

Energy Supply Panel An Industrial Perspective

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(CIBO)**

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Presentation Purpose

- Help establish a framework for further discussion
- Present some of the many competing drivers that raise the cost of energy
- Explain some basic corporate practices
- Help develop a common understanding of the industrial energy landscape on which industrial energy decisions are based

Corporate Pressures

- Serve stakeholders
 - Shareholders
 - Customers
 - Communities
 - Employees
- Enhance Core Values - e.g., the goal is "zero"
 - Safety & Health
 - Environmental Stewardship
 - Highest Ethical Behavior
 - Respect for People

Internal Corporate Goals Example

- Energy related - 2010
 - Hold energy use flat vs 1990 base year
 - Source 10% of energy input from renewable sources
 - At a cost competitive with best fossil alternatives
- Sustainability/footprint
 - GHG emissions- 15% reduction - 2004 to 2015
 - Air carcinogen emissions - 50% reduction 2004 to 2015
- Water consumption
 - 30% reduction in water stressed areas - 2004 to 2015
- Independent verification of the effectiveness of environmental management goals and systems
 - 100% of global manufacturing sites by 2015
- Fleet fuel efficiency
 - 100% of fleet cars & light trucks represent leading technologies for fuel efficiency & fossil fuel alternatives by 2015

Other Influences

- Global competition pressures
- Environmental pressures
- Aging workforce
- Aging infrastructure
- High and volatile energy prices
- FERC regulatory developments
 - More difficult to utilize PURPA/CHP
- Global Climate Change policies and requirements

How is Energy for Fuel & Power (non-feedstock) Considered?

- Variable cost dependencies
 - Energy use, (production rate, mix and weather)
 - Unit energy price
- Energy cost as % cost of manufacture
 - Some products are $\ll 5\%$
 - Compressed gas production approaches 80%
- Some energy is a necessary evil not well-controlled
 - Not considered on the management score card

Energy & the Environment

Energy Cost and Environmental Drivers
are
Inextricably Linked

Environmental Drivers

- Existing permit conditions
- Regional Haze- BART eligible unit?
- Boiler MACT requirements
- PM Fine implications
- NAAQS reductions
- Global Climate Change initiatives
- PSD/NSR implications
- Local issues

Fuel Option Limitations

- Existing equipment capability
 - Existing solid fuel firing capability is mostly depreciated
 - Very difficult to replace
 - O&M expertise & resource support is difficult to maintain
- Stokers have inherent fuel variability limitations
 - Fuel quality limitations (Slagging, fouling & clinkering)
 - Fuel feed capability
 - New sidewall burners can be expensive with pressure part modifications and external space availability
- PC boilers can more readily accept gas/liquid fuels

Fuel Availability/Viability

- Natural gas not available in some locations
- Inherent limitations for economic transport of biomass
- Competing demands for biomass
- Even partial steam supply from biomass might not be justifiable with new boiler installation

Current Project Issues

- World demand for basic materials (steel, concrete)
 - Fabrication shops are extremely busy
 - Cost increase and delivery delay
- Skilled labor pool very limited
- Internal resources have been reduced
- All leads to significantly increased costs and lesser ability to economically justify projects

Energy Supply Decision-Making

- Evaluation of fuel and energy supply alternatives can take different forms depending on complexity
 - Simple NPC/IRR analysis
 - Complex Decision & Risk Analysis (D&RA) approach
 - Look at major alternatives
 - Evaluate influences on ultimate cost of services
 - Capital, energy cost, O&M, etc
 - Establish steam balances for alternatives
 - 10-50-90 sensitivity evaluation of major uncertainties
 - Including potential environmental limitations
 - Evaluate overall impact on NPC and see overlap of potential NPCs

Hypothetical Example Facility

- Original plant built in the 1950s or before
- Original solid fuel fired boilers still installed and usable
- Additional boilers added during later years as the plant expanded for new production lines
- PM emissions controls had been shoe-horned in place
- Infrastructure is degrading and causing reliability issues
 - Underground lines, corrosion, insulation degradation

Hypothetical Plant Changes

- Product line has changed in recent years
 - Production shut down
 - Production facility sold to another company that is now a tenant on site
- Boilers no longer used at high capacity factor due to demand reduction
- Fixed costs have been significantly reduced
 - Fewer operators and mechanics
 - Contract maintenance
 - No shift supervision
 - Minimal tech support and engineers
 - Reduced maintenance
 - Instead of PM, now fix at failure (maybe)

Hypothetical Plant Pressures

- Fuel & energy costs have risen drastically
- Community has lost many jobs already
- Products are marginally profitable in global markets
- New emissions limits require significant capital and annual O&M
 - How can this be accomplished?
- How might incremental equipment improvements impact NSR?

The Conundrum

- How to balance all of the competing pressures while remaining competitive and meet the needs of all stakeholders?
- How will future Climate Change policies and programs impact industrial facilities and how will this impact the energy environmental decision-making process?

Energy & Environmental Issues for ICI Boilers

- What is the Industrial Commercial & Institutional (ICI) Sector Boiler?
- What are the Energy and Environmental Issues?
- ICI Perspective – “I Will Comply!”

ICI Boiler Population Summary

	Industrial	Commercial	Total
Boilers	43,105	119,790	162,895
> 10MMBtu/hr	19,520	26,140	45,660
Capacity (MMBtu/Hr)	1,556,780	1,147,617	2,704,397
> 10 MMBtu/hr	1,464,474	846,415	2,310,889

Data from "Characterization of the US Industrial Commercial Boiler Population,"
by Energy and Environmental Analysis, Inc. for Oak Ridge National Labs/DOE
May 2005

Existing Delivered Energy Cost Base

- Coal @ < \$1.00/MMBtu
- Natural Gas @ < \$2.50/MMBtu
- Oil (No.6 or No.2) @ < \$5.00/MMBtu

Fuel	Delivered Cost	Conversion Efficiency	\$/MMBtu Steam
Electricity	\$ 0.10/kwH	98%	\$ 29.60
No.2 Oil	\$ 3.00/Gal.	84%	\$ 24.81
Cord Wood	\$ 200/Cord	60%	\$ 19.85
Residual Oil	\$ 2.00/Gal.	84%	\$ 14.88
Natural Gas	\$ 8.00/MMBtu	84%	\$ 9.52
Eastern 1.2S	\$ 100/Ton	85%	\$ 4.70
PRB Coal	\$ 50/Ton	85%	\$ 3.46
Illinois Basin	\$ 60/Ton	85%	\$ 3.06
Biomass	\$ 15/Ton	60%	\$ 2.08

Environmental Compliance Requirements: Today & Tomorrow

- NO_x SIPs
NO_x
- NSPS *
NO_x, SO_x, CO
- NSR *
PSD, PTE, Hourly
- Boiler MACT*
PM, HCl, CO, Hg
- CAIR/CAMR*
NO_x, SO_x, Opt-in
- State/Local
Beyond EPA Demands

* Ongoing Litigation

- PM & Ozone NAAQS
More Non-Attainment Areas
- NO_x, SO_x & PM SIPs
- Regional Haze BART
NO_x, SO_x & PM
- CAIR – Plus
ICI Unit BACT
- Area Source MACT
Tune-ups, Hg, PM & CO
- Climate Change
Energy Efficiency, Bio-Fuels,
Natural Gas

The Good, The Bad and The Ugly

- States and Regions are beginning to consider Energy costs and real health impacts.
- Sarbanes-Oxley Act of 2002 Globalizes Corporate Decision-making.
- US Companies must shift production to foreign subsidies when in the best interest of Shareholders.

CIBO Members

- If our members are shown a real environmental health risk associated with production or plant, they will fix it.
- For global companies, if costs are excessive, shuttering the facility and moving the production becomes a valid/mandatory alternative.
- For public institutions, district heating companies, universities and other energy suppliers, costs must be passed through or paid with public funds from tax revenues.

Ending Thoughts

- Environmental linkages to energy costs are not sufficiently addressed.
- Combined Heat and Power, Distributed Generation and energy efficiency optimization are complicated by barriers to electricity grid access.
- Environmental regulatory uncertainty and a no-good-deed-goes-unpunished awareness increases risk for early action.

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