

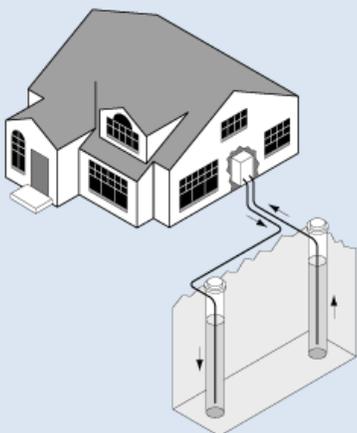
Geothermal Resources in Indiana

Sources of active geothermal energy, such as the famous hot springs and geysers of Yellowstone National Park, do not exist in midwestern states. Unlike Yellowstone, midwestern rocks near the surface are only about 55° F and increase with depth approximately 1 degree for each hundred feet below the surface. For example, rock temperatures at a mine in Ohio are only 85°F at a depth of 2,000 feet below the land surface. It is, therefore, impractical to drill wells to a sufficient depth to “mine” geothermal energy as a heat resource to generate steam or electricity.

In contrast, ground-source heat pumps that use passive geothermal energy can efficiently heat and cool homes, schools, and businesses in Indiana. In most of these systems, heat is exchanged by circulating a fluid through a loop of pipe that is placed horizontally or vertically under the ground. The significant temperature difference between the fluid in the pipe and the surrounding rock or soil allows heat to transfer between the building and the ground. Heat transfers from the pipe to the ground in the summer, and is retrieved in the winter.

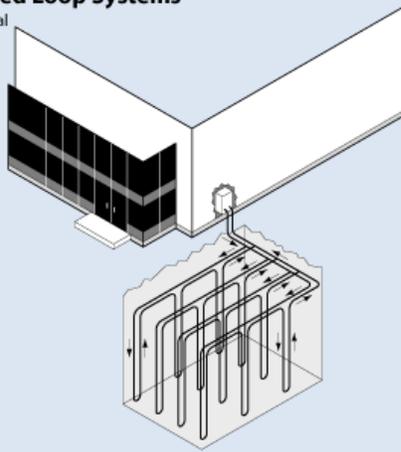
For a typical household, one or two heat exchange loops can maintain a comfortable interior temperature. For industrial or district-scale applications, fields of borehole heat exchangers connect to a centralized heat pump. The district-scale geothermal system at Ball State University in Muncie, Indiana—one of the largest in the world—is made up of some 3,600 borehole heat exchangers.

Open Loop Systems



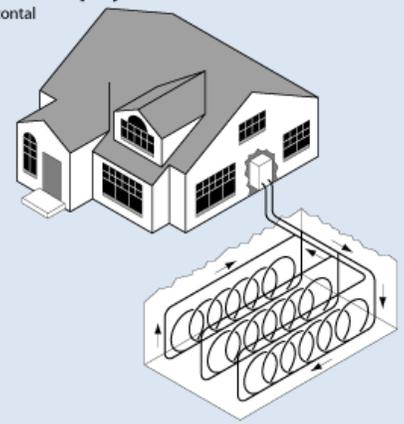
Closed Loop Systems

Vertical



Closed Loop Systems

Horizontal



Three types of ground-source heat pump systems commonly used in Indiana (Source: USDOE)