Representing the Interests of America's Industrial Energy Users since 1978

Boiler/Process Heater MACT- Subpart DDDDD
EPA Proposed Rule

CIBO-URS-IHS Global Insight Study

EPA Meeting

October 12, 2010

Agenda

- Key CIBO positions on proposed rule
- Major issues that influenced the proposed rule
- CIBO position on how those issues and proposed rule requirements influence compliance
- Cost estimate methodology (URS)
- Economic model methodology (IHS Global Insight)
- Additional discussion of EPA staff comments on the study
- Questions and additional topics

CIBO overarching proposed rule positions

- Gas 1 work practice approach is appropriate
- Need to extend work practice to Gas 2; Distillate Oil
- Some emission limits are unattainable
- SS and M periods must be handled differently
- Health based alternative must be provided for HCl compliance

Floor setting issues

- Data quality
- Use of Detection Level Limited (DLL) data
- Floor unit representativeness of the subcategory
- Pollutant by pollutant approach
- Statistical methodology
- Variability considerations grossly inadequate
- Insufficient use of subcategorization discretion

Data quality

- Errors in reported data in spreadsheets vs. emission test reports
- Errors in test reports/reporting methodology
- Errors in conversions
- Data used for establishing MACT Floors simply must be fully QA/QC'd with errors corrected

Use of DLL data

- Many Hg test results showed M29 fractions below detection limits
  - Inconsistent reporting basis vs. EPA instructions for ICR Phase 2 testing (many used zero instead of DL)
    - Imposes a significant negative bias
- D/F testing showed many results < DL
  - Leads to establishing Floor emission limits on the basis of emissions below the method detection limit
  - Results in subjecting regulated sources to the vagaries of emissions testing protocols and methodologies rather than actual emissions performance
- CO data used when far below method limits based on calibration range

Floor unit representativeness

- Use of units firing unique fuels with low inherent constituent levels creates an arbitrarily low standard
  - Example
    - Boiler firing liquid tetramer byproduct from anhydrides process used as a top performer for liquid Hg, HCl, D/F, PM Floors
      - Extremely low Hg and Cl content with high Btu content
      - In no way representative of a subcategory dominated by fuel oil fired units
        - Plus it suffered from the M29 DLL reporting problem
- Grossly inadequate number of units used to set the MACT Floor- not representative and arbitrary
  - Example- Gas 2: PM- 2; Hg- 1; HCl- 1; D/F- 1
    - Where 199 units listed by EPA (known to be low)
    - Diverse unit designs firing diverse gases

Pollutant by pollutant approach

- Using this approach without proper allowance for real equipment performance injects a severe negative bias to resultant emission limits
- Only 6 boilers with emissions test data showing they can actually meet the 5 existing unit emission limits
  - 5 biomass; 1 coal
  - Many units with applicable controls documented emissions above the proposed limits
  - Considering the number of units with data provided to EPA, this should indicate an obvious problem

Statistical methodology

- EPA's 99% UPL approach is not properly applied
  - UPL methodology relies fundamentally on random samples that are representative of the population
  - EPA identified units for Phase 2 ICR testing based on Phase 1 data indicating they were better/best performers
    - This imposes an inherent bias in the methodology toward top performers and is neither compensated for nor addressed
    - The result is a lower emission rate standard that is not achievable by the population
- Use of <5 units as indicative of a diverse population's performance is neither technically nor statistically supportable

Variability considerations

- Extremely limited approach to consideration of fuel quality variability
  - Excluded use of the most detailed and representative coal quality data
  - Fuel variability not even considered in some cases
- CO emissions variability not considered when setting limits
  - Just used M10 run data, not even the available CEMS data
  - This imposes an extreme hurdle to meet the limit at all times, including SS and M periods

Subcategorization discretion

- Subcategorization can be used to address inherent differences in fuels and unit design
  - Proposed rule does not provide enough latitude
  - Particularly problematic for new units
    - Further subcategorization by fuel type and quality could accommodate location of a new unit anywhere in the US
    - Whereas current approach is based on a single fuel with no fuel quality considerations
  - Proposed new unit limits are simultaneously achieved by NO existing similar unit
    - This indicates it will be even more difficult for units intending to burn available fuels

Impacts of these issues and proposed rule requirements

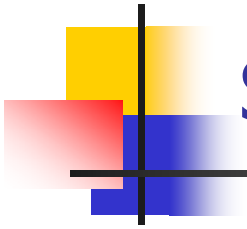
- Regulated entities have NO assurance we can comply with the proposed rule regardless of controls installed
  - Control equipment suppliers will not guarantee emissions to meet the limits under the conditions proposed
  - Fuel quality is known to vary greatly- not controllable
  - Monitoring and testing limitations & variability vs. limits
- This imposes an untenable risk position
  - Compliance, investment, cost, operations assurance

Problems can be addressed by EPA

- CIBO believes that EPA can correct problems associated with the proposed rules within their defensible discretion
- The final rule can be crafted to incorporate needed latitude and flexibility to provide
  - Assurance of compliance
  - Ability to utilize optimum fuels
  - Lower control costs
  - Ability to continue operations and maintain jobs
  - While still maintaining health protection

How do the problems impact the study?

- CIBO evaluated the rule AS PROPOSED
- No latitude for marginal controls
  - Must assume best control technology
- Cannot assume fuel switching
  - EPA correctly concluded fuel switching is not a control technology
  - Emission limits provide no latitude for incremental fuel quality changes
  - Only use of Gas 1 could ensure compliance
    - But that capability is unknown based on database



Study cost estimate methodology

Scenarios evaluated

- Scenario 1
  - Costs for the rule as proposed for units ≥ 10MMBtu/hr
- Scenario 2
  - Maximum potential cost reduction from Scenario 1 that could be achieved if all units could utilize a health based alternative in lieu of installing/upgrading scrubbing for HCl
- Scenario 3
  - Maximum potential control cost for Gas 1 units if work practice was not promulgated, but rather emission limits were promulgated as discussed in the FR notice

How was the cost estimate done?

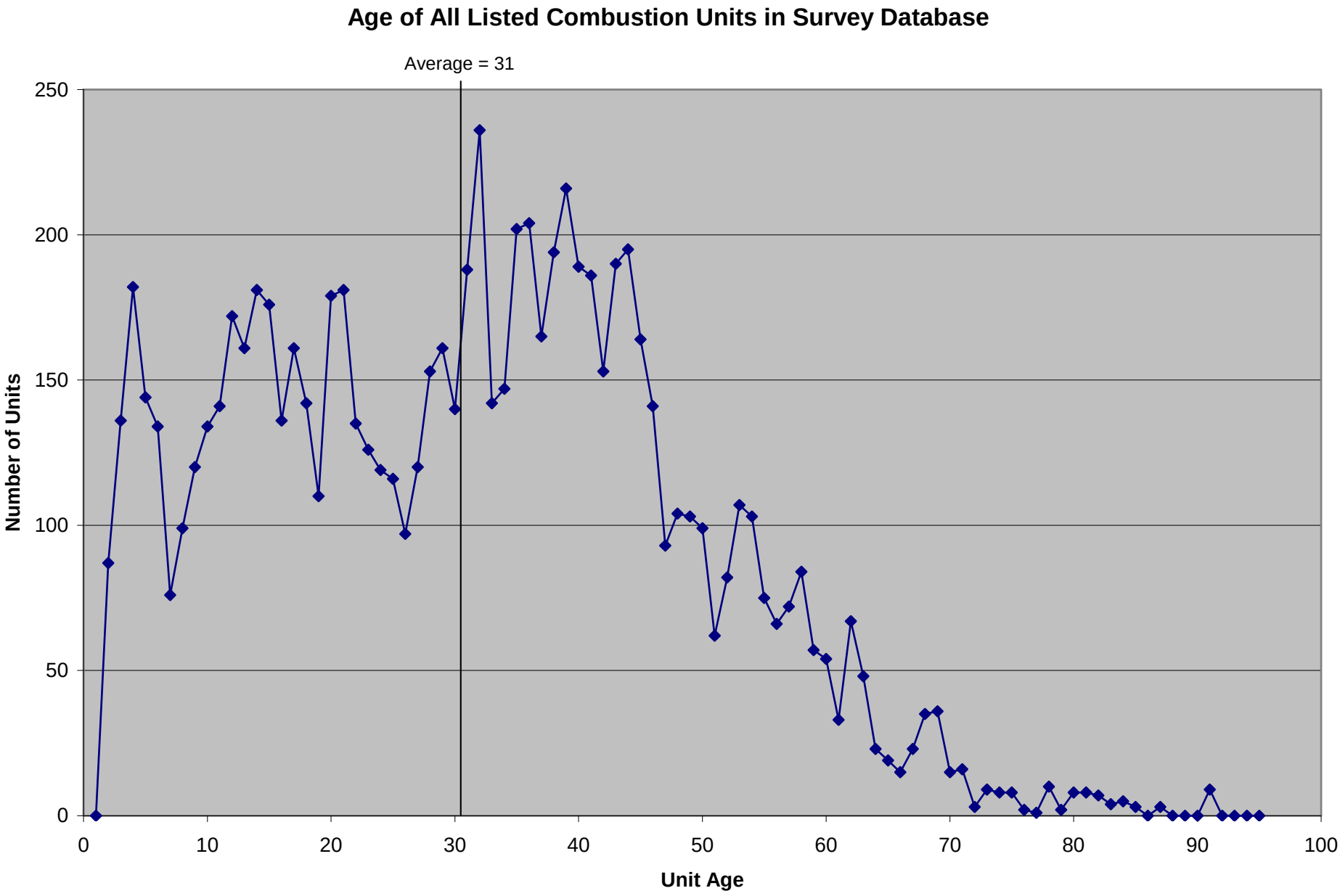
- EPA inventory database included:
  - Unit fuel type
  - Design heat input
  - Existing emissions controls
  - Emissions data for some units
- Assumed installation of controls identified by EPA as being required to meet the floor limits if emissions for listed units did not meet the limits
  - Despite our belief that some units still cannot meet the limits even with these controls
    - PM — FF or ESP
    - Hg; D/F — ACI (with FF or ESP)
    - HCl — Acid gas scrubber
    - CO — Combustion/fuel feed improvements or CO catalyst

Cost estimate basis

- Up front capital costs only
- Lower cost incremental improvements where existing controls were installed and emissions > limits
- No ongoing O&M costs, e.g.,
  - No additional energy cost penalty or waste disposal cost
  - No sorbent cost
- No incremental increase in fuel cost since fuel switching to gas not considered
  - Note that increased cost of gas typically prevents economic justification of fuel switching

Capital cost estimate basis

- Published reports
- Specific project costs
- EPA reports or control device fact sheets
- Actual BACT or BART analyses
- Note that control costs are considered reasonable
  - Median costs used
  - Costs are < more detailed estimates for specific units
  - Costs were not escalated to future years
  - Combustion unit replacement not addressed- much higher $
    - Some units would be replaced/shut down
      - However, average age is not excessive



Based on list of units with installation date in "Unit Design/Operation" Table in EPA Access Database- not corrected for multiple units

Scenario 1 & 2 unit summary for proposed rule cost estimate

Limited to units ≥10MMBtu/hr (average- 216MMBtu/hr)

Combustor Type	# of Units
Boilers	1599
Process Heaters	220
Total Units	1819

Subcategory	# of Units
Coal	601
Biomass	434
Liquid	591
Gas 2	193

# of Units with Control Cost	
PM	1570
HCl	1631
Hg; D/F	1713
CO	1348

Base case cost estimate

- Based on 250MMBtu/hr heat input unit
  - Fabric filter $7MM
  - Wet scrubber $8MM
  - Scrubber/FF/ESP upgrade $4MM
- Approximate cost based on heat input using 0.6 factor for FF/ESP/scrubber costs
  - Example- 100MMBtu/hr boiler scrubber cost
    - $8MM * (100/250)^0.6 = $4.6MM
- Fixed cost for Activated Carbon Injection/CO controls
  - ACI for Hg; D/F $1MM
  - Combustion/fuel feed/other improvements or catalyst for CO $2MM

Scenario 1 cost estimate summary

Control	EPA Capital Cost	CIBO/URS Capital Cost
HCl controls	$3.3 billion	$9.3 billion (1)
PM controls	$6.1 billion	$7.0 billion
CO controls	$13.9 million	$2.7 billion
ACI for Hg; D/F control	$9.5 million	$1.7 billion
Total capital cost	$9.5 billion	$20.7 billion

(1) HCl control cost provides the basis for Scenario 2

Scenario 3 unit summary for cost estimate

All Units	
Combustor Type	# of Units
Boilers	6441
Process Heaters	5091
Total Units	11,532
Average heat input	41 MMBtu/hr

Units ≥ 10MMBtu/hr	
Combustor Type	# of Units
Boilers	2238
Process Heaters	2150
Total Units	4388
Average heat input	101 MMBtu/hr

Scenario 3 cost estimate summary Gas 1 units

Control	EPA Capital Cost	CIBO/URS Capital Cost (all units)	CIBO/URS Capital Cost (only units ≥10MMBtu/hr)
HCl controls	$3.1 billion	$23.2 billion	$17.8 billion
PM controls	$11.5 billion	$19.6 billion	$14.8 billion
CO controls	$3.5 million	$5.8 billion	$4.4 billion
ACI for Hg; D/F control	$32 million	$2.9 billion	$2.2 billion
Total capital cost	$14.6 billion	$51.5 billion	$39.3 billion

CIBO/URS vs. EPA cost differences (1 of 4)

- Source of cost data
  - EPA- outdated Control Cost Manual
  - CIBO/URS- more recent actual vendor estimates, project costs, BACT/BART analyses, industry control cost studies
- CO catalyst cost
  - CIBO/URS supplier quote 4x EPA 1998 Control Cost Manual cost which was based on VOC control, not CO
- CO compliance
  - EPA assumed tune-up or lower cost burner replacement to meet CO limits
  - CIBO/URS believes more costly additional controls, fuel feed improvements, or CO catalyst will be required to meet the proposed limits at all times based on experience

CIBO/URS vs. EPA cost differences (2 of 4)

- Hg compliance
  - EPA estimated ACI for only 155 units believing fabric filters alone would control Hg except where emissions were > Hg limit with existing FF
  - CIBO/URS believes FF alone will not meet the Hg limit based on experience and knowledge of high fuel Hg variability
    - Many units in database with FF show Hg emissions > Hg limit
  - EPA cost per ACI system appears to be ~$60,000 ($9.5MM for 155 units)
  - CIBO/URS believes full scale systems will be much higher cost based on experience with similar projects
    - Assumed $1MM per unit with no scaling by heat input since basic systems need similar components

CIBO/URS vs. EPA cost differences (3 of 4)

- PM compliance
  - EPA assumed ESP would be installed unless existing FF
  - CIBO/URS believes a FF would be chosen for improved control of acid gas, Hg, D/F emissions
    - ACI rate is 4x higher with downstream ESP vs. FF
- HCl compliance
  - EPA assumed costs for use of packed bed scrubbers
  - CIBO/URS believes that technology is generally not appropriate for most ICI boiler/process heater applications
    - Sources more likely to use wet, dry, or semi-dry scrubbers
    - Some facilities have zero discharge requirements
      - Any type of wet product stream is problematic
    - Costs for waste disposal facilities not considered

CIBO/URS vs. EPA cost differences (4 of 4)

- Dioxin/Furan compliance
  - Per EPA cost methodology memo, Option 4E (proposed rule) references Option 2E
    - Did not estimate ACI for units exceeding MACT Floor for D/F
    - Estimated that most units will be below detection levels without installing any additional control devices
  - CIBO/URS believes this is an illogical assumption
    - EPA has no established procedures for handling non-detects
    - Database includes units indicating ND with emissions > limit
  - Very limited data available, e.g., number of units used for Floor
    - Cannot identify conditions conducive to D/F formation for various unit designs and fuels
    - Cannot identify controls that would be effective to proposed limits
  - Can only conclude ACI would be needed for all units for estimating purposes

Economic model methodology (IHS Global Insight)

General methodology

- Use IMPLAN model for entire US economy to quantify economic impact
- Determine impact on 5 primary areas of economic activity as a consequence of complying with the proposed standards
  - Employment
    - Number of jobs potentially "at risk" of being eliminated
  - Labor Income
    - Employee compensation potentially forfeited
  - Value Added
    - Economic contribution to the US Gross Domestic Product that could be affected
  - Industry Output
    - Industry sales lost as affected sources either shutter plants or attempt to pass the costs on to their customers
  - Tax Implications
    - Potential loss of federal as well as state and local tax receipts

Levels of economic impact

- Direct impact
  - Impact to affected sources for upgrading emissions controls
- Indirect impact
  - Impact on supply chains of the direct industries
- Induced impact
  - Impact on economic activity attributable to spending by employees of direct and indirect industries

Scenario 1 results

Summary of Economic Impact of Scenario 1				
	Direct	Indirect	Induced	Total
Employment	69,934	157,824	109,944	337,702
Labor Income	$3.6B	$6.4B	$5.2B	$15.2B
Value Added	$4.4B	$11.7B	$9.1B	$25.2B
Output	$20.7B	$29.5B	$17.2B	$67.4B
Taxes				$5.7B

Source: Results generated by IHS Global Insight from IMPLAN model

- Potential impacts of Boiler MACT rule as proposed
- Costs distributed across 24 industry subsectors
  - Upgrade expenditures subtracted from output of each subsector and used as inputs to IMPLAN model

Scenario 2 results

Summary of Economic Impact of Scenario 2				
	Direct	Indirect	Induced	Total
Employment	31,639	71,246	49,668	152,552
Labor Income	$1.6B	$2.9B	$2.3B	$6.9B
Value Added	$2.0B	$5.2B	$4.1B	$11.4B
Output	$9.3B	$13.3B	$7.8B	$30.4B
Taxes				$2.6B

Source: Results generated by IHS Global Insight from IMPLAN model

- Maximum potential impacts that could be avoided with use of health-based alternative for HCl to avoid scrubbing costs
- Costs distributed across 24 industry subsectors
  - Upgrade expenditures subtracted from output of each subsector and used as inputs to IMPLAN model

Scenario 3 results

Summary of Economic Impact of Scenario 3				
	Direct	Indirect	Induced	Total
Employment	181,099	341,800	275,351	798,250
Labor Income	$8.5B	$16.6B	$12.9B	$38.0B
Value Added	$11.1B	$29.3B	$22.9B	$63.3B
Output	$51.5B	$77.9B	$43.0B	$172.5B
Taxes				$14.3B

Source: Results generated by IHS Global Insight from IMPLAN model

- Maximum potential impacts if Gas 1 limits imposed on all units
- Costs distributed across 26 industry subsectors
  - Upgrade expenditures subtracted from output of each subsector and used as inputs to IMPLAN model

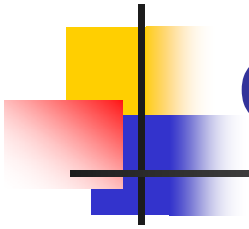
Scenario 3 limited scope impacts

- Simple factored impacts if Gas 1 limits restricted to units ≥10MMBtu/hr
- Ratio with direct cost $39.3B vs. $51.5B for all units

	Direct	Indirect	Induced	Total
Employment	138,198	260,830	210,122	609,150
Labor income	$6.5B	$12.7B	$9.8B	$29.0B
Value added	$8.5B	$22.4B	$17.5B	$48.3B
Output	$39.3B	$59.4B	$32.8B	$131.6B
Taxes				$10.9B

Further discussion of EPA staff comments on the study

- General observations
- Detailed comments
- Further discussion



General observations

Study is limited in scope

- As the study states, this presents potential (maximum) economic impacts and jobs at risk
  - As noted, while some entities may be able to pass through increased costs, there will be downstream and upstream impacts due to those increased costs
  - It is not feasible in a limited study of this type to determine and model actions by each individual affected source
    - Decisions relative to new regulatory requirements are typically made on a business/facility/unit basis so that gross assumptions of likely reactions are unfounded and likely erroneous
    - Significant assumptions would need to be made on the market response, and on each company's ability to acquire and absorb the financing costs
- AF&PA used detailed analysis of mill economic viability and derived very similar impacts for that segment

Study does not look at potential job increases such as for O&M of pollution control devices, work practices, and production methods that could increase labor; or jobs at equipment suppliers

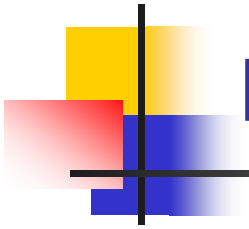
- It is correct that specific estimates of jobs associated with those efforts were not quantified; the study clearly states what was/was not analyzed
- This is not considered a deficiency because:
  - Some facilities would not increase employment to cover additional equipment, but rather just spread the work over the existing workforce
  - Where significant emissions control investment does require additional job assignments, typical industry experience indicates investments in manufacturing assets produce 2-5x as many direct full time jobs as those associated with pollution control investments
    - That would be further multiplied by indirect and induced effects
  - Modeled impacts are based on long term economic impacts and employment whereas jobs associated with emissions control equipment manufacture/installation are short term when associated with that regulatory program
  - Industrial practice would generally not change toward methodology that requires increased labor, but rather almost universally move toward decreased labor requirements and increased automation (unless moving production to a country with lower labor costs is considered)
  - A key point is the potential economic and jobs impact associated with those combustion units and associated facilities that are shut down
    - Old units generally will not justify emissions controls investment

Cost estimate is > 2x EPA capital cost

- Cost estimate differences and the basis for CIBO/URS costs were explained in prior slides

Interpretation of the results seems meager and potentially misleading

- An Executive Summary is a summary- not all conditions and qualifications are included- need to read the report
- It is clearly stated that these are "potential" impacts and identification of "jobs at risk" at the facilities directly impacted with their associated indirect and induced impacts
  - Obviously we would model maximum potential impacts to provide the expected upper bound
- Regarding time frame for employment impacts-
  - Regulatory requirement impacts are forced into the period prior to the compliance date- 3 years from final MACT promulgation plus 1 year extension if needed
    - Therefore, decisions and changes would be within that time period
    - But once combustion units/associated facilities are shut down and jobs eliminated, the impacts continue long term
  - Evaluating impacts on annualized basis requires inclusion of all annualized costs- much more intricate modeling required and outside CIBO's financial capabilities



Detailed comments

1. Costing assumptions lead to an overestimate of capital cost

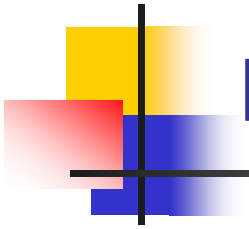
- First- EPA applied emission factors to units without emissions data vs. CIBO/URS approach
  - A bold EPA assumption since most units did not have adequate fuel quality data to make those estimates and many units with controls had emissions > proposed limits
    - CIBO/URS believes this EPA approach understates costs
  - CIBO/URS applied control costs as explained based on fuel type, existing controls, and emissions data if known
- Second- CO controls- explained previously- we disagree that proposed CO limits can be achieved at all times without additional investment based on knowledge of equipment operation

1. Costing assumptions lead to an overestimate of capital cost

- Third- Hg & D/F- CIBO assumed ACI even though none of the best performing units were using ACI
  - EPA states ACI would be control for D/F emissions
  - EPA provides no understanding of conditions leading to D/F emissions nor methods for control other than ACI
  - Serious DL issue for D/F emissions compliance
- Finally- CIBO/URS assumed a more complex scrubbing system vs. EPA "simple wet scrubber"
  - Discussed previously- EPA basis generally not applicable to industrial size units
  - Wet scrubber discharge also presents disposal/cost issues
- EPA's $9.5B capital cost factored for Scenario 1 would be 154,984 jobs at risk
  - CIBO believes this to also be unacceptably high

2. The way capital cost is used with the model is inappropriate

- The assumption that capital expenditures equal product loss is not the best way to use the model
  - The methodology chosen is a simplification of the range of potential outcomes, but analyzing and accurately calculating real world outcomes of price changes and market responses would be an extremely involved exercise, where numerous uncertainties would remain.
    - That doesn't include those companies who either could not acquire financing or could not afford it.
    - The timeframe for the analysis was very tight, necessitating a focused and uniform methodology.
  - A more detailed analysis (beyond time and resource restrictions) would need an understanding of the exact elasticity for each market segment, thereby determining exactly what level of costs could be passed on without impacting output.
  - Then, the remaining level of cost increase borne by each industry would need to be broken out from a financing/profit point of view, requiring even more time and analysis.
  - The last aspect would be modeling the resulting impact on the rest of the economy- what those increased costs passed on to consumers would mean.



Further discussion

1. EPA would like to see detailed costs study by URS

- A pdf of the URS developed Excel spreadsheet for costs associated with Scenarios 1 and 2 was already provided as Appendix A of the ACC Boiler MACT comments

2. EPA would like to discuss other methods of using upgrade costs with IMPLAN

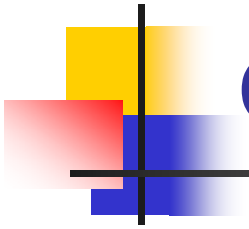
- Methodologies to reflect market outcomes for producer and consumer response- Part 1
  - As mentioned previously, AF&PA model by Fisher International provided similar levels of impact for that sector using a more detailed analytical approach
  - For the market outcomes, we've previously discussed some of the top level information needed to get into this level of analysis.
  - From an IMPLAN point of view, the first assumption would be on borrowing costs, and if all firms could assume it. The AF&PA study addressed that for one market segment. If the assumption was made that all firms could afford those costs, that provides the annual cost associated with borrowing.
  - An assumption would need to be made for the level of costs that could be passed on without impacting demand; and an assumption that passed-on costs could be pulled from the annual borrowing costs, leaving the annual industry-level impact.
    - Then that increased cost to consumers would need to be allocated to lower demand across the rest of the economy, as it is assumed consumers have a fixed amount of money to spend. That increase in revenue would be constrained to the impacted industries since it wouldn't result in increased employment or income. That negative impact to consumer demand could be allocated uniformly to all other industries, or could be selectively applied to those discretionary industries most likely impacted.
    - The result from this analysis would be a macro employment drop resulting from lower demand in other industries due to reallocated consumer spending.

2. EPA would like to discuss other methods of using upgrade costs with IMPLAN

- Methodologies to reflect market outcomes for producer and consumer response- Part 2
  - The second part is to model the remaining increased costs on the impacted industries.
    - As the AF&PA study analyzed, a segment of the market would not be able to afford the cost increases, either to just upgrade or because it would require them to replace existing systems. This output would need to be removed from the market and an assumption would need to be made on what would be absorbed by competitors vs. what would be outsourced to non-US suppliers. The resulting total drop in output would be modeled as previously done.
    - An additional drop in output would need to be estimated based on those firms that were able to acquire financing for the upgrades, but need to pass that cost along to customers who would no longer support those increases, resulting in the drop in output previously modeled.
    - The final market segment would be those companies who could acquire financing and carry and manage those costs through normal operating procedures, resulting in only a profit/shareholder impact. For each IMPLAN sector, the proprietor income would be reduced accordingly and the resulting impact would be incorporated.

2. EPA would like to discuss other methods of using upgrade costs with IMPLAN

- How model increased manufacture of pollution control equipment within IMPLAN?
  - If the control equipment costs could be broken out by component, and tied to either each boiler or just total figures by component, then a very similar analysis could be run to look at that other side of the ledger.
  - These costs would also have to be broken out into those that are one-time capital purchases and those that would be on-going increased operational costs for the operators.



Questions and additional topics