No Winter at Whitewater Gardens Farm: Geothermal Greenhouse Project in Altura, MN

Written by Jenna Lewein • Ashley Stucky • August 2011

As residents of the Midwest know, the growing season is painfully short. When it’s twenty below, what else can you do besides go to the supermarket and buy tomatoes shipped from thousands of miles away? Whitewater Farms in Altura, Minnesota has found a solution. The farm, owned and operated by Sandy and Lonny Dietz, contains a geothermal greenhouse that allows them to produce fresh vegetables year-round.

The Dietz family plant up to eight acres every growing season and the resulting produce is eagerly gobbled up by local community members, co-ops, and restaurants. Sandy and Lonny saw the potential in exploring renewable energy options to expand the growing season into the winter months by powering a greenhouse and operating a cold cell storage unit to keep produce grown in the greenhouse from spoiling.

In order to find the best possible combination of renewable energies, the Dietz family turned to the Southeast CERT for a grant that would allow them to research methods they thought had the most potential, namely, ground source heat pumps, wood boiler systems, wind turbines, and photovoltaic cells. In 2007, Sandy and Lonny were awarded $4,000 by CERTs, which allowed them to conduct a feasibility study and hire a board of advisors to help them engineer solutions that could be applied to their greenhouse.

Ultimately, it was decided that geothermal energy, by way of ground source heat pumps, was the most feasible for heating the soil within the greenhouse and also for cooling the cold storage area. Ground source heat pumps work by using the temperature of the soil to heat or cool something. While the surface temperature of the soil will vary wildly depending upon the time of year, the soil a few feet below the surface remains unaffected.

Ground temperature in winter is always warmer than the air temperature around it, and cooler than the air temperature in the summer. By using this difference in temperatures to regulate and guide heating and cooling with a ground source heat pump, the Dietz family could use a renewable type of energy to offset their conventional energy usage.

Project Snapshot

Purpose:
To explore multiple ways renewable energy can be used to extend the growing season of crops

Technology:
Ground source heat pump

CERTs Grant:
$4,000 SE CERT

Total Cost of Feasibility Study:
$6,000

Result:
Installation of a ground source heat pump to provide heat to the greenhouse and cool air to the cold storage area.

Benefits:
Locally grown produce available year-round
Since the greenhouse’s completion in February of 2011, operating the greenhouse has been both a success and a challenge. The project has benefited them greatly, Sandy Dietz explains. “We grow crops in two large bays inside the greenhouse. One bay is dedicated to tomatoes—the most profitable crop in winter—the other bay includes cucumbers, pole beans and more tomatoes.” The Dietzes aren’t finished tweaking their system, “It’s still a learning project,” notes Sandy, “And the reaction of our customers has been extremely positive.”

Sandy also said that one of the greatest advantages of producing crops throughout the winter is that this balances out their seasonal income. “Some people have asked us, “Why do you guys want to work through the winter? You’ll never get a break,” Sandy explains. “Having the greenhouse allows us to have a reliable income all year instead of just part of it.” In addition, she points out that since they do not just rely on one growing season a year, the summer is less stressful on both the farmers and their land. The short summers in Minnesota mean that farmers have scramble to plant and harvest as much as they can to ensure they have enough money to support them through the winter. The Dietz’s greenhouse allows them to spread their work out more evenly throughout the course of a year.

The greenhouse currently has a propane back-up heating system. Sandy explains that the geothermal energy system had done a good job of heating the soil, but not the ambient air above it during the cold season. “We are looking at gasification as a renewable source of energy to replace the propane to heat the rest of the greenhouse.”

As of right now, Whitewater Gardens is the only farm in the area to use a geothermal greenhouse to produce food. Many local farms grow food throughout the winter, but none of them have a system like the one found at Whitewater Gardens. One of the goals of the Dietz’s project had been to serve as a demonstration of renewable energy for others to replicate on their own farms. Sandy points out that while many people have been impressed with what they have done, she understands the challenge of the high upfront costs.

Sandy is confident in the project’s cost-effectiveness. “We are now able to grow high priced crops throughout the winter when demand is very high,” she said “I think the payback on a system like this will be very fast.”

For more information, contact Lonny and Sandy Dietz at 507-932-5225.