NACAA
national association of clean air agencies

EPA'S PROPOSED REGULATIONS ON HAZARDOUS AIR POLLUTANTS FROM BOILERS

A Critique of Exaggerated Industry Cost Estimates

Prepared by the
National Association of Clean Air Agencies
December 8, 2010

444 North Capitol Street, NW • Suite 307 • Washington, DC 20001 • phone 202.624.7864 • fax 202.624.7863 • www.4cleanair.org

EXECUTIVE SUMMARY

The National Association of Clean Air Agencies[1] ("NACAA") has critiqued an analysis by the Council of Industrial Boiler Operators ("CIBO")[2] of the potential economic impacts of EPA's proposed emission limitations for industrial, commercial and institutional boilers ("ICI Boilers") and solid waste combustion units ("CISWI") (jointly referred to as the "Boiler MACT") prepared by itself and IHS Global Insight ("IHS")[3]. EPA's April 29, 2010 proposal would require operators of ICI Boilers to substantially reduce emissions of hazardous air pollutants ("HAPs") such as cadmium, chromium, mercury and other metals, hydrochloric and other acids, organic compounds such as benzene and acetaldehyde, dioxins and furans.

The CIBO/IHS report concludes that the EPA proposed rules will cost a total of $20.7 billion and that this expenditure will cause $113.5 billion in adverse economic effects and put 337,703 jobs "at risk". These estimates are far higher than those prepared by EPA and its contractors, RTI International[4] and Kapur Energy, Environment and Economics Consulting ("EPA/RTI analysis"), which concluded that the capital cost of EPA's proposals (to be amortized over the life of the capital improvements) is $9.5 billion[5] and that the health benefits of the proposed rule in the first year of full implementation (2013) would be $17 billion to $41 billion. The EPA/RTI analysis concludes that the rule has a positive cost benefit to the public of between $5 and $12 for each dollar spent and that the long-term net employment effect of the proposed rules could range between 4,000 job losses to 9,000 job gains.

NACAA's review concludes that the extraordinarily high CIBO/IHS estimates result from the use of "beyond worst case" assumptions and a failure to consider factors that offset costs. We focus on five major defects in the CIBO/IHS analysis.

---

[1] NACAA is an association of air pollution control agencies in 52 states and territories and over 165 major metropolitan areas across the United States. NACAA's mission is to encourage the exchange of information among state and local air pollution control officials, to enhance communication and cooperation among federal, state, and local regulatory agencies and to promote good management of the nation's air resources.

[2] *The Economic Impact of Proposed EPA Boiler/Process Heater MACT Rule on Industrial, Commercial and Institutional Boiler and Process Heater Operators, IHS Global Insight,* 2010 ("CIBO/IHS Report"). See, http://www.cibo.org/pubs/boilermact_jobsstudy.pdf.

[3] IHS developed its estimate of the indirect economic impacts of the proposed rules based on cost estimates developed by CIBO and its contractor URS.

[4] RTI is a well-respected firm with a large base of government and private clients. See, http://www.rti.org/page.cfm/Clients_and_Funding_Agencies.

[5] RTI International and Kapur Energy, Environment and Economics Consulting (2010), *Regulatory Impact Analysis: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial and Institutional Boilers and Process Heaters*, ("RIA"). This estimate increases to $15.8 billion when controls for natural gas-fired units are included.

(1) The CIBO/IHS estimate of the number of sources that must be controlled is grossly in error. Stack test data show that a substantial number of sources already meet EPA's proposed limits and that many more sources are close to meeting those limits. Rather than employing standard statistical techniques to estimate the number of sources that must add controls, CIBO/IHS assumes that all sources that have not yet been stack tested must install the most expensive set of available control technologies. In addition, the CIBO/IHS report fails to consider the use of combustion efficiency improvements or cleaner fuels as likely compliance options for many sources, especially those sources that combust natural gas.

(2) The CIBO/IHS report does not include the positive economic benefits associated with new capital investment in existing facilities. The sums expended for construction, installation and operation of additional pollution controls will create tens of thousands of new jobs for U.S. companies. The direct, indirect and induced economic benefits associated with these new jobs will more than offset the costs to the regulated community.

(3) The CIBO/IHS report does not include the increase in life expectancy, reduction in health care costs and reduction in lost work days associated with the rule in its calculation of society-wide impacts of the rule. Major studies that have considered these factors conclude that air pollution regulation has had a positive effect on the economy and that environmental regulation has not led to a statistically significant number of layoffs within the affected industries.

(4) The CIBO/IHS report treats "one-time" project costs as recurring expenses. However, the capital construction for pollution controls required by the rules is a largely "one-time" obligation that will not need to be made again each year under the EPA rule. This error alone increases the estimated adverse economic impact by an order of magnitude.

(5) The CIBO/IHS report's assumption that each dollar invested in pollution controls reduces plant output by a similar amount is not likely to be correct under current economic conditions. CIBO/IHS assumes that each dollar invested in pollution controls reduces plant output by a similar amount. However, currently most firms subject to the proposed rules have significant unused manufacturing capacity and in today's market manufacturers may be unable or unwilling to pass the cost of pollution controls on to consumers.

There is no dispute that the proposed regulations, if adopted, will require several billions of dollars of capital construction over the next three years. This investment in our manufacturing infrastructure is affordable and will generate on the order of 40,000 FTE[6] in engineering and construction jobs over the short term and several thousand new jobs *within the affected industries* to operate and maintain the new capital equipment. These new jobs will themselves create additional indirect and induced employment. The CIBO/IHS report does not dispute these facts; it simply ignores them and provides an estimate of *other* costs and job losses based on unidentified, untested and unjustified

[6] "Full time equivalent" jobs – one person working full time on a project for one year.

assumptions. On balance, it seems clear that the proposed rules, if adopted, would lead to a substantial number of new jobs over the next several years.

INTRODUCTION

Section 112 of the Clean Air Act ("CAA") requires EPA to issue National Emission Standards for Hazardous Air Pollutants ("NESHAP") for major sources that emit significant amounts of any of the 187 specified "hazardous air pollutants" in accordance with a congressionally mandated schedule. The current statutory scheme relies, at least initially,[7] on technology-based limits and on a simple mathematical formula to establish minimum emission limitations for toxic air pollutants, rather than the risk-based approach that had proven to be impossible for EPA to implement.[8] Under this approach the NESHAP for a sector is to be based on application of the Maximum Achievable Control Technology ("MACT"), but may not be less stringent than the level achieved by the average of the best performing 12 percent of similar units ("the MACT floor"). EPA has employed this formula to promulgate over 100 standards, covering a broad range of industrial sectors from aerospace to wool fiberglass manufacturing.[9]

EPA promulgated a Boiler MACT rule in September, 2004 that would have established emission limitations for existing major sources of HAPs. However, in 2007 the U.S. Court of Appeals issued a decision that overturned EPA's definition of "solid waste" under section 129 of the CAA. Because sources that combust solid wastes are regulated under section 129 (rather than section 112), they may not be included in the group of sources that makes up the "best performing 12 percent" of a MACT category under section 112. Thus, the rejection of EPA's definition of solid waste led to the vacatur of the 2004 Boiler MACT rule. Importantly, at about the same time, the methodology used by EPA in calculating the MACT floor was determined to be unlawful in cases involving NESHAPs for the plywood and brick manufacturing sectors. The revised EPA proposal reflects the change in the composition of the category to be regulated because of the proposed change in the definition of solid waste and the direction of the court concerning the method to be used to calculate the emission levels achieved by the "best performing 12 percent" of the category.

In those instances where EPA has failed to issue a NESHAP in accordance with the schedule provided under the Clean Air Act, state and local permitting authorities must issue MACT limits on a case-by-case basis, pursuant to section 112(j) of the Act. The decision of the Court of Appeals to vacate, rather than remand, the 2004 Boiler MACT rule triggered this obligation with respect to several thousand ICI Boilers[10]. To assist

[7] EPA is to consider additional, more stringent standards based on risk and may delete pollutants from the list if it determines that no source within the category emits hazardous air pollutants at a level that will cause a lifetime excess cancer risk of one in one million or exceeds an established "no adverse effect level."
[8] Prior to the 1990 amendments, the CAA mandated the issuance of NESHAPs based on a determination of risk. EPA was unable to resolve issues associated with risk identification and management over a period of 20 years and failed to effectively regulate emissions of carcinogenic and highly toxic hazardous air pollutants on the basis of risk.
[9] See, http://www.epa.gov/ttn/atw/mactfnlalph.html.
[10] It should be noted that, while the proposed rules will affect large numbers of boilers and will have a

state and local permitting authorities in managing the potentially significant workload of this obligation, NACAA collected existing stack test data for ICI Boilers and in 2008 developed a model ICI Boiler MACT Permit.[11] This effort provided a far more comprehensive emissions data set than had been employed by EPA in the past and demonstrated that ICI Boilers were capable of far better emissions performance than had been previously understood. EPA then embarked on an additional data collection effort, the results of which formed the basis of the proposed rules. Based in part on its experience in developing the model ICI Boiler Permit, NACAA has provided significant comment to EPA concerning EPA's proposed data-gathering effort[12] as well as EPA's proposed Boiler MACT rules.[13]

ANALYSIS: ISSUES WITH RESPECT TO THE CIBO/IHS ESTIMATE

Pre-regulation estimates by industry sources have historically overstated the cost of compliance with proposed regulations, often by substantial amounts. One commonly referenced example is the pre-adoption estimate of the cost of the Acid Rain control program under Title IV of the 1990 Clean Air Act ("CAA"), which the Edison Electric Institute ("EEI") estimated at costing $7.5 billion per year, approximately six times the actual cost of the program. EEI also incorrectly estimated that this program would lead to large increases in retail electric rates, which have in fact been reduced since the implementation of this program. Numerous other examples of industry overestimates can be found in the record, from estimates of the cost of catalytic converters and air bags in cars to the cost of removing lead additives from gasoline or ozone depleting substances from air conditioners to the estimates of an enormous adverse impact of the 1997 National Ambient Air Quality Standards ("NAAQS").

In contrast to the numerous occasions where economic disasters were predicted by those potentially affected by a proposed regulation, but did not occur, CIBO/IHS is not able to cite an EPA rule in the now 40-year history of the CAA where a catastrophic unintended impact on a regulated industry has occurred. It should be anticipated that EPA will monitor the implementation of these proposed rules, as it has in the past, and will act to remedy specific problems in the highly unlikely event that the undocumented CIBO/IHS predictions of extreme cost and/or impossibility are demonstrated during the multi-year implementation phase.

CIBO/IHS suggests that its analysis must be correct because the analysis employs the IMPLAN input-output modeling tool[14] to track the impact of changes in demand through different economic sectors. However, EPA/RTI also used standard input-output

---

significant impact on public health, these rules are smaller in scope, impact and cost than earlier EPA rules, such as the lead abatement rules, the NO_x SIP call and the Acid Rain program. None of those rules had an adverse economic impact remotely resembling that predicted by CIBO/IHS.

[11] See, http://www.4cleanair.org/Documents/RHAP.pdf.

[12] See, http://www.4cleanair.org/documents/Datacollectioncomments12909.pdf.

[13] See, http://members.4cleanair.org/rc_files/5043/Boiler-CISWI%20comments-08-23-2010.pdf.

[14] "IMPLAN", the "Impact Analysis for Planning," model is a widely used, commercially available model for economic input/output analysis.

modeling tools in its assessment of the potential economic impacts of the proposal and computed a markedly different result.[15] Thus, the usefulness of the CIBO/IHS report is not governed by the choice of modeling tool employed, but by the reasonableness of the input assumptions chosen and level of support provided by CIBO/IHS for those assumptions. As set out below, the CIBO/IHS report employs a number of incorrect and/or unsupported assumptions. As a consequence the CIBO/IHS report greatly overstates the adverse economic impact of the proposed rules and does not inform the examination of the costs and benefits of these rules in a meaningful or credible way.

(1) The CIBO/IHS estimate of the number of sources that must be controlled is grossly in error[16].

The CIBO/IHS estimate of the direct cost of the rule is $20.7 billion – twice EPA's estimate. This estimate increases to $81.7 billion when controls on natural gas-fired units are included (five times EPA's estimate of $15.8 billion).[17] The NACAA and EPA data sets each reveal a continuum of emissions performance where there are substantial numbers of units whose emissions are within 10 to 40 percent of the proposed standard and a number of units that can be classified as "extremely high emitters." It is very unlikely that every boiler whose emissions have been measured to be above the standard, or whose emissions have not yet been measured, will be forced to employ the full suite of pollution controls that might be needed by the "very high emitters." Instead, for units whose emissions are near the proposed limits, it should be anticipated that minor changes, such as blending in small amounts of clean fuel, will suffice in lieu of major capital projects. For example, the dramatically reduced costs of the Title IV program are generally attributed to "fuel switching" as a control technique. There is no reason to believe that clean fuels will not be an important part of the Boiler MACT compliance regime.

The two figures that follow illustrate three points:

(1) EPA has employed very large "variability factors" to generate proposed limits that are often quite lenient under the statutory scheme;

(2) there is a continuum of emission levels within the existing fleet. Contrary to the CIBO estimate, many sources will not need to apply the most effective control levels, but may comply by use of less expensive techniques; and

(3) the CIBO assumption that all units for which there are no data will need to apply the full suite of MACT controls leads to a substantial overestimation of direct costs.

[15] As discussed below, in examining the overall economic impact of the CAA, IEc employed a more robust modeling tool, the Economic Model for Policy Analysis (EMPAX-CGE).

[16] CIBO has also used nonstandard estimates of the unit costs for controls, asserting that it has access to confidential pricing information that is more accurate than that in the open literature. This information is not provided in the CIBO/IHS report.

[17] EPA has not proposed to require such controls, but has solicited comment on whether it must..

Figure 1. Carbon Monoxide Emissions from Pulverized Coal-fired Boilers

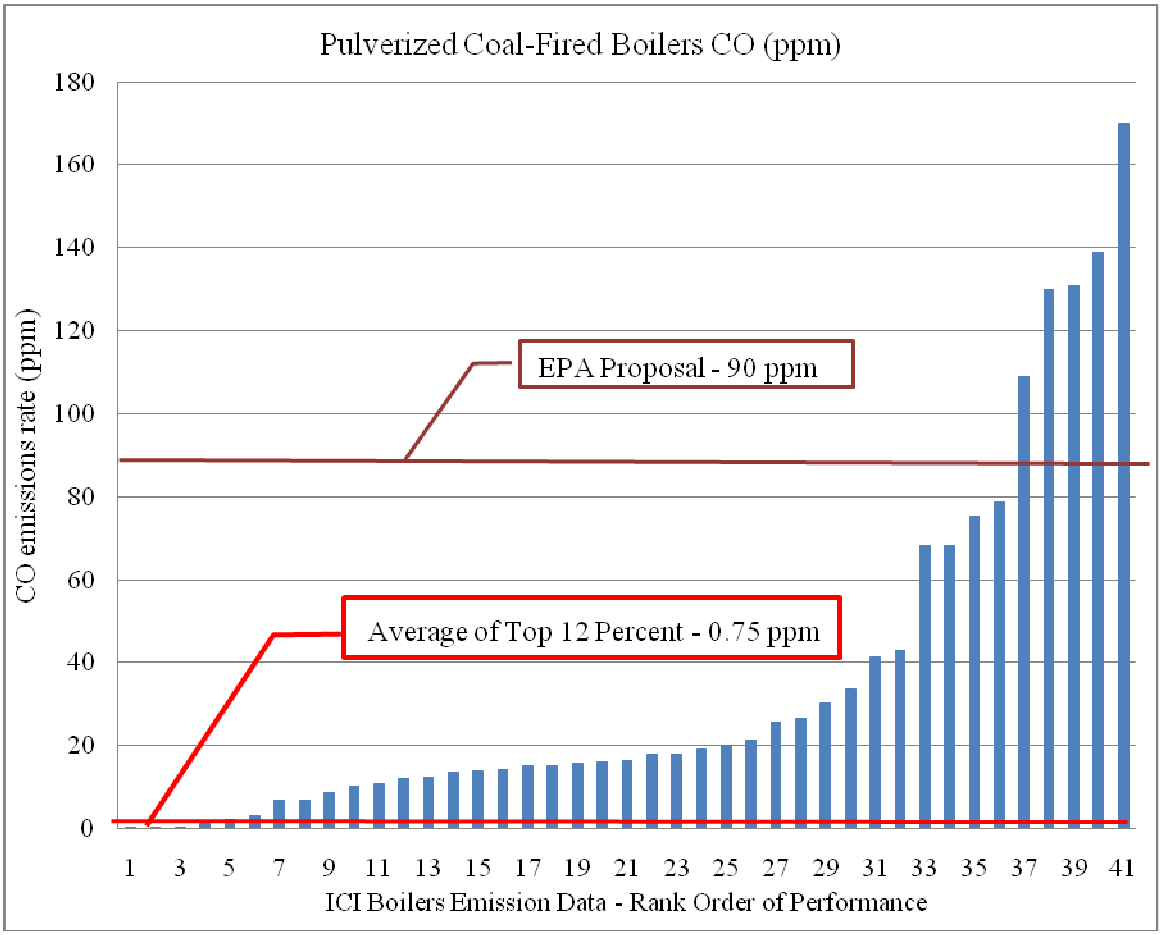

Figure 1 includes all the tested carbon monoxide ("CO") emission levels for pulverized coal-fired boilers in the EPA database for that subcategory. In this subcategory the arithmetic average of the test results for the best performing 12 percent is less than 1 ppm. By applying a series of "variability factors" (including some questionable factors), EPA inflates the average of the best performing 12 percent and proposes a standard of 90 ppm. The result is that 87 percent of units for which EPA has data already meet the proposed limit of 90 ppm for CO – clearly a lenient standard. There are a total of 187 units in the subcategory. The CIBO/IHS estimate assumes that none of the 146 units in the subcategory that have not been tested will meet the proposed limit and that each unit will require substantial capital expenditures to meet the proposed limit. For this reason CIBO/IHS assumes that the rule will impose capital costs for CO catalysts or new burners for 151 of the 187 units in this subcategory. However, since EPA has robust data for almost 25 percent of the units in the subcategory, a more reasonable assumption is that the emissions profile of the "unknown" universe of sources is similar to that of the "known" universe. Thus, the more reasonable estimate is that 25 -

50[18] of the units in the subcategory – not 151 – will need to reduce emissions.[19] Moreover, especially for pulverized coal sources, combustion efficiency improvements are a far more likely means of compliance than CO catalysts. Thus, the CIBO/IHS "worst case" estimate for direct cost for this item is several times higher than would be anticipated based on the existing data.

Figure 2. Mercury Emissions for Coal-fired Boilers

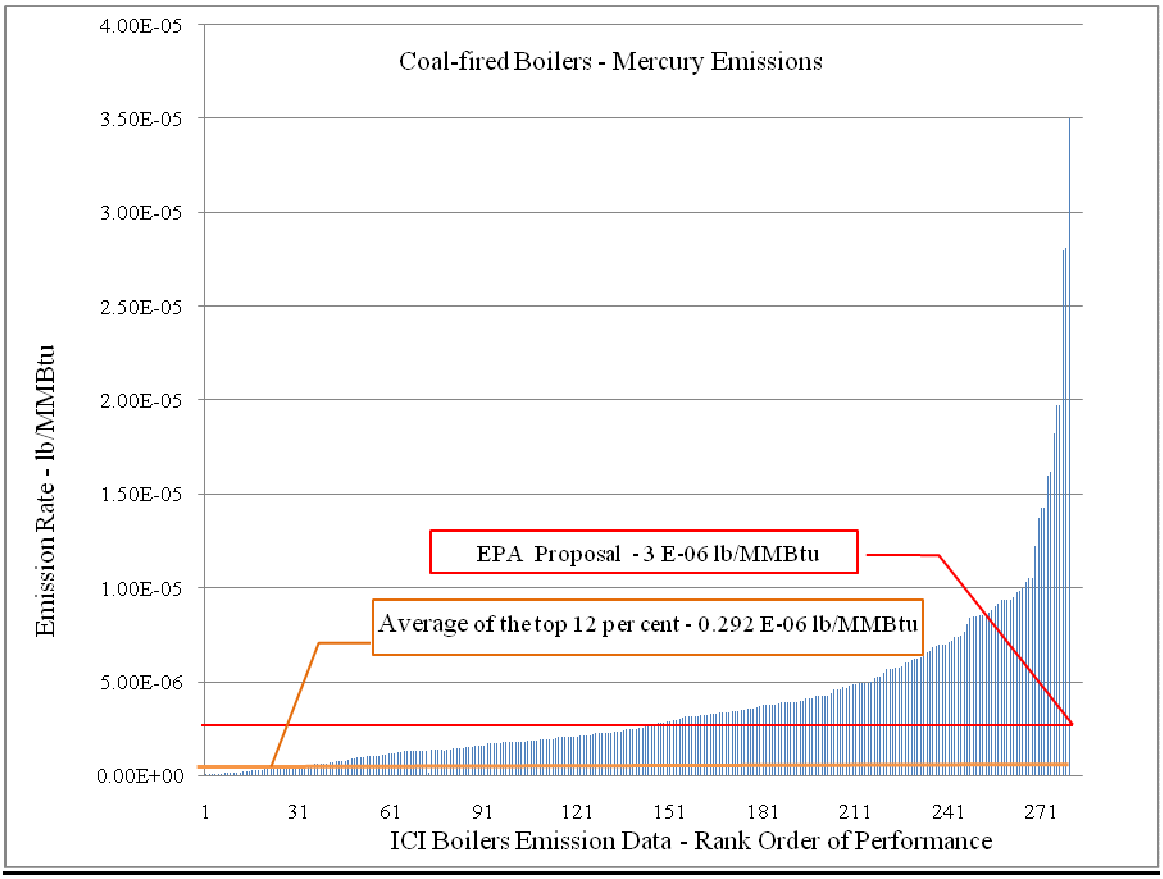

Figure 2 sets out the data[20] underlying EPA's proposal for mercury levels for coal-fired boilers. The average of the test results for the top 12 percent of the units in the subcategory is 0.292 x 10^{-6} lb/MMBtu. EPA's several "variability" factors[21] lead it to

[18] Sources will likely seek to operate at a level that employs some amount of compliance margin, but not the very high margins employed by EPA in setting the MACT level.

[19] CIBO has argued that EPA only required testing of the top 12 percent of the sources. However, EPA did not have prior knowledge of the emissions performance of the units that were tested and allowed sources to submit additional test data if they desired to do so. Moreover, the data used by EPA is generally consistent with compliance test data submitted by state and local permitting authorities through NACAA. There is no suggestion that this data set exhibits a bias.

[20] In order to facilitate scaling, the chart does not include the highest five values (ranging from slightly above 3.50 E-05 to 1.73 E-03 lb/MMBtu). These figures are included in the related calculations.

[21] These factors include rounding "up" for no technical reason.

propose a limit of 3 x 10^{-6} lb/MMBtu.[22] This limit is already met by approximately half of the existing sources, with numerous other sources close to that limit. Thus, it would be reasonable to assume that approximately half of the 578 sources within the subcategory will not incur any additional costs and that many of the sources whose emissions are only slightly above the standard[23] will not need to incur major capital costs[24]. Again, the CIBO/IHS estimate assumes that (1) each of the sources whose test results are above the proposed limit (even by as little as 0.00000001 lb/MMBtu) and (2) each of the 304 sources whose mercury emissions have not yet been measured emits at levels so far above the standard that the capital costs associated with a fabric filter and carbon injection will be incurred. Thus, it is more reasonable to assume that only 33-40 percent of the units (or fewer) within this subcategory will incur capital costs to comply with this proposed limit, not the 75 percent assumed by CIBO/IHS. For these reasons the CIBO/IHS "beyond worst case" estimate for this subcategory is at least two to four times larger than the EPA test data would indicate.

The CIBO/IHS assumption leads to an overestimate of compliance costs in each of the subcategories subject to the proposed regulation. The amount of the overestimate varies by subcategory, but is greater in those subcategories where less emission data are available than in the examples provided above. EPA has limited particulate matter ("PM") emissions data for the Gas #2 subcategory,[25] but compensated for this lack of information by proposing an extremely lenient limit. No test result showed a failure. Indeed, the EPA proposal is set at two times the highest test result obtained. Nonetheless, CIBO/IHS assumes that 183 of the 193 Gas #2 units would require PM controls at a cost in excess of $1 billion[26].

EPA has suggested that many sources will not need to add controls for dioxin and furan emissions because their emission levels are less than the detection limit for EPA-

---

[22] EPA's intentional lack of specificity in establishing a decimal point leads to an effective limitation of 3.49 x 10^{-6} lb/MMBtu given past precedent regarding rounding of emission test results in an enforcement setting. At this level 174 of 284 units (61 percent) already comply.

[23] Two-thirds of the units for which EPA has data have emission levels within 20 percent of the standard.

[24] For example, NREL's "Thief" technology employs unburned carbon within the combustion chamber, rather than carbon injection for low-cost mercury control. See, http://fossil.energy.gov/news/techlines/2009/09048-NETLTechnologies_Earn_Prestigious_.htmlhttp://www.netl.doe.gov/technologies/coalpower/ewr/pubs/EvanJGraniteThiefProcessClearwater.pdf.

[25] The "Gas 2" subcategory includes those units designed to combust gaseous fuels other than natural gas, propane or refinery gas.

[26] It may be argued that some units may need to employ fabric filters and dry sorbent injection to meet limits for HCl in lieu of wet scrubbers and to be able to meet limits of dioxin and mercury. CIBO has assumed that all 193 Gas #2 units will need scrubbers (at a capital cost of $1.2 billion) and 192 of 193 units will need sorbent injection equipment (capital cost $192 million). Given the large differences in the volume of materials that would need to be processed, cleaning gaseous or liquid fuels prior to combustion may be a more cost-effective solution for units that do not need to add fabric filters for PM controls. Other sources may have the option of specifying gas that is naturally lower in mercury. See, e.g. http://www.uop.com/objects/87MercuryRemoval.pdf, http://www.epa.gov/nrmrl/pubs/600r01066/600r01066.pdf, http://www.chem.unep.ch/mercury/Report/1st-draft-comments/govs/ETCE%202001.pdf, http://www.calgoncarbon.com/documents/MercuryRemovalfromGasStreams.pdf, http://www.jmcatalysts.com/ptd/site.asp?siteid=498&pageid=567.

approved measuring procedures. CIBO disagrees with EPA's suggestion and assumes that sources will nevertheless need to spend very substantial sums for fabric filters and carbon injection systems. CIBO cannot be correct in its assumption because it is EPA that defines the compliance obligation under the final rule. If EPA states that the compliance obligation is resolved by the use of an approved test procedure that shows a result less than the detection limit for the approved method, the obligation of the sources is defined and such sources would not need to install controls.

Rather than assuming that all sources for which no data are available must install controls, EPA assumed that such sources emit at the average rate for sources for which there are data[27]. Additionally, EPA layered the levels of controls such that sources whose emission rates are close to the proposed levels would add less expensive controls (e.g., cyclones) than sources that need a greater control efficiency (e.g., fabric filters) in order to meet proposed limits. These steps lead to a more reasonable estimate of control costs.

Neither EPA nor CIBO effectively address the use of different or cleaner fuels in lieu of stack controls. EPA's data reveal that a large number of sources are capable of burning a variety of fuels. The proposed regulations rely heavily on the definition of the "capability" of a source to burn one or more fuels and differ widely in stringency depending on the specific percentage of the fuel combusted. If retained in the final rule, this structure would create significant opportunities to reduce capital costs by shifting the mix of fuels combusted. For example, if a source generates 10 percent of its heat energy from combusting coal and 90 percent from natural gas, under the proposal it is a "coal-fired" unit, and might have to install controls costing several millions of dollars to meet emission limits. If that source reduced its use of coal to below 10 percent it would be a gas-fired unit subject only to the proposed work-practice standard of a "tune-up," with no obligation to install controls.

In addition to "shopping" for the lowest cost fuel to use under the structure of the regulations, sources also have the opportunity to use cleaner fuels. This technique became the compliance approach of choice for many sources subject to the Acid Rain program and is largely responsible for the relatively low cost of that program. Coal washing has been shown to reduce both sulfur dioxide ("SO_2") and mercury levels and so, just as many sources today specify the levels of sulfur, ash and other contaminants in their fuels, some sources may switch to fuels with lower levels of chlorine or mercury to meet hydrogen chloride ("HCl") and mercury levels. Biomass-fired units may seek to lower moisture levels in their feed stocks to reduce CO emissions or augment biomass combustion through the use of small amounts of natural gas or other fuels or more careful blending of existing sources of biomass (such as wet and dry biomass). Indeed, many of the MACT sources in the "top 12 percent" of their respective subcategories did not have

[27] This may lead to an overestimation of the number of sources that need controls, but may not have the same impact on the cost of controls. Had EPA assumed that the "unknown" sources exhibit an emissions rate distribution that is similar to the universe of "known" sources, fewer sources would need controls.

post-combustion controls, but achieved low HAP emissions because of their use of fuels with lower levels of those hazardous substances.[28]

(2) The CIBO/IHS report does not include the positive economic benefits associated with new capital investment in existing facilities.

CIBO/IHS purports to study the "economic impact" of EPA's proposed rules, but presents only an inflated "debit" side of the ledger. What CIBO would consider as an expense is a business opportunity to those who design, manufacture, install and service pollution control devices. U.S. companies, such as Alstom Power (TN); Babcock & Wilcox (OH); Calgon and Siemens (PA), ADA Environmental Solutions (CO), Norit Americas (TX), Nalco Mobotes (CA) and Albemarle Performance Chemicals (LA) are among the many suppliers[29] who would likely receive direct positive economic benefits in the form of increased jobs[30], productivity, taxes and output. Steel, concrete, electronic, petrochemical, mining and other sectors would benefit from indirect purchases of supplies. Similarly, indirect economic benefits would be generated within the professional services and financial sectors as contracts are negotiated, systems are designed and tested and financing is arranged. Thereafter, induced economic benefits would be generated as the income earned by those newly employed in building and operating the added pollution controls is spent in the general economy.

A January, 2010, study by Industrial Economics, Inc. ("IEc") estimated the number of jobs associated with the manufacture, installation and operation of a typical scrubber installed at a 250 MMBtu/hr industrial boiler under several assumptions. IEc concluded that such an installation would result in 77–400 FTE during the construction phase and 16-29 permanent direct and indirect jobs for operation and maintenance of the device[31]. Induced jobs and economic benefits created by spending by employees engaged in these activities would be generated throughout the country and across the economic spectrum. The manufacturing jobs directly created by the proposed rules have among the highest ratios of indirect/induced employment to direct employment in our economy[32], and so direct job creation in this sector may well create more indirect and induced jobs than investment in a number of other sectors that are subject to the rule.

NACAA has calculated that, based on EPA's estimated capital costs, on the order of 40,000 FTE would be created over the next three years[33], when our economy needs

---

[28] It must be noted that, for the most part, units in the top 12 percent were not required to reach a certain level or emission performance and did not employ CO catalysts for organic HAP reduction or specific stack controls designed to limit emissions of dioxins or furans.

[29] This partial list is not intended as an endorsement of any company or its products. It merely illustrates the broad geographic distribution of the companies that would benefit from the investment that would be required by the proposed rule.

[30] Of course, many of the on-site installation, operation and maintenance jobs would be filled by local workers.

[31] See, http://www.epa.gov/airtoxics/utility/scrubber_jobs_memo_011510.pdf.

[32] See, e.g. Bivens, J (2003), *Updated Employment Multipliers for the U.S. Economy,* Economic Policy Institute.

[33] This calculation is based on EPA's estimated capital cost of $9.5 billion and an estimate by Industrial Economics Inc. (IEc) of the cost of installing and operating scrubbers. Labor costs are generally given at

them the most, and paid for by internal or private financing over the next decade. After completion of the construction phase, a smaller number of permanent jobs would be created, both at the affected facilities and throughout the supply chain. These positive impacts can be estimated using IMPLAN or other models, but have not been included in the CIBO/IHS analysis. The CIBO/IHS report assigns no benefit to the direct, indirect or induced expenditures that result from the capital investments required by the proposed rules and offers no explanation as to why standard estimating techniques were not employed to evaluate the positive economic impacts of the rule[34].

(3) The CIBO/IHS report does not include the increase in life expectancy, reduction in health care costs and reduction in lost work days associated with the rule in its calculation of society-wide impacts of the rule.

The CIBO/IHS report purports to examine the direct, indirect and induced costs of the proposed rule, including effects on employment, across the U.S. economy. According to standard economic theory, the "cost" of a regulation is equal to "the change in consumer and producer surpluses associated with the regulation and with ***any*** price and/or income changes that may result."[35] However, the CIBO/IHS estimate does not examine ***each*** of the price and income changes that may occur. It fails to "net out" of its calculus significant benefits that will more than offset the "costs" it identifies. The proposed regulations may be estimated to have a benefit to the economy, in terms of increased life expectancy, reduced health care costs that must be borne by businesses and/or consumers and increased productivity (as people are healthier, they become more productive in general and require fewer work days lost to industry), but these effects are not reflected in the CIBO/IHS estimate. This omission might be appropriate in an examination of a small portion of the economy. However, CIBO/IHS is attempting to examine the very broad sector of the economy directly affected by the Boiler MACT and then to assess the rule's impact across the entire economy. The overwhelming majority of the cost estimated by CIBO/IHS consists of indirect and induced costs in the broader economy.

If, as the EPA/RTI study concludes, every dollar invested in pollution controls reduces morbidity to workers or consumers, as well as lost work time or health care premiums by $5 to $12, this should lower health care costs to businesses and consumers and, under the CIBO/IHS algorithm, create jobs and other positive economic benefits in other sectors, including those affected by the proposed rules. To put it another way – to the extent that the general public must devote more resources to health care because of the greater level of toxic and criteria pollutants, fewer resources are available to purchase goods produced by the sectors that are subject to the Boiler MACT and jobs within those sectors are lost.

---

40 to 50 percent of the cost of the control device. A weighted average of the annual compensation of the engineers, metal workers and boiler makers of $110,000 was employed. If CIBO's estimate of $20 billion in capital costs is correct, the investment would create almost 100,000 FTE in new jobs over the next three years. See, http://www.epa.gov/airtoxics/utility/scrubber_jobs_memo_011510.pdf.

[34] To the extent that CIBO/IHS believed that such positive economic benefits were offset by other effects, the estimate could have identified both sets of effects and provided a basis for its belief.

[35] Harrington, et al., citing *Cropper and Oates,* 1992, p.721

The positive impact of the proposed rules on public health, productivity and health care costs is real and at least partially quantifiable. Productivity improvements can be attributed to the reduction in lost work days and health-care costs, as well as increases in longevity, resulting from decreases in criteria pollutants that occur as co-benefits of the proposed rules. EPA and others have quantified these effects with respect to criteria pollutants for many years[36]. Industry representatives have had numerous opportunities to comment on and challenge EPA's methods and assumptions and the underlying science relating to the quantification of the adverse economic effects of ozone and fine particulate matter ("$PM_{2.5}$") pollution – both before the Office of Management and Budget and in the courts over the past decades. Those issues can no longer be considered in serious dispute and, in fact, CIBO/IHS does not attempt to refute the (by now) standard estimates of morbidity, lost work days and increased health care costs or offer alternate estimates of these factors. Instead, CIBO/IHS ignores the issue.

The most recent analysis of the society-wide impact of the pollution controls required by the 1990 CAA[37] ("the Draft 2020 Prospective Analysis"), concludes that these pollution controls have a direct annual cost of $53 billion[38] and provide direct annual benefits of $1.3 trillion; with an overall positive benefit/cost ratio of 25:1. When increased longevity, reduced health care costs and reduced lost work days are considered, those rules are found to have a positive impact on the economy – the 2020 GDP is increased by 0.02 percent and consumption by 0.03 percent ($5 billion) over the "no pollution control" case.

The issue of the long-term economic impact of environmental regulation is, of course, important. However, a more immediate issue of concern is whether the proposed requirements will lead to a significant number of layoffs in the near term. For a half-century or more, proposals to establish more stringent environmental protection have been subjected to the argument that the incremental cost of the proposed new requirement will represent a "tipping point" that will cause a large number of layoffs within the regulated community. CIBO/IHS implies this charge in its report. Fortunately, this specific issue has also been directly examined. The Bureau of Labor Statistics (BLS) surveyed the employers of companies that had announced sizeable layoffs to determine the factors responsible for the layoffs. The results of this study reveal that employers do not lay off statistically relevant numbers of workers because of new or anticipated safety and environmental regulations. Of the 2 million employees laid off in the 1987-1990 timeframe of the BLS study, 0.1 percent was reported **by the employers** as being occasioned by an environmental or safety-related shutdown. Indeed, the probability of a

---

[36] See, e.g. http://www.epa.gov/ttn/ecas/regdata/Uncertainty/pm_ee_report.pdf; http://www.epa.gov/ttn/ecas/regdata/RIAs/Executive%20Summary.pdf.

[37] Section 812 of the 1990 CAA requires the EPA to develop periodic reports to Congress that estimate the benefits and costs of the CAA, including the effects of the CAA on economic growth, employment, productivity, cost of living, and the overall economy of the United States. *The Benefits and Costs of the Clean Air Act: 1990 to 2020, Revised Draft Report*. See also, E.H. Pechan & Associates, Inc. and Industrial Economics, Inc., (2009) *Direct Cost Estimates for the Clean Air Act Section 812 Prospective Analysis, Draft Report,* prepared for U.S. EPA, Office of Air and Radiation. See, http://www.epa.gov/oar/sect812/may10/Pechan_IEc_Cost.pdf.

[38] Approximately half of these costs are for cleaner fuels and mobile sources.

layoff for an environmental or safety-related shutdown is about the same as for natural disasters.

(4) The CIBO/IHS report treats "one-time" project costs as recurring expenses.

CIBO/IHS estimates the capital costs of the proposed rules at $20.7 billion and assumes that this amount of investment in pollution controls will lead to an equivalent loss of plant output and result in the loss of 70,000 "direct" jobs and 268,000 "indirect" and "induced" jobs. The CIBO/IHS report relies on the assumption that every capital dollar spent on pollution control devices reduces potential plant output by a similar amount.[39] Importantly, in applying this assumption, CIBO/IHS reduces plant output by the full amount of the cost of the controls, not just in the year that the pollution control device is installed, but for every year thereafter – as if the source were required to install a new pollution control device each year. CIBO/IHS asserts that the use of its assumption is "a direct and standard methodology to examine such a situation that provides clarity to the process and consistency across industries."[40]

If the CIBO/IHS theory is that $20 billion invested in construction of new pollution controls displaces a similar amount of investment of construction of new manufacturing capacity, the analysis of those effects should be similar. Published studies of the employment effect of new investments differentiate the short-term benefits of the new construction and the longer-term effects of the smaller number of permanent jobs created. Such studies[41] do not assume that the jobs created during the construction phases will continue forever. In contrast, CIBO/IHS assumes that the jobs "at risk" because of one-time project costs remain "at risk" forever.

In an effort to determine whether CIBO/IHS's use of the term "jobs at risk" was reasonable, the total projected "income lost" and the projected "lost output" were divided by the number of projected jobs[42]. The result for EPA's Proposed Rule was $45,000 per lost job in income and $200,000 per lost job in output, reasonable figures if one assumes an annual reduction in output of $20 billion (and no offsetting gains). However, these figures are each reduced by an order of magnitude and are unreasonable if one substitutes the amount that will actually be spent in any given year for these controls.

EPA/RTI also assumed some reduction in demand in its calculation of economic and employment consequences, but used the annualized cost of compliance (including both annualized capital cost and ongoing operation and maintenance costs) rather than the total capital cost employed by CIBO/IHS[43]. These refinements lead to a far lower (and

---

[39] CIBO/IHS Report, *supra*, p.11.
[40] *Id*. p 11.
[41] See, e.g. http://www.geo-energy.org/geo_basics_employement.aspx; http://nuclearcompetitiveness.org/images/Oxford_State_Benefits_2008.pdf; http://irecusa.org/wp-content/uploads/2009/11/Friedman.pdf.
[42] CIBO/IHS Report, *supra, p. 17.*
[43] EPA/RTI also adjusted the estimated reduction in demand by a consideration of elasticity and incorporated some estimation of the "cost" and "factor shift" effects that offset the reduction in demand but were ignored by CIBO/IHS.

more reasonable) projection of economic and employment impacts. According to EPA/RTI "[n]ear-term employment changes associated with the proposed rule are estimated to be less than 5,000 job losses; over a longer time period, net employment effects could range between 4,000 long-term job losses to long-term 9,000 job gains."[44]

The CIBO/IHS report may simply be imprecise in its discussion of a "job" – many studies employ the term "job-year" when they mean to discuss the loss or gain of a job for one year. The other possibility is that CIBO/IHS believes that the investment in pollution controls would permanently reduce output by many times the amount of the investment – an approach that is not found elsewhere in the literature. The failure to employ annualized cost figures by itself increases the CIBO/IHS estimate by an order of magnitude.

(5) The CIBO/IHS report's assumption that each dollar invested in pollution controls reduces plant output by a similar amount is not likely to be correct under current economic conditions.

In assessing the economic impact of the rule changes in the U.S. economy, the CIBO/IHS report assumes that the upgrade costs borne by each industry due to the regulations result in a corresponding and equal loss in potential output. IHS then assumed that this loss in potential output was reflected in a loss of actual output, irrespective of the current utilization level of the facility, and that this loss in output is maintained forever, even though there is no cost incurred in the out years. This assumed relationship between capital investment in pollution controls and potential plant capacity may not be present in the current economic climate.

Control of carbon monoxide emissions from natural gas- fired boilers represents a major cost ($2.7 billion) in the CIBO/IHS estimate. CIBO/IHS assumes that natural gas boilers will have to install CO catalysts or new burners at a capital cost of $1 million, and the output of the facility would be reduced by $1 million with a corresponding loss of income and jobs. Intuitively, the investment of $1 million to upgrade a natural gas boiler with more efficient burners of the same capacity is unrelated to the number of widgets that a factory can produce per hour or the number of students that can be taught at a university. Moreover, in this example there is no reason to believe that large numbers of sources will install CO catalysts or that investments in more efficient combustion equipment will lead to the assumed reduction in output and in product cost. This is because CO emissions[45] are a consequence of incomplete (and hence inefficient) combustion. The most likely response to CO limits is either a "tune up" for those close to the limit or new burners/combustion chambers for very high emitters. Either of these responses may return all or nearly all of the direct cost to the facility in terms of reduced

[44] RIA, supra, Section 7-1. It should be noted that these figures do not include the added employment at existing facilities (as well as the induced and indirect employment) associated with operation and maintenance of pollution controls and/or the near-term benefits associated with the construction that would occur over the near term.

[45] CO emissions are regulated as a surrogate for organic hazardous air pollutants such as benzene, benzo[a]pyrene, xylene, and formaldehyde.

fuel costs and either of these responses involves some job creation for manufacturing and installing new burners.

In addition, current economic conditions give rise to arguments that suggest that the investment in pollution controls will not divert expenditures from plant expansions and may not increase prices or reduce demand on a dollar-for-dollar basis. As the country struggles to recover from the recent recession, it is reported that corporate revenues, profits and stock values have increased significantly, but that managers are reluctant to invest in restoring manufacturing capacity. Since consumer purchasing levels are low, most sectors have large reserve manufacturing capacities of 30 percent or more and so, absent sharply increased demand, there is an argument that the pollution control investments in the next three years will not divert resources from investments that increase production capacity. Given the relatively small increase in overall costs that these rules would require and flat personal income levels within the general public, many companies may not seek to raise the price of their products. In these circumstances, the cost of new pollution controls (financed or otherwise) would likely be absorbed in the form of reduced corporate cash reserves and/or reduced distributions to shareholders, rather than reduced output that might directly threaten employment. At the same time, the stimulative effects of the new construction and additional permanent onsite jobs would be felt throughout the economy.

In its report, CIBO/IHS explicitly acknowledges that the compliance costs of the rule will not reduce potential plant capacity or necessarily reduce employment, but will likely be absorbed and distributed throughout the economy as dictated by the economics of the particular organization.

> Some larger organizations will absorb the costs with minimal changes to employment levels; however they will likely pass both the compliance and on-going maintenance costs downstream to their customers or absorb a hit to their profitability and therefore pass that cost along to their share-holders. Smaller or marginally-profitable firms, on the other hand, may be faced with either reducing staff or shutting down operations.[46]

Nonetheless, even as it acknowledges that (1) it has no information that would enable it to gauge whether **any** sources subject to the proposed rules will in fact lay off workers and (2) many sources subject to the rule will not lay off workers, CIBO/IHS applies its "reduction in plant capacity" method to all sources subject to the rules and predicts that **all** sources subject to the rules will lay off workers rather than simply absorb those costs.

The record of earlier pollution control efforts shows that adding pollution controls does not necessarily reduce long-term demand for a product. For example, the Title IV program of the 1990 amendments led to the expenditure of billions of dollars in control costs, but those costs[47] have not been shown to have diminished the productive capacity

[46] CIBO/IHS Report, supra, p 18.
[47] CIBO/IHS Report, supra, p 18.

(or actual generation) of the Electric Generating Units ("EGU") involved. To the contrary, utilization of facilities where pollution controls had been installed increased, while utilization of poorly controlled facilities decreased. Similarly, the installation of pollution controls at wood products and other facilities as a result of EPA's New Source Review enforcement actions allowed a number of affected facilities to increase hours of operation and increase throughput without violating preexisting state-imposed SIP limits needed to meet National Ambient Air Quality Standards.

The CIBO/IHS input assumptions also generate counterintuitive modeled results within certain sectors. As an example, one need only examine the multiplier assigned by CIBO/IHS for indirect costs in the natural resource sector. CIBO/IHS assumes that the proposed rules will require $64.6 million in capital expenditures within the natural resources sector[48]. At a 7-percent discount rate, a $65 million capital expenditure has an annual amortized cost of less than $5 million per year, spread over the entire natural resource sector. Employing its "reduction in plant output" assumption, CIBO/IHS projects that this expense will result in the loss of 983 direct jobs[49]. The CIBO/IHS report then concludes that the "indirect or induced" economic consequence of the loss of these 983 jobs is that an additional 75,000 jobs will be "at risk" and the expenditure of $5 million per year in capital costs will create an astounding $2.5 billion per year in economic losses each year going forward indefinitely[50]. This represents an induced/indirect multiplier of 76; in contrast, the Economic Policy Institute reports that the indirect/induced multiplier for the mining sector is two[51].

Consider the converse of CIBO/IHS's conclusion. Is it realistic to believe that an investment of $65 million in capital improvements that expand potential plant capacity in the natural resources sector will create 75,000 new permanent jobs across the economy and return $2.5 billion per year to the economy? The CIBO/IHS estimate that the "Professional Services sector" will lose nearly as many jobs as the "Manufacturing

---

[47] There is an energy penalty associated with most pollution control devices but this penalty is a small fraction of the output of the facility and is a different issue than asserting that there is a direct link between pollution control expenditures and the productive capacity of a factory.

[48] CIBO/IHS Report, supra, p 17.

[49] This computes to only $5,086 per job-year and so those affected facilities would have reduced annual operating costs (by laying off workers) by more than 10 times the amount of the annualized investment in pollution controls. At $66,000/year per employee the savings associated with firing 985 workers is $65 million **per year**. However, as noted above, the capital expenditure for compliance is a one-time obligation and the annualized cost is far less. CIBO/ IHS Report, supra, p. 26.

[50] While extreme, this multiplier is by no means the most egregious example found in the CIBO/IHS report. In its evaluation of the cost of controlling natural gas-fired units, CIBO/IHS asserts that the potential regulation of these units within the natural resources sector would require capital investments of $3.8 million (perhaps $1 million/year in annualized costs) that would result in the loss of 37 direct jobs. CIBO/IHS reports that its indirect/induced multipliers applied to this figure yield a figure of 137,281 indirect jobs "at risk" and $22 billion in cost to the GDP. Here, the CIBO/IHS report suggests that several hundred thousand dollars of annual expenditures (or even a few million dollars) within this sector will lead to a $22 billion change in the GDP and put 137,281 jobs "at risk." Nowhere in the literature is there a serious study that reports an indirect/induced multiplier of 5,500. Again, this appears to be an artifact of the CIBO/IHS report's assumptions.

[51] See, *Updated Employment Multipliers for the U.S. Economy,* supra . Oil shale development has been reported to have an /indirect/induced to direct employment ratio of 0.9.

sector" is among those estimates that appear to be an artifact of the underlying assumption, rather than what one would expect from a rule that largely affects manufacturing operations.

Conclusion: The CIBO/IHS estimate does not inform meaningful policy issues.

The CIBO/IHS estimate does not claim or demonstrate that the proposed emission reductions are not in the public interest. Substantial progress has been made over the past decades, but continuing research demonstrates the need for additional reductions in ambient concentrations of both criteria and hazardous air pollutants. The ICI Boiler sector is one of the most significant contributors of these pollutants and a cost-effective sector to provide needed reductions.

The CIBO/IHS estimate does not assert or demonstrate that those subject to the regulation cannot afford to make the improvements that will be required. It simply publishes an estimate of the total cost of construction and assumed indirect costs, while tacitly conceding that facilities will be able to afford the cost of the investment. While tens of billions of dollars sounds like a large sum, in fact the total output of the sectors involved over the life of the improvements is hundreds of trillions of dollars. The sums involved represent an extremely small fraction (approximately 0.01 percent, according to EPA) on an annualized basis of revenues and plant value.

The CIBO/IHS estimate does not provide any new information as to whether there will be any job loss under the EPA rules. It assumes, without support or any sound basis in economic theory, that there will be a reduction in plant output that will lead to job losses.

The CIBO/IHS estimate of job creation/loss fails to address the near-term impact on employment, the clear benefit to public health and the substantial positive cost/benefit ratio of the proposed rules. If EPA's rules are adopted, capital construction projects of $9 billion or more will be constructed over the next three years. Approximately 50 percent of these amounts will be spent for direct labor (i.e., jobs – engineers, pipe fitters, machinists, welders), while the balance is spent at suppliers. This could generate on the order of 40,000 FTE over the next three years. The study also does not attempt to address net employment within the industry by evaluating whether the increased long-term employment associated with the operation and maintenance of the pollution controls will offset any reduction in output.

The job gains in 2011-2014 associated with the several billion dollars of new capital construction are far more certain to occur than job losses that one might speculate will happen depending on the source of the financing for this construction, the elasticity of demand for products and the state of the economy years from now. The potential job gains and losses projected on the basis of the annualized cost of the proposed rules are so small, compared to the 110 million jobs in the U.S. labor market, that they will be difficult, if not impossible, to isolate from job gains or losses associated with more important drivers of the U.S. economy.