CASE STUDY

Geothermal Project Saves Energy and Reduces Costs for City of Prairie Village

OVERVIEW: As Prairie Village, Kansas made plans to upgrade outdated HVAC equipment at its municipal complex, the City wanted to make sure that it installed an environmentally friendly system to address climate control. Prairie Village selected Energy Solutions Professionals to design and deploy a comprehensive energy system that uses the earth's geothermal benefits to reduce the City's carbon footprint and lower heating and cooling costs.

Background

Prairie Village, Kansas is a charming suburban bedroom community that shares its eastern border with Kansas City, Mo. and is celebrated as one of the original master-planned communities. Named the best planned community in America by the National Association of Home Builders in 1949, the City is dedicated to being a good steward of its environment. Today, Prairie Village is home to nearly 22,000 residents who enjoy an exceptional quality of life. Among the City's trademarks are its extensive sidewalk system, excellent services, and an abundance of green space retained by 12 parks nestled on 64 acres throughout the City.

Challenge

Prairie Village city administrators were faced with trying to squeeze a few more years out of the City's aging heating and cooling system; replace it with a new conventional HVAC system; or install an environmentally friendly solution. Regardless of the option, Prairie Village officials were determined to fund the new system without raising taxes.

Solution

After reviewing proposals from several vendors and considering multiple options including the installation of solar panels, Prairie Village awarded the project to Energy Solutions Professionals (ESP). ESP conducted a thorough investment grade audit that was the basis for the design and implementation of a geothermal heat pump system to heat and cool City Hall, the Police Department headquarters and the community center as well as other energy efficiency measures.

Key Benefits

Prairie Village has demonstrated its good environmental stewardship by becoming the first of Johnson County's 20 cities to implement a sustainable geothermal system. In addition to conserving natural resources and reducing energy consumption, the City's new geothermal system is also fiscally sustainable – Prairie Village is estimated to save $45,000 in annual energy reductions, with a total estimated savings of $53,500 each year. The City was able to secure federal stimulus money and energy rebates to fund a sizeable portion of the project, ensuring the system was funded within existing budgets. And green space that had to be excavated for installation of the system's wells was returned to green space.

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Finding the Green to Go Green

When the City of Prairie Village decided repairing the old heating, ventilation, and air conditioning (HVAC) system didn't make good fiscal sense, administrators began comparing the cost to replace the system with a new system that used conventional technology with the cost and benefits of a sustainable system.

To install an environmentally friendly system to heat and cool the City's municipal complex, the city would have to spend more up front but the total cost of ownership would be far less. Plus, if renewable energy was used, the City could apply for federal grant dollars as part of the American Recovery and Reinvestment Act of 2009.

After evaluating numerous conventional and sustainable options including solar power, Prairie Village decided on a geothermal system. Geothermal is ideal for the significant heating and cooling loads generated by the dramatically changing climate. While a number of companies responded to the City's request for proposal, the project was awarded to ESP, which already had a number of similar deployments under its belts.

"As a city we're always interested in promoting sustainability – especially when it's tied to reducing costs," said Chris Engel, Assistant to the City Administrator for Prairie Village. "This project offered the perfect intersection of financial feasibility, return on investment and good environmental stewardship."

As an experienced Energy Service Company (ESCO), ESP provided guidance that resulted in Prairie Village's ability to secure more than $400,000 in energy grants and utility rebates, helping to defray the $1.3 million up-front cost to install the geothermal system. Also included in these costs were water conservation, lighting retrofits, building envelope repairs, and energy management control measures, which the City added based on ESP's holistic approach to energy savings.

Digging Deep

Mother Nature is the energy source for the City's geothermal system. The earth has a constant underground temperature, giving it a tremendous capacity for storing thermal energy, which can be used to heat or cool a building.

To get the heat or cool from the earth, ESP dug 32 wells 400 feet below the surface on grounds outside of the municipal complex. Piping provided the link from the wells to the three municipal buildings. A compressor circulates water through the system.

In the summer, heat pumps reject the heat and store it underground to provide cooling. In the winter months, the rejected heat is recirculated to provide heat. As part of the installation, several zones were added to ensure all comfort needs were met. From start-to-finish, ESP completed the installation process in three months without any disruption to the work environment.

A Sustainable ROI

With the geothermal system, water conservation, lighting retrofits, building envelope repairs, and energy management control measures all in place, Prairie Village now benefits from a projected 42 percent reduction in heating and cooling bills. This translates into $45,000 in annual energy reductions, with a total estimated annual savings of $53,500 for all environmental measures deployed as part of the project. These savings are the equivalent of removing 134 cars (e.g., 33,484 gallons of gasoline) from the road or preserving 277 acres of pine forests.

"We considered the life-cycle savings in energy and the reduced maintenance costs," said Engel. The geothermal system and other retrofits installed by ESP represented the smartest decision."

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