

Energy and Environmental Implications for US Industry and Institutional Survival

For

Tennessee Environmental Conference

Kingsport, TN

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What do I Want to Do?

- Provide an overview of CIBO
- Ask a few questions
- Set a frame for common understanding
- Talk a little about energy and manufacturing...
- Look at the implications of environmental regulations on energy
- Consider Boiler MACT as an example
- Question litigation and uncertainty's impact

The Council of Industrial Boiler Owners (CIBO)

CIBO is dedicated to ensuring that non-utility industrial, commercial and institutional energy producers and users can continue to provide safe, cost-effective and reliable energy to sustain a strong and globally competitive economy.

CIBO's Mission

- CIBO represents the interests of America's non-utility energy producers and users. It is the organization of choice for accurate information and advocacy to achieve safe and cost-effective solutions for industrial energy, technology and environmental issues.
- CIBO activities are designed to:
 - Provide for the focused exchange of accurate technical information among organizational members, government and the public concerning policies, laws and regulations that impact industrial energy systems.
 - Provide a forum for the continued education of organizational members, and the broader industrial energy community on advances in technology and operations to improve the reliability, cost-effectiveness and environmentally safe production and use of energy.

Three Truths

- **You Can't Make Anything or Do Anything Without Energy**
- **Energy Issues Impact the Environment**
- **Environmental Issues Impact Energy**

A Few Questions

- How many of you would sell a product if it cost more to make than that for which it can be sold?
- Should you make a Profit? Yes? No?
- Do shareholders, investors and banks deserve a return on their investments?
- Should you have to buy something if there is no guarantee it will do what you need it to do?

A Common Understanding

- You have to make a profit to grow a product or business in the long term or at least cover your costs to survive in the short term.
- If that cannot be accomplished, the product line or business will die.

The Fundamental Truth

- **There is nothing that can be made or done without energy.**
- **Anything that impacts the availability, use or cost of energy impacts everything we make or do or buy - everything!**

Energy and Manufacturing

- The history
 - Wood, Water, Coal, Oil, Natural Gas...
- Getting and using the Energy
 - Availability
 - Production
 - Transportation
 - Utilization
- Efficiency
- Where are we today?

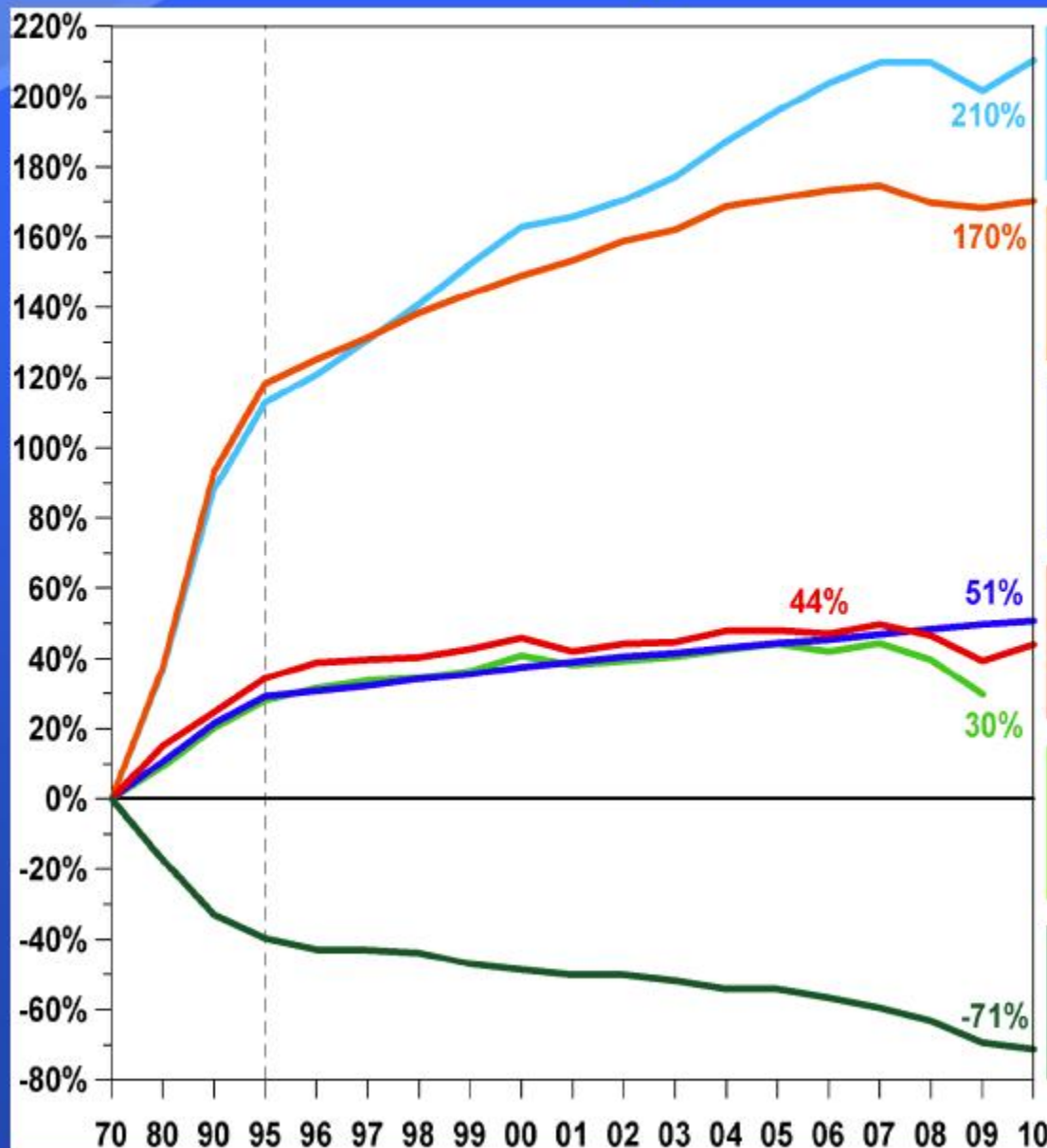
The Public's View of Energy Today

- Coal is Bad, Very Very Bad!
- Renewable Energy is Good, Very Very Good!
- Biomass is Ok as long as it displaces Coal.
- Natural Gas is good for now, to displace coal and anything else with more than “Zero” emissions.
- Energy Efficiency is believed to be Free.
- Electricity is Assumed & Happens.
- Why do you “Old Guys” use/need steam?

Environmental Regulations & Energy

- The Clean Air Act
- National Ambient Air Quality Standards (NAAQS)
- Green House Gasses and Global Warming Now reported as Climate Change (GHG)
- Air Toxics Regulations (MACT & GACT)
- Regulatory Landscape (PM, CO, NO_x, SO₂, Hg...)
- Resource Conservation and Recovery Act (RCRA)
- Clean Water (wetlands, effluent & intake Rules)
- Land Use (Endangered Species, Fed. Land Use)

Cutting air pollution as U.S. economy grows: Progress 1970 to 2010



Gross Domestic Product



Vehicle Miles Traveled



Population



Energy Consumption



CO₂ Emissions



Aggregate Emissions
(Six Common Pollutants)

The Boiler MACT Example

Final Reconsidered Rule Issued
January 31, 2013

Compliance
January 31, 2016

Compliance the Real World

- Compliance and US versus the World
- The Cost of Compliance
- Economic Impacts of Compliance
- Potential Schedule for a Compliance Plan
- Rule Short Comings and Litigation
 - The Environmentalist Concerns
 - Industries Concerns
- Potential Litigation Impacts on Compliance
 - The Courts and Congress

Compliance

- **Four Emission Limits :**
 - **PM, CO, HCl, & Hg**
- **Boiler owners' must comply with all aspects of the rule.**
- **Simultaneously!**

Alternate Cost Analyses

- Original cost analyses assumed all boilers would install controls to reduce emissions and comply with limits. Did not address replacement units or fuel switching.
- EPA's final BMACT cost assumes that any liquid units that do not comply and have ability to fire gas will fuel switch rather than install controls.
- Our alternate cost analysis looks at replacement natural gas units and fuel switching for coal and liquid units.
- We also made some refinements to the base cost analysis to reflect differences in approaches between types of boilers that would install controls.

Alternative Cost Qualifications

- Costs are based on good engineering assumptions for technology application considering a typical boiler case using real world data, budget cost estimates and extrapolating for individual boiler applications.
- Costs are suggestive potential facility costs; and are for initial considerations only.
- EPA's financial assumptions are used as needed.
- **Real cost and applicability determinations must be made on a sight specific basis.**

Refinements to Base Capital Cost Analysis

- CO Upgrade cost - base cost for 250 MMBtu/hr unit is \$3M. For biomass units, need to consider fuel storage and fuel consistency, boiler and combustion controls, steam demand stability. A woodyard upgrade could be \$3MM by itself, so changed CO base upgrade cost for biomass wet stokers to \$6MM.
- For coal stokers, added information on existing NOx controls to the analysis. If CO is >500 ppm and there are no NOx controls, changed base cost to \$5M to account for addition of NOx controls to prevent NOx emissions increase with addition of CO controls.

Operating Cost Analysis

- Tune up cost
 - \$5k for gas and liquid
 - \$10k for any stoker, any biomass, any fluidized bed
 - \$15k for PC
- Energy assessment cost
 - EPA assumed \$75k for facilities in certain NAICS codes. We started with \$75k for facilities that have the highest annual heat input (based on unit design capacity and assumed 55% utilization) and then ratioed that cost down for the other 2 tiers of the energy assessment requirement.
- Annual costs for controls and testing based on combination of EPA analysis and site examples.

Summary of Base Capital Cost Analysis

Fuel	Sum of PM Upgrade Cost	Sum of HCl Upgrade Cost	Sum of Hg Upgrade Cost	Sum of CO Upgrade Cost	Sum of Total Capital Cost
Bagasse	\$0	\$0	\$1M	\$49M	\$50M
Coal	\$1.2B	\$3.3B	\$71M	\$1.0B	\$5.6B
Dry Biomass	\$18M	\$28M	\$5M	\$96M	\$147M
Heavy Liquid	\$1.1B	\$1.4B	\$303M	\$4.9M	\$2.9B
Light Liquid	\$878M	\$1.2B	\$254M	\$0	\$2.3B
Process Gas	\$0	\$28M	\$1M	\$0	\$29M
Wet Biomass	\$865M	\$129M	\$6M	\$102M	\$1.1B
Grand Total	\$4.1B	\$6.1B	\$641M	\$1.3B	\$12.1B

Subcategory / Units	Total #	# No Capital Cost	% No Capital Cost
Biomass Wet Stoker	290	135	47%
Biomass Kiln-Dried Stoker	70	50	71%
Biomass FB	24	18	75%
Biomass Dutch/Pile	15	13	87%
Biomass Suspension Burner	48	45	94%
Biomass Fuel Cell	14	12	86%
Biomass Hybrid Susp/Grat	20	7	35%
Coal pulverized	185	31	17%
Coal stoker	387	10	3%
Coal FB	34	13	38%
Coal FBHE	1	1	100%
Oil - Heavy	295	32	11%
Oil - Light	262	26	10%
Oil non-continental	19	1	5%
Gas2	78	76	97%
	1742	470	27%

Analysis No. 1

- For all coal and liquid boilers, compare cost of controls to cost of new gas-fired package boiler.
- We assumed that biomass units would not fuel switch to natural gas, so we only looked at coal and liquid units.
- \$10MM base cost for 250MMBtu/hr unit, size new unit 3% bigger than existing unit.
- It seems to be more cost effective from a capital cost standpoint for most of the liquid units to make the change, but not as cost effective for most coal units other than Stoker units.

Analysis #1 Results

Category	# of Units	Total Capital BMACT Cost	Number Where New Gas Fired Package Boiler Cheaper	Total Capital BMACT Cost with Replacement Unit If Cheaper	Percent Replaced Instead of Controlled
Coal	607	\$5.6B	381	\$4.6B	63%
FB	34	\$274M	0	\$274M	0%
FB-HE	1	\$ -	0	\$-	0%
PC	185	\$1.7B	73	\$1.5B	39%
Stoker/Other	387	\$3.7B	308	\$2.8B	80%
Heavy Liquid	312	\$2.9B	266	\$1.9B	85%
Light Liquid	264	\$2.3B	239	\$1.5B	91%
Grand Total	1183	\$10.8B	886	\$7.9B	75%

Analysis No. 2

- For liquid, coal stoker, and PC boilers - compare cost of controls to cost to upgrade unit to natural gas firing.
 - base stoker conversion cost \$1.5MM for 250 MMBtu/hr unit,
 - base PC conversion cost \$5MM for 250 MMBtu/hr unit,
 - base liquid conversion cost \$1MM for 250 MMBtu/hr unit,
 - size new unit 3% bigger than existing unit.
- Assumed FB boiler would not convert to gas.
- Assumed Biomass would not convert to gas.
- This seems to be very cost effective across the board, especially for the liquid units and the Stoker units.

Analysis #2 Results

Category	# of Units	Total Capital BMACT Cost	Number of Natural Gas Conversion Cheaper	Total Capital BMACT Cost with NG Conversion if Cheaper	Percent Fuel Switching
Coal	572	\$5.4B	512	\$1.5B	90%
PC	185	\$1.7B	135	\$1.0B	73%
Stoker/Other	387	\$3.7B	377	\$460M	97%
Heavy Liquid	312	\$2.9B	303	\$196M	97%
Light Liquid	264	\$2.3B	264	\$12M	100%
Grand Total	1148	\$10.5B	1079	\$1.8B	94%

Analysis No. 3

- Objective is to compare operating cost of keeping current fuel and installing/operating controls as a coal or liquid unit vs. operating costs as a natural gas unit.
- Fuel cost:
 - coal \$4/MMBtu
 - gas \$4.50/MMBtu if you have gas, \$7.50/MMBtu if you don't
 - light liquid \$22/MMBtu
 - heavy liquid \$17/MMBtu
 - Assumed 55% capacity when calculating annual fuel costs
- Compare the year 1 operating costs - initial tune up, initial energy audit, initial testing, purchase of new monitors, operating cost of control equipment, fuel cost, etc.

Simple Analysis for 2 Unit Site

Cost Item	Coal	Natural Gas at Site	Natural Gas not at Site
Labor	\$2,736,000	\$952,000	\$952,000
APCD Operation	\$1,150,000		
Testing/Monitoring	\$100,000	\$30,000	\$30,000
Fuel	\$8,431,500	\$12,647,250	\$20,235,600
Maintenance	\$2,000,000	\$1,000,000	
Ash disposal	\$200,750		
Total	\$14,618,250	\$14,629,250	\$22,217,600

CIBO Analysis #3 Initial Cost

Category	Count of Units	Total Initial BMACT Cost	Count of Natural Gas Conversion Cheaper	Total Initial BMACT Cost with NG Conversion if Cheaper	Percent Convert to Natural Gas
Coal	572	\$5.5B	516	\$1.5B	90%
PC	185	\$1.7B	139	\$1.05B	75%
Stoker/ Other	387	\$3.7B	377	\$473M	97%
Heavy Liquid	312	\$2.9B	305	\$204M	98%
Light Liquid	264	\$2.35B	264	\$157M	100%
Grand Total	1148	\$10.8	1085	\$1.9B	95%

Includes monitor installation, initial testing, energy assessment, initial tune-up, capital cost of APCD.

CIBO Analysis #3 Annual Cost

Category	# of Units	Total Annualized BMACT Cost	Number With Cheaper Natural Gas Costs	Total Annualized BMACT Cost with NG Conversion if Cheaper	Percent Cheaper to Switch to Natural Gas
Coal	572	\$4.2B	341	\$3.7B	60%
PC	185	\$1.8B	85	\$1.7B	46%
Stoker/ Other	387	\$2.3B	256	\$2.0B	66%
Heavy Liquid	312	\$1.5B	240	\$1.2B	77%
Light Liquid	264	\$1.1B	196	\$923M	74%
Grand Total	1148	\$6.7B	777	\$5.84B	68%

Includes annualized capital costs, annual operating costs, annual fuel cost, annual testing cost.

Summary

- Compliance costs for add-on controls are significant for coal and liquid units.
- Replacement with a natural gas fired package boiler or conversion of the unit to natural gas firing may provide a less costly compliance approach.
- Both capital and annual operating costs should be evaluated to determine which approach to implement.
- Consider importance of fuel flexibility to the site, other environmental requirements (current and future), and future cost and availability of natural gas.

Economic Impacts of Compliance

- 2010 CIBO sponsored IHS Global Insight Report
 - Every billion dollars spent on MACT upgrade and compliance costs will put 16,000 jobs at risk
 - Reduce US GDP by as much as \$1.2 billion.
 - Reduce Taxes Revenues by \$275 million.
- Reconsidered Economic costs of compliance
 - Capital Cost of Compliance for January 2013 Major Source MACT is \$12.1 billion.
 - **This suggests 193,600 Jobs put at risk; a \$14.5 billion in reduced GDP & \$3.3 billion in lost Taxes**

Compliance - 1/31/2016

- **Timeline for decision making**
 - 3/11 - 1/13 Data Collection & Alternatives Consideration
 - 3/12 - 9/13 Alternatives Evaluations
 - 1/31/13 EPA's Reconsidered Final Rule
 - 6/13 - 3/14 Compliance Option Selection
 - 9/13 - 6/14 Permitting & Regulatory Negotiations
 - 9/13 - 6/14 Go-No Go decision & Detailed Engineering
 - 1/14 - 6/14 Equipment Purchase & Final Engineering
 - 3/14 - 9/14 Apply for State Extension if needed
 - 6/14 - 1/16 Construction & Installation
 - 1/31/16 Start-up or Shut-down Operations
 - 1/16 - 3/16 Compliance Testing
 - 1/16 - 1/17 Possible 1 Yr. State Extension

Rule Short Comings

- **ENGO:** Some major potential issues of concern, currently expressed by some as illegal.
 - Work Practice Standards, Fuel Variability Analysis, Sub-categorization, Energy Assessments, Startup / Shutdown, testing frequency, floor setting & emission limits
- **Industry: Major issues of concern.**
 - No CO Work Practice Standard like MATS
 - Improper HCl Fuel Variability/Floor setting analysis
 - Startup/Shutdown not functional
 - Energy Assessments
 - No across sub-category averaging

Potential Litigation Impacts

- Petition notices to courts due April 1, 2013
- Administrative petitions for reconsideration
- Notices for Intervention on behalf of petitioners
- 2 years for the Court to rule, maybe.
- Major questions:
 - Will there be a stay?
 - What will the Court do, Vacate, Remand or Agree with EPA in all or parts
- What can Congress do? Or, Can Congress do anything?

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