

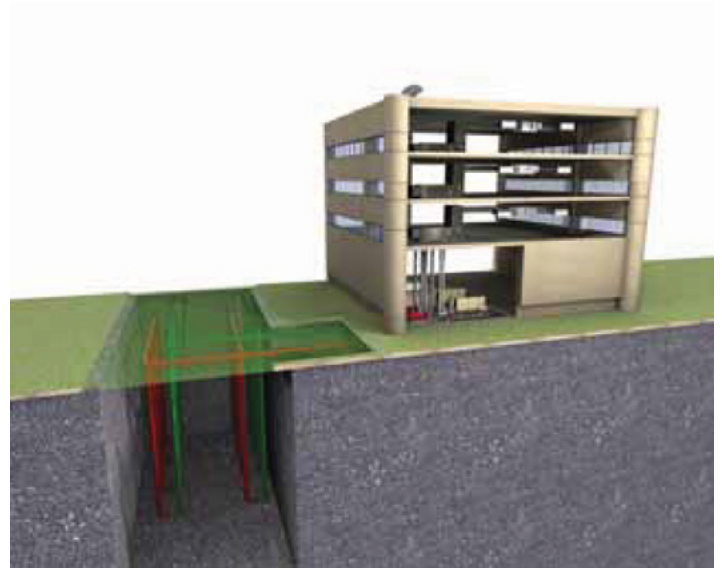
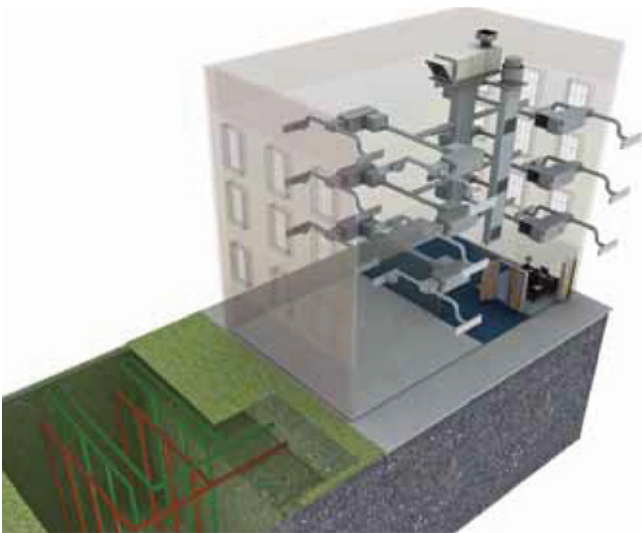
# Geothermal



## Distributed or Central Geothermal Systems - It's Your Choice

Geothermal HVAC systems use the earth as a heat sink when cooling and as a heat source when heating. In other words, energy removed from a building in the summer cooling season is sent to the earth and stored for retrieval during the winter heating season. Because the earth's temperature is generally more moderate than the outdoor air temperature, the annual energy efficiency of heat pump systems is improved, with geothermal systems operating 10 to 30 percent more efficiently than comparable conventional HVAC systems. With savings like these, geothermal is a great choice for educational facilities.

Trane has the expertise to help you determine which type of system is right for you. The TRACE™ 700 energy modeling program, which can help compare the two systems based on your institution's needs, is just one way that Trane brings the right people, tools, systems and controls to work for you.



Distributed geothermal heat pump systems utilize multiple small water-to-water heat pumps, one per thermal zone, coupled with a ground-source heat exchanger. These systems operate very efficiently since heat rejected to the ground loop in the summer is stored and extracted in the winter, a feature that offers customers very good redundancy.

The central geothermal systems consists of one or two central water chillers coupled with a ground-source heat exchanger that provides the benefit of higher system-energy efficiency, centralized maintenance, acoustical advantages, and air distribution flexibility.

The chart below compares the distributed and central geothermal systems to provide design teams an easy-to-use tool when developing their projects.

Characteristics of Heat Pump Systems	Distributed System	Central System
Number of compressor bearing HVAC units	Many	Few
“Heat pump” enabling technology	Reversible refrigeration circuits	Hydronic system or reversible circuit
Location of compressor bearing HVAC units	In or near occupied space	In mechanical equipment room
Method of distributing air to space	Terminal units (one heat pump per space)	Air handlers and VAV boxes, one or more
Geothermal loop temperatures	40° – 90°F	40° – 140°F
Number of loops within the building	One	One or two
Economizer	Water	Air or water
Efficiency	Very good Geothermal energy storage	Excellent Geothermal energy storage Higher equipment operating efficiency Reduced mixing Efficient central fans and motors
Maintenance	Many units in the space each with Geothermal energy storage	One or Two Units Geothermal energy storage Higher equipment operating efficiency Reduced mixing Efficient central fans and motors
Acoustics	Compressors & fans near space	Compressors & fans located away from space offering multiple attenuation options
Humidity control	Generally a constant volume system requiring a separate, dedicated outdoor air system	Inherently improved due to variable air delivery system (VAV)
Ventilation	Generally requires separate, dedicated outdoor air system	Allows outdoor air to be treated and distributed along with mixed air.



Trane – by Trane Technologies (NYSE: TT), a global climate innovator – creates comfortable, energy efficient indoor environments through a broad portfolio of heating, ventilating and air conditioning systems and controls, services, parts and supply. For more information, please visit [trane.com](http://trane.com) or [tranetechnologies.com](http://tranetechnologies.com).

All trademarks referenced in this document are the trademarks of their respective owners.

© 2020 Trane. All Rights Reserved.

EDU-SLB029-EN  
07/04/2020