



## Mechanical/Environmental Sustainability Project

# Ground Source Heat Pump Utilizing Solar Energy

### Mission Statement

To research, develop, and create an energy efficient ground source heat pump utilizing a solar collector to support the heating and cooling of buildings.

### Synopsis

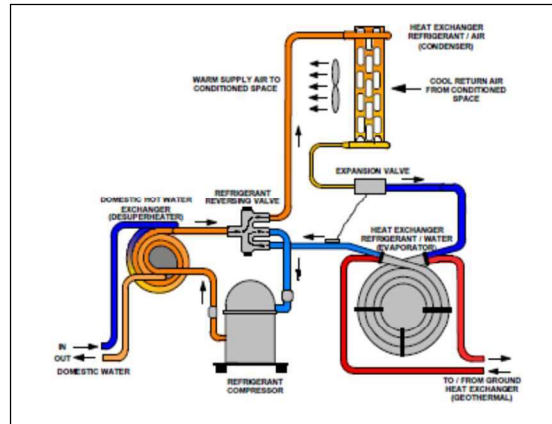
The project's aim was to perform an analysis for the potential installation of a new direct exchange ground source heat pump (GSHP) on the University of Hartford campus and explore how to increase the efficiency by designing a hybrid GSHP. A traditional GSHP is a device that uses the energy stored in the ground to support the heating and/or cooling of a building.

While ground source heat pumps and solar thermal collectors have been utilized for many years, a hybrid GSHP, using the sun's thermal energy to indirectly aid the efficiency of the GSHP, could have a dramatic impact in the field of energy. Essentially the solar collectors add additional heat to the ground in order to prevent the ground temperature from dropping too low to be an effective heat source.

The heat pump selected for this project relies on a closed loop system. The system relies on well holes being bored into the Earth down to a depth of several hundred feet. Pipes are installed in the well holes and connected to a heat exchanger. The team determined that the soil structure on the campus to be an acceptable drilling site.

In summary the team concluded that the hybrid system will run as a conventional GSHP during times when building cooling is needed, and as a hybrid ground source heat pump (using the solar collectors) when heating is needed in the coldest months.

The team felt that their final design was a truly unique application and has been presented to the school administration for possible implementation.



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