

Living Energy Farm

May - June 2016 Newsletter

Upcoming Events

PLEASE POST AND FORWARD THESE EVENTS AS YOU SEE FIT

Living Energy Global Initiative Kickoff Number One LEGI is a new project to spread LEF to the non-industrial world. Come hear about what we have done at LEF and our new partnership with Africa Transforming Lives. Come enjoy snacks, music, and a slideshow about how you can help the poor, save the Earth from climate change, and improve your social life all at the same time! **Tuesday, July 19, 6 - 8 PM, at 715 N. Main St., Harrisonburg VA, 22802** (aka Vine and Fig/ New Community Project). More information about LEGI is in the LEF newsletter. We will pass a hat to collect donations.

Living Energy Global Initiative Kickoff Number Two LEGI is a new project to spread LEF to the non-industrial world. Come hear about what we have done at LEF and our new partnership with Africa Transforming Lives. Come enjoy an African meal and a slideshow about how you can help the poor, save the Earth from climate change, and improve your social life all at the same time! **Sunday, July 24, 6 - 8 PM, Quaker Meeting House, 1104 Forest St, Charlottesville, VA 22903.** More information about LEGI is in the LEF newsletter. We will pass a hat to collect donations.

Strawbale Building Workshop, Hands-On! The time for our long-awaited strawbale building workshop has arrived. We're not pretentious, and we have been doing this kind of building for a while. You could pay someone else hundreds of dollars, or you could just come and help us build our house. We will kick off with a **Green Building Workshop, Saturday, August 6, 9 AM - Noon at LEF, 1022 Bibb Store Road, Louisa, VA, 23093.** Starting that afternoon and for the following week, we will put straw in our walls and plaster it. **You are welcome to come any time in the week August 6 - 12 and learn about strawbale building by doing it. Suggested donation is \$50 for participation in any or all of the workshop.** You are welcome to camp on our land, but you should be prepared to be self-sufficient. We can give you as much drinking water as you want. We may have some shared food, but you should be prepared to feed yourself as necessary. Bathing facilities are limited to a hand-pumped, outdoor, solar-heated shower. (And a fine one at that!) Bring your own gloves if you need them. We will have good quality dust masks (a must for straw), but you will have to pay for them. You will have to walk a half mile to get to the house where we are working. It can be very hot and muggy in August in Virginia. If it is rainy, it will be muddy.

Living Energy Global Initiative

At Living Energy Farm we are building an economically and ecologically viable community that will run without fossil fuel. Our integrated high-voltage and low-voltage DC economy is, so far as we know, unique. It is also different from what most Americans are used to. We have been considering options for helping communities in the non-industrial world put together projects similar to LEF.



Some of the children ATL was able to send to school.

In the last month we have had the honor of hosting a Kenyan activist named Nicolas (Nick) Dagala. Nick is the founder of the Kenyan NGO Africa Transforming Lives (ATL). ATL has been working since 2013 in the village of Bindura to provide the means for children to go to school whose families cannot afford school fees. ATL began raising local and international funds in order to give children scholarships to attend school. Starting in 2015, ATL expanded its mission to providing training in organic agriculture to adult farmers in order to ensure a more enduring economic foundation for families in need. In order to learn more about organic farming and find partners interested in

supporting ATL, Nick traveled to the USA in the spring of this year, eventually connecting with LEF. He's been living with us and helping out on the farm since mid-May.

During his time at LEF, Nick has been inspired to expand the mission of ATL to introducing simple, affordable, village-scale renewable energy systems to his home village. The cooperative use of tools and technologies at LEF makes them affordable and practical even to those of very meager means. For example, at LEF we use solar cookers and wood-fired stoves. Solar cookers can be made from simple materials or purchased relatively cheaply. For cooking with wood, we use high-efficiency rocket stoves that use a small fraction of the wood used to cook on open fires (as is common in rural Kenya).

In most of rural Kenya, the only light sources after sundown are smoky kerosene lamps, which are expensive to run and hazardous to the user. Because of this, many children who work on the farm during the day cannot work on their studies after the sun sets at 6pm. The expense of grid electricity is prohibitive to most villagers. At LEF, we use super-efficient DC LED light bulbs powered by a durable, old-fashioned battery technology called nickel-iron (NiFe) batteries, which are charged by solar panels. Unlike standard lead-acid batteries, which do not last long and are toxic to manufacturer and recycle, NiFe batteries are non-toxic and last for decades. This mix of old and new technologies -- modern photovoltaic electricity, DC LEDs and NiFe batteries -- are ideal for powering village-scale lighting systems.



Nick works on a farm in Bindura

At LEF, the same solar electric panels that power our well pump also supply irrigation water and run the blowers that warm our house during the winter. This same solar electric source can be used for cutting firewood, metal working, woodworking, grinding grain, or any other motor-driven tools. This integration of uses allows us to do a lot more work with a lot less energy supply. The solar electric panels last for decades, and the DC motors which convert the electricity to motion are a durable technology that has been in use since the 1800s.

It is our mission at LEF to demonstrate that a good quality of life is possible using existing renewable energy technologies that are durable and affordable. We want to create, and help others create, a standard of living that seven billion people across the world can afford, sustainably. To this end, we are joining forces with Nick and Africa Transforming Lives to create the Living Energy Global Initiative (LEGI). The mission of LEGI is to help villages in the non-industrialized world become energy self-sufficient using an integrated system of village-level renewable energy technologies similar to those used at LEF.

LEGI and ATL are seeking to begin the construction of a solar demonstration center in Kenya. We see this as a first step to spreading these technologies across the non-industrial world, to whoever wants it and needs it the most. Our first project will be to drill a well that the villagers around the land held by ATL in Bindura village, Kenya can use. In Kenya food in the dry season is expensive, and people go hungry. Using solar-powered pumps and durable drip irrigation as we have at LEF would make all the difference for a Kenyan farmers during the dry season and allow their children to go to school. We will proceed from there to build a demonstration center -- an LEF in Kenya -- so we can spread the tools and technologies of energy self-sufficiency to other villages in Kenya.

At LEF we teach people that renewable energy works best on a village scale. It does not work very well to build solar hot water, solar electric, or biofuel systems for each individual or household. One gets an effective economy of scale at the village level. In the US, this is a challenge because most Americans do not live in villages or share resources. In Kenya, as in much of the non-industrial world, there is a heritage of collective use of resources which pre-dates colonialism. While the greatest responsibility for climate change may lie in the industrialized nations, the solution to global climate change may be found in the villages of the non-industrialized world. We believe that the partnership of LEF and ATL in creating LEGI to build energy self-sufficient villages can be a powerful model for addressing climate change.

We are seeking support for this project. An American dollar in Kenya can purchase 10 times and services that it can purchase the U.S. A little goes a long way. We feel like we have a magnificent opportunity to improve the lives of desperately poor people while creating a powerful model of environmental protection. We ask for your support. Non tax-deductible donations can be given directly to LEF or ATL (note LEGI in the comment box of a check). Tax deductible donations can be given to Virginia Organizing (same as donations to the LEF education fund), BUT you must make sure you mark those donations for LEGI.

Welcome Misha, Deanna, Sunnelin, Olan

Debbie, Alexis, Rosa and Nikita have been joined at LEF with another full-time resident family. Misha, Deanna and their children have been visiting us for several years. We are very pleased to have them on board.



Deanna, Debbie and the kids

69 Panes of Glass

We are, hopefully, closing in on completing our main house, EarthHeart, in the next few months. Buildings last for decades, even centuries. Keeping millions of homes at habitable temperatures over such long time spans consumes unfathomable volumes of energy. Such



Alexis hangs the last sheet of glass!

considerations argue for taking the time to build buildings that operate efficiently. At LEF, that translates into our solar, air-based radiant slab heating system. The one on the kitchen doubles as an industrial scale food drying system, and it has worked fantastically well. A similar system is now complete on EarthHeart, our main house. We hung 69 plates of glass on the roof to make it work. Glad that's done! We have also finished the interior plumbing, the ductwork and blowers for the heating system, and as much drywall as can be done before the straw is installed.

An Overview of Ecological Technologies at LEF and Taking them Abroad

In moving forward with Living Energy Global Initiative (LEGI), it is a good time to make an assessment of where we have come with bringing together the tools and technologies that are necessary to live comfortably without fossil fuel. Realistically, what do we have to offer to other villages around the world? What does working on LEGI mean in terms to the progress on the (many) projects already underway at LEF? It seems like honest answers to these questions are important.

When we first envisioned LEF, we asked ourselves questions. Can we provide water without grid electricity? Can we run the farm? Can we cook food? It seemed like we could, so we decided to try. But truth be told, none of us had laid hand on a solar pump at that point. We had no idea how well, in a practical sense, the various tools and technologies would work.

We have been surprised that cooking is our biggest challenge. We originally planned to use solar, wood, and biogas. The solar cooking has worked out pretty well, though we have learned that poorly built solar cooking devices do not work. Sunshine has to be concentrated to generate cooking temperatures, and thus solar cooking devices need to be elegant and effective. We built a prototype biogas system. For its size, it worked fairly well. But the need for a constant feedstock supply for biogas led us to prefer a solar boiler, which could be used most anywhere, with no biomass feedstock. We have been working on the solar boiler, but the results so far are frustrating. In considering work in Kenya, we realized that, in a tropical climate that never freezes, we don't have to protect our steam pipes from freezing. We are also going to try using a trough instead of a dish, thus eliminating the need for tracking. A tropical solar boiler could thus be MUCH simpler than the one we originally designed. At this point, we will probably not focus on this project intensively until the house is done this fall. In the meantime, we are pursuing making and buying solar cookers as well as rocket stoves for Kenya. Well-made rocket stoves are amazingly efficient. Some combination of these low-budget technologies should be able to provide rural Kenyans with a significant improvement in their quality of life, and not coincidentally, ours as well!

Our super-insulated buildings are working fantastically well. On our to-do list is to make a critical assessment of the economics of building this style of housing in other locations. As for Kenya, insulation is not necessary.

When we started LEF, we had various ideas about how to do all the things that can be done with electric motors in a self-sufficient community. Naive notions of simplicity aside, any community benefits enormously from a good metal shop, and a good wood shop. We had hoped to use low-voltage electrical tools tied into our (humble) battery set, but they did not hold up at all. The success of our high-voltage DC systems, on the other hand, has been fantastic. Using DC motors direct-drive from the solar panels seems to be something others rarely do, and it seems like something that would benefit villagers in the non-industrial world greatly.

We did not even know about nickel-iron (NiFe) batteries when we started LEF. A friend of ours

gave us an old Edison battery, with Thomas Edison's signature on it. It is clear why these batteries have been abandoned. The battery market now is very focused on small, powerful batteries. NiFe batteries are large and heavy, the opposite of sophisticated laptop and cellphone batteries. For sustainability, however, the NiFe batteries are the clear winner. They are very durable. Cycling them results in no degradation. They can even be made at home. While we have not tried that, the technology is far less esoteric than most other battery technologies. We have had some lead-acid batteries in use temporarily to run power tools so we can finish our house in a timely fashion, and we have been able to witness the rapid degradation of these lead-acid batteries. The NiFes have shown no sign of wear and tear. Soon our lead-acid batteries will go away.

For people in non-industrial villages, the choices are poor. Grid power is often unavailable, or expensive. Many NGOs or private companies have brought lead-acid based solar lighting systems to the non-industrial world. In just a few short years, those batteries fail. They become toxic waste, and the villagers are left where they started. NiFes could be a huge improvement, especially if public or private interests started manufacturing them in countries where they are most needed. Given their simplicity, this is a very possible.

There are a few questions about NiFe batteries that need to be answered. How many small houses could we support with one set of NiFe batteries? We have been running ours for a few years, but we have not loaded them heavily. We will move them to the main house and wire them to the main house soon. By next spring, we will have a clear answer to the question of how many DC LED lights we can keep lit with this technology. Another issue is that individual NiFe cells are low voltage, only 1.2 volts per cell. To get higher voltages, one has to stack up cells. Would it be practical to find or manufacture smaller, cheaper cells that can be stacked to achieve higher voltages? We have been communicating with NiFe distributors and manufacturers to try to answer these questions.

Woodgas tractors are an important part of LEF, but we have not had time to work on this project. It will not be difficult, as there are thousands of people in the U.S. working on woodgas and using it. At this point, we will finish the woodgas tractor when our house is done.

The question of what constitutes a truly sustainable level or kind of development is not easy to answer. Even at the level of a village farm, the questions are complex and difficult to answer. Draft animals may seem more natural than machines (such as a woodgas tractor), but the number of domestic animals humans own is stunning. 94 - 98 % of the zoomass on planet Earth is now comprised of humans and our domestic animals. All the wild animals in the world have been reduced to between 2 - 6% total zoomass. Domestic animals contribute to total greenhouse gas emissions by between 18 - 51%, compared to 13% for the entire transportation sector (all the cars, trains, buses, ships, etc.) Machines lie quietly needing no fuel when not in use, which argues in favor of the woodgas tractor instead of draft animals. However, villages in the non-industrial world can breed their own draft animals, oxen in particular. Does the fact that we have far too many domestic ruminants, kept mostly for food, mean we shouldn't do that? Such questions are not easy to answer. At LEF we are trying to work on a package of answers. Because we are living it, we get to feel the impacts of these technologies on a daily basis. That and some good science should help us find answers.

Old-fashioned visions of simplicity -- the log cabin farmstead in the wilderness -- are simply not sustainable in a world of 7.4 billion people. We have left the world of candles and fireplaces behind us, and we cannot go back. The wise use of machines is almost certainly more sustainable. Beeswax candles, while natural, could supply light for a tiny number of people. Firewood is also natural, but if we turned to firewood as a primary energy source, we would strip our forests very quickly. NiFe

batteries are likely much more sustainable, provided we are using them only for lighting. Clearly, building and using what we need, combining good passive and active solar features is the means by which we preserve our forests and our climate. Hybrid cars and houses with heat pumps and grid-tie solar are simply not a solution for 7.4 billion people. There are solutions for our crowded world, but they are harder to sell politically.

We are excited about Living Energy Global Initiative, for ourselves, for the impacts we may be able to have on people in Kenya who are living on very little, and for our children's generation who need sustainable models. Some of this work will benefit us directly. We will test and refine our DC economy at LEF and as we establish solar villages in Kenya. We will figure out how many Kenyan cottages we can light up with a set of NiFe batteries and DC LEDs, and both we and they will be able to study in the evening. We will build the tropical solar boiler, use it for ourselves, troubleshoot it, and send it abroad. We will figure out what works, and help others do it. In the end, the LEF model is not worth much, no matter how sustainable, if no one wants to live this way. If we can put together solar villages in Kenya and elsewhere in the non-industrial world, villagers will likely embrace sustainable technologies because these technologies will improve their lives. Hopefully, then they will teach us.

Links for Media Articles About LEF

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>

LEF article in the Central Virginian Newspaper

<http://www.livingenergyfarm.org/cvarticle.pdf>

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. Donations to the Living Energy Farm Education Fund are tax deductible.