For more information:

www.geothermalconnecticut.org

www.energizect.com/events-resources/energy-basics/geothermal

www.epa.gov/rhc/geothermal-heating-and-cooling-technologies

www.energy.gov/energysaver/choosing-and-installing-geothermal-heat-pumps

www.igshpa.org/geothermal

With USDA Rural Development support through a REDA grant, CT Farm Energy Program (CFEP), a program of CT RC&D, seeks to implement a two-year pilot project. CFEP will offer education, outreach, workshops, and renewable energy assessments specifically focused on geothermal opportunities for farms and agriculturally based rural small businesses in Connecticut. The goal of this project is to reduce barriers to alternative renewable energy resources by providing eligible farms and businesses with a free geothermal energy assessment and corresponding report, with no obligation to implement.

Funding opportunities and technical assistance are available. Contact CFEP for more information.

THIS GUIDE IS A PROJECT OF:

CONNECTICUT RC&D

CONNECTICUT FARM ENERGY PROGRAM

USDA Rural Development
Committed to the future of rural communities.

Connecticut Geothermal Association
CT GEO

An equal opportunity employer and provider

Geothermal Energy

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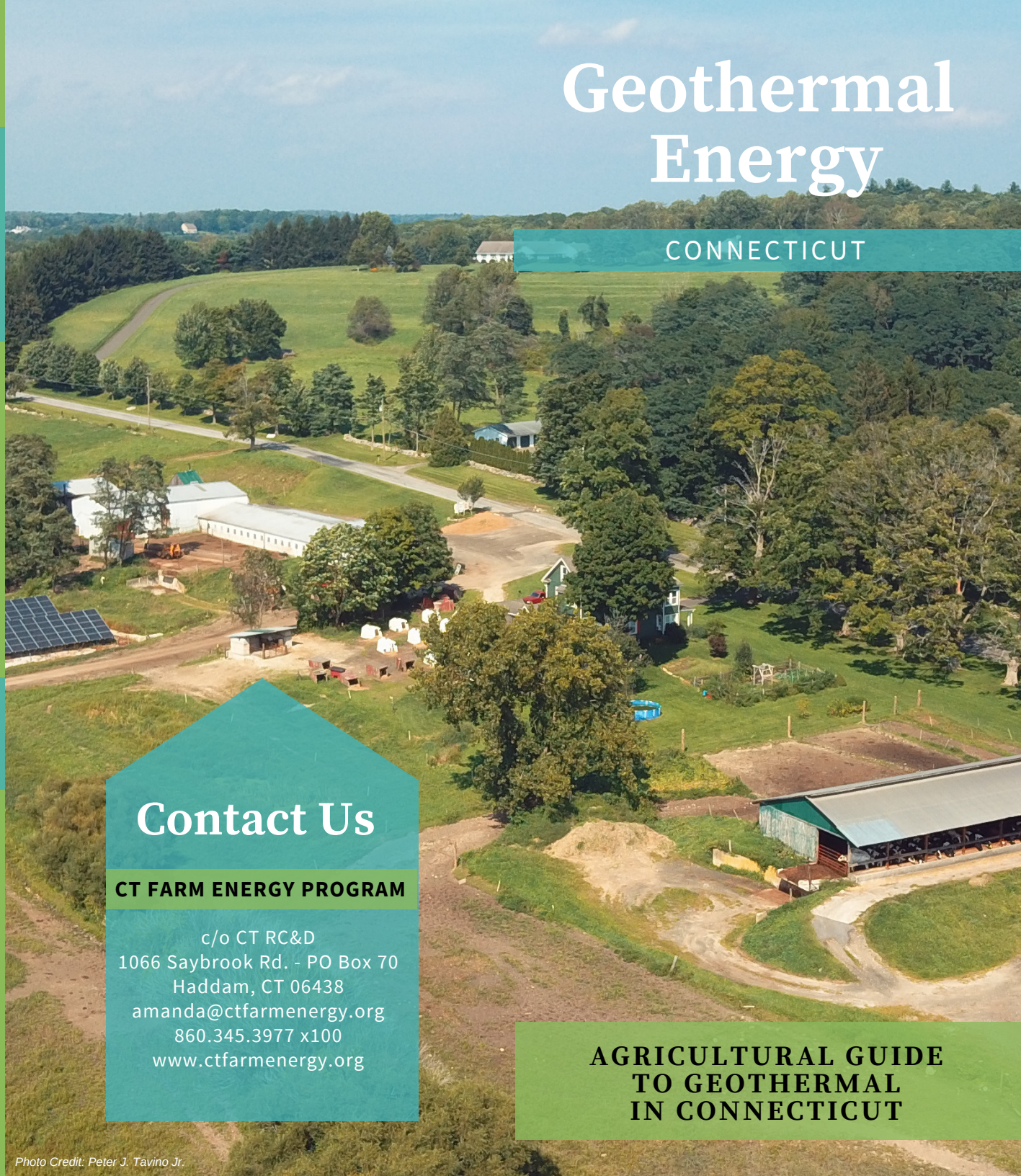

Contact Us

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AGRICULTURAL GUIDE TO GEOTHERMAL IN CONNECTICUT

Photo Credit: Peter J. Tavino Jr.

Geothermal Energy

The United States Environmental Protection Agency promotes ground-source heating and cooling as a renewable technology.

EPA notes that geothermal heat pumps: “take advantage of the naturally occurring difference between the above ground air temperature and the subsurface soil and bedrock temperature to move heat…for space heating, cooling and water heating.”

Agricultural and rural small business owners can save operating costs by switching from electric heat, fuel oil, or propane to efficient geothermal heating and cooling. In Connecticut, the deep earth temperature is approximately 50 degrees Fahrenheit year-round.

Moving a medium such as colder 40 degree water into 50 degree soil or rock warms the water to about 45 degrees. The 45 degree water then warms refrigerant in a heat pump that heats to 120 degrees when compressed - to heat an entire building. This cools the water back down to 40 degrees where it re-enters the earth to reach 45 degrees warm again, in a constant cycle.

A 400' deep borehole, sized for a certain building heat load would use an 800' long polyethylene U bend that delivers the circulating water down to the bottom and back up again at a different temperature.

Heat Pumps

Connecticut is fortunate to have soils and rock that are good for geothermal systems. The ground is too cold to heat efficiently in Alaska, and warm ground is unnecessary in Florida, where heating is not predominant. Connecticut’s bedrock has high thermal conductivity, meaning the heat moves rapidly.

Heat pumps are either air-sourced or ground-sourced or water-sourced to a boiler or cooling tower. A heat pump uses less electricity if it is drawing heat from 50 degree ground temps instead of the 20 degree air temps for air-sourced. Ground-sourced heat pumps do not need preheated water-source from fuel burning boilers. The many installed Connecticut geothermal heat pumps have a great track record of performing well, using little electricity because of Connecticut’s great geological features.

Ground Loops

There are several effective ways to move heat in order to warm or cool a building. The diagram below illustrates the exchange process for both cooling and heating.

The usual method in Connecticut is the closed loop vertical borehole. These are about 400' to 500' deep and 6" in diameter, like a commonly drilled water well. The same well drilling truck rigs perform the installation.

Other methods are open-loop, where very pure abundant water is pumped into the heat pump from the well and returned back down.

In certain soil conditions, a 7' deep horizontal trench can be installed by an excavator (track hoe). Sometimes the refrigerant is circulated underground. Pond loops are feasible, but not usual in Connecticut.

Most loops installed have a 50 year warranty; however, loops are expected to last up to 100 years.

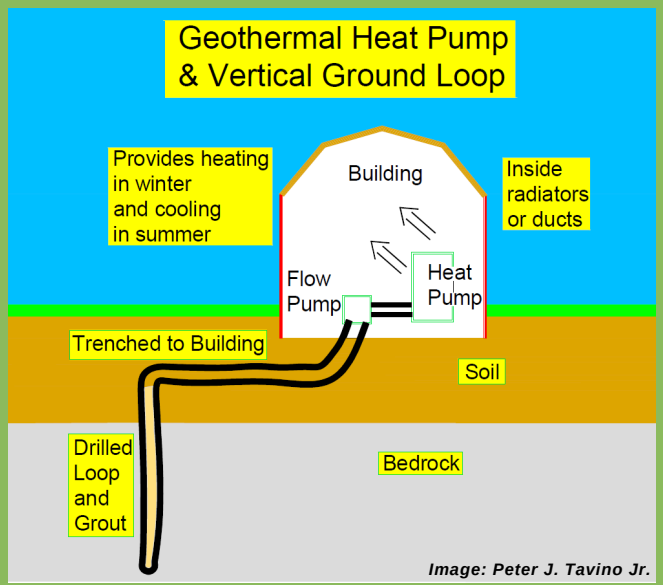

Image: Peter J. Tavino Jr.