
Cogeneration at UC

March 09, 2012

Welcome

UNIVERSITY OF
Cincinnati



Central Utility Plant





University Hospital



Hoxworth Blood Bank



Veterans Hospital

Hospitals Served by UC Utilities



Childrens Hospital Medical Center



Shriners Hospital for Children



Holmes Hospital

University of Cincinnati Consolidated Utilities

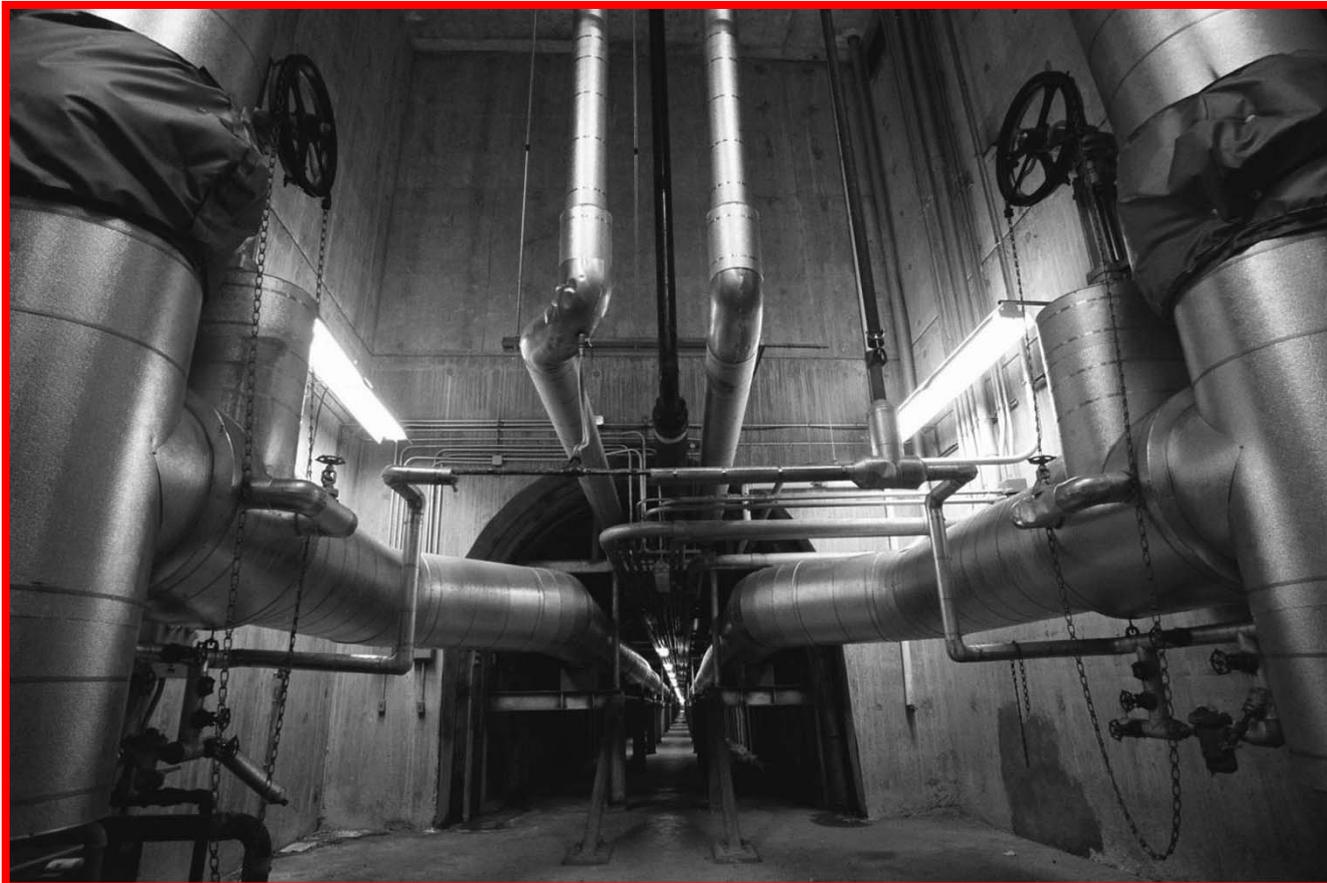
- UC and 6 Hospitals
 - 100 buildings
 - 12 million square feet
- Two Utility Production Plants
- Piping/Tunnel System
 - 100% distribution

Consolidated Utilities Operations Capacity

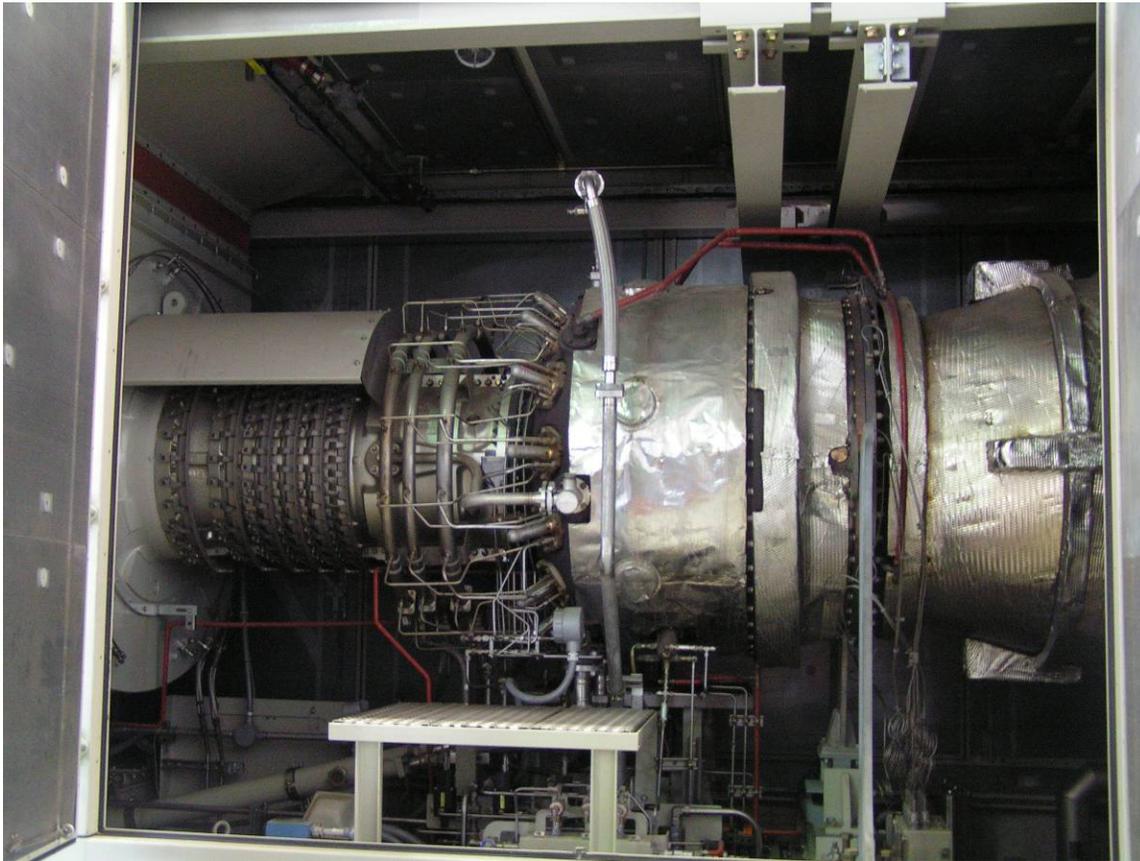
- Electric Production 45MW
- Steam Production
 - 610,000 pounds-per-hour capacity-coal, gas, oil, interruptible gas
- Chilled Water Production
 - 34,000 tons capacity
 - natural gas and electric chillers
- Thermal Energy Storage
 - 2.8 million gallons of chilled water
 - 4.0 million gallons of chilled water

Utilities Distribution System

Steam Pipes	35,509 Linear Feet
Chilled Water Pipes	32,889 Linear Feet
Tunnels	13,947 Linear Feet



State of the Art Electric Production Equipment



Cambridge System Associates, Inc.
M - Engineering, Inc.

View From North East
at Street Level

Control Utility Plant
University of Cincinnati

- 2 Solar Titan Combustion Turbines
- 12.47 kV
- 13,400 kVA

Heat Recovery From Cogen Increases Efficiency



- 2 ERI HRSGs
- 600 PSIG
- 40,000 #/hr
- 140,000 #/hr with burners

Additional Electric Production Equipment



Cambridge System Associates, Inc.
H. Engineering, Inc.

View From North East
at Street Level

Central Utility Plant
University of Cincinnati

- Use for campus heat in winter
- Use for more electricity in summer
- 20 MW steam turbine generator
- 12.47 kV

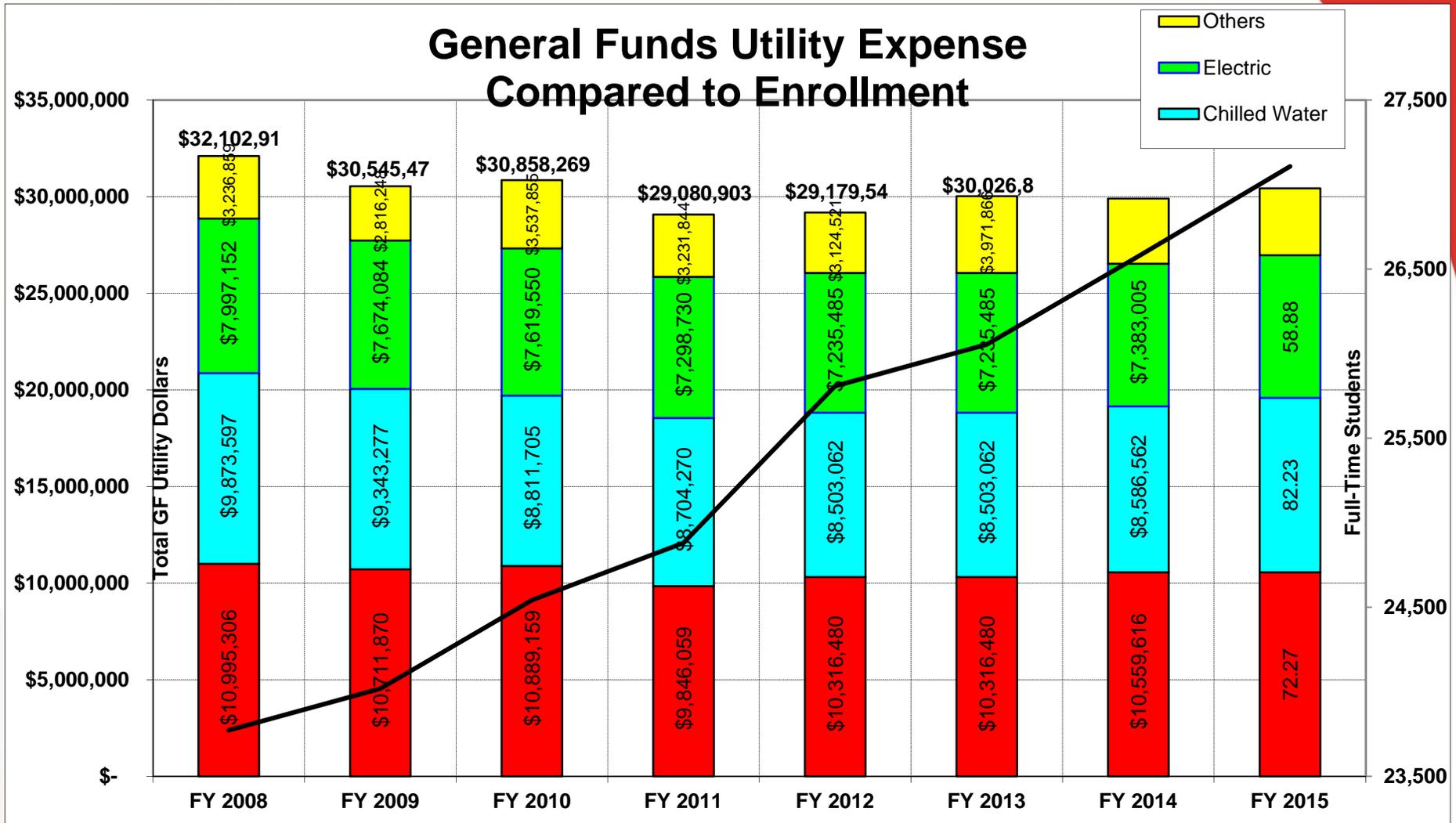
Cogen Benefits

- Increased Reliability
- “Free” Steam
- \$2,590,000 per year of savings
- Lower Emissions



**Certified Emission Monitoring
System**

General Funds Utility Expense History



Renewable Energy

- UC Buys renewable fuel
- UC burns renewable gas
- UC generates approximately 20% of its kWh with renewable fuel
- UC generation offsets purchases of predominately coal fired utility generation
- UC sells Renewable Energy Credits to produce revenue to pay for the fuel

Source of Renewable Fuel

- Landfill Gas
 - Must be collected and burned
 - By UC burning it – natural gas burns are reduced
- Abandoned Coal Mine Gas
 - Must be collected and burned
 - Offsets burning generation fuel

Coal Based Methane

“ Methane is the primary constituent of natural gas. Thus, the collection and utilization of methane provides a valuable, clean-burning energy source that improves quality of life in local communities and can generate revenue and improve living standards. Producing energy from recovered methane can also replace higher-emitting energy resources such as wood, coal and oil...Capturing methane from coal mines can also improve safety conditions by reducing explosion hazards.” Source: US EPA

Coal Based Methane Cont.

- A hydrocarbon that is a primary component of natural gas that can be used as energy
- A “greenhouse” gas that is 23 times as potent as carbon dioxide and a major contributor to global warming. Reducing emissions can lead to important energy, safety, economic and environmental benefits
- Was made a renewable fuel for abandoned mines to create finance its capture and to prevent it seeping into the atmosphere

Regulatory Issues

- Interconnection
- Back Up Power
- Gas LDC Costs
- Ability to change renewable energy sources quickly.
 - Rumpke landfill fire
 - Pricing incentives for abandoned coal mines

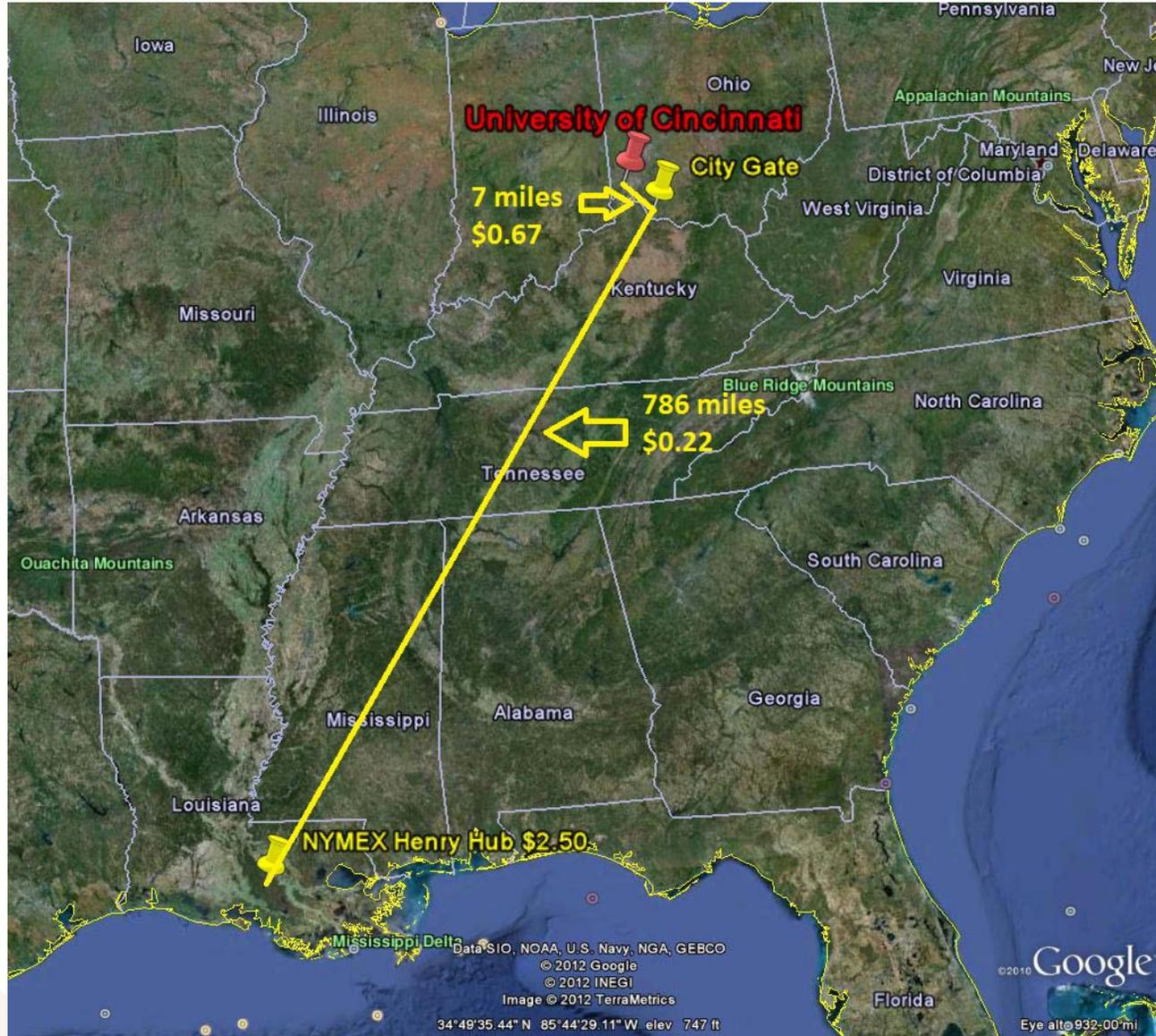
Back Up Power Issues

- Tariffs are very expensive
- Demand rates are set based on summer peak from highest of 3,096 15 minute intervals
- PJM capacity is based on 5 peak hours
- One bad 15 minute period could cost over \$6,100,000 in demand and ratchet fees
- UC forced to trip all chillers in 10 cycles

Construction of New Substation Costs Over \$6,000,000



Gas Distribution Costs



Great Recognition for a Great Technology



Summary

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