

Living Energy Farm

April-May 2018 Newsletter

LEF Update

Things are going well at LEF. We have two families and a great collection of interns and visitors these days. We have been planting our fields, our gardens, and expanding our orchards. We are excited about the largest strawberry harvest ever, and about a big contract to grow Orangeglo watermelons. (They're really good!) We have planted a big corn crop, as well as a lot of berry bushes, persimmon trees, jujubes, kiwis, grapes, and other lovely fruiting plants. We are about to harvest our biggest wheat crop ever. We have had a spring alternating heat and cold, wet and dry. We couldn't get our seeds to sprout, now we can't pull the weeds as fast as they are growing because of the rain. For now, these are minor and manageable issues one deals with as a farmer. We are deeply concerned about the impacts on our long-term food supply as a result of weather oscillation triggered by climate change. For now, we are doing well. And we are working as hard as we can to encourage positive and effective solutions.

Our Third Weekend Immersive

happened in May and was focused on energy self-sufficiency. It went well. We made some excellent connections, including a DC-based worker cooperative which aims to integrate some of our off-grid design.

Our DC Microgrid

continues to work great. We make small refinements here and there. But as it is, we heat our buildings, pump and heat our water, and run all kinds of equipment using our DC power. We get to surf the net or watch a movie any time we want. Our solar powered fridge runs great. Every time I take a hot shower I think, "People just assume life without fossil fuel means sacrifice. This isn't sacrifice..."

Running AC Power Tools on DC

We continue to "tool out" our shop at LEF. For a while now, we have been running cordless tools on power from our nickel-iron battery set. We pull the batteries out of the battery pack and solder in an extension cord. An 18 volt DC portable drill will run at 24 volts or 12 volts DC. The nickel-irons run 14 - 16



Alexis cutting quarter inch plate steel with a circular saw powered by daylight drive solar electricity. DC electricity is powerful!

volts usually, so that works fine. For stationary power in the shop, we use our 180 volt daylight drive power. But we have found ourselves in need of stronger portable power. Specifically, how do you cut heavy plate steel? The cordless tools work, but they are not all that powerful for such a heavy task. The 180 V industrial DC motors are very durable, but also very big and heavy. An oxy-acetylene torch is effective but messy. A while ago, our friend Kris Ward in Missouri told us that ordinary power tools, the ones made to run off household current, actually have AC/DC motors. We researched the question further, and it's true. Those tools have what are called "series wound universal motors." Fancy talk for a motor that can run on AC or DC. We tried hooking up a circular saw to the 180 volt DC, just for sparks, and it sorta worked. Turns out the speed of series wound motors has no fixed point, but is rather set by voltage. Our 180 volt system runs at about 230 volts at full sun. So that saw took off like a rocket, and exploded the trigger switch in the process. Very exciting!

Still seeking a way to cut plate steel (and to have other powerful portable power tools), we took our 180 volt, 8 amp PV rack and cut into to sections. That gives us a nominal 90 volt at 16 amps, just about what a household power tool would want. High amperage DC switches are hard to come by, so we put at 30 amp AC switch on the saw. Now it runs like a champ! It's great, now we can run any normal household power tool straight off the daylight drive PV rack. It really enhances what we can do in the shop. A single "double pole double throw" switch installed in the wiring switches power from 180 to 90 volts. We love making sparks!



Nika helped with grafting this year.....

Building the LEF model in Nicaragua

We mentioned in our last newsletter that Eddie had traveled down to Nicaragua to examine possibilities for building LEF-style energy systems down there. We have been communicating with Barrio Planta, an organization that runs several schools. No sooner had Eddie got back to the U.S. than major political unrest erupted in Nicaragua. Dozens of people have been killed. There is quite a bit of chaos and we have not been able to communicate effectively with people down there. We are hopeful that we can move forward with the project this fall. We continue to reach out and communicate with other organizations involved in similar work.

Experiments with No-Till Farming

Growing vegetables with lots of mulch and no tillage is a well-known permaculture strategy, and has many benefits including improved soil health, water conservation and labor savings. Most folks we know who use this method rely on large amounts of imported mulch- usually waste hay in rural areas, which requires a lot of land and machinery to produce, or discarded leaves in urban areas. We've long said that this method is not practical for us at LEF because we don't have a surplus of mulch. On a larger scale, organic no-till is done by growing a cover crop to cut or crimp and leave in the field to serve as mulch. We've tried this method in the

past, but it didn't work well for us. The mulch was too sparse and we had to do a lot of hand weeding.

Last summer we grew Kentucky Rainbow, a dent corn bred by Susana Lein, a permaculture farmer in Kentucky. In the fall, Susana was kind enough to reach out to us and give us advice on seed stock selection for her corn. She asked how the crop had done; I told her that the corn was beautiful but the yield was disappointing, probably because of last year's drought. She told me that she never has problems with yield on drought years, which she attributes to the fact that her farm is 100% no-till. She also works her farm with only hand tools, and grows her own mulch. I was intrigued.

After picking Susana's brain and doing my own research, I'm beginning to appreciate why our experiments with no-till didn't work in the past. First off, it doesn't work well to rotate between tillage and no-till management. Weed control in organic no-till (conventional no-till uses herbicides) depends upon leaving weed seeds buried where they won't germinate. Tillage brings weed seeds to the surface of the soil. Also, instead of just using rye as we had done, Susana plants a diverse winter cover crop including rye, clover, mustards, winter peas and others. This diversity, along with improved organic matter in the soil, contributes to a more lush cover crop, and therefore more mulch for the cash crop.

We're beginning to appreciate that good no-till management comes down to investing in soil health- high organic matter in particular- and a low weed seed load. To achieve this, we have taken sections of our fields out of production for a few years. We are growing only cover crops to build organic matter and smother weeds. We are attempting to manage these cover crops without tillage- that is, we broadcast summer cover crop into the standing winter cover, then cut the winter cover so it can serve as mulch to help the next cover crop germinate. Our summer cover mix includes sorghum sudan, buckwheat, and cowpeas.

Taking land out of production, as well as the cost of the cover crop seed, is a sacrifice for our farm. But the pay off is potentially huge. Our major calorie crops- the crops that supply the bulk of calories for us and our poultry- are corn, wheat, beans and sweet potatoes. All of these crops are well suited to no-till management. If we can grow these crops in a way that builds organic matter, requires less water and weeding, and can stand up to downpours without erosion, this will mean a much more resilient food system in the face of climate chaos and uncertain times.

Nickel Iron Battery Project

Eddie is working on our second generation of homemade nickel-iron batteries. We started using plates. Now we are using powdered metal oxides (which provide much higher surface area). So far, we have some minor explosions, no casualties, and (hopefully) progress toward figuring out how to make durable, effective, homemade batteries. In the meantime, a shipment of small nickel-iron batteries directly from Changhong (a very large battery manufacturer in China) are due to arrive in a few weeks. As soon as we get those, we will begin experiments on making very small, cheap lighting systems for small houses.

High Temperature Solar Storage for Cooking

We have been working on building a high-temperature solar storage system for cooking. Sadly, our prototype trough collector was flipped over and smashed to bits in a windstorm this spring. Now we are going to build a more sturdy metal-framed one. It's sad we lost our prototype. It is uncertain as to whether or not a trough design will really work. We may need to use a parabola (like a satellite dish). The trough is simpler in that it does not need to track the sun daily. The trough does not concentrate the sun quite as much as a parabola, but a parabola has to have a sun tracking system. If we could have tested the wooden-framed trough more thoroughly before the wind got it, we could have perhaps refined our design without further time and expense. The metal trough will take some work and money. Hopefully, we can get some intern help with it this summer.

Farm Grown Fuel for Small Engines

We are continuing to try to pull the pieces together, mentally and materially, to build a farm that can grow its own fuel. Our friend Kris has once again been a huge help. We are rebuilding some small engines, and small tractors, to try to run them on woodgas and/ or turpentine. "Turps" as we call it, can be distilled from pine sap. We can't afford to hire mechanics or buy new machinery, so we are rebuilding old equipment. We have

learned a lot about old machines. Older engines turned more slowly than modern ones, and are made with more iron (less aluminum). Homegrown fuels tend to be low-octane, meaning they burn more slowly. Older engines, with their slower piston speeds, are better suited to these fuels. The older engines also are more tolerant of variability in fuel mix. The hope is that we can build our own energy independent micro-economy, and then calculate the feasibility of expanding that economy to people around the world.

Bringing An Energy Independent Society Into Focus

With human population densities being as they are, we can't go back to feeding ourselves with acorns and wild game, even if we wanted to. With that certainty in hand, visions for our future seem mostly to be a matter of personal and political preference. Most of the people who concern themselves with thoughts of our collective future seem to endorse solutions that are much more complex and expensive than our vision at LEF. Time will tell, but it seems clear that the high-tech solutions for maintaining industrial consumer society are going to fall prey to the simple laws of physics. There are not enough resources to provide everybody with a "middle class" lifestyle. It would appear that a lot of what passes for charity, nationally and globally, serves to encourage the illusion that everyone can have the lifestyle of wealthy consumers. That, perhaps, is a large part of the reason we maintain our attachment to illusions of a pale green industrialism. Hopes of "progress" toward a "better life" is the best social narcotic around, and the laws of physics be damned.

It is our hope that our work at LEF is informing a vision of our future that is possible, a vision that does not try to defy physics. The DC microgrid at LEF is working fantastically well. We are optimistic that we can come up with a farm-grown fuel that will work. One question in the back of my mind has been motor oil. Not a big concern of your average American I know, but you have to realize that our very lives are utterly dependent on machines, and no machine is any better than its lubrication. Impressed with your internet connection? Fine, but there are a lot of heavy machines with flying pistons and spinning shafts that make your energy, make and move your food, and make those fancy computers. Those machines need high-quality oil for lubrication. I finally got around to bringing it up with our friend Kris in Missouri. I asked him how we could produce our own motor oil. Here is his answer.

"I would choose castor oil, due to its viscosity and heat tolerance, followed by cottonseed or safflower oil, perhaps blended with tallow. Slower speed cast iron machinery is much more tolerant of natural lubricants than newer high speed stuff (why do we need to go so fast anyway?). An example is the old farm engines that work just fine with lard in the grease cups and veggie oil in the cylinder drip."

So there you have it -- an irresolvable problem solved by castor oil. I had to laugh. If only we could get people working on this, it's doable.

All of our political and ecological problems point in the same direction -- sustainable, empowered communities. Here's our list of what we need: Photovoltaic panels and DC motors for stationary power, like LEF. If we had a networks of communities supporting each other, we could build our own electric motors. Not sure about making the PV panels at the village level. Good submersible DC well pumps are also pretty high-tech, but I am sure it could be done. For mobile power, we use the old iron engines. Eventually, we build our own. In the Cultural Revolution in China (a messy subject), the Chinese set up village iron smelters all over China. In time, we make our engines. We grow our own fuel, our own lubricating oils, our own food. Communities trade and support each other. Our buildings are locally adapted, strawbale in cold climates.

So a fully sustainable economy is not so hard after all. You will notice what is **not** on the previous list. Industrial cellulosic ethanol, private cars with 200 - 300 horsepower engines that cost tens (hundreds?) of thousands of dollars, clean coal and carbon sequestration, multiple KW of grid-tie solar electricity on private homes supporting a "transition" to a future that is just a crazy wasteful as the present. The high-tech fantasies of a post-fossil fuel economy based on yet more high-tech consumerism are collective suicide.

The reality is that the choices are plain and before us, but you are not going to see them advertised on television. The commercial interests vested in the profitable new market of "renewable" energy supply, along with the large environmental groups, seek supply side "solutions" that make us feel better but do nothing to address the core problems of a future sustainable economy.

LEF's realistic, positive vision will work. But in not pursuing it in a timely fashion, the sober reality is

that we are committing ourselves to mass starvation. As the laws of physics collide with the physical realities of the Earth, palliative measures will be ineffective. People have cast climate change as a slow changing of temperature. Climate change is a symptom of a disease called unrestrained growth. And that growth commits us to its own repercussions. Climate change means a change in rainfall patterns. That means dramatic changes in the human capacity to grow food, or not, in the manner to which we are accustomed. The average American has hardly noticed that each season, growing food is getting harder and harder. Every farmer I talk to has noticed. We have a better answer. In nuts and bolts, sweat and soil, we have a better answer.

Please support us if you can.

Articles and videos about LEF:

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

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.