Living Energy Farm
March - April 2021 Newsletter

Springtime has arrived at Living Energy Farm. On the farm, we are preparing for a new growing season, planting for seed and food crops in the fields. We are also moving forward with setting up solar equipment in Jamaica, working on biogas, and working on taking Magnolia (the house in the town of Louisa) off grid. Our community is full of very engaged people these days. So far this spring is much better than last year (which had some awful late cold weather). Looks to be a good year for fruits and berries.

Expanding the LEF Vision

We shipped a crate full of solar powered equipment to Jamaica, including commercial food processing appliances, durable nickel iron solar kits, a water pump, and solar cookers. That equipment has reached its destination at The Source Farm in Jamaica. Carrie (Debbie's sister) will be leaving in a few days to go down there. She will be gathering information and communicating with the folks down there, figuring out what further tools and materials we need to move forward with our various projects. She will be helping set up the new solar cookers (see http://conev.org/ISECmanual14.pdf). We will be sending more people later in the year to help with training and installation of the commercial daylight drive breadfruit processing equipment. Our plan is to help The Source Farm create a Social Enterprise (a for profit business that turns the profits toward socially beneficial ends rather than maximizing profit). We intend for the Social Enterprise to distribute nickel iron battery kits, solar cookers, and to help people set up daylight drive solar energy systems.

Biogas

We have built 3 different biogas digesters in the last 10 years. Our largest, newest digester is finally ready for action. We learned some difficult lessons in how to (not) make joints in plastic. We had to fill and drain our newest digester about a half dozen times to repair leaks. Now we know some better techniques (involving fancy epoxy and hot glue). We are going to wait a few more weeks before converting our gas production from the old digester (named Seymour) to the new digester (named Seymost). We can't run both because we only have one solar heating system. Once we cut off the heat to Seymour, he will go into fatal decline. The biogas is huge help for cooking. It is much, much more pleasant to cook in the morning with gas than with a smoky rocket stove.

Magnolia, straw and stucco are done. Thanks to our hard-working crew!

We also plan to use biogas to power our small tractors, or at least to try it. Intern Eric has been doing some calculations regarding how much we need to compress the biogas. Biogas is methane is natural gas. They are all the same thing, except biogas also tends to have some other contaminants in it. The big limitation of any form of methane is that is has very low energy density. It can be sent down a pipe easily enough, but for mobile applications, it has to be compressed, or even liquefied. Normal "CNG" (compressed natural gas) vehicles use equipment that is too expensive for us. I had hoped we could use lower pressure propane tanks. But the numbers are clear. We have to use very high pressure containers.

The high pressure gas bottles used for oxygen, carbon dioxide, helium, and other gases are often filled to 2000 psi or more. A moderately large high pressure gas cylinder (like you would see in a welding shop) filled

with methane at 2000 psi would have the energy equivalent of a bit more than 2 quarts of gasoline. That's enough for us. If we strap a couple of them to the front of one of our small rear engine tractors, it should run for a couple of hours. The gas cylinders themselves are made of heavy steel, and are safe enough. The brass valves and regulators at the top of the cylinders are more vulnerable. We will have to develop a very clear set of safe procedures for filling and handling the cylinders as we go forward with this plan.

It is interesting to note that biogas is used extensively around the world. India has millions of small biogas digesters. India, Canada, and Sweden also have large programs encouraging the use of compressed biogas for trucks and farm tractors. A couple of large tractor companies are making tractors made to run specifically on biogas. The Canadian and Swedish programs use expensive equipment. Canadian farmers get subsidies for running compressed biogas into their diesel tractors. (They are still using diesel. The biogas is a parallel fuel system, not a replacement.) Want to convert your farm pickup to biogas? That's nearly $20,000 in hardware, not including setting up the digester itself.

Biogas equipment to run a small tractor. Air rifle compressor, high pressure gas cylinder with regulator, hydrogen sulfide meter. We will have a biogas tractor running very soon, and this equipment cost less than $500.

Tractors and trucks that cost tens of thousands of dollars are not going to help small farmers in sustainable villages around the world. But the fact that this is already a booming trend means we can learn a lot from other people working with biogas. Our task at LEF is to figure out how to scale this technology at much lower costs, how to make it accessible to ordinary people. For now, we need to figure out how to run small engines, and what kind of engines and connected hardware will work. For some alternative fuels, older engines are preferable. Older engines are lower compression, they turn more slowly, and they are less finicky about fuel mix. Which engines work better with biogas, new ones or older ones? We don't know yet. If we end up exporting this technology, as we are doing with our solar technologies, we are likely to be putting biogas in modern engines on small Chinese manufactured walk behind tractors. We will have to experiment with similar engines at LEF and see how well they run on biogas.

A biogas digester is a plastic tank. That's cheap and easy enough. The hardware to make the biogas usable in moving vehicle can be borrowed from other uses. For better or worse, there is a considerable market for very high pressure compressors that power paintball guns and pre-compressed pellet rifles. That means cheap, high pressure compressors made for the air-gun market are available to us for compressing biogas. We

have purchased most of the hardware we need to at least test our modestly priced approach to making machines run on biogas. Overall, the cost of the equipment (compressor, cylinders, regulators, etc) is fairly moderate. This, like many of the technologies we are developing, works much better on a community scale. In the coming weeks and months we will be trying to figure out which compressors work well, which engines run on biogas, how to set up the equipment so that it is safe and effective. We are cautiously optimistic that biogas will finally allow us to run our farm with fuel that we grow ourselves.

About Mowers and Farming More Efficiently

The message that we can substitute renewable energy for fossil energy has been promoted by our mainstream environmental movements. Politically, it sells, but it just isn't true. For renewable energy to have any impact on our overall environmental footprint, we have to dramatically reduce our energy demands *before* we build renewable energy systems. In the U.S., our kitchens use more energy than our farms do. At LEF, we have made good progress on minimizing the environmental footprint of our residential needs.

If biogas is going to be used to reduce our environmental footprint and make our farms energy self sufficient, we have to maximize efficiency first and foremost. The farm at LEF intends to find a good balance of local resources applied at a modest scale to try to approach true sustainability. For farming, we grow $15,000 to $30,000 of seeds (gross) per year. To run our farm, we burn about 80 gallons of gas and diesel per year currently. The amazing thing is that only about 20 gallons of that fuel are used for tillage. Another 60 or so gallons are for mowing. Just mowing! One can entertain various fantasies about not mowing or mowing with grazing animals. Well, the forest will happily take over what we don't mow. We have to mow to control weeds in the fields, and any sheep or goats will happily devour or field crops and orchards. We use scythes some.

A regular lawnmower, or it's bigger bush hog cousin, cuts with a rotary action and uses a lot of energy. A sickle bar mower has sharp fingers and cuts with a scissor action. Sickle bar cutters predate rotary mowers by a couple of centuries. All of the old horse-drawn mowers were sickle bar cutters. Sickle bar cutters are still used a lot in hay and harvesting equipment. Our friend in Missouri Kris Ward continues to help us a lot. He advised we get a Gravely sickle bar cutter, which we did. We have put it to use. That sickle bar cutter uses a lot less energy than a rotary mower, and the old Gravelies are built like a tank. It's hard to say, but I think the application of sickle bar cutters may allow us to cut our total farm fuel use in half. The sickle bar cutters leave a bit of a ragged look in the grass, thus they are not used for American lawns where that immaculate golf-course look is considered desirable. I really like our sickle cutter. Chops heavy grass with the engine at a high idle. Very nice. And if it means we have to work half as hard to make farm fuel, all the better.

Dan, a skilled mechanic, stayed with us for a while and helped. The Gravely sickle bar mower in the foreground use a lot less energy in mowing than a regular mower, and is one tough machine.

Haraka -- A Better Garden Seeder

A small garden tractor or walk-behind tractor can do a lot of useful work. Small, homeowner-sized planters that plant seed in a field don't work so well. They are too lightweight to work in anything but powdery soil, and making soil into powder takes a lot of mechanical energy. Up till now, a real tractor has been our only means to carry an effective planter that's heavy enough to do useful work in a field.

No-till farming involves planting through cover crop instead of tilling up the soil. The no-till movement has grown so large globally that Chinese manufacturers are now making plastic, no-till jab planters that poke through organic matter on top the soil. There are also commercial no-till planters available, but they are expensive and too heavy for a very small tractor.

The Haraka may be the most effective, durable push planter ever built. It's not cheap, but using it means we can save a lot with reduced tillage.

Some months ago we discovered Eden Equipment in South Africa. They are making no-till equipment developed for small farmers. They have produced a no-till push planter named Haraka. We got one a few months ago, and are now putting it to use. We can't compare it to the cheap Chinese plastic ones as we have not used those, but one thing is for sure, the Haraka is a very heavy, well built, well designed machine. It's welded steel that will last a long, long time. It can plant no till. It is the only push planter I have ever seen that can handle rough soil, thus making it possible to plant with less tillage. This is the only small planter ever developed that is made to be durable and can punch through soil with a lot of organic matter on top, or poke into heavier, clay-based soils. The Haraka can do the work of a very heavy commercial planter, and you can push it by hand! This is a very useful tool for us in our quest to farm more efficiently. Eden Equipment is also making other punch planters for handling very small seeds. The Eden planters can handle small farms up to a few acres easily. (Website www.eden-equip.co.za American distributor, Ben Johnston, usa.ben@eden-equip.com.)

The Way Forward

The interest in LEF's ideas continues to grow. We get lots of inquiries. A couple of different television programs have contacted us recently. (No idea if that's going anywhere just yet.) People send us emails about the various books and movies that question mainstream environmental movements. Among that genre, my favorite is Ted Trainer in Australia. He has published a lot, including a book called *Renewable Energy Cannot Sustain a Consumer Society.* He is very much into community, and we have communicated quite a bit. In the U.S., Ozzie Zehner published *Green Illusions* a few years ago. That's a good book too. Zehner worked with Jeff Gibbs to produce the movie *Planet of the Humans*, now available on Youtube. That movie does a good job of pointing out the weaknesses of industrial "renewable" energy systems. It does not explore practical solutions to any great extent. Two more books have been published recently. Derrick Jensen has published *Bright Green Lies.* I haven't read it, though one can tell from the table of contents that the book is about the cost of producing large-scale renewable energy systems, not so much about real solutions. Another book published recently *Stop Saving the Planet,* by Jenny Price. The author "challenges you, corporate sustainability officers, and the EPA to think and act completely anew--and to start right now--to ensure a truly habitable future." Hard to know exactly what that means, but I don't think "corporate sustainability officers" are moving toward energy self-reliance for common people.

The new *Planet Earth* series with David Attenborough has a strong environmental focus. They did a pretty good job of finding a way to talk about plant versus animal based foods. They point out that on the

African Savannah (backdrop, big cat and dramatic music) there are 150 plant eating prey animals for every predator. So if humans act like big predators, the planet cannot support very many. Then they cut to massive solar fields in the desert. Likewise, the Green New Deal proposes yet more centralized "renewable" energy systems owned and controlled by by giant corporations, pushing power down high voltage wires on which Americans are dependent. Everybody either loves or hates big wind and solar, while *decentralized* energy systems that empower communities remain invisible.

Although there are a lot of people questioning our environmental movements, there is precious little offered in the way of concrete alternatives. The big environmental groups tell us that wind and solar energy are GOOD, *no matter how we use them or how we build them*. The southeastern U.S. is being deforested at *five times* the rate of the Amazon. Around LEF there are several large solar fields totaling thousands of acres where they removed a hardwood forest, burned the stumps, paved the land, and put of solar PV panels. I have seen the proposed carbon cost accounting for that, and it's absurd. Meanwhile, the critics say that solar and wind energy are BAD *no matter how we use them or how we build them*. Peculiar that it's the same message in reverse. Except we can't go back to gathering and hunting, or even simple digging stick farming, with eight billion people. So what do we do? We have to eat. We have to live.

At LEF, that is precisely the question we are trying to answer, with such meager attention as we can gather. It is a big problem that people living in our modern age tend to have little understanding of energy systems. They can't tell you whether an alarm clock or a heat pump uses more energy, or how much more. (It's multiple orders of magnitude.) This lack of understanding of the industrial systems that support our lifestyle makes it possible to market all sorts of green snake oil. The critics are right -- massive solar and wind projects that are added to our exiting industrial systems do not decrease our total footprint.

In *Planet of the Humans,* there is a moment in the film where Ozzie Zehner is interviewing a working class guy running a coal fired power plant. "We keep it hot," was the answer to the question of how they run it. Our current economy is built on the expectation of a boiler-based, round-the-clock high voltage AC based power grid. (Owned and controlled by giant corporations, incidentally.) A lot of our "renewable" energy is simply thrown away because it is so intermittent. "We keep it hot" means they mostly ignore the fluctuations coming in from all those grid-tie solar systems and keep the boilers stoked up. But all the statistics around industrial renewable energy talk about carbon displacement based on renewable energy *production,* NOT *utilization.* Such misrepresentations are political win-win game for everybody but our children.

LEF is trying to answer the hard questions. How do we use renewable energy in a way that actually works, and works for as many people in the world as possible? I am quite sure LEF's daylight drive technology is already impacting the lives of many, many people around the world. World Bank statistics show a rapid growth in DC based systems outside of the U.S. We have no means be which to quantify what impact we have had. DC power in itself is a tool than can *can* help us live with less impact, but it certainly is not a magic bullet.

At LEF, we use about 200 watts per person of photovoltaic power. Last I checked, the global supply was around 50 watts per-capita of PV power. One needs less energy in a warmer climate, and those numbers at least represent a bridgeable gap (if everyone started adopting our methods). But the critics will say current industrial solar panel production is environmentally damaging. It is. Industrial farming is damaging. And we have to eat. We need a better way than just building massive "renewable" energy systems and pretending our lifestyle is sacrosanct.

LEF is trying to shine a light through the darkness of confusion. The super high-tech fantasies based solar, wind, and magic batteries are delusional. Lithium batteries don't last all that long, they can't power the industrial economy, and we can't run an industrial economy with an energy source that has to be completely re-built every few years. We need to make the best use of both modern and time-tested tools. If we are willing to change our lifestyle to fit what modest, well designed renewable energy systems can provide, we and our children get to live. If we remain obedient to centralized, industrial corporatism, and the consumerist, hyper-individualized lifestyle it tries to sell us, we don't. Please help us spread the word.

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 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.

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