

Living Energy Farm

October - November 2018 Newsletter

Upcoming Workshops

LEF's Weekend Off-Grid Immersive Program for Nov 30 - Dec 2nd Energy Self Sufficiency and Building Your Own DC Microgrid

We have more openings for our weekend immersive for **Nov 30 – Dec 2nd** focused on energy self sufficiency and building DC micrgrids like we have at LEF. LEF's integrated village economy uses high-voltage DC daylight drive motors. Our lighting system uses very durable nickel-iron batteries. We will teach you the basics of electricity, and show you how to wire solar electric panels, both high voltage and low voltage systems. We will show you how to put together battery banks, and explain the difference between different kinds of batteries. We will explain how nickel-iron batteries work, and how to make them last for decades. We will show you some of the basics of electrical wiring for both high voltage and low voltage electrical systems. You will work on these projects with your own hands, so you will know how to do it yourself. We will have a weekend of homegrown, tasty food, and an engaging social environment. Our immersives have been enjoyable and rewarding. With each immersive, we feel like we get a little better at what we do. We look forward to seeing you there!

Location: 1022 Bibb Store Rd, Louisa VA 23093. Contact Debbie at 540-205-9815, livingenergyfarm at gmail.com The fee for the weekend is \$150, work trade options are available.

Farm Update

We had a wonderful land day this year. The LEF string band (with welcome support from a few talented friends from local communities) played to a rapt audience. We gave tours and explained our desires for LEF to be a sustainable prototype that can spread far and wide. We ate lots of homegrown food! Deb made the most amazing tortilla chips from homegrown corn. We put out a bunch of ripe persimmons and they were dutifully dispatched. The wonderful sunny weather showed off our solar systems well. It was a great day.

After Land Day it turned cloudy and rainy again. On cloudy days we pay more attention to the amount of power collected and stored by our nickel iron battery set, measured in amp hours (ah). Well, the full week of bad weather following Land Day hit its peak that Friday, when it didn't stop raining all day. Temperatures were in the 30s with a howling, wet wind. On Friday we set the record for lowest number of amp hours ever collected in a day, a whopping two. (Ten ah is about breaking even with overnight use.) Then on Saturday, the sun came out (hallelujah!) and we collected 84 ah. That's the challenge of renewable energy, a whopping 42 times difference in energy generation in two days!

This also displays the weakness of traditional off-grid design that uses large battery banks tied to all your appliances. With all of your electrical demands pulling on the battery bank, there's no way you can make it through a 2 ah day at the end of a cloudy week. So imagine, it's 35 degrees, wind and water howling like a hurricane, there's no way you can keep the lights and everything else on with the batteries, so you have to go outside to start the generator (certainly can't keep a gasoline generator inside). That's a bad, terrible, awful day, and why off-gridders are so rare. Bad design. And at LEF? We worked all day on the computers. Kept the lights on as we pleased. The nickel iron batteries were sagging a little by the end of an abysmal day at the end of an abysmal week. But I still worked all day on our new website. The design is better, the batteries are better, and hopefully the website will be better. You should try it.

The kids are great. We used to worry about having free access to internet. Maybe the kids would do silly things with their screen time(?) But all Rosa does is research animals. She knows more about cetaceans (whales), cervids (deer), canids (dogs), muscalids (skunks, badgers, etc) than any adult I have ever met. And yes she uses the latin names! Her first words were all animal sounds. And she hasn't lost interest since. Eric has been helping us finish processing seeds, and learning how to make electrical repairs. Our DC Microgrid works really well, but DC power will arc-weld switches if you let it. Eric has learned how to swap the frail little toggles for big throw-lever switches that will last longer than any of us. Our old and trusted friend Napi has joined us, staying at LEF and Magnolia with the hope of helping transform Magnolia into an off-grid publicly accessible front door for LEF.



Kiwis, Perissmons, Deb and Nika -- we enjoy our fall fruit! We are drying lots of persimmons this year -- nature's candy.

Higher Temperature Solar Cooker

Improved solar cooking equipment is our first priority project now that the harvest is done. We have made progress. It should be operational soon, but it may not work as an effective cooking system at our latitude. People are surprised to hear us say that. Check the photo of an industrial solar trough system. This technology has been employed a lot on an industrial scale. Can we make a cheap and effective community-scaled version? Maybe, maybe not. We are pursuing a trough design because we think it is (if we can make it work) the simplest, cheapest, all-weather solar cooking system we can come up with. The trough is simpler than a dish because it needs no tracking.

And if it doesn't work? We will probably move to a Scheffler reflector design. (See <http://www.solare-bruecke.org/index.php/en/die-scheffler-reflektoren>) A Scheffler reflector is much more sophisticated than a simple trough. Sadly for us, none have been built in the U.S. At least one industrial scale Scheffler reflector system using heat transfer fluids has been built in northern India. Soon we will know if we can make the trough work.



Industrial solar troughs, much more efficient than photovoltaic.

Solar Lighting with Durable Nickel Iron Batteries

We are continuing work on putting together the cheapest, *durable* small scale solar lighting system we can. It has been quite surprising to realize that the nonprofit organizations that presume to be providing lighting to disadvantaged people in the nonindustrial world are all (as far as we can tell) wedded to the disposable consumer technologies that dominate in rich countries – disposable batteries in particular. We believe putting together modern LED lighting technology with very old nickel-iron battery technology may yield a simpler, cheaper, more durable lighting system than anything currently being pursued by other organizations. Certainly the system we have at LEF works amazingly well, with a seven year old battery bank that shows no signs of aging.

We have been pursuing several pieces of this idea. Eddie in Pittsburgh made two generations of prototype nickel iron batteries. We are transferring the materials to LEF to pursue the next generation. (We are getting closer to what we want as an operational product, we hope.) We have imported very small nickel-iron batteries from China.

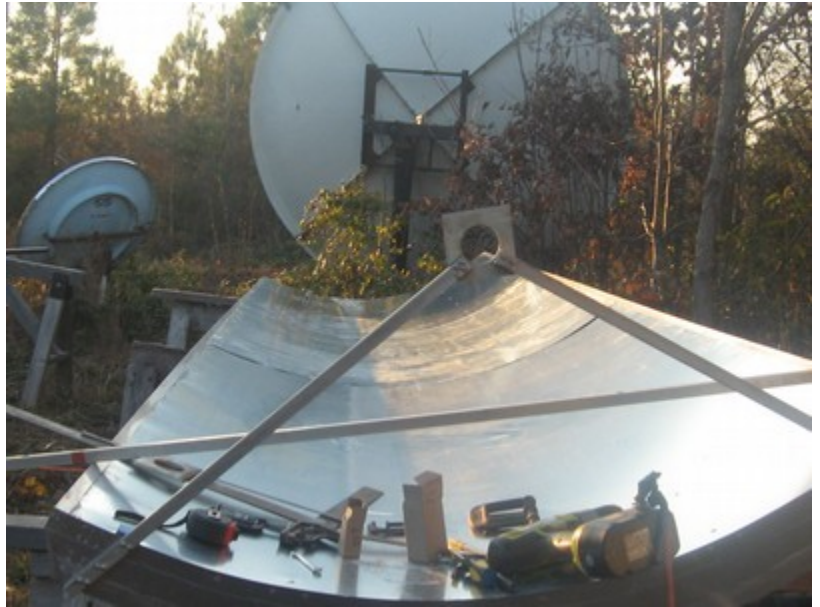
And we are building homemade LED bulbs. The cheapest bulbs we can build are from individual, one-penny-each LEDs. The light quality is pretty poor though. Seeing the poor light quality of the cheapest LEDs, we have now moved on to LED chips. These are the chips used in “real” LED light bulbs. They range from .20 - .30 cents each, but each chip puts out as much light as 20 or 30 small LEDs.

It seems like the cheapest, durable lighting system we are going to be able to build that makes good quality light for years to come is likely to be a 6 volt system that cost around \$120 - \$130. More expensive than we had hoped for a good system, but it should produce light for decades to come at a quality that would approximate “real” light bulbs in a small house.

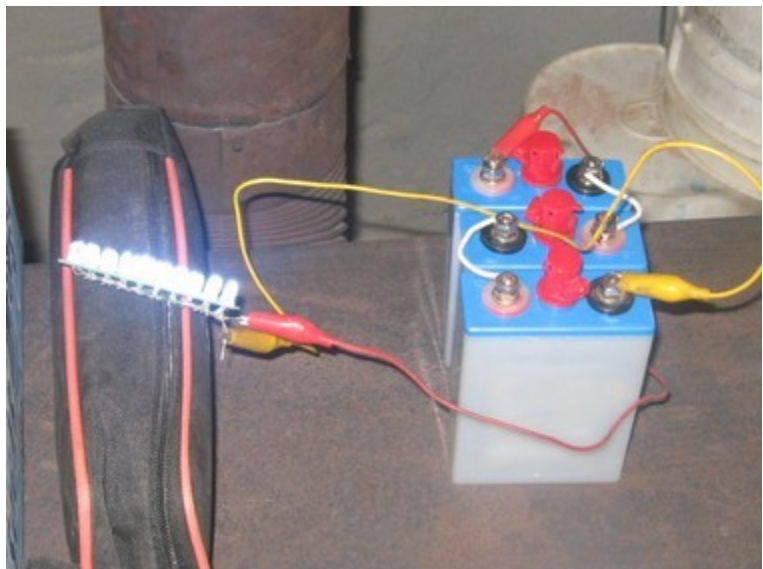
LEF’s Role in Addressing the Global Environmental Crisis

As much as we believe in what we are doing at Living Energy Farm, we want to be honest with ourselves and others about where we stand. The truth is that with the economy generally stable, most people do not want to move to an off-grid community and become subsistence farmers. (A lot of our friends ask us to save them a spot when the grid collapses -- sorry folks, there probably won’t be room for everyone then.) So as a community, LEF is small, and probably won’t get much bigger any time soon.

One of several of our goals in starting LEF was to find a better way to live off-grid. Our DC Microgrid has far exceeded



LEF's Solar Trough. It's the simplest, cheapest option that may work for round-the-clock solar cooking.

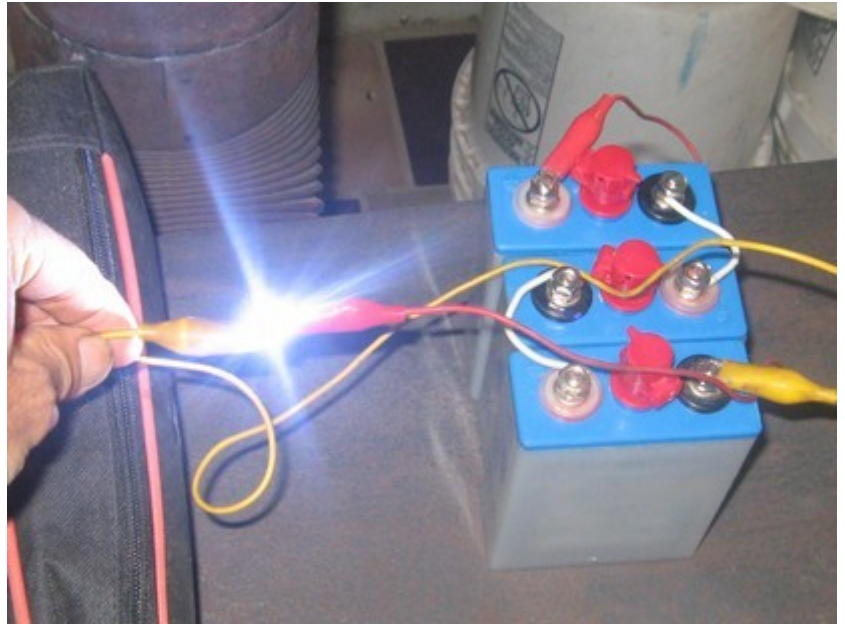


Homemade 20 cent bulb made from individual LEDs, but poor quality light.

our expectations. With a DC Microgrid, you don't need all the massive environmental destruction that comes with an AC grid to enjoy a very comfortable lifestyle. While a few folks have been interested in reproducing parts of our design, large-scale propagation of our ideas is not happening spontaneously.

It seems like LEF is evolving toward being a technology development and deployment organization rather than growing our farming community. We feel like we have an important role to play. Finding the right tools for true sustainability is not easy. It seems like most of the proposed solutions we see being pursued by other organizations are "over-engineered," -- unnecessarily complex, expensive, and just not likely to go anywhere. What we have found at LEF is a modest, effective level of providing modern services at a much, much lower environmental cost. The needs of a sustainable village and how they relate to LEF's efforts can be summarized as follows:

- 1) Stationary mechanical power (for pumping water, grinding grain, accomplishing any of a multitude of tasks needed in a village) – our DC Microgrid works really well.
- 2) Inexpensive, durable lighting systems – We are fairly confident that our nickel-iron/ LED lighting systems will fill a substantial void in what is being offered in non-industrial countries, whether the batteries are homemade or not. It's odd to think that for all the people working on development issues, so little attention has been paid to the strength, durability, and flexibility of nickel-iron technology combined with modern LEDs. We feel like we will be able to offer an effective solution to this problem.
- 3) Space heating – The systems we have developed at LEF, combining active solar with daylight drive DC equipment, works great. This approach will be a huge benefit if it gains broader acceptance.
- 4) Cooking – it remains to be seen if our efforts at miniaturizing solar high temperature storage will provide good results. Numerous organizations are pursuing both the development and distribution of rocket stoves, biogas systems, and better use-it-when-the-sun-is-out solar cookers. All of these technologies are great, and each has its benefits and limitations. Even under the most optimistic scenarios, our system will certainly not work in areas with persistent heavy cloud cover. If it works, our system will be by far the best for more urban/ semi-urban environments, and for village-level cooking systems. Rocket stoves and simpler cookers are going to remain the cheapest option for the poorest of rural areas. For now we will simply have to wait and see what LEF has to offer in this field.



LED "chip," as much light from one chip as from 20 individual LEDs. Two to four chips will work to make a good quality light.

- 5) Refrigeration – This is a question we have been asked about on numerous occasions. For keeping homes and community buildings at modest temperatures, good design and absorptive systems (using cool water or dirt to absorb or moderate summer heat) would help a lot when it is available. We get asked by farmers who want to know how to run commercial scale walk-in coolers with solar daylight drive power. While it is theoretically possible, it probably will never happen. It's just too expensive. The bottom line is (probably) that commercial scale refrigeration is just not sustainable on a large scale. The amount of energy needed, the cost of insulation – it just doesn't add up to make large scale commercial refrigeration work with solar energy. A number of aspects of our modern lifestyles (the daily use of private cars for instance) are simply not sustainable. Nothing we can do with solar magic is going to fix that.
- 6) Farm-Grown Fuel – How the next generation is going to feed itself is not clear. The industrial agricultural system cannot sustain, for a number of reasons. Old-fashioned notions of going back to draft animals will not

work. The animals eat too much. Gardens are great, but some mechanical aid is really, really helpful. We are working at LEF to try make small tractors work on Farm-Grown Fuel. It is not clear, at this time, to what extent we are going to be able to develop a successful, easily replicated model. We are working on it though.

7) Scaling sustainable agriculture – One of our goals at LEF is to figure out what it takes to create a truly sustainable agriculture system, including energy self-sufficiency, and then assess the scalability of it. There are numerous faces to our agricultural efforts, including food self-sufficiency, open-pollinated seeds, growing food on trees, and (something we are very excited about) developing better organic no-till techniques. Will any of the tools or insights we develop at LEF really be widely applicable? We don't know yet, though we are excited to try.

8) Small scale harvesting equipment – Another project, admittedly on a back burner for now, is the development of better, small-scale grain harvesting equipment. “Better” in this case means cheap and simple. Partly just because we want to eat home-grown grain, we have been working in the last few years to figure out the best ways to produce and harvest grain in the context the LEF economy (utilizing the tools of our DC Microgrid and Farm-Grown Fuel). We have some “on paper” designs that we are excited about, but it may be a while, depending on available resources, until we can make the paper into metal.

In summary, the clearest, generalizable accomplishments we have so far at LEF concern our DC Microgrid, daylight drive DC equipment, and the integration of nickel-iron batteries into those systems. These technologies, if they gain wide acceptance, will make the global electrical grid unnecessary. (Granted, that would involve some major reconfiguration of current infrastructure, but we are facing a lot of changes in the coming years, like it or not.) We need to take the steering wheel in hand so we don't get run over by our own civilization. If some of our other projects yield fruit, that will be advantageous, but shutting down the global grid with all it's attendant environmental havoc would be a fine accomplishment for one lifetime!

We would like to see LEF develop into an organization that can make use of the insights we have found. We are profoundly grateful for the donations to our Education Fund that have supported us in getting as far as we have come. We are hoping to pull together the resources – human and financial, at LEF or in connection with other organizations – to make it possible to spread the tools we have developed. We will keep working with the resources in hand to make such progress as we are able. Our current plan is to focus on the solar cooking system, then shift our primary focus onto communication and outreach. (We hope to have a new website up soon the better explains what we are doing.) We are hoping to see our organization develop to the next level where we can hire people, and start our own sites in other locales. We are seeking support and ideas towards these ends.

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 Education Fund are tax deductible.

Articles and videos about LEF:

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 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>

First video on youtube

<https://www.youtube.com/watch?v=ppTBO8d6jhY>

Second video on youtube

https://www.youtube.com/watch?v=wdSX_TIYkD4

Video on vimeo

<https://vimeo.com/128744981>

Slideshow produced by Alexis a while ago

https://www.youtube.com/watch?v=4x_C3iScoAw