

Mercury Matters 2018: A Science Brief for Journalists and Policymakers

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Mercury in Context

Coal-fired power plants are the largest source of mercury in the U.S., accounting for approximately 48% of mercury emissions in 2015¹.

The Mercury and Air Toxics Standards ([MATS](#)) were finalized in 2011 and currently regulate emissions of mercury, acid gases and other hazardous air pollutants (HAPs) from U.S. electric utilities.

The MATS rule is expected to reduce mercury emissions from the power sector by 90%, improve public health, and play an integral role in meeting U.S. commitments under the international [2017 Minamata Convention on Mercury](#).

The Latest from EPA

In August 2018, the U.S. Environmental Protection Agency (EPA) announced plans to revisit the Agency's prior determination that regulating HAPs emitted from power plants under section 112 of the Clean Air Act was "appropriate and necessary".

A proposal to reopen one or more aspects of MATS is currently under interagency review at the Office of Management and Budget and could result in lifting limits on mercury emissions from electric utilities in the U.S.

The Issue

Recent research shows that MATS has substantially reduced mercury levels in the environment and improved public health at a much lower cost than anticipated. However, the Regulatory Impact Assessment (RIA) that the Administration is relying on in its rollback proposal does not reflect current scientific understanding of the local impacts and societal cost of mercury pollution in the U.S.^{2,3}.

Many of the health effects associated with mercury exposure are not fully reflected in the RIA, and the final estimate of the mercury-related benefits from MATS only accounted for benefits to children of freshwater recreational anglers in the U.S., a small fraction of the total population affected.

Mercury Emissions Matter to Human Health and the Environment

Mercury in the form of methylmercury is a potent neurotoxin. Important facts about the health effects of methylmercury include the following:

- Children exposed to methylmercury during a mother's pregnancy can experience persistent and lifelong IQ and motor function deficits⁴.
- In adults, high levels of methylmercury exposure have been associated with adverse cardiovascular effects, including increased risk of fatal heart attacks⁵.

- Other adverse health effects of methylmercury exposure that have been identified in the scientific literature include endocrine disruption⁶, diabetes risk⁷, and compromised immune function⁸.
- The societal costs of neurocognitive deficits associated with methylmercury exposure in the U.S. were estimated in 2017 to be approximately \$4.8 billion per year⁹.
- No known threshold exists for methylmercury below which neurodevelopmental impacts do not occur^{10,11}.

Mercury exposure in the U.S. occurs primarily through the consumption of freshwater fish and seafood (fish and shellfish). The consumption of marine fish, often harvested from U.S. coastal waters, accounts for greater than 80% of methylmercury intake by the U.S. population¹². Dietary supplements cannot counteract methylmercury toxicity in U.S. consumers. A safe and consumable fishery is important to retaining a healthy, low-cost source of protein and other nutrients that are essential for pregnant women, young children, and the general population.

After mercury is emitted from power plants it is deposited back to Earth where it can be converted to methylmercury, a highly toxic form of mercury that magnifies up food chains, reaching concentrations in fish that are 10 to 100 million times greater than concentrations in water¹³.

With increasing levels of mercury in the environment due to human activities, virtually all fish from U.S. waters now have detectable levels of methylmercury. Some fish, such as swordfish, large species of tuna, and freshwater game fish, can have levels that exceed consumption guidelines.

States post fish consumption advisories for waterbodies that are known to have elevated contaminants. In 2013, consumption advisories for mercury were in effect in all 50 states, one U.S. territory, and three tribal territories, and accounted for 81% of all U.S. advisories¹⁴. This represents more advisories for mercury than for all other contaminants combined.

Wildlife that consume fish, such as common loons, bald eagles, otter and mink, and many marine mammals can also experience adverse effects from mercury and are unable to heed advisories¹⁵. The health of many songbird and bat species is threatened due to methylmercury exposure in wetland habitats. The productivity of economically valuable game fish stocks can also be compromised¹⁶.

As Mercury Emissions in the U.S. Have Declined, Health Has Improved

In the 2011 MATS RIA, it was assumed that mercury emissions from coal-fired utilities are mainly transported long-distances away from the U.S. and that a substantial fraction of mercury in the U.S. comes from international sources. Since that time, scientific understanding of the fate of U.S. mercury emissions has advanced^{17,18}. Recent research reveals that the contribution of U.S. coal-fired power plants to local mercury contamination in the U.S. has been markedly underestimated. Accordingly, controls on mercury emissions from U.S. electric utilities have contributed to the following human health and environmental improvements.

- Mercury emissions from U.S. coal-fired power plants have declined by 85% from 92,000 pounds in 2006 to 14,000 pounds in 2016¹⁹ since states began setting standards and MATS was introduced in 2011. Eleven states had implemented mercury emissions standards for power plants prior to 2011.
- Concurrent with declines in mercury emissions, mercury levels in air, water, sediments, loons, freshwater fisheries, and Atlantic Ocean fisheries²⁰ have decreased appreciably.
- Mercury levels in the blood of women in the U.S. declined by 34% between 2001 and 2010 as mercury levels in some fish decreased, and fish consumption advisories improved²¹.
- The estimated number of children born in the U.S. each year with prenatal exposure to methylmercury levels that exceed the EPA reference dose has decreased by half from 200,000-400,000 to 100,000-200,000, depending on the measure used²².

The Benefits of Reducing Mercury Are Much Larger Than Previously Estimated

The EPA estimated in the MATS RIA that the annualized mercury-related health benefits of reducing mercury emissions would be less than \$10 *million*. Recent studies that account for more pathways of methylmercury exposure and additional health effects suggest that the monetized benefits of reducing power plant mercury emissions in the U.S. are likely in the range of several *billion* dollars per year^{23,24,25}. These and other studies support the conclusion that the mercury-related benefits from MATS are orders of magnitude larger than previously estimated in the MATS RIA²⁶.

In addition to the mercury-related benefits, MATS has also decreased sulfur dioxide and nitrogen oxide emissions, improving air quality and public health by reducing fine particulate matter and ground-level ozone. The EPA estimated that the annualized value of these additional benefits is \$24 to \$80 billion; bringing the total annual benefits from MATS to tens of billions of dollars. Even with these more complete estimates, substantial benefits of reducing mercury and other air toxics remain unquantified due to data limitations²⁷.

On the cost side, new information suggests that the EPA's original cost-estimate for MATS of \$9.6 billion is much higher than the actual cost due to declines in natural gas prices and lower than expected control equipment and renewable energy costs²⁸. Yet, even with the original overestimate, the EPA projected that MATS would increase the monthly electric bill of the average American household by only \$2.71 (or 0.3 cents per kilowatt-hour). This value is well within the price fluctuation consumers experienced between 2000 and 2011²⁹.

The Bottom Line

The science is clear, the health impacts of U.S. mercury emissions in the U.S. are large and disproportionately affect children and other vulnerable populations. Mercury emission standards in the U.S. have markedly reduced mercury in the environment and improved public health. The mercury-related benefits of MATS are much larger than previously estimated, the actual costs appear to be substantially lower than projected by the EPA, and the total monetized benefits across all pollutants far outweigh the costs of the standards.

Contributors

Charles Driscoll, Department of Civil and Environmental Engineering, Syracuse University

Elsie Sunderland, Harvard Paulson School of Engineering & Applied Sciences and Harvard T.H. Chan

School of Public Health, Department of Environmental Health, Exposure, Epidemiology and Risk

Kathy Fallon Lambert, Harvard T.H. Chan School of Public Health, Center for Climate, Health, and the
Global Environment

Joel Blum, Department of Earth and Environmental Sciences, University of Michigan

Celia Chen, Department of Biological Sciences, Dartmouth College

David Evers, BioDiversity Research Institute

Philippe Grandjean, Harvard T.H. Chan School of Public Health, Department of Environmental Health,
Environmental and Occupational Medicine and Epidemiology

Rob Mason, Departments of Chemistry and Marine Sciences, University of Connecticut

Emily Oken, Harvard Medical School

Noelle Selin, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of
Technology

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