

# GEOTHERMAL ENERGY

FOR GREENHOUSE GROWING

THE EPA HAS RECOGNIZED  
GEOTHERMAL SYSTEMS AS THE MOST  
ENERGY EFFICIENT, ENVIRONMENTALLY  
CLEAN, & COST-EFFECTIVE SPACE  
CONDITIONING SYSTEMS AVAILABLE.

In most climates, growing a variety of crops through the off-season in a standard greenhouse requires large amounts of heat— usually provided by propane or natural gas. The cost is prohibitive for many growers, and not all that green, either.

Farmers and agricultural businesses seeking ways to make production more energy and cost efficient are discovering the benefits of geothermal heating and cooling.

Geothermal systems take advantage of the stable temperature of soil and water stored in the earth below the frost line where the earth's temperature remains constant, either warmer or cooler than the ambient air temperature all year 'round.

Geothermal systems can tap into the thermal energy stored in the earth and convert it to provide heating and cooling at remarkably high efficiencies, *and it's clean energy.*

Many types of systems are available for many different applications. Some can even be installed as a Do-It-Yourself project!

Whether you are a small scale grower or a large scale grower, a geothermal system can help extend your growing season and help save you money.

**For big and small agricultural operations, Geothermal Energy is definitely worth looking into.**



Rhode Island Conservation &  
Development Area Council, Inc.  
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# GREENHOUSE GROWERS

ARE YOU LOOKING FOR A CLEAN,  
GREEN, ENERGY EFFICIENT WAY TO  
SAVE BIG ON HEATING AND  
COOLING?



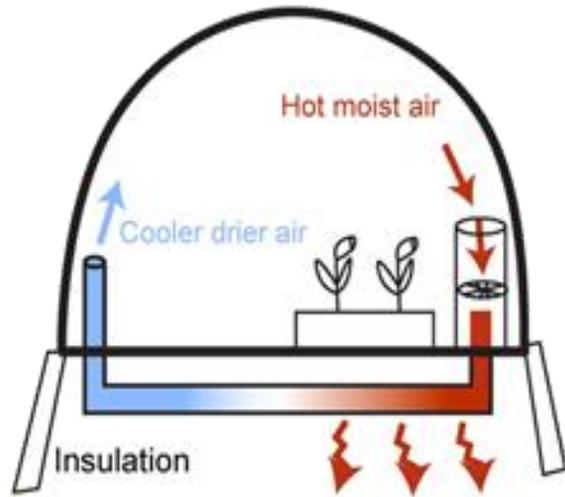
The solution may be right  
under your feet!

**GEOTHERMAL ENERGY**

Farmers' Guide to Geothermal  
In Rhode Island

## Geothermal Climate Battery System

For those with high energy bills resulting from greenhouse heating and cooling, an efficient geothermal system is a good option to consider.



You may have heard of this type of system by other names— Subterranean Heating and Cooling System (SHCS), Ground to Air Heat Transfer System (GATT), Earth Battery, Geoair Exchanger, “Low-Grade” Geothermal.

This type of system pushes warm, humid greenhouse air underground through buried tubing to transfer heat to the greenhouse soil, storing thermal energy for future heating and cooling needs.

The system consists of buried tubing, risers, manifolds, fans, and an insulated mass of soil, which acts as the “storage battery.”

The Climate Battery can be combined with solar energy, it can be applied to High Tunnel Projects, and it can also work with Hydroponics, Aquaponics, and Aquaculture.

## DESIGN CONSIDERATIONS

Building and installing can be rather simple— if you have the right plan in place. Creating the plan and knowing what to do, however, is the key.

Choosing a best option for the site depends on the local average temperatures, soil conditions, water table, available land and local installation costs.

It also depends on your growing goals. Do you want to grow year-round despite freezing winter temperatures? Or do you only intend to extend your growing season into spring and fall?

Some individuals have researched and designed and built successful greenhouse systems to meet their particular environment and needs.

### Considerations for designing an efficient geothermal system:

- Always be sure to use components intended for this type of application. For instance, be sure the fans are designed for a humid environment.
- Pipe diameter, pipe length, and air flow must be balanced to optimize performance. The diameter and length of the pipes must be calculated to work together to move the air efficiently.
- Protection to air intakes and drainage pipes must be provided so that they don't get blocked.
- Drainage must be adequate— be sure that there will be no obstructions.
- Be sure to there is no air leakage between pipe connections or the system will be less efficient, and may fail.
- Plan automatic thermostat controls so that the fans don't run all the time. A split system, one that turns the system on when the greenhouse is cold; and one that turns on when it's too hot, is best.

## MORE RESOURCE LINKS

Visit <http://rifarmenergy.org>



for links to more geothermal greenhouse resources.

**Funding opportunities and incentives may be available. Contact RIFEP for more information.**

This guide is a project of the Rhode Island Resource Conservation & Development and developed with support from USDA Rural Development.



**RI Farm Energy Program is a project of the Rhode Island Resource Conservation and Development Area Council, Inc.** It serves as a resource on energy as it relates to agriculture in RI, and provides Ag Producers and Ag-based Small Businesses with current information on energy, grant opportunities, and supportive events that help increase awareness about energy conservation in agriculture.

**RI Farm Energy Program**  
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