

Our Solar Drip Irrigation System

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I was attending a field day at Caretaker Farm in Williamstown Massachusetts. It is a quite well known farm for its CSA (Community Supported Agriculture); its conservation efforts and the transfer of the farm to a young couple, not related to the original owners.

We were there looking at ways the Smith's (the owner's of Caretaker Farm then) were using solar energy on their farm. The first application was solar collectors capturing the sun's energy to charge car batteries to operate electric fencing. We were currently using this same method around all of our pumpkin patches to keep the deer out. We have up to seven patches of pumpkins, which have solar collectors and car batteries to zap the deer.

The second application was one, which captured the sun's energy to operate a water pump to push water to the top of a hill, and filled a big tub where their livestock drank. There was a float in the tub to regulate when the water would be pumped.

Upon leaving this field day, I made an "off hand" comment "have you ever thought of solar and drip irrigation?" The response was "no, but we would like to". This started the ball rolling. The Massachusetts Conservation Office had sponsored this field day with the Center for Ecological Technology (CET) both located in Pittsfield Massachusetts.

In November of that year, the planning started with a farm visit. A team of people, which consisted of members from the following: the Vegetable Extension Department at the University of Massachusetts, the Center for Ecological Technology (CET) in Pittsfield and the Berkshire Photovoltaic Services, in Williamstown, which would be the supplier, builder and installer of the unit.

I wanted a system, which would run drip irrigation on a five-acre parcel of land. It is important to "spec" the solar unit to do just what you need it to do or a little less. Since this new application is a new one, I had no history on how much electricity it would take to run the pump for this system. When you design a system, figure how much electricity you need for the system designed and then provide that amount. The investment of such technology is expensive and the pay back time too long to make it economically feasible for more than a specific application.

In this application electricity would be generated at time when the drip irrigation would not be running. It was decided to use the extra power generated in a portion of the house on the property for the outdoor lighting, lighting in the basement and any other power needed in the landlord's portion of the rental property.

This application called for a 1.1-kilowatt unit.

Water sources: In this case we decided to use the well in the house on the property as the water source. The well is capable of delivering 45 gallons per minute.

Other water sources that were considered were an ox bow and the Houstanic River. Since this is a pumpkin farm we wanted no chance of using surface water, which could be contaminated with Phythophthora, the dread disease in Pumpkins.

A Contract: In this case it is a three-way contract between Howden Farm LLC, CET and Berkshire Photovoltaic Services. This turned out to be too cumbersome and one of the biggest hold-up of the process. You can only imagine three sets of attorneys, each trying to protect their clients. My attorney likes simple contracts, possibly in the form of a letter with the intention. But she also makes sure that all of the “I s” get dotted and the “t s” get crossed. She, my attorney, wanted to be sure that when I “put money down on the system it would not take months to complete.

The Site: The site in this case was on the edge of a field south of a farmhouse. The arrays sit on a cement pillar, which was poured in the ground.

Another location might have been on the roof the adjacent house. In this case the house has a slate roof and it would be costly to begin to carve up that roof and it would also be unsightly on a lovely old brick house (circa 1829).

Another installation would be to glue the solar panels to a barn roof. The down side of this type of installation is that the glue heats up and leaks out and creates a mess on the roof and along the drip edge and onto the ground. Another type of installation would be one with solar shingles. The down –side of this type of solar collector is all of the shingles are wired in a series—one shingle plugging into the next-and when something goes wrong it like a set of Christmas tree lights, when one goes out the whole string goes out.

The Construction: The construction of the solar unit and the inverter was left up to Berkshire Photovoltaic Services and CET. The materials were all itemized with prices in the contract. We now had another hold-up. The solar panels, which were specified and were to come form some Southwestern state in the US were not available. There had to be a revision to the contract. New solar panels were located in Billerica Massachusetts, which made this project eligible for a tax credit since they were both manufactured and being used in the state of Massachusetts.

The collector makes direct current and must be converted so our homes and farms can use it. This why you need an inverter to take that direct current and convert it to alternating current.

Just as a note-you may need a building permit. In this case we did however Berkshire Photovoltaic Services were responsible for the permitting process.

It is also the case, that this solar collector is not taxable as part of our real estate taxes.

Insurance: My agent has this solar collector insured as a piece of equipment. I maintain that this array is a fixture since I cannot move it if I were to move.

The Grid: One decision that needs to be made is whether you want to be on or off the grid.

In this case we chose to be on the grid. We are making power during the day and what we are not using is going out onto the grid system (the local power supplier) for their use. At night when the solar system is not making any power and some is needed power flows back into your house or system for your use.

If you choose to be off the grid you need batteries in which to store the electricity, which is made in the day for use at night when no power is being made. When you have exhausted the power stored in the batteries, then you have no power.

How long will the system last? The system has the potential to operate for more than thirty years. However, the system warranty is for twenty years.

Costs: I was willing to use my own money and then be reimbursed. Total cost \$14,500 ending up costing out of pocket expenses for \$3700.

Sources of Funding:

Massachusetts Renewable Energy Trust Grant

University of Massachusetts Extension Service - John Howell, Horticultural Consultant - report on "Solar Powered Trickle (Drip) Irrigation System

Massachusetts Technology Collaborative - a state agency - helped fund the installation and pays Howden Farm 38 cents per kilowatt-hour for energy produced for 3 years.

U.S. Department of Energy - a federal agency - helped fund the installation. We have Congressman John Olver to thank for this funding and his commitment to climate protection.

Sustainable Agriculture Research and Education (SARE) program helped fund the labor and Soltrex monitoring system that provides information about energy output that is available on the Soltrex website: www.soltrex.com SARE is part of the U.S. Department of Agriculture's Cooperate State Research, Education and Extension Service. They fund projects and conduct outreach designed to improve agricultural systems.

Center for Ecological Technology (CET), a non-profit organization based in Pittsfield. CET staff conducted initial outreach about solar energy for farms and then helped coordinate the installation - worked with various parties during all stages, including site evaluation, contract agreements, installation, inspection, monitoring performance--and on-going education about solar energy technologies.

Berkshire Photovoltaic Services - Chris Derby Kilfoyle - local contractor from Adams, MA who conducted the initial site exaltation and installed the system.

YOU, of course, were the driving force with the vision and patience to see it through.... and provided your own funds to make it happen.