

RUNNING OUT OF TIME

New U.S.EPA Power Plant Data Shows Greenhouse Gases Rising Steadily

**An Analysis by the Environmental Integrity Project
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Carbon dioxide (CO₂) emissions from power plants rose 2.9 percent in 2007, the biggest single-year increase since 1998, according to new data from the U.S. Environmental Protection Agency. Emissions of carbon dioxide from the electric power industry have risen 5.9 percent since 2002, and 11.7 percent since 1997.

The current debate over global warming policy tends to focus on the long-term, e.g., whether and how we can reduce greenhouse gas emissions by 80 or 90 percent over the next fifty years.¹ But, even as we grapple with these long-term goals, rising emissions from U.S. power plants are making an already dire situation worse. Because CO₂ has an atmospheric lifetime of between 50 and 200 years, today's emissions could cause global warming for up to two centuries to come.²

The recent power plant data from EPA suggests we must start to reduce carbon dioxide emissions now, before it is too late.

The EPA's data allows easy identification of states that release the most carbon dioxide from electricity generation, as well as states that have registered the greatest increases in emissions over the past decade. See Appendix A.

The consumption of electricity accounted for more than 2.3 billion tons of CO₂ in 2006, or more than 39.5 percent of total emissions from manmade sources, according to the U.S. Department of Energy. Coal-fired power plants alone released more than 1.9 billion tons, or nearly one third of the U.S. total.^{3,4}

Several factors are driving power plant carbon dioxide emissions up, including the rising demand for electricity, and the growth of generation by both existing and new fossil-fired power plants over the past decade. The Department of Energy predicts that carbon dioxide emissions from power generation will increase 19 percent between 2007 and 2030, due to new or expanded coal plants.⁵ An additional 4,115 megawatts of new coal-fired generating capacity was added between 2000 and 2007, with another up to 15,000 megawatts expected to come online between 2008 and 2012.⁶ See Appendix B.

The data make clear why national environmental groups have expended so much effort trying to stop the construction of a new batch of conventional coal-fired power plants, which would make a bad situation worse. For example, the eight planned coal-fired plants that TXU Energy withdrew in the face of determined opposition in Texas would have added an estimated 64 million tons of CO₂ to the atmosphere, increasing emissions from power plants in that state by 24 percent.

But some of the rise in CO₂ emissions comes from *existing* coal fired power plants, either because these plants are operating at increasingly higher capacities, or because these aging plants require more heat to generate electricity.⁷ Whatever the reasons, many coal-fired power plants are churning out more CO₂ than they did in years past. For example, all of the top ten highest emitting plants in the nation either held steady or increased CO₂ output from 2006 to 2007. Georgia Power’s Scherer plant – the highest emitting plant in the nation, emitted 27.2 million tons of CO₂ in 2007, up roughly 2 million tons since 2006. Some coal-fired plants date back fifty years or more, and carbon reduction strategies will need to include ways to permanently retire these plants. For a complete listing of each power plant that reported CO₂ emissions to EPA in 2007, see Appendix C.

The States That Emitted the Most Power Plant CO₂

Three states – Texas, Arizona, and Georgia – registered the greatest annual increase in total CO₂ emissions when measured over the past one year, five years, or ten years. The ten states that emitted the most CO₂ in 2007, measured in total tons, are: Texas, Ohio, Florida, Indiana, Pennsylvania, Illinois, Kentucky, Georgia, Alabama, and West Virginia.

Rank	State	CO ₂ Tons (2007)
1	TX	261,798,527.5
2	OH	138,567,562.7
3	FL	134,511,485.7
4	IN	132,366,691.4
5	PA	123,583,664.4
6	IL	109,014,967.8
7	KY	101,784,836.0
8	GA	100,759,060.8
9	AL	94,803,674.3
10	WV	90,866,457.0

The ten states with the largest increase in CO₂ emissions between 2006 and 2007, measured in total tons, are: Texas, Georgia, Arizona, California, Pennsylvania, Michigan, Iowa, Illinois, Virginia, and North Carolina. California has led state efforts to cut greenhouse gas emissions, so the rise in carbon dioxide emissions from power plants in that state may be surprising. (Even after these increases, California generates significantly less CO₂ per megawatt of electricity than the national average).

Rank	State	One Year Increase 2006 to 2007
1	TX	5,684,471.70
2	GA	5,495,970.90
3	AZ	5,020,246.80
4	CA	4,669,688.10
5	PA	4,390,159.60
6	MI	4,098,832.20
7	IA	4,050,591.80
8	IL	3,890,271.20
9	VA	3,778,610.80
10	NC	3,671,476.00

The ten states with the largest increases in CO2 emissions over the last five years (between 2002 and 2007) are: Texas, Georgia, Arizona, Pennsylvania, California, Illinois, Alabama, Mississippi, South Carolina, and North Carolina.

Rank	State	Five Year Increase 2002 to 2007
1	TX	18,654,042.80
2	GA	16,816,419.50
3	AZ	14,936,723.40
4	PA	12,696,330.20
5	CA	11,140,449.40
6	IL	8,898,119.70
7	AL	7,569,555.00
8	MS	5,317,943.20
9	SC	5,088,513.90
10	NC	4,785,153.00

The ten states with the largest increases over the past ten years (between 1997 and 2007) are Texas, Arizona, Georgia, California, Illinois, Alabama, Florida, South Carolina, Oklahoma, and Missouri.

Rank	State	Ten Year Increase 1997 to 2007
1	TX	38,574,470.10
2	AZ	25,728,965.80
3	GA	24,790,270.00
4	CA	18,766,810.70
5	IL	16,471,638.80
6	AL	15,644,019.70
7	FL	13,734,656.20
8	SC	13,196,399.20
9	OK	12,033,508.80
10	MO	10,946,620.20

Based on 2006 data,⁸ the ten states that emitted the most CO₂ per megawatt-hour of electricity produced, are: North Dakota, Wyoming, Kentucky, Indiana, Utah, West Virginia, New Mexico, Colorado, Missouri, and Iowa.

Not surprisingly, states like Ohio, Kentucky and West Virginia, with a historical relationship to the coal industry, have lots of coal-fired power plants and high carbon dioxide emissions. Some states with no such ties to the coal industry have become overly dependent on coal to generate electricity. For example, Iowa and Missouri are among states that release the most amount of carbon dioxide for every megawatt-hour of power produced.

Rank	State	CO ₂ tons (2006)*	Net Gen (MWh - 2006)*	CO ₂ Lbs/MWh*
1	ND	35,951,929.6	30,881,137.0	2328.41
2	WY	49,551,012.0	45,400,370.0	2182.85
3	KY	102,289,243.2	98,792,014.0	2070.80
4	IN	132,783,016.1	130,489,788.0	2035.15
5	UT	40,522,303.0	41,263,324.0	1964.08
6	WV	87,660,563.2	93,815,804.0	1868.78
7	NM	34,374,286.3	37,265,625.0	1844.83
8	CO	46,659,680.6	50,698,353.0	1840.68
9	MO	82,173,705.9	91,686,343.0	1792.50
10	IA	39,875,221.7	45,483,462.0	1753.39

Data for all 50 states may be found in Appendix D. Reported CO₂ emissions were obtained from the U.S. Environmental Protection Agency “Clean Air Markets” webpage. The database is a publicly accessible repository for emissions and other operational data self-reported by the utility industry, and includes more than 1,000 power plants regulated under the federal Acid Rain Program. Additional information on these programs and the database can be found on EPA’s Clean Air Markets web page at <http://www.epa.gov/airmarkets/>. Net generation data for 2006 is from the U.S. Energy Information Administration, and is available at: http://www.eia.doe.gov/cneaf/electricity/st_profiles/e_profiles_sum.html.

Increased Efficiency the Key to Short-term Reductions in Carbon Dioxide

Power plant CO₂ emissions are directly linked to the efficiency with which fossil fuels are converted into electricity, and coal-fired power plants are inherently inefficient. A typical power plant converts only about a third of the energy contained in coal into electricity, while the remainder is emitted as waste heat.⁹ In fact, coal-fired power plant efficiency has remained largely unchanged since the mid 1960’s.

The nation’s oldest and dirtiest power plants need to be retired, and replaced with cleaner sources of energy. That will require accelerating the development of wind power and other renewable sources of electricity. In the short-term, the quickest route to greenhouse gas reductions is reducing our insatiable demand for energy. That means smarter building codes, and supporting low cost efforts – such as the weatherization of low-income homes and appliance efficiency standards – that will reduce demand and yield greenhouse gas benefits.

We clearly cannot afford a wave of conventional coal-fired power plants that would add millions of tons of carbon dioxide to the atmosphere. Carbon capture and sequestration (removing and storing the carbon either before or after the fuel is burned) and storing the carbon underground) may have long-term potential, but has not yet been shown to be economically or technically viable on a large scale. There may be some opportunity to retrofit existing plants to improve their efficiency, e.g., by capturing and using some of the heat that is now wasted in the combustion process.

The solutions may challenge old habits and entrenched interests. But if we are serious about curbing greenhouse gas pollution, we have no time to lose.

Endnotes

¹ Juliet Eilprin, “Carbon Output Must Near Zero to Avert Danger, Studies Say,” Washington Post, Mar. 10, 2008, at A01, available at <http://www.washingtonpost.com>.

² See Atmosphere, Climate & Env’t Info. Programme, U.K. Dep’t for Env’t, Food & Rural Affairs, Climate & Ozone, http://www.ace.mmu.ac.uk/Resources/Teaching_Packs/Key_Stage_4/Climate_Change/02p.html (last visited on Mar. 17, 2008); Kyoto Forestry Ass’n, Frequently Asked Questions: How Long Does Carbon Dioxide Stay in the Atmosphere?, <http://www.kfoa.co.nz/faqs.htm#5> (last visited Mar. 17, 2008); British Broad. Corp. Weather Ctr., British Broad. Corp., Climate Change: Carbon Dioxide http://www.bbc.co.uk/climate/evidence/carbon_dioxide.shtml (last visited Mar. 17, 2008); Office of Science, U.S. Dep’t of Energy, Carbon Dioxide Duration in Atmosphere, <http://www.newton.dep.anl.gov/askasci/wea00/wea00296.htm> (last visited Mar. 17, 2008).

³ Energy Info. Admin., U.S. Dep’t of Energy, Emissions of Greenhouse Gases Report (November 28, 2007) available at <http://www.eia.doe.gov/oiaf/1605/ggrpt/>. Note: EIA data differs slightly from EPA Acid Rain data.

⁴ In addition, according to the EPA’s most recent Inventory of U.S. Greenhouse Gas Emissions, electricity generators consume about 34 percent of U.S. fossil fuel energy and emit roughly 40 percent of all CO₂ from fossil fuel combustion. Electricity generators rely on coal for more than half of their total energy requirements, and electric generation accounts for 94 percent of all coal consumed in the United States. U.S. Env’t. Prot. Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2004 (No. 430-R-06-002) ES-7 (April 2006), available at http://epa.gov/climatechange/emissions/downloads06/06_Complete_Report.pdf.

⁵ Energy Info. Admin., U.S. Dep’t of Energy, U.S. Data Projections, Forecast & Analyses: Carbon Dioxide Emissions by Sector and Source tbl. 18 (March 2008), available at http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_18.xls.

⁶ EIP analysis based on U.S. Department of Energy, National Energy Technology Laboratory, *Tracking Coal Fired Power Plants: Coal’s Resurgence in Electric Power Generation* (October 2007 version); most recent update available at: <http://204.154.137.14/technologies/coalpower/refshelf.html>; and, Gregory Bryce, Chairman & Chief Executive Officer, Peabody Energy, Keynote Address at Ceraweek Global Power Day (Feb. 14, 2008).

⁷ While coal-fired generation climbed about 1.5 percent between 2006 and 2007, the amount of heat input used to generate that electricity rose about 3.6 percent. Heat input data from USEPA Clean Air Markets, available online at <http://camdataandmaps.epa.gov/gdm/index.cfm>. Net coal-fired generation from Energy Info. Admin., U.S. Dep’t of Energy, Monthly Flash Estimates of Electric Power Data, Table 4.1 (Jan. 2008 edition), available online at: <http://www.eia.doe.gov/cneaf/electricity/epm/flash/february2008.pdf>

⁸ This information is based on EPA’s “Clean Air Markets” data, available at <http://www.epa.gov/airmarkets> and net generation data from the U.S. Energy Information Administration, available at http://www.eia.doe.gov/cneaf/electricity/st_profiles/e_profiles_sum.html. 2006 data was analyzed because net generation data for 2007 is not currently available.

⁹ See U.S. Dep’t of Energy & U.S. Env’t Prot. Agency, Carbon Dioxide Emissions from the Generation of Electric Power in the United States 8 (July 2000), available at http://www.eia.doe.gov/cneaf/electricity/page/co2_report/co2report.html