

Going Green in The West Woods Nature Center

When Geauga Park District planned construction of The West Woods Nature Center that opened in 2002, it was a high priority to incorporate as much “green” technology as feasible. Following is a sampling of some eco-friendly features demonstrated in the Nature Center, which you might like to incorporate in your home or workplace.



In the Building...



Sun Block Anyone?

Low-E glass is used throughout The West Woods Nature Center. The “E” stands for emissivity, which is the measure of a material’s ability to absorb radiated energy. E-glass has the ability to reflect heat back to its source by means of an ultra-thin metallic coating. Low-E glass will allow visible light to pass in to the building, while blocking out certain amounts of Ultra Violet and Infrared light. Low E-Glass also enhances insulation properties. Single pane regular glass has an “R” value of .85, while the windows in the Nature Center have an “R” value of 2.56.

For the Birds

Geauga Park District incorporates bird netting on the observation area windows to prevent birds from colliding into windows. The idea was recommended by Cornell Laboratory of Ornithology, while the design and materials were modified by staff at The West Woods Nature Center.

Utilizing cedar frames, readily available nylon bird netting and galvanized hardware, the netting was constructed and installed 3 to 4 inches from window surface to allow the “bounce” effect. The cost totaled \$21.00 per window. Approximately 40 bird deaths occurred each year until the netting was installed in November of 2003. This number has been reduced to nearly zero.



What's growing on that roof?

In 2002, Geauga Park District opened The West Woods Nature Center, which included many GREEN features including a service building with a green roof. It was the Park District's intent to utilize this feature as a pilot project to study the benefits of green roof construction.

(See Green Roof brochure for more information)



Geauga Park District
9160 Robinson Road
Chardon, Ohio 44024

The West Woods Nature Center
9465 Kinsman Road
Russell Township, Ohio 44072
440-286-9516

Some of the information used in this brochure was gathered from the following websites:

www.askthebuilder.com
www.geoexchange.org
www.soundgt.com

www.geaugaparkdistrict.org
info@geaugaparkdistrict.org



Going
GREEN
in The West Woods Nature Center



Geothermal Heating & Cooling

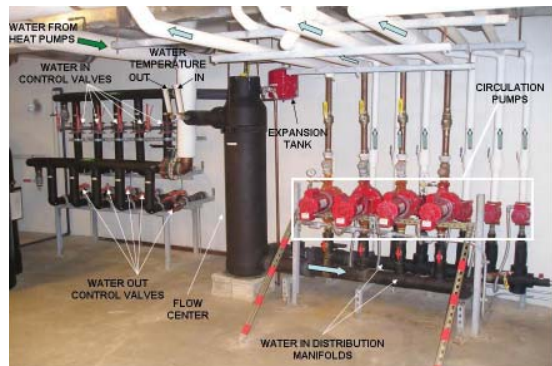
Did you know that 46% of the sun's energy is absorbed by the ground? Geothermal energy uses the earth's natural underground heat storage to heat and cool buildings, and The West Woods Nature Center is equipped with a geothermal system.

A geothermal system utilizes water, the temperature of which is kept constant by circulating it through underground pipes. This system is "closed loop," which means no external water sources are utilized. Thirty wells, 300 feet deep, are located under the main parking lot, and feed 10 heat pumps/exchangers throughout the building.

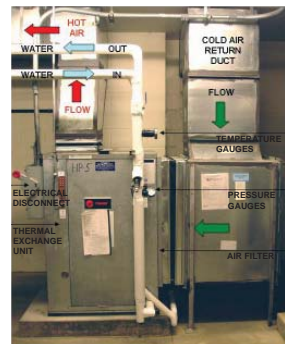
The casings for these wells are surrounded with a special 6-inch thick conductive ceramic coating, to promote thermal transfer from the surrounding ground. 3200 gallons of water containing 18% glycol solution circulates throughout the system and remains at a constant temperature range between 50 and 60 degrees through the year.

The original cost for installation in 2001, including excavation, was approximately \$300,000. The initial costs are 50% to 100% higher than conventional systems, but pay back will be 40% to 80% lower utility bills.

How Geothermal Works



Circulation System at The West Woods Nature Center



10 Ton Heat Pump at The West Woods Nature Center

There are five basic parts to a geothermal system:

- 1 **Well** – Brings system water in close contact with earth for thermal transfer
- 2 **Circulating pumps** – Circulate well water through system
- 3 **Heat pump** – works like a reversible refrigerator, removing heat from one location and depositing it in another.
- 4 **Heat exchanger** – transfers heat or cold from a mechanical source to circulating air
- 5 **Air duct system** – Delivers warm or cool air to desired area.

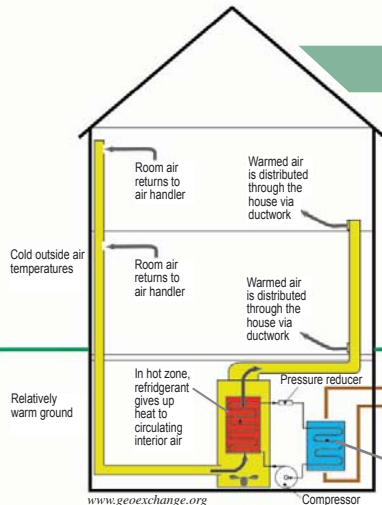
Geothermal operation follows two basic natural laws:

1. **Heat travels toward cold.**
2. **Gases under pressure change temperature.**

A liquid known as a refrigerant, whose temperature characteristics change rapidly with a change in pressure, circulates through coils within the heat pump and the heat exchanger.

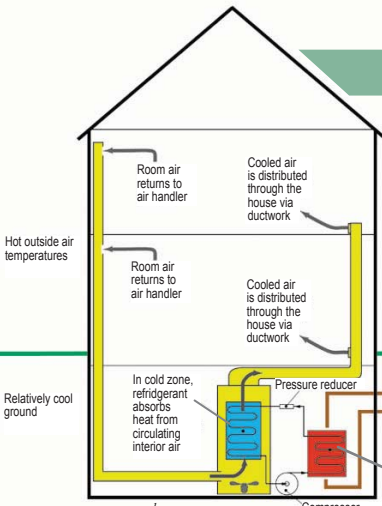
GeoExchange System Heating Mode

As the refrigerant circulates through the coils of the heat pump, which are in close proximity to the ground loop coils, it is under reduced pressure and therefore cooler (30°-40° F), than the earth's temperature (40°-50° F). Since heat travels toward cold the refrigerant absorbs heat from the ground loop. It then gets compressed and temperatures rise to about 170° as it circulates through the heat exchanger, where a fan circulates air across the coils into the living space duct work. The refrigerant then leaves the exchanger and its pressure is reduced, cooling it down before entering the heat pump and repeating the cycle.



GeoExchange System Cooling Mode

In the cooling mode the circulation of the refrigerant is reversed. Being under minimal pressure out of the compressor the warm refrigerant loses its heat to the cooler ground loop water and becomes approximately equal to the earth's temperature (40°-50° F). It is then reduced in pressure, becoming even cooler as it passes through the heat exchanger coil. Here a fan moves air across the coil, forcing cool air into the living space. The cooler refrigerant absorbs the warmth from the warm living space air, returned through the duct work. It then enters the compressor and begins another cycle.



Advantages of Geothermal Heating & Cooling

- Very low operating costs for electricity
- No fuel consumption
- Produces no greenhouse gases
- Eliminates CO2 poisoning within the building
- Reduces fire and explosion risks
- The average 1,500-square foot home costs about \$1 a day to heat and cool
- With an optional feature, geothermal systems can also be used to heat water for home use
- Two to three times more efficient than any other type of conventional heating

On the Grounds...



Run-off Reduction

Where there are parking lots, there is runoff. But at The West Woods Nature Center, "Bio-Retention Cells" have been installed to reduce the effects. They extend the entire length of the main parking lot (225 ft), and along the waste water plant driveway (112 ft.).

These cells (or trenches) are 5 feet deep and 2 feet wide and contain 50% wood chips and 50% drainage material. Their purpose is to catch the petroleum residue runoff that occurs when rain water and snow wash across the asphalt areas. The material in these trenches will be replaced approximately every 5 years.



Composting Outhouse

If you have never experienced an "odor free" and non-polluting outhouse, such a system does exist at The West Woods shelter area at the south end of the park. Constructed by Clivus Multrum, Inc., this outhouse was installed in 1999 at the cost of \$67,100.

This outhouse incorporates a closed system, which composts waste with wood shavings and a special mixture of bacteria. At the final stage of composting all "ingredients" become liquid and empty into a sump. The sump is pumped annually or as required.



Water Treatment The Zero Discharge Way

The West Woods Nature Center has its own wastewater treatment plant. Unlike a public wastewater system that discharges processed water into streams to continue the recycling process in nature, Geauga Park District's plant utilizes what is called a "drip disposal system" that Ohio E.P.A. declares to be a "zero-discharge treatment system."

As water is used in the nature center and sent down the drains, it is collected in a basin and processed through several other stations for aeration, clarification, then stored and pumped through sand filters. It is at this stage where a traditional wastewater plant would release the water to nearby rivers and streams. But the drip disposal system, controlled electronically, alternately sends the



plant processed water to four "drip fields" or zones. These zones are made from a total of 4,800

feet of 1/2-inch plastic tubing buried unnoticeably eight inches deep in the nearby forest floor. The water then filters through the ground, eventually making its way to the aquifer.

A 2005 Coli-Count test, comparing the plant water with that from an off-site creek, determined that the water within the plant, prior to its release into the drip fields, is "far cleaner than many local rivers and streams."