



Commercial Case Study

Oklahoma Capitalizes on Geothermal

For over ten years, the Oklahoma State Capitol has been one of the largest buildings in the world to be heated and cooled by geothermal energy. The six-floor, 400,000 square foot historical building was originally heated with steam and later, cooled with window air conditioning units. In the late '80s, Oklahoma State University engineering students evaluated the option for a geothermal application to the building. After the study was completed, it was determined that the geothermal heating and cooling system would offer significant savings of 25% or more in operating costs and reduce CO₂ emissions to practically zero.

In 1990, construction began and was completed in 18 months by RMS Mechanical of Norman, Oklahoma. The geothermal installation began with drilling 370 bore holes (wells), 12 feet apart and approximately 255 feet deep. The total amount of bore is 185,000 feet with two one-inch pipes (and u-bends) inserted into each bore hole. The wells were collected into 12 header pipes (each with its own manhole for service) located underground approximately 100 yards from the building housing the heat exchanger.

The heat exchanger was installed along with a cooling tower. A second well field was considered to increase the cooling capacity but the cooling tower application had proven to efficiently remove excess heat and cost less than a second well field. The cooling tower has a capacity of 607 tons. Rated in BTU, the cooling tower would be 7.25 million BTU.

Variable speed pumping with lead-lag pumps was used to prolong pump life, provide a backup pump, and allow time for maintenance. The two 150 horsepower, variable speed system pumps were located in the basement to provide 2,200 gallons per minute flow. Each pump has





a control box and is rotated in and out of service every 500 hours.

The geothermal closed system supplies water to 460 ClimateMaster water source heat pumps located throughout the building, sized from 1/3 ton to 30 tons totaling 843 tons. The individual units maximized comfort levels for the occupants and allowed easy maintenance without system-wide shutdowns.

The convenience of a computer controlled building management system for all of the heat pumps is a maintenance benefit. Everything from system flow rate to individual area heat pump temperature settings can be controlled via computer with the flexibility of off-site maintenance.

Today, governments and private businesses alike are turning to geothermal energy systems to heat and cool buildings all over the world. Significant breakthroughs in geothermal technology offer higher efficiency levels, environmentally friendly refrigerants and piping with 25-year plus warranties. The benefits add up to greater comfort levels at lower costs while protecting the environment in new construction and retrofit applications.

Oklahoma Capitol Building Oklahoma City, OK

Mechanical Contractor:

RMS Mechanical
Norman, OK

Architect:

Solomon A. Layton

HVAC Manufacturer:

ClimateMaster, Inc.
www.climatemaster.com



ClimateMaster is the world's largest and most progressive manufacturer of geothermal heat pumps. The company is committed to innovation and dedicated to environmentally clean, economically sound and superbly comfortable home and business environments.

ClimateMaster has been designing and building equipment that enhances the environments we live and work in every day for more than 50 years. In addition to geothermal heat pumps, ClimateMaster offers the most extensive product line of water-source heat pumps for use in a wide variety of applications. ClimateMaster products are proudly built in the U.S.A.



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