

YMCA Solar Greenhouse

What is a Solar Greenhouse?

Many people think that any greenhouse is a solar greenhouse. That is not correct. A solar greenhouse has the ability to store much more energy from the Sun than does an ordinary greenhouse. The energy is usually stored in water or rocks inside the greenhouse, taking up floor space. The long axis of a solar greenhouse runs east and west, not north and south like a regular greenhouse. The north roof of a solar greenhouse is heavily insulated, not glazed.

A solar greenhouse (SGH) differs from a standard greenhouse in that energy is collected from the Sun and stored for use when the Sun is not shining. Greenhouses tend to get too hot when the Sun is shining and too cold during winter nights. A SGH stores energy in some medium other than the air, the structure and the soil during sunny weather. The best SGH cools the air as needed when the Sun is shining as well as heats the air when needed. This process of cooling and heating needs to be done with a minimum of energy input from external sources other than the Sun.

The standard SGH stores the Sun's energy in water barrels and/or rocks at the north wall. The YMCA Solar Greenhouse uses a new way to store energy collected from the Sun, in a subterranean heat sink of soil/rocks/water under the planting beds. This system is called the Subterranean Heating and Cooling System (SHCS).

Why Build a Solar Greenhouse?

Global Warming and Peak Oil require that humans acquire their food from local farmers or grow it themselves. In climates with cold winters, such as at Blacksburg, Virginia where Virginia Tech is located, acquiring local food in the winter time requires the existence of solar greenhouses. Of course, one could preserve summer crops by canning and drying, but fresh vegetables in winter months make a healthy diet more likely.

The YMCA at Virginia Tech Community Gardens

The YMCA at Virginia Tech has managed a community-gardens area on property of the Town of Blacksburg for several years. A 15-acre area is being developed as a larger YMCA Community Gardens. It is called the Hale-YMCA Community Gardens. It has been beautifully designed by Steve Somick of Anderson and Associates:



An 18'x32' SGH utilizing the Subterranean Heating and Cooling System has been built as part of the Hale-YMCA Community Gardens. As far as is known, this is the first large SGH using the SHCS east of the Mississippi in the United States.

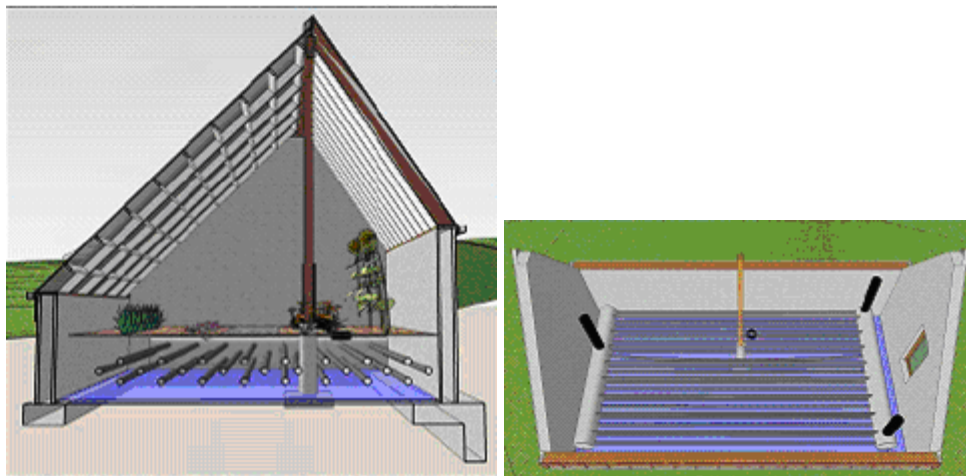
(OVER)

The design of the YSGH was made by L. David Roper. The architectural drawings were made by Colley Architects. Engineering calculations were done by Truesdell Engineering. The construction was managed by Green Valley Builders, with several other construction companies and many volunteers helping.

Several businesses and individuals donated time and materials to build the YMCA solar greenhouse.

Subterranean Heating and Cooling System

Water and heat energy are stored under the 16"-deep planting beds in a 3' layer of rocks with three layers of slotted 4" pipes in the rocks. When the air is hot and humid ($>70^{\circ}$) a fan on the west end pushes the SGH air into the pipes where the water condenses into the rocks with its heat of condensation and the air comes out at the east end cool and dry. When the air is cold and dry ($<50^{\circ}$) the fan pushes the SGH air into the pipes where water evaporates into the air using the heat stored in the rocks and the air comes out at the east end warm and humid. Thus the temperature and humidity are kept in a range beneficial for plant growth during winters.



For extra cooling when needed there are small vent windows high on each end that open when the temperature there exceeds 90° . An exhaust fan at the west window turns on when the temperature there exceeds 95° .

Who Will Use the YMCA Solar Greenhouse?

Eventually the growing space will be rented out to gardeners, similar to the renting out of garden space in the rest of the Hale-YMCA Community Gardens. The first year the Blacksburg New School will use half of the solar greenhouse as an educational project and research about greenhouse gardening; the other half will be planted by a group of select gardeners as a research project.



<http://www.roperld.com/science/YMCASolarGreenhouse.htm>