

# Geothermal Technology

## Energy Savings Among Potential Benefits

**By Tony Cooper**

**A**s business leaders, we often talk about “thinking outside the box” — using innovative solutions to solve old problems.

One of the more practical examples of “thinking outside the box” is installing geothermal or water-source heating and cooling in a commercial or institutional building.

Many thousands of such applications are up and running around the world. Many of these are here in Indiana, using geothermal heating and cooling technology generated within the state. The list includes hotels, hospitals, office buildings, manufacturing plants, banks, courthouses, entire subdivisions and many schools.

### Key advantages

With geothermal heating and cooling, building owners realize a number of benefits, including:

- Significant energy savings, which translate into reductions in operating costs and lower maintenance expenditures
- Greater flexibility in design and efficient use of space
- Reduction of dependence on fossil fuels, including the accompanying concerns about availability and price fluctuations
- Recognition as a steward of the environment

Research shows that geothermal, or water-source, technology can save up to 60% in energy costs compared to ordinary HVAC systems. These savings can help make office leases more attractive to tenants and significantly lower long-term operational costs.

A geothermal system generally needs only about one-third the space of a traditional boiler room, and all the heating and cooling equipment can be hidden from view. This creates many possibilities for a more efficient and pleasing design. Once aware of geothermal technology, architects, engineers and designers find that it frees them from

traditional thinking and opens a world of opportunities. Smaller space requirements can also produce more room for additional offices, retail operations and other profit centers.

With building owners not tied to fossil fuels when using a geothermal system, they can avoid many of the fluctuations in energy prices while helping to keep the environment cleaner and healthier. Geothermal systems emit no carbon dioxide or greenhouse gases.



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### How it works

Although geothermal has a tremendous future, the idea behind it is as old as the earth itself. Geothermal heating and cooling uses the natural and renewable energy found just below the earth’s surface to provide comfort for buildings — and even hot water. This is possible because the technology involved is tested, proved and highly efficient. The most efficient ordinary gas furnace technology creates less than one unit of energy for each unit it uses. Geothermal technology can create three to four units of energy for each unit it uses.

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These results are recognized by the U.S. Environmental Protection Agency, which thoroughly researched geothermal heating and cooling and concluded it is the most cost-effective, energy-efficient and environmentally friendly building comfort system available.

The heart of the typical geothermal system has two parts, the earth loop and the geothermal heat pump.

A solution of water and antifreeze circulates through the earth loop, which is buried in the ground or placed in a nearby pond. In winter, the loop uses the natural warmth of the surrounding earth — a moderate 50 degrees or so in Indiana year-round — to carry heat to the building; in summer, the process is reversed and heat from the building is dispersed into the earth, creating cool and comfortable air conditioning.

The geothermal heat pump uses a refrigeration process and an indoor handling system to treat the air and circulate it throughout the building. Although this principle is the same for a small home or a huge multi-building complex, an alternative method sometimes is designed for commercial buildings.

For efficiency upgrades where large geothermal systems are not viable, existing boiler/tower jobs are frequently retrofitted. These hybrid water-source systems incorporate a geothermal loop with downsized conventional heat rejection or additional equipment (the boiler or tower).

### INFORMATION LINK

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