



CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

Shands Hospital

11.7 MW CHP & District Heating/Cooling System

Project Overview

UF Health Shands HealthCare South Campus is located adjacent to the University of Florida campus in Gainesville, FL. It consists of three teaching and research hospitals for the University of Florida, and includes the areas only Tier 1 Trauma Center. UF Health selected Gainesville Regional Utilities (GRU) to design, build, own and operate an on-site energy center for the hospital campus to ensure power quality and reliability. GRU is the local municipal electric, water, wastewater, natural gas, and telecommunications utility.

The GRU South Energy Center is comprised of a CHP system that delivers district heating and cooling to the hospital as well as reliable power. The CHP system is housed in a structure designed to withstand hurricane force winds.

Power generation is provided by a combustion turbine producing 4.3 MW and a reciprocating engine-generator producing 7.4 MW, while heat recovery steam generators on each unit provide steam for the hospitals and aid with the production of chilled water. The reciprocating engine generator is also equipped with a waste heat recovery system to convert engine water jacket and turbocharger waste heat to hot water for beneficial use by the hospital. The CHP system provides 100% of the South Campus hospitals' electric and thermal needs. This allows the site to operate at a total thermal efficiency of 75%.

Reasons for Installing Combined Heat and Power

The GRU South Energy Center CHP Plant provides many benefits for the hospital, including:

- Enhanced quality of power assuring smooth, continuous operation of clinical devices
- Ability to seamlessly transition from grid connected to full island operation. Capable of supporting full campus and plant operation during island operation
- Two electrical feeds from different substations in the power grid provide full electrical redundancy
- Diesel Generators provide for black start of combustion turbine and reciprocating engine generators and for code mandated hospital Life Safety Systems
- The Energy Center is 75% efficient at primary fuel conversion to useful energy, compared to typical grid efficiency of 30%
- Significant reductions in NO_x, SO₂, and CO₂ emissions

Quick Facts

LOCATION: UF Health South Campus, Gainesville, Florida

OWNER: Gainesville Regional Utilities

MARKET SECTOR: Hospital/University/District Energy

FUEL: Natural Gas

MAX CAPACITY: 11.7 MW (Electrical)

OPERATIONAL SINCE: 2009 (Expanded 2017)

EQUIPMENT:

Existing – 4.3 MW Combustion Turbine, 14,500 lb/hr HRSG

Expansion – 7.4 MW Reciprocating Engine Generator, 9,000 lb/hr HRSG

ENVIRONMENTAL BENEFITS: Emission reductions of up to 72,145 tons CO₂e/per year, including upward of 90% of SO₂, CH₄, N₂O.* (equivalent to removing 14,000 vehicles from the road each year)

*[Based on CHP system operating at 85% capacity factor]



The CHP system helped Shands Hospital achieve LEED Gold certification from the U.S. Green Building Council (Phase 1) and four Green Globes (Phase 2)

Equipment and Configuration

CHP Components

- 4.3 MW Combustion Turbine (Solar Turbines Mercury 50)
- Turbine Exhaust Diverter Valve
- Heat Recovery Steam Generator (14,500 lbs/hr)
- Combustion Turbine Inlet Cooling Coils
- Thermal Device Exhaust Stack
- 7.4 MW Reciprocating Engine Generator (Wärtsilä 16V34SG)
- Heat Recovery Steam Generator (9,000 lb/hr)
- Engine Water Jacket and Turbo Waste Heat Recovery System
- SCR

Chilled Water

- Two Electrical Centrifugal Chillers (1,500 tons each)
- Chiller Water Variable Primary Pumps
- Steam Turbine Centrifugal Chiller (1,200 tons)

Heating

- Standby Packaged Boiler (30,000 lbs/hr)

Emergency Generation

- 500 kW Black Start Engine Generator
- One 2,250 kW and one 3,000 kW Emergency Engine Generator



Wärtsilä 16-Cylinder Reciprocating Engine



CHP System Equipment: Gas Turbine, Heat Recovery System, Chiller, Backup Generator

Collaborative Partnership

This CHP project was developed through a collaborative effort between UF Health and Gainesville Regional Utilities. The design engineering firm was Burns & McDonnell. GRU financed, owns and operates the South Energy Center as part of a 50 year agreement to provide electricity, steam, and chilled water to the hospital. The hospital accrued capital savings from foregoing the building of its own central plant.

The South Energy Center is expandable to meet planned future growth of the hospital and will also serve chilled water to the larger South Campus area under development. In 2010, the Environmental Protection Agency recognized GRU with an Energy Star CHP Award for the South Energy Center's energy efficiency and outstanding pollution reduction.

The UF Health CHP system provides numerous benefits to our campus including the ability to operate in Island mode, eliminating even momentary power drops during grid outages. Additionally, through our partnership with GRU, we benefit from the reliability and resilience attributes of the CHP system while allowing the hospital to concentrate on our core business. Utilizing waste heat to generate chilled water is a significant monetary benefit realized by our organization which is another testament to the LEED Gold status achieved on the CHP project.

*-- Bobby Baird, Senior ASHE Fellow
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For More Information

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