All Pain and No Gain

The Illusory Benefits of the Utility MACT

By Marlo Lewis, Jr., Ph.D., William Yeatman, and David Bier

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Executive Summary

The U.S. Environmental Protection Agency's (EPA) Utility MACT Rule establishes the first-ever maximum achievable control technology (MACT) standards for emissions of hazardous air pollutants (HAPs) from coal- and oil-fired power plants.

Mercury is the principal HAP targeted by the Rule. Unlike most air pollutants, mercury poses health risks not via inhalation but after being deposited in bodies of water. Microbes can transform some of the mercury into an organic form, methylmercury, which can accumulate in aquatic food chains.

The EPA contends that pregnant women in subsistence fishing households consume enough methylmercury in self-caught fish to impair fetal cognitive and neurological development. The MACT Rule supposedly reduces the risk to unborn children by lowering methylmercury concentrations in non-commercial fish. But the agency provides no empirical evidence that any American children are harmed by mercury emissions.

With an EPA-estimated annual compliance cost of $9.6 billion, the Utility MACT Rule is one of the most costly environmental regulations in the nation's history. The EPA claims that the Rule will deliver up to $80 billion in annual net benefits, with no risk of significant adverse impacts on fuel choice, electric supply reliability, or employment. These claims are false.

EPA Exaggerates the Health Risks of Mercury.

- The EPA's December 2000 "appropriate and necessary" determination, the trigger for the Utility MACT Rule, assumed that 7 percent (one in 14) pregnant women in the U.S. have blood mercury concentrations exceeding the agency's reference dose (the "safe" exposure level). In reality, only 0.4 percent (one in every 250 pregnant women) had blood mercury levels exceeding the reference dose.
- The EPA's reference dose is not a valid measure of actual health risk. It is 1/15 the lowest exposure level associated with mild, sub-clinical effects in epidemiological studies.
- To estimate the Rule's mercury-related health benefits, the EPA relies on a single study that attempts to correlate prenatal mercury exposure with IQ loss. The study is an "integrative assessment" of epidemiological studies conducted in the Faroe Islands, Seychelles, and New Zealand. However, the most reliable of those studies—the Seychelles study—found no association between prenatal exposure and IQ.
- None of the children in the three island studies was learning disabled or cognitively abnormal in any way, despite having mercury exposures many times greater than those of most American children.
- EPA estimates that each year 240,000 pregnant women in subsistence fishing households eat enough self-caught fish to endanger their children's cognitive or neurological health. Yet in the 22 years since the Clean Air Act tasked the EPA to study the health risks of mercury, and the 12 years since EPA published its "appropriate and necessary" determination, the agency has not identified a single woman who fits this description.
- More importantly, the EPA has not identified a single child whose learning or other disabilities can be traced to prenatal mercury exposure.

The costs of the HAP reductions overwhelm the projected benefits.

- The EPA estimates that the Rule's mercury emission reductions will provide $0.5 million to $6 million in direct annual health benefits. Given the Rule's $9.6 billion price tag, costs overwhelm benefits by a ratio of 1,600 to one or even 19,200 to one.
- Even those numbers may inflate the Rule's value, because the EPA's estimated benefits cannot be verified even in principle.
  - The EPA projects that, in the supposed population of 240,000 prenatally exposed children in subsistence fishing households, the Rule's mercury reductions will avert the loss of 511 IQ points, or 0.00209 IQ points per child, and that these "saved" IQ points translate commensurately into higher lifelong earnings.
  - However, it is not possible to measure IQ out to five decimal places. Consequently, it is also not possible to determine whether any relationship between income and IQ holds for increments as small as 0.00209 IQ points.
- In short, the Rule's mercury reductions may well have no quantifiable benefit.
- The health benefits of the Rule's reductions in other HAPS such as chromium, nickel, and acid

gases are even more dubious. EPA does not even try to quantify them.

EPA relies on illusory "co-benefits" to make the Utility MACT Rule look reasonable.

The EPA claims that the Rule's "co-benefits" from coincidental reductions in non-HAP emissions, particularly sulfur dioxide, a precursor component of fine particulate matter ($PM_{2.5}$), total $33 billion to $89 billion. These putative co-benefits are not credible.

- $PM_{2.5}$ is already regulated under the Clean Air Act's National Ambient Air Quality Standards (NAAQS) program to levels "requisite to protect public health" with "an adequate margin of safety." Almost all of the Utility MACT Rule's "co-benefits" occur at areas already in compliance with the NAAQS health standard for $PM_{2.5}$
- Up to 89 percent of the co-benefits are attributable to $PM_{2.5}$ reductions below any $PM_{2.5}$ concentration statistically associated with mortality risk in any epidemiological study.
- Reductions of sulfate PM—a co-benefit of the MACT for acid gases—account for about 95 percent of projected co-benefits. Yet sulfate PM is not toxic and EPA knows of no biological mechanism that could explain the health benefits it attributes to sulfate PM reductions.

The Utility MACT Rule will adversely affect fuel choice.

- The Rule's mercury emission limits are so stringent that pollution control technology manufacturers cannot guarantee that power plants installing their equipment will be in compliance. Without such a guarantee, investors will not finance new coal-fired power plants.
- The Rule's acid gases emission limits are so stringent that no existing coal-fired power plant can meet them.
- Thus, the Utility MACT Rule effectively bans the construction of new coal electric generation—a policy Congress has not approved.

The Utility MACT Rule jeopardizes electric reliability.

- The EPA predicts that the Utility MACT Rule, in addition to other final environmental regulations, would cause the retirement of 10,000 megawatts of electricity generation. Already, operators of 26,000 megawatts of coal-fired electricity generation have announced that their power plants will close rather than comply with EPA regulations.
- The Federal Energy Regulatory Commission projects that 81,000 megawatts—almost eight times the EPA's estimate—are "likely" to retire.
- According to North American Reliability Council, "Environmental regulations [promulgated by EPA] are shown to be the number one risk to reliability over the next one to five years."
- Twenty-four States are challenging the regulation in the D.C. Circuit Court of Appeals, largely based on reliability concerns. Never before have so many States litigated to stop an EPA air regulation.

The Utility MACT Rule will do more harm than good to public health.

- People generally use part of their income to enhance their health and safety. This is why regulations imposing large costs for little or no public health benefit are not only wasteful but also harmful. Spare-no-expense, health-at-any-cost regulation ignores the obvious connection between livelihoods, living standards, and life expectancy.
- Many studies demonstrate that unemployment increases the risk of sickness and death.
- NERA Economic Consulting projects that EPA regulations targeted at the power sector would result in a net average loss of 183,000 jobs per year through 2020.

The Senate is expected to consider a Congressional Review Act resolution of disapproval to overturn the Utility MACT Rule. In September 2011, the House of Representatives passed the Transparency in Regulatory Impacts on the Nation (TRAIN) Act (H.R. 2401), by a vote of 249-169. The TRAIN Act would nullify the Rule and direct the EPA to adopt a less burdensome control strategy for addressing power plant HAP emissions. There is zero chance that Congress would enact the Utility MACT Rule were it introduced as a bill and put to a vote

The Illusory "Benefits" of the Utility MACT Rule

The Environmental Protection Agency's (EPA) Utility MACT Rule establishes first-ever maximum achievable control technology (MACT) standards for emissions of hazardous air pollutants (HAPs) from coal- and oil-fired power plants. The Rule targets three main types of HAPs: mercury (Hg), other hazardous metals (such as arsenic, chromium, and nickel), and acid gases. Utilities must comply by 2015, although the agency may allow units deemed "reliability critical" to comply by 2016 or 2017.[1]

The EPA estimates that the required HAP reductions will generate $0.5 million to $6 million in annual quantifiable health benefits in 2016, while imposing $9.6 billion annually in new compliance costs on electric utilities. For the HAP reductions that are the Rule's statutory purpose, estimated costs exceed quantified benefits by a ratio of 1,600 to one—or even 19,200 to one.

The EPA contends that when the "co-benefits" of coincidental reductions of fine particulate matter ($PM_{2.5}$) are taken into account, the Utility MACT Rule will provide net benefits of $24 billion to $80 billion in 2016.[2] This rosy estimate is a statistical figment, rather than a real benefit. The Utility MACT Rule is all pain and no gain, as this study shows.

Mercury, Fish, and Children's Health

Unlike most other air pollutants, mercury emissions do not endanger health via inhalation or airborne exposure. Rather, mercury emissions can pose health risks after being deposited in bodies of water. Microbes transform some of the mercury into an organic compound, methylmercury (MeHg), which can accumulate in aquatic food chains. All fish contain some methylmercury, because mercury is a natural component of the Earth's crust, and top predator fish have the highest concentrations. Most of the methylmercury consumed by eating fish is absorbed into the circulatory system and easily traverses the blood-brain barrier and the placentas of pregnant women.[3]

Millions of the world's people regularly eat fish with no apparent ill effects. Indeed, fish is a low-cholesterol source of protein with nutrients and fatty acids beneficial to adults, children, and fetuses in the womb. However, at high enough doses, methylmercury can cause neurological disorders, organ damage, and even death. Tragic poisoning episodes in the early 1970s in Iraq (from grain treated with methylmercury as a fungicide) and in the 1950s and 1960s in Japan (where companies dumped industrial waste containing mercury in coastal waters) demonstrated that methylmercury is most toxic to developing fetal brains and nervous

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systems.[4] Those events raised the question—still debated in the medical literature—of whether prenatal exposure to methylmercury at much lower concentrations leads to cognitive or neurological deficits in children who do not exhibit clinical symptoms of mental, physical, or sensory impairment.[5]

EPA's Appropriate and Necessary Determination

Section 112(n)(1)(A) of the Clean Air Act (CAA), enacted via the 1990 CAA Amendments, directed the EPA to conduct a study of the public health hazards reasonably anticipated to occur from electric utility HAP emissions after the imposition of other CAA requirements, and to regulate HAP emissions from power plants if the agency concludes such regulation is "appropriate and necessary."[6]

In addition to the HAP utility study, Congress tasked the EPA and other agencies to conduct studies specifically on mercury. The Clean Air Act's Section 112(n)(1)(B) directed the agency to study mercury emissions from power plants, municipal waste facilities, and other industrial sources, the health and environmental effects of such emissions, and the cost and availability of control technologies. The CAA's Section 112(n)(1)(C) directed the National Institute for Environmental Health Sciences (NIEHS) to determine the level of mercury exposure below which adverse human health effects are not expected to occur. Report language accompanying the EPA's fiscal year 1999 appropriations directed the agency to fund a National Academy of Sciences (NAS) study on the toxicological effects of methylmercury.[7]

Congress did not set a deadline for the EPA's "appropriate and necessary" determination, but it did require the agency to complete the utility HAP and mercury studies "not later than three years after November 15, 1990." The EPA did not complete the studies until 1998[8] and did not finally make its determination to regulate power plant mercury emissions until December 2000. The Clinton administration waited until the lame duck period following the 2000 election to take action on this allegedly urgent issue.

The EPA based its "appropriate and necessary" determination on the following considerations:

1. Mercury is highly toxic, persistent, and bio-accumulates in food chains;
2. Forty States and American Samoa have issued fish advisories for mercury;
3. Developing fetuses are most sensitive to the effects of methylmercury;
4. About 7 percent of childbearing-age women have methylmercury levels exceeding the EPA reference dose (RfD), the lifetime daily exposure

anticipated to be without risk of adverse health effects;[9]

5. A significant fraction of total mercury deposited in the U.S. comes from U.S. power plants (the EPA estimated about 18 percent);
6. Mercury power plant emissions are projected to increase from 46 tons in 1990 to 60 tons in 2010;
7. Other CAA requirements will not adequately control mercury emissions from power plants; and
8. Alternative strategies exist to reduce mercury emissions.[10]

One of the factual premises for the EPA's "appropriate and necessary" finding—projected mercury emissions from coal power plants—is clearly incorrect. Mercury power plant emissions have not increased from 46 tons in 1990 to 60 tons in 2010, as EPA projected. Rather, they declined to 29 tons in 2011—more than 50 percent below the EPA's projection.[11]

Another factual premise—the percentage of childbearing-age women with blood mercury levels above the RfD—quickly became dated and was, in any case, an inappropriate measure of actual health risk. The EPA cited the 1999-2000 National Health and Nutrition Examination Survey (NHANES) conducted by the Centers for Disease Control and Prevention (CDC), which found that about 7 percent of women of childbearing age (between 15 and 44 years) had methylmercury blood concentrations exceeding the agency's reference dose of 0.1 micrograms per kilogram body weight per day (0.1 µg/kg-bw/day).[12] However, during 2001-2002, the percentage of child-bearing age women with blood mercury levels equal to or greater than the RfD was 3.9 percent—50 percent lower than levels in 1999-2000 levels.[13]

More importantly, the EPA's emphasis on childbearing-age women is misleading. Women in this category are much older, on average, than the average woman who becomes pregnant, and blood mercury levels tend to increase with age.[14]

Analyzing CDC NHANES data through 2004, air quality analysts Joel Schwartz and Steven Hayward report that during 1999-2004, 2.4 percent of *pregnant* women had blood mercury levels exceeding the EPA's RfD, and during 2001-2004, 0.4 percent had levels exceeding the RfD.[15] As of the early 2000s, the actual population at risk (assuming the validity of the EPA's RfD) was only one in every 250 pregnant women, rather than the agency's implication of one in every 14 pregnant women.

How Dangerous Is Mercury in Fish?

Exceeding the reference dose for mercury does not actually put children

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at higher risk for learning disabilities or developmental abnormalities because the EPA's RfD is set at 1/15 the lowest level associated with mild sub-clinical health effects in epidemiological studies. Statistical associations between mercury exposure and neuropsychological test scores do not occur until exposures are 15 times greater than the reference dose. Serious harm, such as mental retardation, requires mercury doses far higher still.

Prenatal exposure is typically measured by mercury concentrations in maternal blood and hair. The EPA's RfD of 0.1 μg/kg-bw/day translates into a maternal blood mercury level of 5.8 parts per billion (ppb) or a hair mercury concentration of approximately 1.2 parts per million (ppm).[16] Schwartz and Hayward report, "The highest mercury exposure measured in a pregnant woman in NHANES was 21.4 ppb during the 1999-2004, or 3.7 times the RfD."[17] That is about one-fourth of the lowest exposure associated with any health effect in epidemiological studies.

Schwartz and Hayward describe the EPA's procedure for setting the RfD:

> To set the RfD, EPA begins with the lowest mercury level associated with any health effect in epidemiological studies. In this case, the starting point was a level in maternal blood of 85 ppb [a value known as the benchmark dose, or BMD]. EPA then takes the bottom of the 95 percent confidence interval for this estimate, which happened to be 58 ppb [a value known as the benchmark dose lower bound, or BMDL]. Then EPA divides this number by safety factors to make sure that no one comes anywhere near an exposure level that might cause harm.... Overall, EPA included a factor of ten for safety, setting the RfD at 5.8 ppb, or one tenth of 58 ppb.[18]

There is no evidence of even mild health effects at the highest mercury exposures measured in the 1999-2004 NHANES, much less of more serious harm, which requires mercury exposures many times greater than the 85 ppb benchmark dose.[19]

The EPA's benchmark dose has problems of its own. The BMD comes from a study of the effects of prenatal mercury exposure on children in the Faroe Islands.[20] The children's mothers had consumed mercury in pilot whale meat and blubber. Prenatal exposure was measured primarily from umbilical cord blood. The researchers administered 20 neuropsychological tests when the children were seven years old. The test most sensitive to mercury exposure was the Boston Naming Test (BNT), in which the children were asked to name objects from line drawings. The lowest exposure associated with poorer scores on the BNT became the benchmark dose.

The appropriateness of the BNT as a diagnostic of child neurological health is questionable, argue medical researchers Gary Myers and Philip Davidson of Rochester University Departments of Neurology and Pediatrics and Conrad Shamlaye of the Seychelles Ministry of Public Health:

> The BNT was developed to detect aphasia and brain damage in adults and is not a standard part of child neurological testing. No biological reason has been proposed as to why the BNT should be particularly sensitive to prenatal methyl-mercury exposure.[21]

The EPA's decision to base the BMD and RfD on the Faroe Islands BNT results is dubious for two additional reasons.

First, children in the Faroe Islands were exposed to methylmercury from maternal consumption of whale meat and blubber, which are not part of the American diet. Whale blubber contains high concentrations of polychlorinated biphenyls (PCBs). According to EPA, PCBs can cause "persistent and significant deficits in neurological development, including visual recognition, short-term memory and learning."[22] Although the researchers believe they adjusted for the confounding effects of PCB exposure, they acknowledge that, "[E]specially for the Boston Name Test, the PCB concentration appeared to be an important predictor."[23]

Second, the Seychelles Child Development Study (SCDS), a 20-year ongoing assessment of approximately 770 children whose mothers ate ocean fish an average of 12 meals per week, found no consistent association between prenatal mercury exposure and over 60 primary test outcomes, even though mothers in the Seychelles study had higher average hair-mercury concentrations (6.9 ppm) than did mothers in the Faroe Islands study (4.27 ppm). The researchers found one adverse association, two beneficial associations, and one that was difficult to categorize. They "concluded that these associations were consistent with chance and that the study provided no support for an adverse association between child neurodevelopment and prenatal exposure to methylmercury from maternal consumption of ocean fish at the levels being studied."[24]

The EPA contends that methylmercury exposures in U.S. subsistence fishing households (households that obtain much of their daily protein from self-caught fish) may decrease a child's IQ by more than seven IQ points.[25] This assumes a particular dose-response function allegedly derived from epidemiological studies in the Faroe Islands, Seychelles, and New Zealand. It also assumes a maternal mercury hair concentration of 40 ppm.[26] Concentrations that high are very rare.

A mercury hair concentration of 40 ppm is 33 times the RfD of 1.2 ppm. Recall that no pregnant women in NHANES had a blood mercury level higher than 3.7 times the EPA's RfD. The agency has not actually identified any women of childbearing age (much less any pregnant women) with methylmercury levels nine times higher than the highest levels measured in NHANES. Rather, such women "exist" in the EPA's computer models. The agency itself states:

> In this analysis, we have focused on a subset of female subsistence-level fish consumers that we believe (a) could potentially exist at a subset of watersheds evaluated in this analysis and (b) are likely to experience higher risk due to their behavior (i.e. ...consume larger amounts of self-caught fish). While we believe it is reasonable to assume that a subset of high-end fishers have these attributes, it is not possible at this point to definitively state at which water-bodies they are active or to enumerate them for purposes of generating population-weighted risk distributions.[27]

To estimate methylmercury-induced IQ losses in the U.S., the EPA relies on a single study by EPA scientist Daniel Axelrad and colleagues,[28] who attempt to derive a dose-response function from the Faroe Islands, Seychelles, and New Zealand studies. The Axelrad study estimates an IQ loss of 0.18 IQ points for every 1 ppm increase in maternal mercury hair concentration.[29]

This is problematic for several reasons. As the Axelrad team acknowledges, the Seychelles study found that higher mercury exposure was not associated with lower IQ.[30] The Faroe Islands study is based on a diet almost unique in the world—whale meat and blubber—and, as mentioned earlier, PCB confounding cannot be ruled out. Furthermore, the Faroes study included only three of out 10 subtests of the standard IQ test for children,[31] so any dose-response function derived from the study should be regarded as tentative at best.

The New Zealand study found an association between mercury exposure and lower test scores, but acknowledges that, "any effect of mercury is small compared to the influence on these tests of other factors such as ethnic group and social class,"[32] again raising the issue of potential confounding. A re-analysis of the New Zealand study confirmed an adverse association but only if one child with an exposure more than four times that of any other—a maternal hair mercury concentration of 86 ppm—was excluded.[33] None of the child's test scores were "outliers," and the researchers do not explain the propriety of omitting the child for purposes of estimating a dose-response

function. Apparently, the child had to be removed to create an adverse association, because his cognitive test scores were about average.

It has been 22 years since Congress required the EPA to study the health effects of mercury, and a dozen since the agency published its "appropriate and necessary" finding. Yet just as the agency has not identified a single pregnant woman with mercury levels 33 times greater than the RfD (or anywhere close to that level), so it has not identified a single child whose learning or other disabilities can be traced to prenatal mercury exposure. This is not surprising, because *none* of the children in the Seychelles, Faroe Islands, or New Zealand studies was learning disabled, or cognitively abnormal in any way, despite having mercury exposures many times greater than those of most American children.[34]

HAP Reductions: Costs Swamp Benefits

The EPA estimates that utilities will spend $9.6 billion to comply with the MACT Rule in 2016. The agency also estimates that the required reductions in mercury emissions will produce between $0.5 million and $6 million in quantified health benefits in the same year. The agency does not quantify the health benefits of reductions in other HAPs such as arsenic, chromium, nickel, dioxin, and acid gases.[35]

Compliance costs exceed the monetized health benefits from the HAP reductions that are the rule's statutory purpose by a ratio of 1,600 to 1 or even 19,200 to 1.

Yet even those numbers likely overstate the Rule's benefits, because the EPA's benefit calculation rests on questionable assumptions.

The EPA assumes that prenatal methylmercury exposure can be translated into IQ loss, which can then be converted into lost lifetime income. As discussed above, the EPA assumes a dose-response function based on a single study—Axelrad et al. 2007—that is not an analysis of new data but an "integrative assessment" of three studies, the most reliable of which, the Seychelles study, found no association between IQ and maternal consumption of mercury in fish.

The EPA's benefit calculation assumes that reductions in mercury emissions translate into proportional reductions in methylmercury fish concentrations. Yet the agency acknowledges that water chemistry (ph, levels of dissolved carbon, sulfate levels) can have a larger impact on methylation rates than does atmospheric mercury deposition.[36]

The EPA's benefit calculation assumes that mercury emission reductions achieved by 2015 produce proportional reductions in methylmercury exposure *by the next year*. Yet the agency acknowledges that the Utility MACT

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Given the doubtful character of the EPA's assumptions, it is not clear that the Utility MACTS Rule's mercury reductions have any quantifiable benefits.

rule may not reduce fish tissue concentrations for "years to decades depending on the attributes of the watershed or water bodies involved."[37]

The EPA's benefit calculation assumes that the relationship between IQ and income is linear and holds even for minute changes in IQ. Citing studies, the EPA assumes that each additional IQ point raises an average individual's lifetime earnings by 1.76 percent to 2.37 percent. The agency projects that the Utility MACT Rule will reduce methylmercury-related IQ losses in 2016 by 511 IQ points nationwide, or by about 0.00209 IQ points per each of 240,000 prenatally-exposed children.[38] The agency then deduces that the present value of those saved IQ points is $0.5 million to $6 million in 2016. None of this is verifiable even in principle, because IQ cannot be accurately measured out to five decimal places. For the same reason, it is impossible to determine whether the relationship between IQ and income holds for increments as small as 0.00209 IQ points. Given the doubtful character of the EPA's assumptions, it is not clear that the Utility MACT Rule's mercury reductions have any quantifiable benefits.

The EPA estimates that in the case of children whose mothers eat self-caught fish at the 95th percentile consumption rate (139 lbs. per year) from water bodies at the 95th percentile level of methylmercury contamination, the IQ loss attributable to power plant emissions of mercury is 0.2 IQ points.[39] Even assuming the correctness of the EPA's dose-response function, standardized intelligence tests may not be precise enough to verify a health benefit from even total elimination of power plant emissions.

As noted earlier, the EPA does not attempt to quantify the benefits of the Utility MACT Rule's reductions in other metallic HAPs (such as arsenic, cadmium, chromium, and nickel) and acid gases. Let us briefly consider why such benefits, if any, cannot be quantified.

Some non-mercury metallic HAPs (such as chromium hexavalent and nickel) are carcinogens. The Rule aims to limit cancer risk in the vicinity of coal- and oil-fired power plants to one in 1 million—the likelihood that no more than "one person, out of one million equally exposed people would contract cancer if exposed continually (24 hours a day) to the specific concentration over 70 years (an assumed lifetime)."[40] The EPA found that five of 16 facilities it modeled have maximum cancer risks exceeding that threshold, with one facility posing a risk of five in 1 million. In the agency's judgment, the presence of risks greater than one in 1 million is another reason why the Utility MACT Rule is "appropriate and necessary."

An industry-sponsored analysis concludes that sampling contamination

by the EPA's testing equipment falsely inflated the cancer risk at the five aforementioned facilities.[41] But even if the agency's test data are accurate, the Rule's reduction in cancer risk exists only in the EPA's model. Few people live in the same place continuously for 70 years. Men in the U.S. have a one-in-two lifetime risk of developing cancer; women have a one-in-three lifetime risk.[42] The effect of power plant emissions on lifetime cancer risk is therefore negligible. Consequently, the Utility MACT Rule's impact on cancer risk is also negligible.

Quantified benefits are also not available for the Rule's reductions in acid gases. The EPA assigns a hazard quotient (HQ) for exposures of airborne pollutants based on a reference concentration (RfC)—the daily exposure assumed to be safe over a lifetime. The acid gas of greatest concern is hydrogen chloride (HCl). The EPA set the RfC for HCl emissions at 20 micrograms per cubic meter (20 $\mu g/m^3$).[43] The agency assigns an HQ of one to an exposure exactly matching the RfC, an HQ of two to an exposure twice the RfC, and so on. For the 16 facilities EPA modeled, the HQs for HCl ranged from 0.05 to 0.005[44]—20 to 200 times lower than the agency's maximum safe lifetime exposure level. It is therefore impossible to quantify the benefits, if there are any, from the Rule's HCl reductions.[45]

The EPA claims there are "substantial" non-quantified benefits associated with HAP reductions. However, nearly all of the claimed non-quantified benefits are due to incidental reductions in non-HAP pollutants such as fine particulate matter ($PM_{2.5}$), ozone, nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). The agency attributes some non-quantified benefits—such as reduced risk of adverse immunologic and developmental effects—to reductions in mercury emissions.[46] But mercury is the only HAP for which the EPA provides either quantified or non-quantified benefits. The agency lists no non-quantified benefits for reductions in other metallic HAPs or acid gases.[47]

EPA Relies on Dubious Co-Benefits to Make the Utility MACT Rule Look Reasonable.

Despite the immense disproportion between the costs and benefits of the HAP reductions that are the Rule's statutory purpose, the EPA assures us the Utility MACT Rule will pay for itself many times over. This supposedly is due to the "co-benefits" of coincidental reductions in non-HAP emissions, particularly sulfur dioxide, a precursor of fine particulate matter. According to the agency, the Rule's $PM_{2.5}$-related co-benefits include 11,000 fewer premature deaths, 4,700 fewer heart attacks, 130,000 fewer asthma attacks, and 540,000 fewer missed work days.

The EPA claims there are "substantial" non-quantified benefits associated with HAP reductions. However, nearly all of the claimed non-quantified benefits are due to incidental reductions in non-HAP pollutants.

The EPA estimates the value of the co-benefits at $33 billion to $89 billion annually, equivalent to $3 to $9 in health benefits for every dollar of cost.[48] None of this is credible.

Fine particulate matter is already regulated under other Clean Air Act provisions (Sections 107-110), which establish the National Ambient Air Quality Standards (NAAQS) program. Under those provisions, the EPA must set "primary" NAAQS at a level "requisite to protect public health" with "an adequate margin of safety," and States must adopt State Implementation Plans (SIPS) to attain the NAAQS in a timely fashion.[49]

The 11,000 fewer premature deaths account for more than 90 percent of the co-benefits which the EPA ascribes to the Utility MACT Rule's coincidental $PM_{2.5}$ reductions.[50] However, as economist Anne E. Smith of NERA Economic Consulting points out, nearly all of the estimated 11,000 premature deaths averted "are in areas that are already in attainment with the current $PM_{2.5}$ annual NAAQS of 15 µg/m."[3] In other words, "Under current EPA policy, all those estimated deaths would be deaths of people living in areas that are protected with an 'adequate margin of safety' for $PM_{2.5}$ risks."[51]

The EPA cites two studies—Pope et al. 2002[52] and Laden et al. 2006[53]—to justify its extrapolation of large health benefits from $PM_{2.5}$ levels below the NAAQS.[54] The lowest measured level (LML)[55] for a $PM_{2.5}$-mortality association in the Laden study is 10 µg/m;[3] the LML in the Pope study is 7.5 µg/m.[3] As Smith points out, however, the EPA extrapolates mortality effects "far below the lowest levels of $PM_{2.5}$ for which risks have ever been estimated in the epidemiological literature."[56] She calculates that, "if EPA had not extrapolated [health benefits] below the [Pope and Laden] LMLs, about 89 percent of the estimated upper bound of MATS co-benefits would have been estimated at zero."[57]

The EPA is reviewing the 15 $\mu g/m^3$ annual NAAQS for $PM_{2.5}$, and agency staff is considering alternative standards in the range 13 to 11 $\mu g/m^3$.[58] However, even under this more stringent NAAQS, nearly all of the Utility MACT Rule's $PM_{2.5}$ co-benefits disappear unless one assumes that air quality deemed by the EPA to be healthy with an adequate margin of safety is in fact deadly. As Smith explains:

> [B]etween 94 percent and nearly 100 percent of the 11,000 $PM_{2.5}$ mortality benefits that EPA has estimated from the Final EGU [electric generating unit] MACT are attributed to $PM_{2.5}$ concentrations below levels that the Administrator will still deem protective of the public health with an adequate margin of safety even if EPA revises the annual $PM_{2.5}$ NAAQS to a level within

its recommended range of 11 μg/m^3 to 13 μg/m^3.[59]

The EPA tries to explain how large $PM_{2.5}$-related health benefits can accrue at levels below the NAAQS:

> It is important to emphasize that NAAQS are not set at a level of zero risk. Instead, the NAAQS reflect the level determined by the Administrator to be protective of the public health within an adequate margin of safety, taking into consideration effects on susceptible populations. While benefits occurring below the standard may be less certain than those occurring above the standard, EPA considers them to be legitimate components of the total benefits estimate.[60]

That is unconvincing. How can a standard be "protective of public health" with "an adequate margin of safety" yet allow 11,000 premature deaths annually? Why would the EPA not set the NAAQS low enough to avoid 11,000 premature deaths if attainment would yield monetized benefits of $33 billion to $89 billion annually? The net benefits of such a NAAQS would presumably be larger than those of the MACT Rule, because states would have the flexibility to devise targeted $PM_{2.5}$ control strategies tailored to their respective economies, instead of having to comply with a one-size-fits-all program of nationwide MACT requirements for non-PM pollutants. The fact that the EPA is not even considering setting the annual $PM_{2.5}$ NAAQS below 11-13 μg/m^3 suggests that it does not regard health risks below those levels as credible.[61]

Underpinning the EPA's co-benefits estimate is the controversial assumption that $PM_{2.5}$ exposure causes or contributes to premature death at almost any level above zero.[62] Smith cautions that this linear-to-zero/no-threshold assumption leads to untenable conclusions. It implies that in 2005, 22 percent of all deaths in many parts of the U.S. were attributable to $PM_{2.5}$. It also implies that 25 percent of all deaths nationwide were due to $PM_{2.5}$ as recently as 1980. Those implications "stretch the bounds of credulity, and thus undercut the credibility of all of EPA's $PM_{2.5}$-related mortality benefits estimates."[63]

It is not even evident that $PM_{2.5}$ levels above the current 15 μg/m^3 NAAQS are cause for concern. The EPA set the NAAQS based on two epidemiological studies, an American Cancer Society (ACS) study[64] and the Harvard Six Cities (HSC) study.[65] The main weakness of such epidemiological studies is that their validity depends on adequate identification and adjustment for confounding factors. Confounders can include demographic shifts (younger, healthier people leaving the study area in search of better economic opportunities elsewhere), personal habits (diet,

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exercise level, smoking), meteorology, and other pollutants (including indoor air pollutants).

Schwartz and Hayward note that a reanalysis of the ACS study "revealed biologically implausible anomalies," suggesting that the study found chance correlations rather than real causal relationships:

> For example, $PM_{2.5}$ appeared to kill men but not women, those with no more than a high school education but not those with some college; and the moderately active but not the very active or the sedentary.[66]

Odd results in the HSC study also suggest the influence of unknown or uncontrolled confounders:

> It, too, found no association between $PM_{2.5}$ and mortality for people with more than a high school education. The HCS study also reported a statistically significant decrease in mortality due to respiratory causes in areas with higher $PM_{2.5}$ levels.[67]

Julie Goodman of the Harvard School of Public Health notes the ACS and HCS studies are "not consistent with many epidemiology studies indicating no correlation between reducing $PM_{2.5}$ and health benefits or experimental studies indicating an exposure threshold below which $PM_{2.5}$ is not likely to overwhelm the body's natural defenses."[68] She cites six studies that do not find a $PM_{2.5}$-mortality link. "EPA placed no weight on these latter studies, and thus did not consider a possible null or no-effect association" when assessing the health benefits of $PM_{2.5}$ regulation. "Thus," Goodman concludes, "EPA's analysis led to grossly inflated estimates of benefits."[69]

The EPA identifies no direct health benefits, either quantified or non-quantified, from the Utility MACT Rule's required reductions in acid gas emissions.

No Plausible Biological Mechanism

As noted above, the EPA identifies no direct health benefits, either quantified or non-quantified, from the Utility MACT Rule's required reductions in acid gas emissions. Nonetheless, without the MACT for acid gases, even the EPA would have to admit that the Rule's costs overwhelm its benefits. About 95 percent of the co-benefits which the EPA projects for the Rule depend on the MACT standards for acid gases.[70] This is not entirely implausible, because the same technology that reduces acid gas emissions—flue gas desulfurization—also reduces sulfur dioxide, which forms the sulfate component of $PM_{2.5}$. There is just one problem: Sulfate PM is not toxic, making it an unlikely killer.[71] Schwartz and Hayward explain:[72]

> The main form of particulate matter from coal-fired power plants is ammonium sulfate, formed from sulfur dioxide emissions, as well as smaller amounts of ammonium nitrate formed from NO_X [nitrogen oxides]. But laboratory studies with human volunteers, including

volunteers with respiratory diseases, have shown that sulfate and nitrate are not toxic, even at levels many times the maximum levels found in ambient air.[73] In fact, ammonium sulfate has been used as an inert control—that is, a harmless compound—in studies of the health effects of aerosols. Inhaled magnesium sulfate is used therapeutically to *reduce* airway constriction in asthmatics.[74]

At most, the EPA addresses this issue obliquely: "We assume that all fine particles, regardless of their chemical composition, are equally potent in causing mortality."[75] In plain English, the agency knows of no biological mechanism that could account for the supposed health effects it attributes to sulfate PM.

More Harm than Good

People generally use part of their income to enhance their health and safety. This is why regulations imposing large costs for little or no public health benefit are not only wasteful but also harmful. Spare-no-expense, health-at-any-cost regulation ignores the obvious connection between livelihoods, living standards, and life expectancy. Some research indicates that every $15 million in additional regulatory cost induces one additional fatality.[76] If that estimate is correct, the Utility MACT Rule, with its annual $9.6 billion price tag, could potentially contribute to 640 premature deaths.

In any case, a prosperous economy supports the development of improvements in health care and makes those improvements more widely available. In contrast, a faltering economy diminishes investment in R&D and curbs spending on life- and health-enhancing goods and services. NERA Economic Consulting, Inc. estimates that four EPA regulations affecting power plants—the Utility MACT, Cross State Air Pollution, coal combustion residuals, and cooling water intake rules—could reduce average annual disposable income by $34 billion from 2012 to 2020.[77] The rules could reduce by billions of dollars household spending on health care and other priorities.

NERA also estimates that those four EPA regulations will cause an average annual net loss of 183,000 jobs from 2012 to 2020.[78] Unemployment is stressful and associated with unhealthy habits such as smoking and excessive drinking. Many studies find that unemployment increases the risk of sickness and death.[79]

The EPA claims that the Utility MACT Rule delivers up to $89 billion in annual health benefits. If that were correct, the Rule's benefits would more than offset its adverse income-related health effects. However, the agency's benefit estimate for the Rule appears to be

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wildly exaggerated. It is reasonable to conclude that the Utility MACT Rule will do more harm than good to public health.

Costs of the Utility MACT Rule

The remaining sections of this paper examine the Utility MACT Rule's impacts on energy markets and employment. Our review of the evidence suggests that the Rule will effectively ban construction of new coal-fired power plants. Combined with other EPA regulations affecting utilities, the Rule will compromise electric supply reliability and impose net job losses.

The EPA's Utility MACT Rule effectively bans the construction of coal-fired power plants, by establishing mercury emissions limits that are so stringent they cannot reliably be measured.

The Utility MACT Rule Effectively Bans the Construction of New Coal-Fired Power Plants

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That is the opinion not only of the coal industry, which has the most to lose, but also of the pollution abatement industry, the biggest beneficiary of the Utility MACT Rule. According to Babcock & Wilcox Power Generation Group, a leading manufacturer of emissions control equipment, "The current state of the art CEMS [continuous emissions monitoring systems] technologies available and referenced in the Mercury and Air Toxics Standards [Utility MACT] rule are not capable of measuring emissions levels needed to comply with the new unit limits."[80] The company, in a petition to the EPA, provided data demonstrating that the Rule's mercury limit is a third of the detection limit of current monitoring technology. For acid gases, the MACT sets the emissions limit almost 20 times below the detection limit.[81]

The Utility MACT Rule establishes emissions targets that cannot reliably be measured, so pollution control vendors cannot issue guarantees that their equipment will achieve compliance with the regulation. Without such guarantees, investors cannot be sure that new generating units will be in compliance with EPA regulations. Whether utilities could raise capital to build coal-fired power plants is doubtful.

This dilemma is explained by the Institute for Clean Air Companies (ICAC), the primary trade association for the pollution control industry, in testimony filed before the EPA:

> Our member companies cannot ensure that the final new source [mercury emissions] standard can be achieved in practice. Thus, ICAC member companies are not in a position to offer commercial guarantees to their customers to meet this particular standard…This standard will make it nearly impossible to construct a new

coal-fired EGU (Electric Generating Unit) because financing of such units requires guarantees from equipment suppliers that all emission limits can be met.[82]

A related problem is that compliance with the Rule's MACT standards for hydrogen chloride may be impossible to achieve. In the final rule, the EPA identified a single coal-fired power plant in New Jersey—the Logan Generating Station—which supposedly meets the Rule's MACT standards for HCl emissions.[83] It does not. The agency's own supporting documentation demonstrates that the Logan Generating Station fails to achieve the new emissions standards 80 percent of the time.[84]

The EPA's authority to regulate HAPs pursuant to the Clean Air Act does not empower the agency to ban the construction of new coal-fired power plants. By effectively taking the nation's most abundant energy resource—coal—off the table, the Utility MACT Rule violates Congress's intent.

The Utility MACT Rule Combined with other EPA Rules Compromise Electric Reliability

The Utility MACT Rule, combined with other final or pending EPA regulations, jeopardizes the reliable provision of electricity. Twenty-four states are challenging the regulation in the D.C. Circuit Court of Appeals, due largely to the EPA's failure to respond to their concerns regarding reliability.[85] Never before have so many states litigated to stop an EPA air regulation.[86]

The EPA did perform an assessment of how the Utility MACT Rule would affect the power industry, and concluded it would "have little to no overall impact on electric reliability."[87] However, the agency's analysis has been challenged by other federal regulators. As part of an inter-agency process, the Federal Energy Regulatory Commission (FERC) Office of Electric Reliability reviewed the EPA's methodology and concluded that its assessment failed to account for:

- Local reliability issues;
- Voltage support;
- Transmission flow constraints; and
- Frequency implications of closures.[88]

Thus, other federal regulators, whose job it is to ensure the reliability of the electric grid, determined that the EPA's reliability assessment omitted virtually all factors that could affect reliability.

Most troublingly, the EPA failed to perform a cumulative analysis. In addition to the Utility MACT Rule, there are several other major pending EPA regulations that will have a significant impact on the electricity sector. These include:

The Utility MACT Rule, combined with other final or pending EPA regulations, jeopardizes the reliable provision of electricity.

Rather than spend hundreds of millions of dollars installing pollution controls in order to comply with the Utility MACT Rule, the operators of many coal-fired power plants are choosing to retire them.

- Clean Water Act 316(b) cooling water intake structures rule;
- Coal Combustion Residuals Rule;
- Cross State Air Pollution Rule;
- Regional Haze Rule;
- New Source Performance Standards for existing coal-fired power plants; and
- Revised National Ambient Air Quality Standards for particulate matter and ozone.

The agency, however, did not assess the cumulative impact of these rules on reliability. Its failure to do so flouts President Obama's Executive Order 13,563[89], which requires the EPA to "[take] into account, among other things, and to the extent practicable, the costs of cumulative regulations." In response to written questions from the House Energy and Commerce Committee, FERC Chairman Jon Wellinghoff explained, "[T]he effects to system reliability are based on the cumulative impact of all the proposed regulatory factors." Wellinghoff expressed puzzlement as to why the EPA did not take these factors into account.[90]

The EPA's analysis has already been belied by events. Rather than spend hundreds of millions of dollars installing pollution controls in order to comply with the Utility MACT Rule, the operators of many coal-fired power plants are choosing to retire them. According to the agency's Regulatory Impact Analysis, almost 10,000 megawatts of electric generating capacity are expected to shutter as a result of final regulations pursuant to the Clean Air Act.[91] In fact, utility companies have already announced that they plan to shut down more 25,000 megawatts of electricity generation, rather than upgrade them with pollution-control technology.[92]

In its 2011 Long-Term Reliability Assessment, the North American Electric Reliability Corporation (NERC) estimated that pending and final EPA regulations would lead to the retirement of 36,000 to 59,000 megawatts of electricity generation, in addition to the almost 40,000 megawatts of coal-fired power plants whose operators already have announced would close.[93] In the report, NERC warns that, "Environmental regulations [promulgated by EPA] are shown to be the number one risk to reliability over the next one to five years."[94]

NERC's analysis is backed by FERC's Office of Electric Reliability, which performed its own assessment and concluded that EPA regulations would "likely" shutter 81,000 megawatts of electricity generation.[95] These plant closure estimates, provided by non-partisan reliability organizations, are eight times greater than the EPA's own predictions.

In addition to retiring a significant portion of the nation's electric generating capacity, the Utility MACT Rule also threatens reliability by demanding a sweeping overhaul of the nation's electricity sector on a very tight schedule. NERC projects that 234,000 to 258,000 megawatts of coal-fired generating capacity will require retrofits due to the EPA's rules.[96] For those coal-fired power plants whose operators decide to fuel-switch to natural gas, pipeline infrastructure must be built. And transmission upgrades will be necessary for the electric grid to accommodate the closure of many coal-fired power plants due to EPA regulations. These are all capital-intensive engineering projects that require years to permit and execute.

Historically, such retrofits and infrastructure improvements have taken six years for investor-owned utilities,[97] and almost seven years for publicly owned utilities.[98] The EPA, however, is giving utilities three years to comply, with an additional one or two years for "reliability critical" units.[99] As such, most utilities are expected to install pollution controls or upgrade infrastructure three to four years faster than usual.

The EPA's deadline poses two major problems for electric reliability. First, power plants would have to cease electricity generation while pollution control retrofits are installed. Second, utilities all rushing to meet the same tight deadline could create a bottleneck of outages at the end of the compliance period, with the preponderance of these scheduled outages likely taking place within the same compressed time-frame from 2015 to 2017. According to the NERC Long Term Reliability Analysis, "The need to take multiple units out-of-service on extended scheduled outages can exacerbate adequacy concerns and reduce needed flexibility."[100]

These concurrent outages will compound the difficulties faced by utilities as they try to replace the massive amounts of coal-fired capacity that will retire rather than comply with the Utility MACT Rule. New natural gas pipeline and transmission upgrades will have to be built just to keep the lights on. These sorts of infrastructure projects—many of which would require securing rights-of-way—can take more than five years to complete, due in large part to "not-in-my-backyard" and environmental pressure group opposition.

NERC projected that, by 2018, capacity margins could fall below key reliability thresholds in virtually every service territory east of the Mississippi River, due to plant closures and inflexible compliance schedules.[101]

The Utility MACT Rule also threatens reliability by demanding a sweeping overhaul of the nation's electricity sector on a very tight schedule.

The EPA's own analysis does not show that the Utility MACT Rule will result in net job creation.

The Utility MACT Rule and other EPA Rules Affecting Utilities Will Impose Net Job Losses

The EPA estimates that the Utility MACT Rule will cost $9.6 billion annually, making it one of the most expensive air regulations ever. Despite this price tag, the agency claims that the regulation will benefit the economy. For example, in July 2011 testimony before the House Oversight and Government Reform Committee, EPA Deputy Administrator Robert Perciasepe stated, "Our analysis shows, particularly on these utility rules, that it will create jobs."[102] Head Administrator Lisa Jackson has repeated the same claim. She said last year, "Every model that we run shows… that it would actually create jobs."[103]

These claims are misleading. The EPA's own analysis does not show that the Utility MACT Rule will result in net job creation, only that it will create construction jobs in the utility industry and increase hires in companies that produce pollution abatement equipment. The analysis ignores the wider economic repercussions. The EPA Regulatory Impact Analysis (RIA) states, "[T]he Agency has not quantified the rule's effects on all labor in other sectors not regulated by the [mercury standard]."[104] In other words, the agency's model runs give a one-sided picture, ensuring that the EPA got a politically convenient result.

The EPA's analysis focuses on proving that electric utility employment is not threatened. It argues that the regulation will create 8,000 coal power plant-related jobs. The agency bases its estimate on a 2002 Resources for the Future study (Morgenstern et al.) of environmental expenditures in four industries in the 1980s—pulp and paper, plastics, petroleum, and steel. The study found "a net gain of 1.55 jobs per $1 million in additional environmental spending" in those industries.[105] The EPA then took this formula and just multiplied 1.55 by the estimated cost of the Utility MACT—$10.9 billion adjusted for inflation (0.55)—to get its result.

This bears repeating: The EPA's economic model assumes that each dollar spent on regulatory compliance creates job growth, with no diminishing returns. By this logic, the more businesses spend on regulatory compliance, the more jobs they create. In fact, based on the formula underpinning EPA's jobs impact estimate for the Utility MACT Rule, a $14 trillion rule—a rule equivalent in cost to the nation's annual GDP—would create 11,935,000 jobs. The economic consequences of such a rule would, however, be devastating.

Using this formula, the EPA can impose unlimited costs and always claim that it will create jobs in the industry. This assumption is ludicrous on its own, but it is made even worse in the context of the assumption made in the

Morgenstern study. The authors concluded that their analysis applied to less competitive industries with inelastic demand, but the demand for coal is not inelastic. Coal is in constant competition with an immediately presentable substitute good in natural gas, while industries like petroleum, for example, have no substitute. In fact, coal is not even its own "industry," but a subset of the electricity generation industry.

Morgenstern, et al note that plants should not fear losing business if they are all subject to the same regulation, but the Utility MACT does not apply to natural gas, so the exact opposite is true. The EPA fails to acknowledge this in its regulatory impacts assessment.

The agency notes that regulation often requires more workers to produce a given amount. But this is bad for coal workers because the economic surplus from their activities is now divided among more workers, which means wages will fall. Moreover, that given output—according to the Morgenstern, et al analysis—will also fall under environmental regulation, so the surplus to be divided will be smaller, leading to a further fall in wages. The EPA also neglects to mention this fact.

The proper goal of economic policy is not job creation but wealth creation, since it is possible to increase employment by decreasing the productivity of labor. As it happens, most of the 8,000 "annual recurring" jobs in EPA's estimate appear to be engaged in regulatory compliance, not in producing and delivering power. As the Morgenstern study points out, "[E]nvironmental activities may be more labor intensive than conventional production. For example, cleaner operations may involve more inspection and maintenance activities."

In any case, the EPA misses the big picture: the combined effect of its rules on employment. As previously noted, in a report commissioned by the American Coalition for Clean Coal Electricity, NERA Economic Consulting projected that EPA regulations targeted at the power sector would result in an average net loss of 183,000 jobs per year and cumulative net job-year losses of 1.65 million through 2020.[106]

Many of the Rule's costs will be passed on to consumers in the form of higher electricity prices. NERA estimates that utilities will have to increase capital spending by $84 billion from 2012 to 2015.[107] The American Legislative Exchange Council projects that pending and final EPA rules will increase utility bills by 11.4 percent.[108] Americans—especially the poor and elderly—will have less disposable income as a result of these electricity rate hikes. In testimony before the House Energy and Commerce Committee, NERA's Anne Smith forecasts that the Utility MACT Rule alone will decrease worker income by the equivalent of 200,000 full time jobs.[109]

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Conclusion

The EPA's Utility MACT Rule will impose large costs on the U.S. economy for negligible benefits.

The Rule's purpose is to regulate the emission of hazardous air pollutants from coal- and oil-fired power plants. Of the 13 HAPs addressed by the Rule,[110] the EPA could quantify the benefits of reducing emissions for only one: mercury. The agency based its benefits estimate on the monetary value of preventing a loss of 0.00209 IQ points per child born to subsistence fisher-women, the target population whom the regulation is supposed to protect. However, such a slight decrease cannot be detected; it is a modeling projection based on a chain of dubious assumptions.

The EPA's estimate of large co-benefits from coincidental reductions in $PM_{2.5}$ are not credible. Up to 89 percent of the co-benefits are attributed to $PM_{2.5}$ reductions below the lowest concentrations associated with mortality risk in any epidemiological studies.

The Utility MACT Rule is one of four major pending or final EPA regulations affecting the utility sector that could reduce average annual employment by 183,000 jobs annually and increase electric rates by almost 11 percent. And because all businesses and households consume electricity, higher utility bills are akin to a national tax. The rules will cause net job losses, in addition to decreasing Americans' purchasing power.

The Utility MACT Rule will also effectively ban the construction of new coal-fired power plants, by establishing compliance criteria that may be impossible to monitor (in the case of mercury) or to meet (in the case of hydrogen chloride). In this fashion, it will erect a regulatory barrier between America and our most abundant electricity fuel.

In addition, the Utility MACT Rule—along with a suite of other EPA regulations—jeopardizes electric supply reliability. The EPA inexplicably failed to perform a cumulative analysis of how these utility regulations would impact electric reliability, despite numerous comments from state officials and other federal regulators asking the agency to do so.

The Senate is expected to consider a Congressional Review Act (CRA) resolution of disapproval aimed at overturning the Utility MACT Rule. In September 2011, the House of Representatives passed the Transparency in Regulatory Impacts on the Nation (TRAIN) Act (H.R. 2401), by a vote 249-169. The TRAIN Act would nullify the Utility MACT Rule and direct the EPA to adopt a less burdensome control strategy for addressing HAP emissions from electric power plants. There is no chance Congress would enact the Utility MACT Rule were it introduced as legislation and put to a vote.

NOTES

1 U.S. Environmental Protection Agency, 77 FR 9411, *National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Steam Electric Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units*, February 16, 2012 (hereafter Final Utility MACT Rule).

2 EPA, Final Utility MACT Rule, 77 FR 9306.

3 Gary J. Myers, Philip W. Davidson, and Conrad F. Shamlaye, "Developmental Disabilities Following Prenatal Exposure to Methyl Mercury from Maternal Fish Consumption: A Review of the Evidence," *Neurotoxicity and Developmental Disabilities,* Vol. 30 of the *International Review of Research in Mental Retardation*, edited by Davidson PW, Myers GJ, and Weiss B, Elsevier: Amsterdam 2006.

4 David O. Marsh, "Organic mercury: clinical and neurotoxicological aspects," *Handbook of Clinical Neurology*, Vol. 20 (64): *Intoxications of the Nervous System*, Part I, F. A. Wolff, editor, Elsevier Science B.V.

5 Myers, Davidson, and Shamlaye, p. 3.

6 42 USC § 7412.

7 EPA, 76 FR 24982-24985, *National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Steam Electric Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units*, May 3, 2011, proposed rule (hereafter Proposed Utility MACT Rule).

8 EPA, Proposed Utility MACT Rule, 76 FR 24981.

9 The EPA defines "reference dose" (RfD) as "the amount of a chemical which, when ingested daily over a lifetime, is anticipated to be without adverse effects to humans, including sensitive subpopulations." EPA, *Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Steam Generating Units*, 65 FR 79826, December 20, 2000 (hereafter Appropriate and Necessary Finding).

10 EPA, Appropriate and Necessary Finding, 65 FR 79827-79828.

11 EPA, *Revised Technical Support Document: National Scale Assessment of Mercury Risk to Populations with High Consumption of Self-Caught Freshwater Fish, In support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units*, December 2011, p. 7, fn. 9 (hereafter Revised TSD).

12 EPA, Appropriate and Necessary Finding, 65 FR 79827.

13 U.S. Centers for Disease Control and Prevention, Blood Mercury Levels in Young Children and Childbearing-Aged Women – United States, 1999-2002, *Morbidity and Mortality Weekly Report 53*, November 5, 2004/53(43); 1018-1020, http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5343a5.htm.

14 Lindsey Jones, Jennifer D. Parker, and Pauline Mendola, Blood Lead and Mercury Levels in Pregnant Women in the United States, 2003-2008, *NCHS Data Brief* No. 52, December 2010, http://www.cdc.gov/nchs/data/databriefs/db52.pdf.

15 Joel M. Schwartz and Seven E. Hayward, *Air Quality in America: A Dose of Reality in Air Pollution Levels, Trends, and Health Risks* (Washington, D.C.: American Enterprise Press), 2007, p. 169.

16 Myers, Davidson, and Shamlaye, p. 12.

17 Schwartz and Hayward, p. 170.

18 Ibid., p. 169.

19 Ibid., p. 170.

20 Philippe Grandjean, Pal Weihe, Roberta F. White, Frodi Debes, Shunichi Araki, Kazuhito Yokoyama, Katusyiuki Murata, Nicolina Sorensen, Rasmus Dahl, and Poul J. Jorgensen, Cognitive Deficit in 7-Year-Old Children with Prenatal Exposure to Methymercury, *Neurotoxicology and Teratology*, Vol. 19, No. 6, 1997, pp. 417.

21 Myers, Davidson, and Shamlaye, p. 14.

22 EPA, Health Effects of PCBs, http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/effects.htm.

23 Grandjean et al., p. 425.

24 Myers, Davidson, and Shamlaye, p. 10.

25 EPA, *Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards*, December 2011, p. 4-3 (hereafter RIA).

26 Ibid., pp. 4-3, fn. 2.

27 EPA, Revised TSD, p. 9, fn. 14. Consider also Revised TSD, pp. 32-33: "This task [estimating population at risk] was challenging because we do not have data characterizing the number and location of subsistence fishers for any of the fishing populations under consideration."

28 Ibid., p. 117.

29 Daniel A. Axelrad, David C. Bellinger, Louise M. Ryan, and Tracey J. Woodruff, "A Dose-Response Relationship of Prenatal Mercury Exposure and IQ: An Integrative Analysis of Epidemiologic Data," *Environmental Health Perspectives*, Vol. 115, No. 4, April 2007, pp. 609-615.

30 Gary J. Myers, Philip W. Davidson, Christopher Cox, Conrad F. Shamlaye, Donna Palumbo, Elsa Cernichiari, Jean Sloanne-Reeves, Gregory E. Wilding, James Kost, Li-Shan Huang, and Thomas W. Clarkson, "Prenatal methylmercury exposure from ocean fish consumption in the Seychelles child development study," *The Lancet*, Vol. 361, May 17, 2003, p. 1687.
31 Axelrad et al., p. 610.
32 Tord Kjellstrom, Paul Kennedy, Sally Wallis, Alistair Stewart, Lars Friberg, Birger Lind, Ted Wutherspoon, and Colin Mantell (1989). "Physical and mental development of children with prenatal exposure to mercury from fish. Stage 2. Interviews and psychological tests at age 6." *Solna*, National Swedish Environmental Board, (Report no. 3642), p. 72.
33 Kenny S. Crump, Tord Kjellstrom, Annette M. Shipp, Abram Silvers, Alistair Stewart, "Influence of Prenatal Mercury Exposure Upon Scholastic and Psychological Test Performance: Benchmark Analysis of a New Zealand Cohort," *Risk Analysis*, Vol. 18, No. 6, 1998.
34 Schwartz and Hayward, pp. 170-171.
35 EPA, Final Utility MACT Rule, 77 FR 9306.
36 EPA, Revised TSD, pp. 25, 45-46, 79.
37 EPA, RIA, p. 4-18.
38 EPA, RIA, pp. 4-3, 4-64, 4-67.
39 EPA, TSD, Appendix B, Table B-1, p. 118.
40 EPA, Final Utility MACT Rule, 77 FR 9319.
41 The EPA estimated that the James River Plant owned by Springfield City Utilities had a five in 1 million cancer risk from emissions of chromium and nickel emissions. In a comment letter written for the Utility Air Regulatory Group (UARG), Ralph Roberson of RMB Consulting and Research, Inc. argues that the stainless steel "hot box" which the EPA used to test the plant's chromium and nickel emissions contaminated the data, increasing the emissions above levels actually found in flue gas. RMB found similar sample contamination in the other plants where EPA estimated cancer risks greater than 1 in a million. See Ralph Roberson, Memorandum to UARG, April 16, 2012, Review of EPA's Non-Mercury Inhalation Risk Assessment, pp. 1-5.
42 American Cancer Society, *Cancer Facts & Figures 2011*, http://www.cancer.org/Research/CancerFactsFigures/CancerFactsFigures/cancer-facts-figures-2011.
43 EPA, Proposed Utility MACT Rule, 76 FR 25050.
44 Ibid., 76 FR 25051, fn. 170.
45 Anne Smith, Testimony, Hearing on The American Energy Initiative—A Focus on What EPA's Utility MACT Rule Will Cost U.S. Consumers—Subcommittee on Energy and Power, Committee on Energy and Commerce, U.S. House of Representatives, February 8, 2012, p. 12.
46 EPA, RIA, pp. ES-9-11.
47 Smith, p. 9; EPA, RIA pp. ES 10-13.
48 EPA Fact Sheet: Mercury and Air Toxics Standards: Benefits and Costs of Cleaning Up Toxic Air Pollution from Power Plants, http://www.epa.gov/mats/pdfs/20111221MATSimpactsfs.pdf.
49 42 USC §7407-7410.
50 EPA, Final Utility MACT Rule, 77 FR 9306, Table 2, fn. b.
51 Smith, p. 17.
52 C.A. Pope III, R. T. Burnett, M. J. Thun, E. E. Calle, D. Krewski, K. Ito, and G.D. Thurston, "Lung Cancer, Cardiopulmonary Mortality, and Long-Term Exposure to Fine Particulate Pollution" *Journal of the American Medical Association*, Vol. 287 (2002), pp. 1132-1141.
53 F. Laden, J. Schwartz, E. Spitzer, and D.W. Dockery, "Reduction in Fine Particulate Air Pollution and Mortality," *American Journal of Respiratory and Critical Care Medicine*, Vol. 173 (2006), pp. 667-672. *Estimating the Public Health Benefits of Proposed Air Pollution Regulations*. Washington, DC: The National Academies Press.
54 EPA, RIA, p. ES-4.
55 The term "lowest measured level" (LML) is misleading. The level is not actually "measured". Rather, it is inferred from statistical associations.
56 Smith, pp. 16-17.
57 Smith, p. 17.
58 EPA, *Policy Assessment for the Review of the Particulate Matter National Ambient Air Quality Standards*, Second External Review Draft, July 2010, p. ES-1.
59 Smith, p. 19.
60 EPA, RIA, p. ES-4.
61 Smith, p. 18.
62 "We assume that the health impact function for fine particles is linear within the range of ambient concentrations under consideration." EPA, RIA, p. ES-4.
63 Smith, pp. 19-21.

64 C. A. Pope III, M. J. Thun, M.M. Namboodiri, et al. "Particulate Air Pollution as a Predictor of Mortality in a Prospective Study of U.S. Adults," *American Journal of Respiratory and Critical Care Medicine*, Vol. 151 (1995), pp. 669-675.

65 D. W. Dockery, C.A. Pope III, X. Xu, et al., "An Association Between Air Pollution and Mortality in Six U.S. Cities," *New England Journal of Medicine*, Vol. 329 (1993), pp. 1753-1759.

66 Schwartz and Hayward, p. 119.

67 Ibid., p. 129.

68 Dr. Julie Goodman, Testimony, *EPA's Assessment of Health Benefits Associated with PM2.5 Reductions for the Final Mercury and Air Toxics Standards*, Subcommittee on Energy and Power, House Committee on Energy and Commerce, February 8, 2012, Overview, p. 1.

69 Ibid., pp. 1-3.

70 EPA, RIA, p. 5-14: "For the modeled scenario, sulfate reductions contributed 95 percent of the health co-benefits of all $PM_{2.5}$ components, with an additional 5% from direct $PM_{2.5}$ reductions . . ." See also Smith, p. 6.

71 L. C. Green, A. E. C. Crouch, M. R. Ames, and T. L. Lash, "What's Wrong with the National Ambient Air Quality Standard (NAAQS) for Fine Particulate Matter ($PM_{2.5}$)?"*Regulatory Toxicology and Pharmaco*logy 35, pp. 327-337.

72 Schwartz and Hayward, pp. 150-151.

73 Schwartz and Hayward cite L. C. Green and S. R. Armstrong, "Particulate Matter in Ambient Air Mortality: Toxicologic Perspectives," *Regulatory Toxicology and Pharmacology*, Vol. 38 (2003), pp. 326-535; M.A. Sackner, D. Ford, and R. Fernandez, "Effect of Sulfate Aerosols on Cardiopulmonary Function of Normal Humans," *American Review of Respiratory Diseases*, Vol. 115 (1977), p. 240; M. J. Utell, P. E. Morrow, D. M. Speers, et al., "Airway Responses to Sulfate and Sulfuric Acid Aerosols in Asthmatics. An Exposure Response Relationship," *American Review of Respiratory Disease*, Vol. 128 (1983), pp. 444-450; and M. J. Utell, A. J. Swinburn, W. R. Hyde et al., "Airway Reactivity to Nitrates in Normal and Mild Asthmatic Subjects," *Journal of Applied Physiology*, Vol. 46 (1979), pp. 189-196.

74 Schwartz and Hayward cite L. J. Nannini Jr. and D. Hofer, "Effects of Inhaled Magnesium Sulfate on Sodium Medtabisulfite-Induced Bronchoconstriction in Asthma," *Chest*, Vol. 11 (1997), pp. 858-861.

75 EPA, RIA, p. ES-2.

76 Randall Lutter, John F. Morall, and W. Kip Viscusi, "The Cost-Per-Life-Saved Cutoff for Safety-Enhancing Regulations," *Economic Inquiry*, Vol. 37 (1999), pp. 599-608.

77 NERA Economic Consulting, *Potential Impacts of EPA Air, Coal Combustion Residuals, and Cooling Water Regulations*, prepared for American Coalition for Clean Coal Electricity, September 2011, p. E-5, http://www.americaspower.org/sites/default/files/NERA_Four_Rule_Report_Sept_21.pdf (hereafter Potential Impacts).

78 Ibid, p. 15.

79 For example: Henrik Lindegaard Andersen, On the Effect of Unemployment on Mortality, *Social Science Research Network*, June 18, 2007, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=994768; Sunnee Billingsley, Downward mobility, Unemployment and Mortality, MPIDR Working Paper WP 2009-015, Max Planck Institute for Demographic Research, June 2009, http://www.demogr.mpg.de/papers/working/wp-2009-015.pdf; Amy Norton, "Lifelong poverty increases heart attack risks," Reuters, May 27, 2009, http://www.reuters.com/article/2009/03/27/us-lifelong-poverty-idUSTRE52Q3S520090327; A. Lundin, I. Lundberg, L. Hallsten, J. Ottoson, T. Hemmingsson, "Unemployment and mortality—a longitudinal study of 49,321 Swedish middle-aged men," *Journal of Epidemiology and Community Health,* Vol. 64 (2010), pp. 22-28, http://jech.bmj.com/content/64/01/22.abstract; Chad Brooks, "Unemployment Proves Deadly, Health Study Finds," *LiveScience*, April 5, 2011, http://www.livescience.com/13578-unemployment-health-mortality.html.

80 Babcock & Wilcox, Request for Partial Reconsideration of EPA's National Emissions Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Steam Generating Units, April 2012, p. 1.

81 Ibid. Taken from table on page 2. For coal-fired power plants, the mercury emission limit established by the regulation is 0.034 micrograms per standard cubic meter (µg/scm) and the mercury CEMS detection limit is 0.1µg/scm. For acid gases, the rule sets the emission limit at 0.04 ppmv, and the acid gases CEMS detection limit is 0.79 ppmv.

82 Institute of Clean Air Companies, Request for Partial Reconsideration of EPA's National Emissions Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units, April 2012, pp. 2-3.

83 EPA, *Response to Comments* (1), December 2011, pp. 446.

84 *Memorandum from Ralph L. Roberson*, RMB Consulting & Research Inc. to UARG Hazardous Air Pollutant Committee, Review of EPA's New-Unit Emission Limits, April 13, 2012, p. 6. This document was Attachment 33 to Utility Air Regulatory Group, Request for Reconsideration of EPA's National Emissions Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units, April 2012, as cited on p. 37. "[W]ithin publically available data posted by EPA, there exists five separate HCl test results for the very same Logan unit that reports emissions well in excess of the new-unit HCl emissions limit."

85 Bobby McMahon, "States at Odds in Dozens of Suits over EPA's Utility Air Toxics Rule," *Inside EPA*, Vol. 33, No. 16, April 20, 2012.

86 Jeffrey R. Holmstead, Written Testimony to U.S. Senate Committee on Environment & Public Works Subcommittee on Clean Air and Nuclear Safety, April 17, 2012, p. 2. "I understand that, just this week, 24 States filed legal challenges to EPA's MATS rule—the highest number of States ever to challenge an EPA air rule."
87 EPA, RIA, p. 3-19
88 FERC Commissioner Philip D. Moeller, Letter to Senator Lisa Murkowski, August 1, 2011, p. 3.
89 76 *Federal Register* 3821, January 21 2012.
90 Wellinghoff wrote to the Energy and Power Subcommittee, "I do not know why EPA did not do a cumulative assessment." Energy and Commerce Committee Subcommittee on Energy and Power, Questions for the Federal Energy Regulatory Commission, American Energy Iniative: Day 12, September 14, 2011.
91 The EPA's estimate that 10,000 megawatts would close is derived from EPA Regulatory Impact Analyses for both the Cross-State Air Pollution Rule and the Mercury and Air Toxics Standards rule. In the latter, the agency said that it included consideration of the former. In order to comply with the CSAPR, the EPA estimated that 4,800 megawatts of electricity generation would retire (see CSAPR RIA, p. 262); for the Utility MACT Rule, the agency estimated that 4,700 megawatts of generation would retire (see RIA, p. 3-17).
92 Through early February 2012, the Institute for Energy Research compiled a list of power plants whose operators had announced the plants would close due to EPA regulations. Institute for Energy Research, *Impact of EPA's Regulatory Assault on Power Plants*, February 7, 2012. Thereafter, almost 5,000 megawatts of additional closures were announced by FirstEnergy (FirstEnergy press release, *FirstEnergy, Citing Impact of Environmental Regulations, Will Retire Three Coal-Fired Power Plants in West Virginia*, February 8 2012), Midwest Generation, and GenOn. Juliet Eilperin, "Utilities announce closure of 10 Aging power plants in Midwest, East," *Washington Post*, February 29, 2012.
93 NERC, 2011 Long-Term Reliability Assessment, p. 116.
94 Ibid., p. 72.
95 FERC Office of Electric Reliability, "Potential Retirement of Coal Fired Generation and Its Effect on System Reliability," Attachment 8 to Utility Air Regulatory Group, Request for Reconsideration of EPA's National Emissions Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units, April 2012.
96 NERC, 2011 Long Term Reliability Assessment, p. 150.
97 Southern Company's Evidentiary Submission and Response to November 14, 2011, Request for Evidence of [FERC] Commissioner Phillip D. Moeller, December 9, 2011. "Through our studies and based on our experience, we have determined the infrastructure required to ensure implementation to the Utility MACT …will take at least six years."
98 American Public Power Association, "77 Month Timeline for Public Power Compliance with Proposed MACT for EGUs," Exhibit B to APPA, Request for Reconsideration of EPA's National Emissions Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units, April 2012.
99 Clean Air Act §112(d) establishes a three-year deadline for compliance. In the final rule, however, the EPA delegated broad authority to state regulatory bodies to issue a one-year extension for compliance. Concomitant with the promulgation of the final regulation, EPA issued a memorandum, "The Environmental Protection Agency's Enforcement Response Policy for Use of Clean Air Act Section 113(a) Administrative Orders in Relation to Electric Reliability and the Mercury and Air Toxics Standards," in which the Agency explained that it would grant an additional year, but only on a case-by-case basis.
100 NERC, 2011 Long Term Reliability Assessment, p. 150.
101 Ibid. p. 118. "MISO and NPCC-New England show decreased Planning Reserve Margins below the NERC Reference Margin Level by 2015—FRCC, PJM, SERC-E, SERC-N, and SERC-W by 2018."
102 Bob Perciasepe, "Lights Out: How EPA Regulations Threaten Affordable Power and Job Creation," Subcommittee on Regulatory Affairs, Stimulus Oversight and Government Spending, Committee on Oversight and Government Reform, July 26, 2011.
103 Lisa Jackson on The Daily Show with Jon Stewart, May 19, 2011.
104 EPA RIA, p. 6-1.
105 Richard D. Morgenstern, William A. Pizer, and Jhih-Shyang Shih, "Jobs Versus the Environment: An Industry-Level Perspective," *Journal of Environmental Economics and Management* 43, October 3, 2001, pp. 412–436.
106 NERA, *Potential Impacts*, p. E-5
107 Smith, p. 23.
108 American Legislative Exchange Council, *Economy Derailed: State by State Impacts of the EPA Regulatory Train Wreck*, April 2012.
109 Smith, p. 24.
110 EPA, Proposed Utility MACT Rule, 76 FR 25003-25005.

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