Combined Heat & Power, A Natural Fit for Healthcare

CHP Summit Eastern Missouri – St. Charles Convention Center
April 10, 2018
St. Vincent’s Chilton Hospital
St. Vincent’s Chilton Hospital

- Located on I-65 North halfway between Birmingham and the Montgomery
- 30 Bed Acute Care Facility
- Designed to be highly efficient for many years to come with advanced,
  - Building Automation Systems
  - Lighting
  - Exterior Insulation Finish Systems
  - Membrane roof
  - Low infiltration
  - Advanced Energy Systems
Missouri Connection

• Building owned by Chilton County and managed by the Chilton County Healthcare Authority.
• Hospital operated by St. Vincent’s Health Systems of Birmingham which is owned by Ascension.
  – **Ascension:**
    101 South Hanley Rd.
    St. Louis, MO 63105

• About Ascension,
  – 150,000 employees and 36,000 aligned providers
  – Operates 2,500 sites
  – 22 states
CHP Project Development

• **Identify need** - Reliability, resiliency, environment or economics.
• **Education, outreach and advocacy**
• **Qualification** - Determine technical potential and cost effectiveness.
  – Minimal site information and average utility costs.
• **Feasibility** - Level 1 and level 2 feasibility analysis with a qualified provider.
• **Procurement** – Procurement planning, contracting, financing, permitting and commissioning.
• **Operations and maintenance**

Resource: www.energy.gov, EPA CHP Project Development Handbook, CHP TAPs
Why CHP at St. Vincent’s Chilton?

• Efficiency
• Environmental benefits
• Economics
• Resiliency
Efficiency and Environmental Benefits

Conventional Generation

Power Station Fuel (U.S. Fossil Mix)
- 91 Units Fuel
  - Power Plant
    - Efficiency: 33%
  - 147 Units Fuel

Boiler
- 56 Units Fuel
  - Boiler Fuel
  - 45 Units Steam
  - Heat

Combined Heat and Power
- 5 MW Natural Gas Combustion Turbine and Heat Recovery Boiler

- 30 Units Electricity
- 45 Units Steam
- 100 Units Fuel

51%...OVERALL EFFICIENCY...75%

45 kTons/yr...TOTAL EMISSIONS...23 kTons/yr
Resiliency
Hospital is located near the Alabama Emergency Management Agency.

According to Kiplinger’s list of States Most at Risk of Disaster between 2006-2015, Missouri is 4th and Alabama is 5th.
Natural Gas Equipment

- Kitchen
- Water Heating
- Condensing Domestic Water Heaters
- Condensing Hot Water Boilers
- Steam Humidifiers
- Micro-Turbines
- Waste Heat Absorption Trigen Chiller
Domestic Hot Water Heater

- Kitchen Hot Water
- 2 at 150 MBH
- Up to 96% Thermal Efficiency
- 5:1 Modulation
- Vent up to 100 equivalent feet
- Smart Controls
Hot Water Boilers

- Heating and domestic hot water boilers
- 2 at 4,000 MBH
- Ultra low emissions
- Up to 98% efficient
- 5:1 turn down
- Metal fiber premix burner

EX SPIRAL FIRETUBE
- 85% more heat transfer than a straight tube design
- Keeps hot flue gas in turbulent flow throughout profile

ALUFER FIRETUBE
- Thermal conductivity is 10 times greater than stainless alone
- Provides the maximum effective heating surface where it is needed the most
- Heating surface up to five times larger than other condensing boilers
Micro-turbines

- 2-Capstone Turbines
- 65 kw / Turbine
- Power Used Within Facility
- Turbine Exhaust Powers Absorption Chiller
Waste Heat Chiller

- Trane Thermax Chiller
- 1-150 Ton Chiller
- Turbine Waste Heat or Auxiliary burner
- Trigen Machine provides,
  - Cooling
  - Heating Hot Water
  - Domestic Hot Water
Chilled Beam System

- Saves
  - Space
  - Energy, Low Fan Energy
  - Maintenance
- Active Chilled Beams
- Passive Chilled Beams
- Hydronic Based 4-pipe Central System
Combustion Turbine with Heat Recovery Generator
Coming Soon! - Engine Driven Natural Gas Chiller

- Tecochill Natural Gas Chiller
- Supplies,
  - 150 tons of cooling
  - Waste heat for DHW and heating HW
- Resilient emergency cooling
- Reduces emergency electric generator load
- Variable speed and load following
MOB Expansion