

Living Energy Farm

November - December 2023 Newsletter

DC Microgrids in the Caribbean

As we head to press, a crew from El Departamento de la Comida, including our trainees Millo, Ricardo, Eva, and Marielisa, are in Jamaica building a DC Microgrid at Solidarity Yaad Farm. The system includes a direct drive pump, fridge, and a few 12V battery kits. Electrically, everything went smoothly, and is working great. The plumbing side of things has been more of a challenge for the crew, but they are getting close to finished with the water system as well.

Back at LEF, we've been hard at work building nickel iron battery boxes and making preparations for another trip to Puerto Rico. Debbie and John will be heading down there in mid-February. In addition to continuing our promotional and educational work with El Depa and Fundación Bucarabon, we're excited to start a collaboration with Ricardo Martinez and his solar distribution company, Energiza PR. We've set up a storage container at Ricardo's farm, and now that we have a trained crew of installers on the island, we'll be able to ship and install DC equipment in Puerto Rico at any time. We even have a Spanish website and catalog, which you can check out here: <https://livingenergylights.com/living-energy-lights-en-puerto-rico/>



Ricardo, Millo, and Marielisa from Puerto Rico helping out installing direct drive solar DC equipment in Jamaica.

Eva and the Jamaican crew installing the solar pump we sent.



In other news, **Alexis did an interview** with an online publication **Socialist News and Views**. The interview is about the Simple Harvester and his book *Integrated Activism*. It can be heard here <https://soundcloud.com/socialistnewsandviews/snv-special-interview-integrated-activism-and-simple-harvester>

Technology Development at LEF

When we conceived of LEF in the beginning, we were clear that we were not going to be a technology development project. That takes too much time and money, so we thought. But that was before the Direct Drive DC Microgrid, before the Simple Harvester, before the realization that we could not obtain a lot of what we needed for a food and energy self sufficient community. At this point, we are very much a technology development project. And we are trying, with such resources as are at our disposal, to make simple, durable technologies available so working class people can use them. Of course, our big inventions are the Direct Drive DC Microgrid and the Simple Harvester. But the list of smaller inventions includes:

A) Simple Washer

David, with support from John and Alexis, has taken over the development of the Simple Washer -- a solar, direct drive washing machine. The machine uses a single tilted drum, a heavy DC gearmotor (normally used for intermediate electric vehicles like rickshaws, low speed cargo trucks or trikes). The Simple Washer uses an Archimedes screw to drain. It's a very repairable and durable machine compared to other washers. We like it that way. The current prototype is a more of an outdoor, homesteader model. We will make an indoor model next. We are using our current prototype to wash clothes. The mechanical side is working well. David is still working on figuring out the best timer setup for sequencing rotation. It's a bit tricky with floating, high voltage DC to do that, and keep it cheap and durable, but he is making great progress. See photo.

B) Direct Drive Dehydrator

The ability to dehydrate food is a critical energy need for anyone interested in food security. At LEF, we have a large solar hot air collector on the roof of our kitchen. In the winter, we blow the heated air under the floor for space heating; in the summer, we blow the heated air into a closet to dehydrate food. It works great for us, but it's expensive and complicated to build, especially in the tropics where space heating is not needed. Looking for a more affordable, mass marketable solution, Debbie has been working on converting small, fully electric food dehydrators to 90V direct drive DC.

The dehydrators have a heating element. That can run 90V DC no problem. They have a thermostat to prevent overheating. We have found that we can use snubbers (capacitors) on AC thermostats to prevent arcing when using DC. For now at least, that seems to be working great. The dehydrators also need a fan. Small, high voltage DC fans are not so easy to find. Low voltage DC fans are widely available for electronics cooling, and the



Direct drive, solar fridge in Jamaica.



Food dehydrator converted to direct drive DC.



Load diverter (showing red numbers) and kettle for providing on-demand hot beverages.

availability of buck circuits to drop DC voltage has greatly increased, so Debbie is using a buck circuit to power a low voltage fan. Electrically, it all works. Debbie is still testing to see how effectively it dehydrates food.

C) Electronic Load Diverter

Mostly we use all the watts our solar panels generate. But not quite! To provide us with convenient hot water for tea and coffee on sunny days, John set up a diversion circuit from our battery charging solar PV panel that first charges the batteries to a particular level and then diverts energy into a 24V electric thermos. It works well.

D) Solar Cookers and Hot Plates

We continue to develop our Insulated Solar Electric Cookers (which are highly efficient). We have also realized that by putting snubbers on the thermostat of a regular hot plate, we can create a simple conversion of ordinary hot plates to DC (not super efficient, but cheap and easy).

E) Shop Tools with Snubbers

We have also realized we can put snubbers inside shop tools. Any tool or appliance that you can carry around probably has a universal motor, and 90% of those will run daylight drive. We had been using heavy external switches, but the snubbers are small enough we can put them right in the tool and use them straight DC. Very cool.

F) Grinder for Biogas

This one we built a year or two ago. It's a homemade, hand powered grinder for crushing material to feed the biogas. Very simple and effective.

G) Biogas Slurry Pump

Our biogas slurry pump is unique so far as we know. It's a piston pump in which both the piston and the sleeve around the piston move independently to create a pumping action for heavy, fibrous material being pumped into the biogas digester. Instead of trying to suck material through an intake valve (as would happen on any other piston pump), the cylinder around the piston lifts up and then chops into the material in the holding tank. Then the piston pushes the material out. It will handle coarse, fibrous material in a way that no other pump will (that we know of...).

H) Squash Guillotine

So maybe this one is only of interest to seed growers, but cutting up lots of winter squash using a kitchen knife is dangerous. This is a simple device using a brush ax that allows us to cut lots of squash quickly and safely.

I) Battery Waterer

We like nickel iron batteries because they can last a lifetime. But you do have to put distilled water in them about once a month. We have had a problem with the battery kits we have been distributing in that the water level needs to be just right -- about an inch from the top of the battery. How do you pour water into a battery and make it stop at just the right level, especially when the battery is in a battery box and you cannot see the side of the battery to see the water level? Sometimes people would over-fill their batteries and



The little purple thing with wires sticking out is a capacitor. With that installed inside this angle grinder, we can run straight off of PV power, no external switching needed.



Homemade, hand cranked slurry grinder for biogas.

spill electrolyte, which is messy. We invented a solution. We took a juice bottle, and drilled two holes in the cap. A long straw and a short straw are pushed through the holes and sealed with hot glue. Both straws protrude from the bottle top exactly one inch -- the right level for watering the batteries when the bottle is inverted and the straws are inserted into the top of a nickel iron battery. The short straw goes through the lid of the bottle and stops. Water flows through this straw. The long straw goes down (up when the bottle is inverted) to the bottom of the bottle. Air flows up this straw. When the water level inside the battery reaches the level of both straws, the air flow is stopped. The bottle is "air locked." Exactly the right level of water delivery is achieved. The battery waterer works well and costs very little to build.



Biogas slurry pump, Piston sleeve and piston move independently.

J) Woodgas

Realizing how difficult it is going to be to make enough biogas to run our tractors, we have returned to working on woodgas. The shop class each week for the kids has been working to revive the woodgas reactor we put together some years ago. We have mixed feelings about woodgas. It's smoky (on the startup) and encourages people to cut down trees. But running a machine through a field is not easy. The current thinking is to start a tractor on biogas and then run it on woodgas. (Starting a cold engine on woodgas is not easy.) We will see how it all works out.



Squash guillotine. Long live the great seeds revolution! Death to the bourgeois squash.... or something like that...

Simplified Combine Harvester

The Simple Harvester has been Alexis' primary focus for the last couple of months. It's coming along. The current iteration is much sturdier, much more precise than the last one. The University of Missouri is supporting us, which is great. The expenses related to the international patent have proven larger than anticipated. It's not clear at this time what course we will take in the long run. We have a contract with the

Soybean Innovation Lab to help farmers in Africa build Simple Harvesters. Beyond that, we just don't know. At this point, the next iteration should be operational in a couple of months. We have intentionally left some cover crop and weeds un-mowed from last summer so we can take the Simple Harvester through it to test cutting and material flow. We have two years from the date of the international patent to file for national and regional patents. We may or may not take that route. For now we just want to make the machine field ready.

We are very excited about the current iteration of the machine. It has one belt and about a dozen bearings. It could be built in small fabrication shops all over the world. It could be a big help to small farmers.

Farming

We are just finishing up the last of the 2023's fresh persimmons. The Rosseyankas last through much of the winter. We keep them outdoors, on the porch. The biggest issue is keeping the rodents out of them. We are swapping around farm equipment to be able to run our farm on small tractor(s) using some form of renewable energy. The historic Farmall Cub tractor has an excellent, fuel efficient engine, but the

original models were too top heavy. We found a Cub 154 which is much more sure-footed (lower to the ground) with a three point hitch for pulling modern implements. We have rebuilt the drive shaft to stand up to pulling discs and plows. The plan is to use one small tractor for tillage and a second tractor for cultivating. This should be a highly fuel efficient approach to running our small farm.

We're starting to plan for next year's seed crops, which will include watermelon (of course), squash, muskmelons, okra and tomatoes. We have invested in some modest peanut processing equipment. Peanuts are great for being a high calorie, oil and protein rich self sufficiency crop (and good money for seeds). Birds eat sunflowers, but with peanuts we can fence out the deer and make a good crop. We found a very cheap little peanut stripper for a whopping \$22 that can make picking the peanuts much faster (item 134802737045 on ebay). We also picked up a very cheap peanut digger from China that someone had purchased and never used.

Interest in our project continues to grow. There are many projects in many locales with which we are consulting about building durable renewable energy systems. Please support us if you can.

Living Energy Farm is a project to build a demonstration farm, community, and education center in Louisa County that uses no fossil fuels. For more information see our website www.livingenergyfarm.org, or contact us at livingenergyfarm@gmail.com or Living Energy Farm, 1022 Bibb Store Rd, Louisa VA, 23093. Donations to the Living Energy Farm Institute are tax deductible. To make tax deductible donations, do not go to the Virginia Organizing website, go here instead: <https://donatenow.networkforgood.org/1388125> Make sure to designate your donation for Living Energy Institute.

Articles and videos about LEF:
Low-Tech Magazine (based in France) did an lengthy, well-researched article, largely about LEF, entitled Direct Solar Power: Off-Grid Without Batteries. It's at <https://solar.lowtechmagazine.com/2023/08/direct-solar-power-off-grid-without-batteries/> That article talks a lot about optimal utilization, translate "community is the magic bullet that makes renewable energy work."



Direct drive, DC washing machine. Simple and effective.



Battery waterer made from a juice bottle and some tubing. Works great!

Matt Dhillon at Cville Weekly did one of the best brief summaries of LEF we have ever seen. The article is entitled Power Shift, Award-winning Living Energy Farm Makes Living Off-grid Sustainable. It is at <https://www.c-ville.com/power-shift>

Truthdig did an article on LEF by Megan McGee, an excellent review of our work in Puerto Rico. It is entitled Decolonizing Puerto Rico Through Solar Power. It's at <https://www.truthdig.com/articles/decolonizing-puerto-rico-through-solar-power/>

We continue to post new videos on Youtube. The latest is Solar Power Systems That Last Forever, focused on our solar powered kitchen. See <https://youtu.be/6XiHC1x8d2Q>

How to Never Pay an Electric Bill

<https://www.youtube.com/watch?v=N5Wk7inolxl&t=201s>

This video is a walk-through of our energy systems at Living Energy Farm. It is a concise summary of how these systems work, and why they are not in common use already.

Solar Installations In The Navajo (Dine') And Hopi Reservations, March 2020

<http://livingenergyfarm.org/solar-installations-2020/>

This is a photo essay about our project to bring durable solar energy systems to the Dine' and Hopi Reservations, where thousands of people live without grid power involuntarily.

Support Living Energy Farm's Climate Justice Campaign, and Bring DC Microgrids to People Who Need Them

<http://livingenergyfarm.org/support-our-climate-justice-campaign/>

This is an updated web page describing our broader social justice ambitions.

How to Live Without Fossil Fuel (Introductory Video) <https://www.youtube.com/watch?v=Ri2U6u8p65E>
Powering a Community with Solar Electricity (LEF has the only DC powered community that we know of, here's how it works) <https://www.youtube.com/watch?v=FvdExgvHnRI&t=23s>
The Best Way to Store Off-Grid Energy <https://www.youtube.com/watch?v=2wOxQ3sL9zc>
Batteries that Last (almost) Forever <https://www.youtube.com/watch?v=dfrgLsyFs0E>

Virginia Homegrown created a program at LEF (the LEF part starts at the 29 minute mark in the program) <https://www.youtube.com/watch?v=MDGP0C9MizU>

International Permaculture has done 2 articles on LEF. One is in issue #93, Autumn 2017, and the second is in issue #94, Winter 2017. See <https://www.permaculture.co.uk/>

Article about LEF at the Atlantic Online Magazine

<https://www.theatlantic.com/politics/archive/2017/01/anarchism-intentional-communities-trump/513086/>

Article about LEF in The Central Virginian

<http://www.livingenergyfarm.org/cvarticle.pdf>

LEF on CNN

<http://www.cnn.com/interactive/2015/09/us/communes-american-story/>

Cville weekly in Charlottesville VA

<http://www.c-ville.com/off-grid-model-environmentalism-made-easy/#.VcHobF054yo>