



Commercial Case Study

Geothermal Heat Pump System from ClimateMaster Helps Sonoma County Water Agency Achieve Renewable Energy Goals in HVAC Retrofit Project

With a mission of effectively managing water resources through environmental stewardship, technical innovation and responsible fiscal management, California's Sonoma County Water Agency ("The Water Agency") is a custodian of sustainable, ecologically sound practices across all areas of its business. The Water Agency, which manages Sonoma County's water transmission, wastewater collection and treatment, flood protection, and related environmental resources, also conducts ongoing public outreach to educate the community on water conservation initiatives.

In March of 2011, The Water Agency's board of directors approved an official energy policy which, in addition to other goals, outlines the pursuit of Carbon Free Water by 2015. Under this program, The Water Agency will advance toward achieving a net carbon neutral power supply for its operations

through system efficiency, water conservation and use of renewable energy sources to offset its energy demands.

Extending this mission into its internal operations, The Water Agency sought an HVAC solution incorporating efficient and renewable energy sources as part of a renovation project at its 1315 Airport Blvd. office building. The 20,578 sq. ft. building, originally constructed in 1990, was modified in 2010 to house The Water Agency's maintenance and operations facilities. Also, a





section of the building that had previously been used for warehousing was remodeled into an office space, which required extension of the HVAC system into that area. The building's existing 51-ton HVAC system, which included 9 packaged gas-electric rooftop units of various sizes, would have required additional equipment to support these renovations.



"Realizing we would need to modify and expand the existing mechanical system because of the renovation, we opted for a complete HVAC overhaul that would incorporate a more energy-efficient geothermal ground source heat pump system to align with our Carbon Free Water by 2015 program," said Cordel Stillman, deputy chief engineer for the Sonoma County Water Agency. "This type of technology has been installed in schools, residences, offices and government buildings for more than 50 years, and uses water to transfer energy to the earth as a heat sink to balance building temperatures to a point where additional energy needs to heat and cool are minimal. As a proven system, and one that the U.S. Environmental Protection Agency has identified as 'the most energy-efficient, environmentally clean, and cost-effective space conditioning systems available today,' we were confident that geothermal ground source heat pumps were the right choice for this project."

With assistance from Meline Engineering, The Water Agency designed a retrofit geothermal heat pump system that would supply 100 percent of the building's heating and cooling load, thus



eliminating need for natural gas. The 60-ton system included nine ClimateMaster Tranquility® Rooftop (TRE) Series units with modulating economizers, one ClimateMaster Tranquility® 27 Two-Stage (TT) Series horizontal unit and one ClimateMaster Tranquility® 20 Single-Stage (TS) Series horizontal unit, all of which were integrated to work in concert with a field of 32 400-ft. boreholes. In addition, exhaust fans were incorporated for warehouse ventilation, along with a building management controls system to monitor and optimize HVAC system performance.

Santa Rosa-based geothermal drilling contractor Air Connection began trenching the borehole field, located next to the building under what would become a parking area, in the early part of 2010. Prior to that time, the company helped educate The Water Agency on the importance of professional loop field design and installation.



"The Sonoma County Water Agency had been interested in executing a geothermal project on its campus for some time, particularly because of geothermal energy's alignment with the agency's environmentally oriented philosophies and programs," said Beth Morelli, CFO at Air Connection. "We were happy to have the opportunity to shed light on the important nuances of proper loop field design and the use of a professional driller, particularly as the agency hoped to use this as a signature project to open the door for future geothermal installations."

Following completion of the borehole field, installation of the mechanical system components commenced in early 2011. The complete project was overseen and partially executed by The Water Agency, with additional services provided by Bell Products in the installation of the ClimateMaster geothermal heat pump systems and controls.

"Facilities staff at The Water Agency were definitely hands-on with this project, and had done a lot of their own homework on geothermal heat pump systems," said Paul Irwin, president of Bell Products. "With an aggressive construction schedule, our installation timeline was definitely tight, but the end result was a solid, well-operating geoexchange system offering numerous improvements from the old equipment."

Completed in the summer of 2011, the HVAC system officially went online in September of last year.

"ClimateMaster's responsiveness was excellent, and definitely helped make this a successful geothermal project overall," said Meline. "They were attentive

to all our needs during the design and construction phases, including those associated with the secondary pumps and loops in the heat pump cabinets as well as the economizers, and were very helpful across the test, adjust, balance and commissioning processes."

Meline additionally noted that ClimateMaster's assistance was key in the modification of zone damper adjustments and the fine-tuning of controls, both of which were necessary due to The Water Agency's specifications for zoning in the office space areas.

"Because these areas were being served by the existing rooftop units, we found that unless all zones were programmed to call for heating or cooling, the return air temperature could get too warm and shut down the heat pump," Meline explained. "Making these adjustments enabled the heat pump systems to operate as intended and per manufacturer specifications."

Also according to Meline, The Water Agency is considering at least one additional geothermal project for the near future, particularly following the success of this initial installation.

"We're expecting to save approximately 173,000 kWh annually in heating and cooling energy with the new geothermal heat pump system," said Stillman. "This would result in offsetting approximately 75,000 pounds of greenhouse gas emissions per year. We're definitely interested in seeing how we can execute similar such projects for the future."





Sonoma Water Treatment Plant
Sonoma, CA

Equipment:

9 Tranquility® Rooftop (TRE) Series units
1 Tranquility® 27 Two-Stage (TT) Series horizontal unit
1 Tranquility® 20 Single-Stage (TS) Series horizontal unit

Engineer:

Meline Engineering

Driller:

Air Connection, Santa Rosa, CA

Manufacturer Representative:

Air Treatment Corporation - Sacramento, CA



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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