



America's Biggest Mercury Polluters

How Cleaning Up the Dirtiest Power Plants Will Protect Public Health



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Plants Will Protect Public Health**

Environment Massachusetts Research & Policy Center

by

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Executive Summary

Power plants continue to release large amounts of toxic pollutants, including mercury, into our air. In 2010, two-thirds of all airborne mercury pollution in the United States came from the smokestacks of coal-fired power plants. In other words, power plants generate more airborne mercury pollution than all other industrial sources combined.*

Mercury is a potent neurotoxicant. Mercury exposure during critical periods of brain development can contribute to irreversible deficits in verbal skills, damage to attention and motor control, and reduced IQ.

In 2011, the U.S. Environmental Protection Agency (EPA) developed the first national standards limiting mercury and other toxic air pollution from existing coal- and oil-fired power plants. Implementing these standards will protect public health.

Coal-fired power plants are a major source of airborne mercury pollution.

- The Big Brown Steam Electric Station and Lignite Coal Mine in Fairfield, Texas, emitted 1,610 pounds of mercury pollution into our air in 2010, the most of any industrial facility in the nation.
- This amount is significant because mercury is so potent. Distributed over a wide area, just fractions of an ounce of mercury can contaminate local and regional water bodies, making resident fish unsafe to eat. All 50 states currently have advisories warning women and children not to eat local fish due to mercury contamination.
- Of the top 10 biggest mercury-polluting power plants in the country, six are located in Texas, with one each in Alabama, Louisiana, Missouri and Ohio. Table ES-1 lists these top 10 biggest mercury polluters.
- Among all states nationwide, Texas ranked first in terms of overall airborne mercury pollution produced by power plants in 2010. Ohio ranked second, followed by Pennsylvania in third. (See Table ES-2.)
- Just five companies were responsible for more than one-third of all power plant mercury emissions in 2010, led by American Electric Power with 6,200 pounds. (See Table ES-3.)

* The data presented in this report focus on power plant emissions data reported to the U.S. Environmental Protection Agency's *Toxics Release Inventory* (TRI). Industries that are not required to report to TRI, or facilities with emissions below the reporting threshold, will not be represented in the data. For more detail, see the Methodology section on page 18.

Table ES-1: Top 10 Dirtiest Power Plants, 2010 Airborne Mercury Pollution

National Rank	Facility Name	Airborne Mercury Emissions (pounds)	State	County	City	Owner
1	Big Brown Steam Electric Station & Lignite Mine	1,610	TX	Freestone	Fairfield	Luminant Generation Co. LLC
2	Ameren Missouri Labadie Energy Center	1,527	MO	Franklin	Labadie	Ameren Corp.
3	Martin Lake Steam Electric Station & Lignite Mine	1,420	TX	Rusk	Tatum	Luminant Generation Co. LLC
4	Limestone Electric Generating Station	1,150	TX	Limestone	Jewett	NRG Texas Power LLC
5	American Electric Power H.W. Pirkey Power Plant	1,070	TX	Harrison	Hallsville	American Electric Power
6	Miller Steam Plant	1,037	AL	Jefferson	Quinton	Southern Co.
7	Monticello Steam Electric Station & Lignite Mine	1,005	TX	Titus	Mount Pleasant	Luminant Generation Co. LLC
8	Big Cajun 2	850	LA	Pointe Coupee	New Roads	NRG Energy Inc.
9	American Electric Power Gavin Plant	829	OH	Gallia	Cheshire	American Electric Power
10	W.A. Parish Electric Generating Station	820	TX	Fort Bend	Thompsons	NRG Texas Power LLC

Table ES-2: Top Ten States Ranked by Total Power Plant Emissions of Airborne Mercury Pollution in 2010

Rank	State	Airborne Mercury Emissions (pounds)
1	Texas	11,127
2	Ohio	4,218
3	Pennsylvania	3,964
4	Missouri	3,835
5	Indiana	3,175
6	Alabama	3,002
7	West Virginia	2,495
8	North Dakota	2,363
9	Kentucky	2,287
10	Michigan	2,253

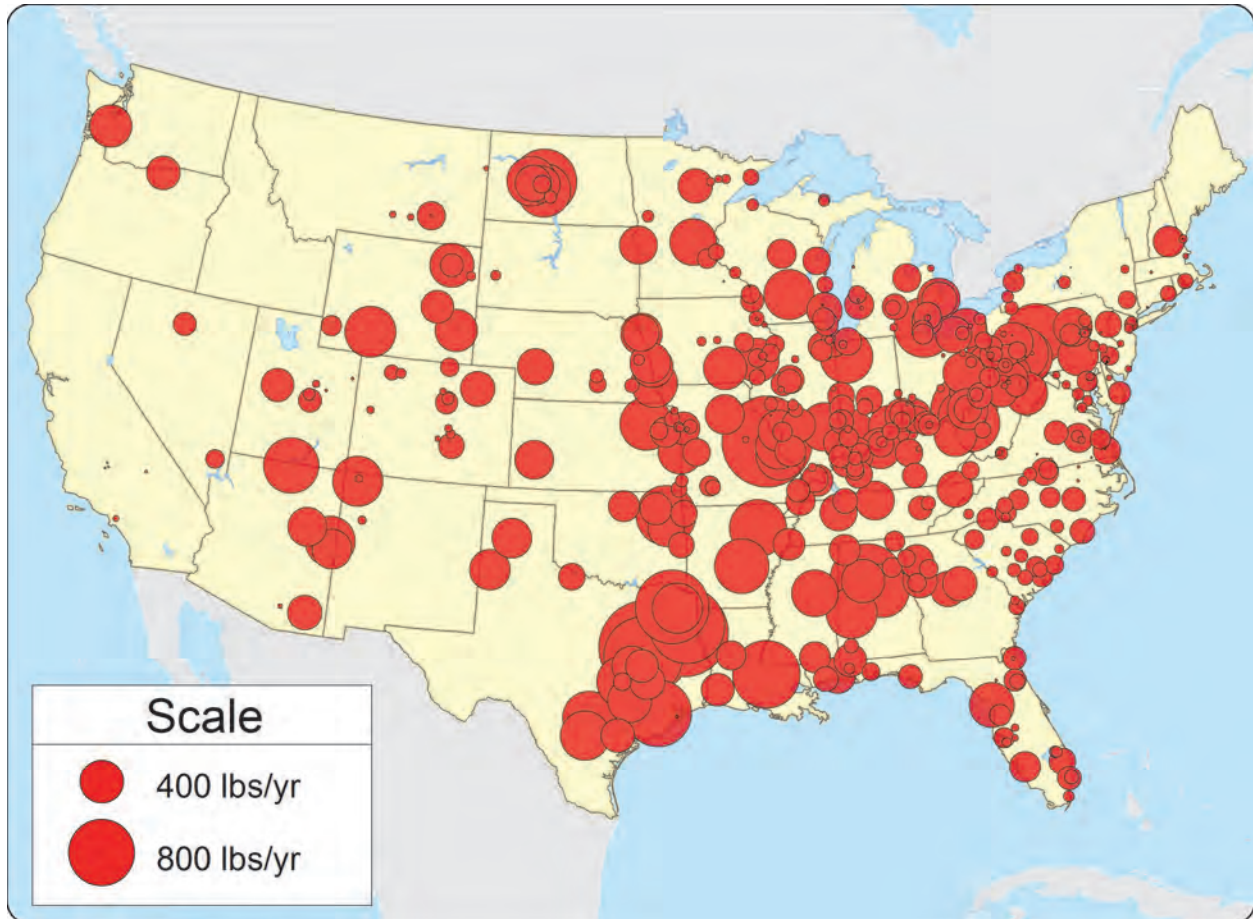
Table ES-3: The Top Five Polluting Power Companies, 2010, Airborne Mercury

Rank	Company	Airborne Mercury Emissions (pounds)
1	American Electric Power	6,220
2	Luminant Generation Co.	4,585
3	Southern Co.	4,369
4	Ameren Corp.	3,699
5	NRG Energy	3,025

Mercury pollution threatens public health.

- Largely due to emissions from coal-fired power plants, mercury contamination in our environment is widespread. After leaving the smokestack, mercury falls to the ground in rain or snow, contaminates waterways, and accumulates in fish. Eating contaminated fish is the main source of human exposure to mercury.
- Mercury is a potent neurotoxicant. During critical windows of brain development that occur *in utero* and in the first year or two of a child's life, mercury exposure can lead to irreversible deficits in attention and motor control, damage to verbal skills, and reduced IQ.
- One in 10 women of childbearing age in the United States has enough mercury in her blood to put her child at risk of developmental damage should she become pregnant.

Figure ES-1: Power Plant Sources of Airborne Mercury Pollution, 2010



Each circle in this map represents a power plant that reported mercury pollution in 2010. The area of the circle is directly proportional to the amount of mercury the plant emitted.

New EPA standards will limit mercury pollution from power plants and protect public health.

- Under the authority of the Clean Air Act, EPA has developed the first national standard limiting releases of mercury and other toxic air pollutants from existing coal- and oil-fired power plants. As proposed in March 2011, this standard will require power plant owners to cut overall emissions of mercury by more than 90 percent using widely available, proven pollution control technologies.
- Similar standards affecting other industries have successfully reduced mercury contamination of fish in local waterways.
- As proposed, the new emissions standard will improve public health. EPA estimates that for every dollar spent to reduce pollution from power plants, the American public and American businesses will see up to \$13 in health and economic benefits. In total, the rules could provide as much as \$140 billion worth of benefits annually.
- EPA should finalize the rules as proposed. Congress should support this common-sense action.

Introduction

In 1970, President Nixon sat down in the Roosevelt Room of the White House to sign the Clean Air Act into law. He said, “I think that the year of 1970 will be known as the year of the beginning, in which we really began to move on the problems of clean air and clean water and open spaces for the future generations of America.”¹

How right he was. 1970 was a landmark year for action to protect our health, our air and our water. It was also the beginning of a long road – and we still have not yet reached our destination.

Although America has made great strides in cleaning up sources of air pollution from automobiles to factories over the last four decades, air pollution remains a serious and persistent problem. Moreover, our increasing understanding of the dangers posed by toxic pollutants only brings the terrible toll that air pollution causes into greater focus. Every year, air pollution kills tens of thousands of Americans, triggers millions of asthma attacks, and causes millions of missed work and school days due to pollution-related illness.² Air pollution costs us hundreds of billions of dollars a year in sickness and lost productivity.³

Industry resistance to common-sense measures that would reduce pollution and protect the health of American families has unnecessarily dragged out the process of cleaning the air. Owners of coal-fired power plants, in particular, have been granted ample time to clean up over the years. Grandfathered under provisions of the Clean Air Act that were intended to require power plants to install better



Photo: Claudia Meyer

pollution controls at the time of any major modifications, many coal-fired power plants have avoided installing effective emissions controls for decades.

Coal-fired power plants are a particularly large source of mercury pollution – a scourge that affects hundreds of thousands of children across the country. By 1990, when Congress rewrote the Clean Air Act to demand faster cleanup of toxic air pollution, coal-fired power

plants produced about as much airborne mercury pollution as municipal waste incinerators and medical waste incinerators.⁴ However, in response to the 1990 Clean Air Act Amendments, mercury emissions from incinerators are down by well over 95 percent.⁵ In contrast, almost half of the nation's fleet of coal-fired power plants still lacks modern emissions control technology.⁶

This year, EPA has proposed to finally require all existing coal- and oil-fired power plants to reduce toxic pollution and safeguard our health. It is long past time for these plants to clean up and to compete on an equal playing field with other power generating facilities under a national emissions standard. Once the new standard becomes final, perhaps 2011, too, can be known as the year in which we “really began to move on the problems of clean air and clean water and open spaces for the future generations of America.”

Mercury Pollution Threatens Public Health

Mercury is a potent neurotoxicant.⁷ Children are particularly vulnerable to the harmful impacts of mercury during critical windows of development that occur before birth and through the first few years of life.⁸ Mercury exposure can lead to irreversible deficits in verbal skills, damage to attention and motor control, and reduced IQ.

Largely due to emissions from coal-fired power plants, mercury contaminates waterways across the United States, from coastal bays to the Great Lakes. Mercury does not decompose in the environment. Rather, it can accumulate in fish and throughout the food chain, all the way to humans. People are primarily exposed to mercury through eating contaminated fish. Every state in the country has issued some form of advisory warning about the consumption of mercury-contaminated fish from local waters.

Scientists at the U.S. Environmental Protection Agency have estimated that one in 10 women of childbearing age in the United States has enough mercury in her bloodstream to risk damage to her child's brain development should she become pregnant.⁹ In other words, between 320,000 and 640,000 children born every year are exposed to mercury at levels associated with measurable developmental damage.¹⁰

Mercury Is Toxic to Human Development

As documented by the U.S. National Academy of Sciences, children exposed to low-dosage levels of mercury while in the womb can develop brain damage, leading to delayed language development, deficits in verbal skills, damage to attention and motor control, and reduced IQ.¹¹ The effects appear irreversible. Scientists have found that deficits due to *in utero* exposure still persist at age 14.¹²

Even adults are vulnerable to mercury pollution. Eating contaminated fish at any age can cause deficits in brain function, as well as fertility and cardiovascular problems.¹³

Researchers at Mt. Sinai School of Medicine, Harvard Medical School, Boston Children's Hospital and the Albert Einstein College of Medicine estimate that mercury pollution costs the nation \$8.7 billion annually in diminished intelligence of the population and resulting lost productivity.¹⁴

Mercury Contamination Is Widespread

Elemental mercury occurs naturally in our environment and can be found in coal and other underground rock deposits. When power plants burn coal, they emit mercury and other toxic pollutants into the air. After leaving the power plant smokestack, mercury pollution falls to the ground in rain or snow and then washes into lakes, streams and the ocean.

Mercury does not readily decompose in the environment. Instead, small organisms can transform it into mercury compounds that do not readily leave the body. These compounds build up in aquatic organisms and tend to increase in concentration in species at the top of the food chain. Species that tend to have high levels of mercury include larger freshwater fish and saltwater species such as tuna, swordfish and shark. People who eat contaminated fish end up with mercury that builds up in their bodies.¹⁵

According to the United States Environmental Protection Agency, mercury pollution impairs nearly 5,000 bodies of water across the country.¹⁶ Mercury contamination affects:¹⁷

- More than 14 million acres of bays, estuaries, lakes, reservoirs and ponds;
- More than 60,000 miles of rivers and streams; and
- More than 6,600 miles of coastal shoreline.

Every state in the United States has issued an advisory warning against the consumption of species of fish that tend to have dangerous levels of mercury.¹⁸ Every square inch of the Great Lakes is under a mercury advisory, along with thousands of smaller water bodies across the country.¹⁹



Scientists at the U.S. Environmental Protection Agency have estimated that one in 10 women of childbearing age in the United States has enough mercury in her bloodstream to risk damage to her child's brain development should she become pregnant.

Power Plants Continue to Emit Large Amounts of Mercury Pollution

Coal-fired power plants are the largest source of airborne mercury emissions in America. In 2010, two-thirds of all airborne mercury pollution came from the smokestacks of these power plants.²⁰ In other words, coal-fired power plants together generate more airborne mercury pollution than all other sources – including incinerators, steel mills and cement manufacturing plants – combined.

In total, power plants emitted 66,050 pounds of mercury pollution into the air in 2010. This amount is significant. Very small amounts of mercury can contaminate local and regional water bodies, making resident fish unsafe to eat.²¹

The most polluting industrial facility in the nation – the Big Brown Steam Electric Station and Lignite Coal Mine in Fairfield, Texas – emitted 1,610 pounds of mercury pollution in 2010. Of the top 10 biggest mercury-polluting power plants in the country, six are located in Texas, with one each in Alabama, Louisiana, Missouri and Ohio. Table 1 lists the top 25 biggest mercury polluters out of the 457 power facilities that reported mercury emissions to the EPA’s Toxics Release Inventory in 2010.

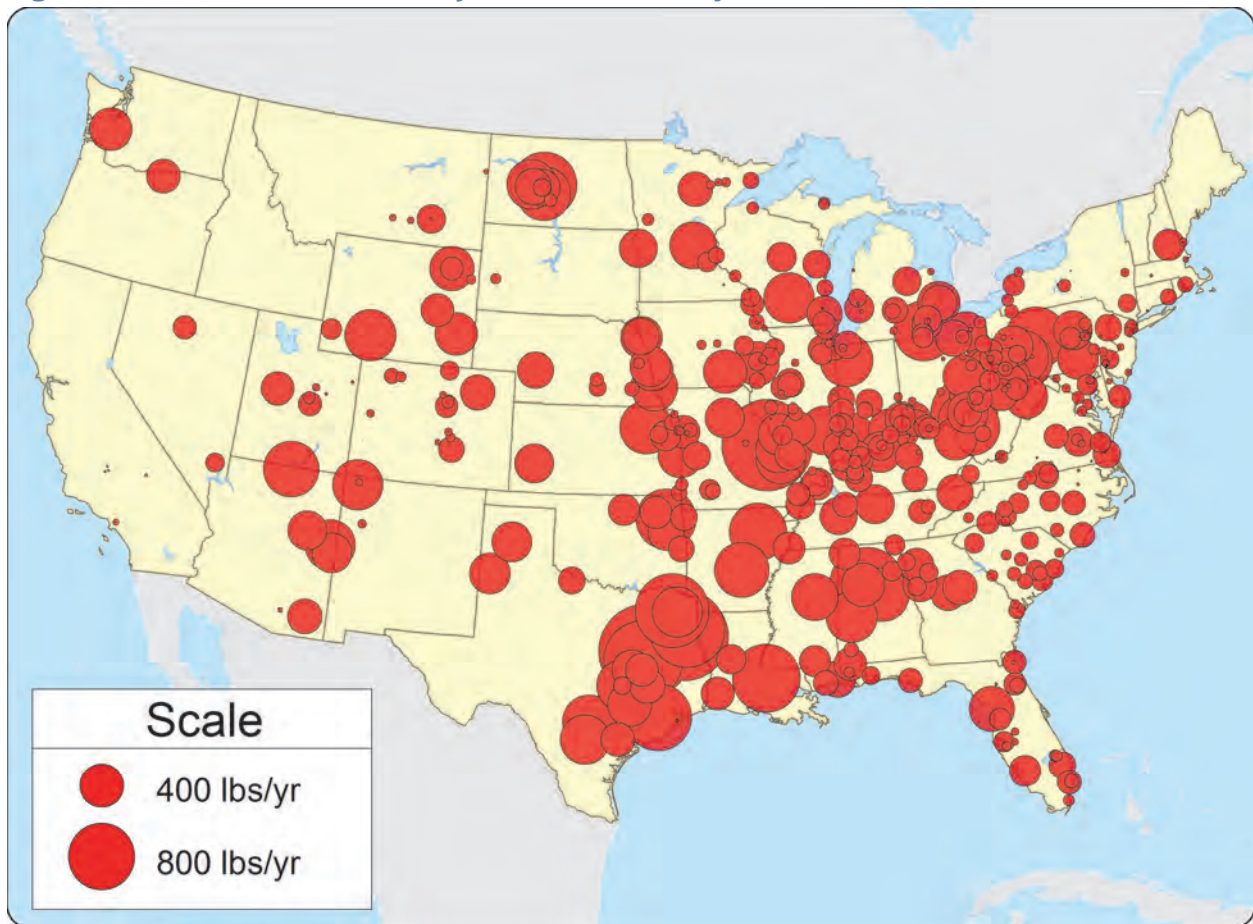
Table 1: Top 25 Dirtiest Power Plants in Terms of Airborne Mercury Pollution in 2010

National Rank	Facility Name	Airborne Mercury Emissions (pounds)	State	County	City	Owner
1	Big Brown Steam Electric Station & Lignite Mine	1,610	TX	Freestone	Fairfield	Luminant Generation Co. LLC
2	Ameren Missouri Labadie Energy Center	1,527	MO	Franklin	Labadie	Ameren Corp.
3	Martin Lake Steam Electric Station & Lignite Mine	1,420	TX	Rusk	Tatum	Luminant Generation Co. LLC
4	Limestone Electric Generating Station	1,150	TX	Limestone	Jewett	NRG Texas Power LLC
5	H.W. Pirkey Power Plant	1,070	TX	Harrison	Hallsville	American Electric Power
6	Miller Steam Plant	1,037	AL	Jefferson	Quinton	Southern Co.
7	Monticello Steam Electric Station & Lignite Mine	1,005	TX	Titus	Mount Pleasant	Luminant Generation Co. LLC

**Table 1: Top 25 Dirtiest Power Plants in Terms of Airborne Mercury Pollution in 2010
(Continued)**

National Rank	Facility Name	Airborne Mercury Emissions (pounds)	State	County	City	Owner
8	Big Cajun 2	850	LA	Pointe Coupee	New Roads	NRG Energy Inc.
9	Gavin Plant	829	OH	Gallia	Cheshire	American Electric Power
10	W.A. Parish Electric Generating Station	820	TX	Fort Bend	Thompsons	NRG Texas Power LLC
11	Coal Creek Station	779	ND	Underwood	McLean	Great River Energy
12	Shawville Station	702	PA	Shawville	Clearfield	GenOn Energy Inc.
13	Grand River Dam Authority Coal Fired Complex	670	OK	Chouteau	Mayes	Grand River Dam Authority
14	Detroit Edison Monroe Power Plant	660	MI	Monroe	Monroe	DTE Energy Co.
15	Independence Steam Electric Station	601	AR	Newark	Independence	Entergy Corp.
16	American Electric Power Amos Plant	585	WV	Winfield	Putnam	American Electric Power
17	Conemaugh Power Plant	576	PA	New Florence	Indiana	GenOn Energy Inc.
18	IPL Petersburg	568	IN	Petersburg	Pike	AES Corp.
19	Salt River Project Navajo Generating Station	566	AZ	Page	Coconino	Salt River Project
20	White Bluff Generating Plant	559	AR	Redfield	Jefferson	Entergy Corp.
21	EME Homer City Generation LP	547	PA	Homer City	Indiana	Edison International
22	Gaston Steam Plant	545	AL	Wilsonville	Shelby	Southern Co.
23	Milton R. Young Station	544	ND	Center	Oliver	Minnkota Power Cooperative Inc.
24	Calaveras Power Station	540	TX	San Antonio	Bexar	City of San Antonio
25	Jeffrey Energy Center	524	KS	Saint Marys	Pottawatomie	Westar Energy Inc.

Figure 1: Power Plant Sources of Airborne Mercury Pollution, 2010



Each circle in this map represents a power plant that reported mercury pollution in 2010. The area of the circle is directly proportional to the amount of mercury the plant emitted.

Table 2: Top Ten States Ranked by Total Power Plant Emissions of Airborne Mercury Pollution in 2010

Rank	State	Airborne Mercury Emissions (pounds)
1	Texas	11,127
2	Ohio	4,218
3	Pennsylvania	3,964
4	Missouri	3,835
5	Indiana	3,175

Rank	State	Airborne Mercury Emissions (pounds)
6	Alabama	3,002
7	West Virginia	2,495
8	North Dakota	2,363
9	Kentucky	2,287
10	Michigan	2,253

Just five companies were responsible for more than one-third of all power plant mercury emissions, led by American Electric Power with 6,220 pounds. (See Table 3.) Luminant, Southern Company, Ameren Corporation and NRG Energy were all responsible for more than 3,000 pounds of mercury pollution.

Table 3: The Top 25 Polluting Power Companies, 2010, Mercury²²

Rank	Company	Airborne Mercury Emissions (pounds)
1	American Electric Power	6,220
2	Luminant Generation Co.	4,585
3	Southern Co.	4,369
4	Ameren Corp.	3,699
5	NRG Energy	3,025
6	Berkshire Hathaway	2,314
7	GenOn Energy Inc.	2,033
8	U.S. Tennessee Valley Authority	1,836
9	Xcel Energy	1,659
10	PPL Corporation	1,615
11	DTE Energy Co.	1,559
12	Duke Energy Corp.	1,444
13	Allegheny Energy Inc.	1,413
14	Entergy Corp.	1,355
15	Alliant Energy Corp.	1,229
16	FirstEnergy Generation Corp.	1,088
17	Dominion Resources Inc.	1,056
18	Edison International	1,041
19	Basin Electric	1,040
20	Salt River Project	1,038
21	AES Corp.	1,009
22	Progress Energy Inc.	995
23	Great River Energy	842
24	Great Plains Energy	812
25	Westar Energy Inc.	759

New Pollution Standards Are Needed to Clean Up Power Plants

In December 2011, the U.S. Environmental Protection Agency (EPA) will finalize new standards – officially known as Mercury and Air Toxics Standards for Power Plants – requiring existing coal- and oil-fired power plants to clean up their emissions of mercury and other toxic air pollution.²³

This safeguard has been in development for more than 20 years. In 1990, Congress revised the landmark Clean Air Act, requiring EPA to take greater action to reduce toxic air pollution, including emissions of mercury, to protect America’s children and overall public health. The law gave EPA the tools to require regulated industries to install the best emissions control technology available. In 2000, after many years of study, EPA determined that toxic pollution from coal- and oil-fired power plants should be regulated. New rules were to be finalized by 2002.

In January 2004, EPA drafted a broad emission standard based on the best available toxic pollution control technology, and also a much weaker alternative cap-and-trade system focused on mercury pollution. The power plant industry vigorously opposed the technology-based standards. In response to this pressure, in 2005 EPA asserted that pollution from coal- and oil-fired power plants did not need strict regulation, and instead finalized the weaker cap-and-trade program, called the Clean Air Mercury Rule.

Fourteen states and dozens of public health and environmental organizations – including Environment



Photo: Keith Syvinski

America – filed suit against this decision.²⁴ In 2008, a federal Circuit Court agreed with public health and environmental advocates, ruling that EPA could not, as it had, exempt the utility industry from regulation of toxic air pollution and that EPA must therefore withdraw the Clean Air Mercury Rule.²⁵ Late in 2008, the coalition of public health and environmental groups sued the agency, seeking a new enforceable deadline for EPA to issue technology-based standards for toxic air pollution from power plants.²⁶

In 2010, advocates and EPA agreed that EPA would propose new standards in March 2011 and finalize them in November 2011, despite resistance from the utility industry.²⁷ Later, advocates and EPA agreed that the final standard would be issued in December 2011 to allow EPA time to fully consider the public comments it had received.²⁸

If finalized as proposed, the new standard will require many power plants to install widely available, proven pollution control technologies, such as activated carbon injection.²⁹ Slightly more than half of all coal-fired power plants already deploy some of the pollution control equipment capable of delivering the performance necessary to meet the new standard.³⁰ The remaining coal-fired power plants – the top polluters identified in this report – will have to clean up. For the first time, all power plants will have to operate on a level playing field across the country.

If finalized as proposed and implemented as required by the Clean Air Act, the rules will reduce overall power plant emissions of mercury by more than 90 percent by mid-2015.³¹ Similar standards affecting incinerators, power plants and other industries have been implemented in some states. These actions have successfully reduced mercury emissions – resulting in significant declines in mercury contamination of fish in local waterways.³² A national standard will reduce mercury pollution and fish contamination nationwide, benefiting everyone.

EPA action will reduce public exposure to mercury and other toxic air pollutants, protecting the health of every American – especially children. In addition to reducing the insidious damage to brain development caused by mercury, the new standard will have broad health benefits by reducing emissions of other toxic metals as well as small particulates and sulfur dioxide. EPA estimates that when the standard is fully implemented – which could be up to four years after it goes into effect – reduced emissions will annually prevent:³³

- 17,000 premature deaths,
- 11,000 heart attacks,
- 12,000 emergency room visits and hospital admissions,
- 120,000 cases of childhood asthma symptoms, and
- 850,000 fewer days of work missed due to illness.

According to EPA, every dollar spent to reduce pollution from power plants will deliver up to \$13 in health and economic benefits for the American public and American businesses.³⁴ In total, the new safeguard could provide as much as \$140 billion worth of benefits annually.³⁵ These figures do not count additional health benefits that will accrue from reduced levels of certain toxic organic air pollutants or the environmental benefits of the rule for ecosystems and wildlife.

The proposed Mercury and Air Toxics Standards represent a clear, common-sense step that will significantly improve public health. EPA should finalize the standards as proposed. Additionally, Congress should support this action on behalf of all American citizens.

Methodology

The emissions data presented in this report are derived from the U.S. Environmental Protection Agency (EPA), *Toxics Release Inventory, 2010 TRI Dataset*, 27 October 2011, available at www.epa.gov/tri/tridata/preliminarydataset/index.html. Toxics Release Inventory emissions data are self-reported by regulated facilities. The dataset we used was the first iteration of the 2010 inventory. EPA may update this information over time to capture late reporting and revisions.

We first selected any emitter listed in the database involved in electricity generation by choosing facilities with a primary or secondary industry classification code (or NAICS code) beginning with 22111. We then examined emissions of mercury and mercury compounds to the air, including both fugitive emissions and emissions through power plant smokestacks. The analysis does not count any mercury emissions reported to TRI that do not involve atmospheric release.

The data represent only industries that are required to submit data to EPA under the Toxics Release Inventory program, and facilities with emissions exceeding the reporting threshold of 10 pounds per year, and is not necessarily a comprehensive listing of all power plants or mercury emitters in each state.³⁶

Appendices

States Ranked by Total Power Plant Emissions of Airborne Mercury Pollution in 2010³⁷

Rank	State	Airborne Mercury Emissions (pounds)
1	Texas	11,127
2	Ohio	4,218
3	Pennsylvania	3,964
4	Missouri	3,835
5	Indiana	3,175
6	Alabama	3,002
7	West Virginia	2,495
8	North Dakota	2,363
9	Kentucky	2,287
10	Michigan	2,253
11	Iowa	2,060
12	Illinois	1,967
13	Arizona	1,835
14	Wyoming	1,590
15	Florida	1,522
16	Kansas	1,500
17	Arkansas	1,465
18	Oklahoma	1,412
19	Wisconsin	1,329
20	Tennessee	1,249
21	Louisiana	1,210
22	Georgia	1,154
23	Nebraska	1,099

Rank	State	Airborne Mercury Emissions (pounds)
24	North Carolina	957
25	Mississippi	951
26	Minnesota	876
27	Virginia	659
28	Colorado	645
29	South Carolina	566
30	New Mexico	489
31	Utah	344
32	Washington	331
33	South Dakota	290
34	New York	259
35	Oregon	206
36	New Hampshire	194
37	Nevada	176
38	Montana	174
39	Maryland	155
40	Delaware	108
41	New Jersey	88
42	Massachusetts	53
43	Connecticut	49
44	Hawaii	42
45	Alaska	18
46	California	12

2010 U.S. Power Plant Airborne Mercury Emissions

For Massachusetts power plant data, refer to the following page. For a table listing all U.S. power plants and their 2010 airborne mercury emissions nationwide, see www.environmentamerica.org, click on “Reports,” and navigate to “America’s Biggest Mercury Polluters.” The table is posted alongside the electronic copy of this report.

2010 Massachusetts Power Plant Airborne Mercury Emissions

National Rank (out of 457)	State Rank	Power Generation Facility Name	Parent Company Name	2010 Airborne Mercury Emissions (pounds)	State	City	County	Latitude	Longitude
261	1	DOMINION ENERGY BRAYTON POINT LLC	DOMINION RESOURCES INC	44.7	MA	SOMERSET	BRISTOL	41.711130	-71.191430
385	2	DOMINION ENERGY SALEM HARBOR STATION	DOMINION RESOURCES INC	7.0	MA	SALEM	ESSEX	42.526510	-70.879860
414	3	MOUNT TOM GENERATING CO LLC	FIRSTLIGHT POWER RESOURCES INC	1.8	MA	HOLYOKE	HAMPDEN	42.280640	-72.607411

Notes

¹ Richard Nixon, “Remarks on Signing the Clean Air Amendments of 1970,” 31 December 1970, available at Gerhard Peters and John T. Woolley, *The American Presidency Project*, at www.presidency.ucsb.edu/ws/?pid=2874.

² See for example: U.S. Environmental Protection Agency, *Benefits and Costs of the Clean Air Act from 1990 to 2020*, March 2011; Clean Air Task Force, *The Toll from Coal: An Updated Assessment of Death and Disease from America’s Dirtiest Energy Source*, September 2010; Travis Madsen and Dena Mottola, NJPIRG Law & Policy Center, *The Public Health Impact of Air Pollution in New Jersey*, December 2003; Travis Madsen and Nathan Willcox, Frontier Group and PennEnvironment Research & Policy Center, *Air Pollution and Public Health in Pennsylvania*, April 2006.

³ Paul R. Epstein et al., “Full Cost Accounting for the Life Cycle of Coal,” *Annals of the New York Academy of Sciences* 1219: 73–98, 2011, DOI: 10.1111/j.1749-6632.2010.05890.x; Nicholas Z. Muller, Robert Mendelsohn and William Nordhaus, “Environmental Accounting for Pollution in the United States Economy,” *American Economic Review* 101(5): 1649–75, August 2011, DOI: 10.1257/aer.101.5.1649.

⁴ Congress rewrote: See *Sierra Club v. EPA*, 353 F.3d 976, 979-80, D.C. Circuit Court, 2004, which describes the introduction of control technology-based air toxics standards in 1990, because the prior approach to air toxics regulation had been disappointing, and Congress wanted faster, deeper reductions than were possible under the prior approach. Emissions comparable to incinerators: see note 5.

⁵ U.S. Environmental Protection Agency, *Reducing Toxic Pollution from Power Plants: EPA’s Proposed Mercury and Air Toxics Standards* (presentation), 16 March 2011, available at www.epa.gov/airquality/powerplanttoxics/pdfs/presentation.pdf.

⁶ *Ibid.*

⁷ For simplicity’s sake, the text of this report uses the word “mercury” to represent inorganic mercury (the element alone), as well as methylmercury – a more toxic compound of mercury that results when microorganisms metabolize the chemical.

⁸ Philippe Grandjean and Philip Landrigan, “Developmental Neurotoxicity of Industrial Chemicals,” *The Lancet* 368: 2167-2178, 16 December 2006.

⁹ Kathryn R. Mahaffey et al, U.S. Environmental Protection Agency, “Adult Women’s Blood Mercury Concentrations Vary Regionally in the United States: Association with Patterns of Fish Consumption (NHANES 1999-2004),” *Environmental Health Perspectives* 117: 47-53, 25 August 2008.

¹⁰ Leonardo Trasande et al, “Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain,” *Environmental Health Perspectives* 115: 590-596, May 2005.

¹¹ National Academy of Sciences, National Research Council, *Toxicological Effects of Methylmercury*, (Washington, D.C.: National Academy Press) 2000; U.S. Environmental Protection Agency, *Mercury Study Report to Congress*, December 1997, vol. 1, pp. 2-5 & 2-6.

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¹⁵ U.S. Environmental Protection Agency, *Frequently Asked Questions about Mercury in Fish and Shellfish: What is Mercury and Methylmercury?*, 6 October 2011, available at water.epa.gov/scitech/swguidance/fishshellfish/outreach/advice_index.cfm.

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²⁰ The data presented in this section focuses on power plant emissions data reported to the the U.S. Environmental Protection Agency’s Toxics Release Inventory (TRI). Industries not required to report to TRI, or facilities with emissions below the reporting threshold, will not be represented in the data. For more detail, see the Methodology section.

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²⁶ *American Nurses Ass'n, et al. v. EPA*, D.D.C. No. 1:08-CV-02198, Complaint, 18 December 2008.

²⁷ *American Nurses Ass'n, et al. v. EPA*, D.D.C. No. 1:08-CV-02198, Order Entering Consent Decree, 15 April 2010.

²⁸ See note 23.

²⁹ U.S. Environmental Protection Agency, *EPA Proposes First National Standard for Mercury Pollution from Power Plants / Mercury and Air Toxics Standards Represent One of Strongest Health Protections from Air Pollution Since Passage of Clean Air Act* (press release), 16 March 2011.

³⁰ James E. McCarthy and Claudia Copeland, Congressional Research Service, *EPA Regulations: Too Much, Too Little, or On Track?*, 21 March 2011, p11, section 16-17.

³¹ See note 29.

³² Evidence summarized in Northeast States for Coordinated Air Use Management, *Tracking Progress in Reducing Mercury Air Emissions*, September 2007, available at www.newmoa.org/prevention/mercury/NESCAUMMercurySuccessStory.pdf.

³³ See note 23.

³⁴ Ibid.

³⁵ Ibid.

³⁶ TRI Reporting threshold for mercury and mercury compounds of 10 pounds: U.S. Environmental Protection Agency, *List of Lists: Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know Act (EPCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Section 112(r) of the Clean Air Act*, May 2010.

³⁷ No power plant facilities in the states of Idaho, Maine, Rhode Island or Vermont had reported any 2010 mercury emissions to the EPA by the time of publication for this report. See the Methodology section for potential caveats around the EPA *Toxic Release Inventory* data.