

Industrial & Institutional CHP:

How and Why It Works Now - Accounting for the Benefits

Case Study:

*The Children's Medical Center of Central Texas
Combined Cooling, Heating and Power Plant (CCHP)
“Challenges and Successes”*

*Combined Heat and Power Roadmap Workshop
Robert P. Moroz, AIA Seton Healthcare Network*

September 20, 2004

Austin, Texas

CMCCT CCHP Plant - Challenges and Successes

Project Participants

- Seton Healthcare Network
 - 8 Hospitals; 1223 Licensed Beds, 5 Satellite Clinics and 3 Charity Clinics
 - Part of Ascension Health; nation's largest Catholic and largest nonprofit health system; 75 acute care, long-term care, and other healthcare facilities in 15 states and the District of Columbia.

CMCCT CCHP Plant - Challenges and Successes

Project Participants (continued)

■ Austin Energy

- The City of Austin's community- owned electric utility.
- 2,626 MW of total generation from three wholly owned natural gas powered plants within the city limits and two partnered power plants outside Austin, one powered by coal, the other by nuclear
- Contract for 89 MW of wind-generated and 13 MW of landfill methane gas-generated power

CMCCT CCHP Plant - Challenges and Successes

Project Description - Phase 1 of “X” Phases

- New, 470,000 Building Gross Square Foot (BGSF), 169 Bed, Children’s Medical Center of Central Texas with \$110M construction cost
- 32.2 acre brownfield site in the Robert Mueller Municipal Airport Redevelopment
- 157,000 BGSF, \$21M Medical Professional Office Building with \$9M, 900 Car Garage
- 20,000 BGSF, \$15.5M, District CCHP Plant

Project Description - The CCHP

- Combined Cooling, Heating & Power (CCHP)
Plant Equipment
 - 2.5 MW Natural Gas fired Turbine Generator
 - Absorption Chillers to produce Chilled Water
 - Heat Recovery Equipment to produce Steam
 - Additional Backup Equipment/C.W. Storage
- Expandable to meet future growth of Hospital
- Will also serve Chilled Water to the larger
“Urban Campus” of the RMMA Development



ILLUSTRATIVE PLAN

RMMA Reuse and Redevelopment Master Plan

Prepared for the City of Austin by ROMA Design Group

SEPTEMBER 23, 2003

**DISTRICT
ENERGY
PLANT**

EMPLOYEE **EMERGENCY**

SERVICE

HOSPITAL

MAIN

POB 1

OP

**OP
Imaging**

**POB
GARAGE
1**

**RONALD
McDONALD
HOUSE**

**CHILD
CARE**

RETAIL





CMCCT CCHP Plant - Challenges and Successes

The Challenges

- Finding/Educating an Owner Champion
- Creating Upper Management Support
- Obtaining concurrence of State Code Officials
- Developing “*Win-Win*” Business Terms
- Obtaining Seton Board and Austin City Council Approvals

Finding/Educating a Champion (continued)

- Educational Efforts by Austin Energy
 - **Contact:** Project genesis occurred when AE's Account Executive invited Seton's VP of Facilities to see AE's Fuel Cell Demonstration Project.
 - **General Education:**

Why are Hospitals the good candidates for CHP?

 - Large, coincident electrical & thermal energy loads
 - Operate 24 hours a day, 7 days a week, 365 day a year
 - Usually a significant sized consumer in the market

CMCCT CCHP Plant - Challenges and Successes

Finding/Educating a Champion (continued)

- Educational Efforts by Austin Energy (continued)
 - ***Specific Education:*** AE hosted a “Distributed Energy Road Show” for the purpose of:
 - Educating Seton staff on Distributed Generation
 - Illustrating AE’s Engineering, Green Building and LEED expertise
 - Showing AE’s desire to have a CCHP Plant associated with our new Children’s Hospital Replacement project

CMCCT CCHP Plant - Challenges and Successes

Creating Upper Management Support

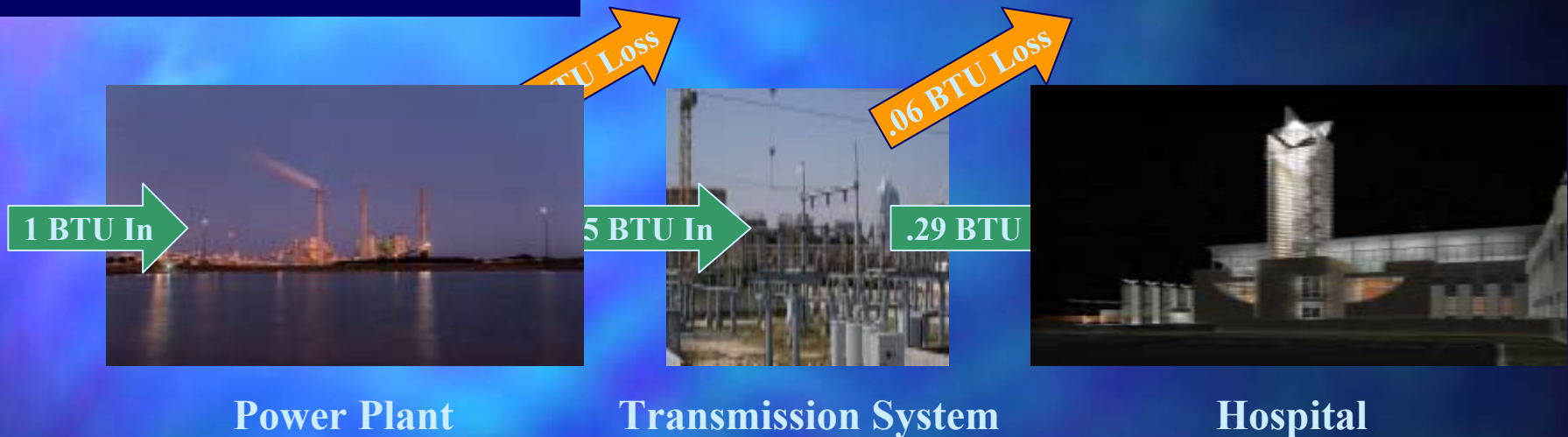
- Generating Interest and Understanding
- Explaining the Intangible Benefits
- Explaining the Economics
- Instilling Trust and Confidence

CMCCT CCHP Plant - Challenges and Successes

Creating Upper Management Support (continued)

- Generating Interest and Understanding
 - *Briefing Meetings with Senior Executives*
 - *Comparisons with other Local Institutions*
 - Austin Independent School District
 - Local Hospitals and Industries
 - *Life Cycle Cost Analysis*
 - *Current Events*
 - August 14, 2003 Blackout of the NE US and Canada

Traditional Power Service Model



At Austin Energy's Fayette Power Station, for example, 35% of the primary fuel is converted into electricity; the remainder is lost "up the stack". An additional 6% efficiency drop occurs in transmission to the site. Overall, at the Hospital's meter, the result is roughly a 29% efficient primary fuel conversion to useful energy.

The CMCCT CCHP Plant Model



Austin Energy's Combined Cooling, Heating and Power Plant at CMCCT will be *85% efficient at primary fuel conversion to useful energy.*

This is a ***56% savings in primary energy utilization*** compared to the Traditional Power Service Model.

CMCCT CCHP Plant - Challenges and Successes

Creating Upper Management Support (continued)

■ Describing the *Intangible Benefits*

- *More Reliable Power for a fully Digital Hospital*
On-site power generation is backed up by:
 - *Grid Feed 1 which is backed up by:*
 - *Grid Feed 2 from a different substation which is backed up by:*
 - *Duel Fuel Diesel Generator*
- *More Backup Power:* the Grid backups supply 100% of the Hospital's needs; not just its Life Safety requirements

CMCCT CCHP Plant - Challenges and Successes

Creating Upper Management Support (continued)

■ Describing the *Intangible Benefits* (continued)

- ***Cleaner Power:** Local generation is anticipated to provide fewer sags and surges. Conversion from primary power to grid backup will be measured in “cycles” rather than “seconds”.*
- ***“Island” Power:** State standards require one grid feed with a diesel generator backing up Life Safety Systems only. In the event of a grid failure due to natural or terrorist causes, this will be the only hospital in Central Texas with full power*

CMCCT CCHP Plant - Challenges and Successes

Creating Upper Management Support (continued)

- Describing the ***Intangible Benefits*** (continued)
 - ***LEED Point Contribution:*** *The CCHP will provide 7 points in our joint effort to achieve a Platinum rating under USGBC LEED 2.1.*
 - ***Public Relations:*** *Austinites embrace energy conservation and green building. Consequently, they view the CCHP very favorably. This project has been enthusiastically received by the adjacent neighborhoods.*

CMCCT CCHP Plant - Challenges and Successes

Creating Upper Management Support (continued)

■ Describing the *Economics*

- ***Indirect Capital Savings:** The CCHP is being funded fully by Austin Energy. As a result, the Children's Hospital will not build its own Central Plant. The gross, indirect savings is \$7 Million.*
- ***Operating Cost Savings:** \$2.5 Million of these Capital Savings are being reinvested in energy conservation measures. Thermal energy and power are purchased at the same large user tariff rates we pay at our other sites, but with less load.*

CMCCT CCHP Plant - Challenges and Successes

Creating Upper Management Support (continued)

■ Instilling *Trust and Confidence*

- *Fear of Code Complications:* Concern over acceptance by the Texas Department of Health
- *Fear of Contract Negotiation Failure:* Inherent as 2 large entities attempt to initiate a “first-time” partnership on a project unique to both.
- *Contingency Planning:* Get the contracts signed before you “dig” and have an “exit scenario”.

Concurrence of State Code Officials

- The Texas Department of Health (TDH) *Hospital Licensing Code* governs hospital construction in Texas. NFPA 99 is the referenced standard for Essential Electrical Systems in the TDH Code
- NFPA 99 3-4.1.1.2 and 3-4.1.1.3 are the applicable sections

Concurrence of State Code Officials (continued)

■ NFPA 99 3-4.1.1.2

“Essential electrical systems shall have a minimum of two independent sources of power: a normal source generally supplying the entire electrical system and one or more alternate sources for use when the normal source is interrupted.”

Concurrence of State Code Officials (continued)

■ NFPA 99 3-4.1.1.3

“The alternate source of power shall be a generator(s) driven by some form of prime mover(s) and located on the premises.

Exception: Where the normal source consists of generating units on the premises, the alternate source shall be either another generating set or an external utility service.”

Concurrence of State Code Officials (continued)

- The Texas Department of Health ***was happy*** to accept this implementation after:
 - it was diagrammed and explained to them
 - they were provided with a copy of relevant sections of the code for reference.

Lesson Learned: CCHP and CHP are specifically allowed under the exception in NFPA 99 3-4.1.1.3

CMCCT CCHP Plant - Challenges and Successes

“Win-Win” Business Terms

- Austin Energy was knowledgeable and prepared
- Seton was knowledgeable and prepared
- Both were motivated towards success
- Criteria set out by Seton in the first business meeting was met by Austin Energy:
 - Purchase Thermal Energy at our best Plant's Cost
 - Purchase Power at current Large User Tariff Rate

Seton Board and City Council Approvals

- Went like clockwork in both cases.
- Austin Energy Executives are using the CMCCT CCHP Plant as a positive indicator of the success of AE's Demand Side Management Program in Budget Justifications before Austin City Council
- Seton Senior Management has stated that CCHP Plants will be installed in all future facilities to be constructed.

CMCCT CCHP Plant - Challenges and Successes

.....a brief footnote.....

A progressive local government like the City of Austin is *immensely important*:

- Approved AE's Budget of \$85 Million for Demand Side Management for 2005.
- Mandated USGBC LEED Silver achievement on all municipally owned buildings greater than 5,000 square feet in June, 2000.
- LEED Certification/Silver mandate at its 709 acre Robert Mueller Municipal Airport Redevelopment

CMCCT CCHP Plant - Challenges and Successes

.....another (final) brief footnote.....

A progressive local Utility like Austin Energy is *immensely important* to success in the implementation of a CCHP project as well.

- Educational Resources – Direct Rebates
- Indirect Capital Partner – Green Bldg Consultants
- Engineering Expertise – LEED Platinum Partner

This project would not be occurring were it not for AE's programs and educational initiatives.

THE END