Making the Case for Industrial Energy Efficiency and CHP

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Advantages of Industrial Efficiency

- Environmental Benefits
- Cost Savings
- Improved Competitiveness
- Domestic Employment
- Savings for Consumers
- Public Opinion & Brand Image
- Grid Benefits
2010 Total Energy Use: 98 Quads Btu

- Commercial
- Residential
- Industrial
- Transportation

EIA
Industrial Sector Energy Consumption Projected to Grow

Combined Heat and Power

• Generates both heat and electrical or mechanical power.
  – Heat from power generation used for processes, space, or water heating (‘topping cycle’)
  – Heat from processes used to subsequently generate electrical or mechanical power (‘bottoming cycle’ or ‘waste heat to energy’)
• Reduces waste, makes the most out of a single fuel source; more efficient than generating heat and power separately.
Combined Heat and Power

• Higher efficiency translates to lower operating cost, but requires capital investment.

• Higher efficiency reduces air emissions – lowers carbon footprint.

• CHP can provide increased reliability and power quality to the user.

• On-site electric generation reduces grid congestion and avoids distribution costs

EPA
Huge Potential for CHP

• Already 82 GW at over 3,700 industrial and commercial sites in U.S.
• Avoids 241 million metric tons of CO₂ compared to traditional separate production

Chart: ICF CHP database
Efficiency Benefits of CHP

**Conventional Generation:**
- Power Station Fuel: 168, Efficiency: 30%
- Boiler Fuel: 65, Efficiency: 80%
- Total Efficiency: 49%

**Combined Heat & Power:**
- 5 MW Natural Gas Combustion Turbine
- Efficiency: 83%

ICF
Environmental Benefits of CHP

Conventional Generation:
- Power Station Fuel
- Power Plant (EFFICIENCY: 30%)
- Emissions: 26 Tons
- Boiler Fuel
- Boiler (EFFICIENCY: 80%)
- Emissions: 15 Tons

Combined Heat & Power:
- 5 MW Natural Gas Combustion Turbine
- Combined Heat And Power
- CHP Fuel
- Emissions: 17 Tons

41 TONS/yr...TOTAL EMISSIONS...
17 TONS/yr

ICF
McKinsey & Co. estimate negative marginal cost for CO₂ reduction. Nearly 1400 major source boilers in US fueled by coal or oil; if all were switched to natural gas CHP, they could generate 25GW and reduce CO₂ emissions by almost 150 MMT. And current low natural gas prices make this even more economically viable.

Meeting 20% of US capacity with CHP (relative to 8.6% in 2008) would:
- Avoid 848 MMT CO₂
- Create 936,000 jobs
Barriers

• Regulatory & institutional hurdles
  – Permitting, siting
  – Interconnection
  – Rate structures

• Value proposition for utilities

• Skills, awareness and understanding

• Operational interruptions
Barriers

• Financial
  – Up-front capital costs
  – Long payback periods
    • Relative to planning around shorter-term profits
  – Mortgage lender limits
  – Limited financing products available
Thank You

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