



TREEDC – Nashville Geothermal Forum- The University of Tennessee CIS : November 30, 2012

From: Warren Nevad, MTAS Municipal Management Consultant

On November 30, 2012, the Tennessee Renewable Energy and Economic Development Council (TREEDC) partnered with Mid-State Construction, Michael Brady, Inc., the University of Tennessee (UT) County Technical Assistance Service and UT Center for Industrial Services (CTAS) to conduct the first ever Geothermal 101 forum for TREEDC members. A total of 42 attendees learned about the various environmental and economic benefits associated with geothermal energy. Representatives from 8 cities, 6 counties and staff from Tennessee Departments of Environment and Conservation and Economic and County Development realized the need for more geothermal outreach and awareness in Tennessee.

TREEDC Director/MTAS Consultant Warren Nevad welcomed the crowd and expressed his appreciation for the leadership of TREEDC Founding Members Mid-State Construction and Frank McKee of CTAS in organizing this forum. Nevad stated that Mid-State Construction should be commended in pushing for more geothermal education and that the TREEDC mayors heard his request loudly and clearly. Mid-State Construction President Jerry Coleman stated that in addition to its original office in Livingston, Mid-State Construction opened its Cookeville office in 2001. Its Commercial/Industrial division was formed in 1995. Since that time, the company's construction volume has risen from \$7 million to \$20 million. The company has historically focused on bridge construction, commercial and industrial buildings and geothermal systems.

Bill Stalker of Trinity Contractors gave an historical video overview of geothermal in Tennessee. According to Stalker, schools, recreational facilities and prisons are using geothermal systems which consists of installing ground-source heat pump systems to harness the heat of the earth's crust for heating and cooling. The technology, already in use across much of the rest of the country, can cut utility costs for some users by as much as 50-70% over traditional air-based HVAC systems, and it's environmentally friendly and quiet. Stalker mentioned that equipment and installation costs are more than traditional systems. He added that with lower utility costs, more ground source systems could pay for themselves in 3 to 5 years. Energy consumers are able to save millions of dollars per year; it encourages economic development, leading to a net increase in demand for electric distributors. The use of energy geothermal also smooths out peaks in demand which means

that the Tennessee Valley Authority (TVA) doesn't have to buy electricity from competitors. Stalker concluded his remarks by stating that since geothermal is not visible like solar or wind power, people don't know about it.

Jason Gentry and Doug Cravens of Mid-State Construction informed the audience that geothermal heat pump systems, also known as "geoexchange," are the most energy efficient, environmentally clean, and cost-effective space conditioning systems available. Ground source heat pumps are electrically powered systems that tap the stored energy of the greatest solar collector in existence: the earth. These systems use the earth's relatively constant temperature to provide heating, cooling, and hot water for homes and commercial buildings.

According to Gentry, geothermal works by

1st Law of Thermo – Energy (heat) can be stored or transferred, but not created or destroyed; and

2nd Law of Thermo – Energy (heat) flows down hill

Mid-State also gave illustrative photos regarding the construction sequence for David Crocket and Fall Creek Falls State Parks. The powerpoint along with the other presentations will be available at

http://www.treedc.us/newsletters_reports/forum_presentations/index.html

According to Cravens, Signal Mountain Middle-High School, which opened in the fall of 2008, going underground with geothermal pipes for the school's heat pumps saved \$185,000 in energy costs in the first school year. The Murfreesboro City school system will see a payback on the more expensive heating and cooling system in less than two years."

James Lasater of Select Geothermal gave a detailed powerpoint presentation regarding their geothermal work with Lawrence County School TN Energy Efficient Schools Initiative Program. Lawrence County Schools were selected to receive this grant from the U.S. Department of Energy for the installation of a Geothermal Hybrid system for the purposes of reporting saving and building an energy saving case study for future use by schools nationwide. This system will be a complete one a kind installation with 24 hour a day live monitoring of the system operation. According to Lasater, Lawrence County Schools expect to reduce the payback from 9 years to 6 years with the geothermal hybrid system.

A Wilson County school was installed with geothermal last year and they have already saved \$36,000 in energy cost.

Lasater concluded his remarks by giving the following overview of proper project planning for geothermal systems:

- Site Assessment
- Energy Analysis of current usage
- Suggest possible savings options
- Suggest possible grants and funds available

Provide financing options with 100% guaranteed performance contracts

Gentry of Mid-State then gave a presentation regarding the new Bledsoe County prison using geothermal. Mid-State Construction Co. Inc. was contracted to install the geothermal heat exchange field and related distribution piping. Gentry stated that this project was the largest geo- thermal heating/cooling system installed to date in the state of Tennessee.

Mid-State drilled the first geothermal bore in July 2010 with work substantially complete by October 2011. Gentry added that one of the biggest challenges was the fact that almost all of the lateral excavation would be in rock. In order to alleviate some of the rock excavation in the geothermal heat exchange field, Mid-State decided to rock trench the lateral ditches before drilling occurred to expedite the excavations after the drilling was completed. There was more than 15,000 lineal ft. (4,572 m) of 16-in. HDPE distribution piping that needed to be installed. The pipe weighed 30 lbs. /foot. The pipe was heat fusion welded, which required 9,000 welds and with its weight it took a great deal of coordination to install. Also, with 580 bores at 500 ft. deep each to drill the coordination of up to five drill rigs at a time was a challenge. More than 654,000 ft. of HDPE pipe was installed for the geothermal heat exchanger and distribution piping.

Robert Kennedy, III of Tetra Tech gave an overview of the Enel Green Power Stillwater Hybrid Power Plant. The facility was commissioned in 2011 with 33 MW geothermal and 26 MW solar PV power generation. This Hybrid Power Plant is the first hybrid renewable energy power plant in the world to combine the continuous, reliable base generation of a binary-cycle geothermal power plant with the peak capacity potential of solar PV generation. It is estimated that the power plant will produce enough clean energy to avoid the emission of around 140,000 metric tons of CO₂ into the atmosphere each year. The added advantage of creating this hybrid mix is that the infrastructure is already in place reducing costs and the transmission connection has also already been made.

According to Kennedy, Tennessee has ample potential for geothermal. The geothermal heating and cooling systems are an energy-efficient alternative for the heating and cooling of residential, commercial and institutional applications. The more moderate and constant temperatures of the earth used by the geothermal system as a heat sink/source are advantageous, when compared to the outdoor air used by air-source heat pump systems. Geothermal heating and cooling systems use the natural properties of the earth and natural heat transfer to provide heating and cooling to buildings.

Kennedy also stated that Tetra Tech is a full-service firm providing integrated environmental, engineering, construction, and operations services. Staff has executed over \$26 billion in engineering and construction services, including \$6 billion of power plant construction. Revenue for Tetra Tech in 2011 exceeded \$ 2.6 billion.

During lunch, TREEDC Financial Consultant Bill Owen gave a presentation about the TREEDC Energy Fund. TREEDC is prepared to assist geothermal projects for funding assistance through a pooled bond program which will offer local governments and schools opportunities to leverage the savings in expected utility costs with upfront capital outlay needs. Potential borrowers will be strictly screened to determine the optimal amount of capital needed. Loans will be sized to fall within existing revenue streams and will be repaid through the savings enjoyed by the borrower.

Also during lunch, Nevad advised the crowd that TREEDC is also gearing up for the 2013 membership campaign. A schedule of 2013 events will be released shortly. TREEDC returns to Hiwassee College for its first forum in 2013 on February 22nd.

TREEDC is a statewide grassroots organization of 88 cities and counties promoting the economic benefits of renewable energy for Tennessee communities. TREEDC was formed by the University of Tennessee President Emeritus Dr. Joe Johnson in 2008. The organization recently received the Governor's award on energy resources and leadership. Please go to www.treedc.us for more information.