

FALL 2011

# THE MAINE SUN

NEWSLETTER of the Maine Solar Energy Association



## A Surprise Trip to the Amazon

by Richard Komp

I had planned to spend the entire summer working in Maine; but in early June I got a call from one of the students from the University of Dayton in Ohio. Only he wasn't in Ohio, he was in a small village called Porto de Moz on the Xingo River, a large tributary of the Amazon in Brazil. In September of 2009, John Burke and I gave a solar workshop for the ETHOS group at the University of Dayton where we taught the students how to build photovoltaic (PV) modules. Two students from the ETHOS group were in Brazil working in this remote village, teaching the native people how to build these modules, but they hadn't themselves taken the course John and I taught (They did however, have a copy of the video that was made of our course). Michael and Phil, the students had a lot of questions and after a couple of breaking up Skype calls, Mike finally said: "You have to come down here right away."

Richie Bouthillier, a missionary from the Vineyard group out of Canada was organizing the solar cottage industry project and helped me arrange plane tickets from Boston to Altimira on the Xingo River. It took four airplane legs and an overnight boat trip on the river to get to the village. The final air leg was in a small two engine turboprop that had to circle around to land on the tiny airstrip on its second try, barely under the low hanging clouds but Richie, Michael and Phil, the other ETHOS student were waiting for me. We stayed in Altimira for two days getting glass cut and other supplies like aluminum frame material to build the PV modules. One of the problems was that the \$330 kit of special silicone encapsulant disappeared from my checked luggage during the trip, most likely at LaGuardia airport but they have no record of that happening either there or Miami (John Burke checked on this while I was in Brazil and we determined the silicone disappeared in the US). I worked out a way of encapsulating the smaller modules we would build without that special silicone, but the big 65 watt modules would have to wait to be finished after we replaced the missing material.

The overnight trip on the diesel powered "lineboat" was very interesting but the accommodations were a bit primitive. You brought your own hammock and were allowed to hang it together with all the others in one of the decks. The space allotted was not as luxurious as that allotted to the sailors on an 18th century wooden British warship; *Continued on Page 6*

## Maine Solar Tours 2011

This will be the 21<sup>st</sup> year that MeSEA has offered this tour, which is always on the first Saturday in October. This year that is the 1<sup>st</sup> of October and we have more than 50 homes in six Tours. As has always been the case since we started the tours with Real Goods back in 1990, the self guided tours are free and each site will have a host to show you around and answer your questions about using solar energy in your own life.

One of the new highlights of this year's tour is the **East Machias Aquatic Research Center**, a run by the nonprofit Downeast Salmon Foundation. This building was the powerhouse for a hydroelectric dam that was removed to make it possible for Atlantic salmon to swim up the east branch of the Machias River. A large 240 volt ac grid intertie PV system plus a vertical axis wind generator furnish almost all the electric power and passive solar south windows aid with winter heating. MeSEA's Charlie Ewing and Richard Komp were consultants on the renovation of the building. *Home Tour details on page 3*



The large 4 KW photovoltaic array in front of the new East Machias Aquatic Research Center. The vertical axis wind generator is just visible to the left.

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## **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.

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## **Calendar of Events**

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

### **WORKSHOPS**

## **PV Workshops in Jonesport, Maine - October** **Sponsored by MESEA, SEADS and DADSolar**

**When:** Friday, Saturday and Sunday, October 7 - 9, and/or October 14 - 16. Each weekend begins on Friday evening with a **free** lecture, from 7 to 9 pm, and then hands-on workshops Saturday & Sunday from 9:30 am to 4:30 pm.  
**Where:** 17 Rockwell Rd, SE, Jonesport, ME 04649

**PV and How to Start a PV "Cottage Industry",** Friday, 7 pm, a free lecture by Dr. Richard Komp.

#### **PV Assembly Workshops: Saturday and Sunday Oct 7-9 - Oct 15-16**

This program will allow all participants to experience the complete PV assembly and encapsulation process that was developed in Nicaragua by Dr. Komp and Marco Antonio of Grupo Fenix and used by Skyheat Associates. The workshop will be led by John Burke and other experienced MESEA trainers and facilitators. Participants will learn how to assemble 60W PV modules. 60W PV modules will be available for sale to participants, to raise funds for the work in developing nations.

**Saturday Oct. 15:** Special Solar Air Heater Workshop. We will rebuild two solar air heater collectors that are built into the solar home, and we will explain solar heater design principles.

**Fees:** You are invited to attend either one weekend, Friday evening + a two day workshop for \$150, both weekends only \$275, or just one day for \$80. The workshop fee includes a healthful lunch each day.

Call to reserve space at 207-546-1639, 516-669-2442, or 207-497-2204. A reservation and a \$50 deposit, with full payment due upon arrival. Thanks! Early Reservation by September 30 will allow 10% rate reduction.

Limited space is available for overnight stay, or longer, for an additional fee. Local motel info is available.

We will keep the maximum # of participants to 15 per day.

## **Grupo Fenix Solar Culture Course in Nicaragua**

January 15 - 22, 2012

Come to Nicaragua and engage your head, heart, and hands in the real work of developing countries. Our hands-on courses allow you to be immersed in the daily life of rural Nicaraguans by living with host families and working alongside local community members to create their vision of a model community through renewable energy and sustainable practices. Discuss the theory behind solar energy and the challenges of development with your instructors and other course participants. Spend your days learning how to construct solar cookers, photovoltaic panels, and installing photovoltaic systems.. Most activities and classes are held in the new adobe Solar Center. Housing will be simple, like that of a typical rural Nicaraguan



# The Maine Solar Tour

## Saturday, October 1, 2011

### Part of ASES National Solar Home Tour and NESEA Green Building Open House

- ~ All tours are free of charge.
- ~ Sites are open 9 AM to 5 PM unless otherwise noted.
- ~ All phone numbers are the 207 area code, unless noted.

#### Tour I: Acadia Region

Organizer: Frank John, 185 Flye Point Rd., Brooklin, ME 04616, 359-8968 E-mail: [maine.johns@gmail.com](mailto:maine.johns@gmail.com)

Site I-1. **Brooklin**, 185 Flye Point Road, Frank and Shari John, 359-8968

Frank and Shari have two PV systems: the first is 1.92 kW grid-tied system with a battery bank. A second grid-tied array was added in early 2010, a 3.68 kW nominal feeding a 4 kW Fronius inverter. They use a Tarm wood gasification boiler to heat their house and provide domestic hot water year 'round. They will also have electric vehicles on display (Toyota Pickup, Suzuki motorcycle and a bicycle!)

Site I-2. **East Blue Hill**, 45 Clayfield Road, Arnold Greenberg, 374-5170

This off-grid home uses energy efficient appliances and a 1500 watt photovoltaic array. Arnold has lived off-grid since 2000. Clayfield Road is off Jay Carter Road.

Site I-3 **Blue Hill**, Dick Bartlett, 219 Kingdom Road 374-3230 (Kingdom Bikes)

This home has a 2 kW grid-tied system with backup and evacuated tubes to heat domestic hot water. It is a very efficient home.

Site I-4. **Hancock, Three Pines Bed & Breakfast** 274 East Side Road Ed and Karen Curtis, 460-7595

We live in an off-grid, 1.7 kW solar electric, passive solar timberframe home, with battery storage and generator backup. We operate a year-round bed & breakfast, have an organic vegetable garden and fruit orchard, and raise rare-breed sheep and chickens. <http://www.threepinesbandb.com>

Site I-5. **Little Deer Isle**, Coveside Lane Kimball Petty/Deb Marshall, 348-2648

This grid-tied system has a 900 W wind generator, a 1.3 kW grid-tie PV system with battery back up and a new 4.7 kW direct grid tie system. All small ICE on lawn mowers etc have been replaced with electric. There are 3 vintage GE Electrak electric tractors and attachments to see as well a solar electric 16' converted electric outboard boat and an electric launch. There is a 1985 VW vanagon being converted to electric that can be seen.

Site I-6, **Sedgwick**, 91 Bayview Ave. Ann Logan & Chris Eckels  
Ann and Chris have a lovely new 3-story home using a 90

evacuated tube array to provide domestic hot water and to assist with their radiant heating system. More info at: [www.downeastsolarhome.com/index.html](http://www.downeastsolarhome.com/index.html).

Site I-7, **Salisbury Cove**, 43 Bay View Dr. ue Turner

This is a rammed earth home with 5.06 kW of photovoltaics and a 60-tube solar hot water array with a SuperStor storage tank and an electric boiler.

Site I-8 Penobscot Carsten & Joanne Steenberg 150 Pierces Pond Road, ME 266-0225

This lovely home has a 20-panel PV system. More info at: [http://dragonflycovehomes.com/pierce\\_pond\\_home.htm#](http://dragonflycovehomes.com/pierce_pond_home.htm#)  
<http://www.vrbo.com/293346>

#### Tour II: Central Maine

Organizer: Claudia Lowd, Orono, ME - ph: 949-5106  
[claudia@mainerural.org](mailto:claudia@mainerural.org).

Site II-1. **Brooks**, 75 Hall Hill Road, Peter Baldwin, 722-3654

Peter's off-grid passive solar home has a 600-watt PV array assembled over the years, a 256 sq. ft. solar water heater and a large wind generator. Peter is always experimenting with new ways to use renewable energy in his life.

Site II-2. **Hampden**, 188 Emerson Mill Rd. Owner: Lee Landry, 589-4171 or 570-4222

Part Owner/Solid Fuel Projects Supervisor ReVision Energy LLC (1.5 m. from Dysart's) 60-tube Apricus evacuated tube solar thermal array on a 105 gallon storage tank.

Site II-3. **Orono**, 95 Main St. Main View Apartments Owner: Richard Pare, 866-5651 Tour Hours: 10am – 12pm noon ONLY thanks!

This 24-unit commercial apartment building has an active 48-panel evacuated tube solar thermal array installed in 1988 which creates all the domestic hot water for all 24 apartments all year round and pre-heats the water being used in the forced hot-water baseboard heating system.

Site II-4. **Orono**, 22 Mill Street Owners: Roberta/John Bradson, 866-4110 The Store-Ampersand A commercial bakery and coffee shop with a large passive solar entrance. It works so well that the entire first floor of the store needs no heat all winter.

Site II-5 **Orono**, 29 Gilbert Street Owner: Cindy Carusi, 866-0608 The collector on the roof is a 40-tube evacuated tube solar thermal array. The tank in the cellar is an 80-gallon Steibel-Eltron storage tank and pumping station. It's all connected to the furnace, which kicks in when there isn't enough solar heating



### **Tour III: Downeast**

Organizer: Richard Komp, 17 Rockwell Rd SE, Jonesport ME 04649, 497- 2204 [sunwatt@juno.com](mailto:sunwatt@juno.com) [www.mainesolar.org](http://www.mainesolar.org)

Site III-1. **Harrington**, 44 Heron Cove Rd., Leonore Hildebrandt/Robert Froese, 610-2929

This 2500 sq.ft. home was designed and built in 1990 by the owners. It is off-grid with a 900 watt PV system and heated by passive solar energy backed by a wood stove. Robert and Leonore, both writers ([www.flatbaycollective.org](http://www.flatbaycollective.org)), have practiced sustainable living for over 20 years—harvesting firewood, caring for fruit trees, and growing a vegetable garden.

Site III-2. **Jonesboro**, 262 Looks Point Road, Lee and Jody Rose, 434-5444

This home features flat plate solar hot water collectors for domestic hot water and to heat an indoor heated pool. This home also uses a high-efficiency gasification wood boiler to provide most of the home's heat and back-up domestic hot water usage. ¼ mile gravel drive. May have to use pull-off. Look out for walkers in the area.

Site III-3. **Jonesport**, 17 Rockwell Road SE, Richard Komp, 497-2204

Home self –designed and built in 1988 with 500 watt off-grid PV, passive solar heating and 4 TAP air heaters, 'Hypocaust' under-floor thermal mass, wood backup, and PV/thermal hybrid for hot water. Featured in the May-June 1997 *Solar Today*. Look for signs.

Site III-4. **Kennebec** (Machias), 35 Cross Road (Bobcat Pass) Owner: Gillian Gatto, 255-4515

This is an owner-built passive solar home with a large solar dome studio for Gillian's woodprints and other art work. The indoor bathroom has a composting toilet and thermosyphon water heating system from the wood cookstove. A 200 watt off-grid PV system with inverter

Site III-5 **East Machias, Downeast Salmon Foundation East Machias Aquatic Research Center**, 13 Willow Street 483-4336 , [dsf@panax.com](mailto:dsf@panax.com) , [www.mainesalmonrivers.org](http://www.mainesalmonrivers.org)

This building was the powerhouse for a hydroelectric dam that was removed to make it possible for atlantic salmon to swim up the east branch of the Machias river. A large 240 volt ac grid intertie PV system plus a vertical axis wind generator furnish almost all the electric power and passive solar south windows aid with winter heating.

Site III-6 **Stuben**, 62 Sunset Bay Drive, Tom Hitchins  
Type of Building: This superinsulated residence is constructed with an Insulated Concrete Form basement and a Structural Insulated Panel shell. Green materials were used where reasonable. House is heated by high efficiency condensing boiler using propane, and a soapstone Rais woodstove. Hot water is solar with propane back-up.

### **Tour IV: Kennebec Valley**

Organizer: MeSEA 497-2204 Tour Hours: 10:00 am – 4:00 pm.

Site IV-1. Hallowell, 11 Inn Road Owner: Scott Cowger, 800-622-2708 Call or [www.maplebb.com](http://www.maplebb.com) for directions.

**Maple Hill Farm Bed & Breakfast:** A full-service inn and

conference center with a heavy demand for energy. The innkeeper is a former State Representative. Maple Hill Farm was the first DEP certified 'Environmental Leader' green lodging establishment in Maine, meeting such criteria as energy efficient upgrades, the usage of non toxic cleaning products and reduced energy usage. In 2003 the owners decided to decrease energy costs as well as their carbon footprint by installing a large 10 kW Bergey wind turbine atop a 100 foot tubular steel tower on the high point of their land, 1000 feet from the buildings. In 2006, they added extensive solar electric and solar hot water systems to the property. The largest solar power array in the state, it has 15 kW of electrical generating capacity, and 202 vacuum tubes for domestic hot water production with 320 gallons of hot water storage in the basement, saving more than \$20,000 in power costs over the past two years. Their system saves a tremendous amount of fuel oil (for hot water production) and offsets about half the electrical needs of the facility. You can monitor the output of the solar electric system, as well as view details of all the system components and get directions on their web site at [www.maplebb.com](http://www.maplebb.com).

Site IV-2. **Palermo**, 401 Marden Hill, Paul Armstrong, 993-2803

Contemporary 3,000 sq ft house, built in stages since 1994 as time & money allowed. Hillside site allows enjoyment of outrageous views & good breezes. CMP wanted the cost of a house mortgage to bring power, prodding us to alternatives. Starting with a generator we have added photovoltaics & a wind turbine for our current 'tri-bred' system. Recycled lumber used in construction.

Site IV-3. **Starks, Maine Solar Energy** 535 Sawyers Mills Road , Floyd Severn, 491-3461 [info@mainesolar.com](mailto:info@mainesolar.com) .

With 43 yrs in solar business, 35 in Maine, Floyd has extensive experience with Off-Grid applications of solar PV and thermal systems. Here is the off-grid, thermal-mass design home. Including 5, flat-plate solar thermal collectors, using non-toxic anti-freeze, and 540 gal. stainless steel tank for pre-heated water. Attached green-house and 35, 130W PV modules, (4.6 kw array), and 48 V battery bank, 24, 2 V deep-cycle batteries. <http://www.mainesolar.com>

### **Tour VI: Midcoast**

Organizer: Jennifer Hatch **ReVision Energy LLC**, 109 Fox St., Portland, 04101, 221-6342 e-mail: [jen@revisionenergy.com](mailto:jen@revisionenergy.com)

Site VI-1 **Belfast** 83 Crocker Road The GO passive house has reduced energy loads with an annual heating bill of only \$300! The team from GO Logic designed this home to bring energy performance in line with affordability. Besides being Passive House Certified this home is also Net Zero, making the same amount of energy it uses over the course of a year and is LEED Platinum rated.

Site VI-2 **Biddeford Pool** 32 Sea Spray Drive, Bill & Renate Riggs This home has both a solar domestic and solar space heating system. The Riggs wanted to cover as much of their heat load as they could with solar so utilized the entire south facing roof on their Sea Spray Drive home. There are five 30 tube Apricus collector arrays which totals 150 tubes. This systems provides the domestic hot water for this house as well as supplements the heating supply. When the solar is not able to

keep up with the heat load a high efficiency propane boiler turns on to provide seamless heat and hot water. The boiler installed is a Triangle Tube Excellence 110 modulating, condensing gas boiler.

**Site VI-3 East Waterboro** Terry McIlveen, 62 Townhouse Road. This home features a solar hot water space heating system. There are 90 evacuated tubes heating a 160 gallon solar storage tank. Terry incorporated solar space heating to reduce his oil consumption and loves the savings he is seeing! This system is designed to provide 100% of the domestic hot water load and a portion of the heat load.

**Site VI-4 Falmouth,** Claudia King & Lindsey Tweed ~ 160 Woodville Rd. The house was originally built in 1975, using passive solar features & a wide variety of salvaged materials, including posts & beams from a 1800's mill building. Low indoor comfort, due to poor shell insulation & high air infiltration, led to the current renovation, a deep energy retrofit to drastically reduce energy needs, with Net Zero as the goal. The current renovation includes new exterior rigid foam insulation, new windows, & new cladding, while reusing or keeping the original salvaged materials used when the house was built.

**Site VI-5 Freeport** Fiona & Rob Wilson, 12 Merganser Way.

The owners of a coastal property sought to build a new home that would sit well with their existing cottage which they had enjoyed for many years, while living as a true modern companion to their eclectic oceanfront neighborhood. Generous porches present a welcoming entry towards the street in harmony with the neighboring structures. A simple compact form rises dramatically and opens towards the ocean. Corner windows are carefully placed to capture spectacular coastal views and ensure privacy. Deep set windows and slatted exterior sunshades prevent overheating in summer while maximizing winter sunlight. The 1,800 square foot 3 bedroom home is on track to receive LEED Certification.

**Site VI-6 Freeport** Melissa & Eric Coleman, 10 Cranberry Ridge Road. Built in 2006 by Wright-Ryan Construction and designed by Richard Renner (both of Portland), this home was designed with careful consideration to utilize non-toxic, environmental, recycled and local building materials wherever possible. Passive solar design, good insulation, and energy efficient appliances keep this home's energy loads to a minimum. This home features include: solar power, radiant heat, local birch, granite and slate, custom millwork, triple pane glass windows and heat recovery ventilation to circulate fresh air through this well insulated home. There is a solar thermal system covering the domestic hot water load of the house with excess heat circulating through the radiant heat distribution and a 2 kW solar electric system that produces over 200 kWh of clean electricity each month. Located within the beautiful Wolfe Neck area of Freeport, this LEED Platinum home is not one to miss!

**Site VI-7 Gray** Tim & Lydia Jilek 4 Pennel Lane View how a pellet boiler works to heat a home by visiting the Gray residence of ReVision Energy staff Tim Jilek. The Jileks installed a boiler that run up to 90% efficiency and a solar hot water heating system

covering the domestic hot water load and a solar electric system producing over 400 kWh of clean electricity each month! Tim installs solar systems for a living, so he knows how they work!

**Site VI-8 Rockport** 181 Mill Street, **The Bright Built Barn**, is a 700 square foot single level space which takes a barn form and contains a studio, a workshop and an office for a couple on their Rockport, ME property. The project is the practical outcome of an in-depth collaboration between Kaplan Thompson Architects, Bensonwood Woodworking Company, a team of green engineers, and a visionary client to create a super green, offsite fabricated net-zero building that can be adapted and replicated over time. Designers, building fabricators, high performance building experts and solar energy professionals from all over the northeast participated in the project.

**Site VI-9 Sanford,** Cliff Babkirk, 65 Sand Pond Road The Babkirks recently installed twenty-three 235 Conergy P solar electric panels to their roof, to total 5,405 Watts. The systems utilizes twenty-three Enphase micro inverters, one under each panel. This system is expected to produce 7,388 kWh of clean, renewable electricity each year! See how their system works online; the Babkirks can pull up that information from their data monitoring system reading what the panels are doing in real time!

**Site VI-10 Scarborough,** Deb & Jim McDonough, 6 Minuteman Drive This family home features 60 evacuated solar hot water collector tubes heating a 105 gallon dual coil solar storage tank. This system is designed to cover most of the domestic hot water used with back up coming from an oil boiler. This is a retrofit installation on a standard construction house. This house also has retrofit radiant heat, and cellulose re-insulation. The solar hot water was installed in 2007. Solar electricity was installed in 2009. If you've never been to this house it is a wonderful place to stop. Deb & Jim are excellent hosts and explain the systems beautifully.

**Site VI-11 Woolwich** Ben & Michelle Tipton, 231 Murphy's Corner Road The Tiptons moved from Vermont to Maine and built their home to provide their family both with comfort and reduced energy so to be less reliant on energy expenditures, allowing that money to be spent on other matters. They built a timber frame home with help of the Shelter Institute in Woolwich. The building is just over 1,000 square feet. There is no basement in this home. It is well insulated with heat coming from a centralized wood stove and radiant floor distribution. The energy loads are low as the Tiptons considered every appliance, its purpose and estimated usage. They live comfortably but also conservatively. There is solar hot water heating the domestic hot water and also part of their radiant space heat. Solar electric panels act as an awning to also provide shade in the summer months. The home is passive solar by design. They recently added a pool which also acts as the heat dump for the solar collectors.

**Site VI-12 Boothbay Harbor, Heliotropic Technologies,** 60 Campbell Street, Michael Mayhew Tour Hours: 10-3

This was an existing seasonal cottage that was situated with very good southern exposure and elevated ocean views, that has been retrofitted into a super-efficient cool place. It was cost-effectively improved and is now a local landmark. Latest

tower/dormer addition has R-80 ceiling & R-45 walls insulated with urethane foam and reflective barrier. , Deep energy retrofit, Energy Star Appliances, Grid Tied PV, Local Materials, Passive solar, Radiant floor heating, Solar domestic hot water, Solar Heated, Sunspace, Super Insulated Walls/ Roof, Single Family Residence

Site VI-13. **Kennebunkport, Cape Porpoise**, 189 Mills Rd : Bill & Debbi Lord, 967-1295

Photovoltaic roof with utility interfaced photovoltaic system. There is a 1000 gallon storage active solar heating radiant floor system. The installations on this home have been featured in many national magazines. This home is not to miss if you are in the Kennebunkport area. This Cape Porpoise home has its own web site, [www.solarhouse.com](http://www.solarhouse.com). Architect: Solar Design Associates, Builder: Tim Spang.

Site VI-14 **Camden** Eric and Laura Evans 82 Annis Road

This single family residence features: grid tied PV, Solar domestic hot water, wood heat, night window covers, and solar-powered hot water and grid-tied solar electricity.

Site VI-15 **Falmouth** Stew MacLehose 34 Hartford Avenue  
Building Features: Daylighting, Energy Star Appliances, Energy Star rated, Passive solar, Solar domestic hot water. This is a module home designed to meet net zero energy status. There is solar hot water collectors heating a 160 gallon storage tank preheating tank for the radiant floor. An electric boiler serves as the back up.

Site VI-16 **Georgetown - Williams Farm** 133 Williams Road  
Tour Hours: 10:00 - 4:00

Building Features: Alt Fuel Vehicle, Radiant floor heating, Solar domestic hot water This tour showcases a 60-tube photovoltaic-powered solar hot water system that provides 100% of the domestic hot water for Williams Farm from May to October and radiant heat for a 180 square foot attached greenhouse. The tour will emphasize the key elements of efficient system design for producing solar hot water in northern latitudes and will also demonstrate how to set up a web enabled logger that can monitor over 100 sensors at a fraction of the cost of commercial loggers. Also on display will be a battery powered riding lawn mower and a Toyota Prius.

Site VI-17 **Woolwich** Guy Marsden 61 Delano Road

Building Features: Energy Star Appliances, Grid Tied PV, Heat recovery ventilation, Instantaneous hot water, Passive solar, Radiant floor heating, Rain Barrels, Solar domestic hot water, Solar Heated, Super Insulated Walls/ Roof,. Self-installed micro inverter based grid-tied 4 kW solar array on workshop powers 53% of the power for home, and 2 home based businesses on an annual basis. Solar building heat in super insulated workshop uses 4' X 8' collectors and an 80 gallon storage tank backed up by propane and wood stove. Heat recovery ventilator used in winter months. Solar DHW in house feeds propane on-demand water heater. Solar charged electric lawn mower conversion started with a 22" Craftsman gas mower.

Site VI-18 **Washington** Sasha Kutsy 722 Old County Rd.  
This small, owner-built off-grid solar home features: Energy Star Appliances, Instantaneous Hot Water, Local Materials, Non-Toxic Products, Off Grid PV, Passive Solar, Rain Barrels,

Recycled Materials, Single Family Residence, Sunspace, Super Insulated Walls/ Roof

Site VI-19 **Mt. Desert Bale Out** 126 Oak Hill Rd.

This Straw Bale residence Features: Energy Star Appliances, Local Materials, Non-Toxic Products, Passive Solar, Radiant floor heating, Recycled Materials

Site VI-20 **Hartford**, 275 Labrador Pond Road, Lee Holman, 388-2510

100 year old cape. A pair of 80-watt PV panels make up this low budget electrical system along with a propane refrigerator & kitchen range and wood heat. This system runs a laptop computer & printer, 12v SHURflo pump for water at the kitchen sink, some lights, a radio & a few other electrical devices.



*From page 1* , but we had slightly more room than the “passengers” on a slave ship had. At least it was only one night and they served a supper of rice and something out of a big kettle as part of the \$20 fare. I didn’t try asking with my bowl for a second helping.

I spent a little over a week at Porto de Moz, getting ready and teaching a 6 day workshop on photovoltaics. We started by making four of the little solar battery chargers that take only four PV cells each (which I had cut ahead of time), then opened the boxes of Evergreen Solar cells I had brought and started sorting and soldering PV cells.



**Mike testing the set of 36 finished PV cells that will make a 65 watt module. A finished solar cell phone charger is setting over to the left.**

Since we didn’t have the special silicone encapsulant, we went all the way with the work to the point where we would mix the silicone with its catalyst, then carefully stacked the assembly away until they got some silicone shipped into Brazil. In the meantime, I taught them how to sort and cut the PV cells into useful shapes and we made a more than a dozen solar cell phone chargers. In remote areas of Brazil, like in most other developing countries, cell phones have become the norm everywhere, but people in remote places need some way to recharge their cell phones in places far from the power lines. The biggest problem is finding the proper plug to fit into a particular cell phone; there seem to be a zillion different styles. I am asking people to save old cell phone chargers (even those that don’t work anymore). I cut off the cord and plug and save them to give a wide selection of different styles for this work.

In addition to the PV module work, we also fixed up a solar cooker they had built from Grupo Fenix plans, and visited some remote homesteads to visit and talk with the people about their getting some solar electricity. I taught the natives how to design and install the PV systems in addition to how to make the PV modules. We also went spear fishing and swimming in the river. Nobody got nibbled on by piranha fish but I discovered that piranha taste quite good. Who is the top predator in the Amazon?



**Traveling to a remote homestead in a dugout canoe with a homemade outboard.**

When we got back to Altimira (on another overnight lineboat trip) we spent two days there designing a backup PV system for the community center where we were staying and I also worked with a couple of people who are working to reintroduce sailboats to the area. Since fossil fuel is very expensive and getting more so, this is a good idea. I designed a sail rig for a small sailboat they were building and also showed them how to install flotation to the boat. The wood they use is very hard and rot proof but it is so heavy that it doesn’t float in water. I also suggested how to add a couple of simple masts to the lineboats so they don’t have to use so much diesel fuel.

After I left, a small supply of the silicone encapsulant arrived and they successfully finished up the 65 watt PV modules we started. I will be going back to the Amazon next May with more of the ETHOS students to continue the workshops. We will start making the big PV modules using the ethylene-vinyl acetate (EVA) encapsulant and a solar cooker instead of the expensive silicone. I will be happy to send anybody a copy of the paper on this method.





## 40.9% efficiency triple-junction solar cell.

### From Renewable Energy world

2011 could be the year that concentrating photovoltaics (CPV) breaks through. Finally. (*Maybe as Hybrid PV RK*) **Solar Junction**, an up-until-now stealthy CPV semiconductor startup, has made their first major commercial announcement in an exclusive to Greentech Media. The firm will soon be announcing an NREL-verified efficiency of 40.9 percent for their triple-junction solar cells. There are a lot of efficiency announcements in this vein -- typically for hero cells of small size on a select group of chips; but Solar Junction's close-to-record-setting achievement is for a standard design 5.5-millimeter production cell, manufactured entirely in-house on their production line in San Jose, California.

This means that Solar Junction has basically duplicated the best performance previously announced by Boeing, Spectrolab and Emcore," adding that Solar Junction's approach is a bit different -- they are using different III-V semiconductor alloys, so their approach might be more readily manufacturable. Nancy Hartsoch, Chairman of the CPV Consortium and VP at SolFocus, had this to say: "Advances like this one by cell suppliers such as Solar Junction are very exciting for the industry, as increased cell efficiency makes a significant impact on reduced LCOE from HCPV systems. The ongoing advances in cell efficiency from the 39 percent range of last year to nearly 41 percent is evidence of the headroom which drives the rapidly reducing cost roadmap for CPV.

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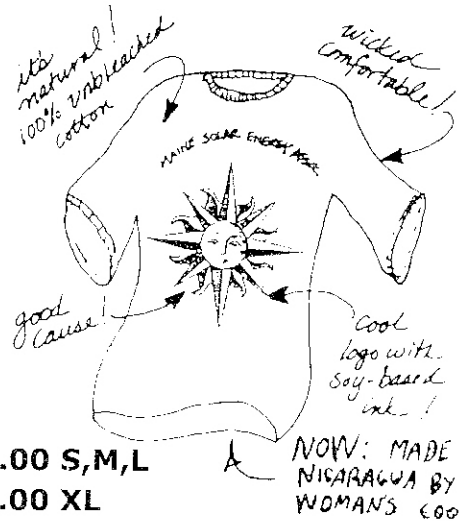
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