Living Energy Farm

December 2018 Newsletter

Upcoming Workshops

Organic Farming, Orcharding and Food Self-Sufficiency Immersive March 15 – 17, at LEF, 1022 Bibb Store Rd, Louisa VA. Come and stay at LEF for the weekend, learn about off-grid living and food self-sufficiency. On Saturday, we will do a brief tour of LEF's energy systems. We will spend the rest of the day discussing how to plan and grow organic gardens. We will look at both home scale food production and food preservation, as well as larger scale organic and regenerative farming and seed saving. We will discuss the importance of and options for organic no-till agriculture. Sunday will be devoted to growing food on trees. In the morning, we will discuss orchard planning. In the afternoon, we will discuss tree propagation, including growing from seed, rooting, and grafting. Each participant will graft 5 pear trees (all materials provided) to take home. You can come for a day ($75) on Saturday or Sunday, or you can come for the whole weekend ($150). Food and boarding will be provided (you will stay with us in our main house at LEF). You will have to walk about a half mile to participate in this workshop. RSVP to livingenergyfarm at gmail. You can also get more information by calling 540-205-9815.

Pruning and Orchard Maintenance, Sunday Feb 10, 9 AM to 4 PM, 912 Woodfolk Drive, Charlottesville VA, 22902. **This event is NOT at LEF!** We will do a brief orchard planning overview in the morning. Then we will talk about orchard maintenance and pruning until early afternoon (potluck lunch). Then we will will get out and prune! The location has a well-developed orchard, so you can see first hand many of the trees we will be discussing. Fee is $25. You do not have to walk far to participate in this workshop. RSVP to livingenergyfarm at gmail. You can also get more information by calling 540-205-0433.

Living Energy Lighting Systems Are (almost) Ready For Release (!)

With farming winding down for the winter, we have made some excellent progress on some of our goals of developing effective, durable, sustainable energy systems. The development of Living Energy Lighting Systems (LELS) is coming together very well, and we are very excited about it! Living Energy Farm is based on a conservationist design that makes renewable energy cheap and durable. The LEF model is most effective when incorporated at a village level and into a conservationist lifestyle. But adopting all of our systems is a big step for most people. We are very excited about LELS because it is a technology that can be easily adopted, by people in the U.S. and abroad. The most exciting thing we have learned living as we do at LEF is that our DC Microgrid encourages conservation, while AC electrical grid power – whether or not it is backed up by "grid-tie" solar or not – encourages people to use energy wastefully. We are hopeful that LELS will be our "foot in the door" for spreading effective, off-grid technologies that empower conservationist lifestyles. *This is how we make the global electrical grid -- with all its massive environmental costs -- unnecessary!*

LELS systems are extremely efficient. One 10 watt solar panel is enough to keep the lights on in a small house.

What is LELS? LELS is a whole new approach to providing light and device charging services for off-grid use and emergency backup, as well as providing services for people who live in areas without reliable grid power. We are going to make these systems available in the U.S.A. and abroad. LELS use nickel-iron batteries and LED lights. Each LELS set will consist of a photovoltaic (solar electric) panel, a battery set, wires, light bulbs, a charging plug for laptops and cell phones, and all the hardware you need to set up the whole system. LELS will be available in different sizes to meet varying demands.

What is the ecological impact of LELS? We believe that LELS provide lighting and charging services at the *lowest possible environmental footprint of any technology.* The batteries we use last for *decades* and use no heavy metals or toxic ingredients. Our system is simple, affordable, and more durable than any other means of providing lighting. LELS have a lower environmental impact than candles and kerosene, conventional off-grid lighting, or AC lighting systems backed up by "grid tie" solar electricity.

Can I light up a whole house with LELS? We will be offering LELS in different sizes, ranging from very small systems that will light 2 bedrooms or a very small house, to larger systems that can light larger buildings and provide charging for cell phones, laptops, and other devices. You can install LELS and use the wiring and the lighting fixtures already in your house, but you have to keep LELS wiring separate from AC circuits. You can't mix 12 volt DC electricity and bulbs with AC electricity and bulbs or appliances.

How much will LELS cost? Costs will range in price from $75 to $2000 depending on the scale of the system.

There are all kinds "solar lanterns" and what not on the market for cheap. Why would I want LELS? There's one huge difference. EVERY independent solar device on the market will be dead in 3 – 5 years, or need an expensive (and toxic) battery replacement. While the bulbs may need replacing, the major components of a LELS system will last for many decades.

Does LELS require maintenance? If a LELS system is used daily, it will need a small amount of distilled water once a month. If LELS is used only as a backup system, then the solar panel can remain disconnected, and the system can be charged once every 6 months. Failing to put water in the batteries is the only way you could cause LELS to wear out in your lifetime.

But why not use the grid as a "battery" by putting grid-tie solar panels on my house? The whole issue of grid-tie (where solar electric panels are put on ordinary houses while the house remains tied to the electrical grid) is problematic. It makes people feel better, but it does *not* decrease overall environmental footprint because centralized AC grids encourages energy consumptive design and lifestyle choices. Actual sustainability is cheap and easy, but it requires fundamental lifestyle changes. LELS supports conservationist choices.

When will LELS be available? We anticipate having these systems available in March, 2019.

If you don't start living more sustainably, he's gonna come get you....

What is the "business model" for developing and distributing LELS? Living Energy Farm will be offering LELS to people who want them in the U.S. at a modest profit. ALL proceeds will be used for procuring materials and transportation to provide LELS at reduced costs for people who live involuntarily without grid power, in the U.S. and abroad.

If You Are Interested in LELS

If you are interested in a LELS set, please let us know. We would like to take "pre-orders" at this point. We will be ordering parts in bulk. We will order more or less parts depending on how much interest we see up front. Expressing an interest at this point does not commit you to anything, but it will help us get a sense of the level of interest. Drop us a line at livingenergyfarm at gmail.

How We Developed Living Energy Lighting Systems (some gibberish about electronics, skip ahead if you want...)

If you have followed LEF, you know we very pleased with our DC Microgrid. In the last 6 months, you could count the number of cloudless days we have had at LEF on one hand. But our electrical systems have worked just fine. We leave the lights on as we please. We surf the net and watch movies whenever we want to (or until the kids run out of screen time). Our power never goes out. It works because we use stored electricity *only* for lights and charging devices, and use solar thermal, insulation and daylight drive electricity for all other energy demands. And it works because NiFe are a superior technology to all other batteries.

Technology moves toward profit, not durability or function. The companies that make batteries realized a few decades ago that they make a lot more money selling disposable, compact, high-powered batteries instead of durable, slow discharging ones. At LEF, we have been utterly amazed with our nickel-iron (NiFe) batteries. Day after day of dismal, heavy overcast weather, and we never run out of electricity. The bottom line is that the standardized rating system for batteries (measured in amp hours, or ah) is just plain horse poop. Or a lie, if you prefer less colorful language.

The NiFe set we have at LEF cost $1000. Even though it is 1/10th to 1/20th the size of a "normal" off-grid battery set, it never fails us. We estimate the long-term cost of degradation of our batteries, panels and other electronics to be around $25 per year. That's a pretty cheap electric bill!

In considering how to expand the reach of LEF's technologies abroad, trying to set up homes or small villages with $1000 battery sets was a hurdle. So we contacted the Chinese company that made our NiFe batteries, Changhong. We asked them to import some smaller NiFes for us, and they did. We took possession of those batteries some months ago, and have been working on building lighting/ charging systems with them.

A "normal" off grid house would have 1000 – 2000 ah battery set that would cost $5000 -- $80,000, depending on what kind of batteries are used. Our $1000 LEF NiFe set is 100 ah. The small Changhong batteries we imported are 10 ah, which is a pretty small battery. Each cell is about the size of a sandwich. The first big question we needed to answer is whether or not there was any hope of lighting a small house with these very small NiFe batteries. NiFe cells always come in nominal 1.2 volt cells. So a nominal 12 volt set takes 10 cells, which is standard voltage for automobiles, and a voltage at which a lot of equipment is made for truckers and yachters. In the interest of making the cheapest functional lighting system possible, we wanted to make lighting/ charging system with less than 10 cells that would operate at less than 12 volts. With this in mind, we made a number of different variations of sub-12 volt LED light bulbs. We did that because while we can easily buy LED bulbs made to run on 12 volts, bulbs for general lighting purposes are not available in voltages lower than 12.

The smallest LEDs operate at 3 – 3.2 volts. Two NiFe cells (2.4 volts) under-powers a single (or parallel) LED set, and 3 NiFe cells (3.6 volts) overpower a single/ parallel LED set. Individual LEDs are a penny each, but don't put out much light. The LEDs used in actual light bulbs are referred to as LED "chips," and they have great light output. And you can choose your color, if you are fussy about that. But the LED chips are still constrained to operate at 3 – 3.2 volts. So, after realizing that underpowered LEDs chips put out crummy light and overpowered LED chips overheat quickly, we settled on a 5 NiFe cell, nominal 6 volt system that would employ 2 LED sets (with voltage demand at 6 – 6.4 volts). We soldered those up, and they worked great.

The moment of truth came after we had run them for a while, then put the amp meter on them. The LEDs we had soldered up (much thanks to Eric for his diligent efforts) lit up about 1/4 of our large living room at LEF. That's about how much light you would need for a bedroom. And the amp meter said... half an amp. Wow. That means our meager 5 cell 10 ah NiFe set with homemade LEDs could power that LED set for 20 hours, give or take. Great! And given that the batteries are being recharged every day by a solar electric panel, we clearly had an adequate, small system. Commercial LED bulbs have a bunch of electronics in the base. It's clear that commercial pressure (aka ecologically unconcerned capitalism) pushed NiFes off the market. But what is all that electronic junk doing in the base of those LED bulbs?

Then the weather brightened up, and we realized we had a problem. NiFe batteries are much, much tougher than any other battery. They tolerate voltage swings – high and low voltage – that would destroy any other battery. That's part of the elegance of LELS. We can use less electronic junk. In conferring with Changhong, they think that our systems, which use small PV panels relative to the size of the batteries, will not shorten the life of the batteries, even though the voltage variation is much larger than you would normally have on a battery charging circuit. NiFe's don't mind voltage swings; LEDs are another story. An incandescent light bulb is a "resistor," in that it only lets a limited amount of electricity (amperage) pass through it. As the filament in an incandescent bulb heats up, the resistance increases, which tends to reduce the electricity flow and, to an extent, protects the bulb from overheating. Most resistors are similar. LEDs are peculiar. As they heat up, the flow of electricity actually increases. Not only that, but the increase in flow is logarithmic. Translate – sun comes out, batteries get all excited, voltage goes up, and our homemade LED system goes beyond tolerable voltage variation.

We did some more research, and indeed, that little electronic circuit in the base of each commercial LED is not just for fun. It stabilizes voltage (and does a few other things). The simplest way to fix our homemade LEDs bulbs was to just add more LED chips in series to aim for the high end of the voltage swing. But by the time you are back at the low end of the voltage swing, those homemade bulbs are pretty dim.

The NiFes clearly had enough capacity, but we decided it was time to punt on the homemade bulbs. We want to keep our systems simple, but they need to work. We have DC regulators in various uses in our DC Microgrid. The ones that handle higher amperage cost something, but in this case, we ain't talking about much in the way of amps. A bit more research, and voltage regulators that can handle 5 amps (ten times the amperage flow of our small system) cost $2 - $3 each. That's a bearable cost, even for our smallest LELS system. And it means we don't have to contemplate the endless hours it would take to make gobs of homemade low-voltage bulbs. The voltage regulator allows us to take 3.6 volts from a 3 cell set, or 6 volts from a 5 cell set, and convert it to 12 volts. Thus we can run 12 volt bulbs with as little as 3 NiFe cells. We get to buy bulbs instead of making them. The 10 cell LELS systems need no voltage regulator, though the larger systems will use a charge controller.

We have to secure our supply chains to make sure we can get the parts we need in a timely fashion, and we need to do some more testing. In another consultation with Changhong, we asked them if we can ship the NiFes dry. If you ship them wet, then they have to travel with a hazmat label. They said having the batteries dry for a few weeks is not a problem, which means we can ship them easily. The key components are in place for the most durable, sustainable, elegant lighting system you could hope to have.

New Website

LEF has a new website. Same URL, livingenergyfarm.org Don't expect a bunch of glitzy web gook. Our point is not to wow anyone with computer skills we don't have, but rather to more clearly explain what we are doing, how, and why. We put up a photo gallery. The agriculture section of the site is not complete. If you see typos, or parts of the new site that are particularly good or bad to your taste, please let us know.

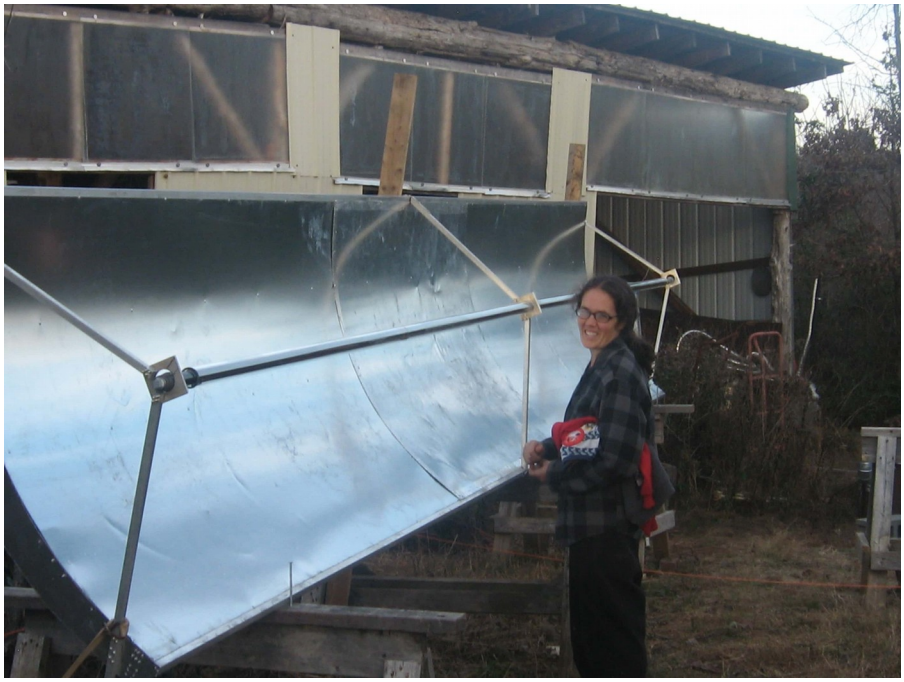
Homemade NiFe Batteries

Changhong has been cooperative with us in meeting our needs. But ultimately, if we can set up village production of NiFes, that could have a huge impact. Working with Eddie in Pittsburgh, we have made two prototypes of homemade NiFes. Presumably, we are getting closer to what we need, but we aren't there yet.

Eddie has shipped the NiFe prototyping materials back to LEF. We also had a visit (coincidentally) from an Australian physicist with considerable experience in the world of electronics and LEDs. He has some experience with the more systematic development and testing employed in industry to refine electronic technologies. He is enthusiastic about helping us with the homemade NiFe project. Wish us luck.

Progress on the High Temperature Solar Storage/ Cooking System

We have made some good progress on testing our solar high temperature storage/ cooking system. We put our parabola in place, filled the system with mineral oil, and pumped the heated oil through our small steam jacketed kettle. The biggest variable in how this system works is likely to be the borosilicate tubing we put around the heat collector pipe. Borosilicate is a fancy name for old-fashioned "pyrex." It can handle the high temperatures, and it's cheap. But will it reduce our thermal losses enough to make the system work? Preliminary indications are positive. We have been making some nice hot oil and a very hot pot. (The steam jacketed kettle is a pot welded within a pot that allows steam to be pumped in between the pots, transferring heat to the material being cooked in the inner pot. They are used a lot in large, commercial kitchens and food processing facilities. We are pumping oil instead of steam through the kettle.) Given our positive prototype run, we are going to put the system together in something resembling final build-out, and "fire er up." Wish us more luck.



Our solar parabola to collect heat for cooking is set in place. We will know soon how much heat it can make.

China Liaison

We mentioned in the last newsletter that we were looking for a person in China to help us get a particular part. With our LELS project coming to fruition more quickly than we expected, we are importing electronics from China. It would be really helpful to have an ongoing contact in China with good english skills to help us communicate with suppliers. We would seek to make the relationship rewarding, as resources allow. Any ideas or contacts, please pass them along.

Did you notice Monsanto is on the ropes? What does that mean for modern agriculture?

It was in the national news a couple months ago that a man had won a law suite recently claiming that Monsanto's Roundup herbicide caused his cancer. The claim, accepted as truth by the court, is that Monsanto has been suppressing the health risks of their herbicide by claiming that medical evidence is a "trade secret." The other day, we were riding the Jaunt bus. (The Jaunt is a local bus service that takes people who need transport around the county. We are raising our kids in a rural area without a car, so we use the Jaunt regularly.) The driver is a very sweet person. He is a baptist preacher, and likes to play gospel on the bus radio. There we are, on the bus with a half dozen other Louisa residents, and a law firm is running ads on the radio seeking people who have cancer that may have been caused by Roundup to sign them up for a class action law suite.

This ad led to some lively discussion among our fellow bus riders. One elderly woman was grateful that companies making dangerous chemicals are finally paying for it. Another woman disagreed, saying "if they stopped making those chemicals, we wouldn't have food." We told her that we run an organic farm and have no

trouble growing food without chemicals. She responded by giving our kids a homemade cookie. We couldn't argue with that.

The ad is a big deal for Monsanto, and a big deal for global agriculture. Second only to nitrogen fertilizer, global agriculture is wrapped around Roundup. A lot of modern genetic modification has been undertaken to help plants respond positively to the chemical onslaught they face in a commercial farm field. Industrial farmers are completely dependent on herbicide, Roundup in particular.

There are consequences for our reckless use of chemicals. Herbicide resistant weeds are developing at a rapid rate. Americans have been hesitant to research the issue of health affects too much. But European researchers have found that both Roundup and the weird proteins used in GMO crops are flowing copiously (or at least at rates well beyond desirable) through the bloodstream of the average person. Put weird stuff on the field, and it travels through the food chain, and into your body. Surprise. Herbicide in your blood.

The other noteworthy set of events we have noticed as farmers this year is one massive rainstorm after another. We have had the kind of flood you might expect every 25 years or so 4 times this year. Makes farming a bit more of a challenge. We manage our fields as best we can. Organic codes encourage that. But holding onto your topsoil in the midst of an 8 inch rainstorm is a challenge. The media has also run stories from much larger commercial farmers making the same observation – farming is getting harder because of climate change.

Did you know that in recent decades global meat consumption has grown twice as fast as population? Did you know that 1/3rd of global farmland has stagnate or falling yields in spite of increased applications of chemicals and GMO seeds? People image climate change as a big catastrophe, or slow change. The ecological limit that we are most likely to feel the soonest at a global level is going to be food. Food price instability triggered by weather anomalies, to be more precise. That, in turn, is likely to lead to further political polarization.

The electrical side of LEF gets attention most easily. And we are happy about our DC Microgrid. But the design process is more important. And regaining our connection with the land, with the Sacred Earth itself, is most important of all. The lowest part of our fields, the part that would wash out most easily, didn't loose a teaspoon of topsoil this year. It was covered in wheat, cover crop, and no-tilled to winter grain. That worked great. Other parts of our fields did loose some soil this year.

Rodale Insitute has done some great work on developing and quantifying the impacts of organic no-till farming, including looking closely at the economics. The bottom line is that farming that ignores the future (chemical industrial farming) can produce bulk commodity grains at a price that is going to be hard to beat with more careful methods. But that is only one measure. We are a small farm. The methods we are trying to develop have more to do with whole-farm sustainability for more modestly sized farms. Whereas Rodale's research is looking at industrial-scale organic farms, we are focused on community-scale farming. And it takes time. Sometimes, if we get lucky, we figure out mechanical things quickly. As much as climate change is pushing the weather to ever greater extremes, we can't rush the seasons. We hope to be growing most of our food and commercial seeds crops in a few years using a more diversified method of organic no-till than the industrial organic farmers are using. That, hopefully, will be a positive contribution to future food security for us all. We can solve the problems we are facing. But not if we don't try.

Please help 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 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 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
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