cross the Straits of Gibraltar to North Africa to tap the solar power from the Sahara Desert. I actually worked with the Afriqpower people in Mali as a consultant to the government about the large solar thermal power plant an EU consortium wishes to build in the desert near Timbuktu. I suggested that the plant also furnish electricity to the capitol city Bamako as well as to Europe.

## What if the Sun went into a new Grand Minimum?

by Georg Feulner

During a meeting of the Solar Physics Division of the American Astronomical Society, solar physicists have just announced a prediction that the Sun might enter an extended period of low activity (a 'grand minimum') similar to the Maunder Minimum in the 17th century. In this post I will explore the background of this announcement and discuss implications for Earth's climate.

It has been known for a long time that solar activity shows a very regular pattern. Every 11 years the Sun is particularly active, and numerous dark sunspots are visible on its surface. These maxima of solar activity are separated by times of low activity when only few (if any) sunspots appear.

One could think that the Sun emits less light during a solar maximum because of the many dark spots. In fact it is the other way round, since active regions around the sunspots emit more radiation than is "lost" in the cooler sunspot areas. An analysis of historic sunspot observations shows that the 11-year solar activity cycle was interrupted during the late 17th century. This period of time, during which the Sun appeared without sunspots most of the time, was called the Maunder Minimum by Jack Eddy in his famous Science paper. (Alliteratively named after Edward Maunder, although it was actually first discovered by Gustav Spörer.)

The Maunder Minimum falls within the climatically cooler period of the "Little Ice Age", during which temperatures were particularly low over continents in the Northern hemisphere (especially in winter). It has long been suspected that the low solar activity during the Maunder Minimum was one of the causes of the Little Ice Age, although other factors like a small drop in greenhouse gas concentrations around 1600 and strong volcanic eruptions during that time likely played a role as well.

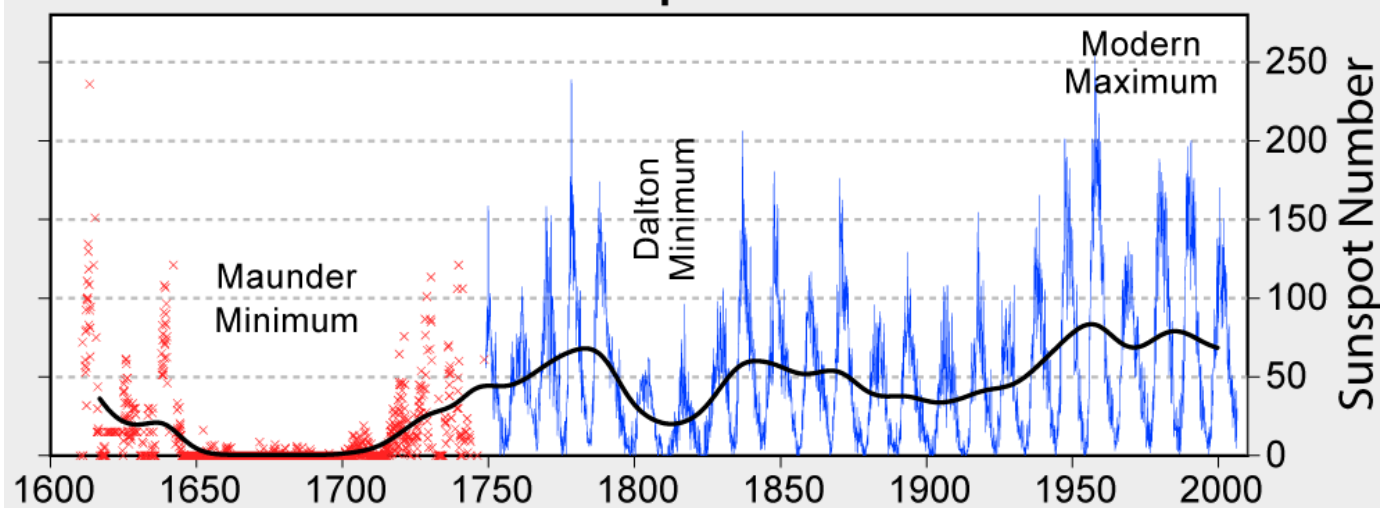
Solar physicists do not yet understand how an extended solar-activity low like the Maunder Minimum arises. Yet there is recent observational evidence for an unusual behavior of the Sun during the current cycle 24, including a missing zonal wind flow within the Sun, decreasing magnetic field strength of sunspots and lower activity around the poles of the Sun. These observations prompted Frank Hill and colleagues to suggest that the Sun might enter a new Maunder-like minimum after the current 11-year cycle ends (i.e. after 2020 or so).

**Visit <http://www.realclimate.org/> for more information on this and other Climate Change information.**

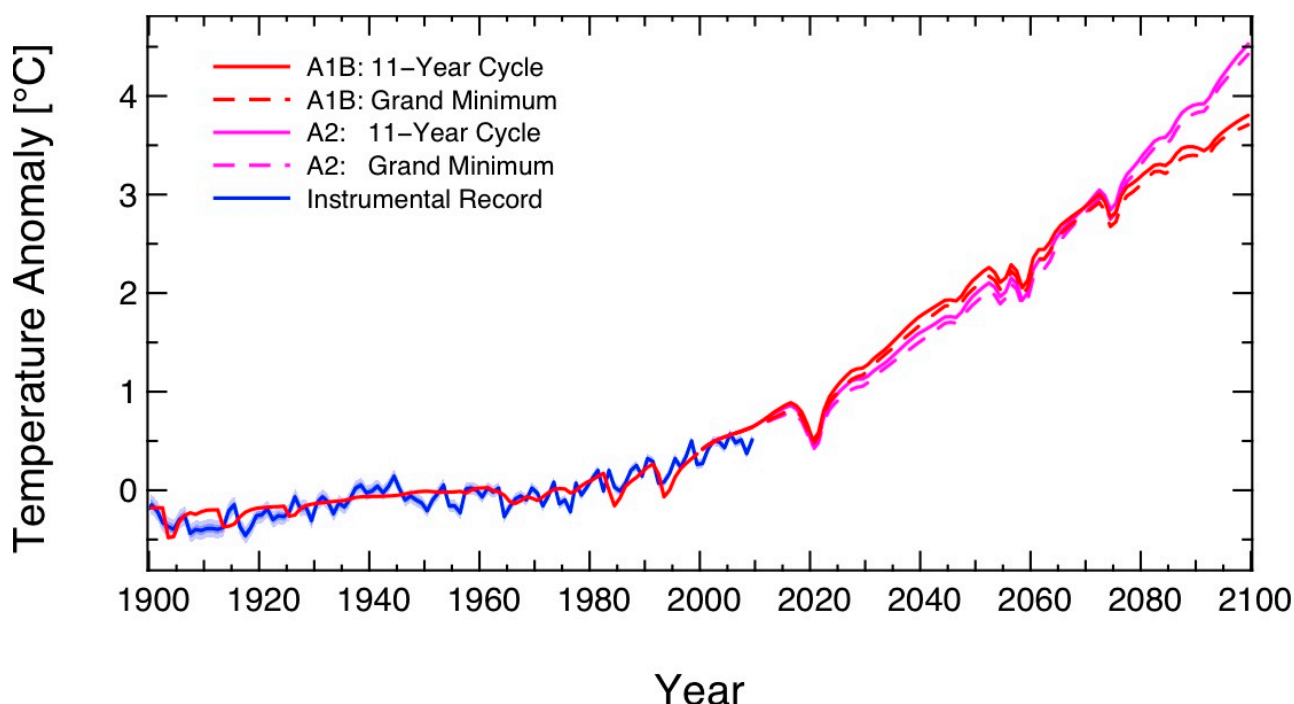




## 400 Years of Sunspot Observations



It remains to be seen whether this prognosis turns out to be true (there have been some doubts expressed), but since grand minima of solar activity did occur in the past, it is certainly interesting to explore what effects such a minimum might have on 21st century climate if it did occur. This is precisely the question Stefan Rahmstorf and I investigated in a study published last year (see also our press release. (Earlier estimates for the size of this effect can be found here and here.) In our study we find that a new Maunder Minimum would lead to a cooling of  $0.3^{\circ}\text{C}$  in the year 2100 at most – relative to an expected anthropogenic warming of around  $4^{\circ}\text{C}$ . (The amount of warming in the 21st century depends on assumptions about future emissions, of course). It is clear that if a grand minimum were to happen it would be a tremendously exciting opportunity for solar physicists; however it is unlikely to be even noticed by anyone else.



*Figure 4: Rise of global temperature (relative to 1961-1990) until the year 2100 for two different emission scenarios (A1B, red, with reductions in our use of fossil fuels and A2, magenta with business almost as usual). The dashed lines show the slightly reduced warming in case a Maunder-like solar minimum should occur during the 21st century. (The sharp dips at 2020 and elsewhere are dust from possible volcanic eruptions.)*



### **From page 1 Other MeSEA PV Workshops**

In March, three Fridays, 4<sup>th</sup>, 11<sup>th</sup>, and 18<sup>th</sup>, was all it took to assemble one 60w PV module, as well as two 30w PV modules, with the Manhattan Comprehensive HS Energy class with Solar1. The two 30w modules were to be used to power air pumps for “compost tea” units, at the NYC Park, next to the HS, on 2<sup>nd</sup> Ave, NYC. The 60w PV module was to be used for a greenhouse fan system in a public garden in Brooklyn, NYC. The class included students that were involved last year during the MeSEA PV workshop, as well as students new to our PV assembly methods. There were, again, students newly arrived in the US, from Africa, Asia and the Caribbean, as well as a few “homegrown”. There were the Solar1 folks involved with this series, as they were last year



**The NYHS Eergy group with their finished PV module**

On March 19th, the MeSEA PV assembly experience was shared with folks in So. Plainfield, NJ. Hosted by the NESEA-NJ chapter, along with the expert cooperation and facilitation of the NYSES, ASES Chpt. John Burke, again led a diverse group through the assembly of a 60w PV module. The group was diligent in their attentive spirit and although we finished late, the module was a success!

April 8th through the 16th, allowed a week-long, PV assembly intensive, at the MeSEA solar seminar center and home of Rich Komp, on the Atlantic Ocean, in Jonesport, Maine. Folks from Rhode Island, and as far away as Maryland (Potomac Region Solar Energy Association, ASES Chpt.), were in attendance, and we assembled four 60w PV modules. These will be installed at the Jonesport solar seminar center, this summer! During the week, John Burke, with MEEP funding, presented a PV workshop with Sacopee Valley high school students, in So. Hiram, Maine. The classes were able to assemble a 60w PV module, each class did complete a step in the six step process. Many of the students had interesting questions and insights and are interested in furthering their alternative energy studies in the future.

Another PV assembly workshop, April 30, in Brooklyn, hosted by City Solar and held at the Brooklyn Commons, was well attended and folks from as far away as N. Carolina were able to participate. Thanks go to City Solar, the Brooklyn Commons and NYSES, again, for a superb workshop, which included an ethnically correct lunch from the mid-east restaurant across the street! The PV assembly process was well documented by many of the participants. The Brooklyn Commons plans on installing the module for a roof-top garden irrigation system!

May 14<sup>th</sup>, was the date for another NYSES sponsored, PV assembly workshop, at the Alley Pond Environmental Center, Douglaston, Queens, NYC. Although there was only a handful of participants, the center and the surroundings, added to the complete experience! We were able to finish a 60w PV module and the group was pleased to learn of the MeSEA PV “cottage industry” process. Thanks to you!

## **MeSEA at the ASES Conference**

**By John Burke**

The next day, May 15, MeSEA headed south to attend the Solar 2011, American Solar Energy Society (ASES) Conference, in Raleigh, N. Carolina.

John Burke is the MeSEA Chapter Rep. again this year. There were representatives from many states, (including N. Carolina, Alabama, and other tornado disaster areas in the southern US), affected by the devastating storms of this spring. There were many suggestions of how ASSES Chapters and the ASSES organization can improve their relationships, including more than two dozen items, the three more important being; 1- to have a full-time, staff person, dedicated to chapter relations, this now is Chris Stimpson, of Solar Nation, an integral part of the ASSES organization; 2- Chapters need to know what the ASSES vision is. Who is the audience? What does ASSES want the chapters to do?; 3- ASSES should develop a written agreement with chapters, renewed yearly, so we all can be reminded of our agreement and partnership, as well as each chapter supplying a one page overview of their programs, to be shared with ASSES and the chapters.

Dr. Komp presented a paper and power point, describing the new methods for encapsulating PV modules, using EVA sheets, being developed by Grupo Fenix and Suni Solar, in Nicaragua. This new method, would replace the expensive liquid silicon encapsulation method, now used in the PV “cottage industry” programs in the developing world. MeSEA also held an impromptu solar battery charger assembly workshop, in the hall of the Raleigh Conference Center. We experienced an unexpected crowd gathering at our table, and repeated the workshop the next day.



### Summer Internships and volunteer opportunities in Sustainable Living in Downeast Maine

MESEA, together with SEADS of Truth will be offering summer internships at three different nearby locations in Columbia and Jonesport, Maine. The interns will live and work on solar thermal and photovoltaic (PV) projects, and organic gardening at one or more of these locations which include Richard Komp's beautiful home on the coast of Maine, a long established SEADS workshop center on 40+ rural acres and a small organic farm. All three locations are off-the-grid with many solar and renewable energy features and all three need repair and upgrading work to make them more useful as alternative learning centers. The SEADS center needs special extensive work on the greenhouse and other parts of the structure for rehabilitation.

The internships arrangements will include free lodging. The only cost will be payments for food.

For more information and to register contact:

SEADS-Charles Ewing [seadsmaine@yahoo.com](mailto:seadsmaine@yahoo.com)

MESEA-John Burke 516-674-9090

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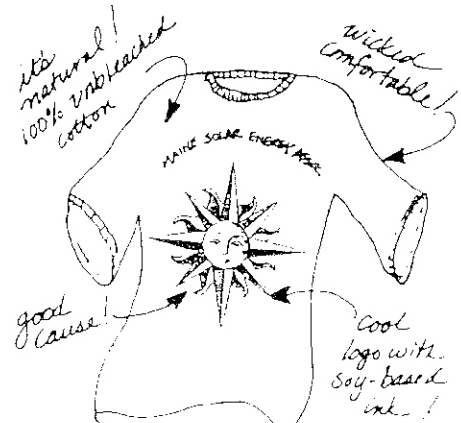
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