

CASE STUDY

ON-SITE POWER

Small Wind, Solar Electric, Geothermal



A trio of renewable energy solutions creates a net zero energy home



The Tyrees' built a net zero energy home in Ellenburg with a wind turbine, solar electric system, and geothermal heating and cooling. Photo credit: NYSERDA

Background

Dr. Mel Tyree wanted his family to live in a comfortable, net zero energy, and zero emission house in Ellenburg, NY. As a college professor, he also wanted to show that building this kind of home could be accomplished in a cost-effective manner.

Net zero energy homes are designed to be energy efficient and produce as much energy as they draw from the electricity grid, so utility bills balance out to zero over a 12-month period. They can be zero emission homes, if they avoid fossil fuels and use renewable energy, which does not generate greenhouse gas emissions.

Construction was completed on the Tyrees' home in Clinton County in January 2008 with support from the New York State Energy Research and Development Authority (NYSERDA). Ten years after the planning began, Mel is glad that he made the commitment. The renewable energy technologies generate all the energy on-site that his family needs in the house as well as for a plug-in electric car.

The home has 2,000 square feet of living space, a full basement, and an attached one-car garage. A 1,200-square-foot detached barn was also built on their 102-acre property. Collecting the energy provided by the wind, sun, and earth provides the Tyree family with a balanced approach to energy generation.

Customer

Dr. Mel Tyree

Location

Ellenburg, NY

Installation Date

2008

Equipment

- 10 kW wind turbine
- 10 kW solar electric system (eighty 125-watt solar panels)
- Open-loop geothermal heat pump system with two 200-foot wells (10 gallons per minute)

Energy Generation

Net zero

“The house cost \$65,000 more to build than a conventional house, but we will save an estimated \$165,000 in energy costs over 20 years.”

— Mel Tyree



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Wind Turbine

Installing a wind turbine was a good option to generate electricity on this site because it had one acre of land and an average wind speed of 10.8 miles per hour, which is a reasonable wind speed to achieve economic benefits. The system was interconnected in December 2005. Almost nine years after the installation, the wind system has produced 78,000 kWh.

Solar Panel System

A 10-kW solar panel system, completed in December 2006, also provides electricity to the home. The barn was designed to hold eighty 125-watt solar panels. The panels completely cover the southern exposure of the 45-degree sloped roof to maximize production from the panels. Mel chose to include batteries in the system to provide electricity to the well pump, emergency oil furnace, refrigerator, lights, and microwave in case of a power outage. “When you live in the North Country, you have to be prepared to survive on your own,” Mel said.

Geothermal Heating and Cooling System

Mel knew that more than 70 percent of the energy used in a typical home goes to conditioning the living space. Therefore, he wanted to find the most efficient manner to heat and cool his home and heat hot water. A geothermal heat pump transfers heat between the constant temperature of the earth and the building to condition the building’s interior space. Deep below the surface of the earth, the temperature remains in the low 50-degree Fahrenheit range throughout the year and provides a source for heat in the winter and a way to cool the home in the summer.

With a geothermal heat pump system, water is circulated between the building and the ground-loop piping buried in the ground. A heat pump makes the collection and transfer of this heat to and from the building possible. This system only uses 36 percent of a similarly sized, traditionally built home’s annual energy use and it also provides some of the domestic hot water.

Results

Purchasing a home is considered a long-term investment, and a net zero energy home is also an investment in the future of the environment. Clean energy generation, energy efficiency measures, and conscious use of energy including using efficient lighting and appliances and drying clothing outdoors worked hand-in-hand to create this home. Constructing this net zero energy, zero emission home, instead of a conventional home, added 25% to the total cost of the home, but it has a rate of return of 12.7 percent. In other words, it will take just under eight years to recoup the extra investment. Mel is satisfied with that timeframe. “Our family will live in comfort, knowing that we are helping to protect our environment and make a difference,” he said.

Get Started

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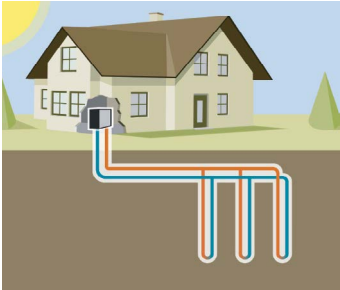


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