

Republic Bank Norman, OK



# Republic Bank Invests in Geothermal Technology

## Geothermal Pays Big Dividends

Low maintenance cost and great return on investment were just the beginning of a list of benefits that motivated Republic Bank President and Chief Executive Officer Chuck Thompson to select a geothermal heating and cooling system for a new facility located in Norman, Oklahoma. The new banking facility in west Norman is the third facility in the Republic Bank network.

A tenant finish project, Thompson wanted to engineer the 29,790 square foot building with a geothermal water source heat pump application and subsequently add HVAC as they grew or leased space. He wanted a system that was flexible enough to complete the building in phases since future tenants and their needs were unknown. To accommodate the staged occupancy, Project Engineer Ken Jorgenson P.E., designed a geothermal installation in three phases.

"The reduced operating cost, reduced maintenance costs and increased flexibility were just some of the reasons why geothermal was the best choice for this building," said Jorgenson. According to Michael Albertson of Global Logic, Climatemaster's representative for Oklahoma and an expert in geothermal applications, stated the architectural team and owner also liked the fact that this application eliminated noisy equipment mounted on the ground or the roof. Using geothermal technology preserved the appearance or aesthetics of the building design.

## Laying the Groundwork

The three-story building called Republic Square featured the bank lobby and office space on the first floor with







tenant options on the other two floors. Phase One of the installation included the first floor banking area and the restrooms located on the second and third floors. The first phase was designed as a fully functioning system complete with ground loops, pumps and Variable Frequency Drives (VFD's). The ground loop was designed to take care of 100 percent of the heat rejection and heat absorption requirements for ALL phases of the project.

The installation began with drilling sixty 4-inch vertical boreholes at a depth of about 200 feet each, located in a grid pattern beneath the parking lot area. A loop of polyethylene piping was placed in each well and manifolded or headered together into three groups of 20 into the 4-inch main piping in the vault. The 4-inch supply and return pipe entered the building underground below the pump room. The pump room is the size of a relatively small closet with easy outside access.

The first phase included installing four ClimateMaster Genesis Ultra High Efficiency (GS) water source heat pumps (WSHP) and one Energy Recovery Ventilator (ERV). The horizontal units totaled eight tons ranging in sizes of 1 ton to 3.5 ton. Thompson chose the ClimateMaster's GS series because it provided the maximum energy efficiency available in a water source heat pump. The series exceeded the ASHRAE 90.1 Standards by 20 percent for the year 2002. The GS units offered ultra quiet operation, lower operating costs, low installation costs, and compact design.

### Adding More Value

In Phase Two, five ClimateMaster GS units totaling 12.5 tons were installed along with a custom computer room application. A computer room unit was used to condition the computer room and computer system server room. This was a water-cooled, cooling only unit similar to a geothermal water source heat pump with special design considerations to satisfy the unique requirements for cfm, latent and sensible Btuh as requested by the engineer. This unit was also tied into the ground loop.

All the WSHPs were provided with ClimateMaster's "Ultra Quiet" Sound Attenuation package. The compressor was internally sprung and externally isolated using a dual vibration dampening system for extra quiet operation. The mounting system incorporates spring isolation under the compressor and rubber grommet isolation between the compressor mounting tray and unit base. An additional mute option was applied that covered the base pan, all access panels and blower housing with high-density noise suppression material and 1/2 inch fiberglass insulation.

Automatic Flow Control packages were also installed



ClimateMaster GS Ultra High Efficiency Horizontal units were installed ranging from sizes 015 - 042



on all the WSHPs insuring specific flow rates designated by Jorgenson along with an actuated ball valve allowing water flow only to operating units. The pumps are controlled by a Variable Frequency Drive, which allows the pumps to operate at specific "speeds" in order to provide the actual flow required by the WSHPs operating at any given time. This "ramp up and down on demand" feature saves operating dollars.

Another energy saving feature was the installation of an Energy Recovery Ventilator (ERV). The purpose of the ERV was to "temper" the outside air when air temperatures reach extremes such as 100 degrees in the summer and five degrees in the winter. The ERV recovers the energy, either warm air or cool air that has already been created by the WSHPs in the building, and uses approximately 80 percent of that energy to temper the fresh air before it enters the WSHP's return air stream.

## Easy Maintenance 24/7

When it came to maintenance, Facility Manager Craig Price appreciated the application of a computer controller that monitored the system off site. From his downtown office or home computer, Price can track all outputs, filters, system location and cause of any problems, and the water pumps' lead/lag schedule anytime day or night. The monitoring and control of output air temperatures allowed Price to provide an exceptional level of comfort for employees and clients.

"If someone said an area was too warm, I first checked to see the recorded temperature. Next, I checked the output air temperature, which told me if there was a problem," said Price. "It allowed me to control one small area when I made temperature adjustments. This avoided the problem of one person being too warm and another too cold, which was almost always the case when the controls affected large areas."

#### Geothermal Investment Pays Off

The return on investment through lower operating costs was much greater than conventional heating and cooling systems, although the initial cost for a geothermal application was more. In the first year of operation, the energy savings alone are projected to be 30 percent to 35 percent. The savings translate into a 3-year to 5-year return on investment.

"After presenting the benefits of a geothermal application, the owner, architect and engineer all agreed it was the best solution offering a great rate of return on investment and easy maintenance," said Albertson. "They were very comfortable with the system operation."

Two of the three phases of installation are completed. At this writing, Phase Three is proceeding. However, the success already experienced at this facility, convinced Thompson that geothermal was a reliable and economical heating and cooling system for future projects.



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Representative: Global Logic Michael Albertson www.hvacok.com

Mechanical Engineer: Whittenberg Engineering Ken Jorgenson, P.E.

General Contractor: Gail Armstrong Construction, Inc.

**Civil Engineer:** Spear & McCaleb Co., Inc.

Mechanical Contractor: Waggoners' Heating/Air Conditioning

Architect: McKinney Partnership Architects

**Structural Engineer:** Midstate Engineering

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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