



Ann Arbor VA Healthcare System

1 MW CHP System



Photo credit: U.S. Veterans Administration

Quick Facts

LOCATION: Ann Arbor, Michigan

MARKET SECTOR: Healthcare

FACILITY SIZE: 1.1 million square feet

FACILITY PEAK LOAD: 5.4 MW

EQUIPMENT: Capstone 1000 Microturbine;
Cain Industries ESG1 Heat Recovery Steam
Generator

FUEL: Natural Gas

USE OF THERMAL ENERGY: steam used for
heating, reheating, and sterilization

CHP TOTAL EFFICIENCY: 84%

ENVIRONMENTAL BENEFITS: greenhouse gas
savings of 2,628.07 MtCO_{2e}/year

PROJECT BUDGET: approximately \$6 million

YEARLY ENERGY SAVINGS: > \$373,000

PAYBACK: 15-20 years

CHP IN OPERATION SINCE: 2012

Site Description

The Energy Independence and Security Act of 2007 (EISA) aimed to move the United States toward greater energy independence and security through increased production of clean renewable fuels; increased efficiency of products, buildings, and vehicles; and improved energy performance of the Federal Government. EISA required federal agencies to reduce energy intensity by 3 percent per year by FY 2015.¹ Starting in FY 2010, new or renovated agency building designs were required to reduce fossil fuel-generated energy consumption by 55 percent.² In response to EISA's ambitious requirements, the Ann Arbor VA Healthcare System installed a 1,000 kW microturbine combined heat and power (CHP) system in 2012. Installed by developer GEM Energy, the CHP system is in continuous use and provides electricity and steam to the 1.1 million-square-foot medical center. The Ann Arbor VA Healthcare System benefits from the CHP system's reduced greenhouse gas emissions and increased reliability of both electrical and thermal generation. The CHP system also provides the facility with a net savings of over \$373,000 per year.

Built in 1953, the Ann Arbor VA Healthcare System includes a state-of-the-art hospital, outpatient clinics, community living center, a radiation therapy facility, two research buildings, five administrative outbuildings, two parking garages, and an energy center. The facility also includes advanced ambulatory care clinics, operating rooms, a cardiac catheterization suite, intensive care units, laboratory, and diagnostic facilities, and serves as a referral center for complex specialty care.

¹ Compared to a fiscal year (FY) 2003 baseline.

² Compared to an FY 2003 baseline.

Reasons for CHP

The increased energy conservation requirements of EISA motivated many VA medical centers, and other critical infrastructure sites, to explore the numerous potential benefits of CHP, which supports the resilience and security of the electric grid as a whole by reducing the risks of grid disruptions. The Ann Arbor VA Healthcare System installed a CHP system to achieve:

- Decreased greenhouse gas emissions;
- Energy savings; and
- Increased reliability of electric and thermal generation.

Practice Greenhealth, a health care membership organization that provides sustainability solutions, has recognized the energy conservation efforts of the Ann Arbor VA Healthcare System, honoring the facility with the **2018 Greenhealth Partner for Change Award**, a designation that recognizes superior performance in environmental sustainability, covering a range of different sustainability programs and activities. (<https://practicegreenhealth.org/>)



A CHP system anchored by a 1000 kW Capstone microturbine provides electricity and steam to the 1.1 million-square-foot Ann Arbor Veterans Administration Healthcare System in Ann Arbor, Michigan. The steam is used for heating, reheating, and sterilization at the medical center.

PHOTO COURTESY OF GEM ENERGY

CHP Equipment & Configuration

The facility's Capstone 1000 Microturbine is fueled by natural gas. A waste heat boiler/heat exchanger creates steam for use in space heating, water reheating and autoclave sterilization equipment at the Ann Arbor Veterans Administration Healthcare System. The CHP installation was funded by the VA Office of Asset and Enterprise Management, is in continuous operation and boasts 84% total efficiency. GEM Energy now provides maintenance under a Capstone Factory Protection Plan for budget certainty and equipment optimization.

Lessons To Share

Following some challenges in the early days of operation related to utility interconnection agreements and the initial lack of a maintenance contract, the staff of the Ann Arbor VA Healthcare System are pleased with the benefits they are realizing from the facility's CHP system. Lessons learned and recommendations include:

- Invest in a **maintenance contract** to begin on day one. Maintenance requirements are specific enough that a highly trained team of specialists is required;
- Research **newer generations of turbines** to ensure fewer failures, improved efficiencies and more up time; and
- Work with the utilities early and often and **have utility agreements in place** prior to initiating construction.

For More Information

U.S. DOE MIDWEST CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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More CHP Project Profiles:
<http://www.mwchptap.org/>

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