



James H. Quillen VA Medical Center

3.2 MW CHP System

Project Overview

Mountain Home VA Medical Center (VAMC) was built in 1903 in Mountain Home, Tennessee. It is part of the U.S. Department of Veteran Affairs and serves counties in Tennessee, Kentucky, North Carolina, and Virginia. The medical center provides health services for 170,000 military veterans in the surrounding counties. A Combined Heat and Power (CHP) system was installed at the hospital in 2001. The system uses a dual fuel (biogas/natural gas) capability reciprocating engine and generates 3.2 MW of electricity. The CHP system was installed and is operated by Energy Systems Group, LLC. ESG also partnered with the Public Works Department of Johnson City to install a landfill gas collection system at the nearby Iris Glen Landfill. Biogas from the landfill is used to fuel the VAMC CHP system. If biogas is not available the CHP system has the capability to burn natural gas. The VAMC/ESG partnership consists of a 35 year lease agreement in which ESG is allowed to operate the CHP system on land and in facilities provided by VAMC.

In return, VAMC purchases the power generated by the CHP system. The system has reduced energy consumption by 20% and will save the hospital in the range of \$5-\$15 million over the term of the agreement. The system consists of a 3.2 MW rated dual fuel engine-generator set. A heat recovery steam generator was installed to recover thermal energy from the engine exhaust and the recovered steam is used to provide heating in the winter months and cooling via an absorption chiller for the summer months.

Quick Facts

LOCATION: Mountain Home, Tennessee

MARKET SECTOR: Hospital

FUEL: Landfill Biogas/Natural Gas

MAX CAPACITY: 3.2 MW

IN OPERATION SINCE: 2001

PRIME MOVER: Reciprocating Engine

EQUIPMENT:

- 3.2 MW dual-fuel engine generator set
- (2) 1.8 MW back up diesel fired engine generator sets
- Heat recovery steam generator
- 1,000 ton absorption chiller

USE OF THERMAL ENERGY: Heating & cooling of medical center campus

INSTALLED COST: \$20,000,000

ANNUAL SAVINGS: ~\$255,000

Reasons for Installing CHP

The James H. Quillen VA Medical Center receives several benefits from their CHP system and the enhanced use lease agreement including:

- Increased Energy Reliability.
- Reduced energy consumption by 25%-30% pursuant to Executive Order 13123.
- From reductions in energy and related services costs, plus their share in the revenue from non-VAMC energy sales, net savings is estimated at \$5-\$15 million over the contract term.
- Cost avoidance in capital budgeting of over \$35million.
- Reliable source of energy, with 100% back-up and minimal risk to the VAMC.



James H. Quillen Veterans Affairs Center

Equipment and Configuration

The CHP system is primarily fueled by biogas from the Iris Glen Landfill and consists of a 3.2 MW dual-fuel engine-generator set. Two 1.8 MW diesel fueled engine generator sets are also available for back-up and they were also retrofitted with the capability to use natural gas and No. 2 fuel oil. The back-up sets are used only during scheduled and emergency outages. The system generates power at 12,470 volts.



Fairbanks-Morse 3.2 MW dual-fuel generator

At the engine exhaust, a heat recovery steam generator was installed. The generator produces steam at 90 psig. This steam is used for heating and cooling the campus of the medical center. Steam is also produced using engine jacket cooling water. Condensate is also sent to a flash tank where steam at 5 psig is produced. This steam is then sent to the de-aerating steam water heater. A 1000 ton absorption chiller was installed alongside three pre-existing centrifugal water chillers, which helps level the electrical demand during the hot summer months. The previous peak summer load due to the chillers was 5,100 kW. With the new absorption chiller, the load was reduced to 3,400 kW.

Collaborative Business Arrangement

James H. Quillen VA Medical Center entered an agreement with Energy Systems Group to install and operate a biogas fueled CHP system. VAMC agreed to lease 2 acres of land and \$300,000 worth of facilities to ESG for a 35 year period. On this property, ESG installed and operates the CHP system that delivers power to the medical center. VAMC is under contract to purchase the energy that is produced by the system. The installed cost of the system was approximately \$20 million. In 2011 the energy savings due to fuel switching (from natural gas to biogas) was approximately \$255,000. At the end of this lease, VAMC will take control of the property, as well as operation of the CHP system.

Partner Profile

Energy Systems Group, LLC is an energy services and performance contracting company. Started in 1994, ESG is now accredited by the National Association of Energy Services Companies (NAESCO) and has also received the Energy Service Provider (ESP) accreditation. ESG's headquarters is located in Evansville, Indiana. ESG has multiple renewable energy sites in the eastern portion of the United States and operates projects at wind and solar power facilities, geothermal facilities, and landfill gas collection facilities.

Lessons to Share

- For the project to be successful, both ESG and VAMC had to be completely committed to the project.
- A review of the completed project determined that the actual savings delivered by the system exceeded the savings predicted by ESG.
- It is important to have a third-party review the baseline information before proceeding with the project to adequately calculate savings and emissions reduction.

For More Information

**U.S. DOE SOUTHEAST COMBINED HEAT AND POWER
TECHNICAL ASSISTANCE PARTNERSHIP**
Isaac Panzarella, Director
919-515-0354
ipanzarealla@ncsu.edu

JAMES H. QUILLEN VA MEDICAL CENTER
Fred N. Overbay Jr.
Energy Manager
Fred.Overbay.va.gov
(423) 926-1171 ext. 7734

More Case Studies: <http://www.southeastchptap.org>
www.energy.gov/chp

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