

Living Energy Farm April - May 2020 Newsletter

It's high summer at Living Energy Farm, and we are reveling in the bounty of watermelons, cantaloupes, tomatoes, pears, peaches, and playing in the long evenings. Farming keeps us busy, but we are also making progress on our projects to spread durable, decentralized renewable energy systems far and wide.

Spreading the LEF Solar Energy Model

We mentioned in the last newsletter that we were sending 10 of our Cabin Kits (solar lighting and charging kits that can light a few light bulbs and charge electronic devices) to The Source Farm in Jamaica. The folks there have happily received those kits. They have begun assembling them, and are sending them along to people who need them. They are also very excited about expanding the program in Jamaica. We have been saying for at least a few years now that LEF's DC Microgrid makes conventional grid power obsolete. The capacity for spreading this technology seems high in Jamaica. There are many, many people there who need durable solar equipment. The folks at The Source Farm are now organizing to build kits and spread this model themselves. We are now making preparations to send them more equipment. We will keep you posted as things evolve.

Simplified Combine Harvester

We mentioned in the last newsletter that we hoped to put a prototype harvester in the field this year. It's a humble machine, made from a 50 gallon drum. It could easily be built for some hundreds of dollars, and could have application all over the world. Well, our plate is

pretty full, and we did the best we could to get the harvester ready. We did some "bench runs," simply firing up the machine on the bench and shoving handfuls of rye and wheat stalks into it. That was highly instructive.

When we tried to take the machine out into the field, things got messier. The 3-point attachment we had built to connect the harvester to a small tractor was clearly inadequate. The thing was just too lopsided. It was counter-weighted, but inadequately so. We put a last minute support wheel on the machine, and took it to the field. We fired it up, and tried to harvest some wheat. Well, the tolerances inside the machine between the thresher arms and the frame of the machine were inadequate, and the whole thing flexed just a bit too much



The folks at The Source Farm, assembling and installing the solar kits we sent them. They are gearing up to make their own kits!

because of the lack structural rigidity. Our harvester all but destroyed itself in a matter of seconds.

Such are the trials of inventing better machines. In retrospect, we should not have tried to move so quickly with the project. A few shortcuts really caught up with us. The bench runs were actually more instructive than what happened in the field. One has to expect such petty disasters any time one tries to invent something new. Still, we would have learned more if it had run a big longer.

Going forward, we are going to work on two designs. The 50 gallon drum seems pretty inadequate as a direct-intake harvester. The idea is that it would function kind of like an old fashioned reel mower, drawing the grain right into the machine. The arc of the drum is really too sharp for that. We are going to put an intake reel, just like real combines have, in front of it. The intake reel from the little Chinese combine we have is easily removed, so we can borrow that. We will also put a sickle bar mower in front of it, just like a real combine. The things that will be missing (compared to normal combines) are a host of conveyors and what not. Even with these add-ons, our harvester will still be much, much simpler than any other combine currently available to small farmers.

We are also going to have another try at building a direct-intake machine, but one with a much larger radius for the thresher. We can easily get metal in 4 foot widths, so that may be the diameter of the new direct intake model.

We have learned quite a bit. The new machine -- still using a 50 gallon drum but with the intake reel and sickle bar -- is almost certain to work, albeit with some modifications along the way. The direct intake machine (with wider radius) is more theoretical, but would be by far the cheapest to build. In either case, both new prototypes will be mounted on their own little trailers this time. And we will make sure the clearances are better, and structural rigidity is adequate.



Our harvester prototype run was a mechanical disaster. We learned some things. Now on to the next model.

Food Self Sufficiency Report

For a lot of people, the current pandemic has really brought home the fragile nature of the industrial food system. It has for us too, especially at one point this summer when we faced the possibility of losing access to our bulk food supplier (where we buy things like vegetable oil and coffee that we don't grow), because of issues related to the pandemic. At that point we asked ourselves, could we really feed ourselves completely if we had to? (It ended up being only an intellectual exercise, as we found another way to order bulk foods, much to the relief of the caffeine addicted among us.) But I think the answer is... maybe, depending on how many people we had, and what everyone wanted to eat. We are blessed with fertile soil. We do use some fertility inputs, but are trying to reduce them using cover crops and reduced tillage. We have a climate that, while becoming increasingly unstable, can still support many staple crops: corn, wheat, potatoes, sweet potatoes, beans, peanuts, and squash.

In this era of wild weather, it's really, really important to grow many different staple crops. This year a devastating late frost cut our potato yield by 80%, and also wiped out some 20% or so of our wheat crop. We were lucky, many wheat growers in the mid-Atlantic lost their whole crop. We got off easier because our wheat was less advanced (due to a later planting date and our no-till planting method). Then, in July, a strong thunderstorm caused some lodging in the corn, which will reduce yields as well. Luckily, our sweet potatoes, peanuts, squash and lima beans are looking good.

Farm Grown Fuel to Run a Small Tractor and Biogas

In the last newsletter, we reported that we had run a small tractor on turpentine made from pine sap. That was a glorious achievement for us! Turpentine is certainly a much, much better fuel than woodgas, if you have the turpentine. We tapped some pine trees this summer and put out sap buckets. The only information we can find about how to collect sap dates back a couple of centuries. Those documents mentioned that the sap flow happens in July and August. We tapped (or scraped, rather) one large tree in early spring, and then did a handful more in late June. Well, that one big tree we tapped early has produced more sap than all the rest combined. In total, we have only collected a gallon or two of sap. Our farm right now uses about 50 or 60 gallons of fuel per year. I think we can cut that in half. (Mostly by using more efficient mowers.) Still, that's quite a bit of sap. The issue of scalability is clearly the big concern with turpentine fuel.

Meanwhile, intern Jessie has been taking good care of Seymour, the biogas digester, and some interesting things have happened. The big issue is keeping this digester warm enough. That's not so hard in summer. More surprisingly, she is now getting more gas than a digester that size normally produces, but with *one third as much inputs as we were using last year!* Clearly, we were over-feeding the digester last year. Last year, it smelled bad. Now, not so bad.

Based on past experience, I had assumed that making enough biogas to feed both our cooking needs and a tractor was not practical. With more experience under our belt, using biogas as tractor fuel is starting to look like a real option. We had intended to use biogas as a startup fuel to warm up a turpentine tractor anyway.

If we are going to use biogas as tractor fuel, there are a few issues to consider. Biogas is very fluffy, and has to be pressurized to at least moderately high pressures to be useful on any mobile machine. Biogas or fossil natural gas are often used on stationary machines where the engine can be fed by a pipe instead of a gas tank. There are some city buses and other vehicles running on CNG these days -- compressed natural gas. (The combustible part of biogas is methane which is natural gas.) Those vehicles have fancy, high-tech, very high pressure tanks that are made to withstand harsh impacts in the event of a crash. We can't afford that.

Another issue with biogas is that it can be corrosive. It contains (most often) hydrogen sulfide, which can react with oxygen and corrode an engine. You can smell the hydrogen sulfide. We had a lot more of it back in the cooler months. It is undetectable now. We have found a local lab that can test for it. Hydrogen sulfide can be filtered out.

We need to do some experiments and calculations to see if we can use a modest compressor to put biogas in propane tanks at an adequate pressure to run a small tractor. We need to do some tests to make sure the biogas will not corrode the propane tanks or the engine. The fact that we might be able to use the biogas digester -- which we were already building for cooking fuel -- for the additional task of creating tractor fuel is very appealing. The tools and time to produce turpentine could be considerable. The biogas approach *might* be dramatically more efficient overall. The biogas production cycle would also fit well with farming -- we could easily make extra in the warmer months when we actually need it. We are very excited about this new approach. We will have to see how it goes, but it feels like the most promising farm-grown fuel option we have looked into so far.

Our increasing proficiency at creating biogas may be the final mile for LEF's energy self-sufficiency. We have our daylight drive solar electric systems that cover all of our stationary power needs. We have our nickel iron batteries for lights and electronics. If biogas covers cooking and tractor fuel, then that's it. That's all we need. And it's a very workable, affordable village-level energy package. It's very exciting to think of being 100% energy self sufficient, on a modest budget, as we have been striving to be for these last 10 years.

Farm Update

Life is full, life is good. We have the best crew we have ever had at LEF. The kids are enjoying summer. One big concern for us each year is what kind of watermelon contract we can get -- what variety, and how much. This year we got a good-sized Orange Glow contract. That is a watermelon with orange flesh, large size, and a delightfully sweet flavor. Having as much watermelon as we want to eat each and every day is a delight for children and adults alike.

Having more people on the farm, we wiped all of our canned goods last winter. We are putting away as much as we can now. We doubled our seed production this year. With tomatoes and peppers, we get to both save the seed and eat the fruit. Some seed companies reported a five-fold increase in seed sales this past spring because of covid. We made our contracts with them back in February, before Covid. Now, sure enough, they want to buy more than the contracts we made. We are harvesting and processing everything we can grow, because the demand for quality organic seeds is much higher than the supply.

The kids are enjoying biking around these days, both on the triple-seater and on their own bikes. They can all bike as far as the town of Louisa, closely escorted of course.

We have a large black bear on the property that has been seen a couple of times in recent weeks. We moved our bee hives up close to the house to discourage the bears from bothering them. That seems to have worked. We have had coyotes on the property since we first arrived ten years ago. They have been howling around the edges of the fields this summer, which reduces deer pressure on our crops. Leaving much of our land wild, we have a lot of deer, and a handful of coyotes, bears, bobcats, and foxes on our property. We are pleased to live in such a rich environment.

We have been doing a few social distancing tours at LEF. As with everyone, our social activities have been impacted by covid. And now that seems set to get worse before it gets better. When the disease itself slows down, the social impacts will linger. A lot of people all over the world have seen their incomes decreased because of the pandemic. Above all else we support self-determination. That is difficult for people of modest income who do not own land, homes, or businesses. Extreme inequality of ownership is a massive problem. We can make choices though. We hope we will see, and can support, a growing movement to make choices to devolve property ownership, food and energy production back to empowered communities.



Rosa, Xander, and Smokey enjoying a dip in a nearby river.

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 Plan a Garden

<https://www.youtube.com/watch?v=JT0qXD3m2AE>

Cutting Firewood With Daylight Drive Solar Power

<https://www.youtube.com/watch?v=mMwwZj8DxjE>

Electrolyte Mixing for Nickel Iron Batteries

https://www.youtube.com/watch?v=ZAjIHN4oL_E

We have a few more videos coming out shortly. Stay tuned.

How to Never Pay an Electric Bill

<https://www.youtube.com/watch?v=N5Wk7inoIxI&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.

Living Energy Farm's Climate Justice Campaign

<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>