

North American
**Power Plant
Air Emissions**



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The data sources used in this report are constantly evolving, as facilities revise previously submitted data to correct reporting errors or make other changes. For purposes of this report, the CEC uses information submitted in Canada to the National Pollutant Release Inventory (NPRI) in its 12 March 2004 update. In some cases, we also use data publicly available through the Canadian Electricity Association, in company annual reports, or from other public sources as indicated throughout the report. In Mexico, we use emissions data from a research report that used standard emission factors coupled with 2002 fuel consumption and generation data provided by Mexico's *Secretaría de Energía* (Sener).

In the United States, we obtained emissions information reported by facilities to the United States EPA's Clean Air Markets Division as of March 2004. For estimating mercury emissions, we relied on the EPA's 1999 mercury estimates coupled with coal consumption data for 2002 reported by facilities to the United States Energy Information Administration (EIA). The EIA was also the source of 2002 generation data for United States facilities. The CEC is aware that changes may occur to the data used in this report after the time period we collected the information. Any future report by the CEC will reflect these changes in making year-to-year comparisons. The CEC also encourages interested readers to check the Web sites and other information resources referenced in this document for any changes to the 2002 information presented here.

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NOTE FROM THE EXECUTIVE DIRECTOR

Electricity is an essential ingredient of the economies of our three countries in North America. Electric power is also a trade commodity of growing importance among the NAFTA partners. However, the electricity sector, both domestically and in a transboundary context, is seen as resource and environmentally intensive, with the air pollution and greenhouse gases it generates being key concerns.

Sound environmental and energy policies in North America rely on good science and reliable information on releases of pollutants to the environment and their consequences. In June 2002, the CEC Secretariat report, *Environmental Challenges and Opportunities of the Evolving North American Electricity Market*, outlined some of the recent structural changes and trends in the marketplace. Our report also noted the need for a database of comparable information from the three countries as a basis for trilateral decision-making—particularly important since the three countries are examining ways to strengthen energy linkages among themselves.

While the 2002 CEC Secretariat report presented basic, non-source-specific information on some of the major air pollutants (SO₂, NO_x, mercury and CO₂), it was not possible to acquire more specific air pollution information from many individual power plants at that time. Having more detailed pollutant information would support a number of decision-making needs, including:

- linking energy demand projections with air pollution trends;
- developing scenarios for a mix of electricity generation fuels and resulting impact on air quality, e.g., clean coal, fuel switching, etc.;
- ascertaining the air quality impacts associated with the use of alternate or renewable energy sources;
- supporting the development of robust and viable trilateral emissions trading programs;
- aiding facilities to develop emissions reduction strategies based on best practices of their competitors; and
- facilitating cross-border cooperation in reducing emissions.

Recent changes in reporting rules have created the opportunity to compile more detailed information on emissions from most large fossil fuel power plants all across North America. This report is the culmination of the CEC's effort to accomplish this North American milestone.

This report is only a snapshot in time for one year—2002. Therefore, it cannot show what actions the facilities named herein are taking to reduce their 'environmental footprint.' A number of progressive companies have developed comprehensive emissions management strategies that include fuel source diversification (switching their fuel source from coal to natural gas; expanding their wind, solar or geothermal power business; etc.) as well as technological innovation that either reduces emissions or improves generating efficiency or both. Consortia of companies, like the Canadian Clean Power Coalition or the Clean Energy Group in the United States, are coming together to promote the production and use of alternate or renewable energy sources. Other companies are partnering with counterparts in developing countries to create Clean Development Mechanisms (CDMs) that will help to address the looming threat of global warming. In a similar vein, several states and provinces have set in place or are contemplating firm commitments to significantly reduce mercury emissions at coal power plants in the next several years (e.g., Alberta, Connecticut, Massachusetts, New Jersey, and Wisconsin).

The CEC is seeking to increase its collaboration with the private sector through cooperative programs in order to facilitate greater environmental progress for North America. My hope is that the reader will use this information to aid decision making for sustainable development in our three countries and provide the Secretariat with advice on how this information could be applied and improved in the future.


William V. Kennedy
Executive Director, CEC

PREFACE

This document represents a milestone in promoting cooperation in North America through the collection, exchange, and public dissemination of comparable environmental information by Canada, Mexico and the United States. The report presents, for the first time, specific air pollutant information for individual fossil fuel-fired power plants across North America. This information will assist air quality planners, energy analysts, and the public to garner a greater understanding of the environmental performance of the electricity generating sector on a continental scale. This includes a clearer picture of how the environmental performance of individual power plants in each country compares in terms of the pollutants released to the atmosphere, whether regional differences exist in emissions levels, and if there are clusters of high-emitting facilities that may contribute to downwind pollution transport, including across international borders. The pollutant emissions information also provides a common reference year in which to track future trends in pollution, both at the level of individual power plants as well as for their collective emissions within specific regions. This helps establish a baseline to measure future environmental performance as increasing competition within the electric sector leads to shifts in generation within large regions of North America. It also helps create confidence in air quality programs by allowing interested stakeholders to track the progress of pollution control measures over time.

Fossil fuel power plants burning coal, oil and natural gas produce a large share of the North American electricity supply and are an important component of the region's economy. These facilities also contribute a significant share of the air pollution and greenhouse gases released in each country. Prior to 2002, however, publicly accessible air pollutant information on individual power plants was not available on a comparable basis across North America. While differences and information gaps still remain, recent changes to reporting rules now allow for a more complete picture of air pollution from virtually all large fossil fuel-fired power plants in Canada, Mexico, and the United States. With existing reporting in the United States coupled to changes in reporting requirements in Canada and increasing information availability in Mexico, the year 2002 is the first year in which it is possible to compile comparable power plant-specific pollutant information from all three countries.

ACKNOWLEDGMENTS

The Commission for Environmental Cooperation of North America would like to thank Samudra Vijay, Luisa T. Molina, and Mario J. Molina of the Integrated Program on Urban, Regional, and Global Air Pollution, Massachusetts Institute of Technology for compiling the Mexico-wide power plant air emissions inventory. The full breadth of this report would not have been possible without their efforts.

In this report, we bring together plant-by-plant air emissions of three key pollutants—sulfur dioxide (SO₂), nitrogen oxides (NO_x), and mercury (Hg)—emitted in Canada, Mexico and the United States. We also report on the releases of carbon dioxide (CO₂), an important greenhouse gas. These substances are all linked to serious human health and environmental concerns. In addition to total emissions from each power plant, we also present their environmental performance in terms of the amount of pollution emitted per unit of electricity produced. This is an “output-based” measure of how efficiently individual power plants produce electricity in relation to the amount of air pollution they emit.

This report is part of an ongoing effort by the Commission for Environmental Cooperation (CEC) of North America to increase the comparability and public availability of North American environmental information. In 2001, the CEC Council (comprised of the federal heads of the environment agencies in each country) adopted Council Resolution 01-05 (29 June 2001) to promote the comparability of air emissions inventories in North America. In the resolution, the Council called upon the CEC to produce periodic reports summarizing publicly available information from North American air emissions inventories, including greenhouse gases.

This report on North American power plant emissions is a result of the CEC Council directive to promote greater exchange of environmental information regarding air emissions inventories among the three NAFTA partners. The electricity generating sector is an appropriate place to begin these efforts because it contributes a significant share of air emissions in North America, it is widely distributed across the three countries, and it currently has the most comparable air pollutant information available among all the major industry sectors of North America. As more information becomes publicly available from other sectors (including motor vehicles and other non-industry sectors), the CEC hopes to provide future compilations for other major sources of air pollution in North America.



GRAND LAKE *fuel used coal, capacity 57 MW, location New Castle Creek, New Brunswick*

Introduction

OVERVIEW

The increasing integration of the continental energy market under the North American Free Trade Agreement (NAFTA) has opened new opportunities for greater access to energy sources with the prospect of lower costs and greater energy security for North American consumers. With regard to the electricity trade, it also calls for greater information exchange on cross-border transfers of electricity to ensure system reliability and to facilitate the dispatch of the lowest cost electricity providers. Also important is knowledge of the environmental attributes of electricity generation on a comparable basis in each country. This report is the first-ever look on a North American scale at one aspect of this—specifically, air emissions from individual fossil fuel power plants in all three North American countries. The goal is to present an overview of air emissions information for several key pollutants from individual power plants in each country in order to provide a more complete environmental context of electricity generation from the burning of fossil fuels in Canada, Mexico and the United States.

The electricity generating sector is an appropriate place to begin looking at the availability and comparability of air emissions information in North America as it contributes a significant share of the annual air pollution and greenhouse gas emissions released to the environment in each country (see Table 1.1). North America at the national, state, provincial and local level has adopted numerous regulations, objectives and goals aimed at limiting power plant pollution, and has made significant progress in reducing some of these pollutants, particularly sulfur dioxide and nitrogen oxides. Despite these efforts, governments continue to be concerned about the effects of power plant emissions on human health and the environment, as demonstrated by the ongoing efforts to establish new pollution reduction targets in each North American country.

Table 1.1
PERCENT CONTRIBUTION FROM THE ELECTRICITY GENERATING SECTOR TO TOTAL NATIONAL EMISSIONS^a

Pollutant	Canada ^b	Mexico ^c	United States ^d
Sulfur dioxide (SO ₂)	20%	55%	69%
Nitrogen oxides (NO _x)	11%	27%	22%
Mercury (Hg)	25%	3%	40%
Carbon dioxide (CO ₂)	22%	30%	39%

^a Contribution to total national emissions from all stationary, area, mobile, and other human-related sources.

^b Canada information sources: SO₂ and NO_x (1995): Environment Canada. 1995 Criteria Air Contaminant Emissions for Canada. Online at http://www.ec.gc.ca/pdb/ape/ape_tables/canada95_e.cfm (accessed 20 July 2004). Hg (2000): Environment Canada. Mercury and the Environment. Online at <http://www.ec.gc.ca/MERCURY/SM/EN/sm-cr.cfm> (accessed 22 July 2004). CO₂ (2002): Environment Canada. Backgrounder—Canada's 2002 Greenhouse Gas Inventory. Online at http://www.ec.gc.ca/pdb/ghg/1990_02_report/ghg_backgrounder_e.cfm (accessed 27 September 2004).

^c Mexico information sources: SO₂ and NO_x (1998): Organization for Economic Co-operation and Development. *OECD Environmental Data Compendium 2002: Air*. 17 June 2003. Online at <http://www.oecd.org/dataoecd/8/62/2958142.pdf>. Hg (1999): Acosta y Asociados. "Preliminary Atmospheric Emissions Inventory of Mercury in Mexico." Prepared for the Commission for Environmental Cooperation. 30 May 2001. Online at http://www.cec.org/files/PDF/POLLUTANTS/MXHg-air-maps_en.pdf. CO₂ (1999): World Resources Institute. *EarthTrends Country Profiles*. Climate and Atmosphere—Mexico. 2003. Online at http://earthtrends.wri.org/pdf_library/country_profiles/Cli_cou_484.pdf.

^d United States information sources: SO₂ and NO_x (2001): United States Environmental Protection Agency. *Acid Rain Program: 2002 Progress Report*. Online at <http://www.epa.gov/airmarkets/cmprpt/arp02/2002report.pdf> (accessed 22 July 2004). Hg (1999): United States Department of Energy, National Energy Technology Laboratory. Mercury Reduction in Coal-Fired Power Plants: DOE's R&D Program. ARIPPA Technical Symposium. 21 August 2002. Online at http://www.netl.doe.gov/coalpower/environment/mercury/pubs/DOE_RD_Prgm_PennState_ARIPPA082102.pdf (accessed 22 July 2004). CO₂ (2002): United States Environmental Protection Agency. *Inventory of Greenhouse Gas Emissions and Sinks: 1990–2002*. EPA 430-R-04-003. April 2004. Online at <http://www.epa.gov/globalwarming/publications/emissions> (accessed 27 September 2004).

In this report, we bring together fossil fuel power plant information for the year 2002 from Canada, Mexico and the United States, detailing the plant-by-plant emissions of three key pollutants: sulfur dioxide (SO₂), nitrogen oxides (NO_x), and mercury (Hg). We also report on the releases of carbon dioxide (CO₂), an important greenhouse gas. We do not report on direct releases of particulate matter (PM), which also presents a risk to human health and the environment. Most of the PM contribution from power plants is through the formation of particles in the atmosphere after release of the gaseous precursors SO₂ and

NO_x from the smokestack, rather than direct emissions of PM itself, although this does occur to some extent.

Throughout this report, we present only data obtained or derived from publicly available sources. We present pollutant quantities in metric units of kilograms or metric tonnes, and electricity output in terms of watt-hours (both megawatt-hours and gigawatt-hours). **Table 1.2** provides the conversion or scaling factors for converting among metric units and other units appearing in this report.

Table 1.2
CONVERSION FACTORS

MASS AND WEIGHT	1 metric ton (tonne)	1.1023 short tons
	1 short ton	0.9072 metric ton (tonne)
	1 kilogram	2.2046 pounds
	1 pound	0.4536 kilograms
	1 metric ton (tonne)	1,000 kilograms
ENERGY	1 kilowatt-hour	1,000 watt-hours
	1 megawatt-hour	1,000 kilowatt-hours or 1,000,000 watt-hours
	1 gigawatt-hour	1,000 megawatt-hours or 1,000,000,000 watt-hours
	1 British thermal unit	1,055 joules
	1 gigajoule	1,000,000,000 joules
	1 petajoule	1,000,000 gigajoules or 10 ¹⁵ joules

We present emissions information for the year 2002 in this report because it is the first year in which it is possible to compile comparable information for individual power plants from all three countries. Prior to 2002, facility-specific information was not uniformly available from every part of North America. Increased information collection efforts or changes to reporting requirements in each country have taken place in recent years that now will bring annual emissions information to the interested public for virtually all the large fossil fuel power plants in all three countries. With respect to individual facilities, the year 2002 serves as a first “snapshot in time” of the comparative emissions performance of major North American fossil fuel power plants. This, of course, will change over time due to new pollution controls, changes in fuel, construction of new plants and retirement of old ones, and other factors. Therefore, while the year 2002 provides a static picture for one year, it also can be a starting point for tracking future changes in individual power plant emissions within the North American context.

In this report, we provide contextual information on the electric power sector, including a discussion of the key pollutants of concern (Chapter 2). We also discuss and tabulate the plant-by-plant emissions in each country (Chapter 3). The data reveal wide variations in the emissions performance of fossil fuel power plants in North America, suggesting that continued progress can be made in addressing the major pollutants of concern. There are facilities in the database that, with the use of modern pollution control equipment, are currently achieving greater than 90 percent reductions in NO_x, SO₂, and mercury. This is a source of optimism for air quality officials responsible for protecting human health and the environment, the electricity generation industry, and individuals concerned about these issues. The emissions data show that the industry has a demonstrated ability to achieve substantial improvements in its environmental performance while continuing to meet the needs of a growing North American economy.

Emissions of CO₂, however, present a unique challenge for policymakers and industry. All fossil fuels contain the element carbon, which produces CO₂ when burned in the presence of oxygen. Reducing these emissions with current technologies will require more than installing retrofit technologies or back-end controls. Reducing CO₂ emissions and the accumulation of greenhouse gases in the atmosphere requires a combination of strategies, including: increased reliance on non-CO₂

emitting power facilities; increased reliance on higher efficiency, lower CO₂ emitting technologies (e.g., combined-heat and power facilities); and a wide range of strategies outside of the electric sector, such as energy conservation and carbon sequestration measures.

The report concludes with a discussion of the information sources and methodology used in compiling the data (**Appendix**). Of special note is that the emissions information we present comes from a variety of public sources, and the methods for measuring or estimating the reported emissions may differ across the countries. It is important to have ancillary information to the emissions data that can help the interested public in evaluating the reasonableness of the reported information. This, unfortunately, is not always publicly available. The physical properties of the fuel, such as sulfur, mercury and carbon content, the types of boilers and pollution control equipment, and the amount of electricity generation are some additional pieces of information that can help provide a useful reference point for evaluating the reported emissions.¹

Table 1.3 provides a summary of the data presented later in the report, including: 1) the summed totals of each pollutant from those facilities having emissions information; 2) the number of facilities having emissions information for the given pollutant; 3) the reported electricity production (when available); and 4) the collective emission rate of the included fossil fuel facilities expressed in terms of the quantity of pollution per unit of electricity output. Note that **Table 1.3** is a summary of information only from the power plants tabulated in this report, unless otherwise noted. Therefore, the totals are not necessarily the national totals from the entire electricity sector in each country. For example, in the United States we include only those plants reporting to the United States EPA Clean Air Markets Division (Acid Rain Program), and further omit facilities having generation capacities less than 100 MW. Therefore, while **Table 1.3** presents the CO₂ emissions from United States power plants included in this report as 2,178 million metric tonnes, the national total for all fossil fuel power plants in the United States during 2002 is 2,240 million metric tonnes,² which is about 3 percent greater than the total in **Table 1.3**. Although this report does not include every fossil fuel power plant, it does include the largest sources that account for the majority of national emissions from the electricity sector.

<i>fuel used</i>	<i>coal</i>
<i>capacity</i>	<i>1200 MW</i>
<i>location</i>	<i>Río Escondido, Coahuila</i>

Table 1.3

SUMMARY OF EMISSIONS FROM POWER PLANTS INCLUDED IN THIS REPORT

POLLUTANT	Country	Total annual emissions from included facilities	Number of facilities included (with some quantity of emissions reported) ^a	Total electricity production from included facilities (GWh) ^b	Collective emission rate of included facilities
SO ₂	Canada	0.62 million tonnes	38	N/A	N/A
	Mexico	1.6 million tonnes	82	0.137 million	11.35 kg/MWh
	United States	9.2 million tonnes	836	2.4 million	3.79 kg/MWh
NO _x	Canada	0.26 million tonnes	70	N/A	N/A
	Mexico	0.25 million tonnes	82	0.137 million	1.83 kg/MWh
	United States	4.0 million tonnes	897	2.4 million	1.66 kg/MWh
Hg	Canada	1,986 kg	22	N/A	N/A
	Mexico	1,025 kg	3	0.003 million	0.034 kg/GWh
	United States	44,231 kg	376	1.9 million	0.023 kg/GWh
CO ₂	Canada	128 million tonnes ^c	N/A	0.154 million ^c	831 kg/MWh ^c
	Mexico	94 million tonnes	82	0.137 million	688 kg/MWh
	United States	2,178 million tonnes	899	2.4 million	893 kg/MWh

^a The number of included facilities can vary across different pollutants for the same country according to the number of facilities in each country for which we obtained or estimated emissions. For example, the mercury totals include only power plants burning coal.

^b The total generation in each row of this table is the summed generation from only those facilities reporting emissions of the particular pollutant. The Mexico and United States 2002 generation data are from government sources described in the methodology section of this report (Appendix). We could not include the summed 2002 generation for Canada because we did not have generation data for many of its power plants.

^c We do not obtain these values from individual facility information presented in this report. They are from aggregated 2002 national totals available from federal agencies in Canada (see accompanying text).

In general, Table 1.3 does not include generation from Canada's fossil fuel power plants because 2002 generation from individual facilities was only partially available. This is also true for CO₂ emissions from most individual Canadian facilities during 2002, although two companies publicly report their plant emissions. We can, however, estimate a national CO₂ emissions average based on aggregated values available from the government of Canada. The federal agency Statistics Canada reports the national net generation from fossil fuel combustion (coal, oil and natural gas) in Canada for 2002 as 0.154 million GWh.³ Environment Canada reports national CO₂ emissions from the electricity sector in 2002 as 128 million metric tonnes.⁴ If we assume Statistics

Canada and Environment Canada are compiling their information from an identical set of power plants, the national CO₂ emissions average during 2002 in Canada would be 831 kg/MWh. We can not do the same for emissions of SO₂, NO_x, and Hg in Canada because we do not have similar national emissions totals for these pollutants during 2002, although we believe the totals given in Table 1.3 encompass the majority of emissions. Without individual facility generation data, however, we are unable to parse out what portion of the aggregated national generation is attributable to only those facilities for which we were able to obtain emissions information.



Context

2.1 THE ELECTRIC POWER SYSTEM

The electric power system in North America is wide-ranging and highly complex, with important implications for national economic performance, energy security, and quality of life. A reliable, affordable, and clean supply of electricity is essential for the functioning of each country's modern economy while maintaining and enhancing the quality of life for its citizens. A major challenge facing governments and industry today is to balance important economic and energy policy considerations with public health and the environmental harm that results from the different sources of power supply.

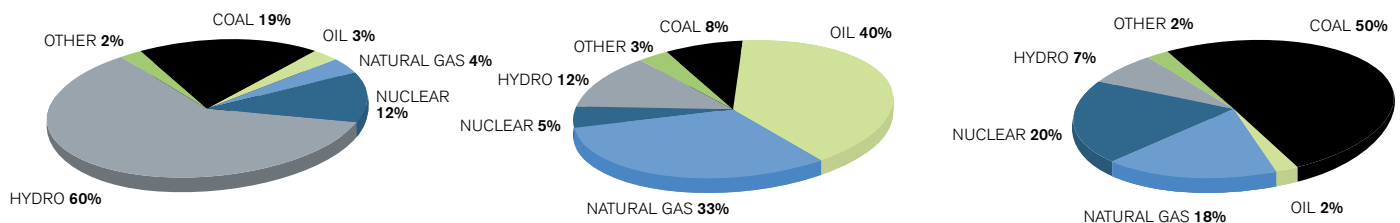
Electricity generation in North America is based on a familiar model, one that is replicated throughout the world. Large central power stations, often in rural locations, spin generators to feed an expansive network of high-voltage transmission lines. These generators are carefully synchronized, each one spinning in unison, and generally powered by steam produced by coal, natural gas, oil, or nuclear fission, or driven by water from reservoirs.

The electricity pulsing through the transmission grid in turn feeds a system of low-voltage distribution lines, which connect to homes and businesses. Turning on a reading lamp or computer connects the appliance to this network of wires, drawing electricity from the grid.

Power plant operators are continually responding to changes in the system, increasing or decreasing supply to match customer demand in a carefully orchestrated exercise managed by a central authority or dispatcher. Intimately involved in the system are fuel suppliers, financial institutions, technology firms, and governments.

The technologies used to supply the grid vary throughout North America depending on a host of factors, including the cost and availability of fuel supplies, the availability of renewable resources (e.g., wind and solar), government subsidies and taxes, as well as the rules and requirements governing power markets and the operations of individual power plants. Because these factors vary across regions and countries, the technologies and fuels used to generate electricity vary according to local circumstances. This can be seen on a national scale in Figure 2.1, which displays the 2002 generation fuel mix in Canada, Mexico and the United States. The figure shows that the United States generates half its electricity from coal, whereas Mexico gets only about 8 percent from this fuel and instead generates a far greater share of its electricity from oil and natural gas. By contrast, Canada produces the largest share of its electricity from hydropower. Within each of these countries, however, there can be significant regional variations in the generation mix.

Figure 2.1
GENERATION FUEL MIX IN NORTH AMERICA



CANADA

In 2002, Canada produced an estimated 576 billion kilowatt-hours of electricity. Sharp regional variations exist within the country. In Quebec, electricity is almost entirely hydro-powered. Alberta and Saskatchewan in the West rely heavily on coal and natural gas.

Source: Canadian Electricity Association, 2002 data.

MEXICO

Mexico produced an estimated 221 billion kilowatt-hours of electricity in 2002. Oil-fired power plants account for the largest share of Mexico's fossil power generation. Mexico's national energy plans call for a greater share from natural gas in the future, but this may depend on price and availability.

Sources: *Comisión Federal de Electricidad, Secretaría de Energía, and the United States Energy Information Administration's Mexico country analysis.*

UNITED STATES

The United States produced an estimated 3,858 billion kilowatt-hours of electricity in 2002. In recent years, natural gas-fired power generation has greatly increased its share of the United States power supply. However, as natural gas prices are now rising, and the existing fleet of coal plants is continuing to age, there is a renewed interest in developing new coal-fired power generation.

Source: *United States Department of Energy, Energy Information Administration, 2002.*

2.2 POWER PLANT AIR EMISSIONS

Every technology used in generating electricity has its associated environmental impacts. For example, coal-fired power plants require the mining, transport, and storage of massive quantities of coal. They release SO₂, NO_x, mercury and other pollutants to the atmosphere when coal is burned. Bottom ash, fly ash, and other solid wastes accumulate at the plant, requiring handling and disposal. Large hydroelectric facilities may require the damming and flooding of large tracts of land, displacing entire communities, destroying natural river courses, disrupting wildlife habitat, and liberating toxic metals like mercury from flooded soils. Wind turbines may generate some noise and, if not well located, can be dangerous to birds in flight and viewed as a visual blight on the landscape. These are just some of the environmental concerns that arise in producing electricity.

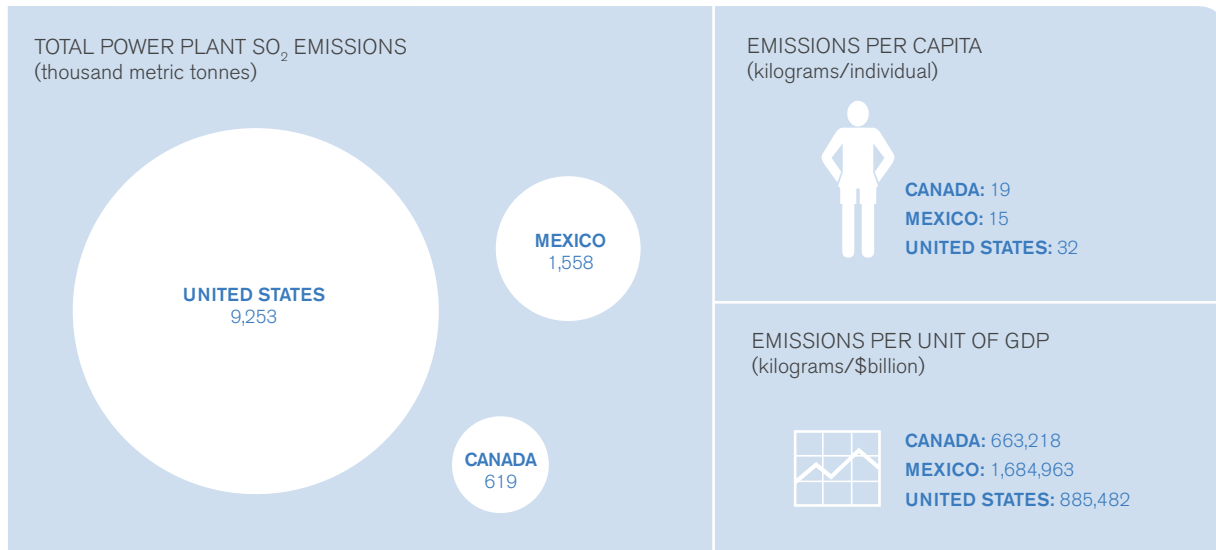
In this report, we focus on the release of air pollutants and greenhouse gases from the combustion of fossil fuels—coal, oil, and natural gas—at large power plants. Along with nuclear and hydroelectric facilities, fossil fuel power plants generate the bulk of electricity in North America (see Figure 2.1)

The key primary pollutants of concern produced by fossil fuel power plants include SO₂, NO_x, and mercury. We also report on the releases of CO₂, an important greenhouse gas. As mentioned earlier, we do not include particulate matter (PM), another key air pollutant for which power plants contribute a major share of the emissions (NO_x and SO₂) contributing to its presence in the atmosphere. All emissions data are for the year 2002, the first year in which comparable data on these emissions are available from each country.

Sulfur dioxide. SO₂ emissions from power plants react with other chemicals in the atmosphere to form sulfate particles, an important contributor to the fine particle mix that circulates with the air we breathe. Fine particles have been linked to a number of serious human health problems, particularly among children, the elderly, and individuals with pre-existing cardiovascular or lung diseases (e.g., asthma). These health effects include premature death, increased respiratory symptoms and disease, decreased lung function, alterations in lung tissue and structure, and changes in respiratory tract defense mechanisms. SO₂ emissions are also a major contributor to acid deposition, commonly known as “acid rain,” which can result in harm to fish and other aquatic life, forests, crops, buildings, and monuments. Fine particles formed from SO₂ emissions also are significant contributors to poor visibility at scenic panoramas across North America because the particles efficiently scatter natural light, thus creating hazy views.

Coal and oil both contain varying concentrations of sulfur, with the result that power plants create SO₂ when burning these fuels. Natural gas is a relatively minor source of SO₂ during combustion. The share of SO₂ emissions from power plants to national totals is not insignificant. Power plants in Canada, Mexico and the United States contribute 20, 55 and 69 percent of their respective national SO₂ emissions.^{5,6,7}

Figure 2.2
SO₂ EMISSIONS ESTIMATES - Total power plant emissions, emissions per capita, and emissions per unit of GDP



Sources: National GDP and population estimates from *CIA World Factbook*, online at <http://www.cia.gov/cia/publications/factbook>, accessed June 2004. Population estimates for 2002 were estimated based on the reported 2003 figures and country specific growth rates calculated from 2003 and 2004 population estimates. GDP (purchasing power parity) estimates were reported for 2002.

United States SO₂ emissions (2002): United States Environmental Protection Agency. *Acid Rain Program: 2002 Progress Report*. Online at <http://www.epa.gov/airmarkets/cmprpt/arp02/2002report.pdf> (accessed 22 July 2004). Note that this figure is slightly higher than that reported in Table 1.3 because Table 1.3 does not include sources below 100 MW in capacity.

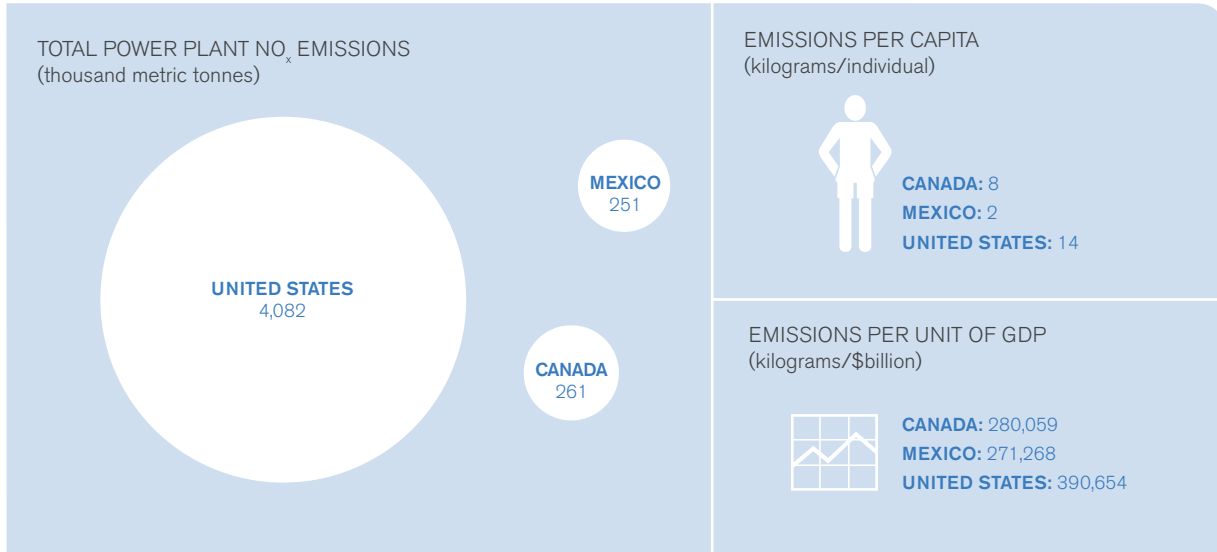
Canada SO₂ emissions (2002): Environment Canada, National Pollutant Release Inventory (NPRI) database for 2002, accessible at www.ec.gc.ca/pdb/npri/npri_dat_rep_e.cfm.

Mexico SO₂ emissions (2002): Vijay, Samudra, Molina, Luisa T. and Molina, Mario J. *Estimating Air Pollution Emissions from Fossil Fuel Use in the Electricity Sector in Mexico*, prepared by the Integrated Program on Urban, Regional, and Global Air Pollution at the Massachusetts Institute of Technology, April 2004. Online at www.cec.org.

Nitrogen oxides. Emissions of NO_x contribute to smog formation (ground-level ozone), resulting in human respiratory problems and crop damage. Like SO₂, NO_x contributes to fine particulate formation (particularly during cold weather) and acid rain. Atmospheric nitrogen deposition from NO_x and other nitrogen-containing compounds contributes to eutrophication of waterways and coastal estuaries. Eutrophication results from an increase in nutrient deposition to a water body, producing algae blooms, which can reduce or eliminate the oxygen available to aquatic plants and animals.

NO_x emissions are formed as a byproduct of high temperature fuel combustion, and are produced during the combustion of all fossil fuels. Power plants in Canada, Mexico and the United States contribute 11, 27 and 22 percent of their respective national NO_x emissions. Motor vehicles and other combustion sources are also important contributors of NO_x, particularly in populated areas.^{8,9,10}

Figure 2.3
NO_x EMISSIONS ESTIMATES - Total power plant emissions, emissions per capita, and emissions per unit of GDP



Sources: National GDP and population estimates from *CIA World Factbook*, online at <http://www.cia.gov/cia/publications/factbook>, accessed June 2004. Population estimates for 2002 were estimated based on the reported 2003 figures and country specific growth rates calculated from 2003 and 2004 population estimates. GDP (purchasing power parity) estimates were reported for 2002.

United States NO_x emissions (2002): United States Environmental Protection Agency. *Acid Rain Program: 2002 Progress Report*. Online at <http://www.epa.gov/airmarkets/cmprpt/arp02/2002report.pdf> (accessed 22 July 2004). Note that this figure is slightly higher than that reported in Table 1.3 because Table 1.3 does not include sources below 100 MW in capacity.

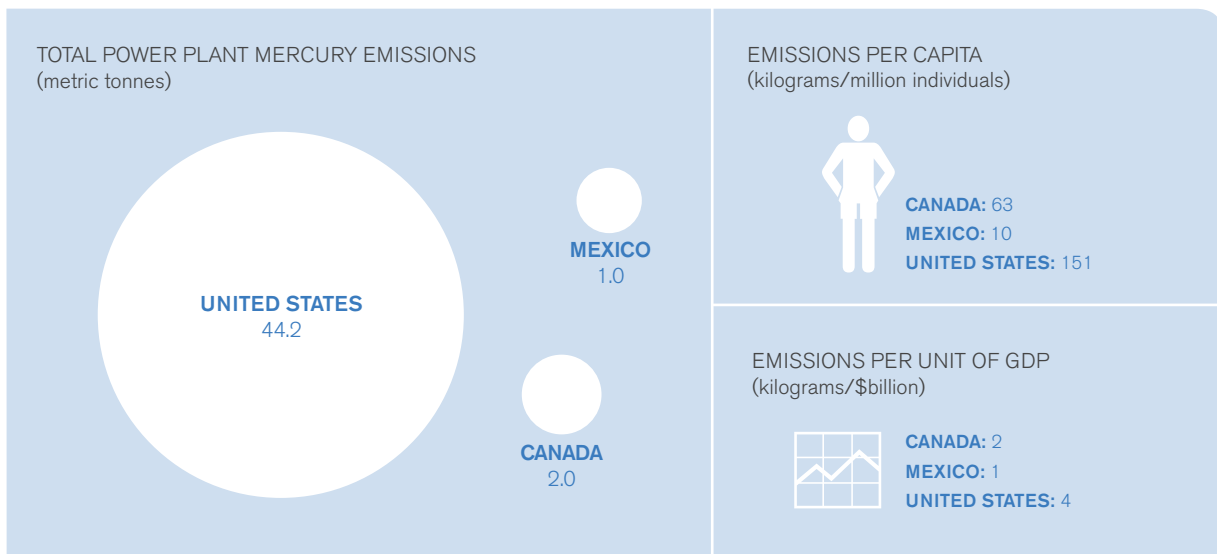
Canada NO_x emissions (2002): Environment Canada, National Pollutant Release Inventory (NPRI) database for 2002, accessible at www.ec.gc.ca/pdb/npri/npri_dat_rep_e.cfm.

Mexico NO_x emissions (2002): Vijay, Samudra, Molina, Luisa T. and Molina, Mario J. *Estimating Air Pollution Emissions from Fossil Fuel Use in the Electricity Sector in Mexico*, prepared by the Integrated Program on Urban, Regional, and Global Air Pollution at the Massachusetts Institute of Technology, April 2004.

Mercury. Power plants, as well as other natural and industrial sources, emit significant amounts of mercury to the air. There are several chemical forms of mercury emitted by power plants. One form, elemental mercury, deposits relatively slowly once emitted to the air, so that its transported distance through the atmosphere can be global in extent. Another form of mercury emitted by power plants is oxidized or ionic mercury. One class of oxidized mercury readily dissolves in water, is less volatile than elemental mercury, and sticks relatively

easily to surfaces, so may quickly deposit downwind from its source. As a result of a shorter transport distance, some forms of oxidized mercury may more promptly enter the food chain nearer to its emission source compared to elemental mercury emissions. Once mercury deposits either in its elemental or oxidized forms, biological processes can transform it into a highly toxic compound called methylmercury.

Figure 2.4
MERCURY EMISSIONS ESTIMATES - Total power plant emissions, emissions per capita, and emissions per unit of GDP



Sources: National GDP and population estimates from *CIA World Factbook*, online at <http://www.cia.gov/cia/publications/factbook>, accessed June 2004. Population estimates for 2002 were estimated based on the reported 2003 figures and country specific growth rates calculated from 2003 and 2004 population estimates. GDP (purchasing power parity) estimates were reported for 2002.

United States mercury emissions (2002): Calculated based on Information Collection Request (1999) database developed by the United States EPA and 2002 coal use data from the Energy Information Administration (EIA) of the United States Department of Energy.

Canada mercury emissions (2002): Environment Canada, National Pollutant Release Inventory (NPRI) database for 2002, accessible at www.ec.gc.ca/pdb/npri/npri_dat_rep_e.cfm.

Mexico mercury emissions (2002): Vijay, Samudra, Molina, Luisa T. and Molina, Mario J. *Estimating Air Pollution Emissions from Fossil Fuel Use in the Electricity Sector in Mexico*, prepared by the Integrated Program on Urban, Regional, and Global Air Pollution at the Massachusetts Institute of Technology, April 2004.

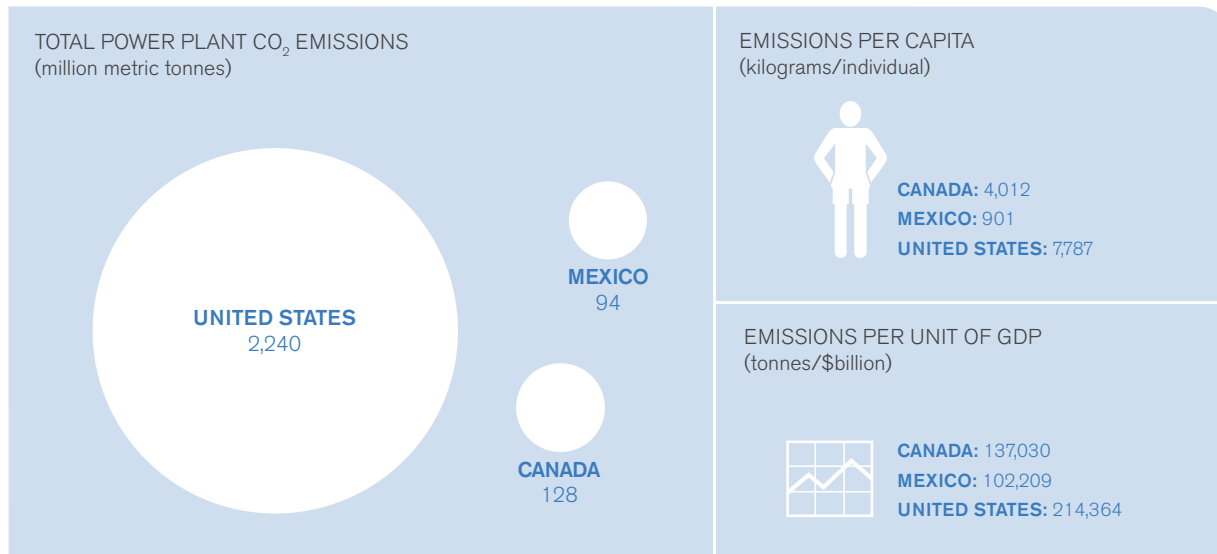
Methylmercury in water bodies concentrates in the tissue of fish, with generally higher concentrations in the larger predator fish that feed on smaller fish and other organisms lower in the food chain. Birds that feed on fish, such as loons, also can accumulate high levels of mercury in their bodies. In addition, human exposure to methylmercury in North America also results primarily from the consumption of fish.

Methylmercury can adversely affect several organ systems in people, with the severity of effects depending largely on the magnitude and timing of the exposure (i.e., during fetal development or as a child or adult). Mercury is a developmental neurotoxin that can damage the central nervous system of a young child or fetus. Some studies suggest that mercury has cardiovascular effects in adults and can impair the adult immune and reproductive systems.

Power plants in Canada and the United States contribute 25 and 40 percent of their respective industrial mercury emissions.^{11,12} Coal-fired power plants are the single largest industrial source of atmospheric mercury emissions in the United States due to the large share of electricity generation in the United States from coal combustion. Oil and natural gas contain relatively minor concentrations of mercury, depending on their source, and are not considered to be significant sources of mercury at this time. Only three power plants burned coal in Mexico during 2002, and these contributed roughly three percent of the country's atmospheric mercury emissions.¹³

Carbon Dioxide. CO₂ is the most abundant greenhouse gas (GHG) emitted from human activities. There are also non-CO₂ GHGs emitted directly by human activities, including methane (CH₄), nitrous oxide (N₂O),

Figure 2.5
CO₂ EMISSIONS ESTIMATES - Total power plant emissions, emissions per capita, and emissions per unit of GDP



Sources: National GDP and population estimates from *CIA World Factbook*, online at <http://www.cia.gov/cia/publications/factbook>, accessed June 2004. Population estimates for 2002 were estimated based on the reported 2003 figures and country specific growth rates calculated from 2003 and 2004 population estimates. GDP (purchasing power parity) estimates were reported for 2002.

United States CO₂ emissions (2002): United States Environmental Protection Agency, *Inventory of United States Greenhouse Gas Emissions and Sinks: 1990–2002*, Chapter 3, Energy, page 42. EPA 430-R-04-003, April 2004. Accessed online at <http://www.epa.gov/globalwarming/publications/emissions> (29 September 2004). Note that this figure is higher than that reported in Table 1.3 because Table 1.3 does not include sources below 100 MW in capacity.

Canada CO₂ emissions (2002): Environment Canada, *Canada's 2002 Greenhouse Gas Inventory*. Accessed online at http://www.ec.gc.ca/pdb/ghg/1990_02_report/ghg_backgrounder_e.cfm (29 September 2004).

Mexico CO₂ emissions (2002): Vijay, Samudra, Molina, Luisa T. and Molina, Mario J. *Estimating Air Pollution Emissions from Fossil Fuel Use in the Electricity Sector in Mexico*. Prepared by the Integrated Program on Urban, Regional, and Global Air Pollution at the Massachusetts Institute of Technology. April 2004.

COLESON COVE

fuel used	oil
capacity	990 MW
location	St. John, New Brunswick



and a group of industrial gases including perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF₆).

Greenhouse gases in the atmosphere absorb infrared light that would otherwise pass through the air on its way to outer space. By storing the light's energy in the atmosphere, greenhouse gases warm the planet significantly, making conditions more amenable to life. Rising concentrations of greenhouse gases beyond recent natural levels due to human activities increase the atmosphere's capacity to absorb energy from light, which in turn can raise the average global temperature. This change may affect global weather patterns, which can lead to rising sea levels, destruction of animal and plant habitat, increased frequency and severity of storms, glacial melting, and drought.

Fossil fuel power plants in Canada, Mexico and the United States contribute 23, 30 and 39 percent of their respective national CO₂ emissions,^{14,15,16} thus are significant contributors to industrial greenhouse gas emissions in each country.

Emissions by Fuel Type. Having emissions information from individual power plants permits the estimation of the relative contribution of different fossil fuels (coal, oil, and natural gas) to each nation's air pollution. This is shown in **Table 2.1** by individual country as well as collectively for all of North America. As can be seen in this table, coal is by far the largest source of air emissions from the electricity sector in Canada and the United States. Oil is an important contributor in Mexico because it is the dominant fuel in use in Mexico, providing about 40 percent of national generation in 2002, while coal combustion provided about 8 percent (see **Figure 2.1**).

We do not include mercury in **Table 2.1** because most information in North America is only available for coal power plants, which dominate mercury air emissions from the electricity sector. There will be a small contribution from oil and natural gas power plants that makes the coal contribution marginally less than 100 percent. The contribution from oil and natural gas, however, is not considered significant at this time so that the mercury emissions from the power sector in each country, including Mexico with only three coal plants,¹⁷ will be mainly from coal combustion.

Table 2.1
PERCENT CONTRIBUTION OF EACH COMBUSTION FUEL TO ELECTRICITY SECTOR AIR EMISSIONS IN EACH COUNTRY AND IN NORTH AMERICA^a

FUEL TYPE		SO ₂	NO _x	CO ₂
CANADA	Coal	86%	82%	N/A
	Oil	12%	11%	N/A
	Natural gas	0%	6%	N/A
	Other ^b	2%	2%	N/A
MEXICO	Coal	21%	47%	22%
	Oil	79%	35%	60%
	Natural gas	0%	17%	17%
	Other ^b	0%	2%	1%
UNITED STATES	Coal	97%	93%	87%
	Oil	3%	2%	2%
	Natural gas	1%	5%	11%
	Other ^b	0%	0%	0%
NORTH AMERICA	Coal	86%	90%	N/A
	Oil	14%	4%	N/A
	Natural gas	0%	6%	N/A
	Other ^b	0%	0%	N/A

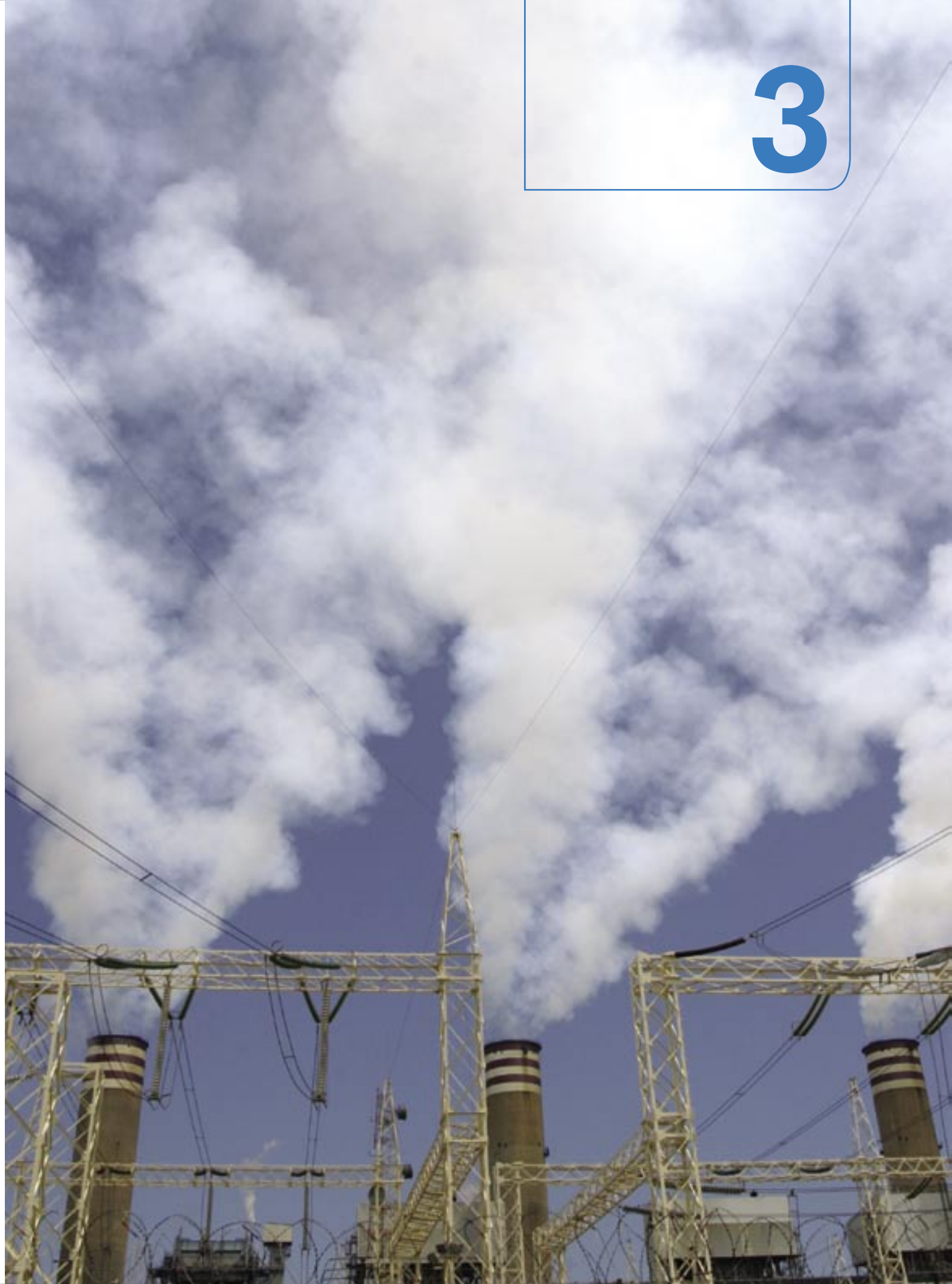
^a Totals may differ from 100 percent due to rounding. We currently believe, however, that coal dominates national mercury emissions from the electricity sector, while oil and natural gas are relatively minor contributors.

^b "Other" includes petroleum coke, diesel, landfill gas, and wood.

For North America as a whole, coal-fired electricity generation is the single largest source of air emissions of SO₂, NO_x, mercury, and CO₂ from the electricity generation sector. Coal combustion accounted for about 44 percent of all electricity generation across the three countries, while oil and gas accounted for about 4 and 17 percent, respectively. When looking at only generation from fossil fuels, coal produced 68 percent of electricity from fossil fuel power plants, while natural gas provided 26 percent and oil 6 percent.¹⁸ Therefore, the higher pollution contribution from coal combustion to trinational air emissions is not surprising based on its higher share of generation. Coal's share of air emissions among fossil fuel sources, however, still tends to be higher than its share of

fossil fuel electricity generation because coal typically emits more of these types of pollutants per kilowatt-hour of electricity produced than the other fossil fuel sources. For example, while coal accounts for about 68 percent of the fossil fuel electricity generation in North America, **Table 2.1** shows that it is responsible for 86 percent of SO₂ and 90 percent of NO_x emissions from the power plants included in this report.¹⁹ Natural gas, on the other hand, accounts for about 26 percent of the fossil fuel electricity generation in North America, but contributes proportionally fewer emissions—less than 1 percent of SO₂ and about 6 percent of NO_x emissions.

3



Emissions Data

3.1 INTRODUCTION

An air emissions inventory serves a number of important functions in understanding and managing sources of air pollution, ranging from motor vehicles to large industrial facilities. Policymakers who are responsible for protecting human health and the environment rely on air emissions inventories to identify opportunities for reducing pollution and to evaluate alternative policy scenarios. Companies rely on emissions data to assess their performance relative to others in their sector and to evaluate their progress in reducing emissions. Public health researchers use emissions inventories when trying to link observed health effects to air pollution sources. The public relies on emissions inventories to understand the sources of air pollution in its communities. Electricity suppliers, in some cases, rely on emissions inventory data to assess and report to their customers on the emissions attributable to the electricity they sell. The investment community can use the data to assess the environmental liabilities faced by a company.

While emissions inventories provide important information for a number of audiences and policy goals, the inventories in North America historically have been varied in level of detail, reporting year, estimation methods, and public accessibility. Each of the three countries requires power plants to

report some types of pollutants and associated operational data, but no common policy exists across North America. For example, the United States requires large fossil fuel power plants to measure and report emissions of some air pollutants using continuous emissions monitoring in the smokestacks. Canada and Mexico do not require continuous monitoring, so emissions information may be estimated by either monitoring or empirical techniques (e.g., calculating SO₂ emissions based on a plant's fuel consumption and the fuel's sulfur content).

Recognizing that air pollution travels across international borders, the North American countries have been placing greater emphasis on the generation and sharing of air emissions inventory information in several bilateral venues as well as on a trilateral level through the Commission for Environmental Cooperation. While data gaps remain and estimation methods may differ, the year 2002 marks the first year that publicly accessible air emissions data exist for individual power plants in each North American country. This is an important result of the increasing cooperative efforts among the three countries to foster the greater exchange and public availability of air pollutant information.

3.2 NORTH AMERICAN INFORMATION SOURCES

We obtained or derived the emissions data presented in this report from publicly available databases and reports. All data presented in this report are for the year 2002 unless noted otherwise.

In the accompanying tables to each pollutant section, we present the facility-specific total emissions from North American fossil fuel power plants grouped by country. We also include the facilities' output-based emissions rates—that is, the amount of pollution emitted per output of electricity. This helps in comparing the relative environmental performance of facilities since a large facility with high total emissions may emit much less pollution on an electricity output basis than a smaller facility with lower total emissions. For example, a large facility emitting twice the pollution of a smaller facility would still be two times cleaner on an electricity output basis if it produces four times the electricity of the smaller facility. Total emissions from a facility are important, however, because ultimately for the environment and public health, it is the total amount of pollution emitted that determines the extent of impact.

Most of the Canadian power plant emissions data come from the National Pollutant Release Inventory (NPRI) database for 2002, the first year in which Canada required reporting of SO₂ and NO_x air emissions (power plants began reporting mercury releases in 2000). Emissions of CO₂ were only available from two companies (ATCO Power and Ontario Power Generation) in annual reports for 2002. More information on greenhouse gas emissions from individual facilities in Canada should be forthcoming in future years under a new reporting program being developed by the federal agency Statistics Canada. Electricity generation information for specific power plants in Canada is typically not publicly available, but the Canadian Electricity Association provides 2001 and 2002 generation figures for a limited number of coal power plants as part of a special mercury program. We obtained additional generation information for some facilities from company annual reports (ATCO Power and Ontario Power Generation).

The emissions data for Mexico are from a database compiled in a report entitled *Estimating Air Pollution Emissions from Fossil Fuel Use in the Electricity Sector in Mexico*²⁰ that was commissioned by the CEC. The report estimates emissions and output emission rates for power plants in Mexico based on fuel consumption and generation data provided by Mexico's Energy Secretariat (Sener). Emission factors for specific types of power generating facilities came from United States EPA tabulations of standard emission factors (AP-42).

The United States emissions data for SO₂, NO_x, and CO₂ are from the United States EPA Clean Air Markets database accessed through the Emissions Query Wizard. Continuous emissions monitoring of many of the large United States power plants provides the basis of these data. Fossil fuel consumption and electricity generation data are from the United States Energy Information Administration. For mercury, we estimated emissions by calculating the ratio of coal consumption (in tons) for the years 2002 and 1999, and multiplying this ratio by the 1999 mercury emissions reported in EPA's Emissions and Generation Resource Integrated Database (eGRID). This simplified approach may provide a general trend in emissions but does not account for important factors beyond fuel use that may also affect mercury emissions.

These could include addition of controls (e.g., wet scrubbers) that may remove additional mercury, or coal switching (e.g., from bituminous to subbituminous or vice versa) that may increase or decrease the amount of emitted mercury.

The following sections provide an overview of the data presented later in this chapter. We begin our analysis with a discussion of the SO₂ emissions data.

CHALK POINT

<i>fuel used</i>	<i>coal, oil, natural gas</i>
<i>capacity</i>	<i>2600 MW</i>
<i>location</i>	<i>Aquasco, Maryland</i>



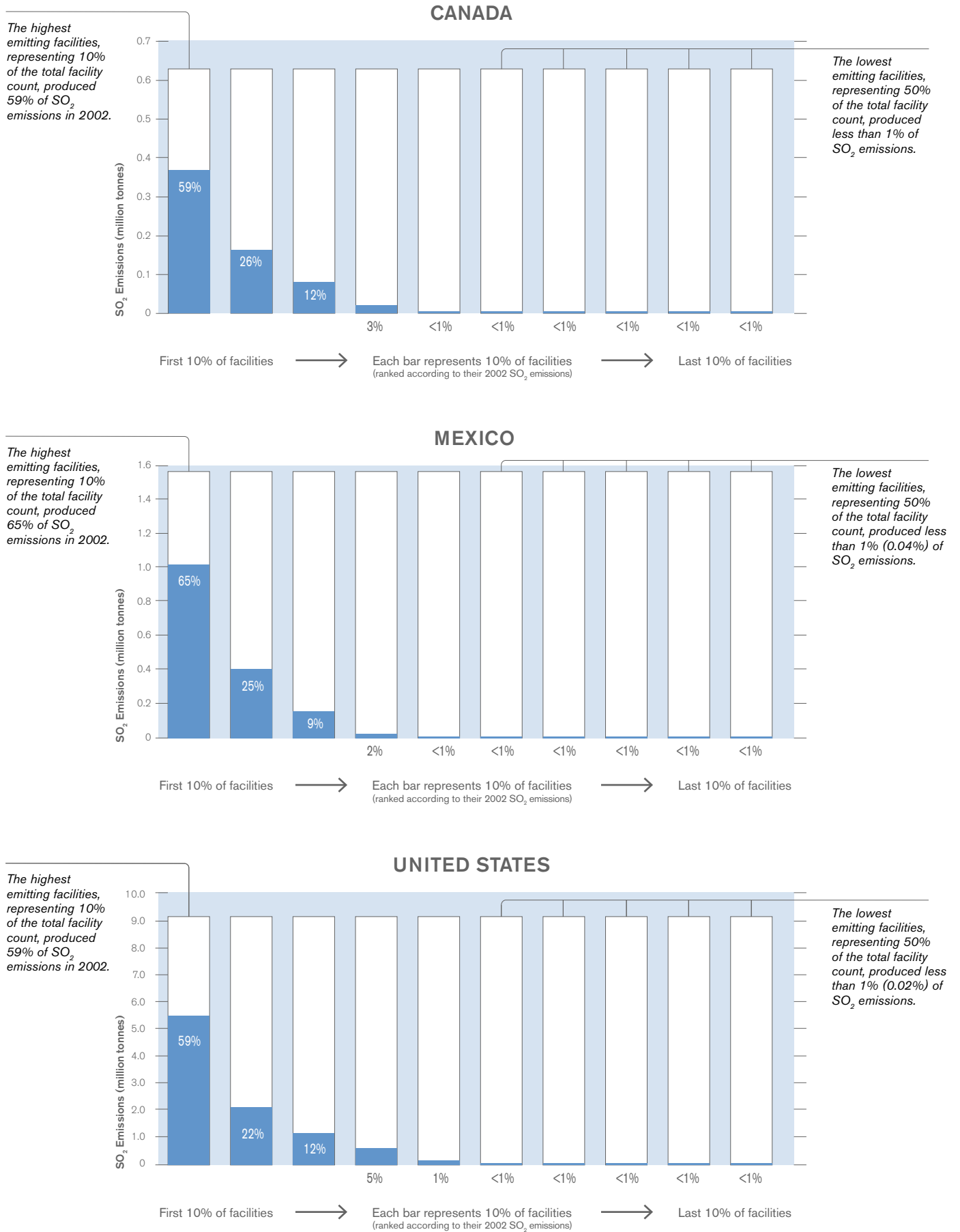
3.3 SULFUR DIOXIDE (SO₂) EMISSIONS

In the United States, where 50 percent of electricity is produced by coal-fired power plants, there are a large number of facilities that produce significant quantities of SO₂ emissions. A total of about 242 facilities (out of 899 in the database) produced 90 percent of power plant SO₂ emissions in the United States, with annual individual facility emissions ranging from 145,763 tonnes to 10,997 tonnes. In Canada, seventeen facilities out of 38 produced 90 percent of SO₂ emissions, with annual emissions ranging from 86,710 tonnes to 12,992 tonnes. In Mexico, sixteen facilities out of 82 produced 90 percent of SO₂ emissions, with annual emissions ranging from 253,430 tonnes to 29,196 tonnes. The SO₂ emissions column of **Tables 3.3, 3.4, and 3.5** reports the annual 2002 SO₂ emissions for each of the facilities in the inventory.

In North America, a fairly small percentage of facilities produced the majority of SO₂ emissions in 2002. For example, the seven highest emitting facilities in the United States (or 2 percent of the power plants listed in **Table 3.3**) produced 10 percent of the total annual emissions. Seventeen facilities (or 4 percent of the power plants listed in **Table 3.3**) produced 20 percent of the total annual emissions. In Canada, the highest emitting facility produced 14 percent of the total SO₂ emissions from the electricity sector during 2002. In Mexico, the highest emitting facility in 2002 produced 16 percent of the total annual SO₂ emissions from the electricity sector.

Figure 3.1 presents in bar chart form the SO₂ emissions generated by power plants in Canada, the United States and Mexico distributed across the facilities in each of the countries. Each bar in **Figure 3.1** represents 10 percent of the fossil-fired power plants within each country, with facilities sorted according to their 2002 SO₂ emissions. In Canada, the total number of fossil-fired facilities is 70, with each bar representing 7 facilities, which is 10 percent of the number of plants. In the United States, the total number of facilities is 899, with each bar representing 90 facilities or 10 percent of the inventory. In Mexico, the total number of facilities is 82 with each bar representing 8 facilities or 10 percent of the inventory. As an example of how to interpret these charts, facilities in Canada report a total of 619,000 tonnes of SO₂ emissions in 2002. The seven highest emitting facilities, representing 10 percent of the total facility count, produced 59 percent of these emissions. The next seven highest emitting facilities produced 26 percent of power plant emissions. The lowest emitting facilities, representing 50 percent of the total facility count, produced less than 1 percent of SO₂ emissions. In each country, the charts show that the 10 percent highest emitting plants collectively contributed more than 55 percent of their national emissions from the electricity generating sector in 2002. For Canada and the United States, the top 10 percent of the emitters are primarily large coal plants, with one oil plant in Canada. In Mexico, these are oil plants along with the only three coal plants in that country.

Figure 3.1
FACILITY DISTRIBUTION OF SO₂ EMISSIONS^a



^a Not all fossil fuel facilities in each country reported SO₂ emissions in 2002, so the total number of facilities covered in Figure 3.1 may be greater than those reporting emissions. Because the power plants not reporting emissions are small emitters, their inclusion in the bar charts does not change the relative contribution of each grouping.

NAUGHTON

<i>fuel used</i>	<i>coal</i>
<i>capacity</i>	<i>700 MW</i>
<i>location</i>	<i>Kemmerer, Wyoming</i>



The SO₂ emission rate column of Tables 3.3, 3.4 and 3.5 shows the SO₂ emission rates for each of the facilities. These output-based emission rates provide a measure of the quantity of SO₂ emissions released to the air per megawatt-hour (MWh) of electricity produced. Emission rates allow a comparison of the relative emissions performance of different size facilities and facilities with different utilization rates.

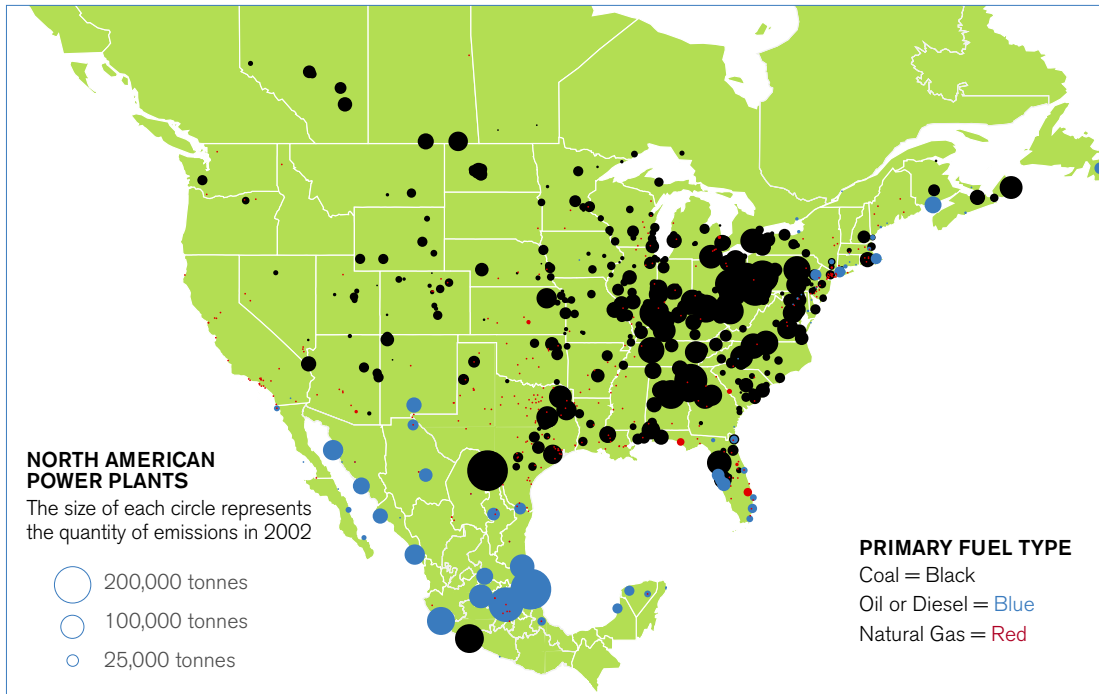
There are several reasons for the wide variation in SO₂ emission rates. One is the fuel used and its level of pollution control. A coal-fired power plant can dramatically reduce its SO₂ emissions with the application of post-combustion pollution control equipment. The leading technology for SO₂ control is flue gas desulfurization (FGD or scrubber) controls, which can achieve greater than 90 percent control efficiency. According to the United States EPA, 31 percent of coal-fired capacity in the United States (or 94 gigawatts) is equipped with scrubber technology, with the remainder having different control technologies, or no controls.²¹ Apart from the Conesville (#5 in Table 3.3), Gibson (#7), and Homer City (#13) facilities, which are each reported to have at least one scrubber installed at their plants, none of the top seventeen highest emitting facilities in the United States is reported to have a scrubber installed.²² Many of the plants in Mexico burn oil containing relatively high levels of sulfur and have no emission controls installed. Among those having some level of control, none is believed to have scrubbers.²³ Canada, like the United States, has a mix of controlled and uncontrolled sources. Of the 20 coal power plants that have power plant information reports collected by the Canadian Electricity Association, five indicated some type of SO₂ control on at least one unit, with two plants reporting the use of scrubbers.²⁴

SO₂ emission rates will also vary as a result of differences in the sulfur content of the coal or oil combusted. In the United States, subbituminous coal mined in the western part of the country generally contains lower concentrations of sulfur than coal mined in the eastern United States, although there are some sources of “low sulfur” eastern bituminous coals. Subbituminous coal mined in Wyoming contains only

about 0.3 percent sulfur, while high-sulfur coal from the Appalachian basin can contain more than 3.0 percent sulfur.²⁵ The SO₂ estimates for Mexican power plants burning coal are based on a sulfur content of 1.3 percent for plants using domestic coal supplies and 0.7 percent for imported coal.²⁶ For the oil-burning plants, which are a much larger share of generation in Mexico, sulfur content is typically in the range of 3.4 to 3.9 percent.

Figure 3.2 presents the geographic distribution of power plant SO₂ emissions in North America. The largest concentration of SO₂ emissions in North America runs through the United States Midwest and Southeast, where the greatest number of coal power plants are located. Coal plants in the western United States are relatively less pronounced, reflecting in part the lower sulfur content of coal primarily used there. In Canada, the large emitters are mainly coal plants located in central Alberta, southern Saskatchewan, southern Ontario, New Brunswick, and Nova Scotia. New Brunswick and Newfoundland also have one oil-fired plant each with large SO₂ emissions. In contrast to the United States, there is a less strong geographical distinction in the size of SO₂ emissions between western and eastern power plants in Canada. The two largest emitters of sulfur dioxide in Mexico are oil-fired facilities in the states of Veracruz and Hidalgo. Mexico has two large coal plants—Río Escondido (1,200 megawatts), also known as Carbón I or José López Portillo, and Carbón II (1,400 megawatts)—that are located in the United States–Mexico border region in the state of Coahuila adjacent to the state of Texas. The map shows the combined SO₂ emissions of these two coal plants as one circle to avoid obscuring their collective emissions in overlapping co-located circles.²⁷ Mexico also added a third coal plant to its national generation mix in 2001 when it converted 1,050 megawatts of the 2,100 megawatt Petacalco power plant from oil to coal (with plans for converting another 700 megawatts by 2003). This plant is located in the southern state of Guerrero on Mexico’s Pacific coast, and imports coal from Asia and Australia.

Figure 3.2
GEOGRAPHIC DISTRIBUTION OF POWER PLANT SO₂ EMISSIONS



3.4 NITROGEN OXIDES (NO_x) EMISSIONS

The burning of fossil fuels at high temperatures in the presence of nitrogen and oxygen in the air produces nitric oxide (NO), which rapidly converts to nitrogen dioxide (NO₂) in the atmosphere. Collectively, these two pollutants are referred to as NO_x. Because of the large amounts of fuel they burn, fossil fuel power plants are significant sources of NO_x in North America. Some of the factors that influence the amount of NO_x produced by power plants include the amount of nitrogen in the fuel, the amount of excess air (which is 78 percent nitrogen), the combustion air temperature, and the level of post-combustion NO_x control.

For the United States, there are a total of 565 facilities, with annual individual facility NO_x emissions ranging from 45,308 tonnes to 190 tonnes. In 2002, 70 facilities reported NO_x emissions in Canada, with annual emissions ranging from 38,204 tonnes to 23 tonnes. There are 81 facilities in Mexico estimated to produce NO_x, ranging from 45,932 tonnes to 13 tonnes. The NO_x emissions column of Tables 3.6, 3.7, and 3.8 shows the annual NO_x emissions during 2002 for each of the facilities in North America.

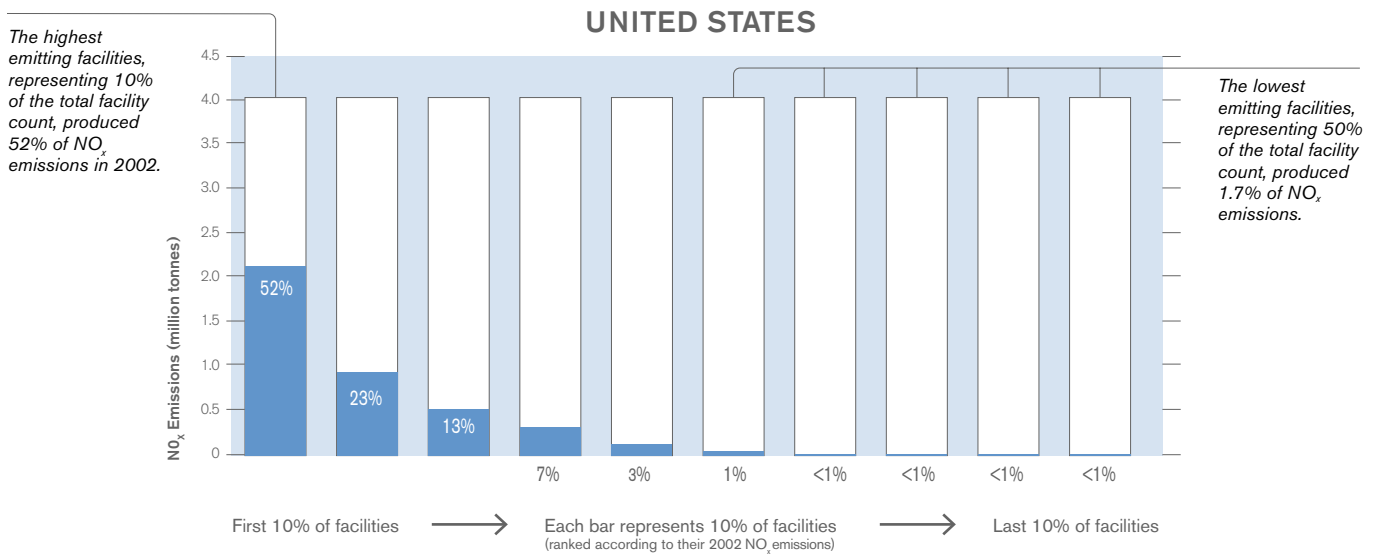
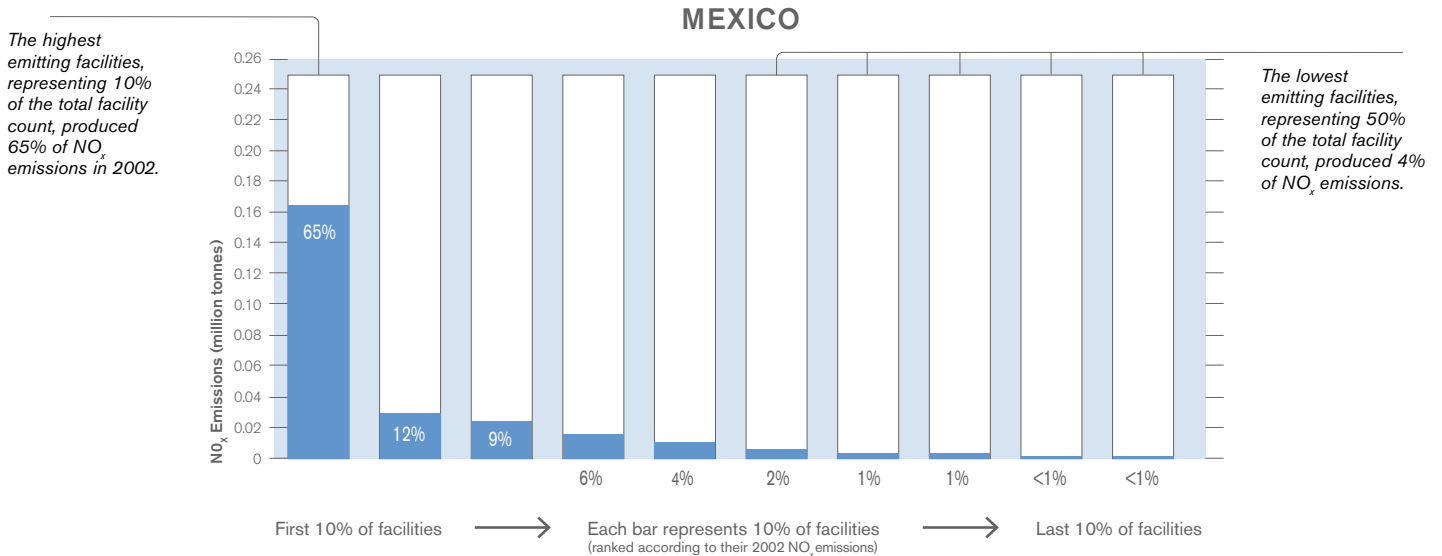
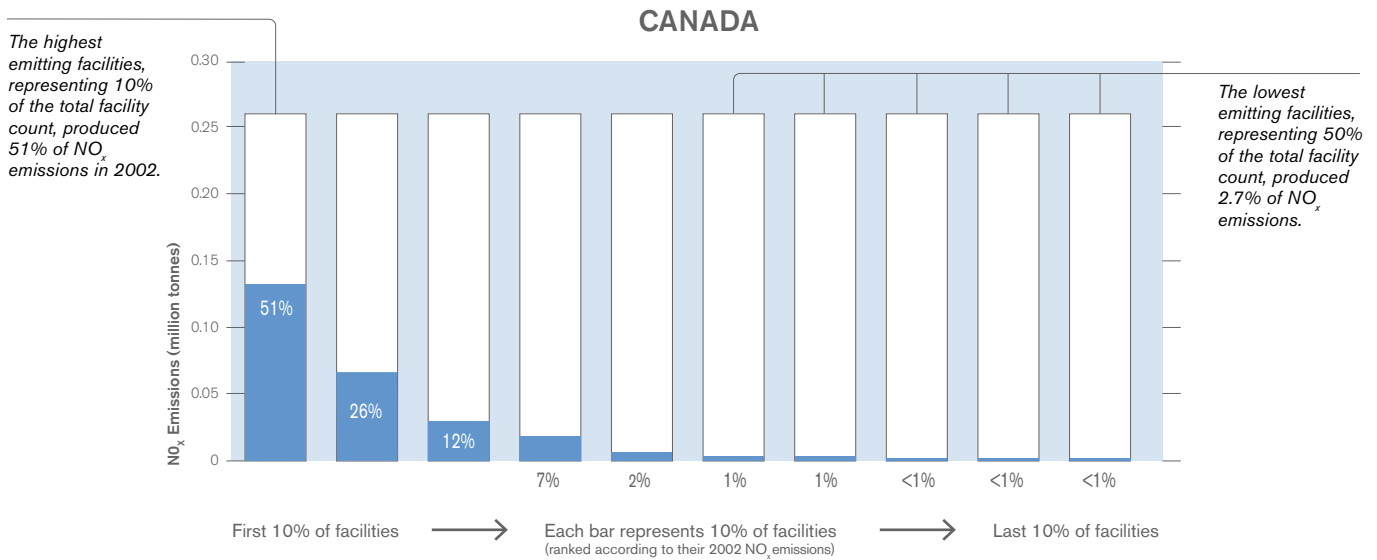
Figure 3.3 presents in bar chart form the contribution of NO_x emissions by power plant groupings in each country to that country's total NO_x emissions from the electricity sector. The bars in each chart represent 10 percent increments of the total number of power plants with their emissions contribution to the electricity sector's national total. The number of facilities in each country included in the bar charts is the same total as previously given for Figure 3.1. In each country, the charts show that the 10 percent highest emitting plants in terms of total annual emissions collectively contributed more than 50 percent of the emissions of the national contribution from the electricity generation sector in 2002. The top 10 percent of the emitters in Canada and the United States are coal plants. In Mexico, the top three facilities among the 10 percent highest emitters are its coal plants followed by large oil facilities.



KINGSTON

fuel used	coal
capacity	1700 MW
location	Harriman, Tennessee

Figure 3.3
FACILITY DISTRIBUTION OF NO_x EMISSIONS^a



^a Not all fossil fuel facilities in each country reported NO_x emissions in 2002, so the total number of facilities covered in Figure 3.3 may be greater than the total number of facilities in each country. This chart does not change the relative contribution of each grouping.

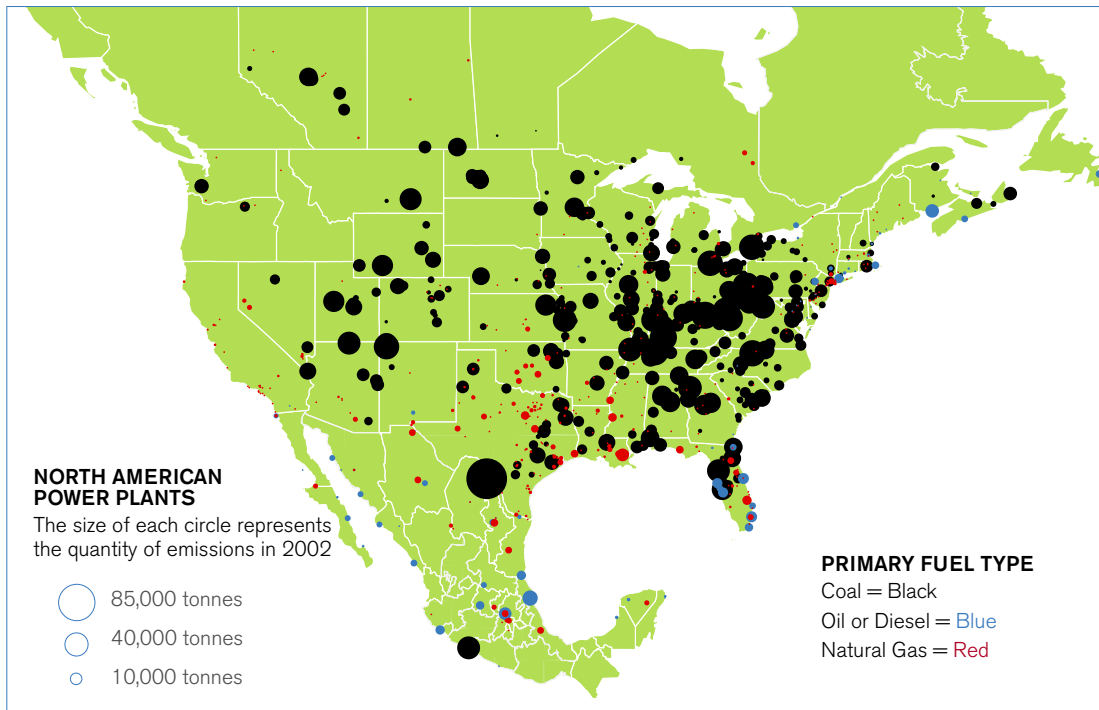
The NO_x emission rate column in Tables 3.6, 3.7, and 3.8 reports the NO_x emission rates for each of the facilities. These output-based emission rates provide a measure of the quantity of NO_x emissions released to the air per megawatt-hour (MWh) of electricity production. Emission rates allow a comparison of the relative emissions performance of different size facilities and facilities with different utilization rates.

NO_x emission rates vary for some of the same reasons that SO₂ emissions rates vary: 1) different levels of pollution control; 2) differences in the characteristics of the fuels combusted; and 3) differences in power plant efficiency.

Figure 3.4 presents the geographic distribution of power plant NO_x emissions in North America. Again, the largest concentration of

emissions runs through the United States Midwest and Southeast, coinciding with the greatest number of coal power plants. The coal plants in the western United States are now more pronounced as NO_x emitters than they were as SO₂ sources (see Figure 3.2), which is a reflection of NO_x being relatively less dependent on coal type as compared to the differences in sulfur content between western and eastern coals. The five largest power plant sources of NO_x in Canada are coal plants in Alberta, Ontario and Saskatchewan. As previously mentioned, Mexico's three coal plants (two in Coahuila and one in Guerrero) are also the three top emitters of NO_x pollution from the electricity sector. The two coal plants in Coahuila are collectively shown in the map as one circle along the northern border of Mexico with Texas because the power plants are virtually co-located on the map scale.

Figure 3.4
GEOGRAPHIC DISTRIBUTION OF POWER PLANT NO_x EMISSIONS



CARBÓN II	
<i>fuel used</i>	<i>coal</i>
<i>capacity</i>	<i>1400 MW</i>
<i>location</i>	<i>Nava, Coahuila</i>

3.5 MERCURY (Hg) EMISSIONS

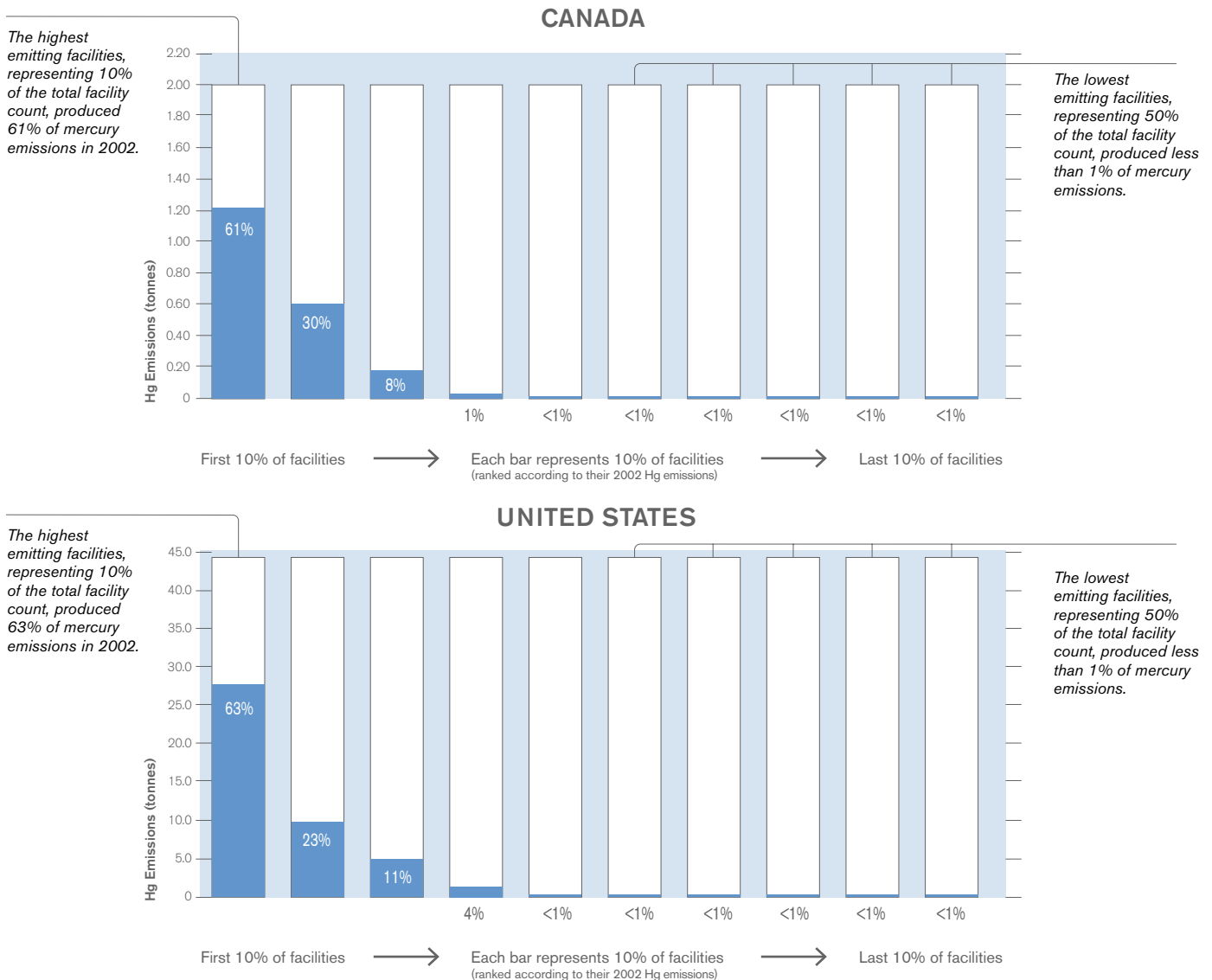
Mercury emissions from coal-fired power plants in North America are generally unregulated, although efforts are underway in Canada and the United States to develop control programs. For example, Alberta adopted a reduction target of 50 percent from 2003 power plant mercury emissions by the end of 2009. The United States has proposed national regulations limiting mercury air emissions from the electricity sector, while several states have already adopted their own requirements. Massachusetts and Wisconsin seek to reduce mercury emissions by 80 percent or greater from the 2001–2002 and 2002–2004 measured levels, respectively. Connecticut and New Jersey require a 90 percent reduction based on measured mercury concentrations before and after the power plant's pollution controls.

A total of about 210 facilities produced 90 percent of the power plant mercury emissions in the United States during 2002, with annual individual facility emissions ranging from 849 kilograms to 56 kilograms. Fourteen facilities produced 90 percent of the power plant mercury emissions in Canada, with annual emissions ranging from 275 kilograms to 1.0 kilogram. Mexico has three coal power plants, each estimated to emit over 300 kg mercury apiece. The mercury emissions column of Tables 3.9, 3.10, and 3.11 shows the 2002 annual mercury emissions for each of the facilities included in this report.

The 60 highest mercury-emitting power plants in the United States (or 18 percent of the those listed in Table 3.9) produced 50 percent of the total annual emissions from such facilities. In Canada, the highest emitting facility produced 14 percent of the total annual emissions from the Canadian electricity sector. In Mexico, the highest emitting facility among its three coal plants is the Carbón II coal plant located in the State of Coahuila near the United States border along southwestern Texas. For mapping purposes, the circle at this location combines the mercury emissions from Carbón II and the nearby Río Escondido coal plant that otherwise would be obscured in overlapping circles.

Figure 3.5 shows in bar chart form the contribution of mercury air emissions by power plant groupings in Canada and the United States to each country's total mercury air emissions from the electricity sector. The bars in each chart represent 10 percent increments of the total number of power plants with their emissions contribution to the electricity sector's national total. The number of facilities in each country included in the bar charts is the same total as previously given for Figure 3.1. We do not include a bar chart for Mexico because its three coal-burning power plants would all fall into only one bar at the top 10 percent. The top 10 percent of the power plants accounts for over 60 percent of mercury emissions from the electricity generation sector in each country. Although the bar charts include all fossil fuel power plants, all the mercury emissions are from coal plants only. While oil and gas power plants may have some level of mercury air emissions, these are not generally considered high

Figure 3.5
FACILITY DISTRIBUTION OF MERCURY EMISSIONS^a



^a In general, coal power plants are the primary emitters of mercury from fossil fuel combustion, while the total number of facilities covered in the figure includes many non-coal plants not reporting mercury emissions. Because the non-coal power plants are relatively small emitters of mercury, the omission of non-coal mercury emissions in the bar charts does not change the relative preponderance of coal plants as the major mercury emitters.

and there are little or no mercury emissions data for these plants in the Canada and United States databases used in this report. Even for the United States plants listed in Table 3.9 that have a primary fuel other than coal, their mercury emissions are from coal that these plants burn as a secondary fuel source.

The mercury emission rate column in Tables 3.9, 3.10, and 3.11 reports the emission rates for each of the facilities. These output-based emission rates provide a measure of the quantity of mercury released to the air for each gigawatt-hour (GWh) of electricity production.

Power plant mercury emission rates vary in part because of the varying concentrations of mercury in coal. Mercury is present as a natural impurity in coal, and the concentrations can vary substantially between coal types and even within the same coal type. Table 3.1 presents the mercury concentrations measured during a nationwide survey coordinated by the United States EPA in 1999.²⁸ The Canadian Electricity Association is currently undertaking a mercury program in Canada to better characterize variations in coal mercury content and emissions in that country.²⁹

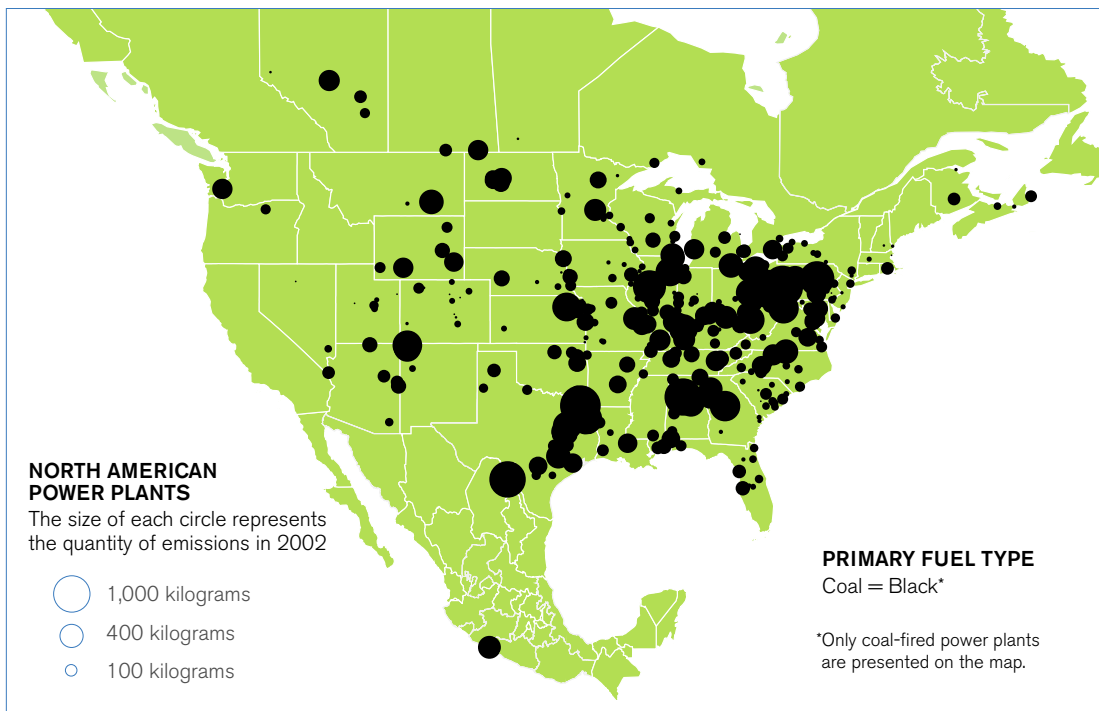
Table 3.1
MERCURY CONTENT OF COAL TYPES

COAL TYPE	Average Mercury Content	Range of Measured Mercury Concentrations
BITUMINOUS	3.69 kg/petajoule (8.59 lb/trillion Btu)	0.02–44.63 kg/petajoule (0.04–103.81 lb/trillion Btu)
SUBBITUMINOUS	2.47 kg/petajoule (5.74 lb/trillion Btu)	0.17–30.56 kg/petajoule (0.39–71.08 lb/trillion Btu)
LIGNITE	4.53 kg/petajoule (10.54 lb/trillion Btu)	0.40–32.27 kg/petajoule (0.93–75.06 lb/trillion Btu)

Emission rates also vary as a result of the incidental capture of mercury at coal-fired power plants. Extensive field tests in the United States have demonstrated that existing pollution control equipment, such as SO₂ scrubbers and post-combustion NO_x controls, can achieve significant levels of mercury control. According to the United States EPA, the average levels of mercury control range from 0 percent to 98 percent, depending on the exact characteristics of the power plant and the coal used.³⁰ In anticipation of mercury control requirements in Canada and the United States, efforts are underway to optimize these control systems to reliably capture a greater share of the mercury in coal, and companies are also developing and testing mercury-specific control technologies.

Figure 3.6 presents the geographic distribution of power plant mercury emissions in North America. As with SO₂ emissions, the largest concentration of mercury emissions in North America occurs in the United States Midwest and Southeast, a region that relies heavily on coal-fired power plants. Eastern Texas, which relies primarily on lignite coal, is also a high mercury emitting area. Mercury emissions in Canada are widely distributed based on the location of coal plants. Mercury emissions from two of Mexico's three coal-burning power plants are collectively shown in the map as one large circle along the country's northern border with Texas because the two plants are nearly co-located.

Figure 3.6
GEOGRAPHIC DISTRIBUTION OF POWER PLANT MERCURY EMISSIONS



NANTICOKE

<i>fuel used</i>	<i>coal</i>
<i>capacity</i>	<i>4000 MW</i>
<i>location</i>	<i>Nanticoke, Ontario</i>



3.6 CARBON DIOXIDE (CO₂) EMISSIONS

The CO₂ emissions from a number of power plants appear more prominently in various locations across the countries (e.g., California) as compared to the other pollutants detailed in this report. This results from several factors. First, all fossil fuels produce CO₂ emissions when burned because all fossil fuels contain the element carbon. For example, natural gas is primarily methane, a relatively simple chemical compound made up of one carbon and four hydrogen atoms (CH₄). Second, there are no pollution control systems in routine use that capture CO₂ molecules as they exit the stack of a power plant.

The CO₂ emissions from a fossil fuel power plant are a function of 1) the amount of carbon contained in the fuel, and 2) the efficiency of the facility at converting this fuel into electricity. Table 3.2 shows the

average input-based CO₂ emission rates for coal, oil and natural gas. The rate for coal is almost two times higher than the rate for natural gas because the carbon content of coal is higher. How this translates into emissions based on generation output depends on the amount of fuel consumed and the efficiency of the power plant in converting fuel into useful electricity output. In a typical power plant, about one-third of the energy contained in the fuel is converted into electricity, while the remainder is released as waste heat. Some facilities make use of this waste heat to produce additional electricity or to supply other energy needs. This increases the overall efficiency of the plant.

Table 3.2
AVERAGE INPUT-BASED CO₂ EMISSION RATES^a

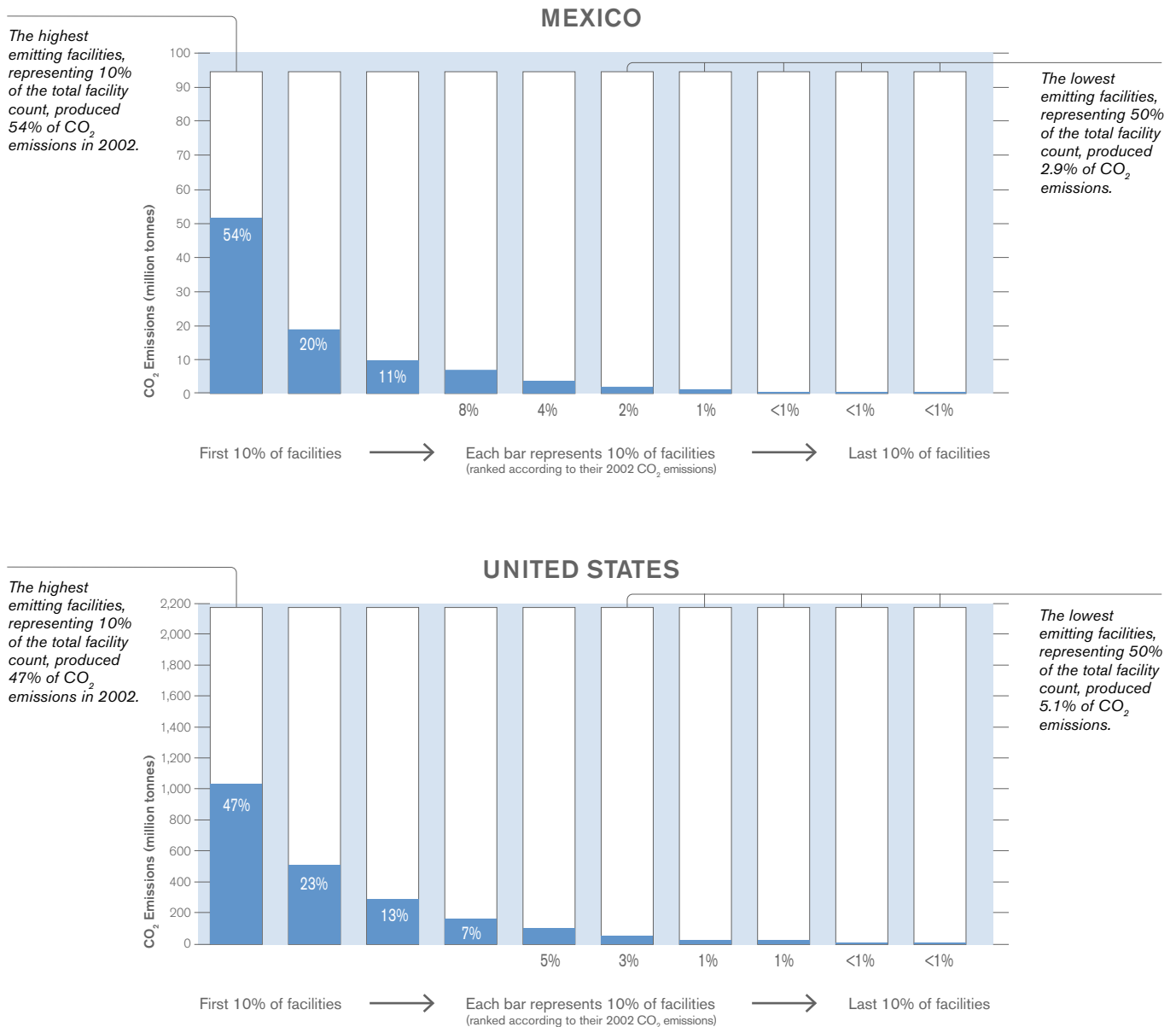
FUEL TYPE	Average CO ₂ Emission Rates
COAL	89.46 kg/gigajoule (208 lb/million Btu)
OIL (DISTILLATE)	69.29 kg/gigajoule (161 lb/million Btu)
NATURAL GAS	50.26 kg/gigajoule (117 lb/million Btu)

^a United States Environmental Protection Agency. *Inventory of United States Greenhouse Gas Emissions and Sink—2002*. EPA 430-R-04-003. April 2004. Online at <http://www.epa.gov/globalwarming/publications/emissions> (derived from Table 2-19 in Annex 2).

Tables 3.12, 3.13, and 3.14 report the 2002 annual CO₂ emissions for each of the facilities in each country. As would be expected, the largest CO₂ emitters tend to be large coal power plants because of coal's higher carbon content than that of the other fossil fuels. The bar charts of Figure 3.7 also reflect a larger proportion of coal plants

among the top 10 percent emitters in each country. Figure 3.7 does not include a chart for Canada because of the lack of comprehensive publicly available CO₂ emissions information for individual power plants during 2002.

Figure 3.7
FACILITY DISTRIBUTION OF CO₂ EMISSIONS

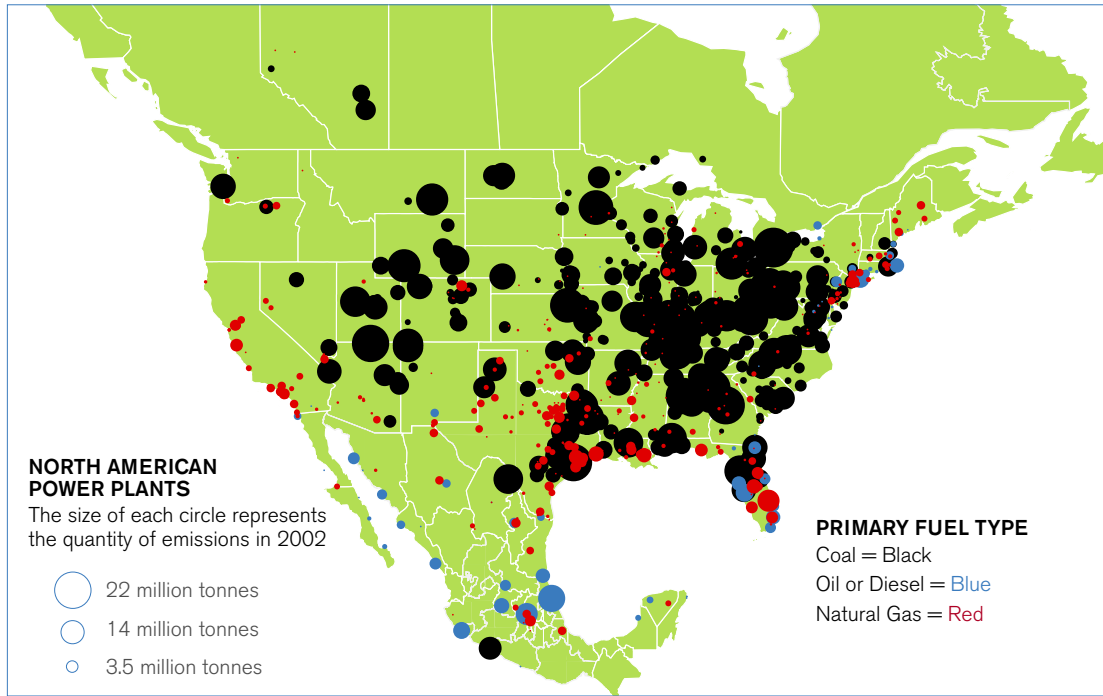


The CO₂ emission rate column of Tables 3.12, 3.13, and 3.14 reports the emission rates for each of the facilities. These output-based emission rates provide a measure of the quantity of CO₂ released to the air for each megawatt-hour (MWh) of electricity produced.

Figure 3.8 presents the geographic distribution of power plant CO₂ emissions in Canada, Mexico and the United States. The Canada portion of the map is incomplete as CO₂ emissions from most power plants in Canada are not yet

available, but this will change in the future as the federal agency Statistics Canada establishes a reporting system for greenhouse gases emitted by industrial sources in Canada. Notable exceptions to the lack of 2002 greenhouse gas information are ATCO Power in Alberta and Ontario Power Generation (OPG), which report CO₂ emissions from their facilities as part of public annual company reports. Figure 3.8 therefore includes ATCO Power facilities in Alberta and OPG power plants in Ontario.

Figure 3.8
GEOGRAPHIC DISTRIBUTION OF POWER PLANT CO₂ EMISSIONS*



* In general, CO₂ emissions data were not available for individual Canadian power plants. Data were available for the major facilities in the Province of Ontario from Ontario Power Generation's *Towards Sustainable Development: 2002 Progress Report*. In Alberta, the map reflects only a subset of the major power plants in the province. CO₂ emissions data were only available for facilities included in ATCO Power's *Environment, Health and Safety Review 2002*. All other facilities without public CO₂ emissions data for 2002 are not shown on the map.

SUNDANCE

fuel used	coal
capacity	2020 MW
location	Duffield, Alberta



Table 3.3
 UNITED STATES SO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS*

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
1	Bowen, Georgia	21,674,542	145,763	6.73	Coal
2	Hatfield's Ferry, Pennsylvania	9,753,564	143,984	14.76	Coal
3	Keystone, Pennsylvania	11,790,991	136,642	11.59	Coal
4	WH Sammis, Ohio	15,521,117	131,647	8.48	Coal
5	Conesville, Ohio	10,158,928	122,949	12.10	Coal
6	EC Gaston, Alabama	12,639,541	115,878	9.17	Coal
7	Gibson, Indiana	20,522,153	115,538	5.63	Coal
8	JM Stuart, Ohio	15,351,286	106,641	6.95	Coal
9	Muskingum River, Ohio	8,359,764	104,805	12.54	Coal
10	Montour, Pennsylvania	9,263,444	101,103	10.91	Coal
11	Johnsonville, Tennessee	8,275,776	98,697	11.93	Coal
12	John E Amos, West Virginia	17,995,089	97,632	5.43	Coal
13	Homer City, Pennsylvania	10,938,699	95,968	8.77	Coal
14	Belews Creek, North Carolina	16,912,850	93,519	5.53	Coal
15	Warrick, Indiana	5,066,020	89,611	17.69	Coal
16	Crystal River, Florida	14,465,667	88,641	6.13	Coal
17	Roxboro, North Carolina	14,281,069	86,737	6.07	Coal
18	Monroe, Michigan	16,720,823	83,375	4.99	Coal
19	Fort Martin, West Virginia	7,855,193	82,663	10.52	Coal
20	Scherer, Georgia	20,817,252	78,336	3.76	Coal
21	Monticello, Texas	13,127,881	78,309	5.97	Coal
22	Miami Fort, Ohio	7,587,241	77,746	10.25	Coal
23	Paradise, Kentucky	14,130,150	76,270	5.40	Coal
24	Marshall, North Carolina	14,498,223	74,626	5.15	Coal
25	Big Brown, Texas	7,920,848	70,635	8.92	Coal
26	Kingston, Tennessee	9,866,292	70,372	7.13	Coal
27	Cardinal, Ohio	8,555,500	67,814	7.93	Coal
28	Kyger Creek, Ohio	6,852,119	67,542	9.86	Coal
29	Harlee Branch, Georgia	9,018,458	67,082	7.44	Coal
30	Chesterfield, Virginia	9,502,996	66,988	7.05	Coal
31	Wansley, Georgia	11,197,521	66,770	5.96	Coal
32	Morgantown, Maryland	7,550,506	63,816	8.45	Coal
33	Walter C Beckjord, Ohio	6,756,632	63,441	9.39	Coal
34	Brunner Island, Pennsylvania	9,994,684	62,535	6.26	Coal
35	Eastlake, Ohio	6,724,187	61,196	9.10	Coal
36	Jeffrey Energy Center, Kansas	15,330,637	61,127	3.99	Coal
37	Martin Lake, Texas	14,825,001	60,238	4.06	Coal
38	Tanner's Creek, Indiana	5,872,947	56,729	9.66	Coal
39	Wabash River, Indiana	5,744,472	56,155	9.78	Coal
40	WA Parish, Texas	20,026,008	56,090	2.80	Coal
41	Barry, Alabama	16,718,579	54,001	3.23	Coal
42	Gorgas, Alabama	7,216,594	50,825	7.04	Coal

Table 3.3
 UNITED STATES SO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
43	Mitchell, West Virginia	9,231,567	50,811	5.50	Coal
44	Cayuga, Indiana	5,930,084	50,455	8.51	Coal
45	Rockport, Indiana	16,643,319	48,259	2.90	Coal
46	FJ Gannon, Florida	4,815,528	48,008	9.97	Coal
47	Chalk Point, Maryland	6,041,207	47,651	7.89	Coal
48	Big Cajun 2, Louisiana	11,125,719	47,178	4.24	Coal
49	Dunkirk, New York	3,591,017	47,090	13.11	Coal
50	Colbert, Alabama	6,305,034	45,324	7.19	Coal
51	Coleman, Kentucky	2,864,421	44,478	15.53	Coal
52	R Gallagher, Indiana	2,977,365	43,334	14.55	Coal
53	Labadie, Missouri	14,406,589	43,192	3.00	Coal
54	Leland Olds, North Dakota	4,576,988	43,000	9.39	Coal
55	Harding Street Stn (Elmer W Stout), Indiana	3,784,144	42,881	11.33	Coal
56	Petersburg, Indiana	11,641,137	42,776	3.67	Coal
57	EW Brown, Kentucky	3,992,354	42,280	10.59	Coal
58	Ghent, Kentucky	11,533,151	42,233	3.66	Coal
59	St. Clair, Michigan	6,965,047	42,205	6.06	Coal
60	Avon Lake, Ohio	4,169,683	41,721	10.01	Coal
61	Sioux, Missouri	6,296,711	41,693	6.62	Coal
62	James H Miller Jr, Alabama	18,592,131	40,052	2.15	Coal
63	Widows Creek, Alabama	8,868,307	39,901	4.50	Coal
64	Mountaineer, West Virginia	8,985,024	39,213	4.36	Coal
65	Crist, Florida	4,572,235	38,918	8.51	Coal
66	Coffeen, Illinois	5,257,211	38,403	7.30	Coal
67	Bull Run, Tennessee	6,760,080	38,273	5.66	Coal
68	Cheswick, Pennsylvania	3,021,295	38,119	12.62	Coal
69	Pleasants, West Virginia	7,629,209	38,020	4.98	Coal
70	Big Sandy, Kentucky	5,752,379	38,011	6.61	Coal
71	Yates, Georgia	5,368,046	37,665	7.02	Coal
72	Greene County, Alabama	3,892,941	37,167	9.55	Coal
73	HL Spurlock, Kentucky	6,080,970	36,751	6.04	Coal
74	Mohave, Nevada	10,170,230	36,603	3.60	Coal
75	JH Campbell, Michigan	9,269,258	36,587	3.95	Coal
76	Phil Sporn, West Virginia	5,361,190	36,511	6.81	Coal
77	Brandon Shores, Maryland	7,160,408	36,265	5.06	Coal
78	Brayton Point, Massachusetts	8,263,163	35,919	4.35	Coal
79	Kammer, West Virginia	4,029,061	35,468	8.80	Coal
80	Huntley Power, New York	2,923,168	35,379	12.10	Coal
81	Shawville, Pennsylvania	2,991,436	34,679	11.59	Coal
82	Clifty Creek, Indiana	7,838,812	34,653	4.42	Coal
83	Winyah, South Carolina	7,720,938	34,131	4.42	Coal
84	Wateree, South Carolina	4,282,531	33,002	7.71	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
85	Welsh Power Plant, Texas	11,000,083	32,460	2.95	Coal
86	Edwards Station, Illinois	3,536,593	32,431	9.17	Coal
87	Shawnee, Kentucky	8,826,178	32,276	3.66	Coal
88	John Sevier, Tennessee	4,880,298	32,194	6.60	Coal
89	RE Burger, Ohio	2,000,668	32,164	16.08	Coal
90	Northeastern, Oklahoma	9,623,635	31,310	3.25	Coal
91	Gallatin, Tennessee	7,271,777	30,989	4.26	Coal
92	White Bluff, Arkansas	8,850,935	30,982	3.50	Coal
93	Dickerson, Maryland	3,263,673	30,764	9.43	Coal
94	Pleasant Prairie, Wisconsin	7,898,581	30,342	3.84	Coal
95	Yorktown, Virginia	4,238,965	29,965	7.07	Coal
96	Four Corners, New Mexico	13,674,415	29,799	2.18	Coal
97	Manatee, Florida	6,116,586	29,667	4.85	Oil
98	Armstrong, Pennsylvania	2,140,768	29,484	13.77	Coal
99	CP Crane, Maryland	2,132,214	29,381	13.78	Coal
100	Gen JM Gavin, Ohio	15,617,077	29,375	1.88	Coal
101	Chesapeake, Virginia	4,141,111	29,343	7.09	Coal
102	Gerald Gentleman, Nebraska	9,549,816	29,168	3.05	Coal
103	Sam Seymour, Texas	11,749,703	28,847	2.46	Coal
104	GG Allen, North Carolina	5,071,389	28,243	5.57	Coal
105	Richard Gorsuch, Ohio	1,297,873	28,129	21.67	Coal
106	Limestone, Texas	11,385,520	27,977	2.46	Coal
107	Anclote, Florida	4,133,979	27,933	6.76	Oil
108	Merrimack, New Hampshire	2,874,174	27,812	9.68	Coal
109	Bruce Mansfield, Pennsylvania	15,974,911	27,500	1.72	Coal
110	Trenton Channel, Michigan	4,339,844	27,371	6.31	Coal
111	Milton R Young, North Dakota	5,117,272	25,915	5.06	Coal
112	Jack McDonough, Georgia	3,728,220	25,395	6.81	Coal
113	Hammond, Georgia	3,935,825	25,033	6.36	Coal
114	Muskogee, Oklahoma	10,275,348	24,968	2.43	Coal
115	Columbia, Wisconsin	6,472,154	24,950	3.85	Coal
116	RM Schahfer, Indiana	8,756,429	24,943	2.85	Coal
117	Mayo, North Carolina	4,737,089	24,867	5.25	Coal
118	Daniel, Mississippi	10,839,532	24,682	2.28	Coal
119	Clinch River, Virginia	4,620,670	24,492	5.30	Coal
120	Harrington Station, Texas	7,831,512	24,465	3.12	Coal
121	Sherburne County, Minnesota	15,344,648	24,260	1.58	Coal
122	Rochester 7, New York	1,506,960	23,945	15.89	Coal
123	Baldwin, Illinois	12,454,874	23,830	1.91	Coal
124	La Cygne, Kansas	9,517,909	23,590	2.48	Coal
125	New Castle, Pennsylvania	1,577,573	23,180	14.69	Coal
126	Williams, South Carolina	4,428,464	23,174	5.23	Coal

Table 3.3
 UNITED STATES SO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
127	Sunbury, Pennsylvania	1,714,652	22,876	13.34	Coal
128	Meredosia, Illinois	1,326,609	22,815	17.20	Coal
129	Watson, Mississippi	4,731,902	22,738	4.81	Coal
130	Tolk Station, Texas	7,662,008	22,566	2.95	Coal
131	Independence, Arkansas	10,510,564	22,330	2.12	Coal
132	Coal Creek, North Dakota	8,559,089	22,161	2.59	Coal
133	PL Bartow, Florida	2,193,974	22,135	10.09	Coal
134	Belle River, Michigan	7,716,451	22,098	2.86	Coal
135	Portland, Pennsylvania	1,915,994	22,063	11.52	Coal
136	Northport, New York	7,278,114	21,932	3.01	Oil
137	Seminole, Florida	9,241,176	21,848	2.36	Coal
138	Jefferies, South Carolina	1,878,197	21,610	11.51	Coal
139	Mount Storm, West Virginia	11,671,736	21,202	1.82	Coal
140	Sandow, Texas	3,943,323	21,165	5.37	Coal
141	Allen S King, Minnesota	3,311,959	21,111	6.37	Coal
142	Rush Island, Missouri	7,483,574	21,097	2.82	Coal
143	Joppa Steam, Illinois	8,075,552	20,982	2.60	Coal
144	John S Cooper, Kentucky	2,100,208	20,605	9.81	Coal
145	Mill Creek, Kentucky	9,075,622	20,457	2.25	Coal
146	Cliffside, North Carolina	2,723,353	20,046	7.36	Coal
147	Martins Creek, Pennsylvania	2,402,706	20,005	8.33	Coal
148	Canal Station, Massachusetts	4,602,939	19,971	4.34	Oil
149	J T Deely, Texas	5,656,468	19,517	3.45	Coal
150	WH Zimmer, Ohio	9,734,563	19,497	2.00	Coal
151	Dan E Karn, Michigan	4,474,257	19,428	4.34	Coal
152	Clay Boswell, Minnesota	7,266,941	19,202	2.64	Coal
153	George Neal North, Iowa	5,703,855	19,167	3.36	Coal
154	Possum Point, Virginia	3,005,462	19,057	6.34	Coal
155	St. Johns River, Florida	9,795,546	18,967	1.94	Coal
156	L V Sutton, North Carolina	2,622,440	18,929	7.22	Coal
157	Cholla, Arizona	6,706,864	18,843	2.81	Coal
158	Joliet 29, Illinois	5,411,689	18,746	3.46	Coal
159	Albright, West Virginia	1,374,335	18,652	13.57	Coal
160	Council Bluffs, Iowa	5,794,189	18,377	3.17	Coal
161	Jim Bridger, Wyoming	14,593,034	18,223	1.25	Coal
162	Dave Johnston, Wyoming	5,759,784	18,124	3.15	Coal
163	Indian River, Delaware	2,129,702	18,104	8.50	Coal
164	Springerville, Arizona	5,830,542	18,019	3.09	Coal
165	Killen Station, Ohio	3,612,949	17,839	4.94	Coal
166	HW Pirkey, Texas	4,504,102	17,668	3.92	Coal
167	AES Greenidge, New York	1,031,345	17,640	17.10	Coal
168	Naughton, Wyoming	5,019,304	17,518	3.49	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
169	Centralia, Washington	9,500,972	17,266	1.82	Coal
170	Hudson, New Jersey	3,356,373	17,195	5.12	Coal
171	S Nelson, Louisiana	5,927,840	17,109	2.89	Coal
172	Port Everglades, Florida	4,497,763	17,089	3.80	Oil
173	Herbert A Wagner, Maryland	3,001,247	17,049	5.68	Coal
174	Allen, Tennessee	4,879,343	16,974	3.48	Coal
175	Canadys Steam, South Carolina	2,124,590	16,866	7.94	Coal
176	Sooner, Oklahoma	6,953,110	16,686	2.40	Coal
177	Frank E Ratts, Indiana	1,517,924	16,379	10.79	Coal
178	Newton, Illinois	7,241,019	16,211	2.24	Coal
179	Coronado Generating, Arizona	5,063,164	16,082	3.18	Coal
180	Kincaid, Illinois	5,847,334	16,026	2.74	Coal
181	Edgewater, Wisconsin	4,786,914	15,817	3.30	Coal
182	Niles, Ohio	1,126,711	15,642	13.88	Coal
183	Grand River Dam Auth, Oklahoma	6,501,431	15,627	2.40	Coal
184	Eagle Valley (HT Pritchard), Indiana	1,332,751	15,618	11.72	Coal
185	Charles R Lowman, Alabama	3,472,719	15,549	4.48	Coal
186	Dolet Hills, Louisiana	4,667,313	15,395	3.30	Coal
187	Presque Isle, Michigan	3,140,761	15,316	4.88	Coal
188	Powerton, Illinois	7,858,082	15,254	1.94	Coal
189	Comanche, Colorado	4,697,167	15,217	3.24	Coal
190	San Juan, New Mexico	12,398,506	15,212	1.23	Coal
191	Colstrip, Montana	13,886,845	15,182	1.09	Coal
192	Asheville, North Carolina	2,628,074	15,160	5.77	Coal
193	Cumberland, Tennessee	16,384,132	15,115	0.92	Coal
194	Vermilion, Illinois	1,102,939	14,984	13.59	Coal
195	Meramec, Missouri	4,434,627	14,920	3.36	Coal
196	River Rouge, Michigan	3,401,765	14,691	4.32	Coal
197	Potomac River, Virginia	2,331,055	14,643	6.28	Coal
198	Ottumwa, Iowa	4,480,923	14,497	3.24	Coal
199	Cherokee, Colorado	4,335,810	14,476	3.34	Coal
200	Louisa, Iowa	4,927,254	14,425	2.93	Coal
201	Kanawha River, West Virginia	2,571,055	14,390	5.60	Coal
202	Montrose, Missouri	2,662,960	14,358	5.39	Coal
203	New Madrid, Missouri	7,606,958	14,332	1.88	Coal
204	Nelson Dewey, Wisconsin	1,172,335	14,250	12.16	Coal
205	George Neal South, Iowa	4,586,420	14,167	3.09	Coal
206	Lee, North Carolina	1,969,494	14,093	7.16	Coal
207	Martin, Florida	12,834,607	13,890	1.08	Natural gas ^b
208	Thomas Hill, Missouri	6,865,414	13,808	2.01	Coal
209	AES Westover (Goudey), New York	863,979	13,672	15.82	Coal
210	Genoa, Wisconsin	2,203,168	13,650	6.20	Coal

Table 3.3
 UNITED STATES SO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
211	Cane Run, Kentucky	3,068,114	13,587	4.43	Coal
212	Riverbend, North Carolina	1,660,438	13,571	8.17	Coal
213	Hutsonville, Illinois	591,199	13,567	22.95	Coal
214	Iatan, Missouri	4,017,999	13,478	3.35	Coal
215	Pawnee, Colorado	3,316,714	13,456	4.06	Coal
216	Valley (WEPCO), Wisconsin	1,147,954	13,323	11.61	Coal
217	Willow Island, West Virginia	1,151,588	13,115	11.39	Coal
218	Coleto Creek, Texas	4,201,689	12,963	3.09	Coal
219	Mercer, New Jersey	2,752,449	12,938	4.70	Coal
220	Salem Harbor, Massachusetts	2,496,128	12,820	5.14	Coal
221	Cross, South Carolina	8,126,251	12,788	1.57	Coal
222	Coyote, North Dakota	3,060,200	12,763	4.17	Coal
223	Antelope Valley, North Dakota	6,317,269	12,577	1.99	Coal
224	Titus, Pennsylvania	1,105,401	12,556	11.36	Coal
225	Rodemacher, Louisiana	4,279,337	12,459	2.91	Coal
226	Huntington, Utah	5,977,918	12,437	2.08	Coal
227	Will County, Illinois	5,419,706	12,414	2.29	Coal
228	Bay Shore, Ohio	3,538,463	12,320	3.48	Coal
229	Bremo, Virginia	1,609,047	12,208	7.59	Coal
230	San Miguel, Texas	2,855,097	11,950	4.19	Coal
231	J R Whiting, Michigan	2,262,790	11,827	5.23	Coal
232	Green River, Kentucky	719,410	11,819	16.43	Coal
233	Northside, Florida	3,668,086	11,742	3.20	Oil
234	East Bend, Kentucky	2,941,427	11,719	3.98	Coal
235	Riverside, Minnesota	2,436,997	11,706	4.80	Coal
236	Havana, Illinois	2,499,684	11,686	4.68	Coal
237	South Oak Creek, Wisconsin	5,393,774	11,674	2.16	Coal
238	Merom, Indiana	6,643,503	11,654	1.75	Coal
239	Nebraska City, Nebraska	4,104,546	11,630	2.83	Coal
240	BC Cobb, Michigan	2,188,545	11,382	5.20	Coal
241	Boardman, Oregon	3,773,750	11,124	2.95	Coal
242	BL England, New Jersey	1,191,120	10,997	9.23	Coal
243	Dynegy Danskammer, New York	2,449,593	10,995	4.49	Coal
244	Sibley, Missouri	3,061,409	10,709	3.50	Coal
245	Weston, Wisconsin	3,202,588	10,698	3.34	Coal
246	Lansing Smith, Florida	4,020,641	10,673	2.65	Natural gas ^c
247	Big Stone, South Dakota	3,119,519	10,665	3.42	Coal
248	Cape Fear, North Carolina	1,857,910	10,664	5.74	Coal
249	Glen Lyn, Virginia	1,718,635	10,597	6.17	Coal
250	Big Bend, Florida	8,518,176	10,524	1.24	Coal
251	North Omaha, Nebraska	3,403,969	10,441	3.07	Coal
252	Laramie River, Wyoming	12,398,253	10,100	0.81	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
253	Duck Creek, Illinois	2,066,628	10,002	4.84	Coal
254	Flint Creek, Arkansas	3,655,965	9,944	2.72	Coal
255	Gibbons Creek, Texas	3,230,078	9,812	3.04	Coal
256	Waukegan, Illinois	4,230,118	9,781	2.31	Coal
257	Seward, Pennsylvania	864,338	9,741	11.27	Coal
258	Robert Reid, Kentucky	369,652	9,600	25.97	Coal
259	Edge Moor, Delaware	1,911,750	9,550	5.00	Coal
260	Picway, Ohio	380,217	9,486	24.95	Coal
261	Craig, Colorado	9,807,407	9,427	0.96	Coal
262	Cape Canaveral, Florida	3,257,614	9,375	2.88	Oil
263	JC Weadock, Michigan	2,205,966	9,195	4.17	Coal
264	Stanton, North Dakota	1,399,737	9,092	6.50	Coal
265	RD Morrow, Mississippi	2,537,751	9,055	3.57	Coal
266	Dolphus M Grainger, South Carolina	931,468	9,048	9.71	Coal
267	McMeekin, South Carolina	1,265,428	8,909	7.04	Coal
268	Port Washington, Wisconsin	747,511	8,894	11.90	Coal
269	Michigan City, Indiana	2,487,472	8,326	3.35	Coal
270	Turkey Point, Florida	3,030,547	8,287	2.73	Oil
271	Riviera, Florida	2,450,156	8,239	3.36	Oil
272	Marion, Illinois	1,136,616	8,160	7.18	Coal
273	D B Wilson, Kentucky	2,849,550	8,068	2.83	Coal
274	CD McIntosh, Florida	2,810,883	8,009	2.85	Coal
275	Gadsden, Alabama	484,718	7,929	16.36	Coal
276	Harrison, West Virginia	12,927,422	7,885	0.61	Coal
277	A B Brown Generating, Indiana	3,194,749	7,837	2.45	Coal
278	Hugo, Oklahoma	3,030,995	7,762	2.56	Coal
279	Martin Drake, Colorado	1,813,674	7,738	4.27	Coal
280	Ashtabula, Ohio	1,236,725	7,673	6.20	Coal
281	State Line Generating, Indiana	2,923,229	7,659	2.62	Coal
282	HB Robinson, South Carolina	1,021,242	7,652	7.49	Coal
283	Trimble County, Kentucky	3,929,027	7,595	1.93	Coal
284	Wyodak, Wyoming	2,858,420	7,522	2.63	Coal
285	Edwardsport, Indiana	344,544	7,419	21.53	Coal
286	Schiller, New Hampshire	873,475	7,305	8.36	Coal
287	Lovett, New York	1,736,083	7,239	4.17	Coal
288	WH Weatherspoon, North Carolina	794,816	7,148	8.99	Coal
289	Lawrence Energy Center, Kansas	3,759,861	7,030	1.87	Coal
290	Stanton Energy, Florida	6,070,495	6,967	1.15	Coal
291	Nearman Creek, Kansas	1,452,206	6,917	4.76	Coal
292	Crawford, Illinois	2,575,482	6,891	2.68	Coal
293	Deerhaven, Florida	1,588,281	6,799	4.28	Coal
294	JP Madgett, Wisconsin	2,097,984	6,795	3.24	Coal

Table 3.3
 UNITED STATES SO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
295	W S Lee, South Carolina	925,685	6,745	7.29	Coal
296	Buck, North Carolina	1,249,807	6,738	5.39	Coal
297	William C Dale, Kentucky	918,000	6,717	7.32	Coal
298	Alma, Wisconsin	690,029	6,607	9.58	Coal
299	Wood River, Illinois	2,205,841	6,588	2.99	Coal
300	Tecumseh Energy Center, Kansas	1,510,699	6,539	4.33	Coal
301	Kraft, Georgia	1,221,647	6,522	5.34	Coal
302	Blount Street, Wisconsin	438,398	6,514	14.86	Coal
303	FB Culley, Indiana	2,417,245	6,458	2.67	Coal
304	Elmer Smith, Kentucky	2,185,345	6,453	2.95	Coal
305	McIntosh, Georgia	1,162,224	6,389	5.50	Coal
306	Hunter (Emery), Utah	9,403,388	6,374	0.68	Coal
307	Pulliam, Wisconsin	2,349,544	6,261	2.66	Coal
308	North Valmy, Nevada	4,081,381	6,236	1.53	Coal
309	Dynegy Roseton, New York	1,211,549	6,188	5.11	Oil
310	Carbon, Utah	1,323,395	6,137	4.64	Coal
311	Eddystone, Pennsylvania	2,750,581	6,095	2.22	Coal
312	Eckert Station, Michigan	1,540,404	5,953	3.86	Coal
313	Port Jefferson Energy, New York	1,646,561	5,854	3.56	Oil
314	OH Hutchings, Ohio	772,666	5,692	7.37	Coal
315	Sikeston, Missouri	1,693,365	5,657	3.34	Coal
316	Conemaugh, Pennsylvania	12,584,027	5,385	0.43	Coal
317	Sheldon, Nebraska	1,442,114	5,102	3.54	Coal
318	Urquhart, South Carolina	1,703,794	4,999	2.93	Natural gas ^c
319	AES Cayuga (Milliken), New York	2,353,387	4,928	2.09	Coal
320	Elrama, Pennsylvania	2,321,405	4,895	2.11	Coal
321	Mount Tom, Massachusetts	915,318	4,792	5.23	Coal
322	Burlington, Iowa	1,225,990	4,773	3.89	Coal
323	Newington, New Hampshire	660,451	4,741	7.18	Oil
324	Bailly, Indiana	2,831,251	4,733	1.67	Coal
325	Apache Station, Arizona	2,799,861	4,688	1.67	Coal
326	Indian River (55318), Florida	1,152,524	4,668	4.05	Oil
327	Twin Oaks Power, LP, Texas	2,689,521	4,656	1.73	Coal
328	Arapahoe, Colorado	1,412,418	4,633	3.28	Coal
329	Mystic, Massachusetts	1,584,556	4,539	2.86	Oil
330	Ray D Nixon, Colorado	1,680,513	4,507	2.68	Coal
331	Hennepin, Illinois	2,045,489	4,347	2.13	Coal
332	JK Spruce, Texas	4,135,806	4,338	1.05	Coal
333	Red Hills Generation, Mississippi	2,450,000	4,305	1.76	Coal
334	James River, Missouri	1,587,089	4,276	2.69	Coal
335	RP Smith, Maryland	503,446	4,162	8.27	Coal
336	Mitchell, Georgia	589,174	4,143	7.03	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
337	Joliet 9, Illinois	1,292,531	4,136	3.20	Coal
338	Rivesville, West Virginia	386,259	4,003	10.36	Coal
339	Somerset, Massachusetts	800,515	3,991	4.99	Coal
340	Lansing, Iowa	1,257,821	3,981	3.16	Coal
341	Asbury, Missouri	1,213,990	3,946	3.25	Coal
342	Prairie Creek, Iowa	878,699	3,904	4.44	Coal
343	AES Somerset (Kintigh), New York	5,453,551	3,764	0.69	Coal
344	Milton L Kapp, Iowa	1,146,286	3,720	3.25	Coal
345	Bridgeport Harbor, Connecticut	1,739,266	3,711	2.13	Coal
346	New Haven Harbor, Connecticut	1,435,307	3,638	2.53	Oil
347	Navajo Generating Station, Arizona	17,832,139	3,635	0.20	Coal
348	Suwannee River, Florida	625,659	3,591	5.74	Oil
349	Erickson, Michigan	809,058	3,508	4.34	Coal
350	Fisk, Illinois	1,299,559	3,486	2.68	Coal
351	Gordon Evans Energy, Kansas	875,810	3,473	3.97	Natural gas ^b
352	High Bridge, Minnesota	1,308,587	3,466	2.65	Coal
353	Valmont, Colorado	1,281,144	3,435	2.68	Coal
354	Hawthorn, Missouri	4,346,949	3,404	0.78	Coal
355	Oklaunion, Texas	4,686,707	3,391	0.72	Coal
356	Sutherland, Iowa	940,504	3,380	3.59	Coal
357	Cromby, Pennsylvania	629,734	3,326	5.28	Coal
358	SA Carlson, New York	242,156	3,322	13.72	Coal
359	Intermountain, Utah	13,485,597	3,310	0.25	Coal
360	Noblesville, Indiana	196,577	3,276	16.67	Coal
361	HMP&L Station 2, Kentucky	2,056,044	3,161	1.54	Coal
362	Riverton, Kansas	475,354	3,114	6.55	Coal
363	RD Green, Kentucky	3,501,986	3,106	0.89	Coal
364	Dallman, Illinois	1,796,111	3,102	1.73	Coal
365	Southwest, Missouri	1,182,527	3,075	2.60	Coal
366	Sanford, Florida	4,998,936	3,061	0.61	Natural gas ^b
367	Quindaro, Kansas	965,065	3,035	3.14	Coal
368	E Corette, Montana	1,132,762	2,844	2.51	Coal
369	Irvington Generating, Arizona	1,403,955	2,829	2.02	Coal
370	Muscatine, Iowa	1,259,121	2,822	2.24	Coal
371	Black Dog, Minnesota	1,662,585	2,786	1.68	Coal
372	Dan River, North Carolina	516,712	2,675	5.18	Coal
373	Hayden, Colorado	3,631,182	2,602	0.72	Coal
374	Lake Road, Missouri	668,090	2,575	3.85	Coal
375	Hoot Lake, Minnesota	830,157	2,566	3.09	Coal
376	Greenwood, Michigan	1,138,043	2,554	2.24	Natural gas ^b
377	AES Deepwater, Inc., Texas	1,287,524	2,530	1.97	Pet. Coke
378	Tyrone, Kentucky	253,778	2,326	9.16	Coal

Table 3.3
UNITED STATES SO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
379	Taconite Harbor, Minnesota	865,126	2,259	2.61	Coal
380	Oswego Harbor Power, New York	415,194	2,241	5.40	Oil
381	Deepwater, New Jersey	423,355	2,231	5.27	Coal
382	Lake Shore, Ohio	860,853	2,225	2.58	Coal
383	Riverside, Iowa	707,625	2,069	2.92	Coal
384	Platte, Nebraska	563,701	2,041	3.62	Coal

^a To limit its length, this table of US facilities presents only the power plants that emitted more than 1,996 tonnes of SO₂ emissions in 2002. The facilities in the table account for 99.5% of the total SO₂ emissions. There are more than 500 additional fossil fuel power plants in the database that reported less than 1,996 tonnes of SO₂ emissions.

^b This plant's EIA 906 generation report for 2002 indicates that the largest share of its 2002 generation is from natural gas. Its SO₂ emissions, however, are largely from the combustion of oil it burned as a secondary fuel.

^c This plant's EIA 906 generation report for 2002 indicates that the largest share of its 2002 generation is from natural gas. Its SO₂ emissions, however, are largely from the combustion of coal it burned as a secondary fuel.

Table 3.4
CANADA SO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS

	PLANT, PROVINCE	ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MW	PRIMARY FUEL
1	Nanticoke, Ontario	22,236,000	86,710	3.90	Coal
2	Lingan, Nova Scotia	n/a	76,034	17.27 ^a	Coal
3	Coleson Cove, New Brunswick	n/a	45,410	n/a	Oil
4	Boundary Dam, Saskatchewan	6,057,364	42,945	7.09	Coal
5	Poplar River, Saskatchewan	4,457,200	42,727	9.59	Coal
6	Trenton, Nova Scotia	n/a	37,365	6.10 ^a	Coal
7	Sheerness, Alberta	5,810,000 ^b	33,016	5.68	Coal
8	Lambton, Ontario	10,455,000	29,882	2.86	Coal
9	Sundance, Alberta	n/a	28,894	1.97 ^a	Coal
10	Battle River, Alberta	4,867,000 ^b	24,603	5.06	Coal
11	Grand Lake, New Brunswick	449,388 ^c	24,240	53.94	Coal
12	Holyrood, Newfoundland-Labrador	n/a	23,235	n/a	Oil
13	Genesee, Alberta	n/a	14,494	2.40 ^a	Coal
14	Lakeview, Ontario	2,455,000	14,336	5.84	Coal
15	Shand Power, Saskatchewan	2,150,000	13,740	6.39	Coal
16	Keephills, Alberta	n/a	13,041	2.03 ^a	Coal
17	Wabamun, Alberta	n/a	12,992	3.32 ^a	Coal
18	Point Tupper, Nova Scotia	n/a	12,712	10.59 ^a	Coal
19	Thunder Bay, Ontario	1,522,000	9,133	6.00	Coal
20	Dalhousie, New Brunswick	n/a	8,960	n/a	Orimulsion
21	Atikokan, Ontario	823,000	4,934	5.99	Coal
22	H.R. Milner, Alberta	790,000 ^b	4,790	6.06	Coal
23	Point Aconi, Nova Scotia	n/a	3,661	2.58 ^a	Coal
24	Courtenay Bay, New Brunswick	n/a	2,410	n/a	Oil
25	Lennox, Ontario	2,762,000 ^d	2,260	0.82	Oil
26	Belledune, New Brunswick	3,616,790	2,070	0.57	Coal
27	Tufts Cove, Nova Scotia	n/a	1,905	n/a	Oil
28	Brandon GS, Manitoba	273,053	649	2.38	Coal
29	Sarnia Regional Cogen Plant, Ontario	n/a	595	n/a	Natural gas
30	Iles-de-la-Madeleine 2, Quebec	n/a	565 ^e	n/a	Oil
31	Selkirk GS, Manitoba	143,765	354	2.46	Coal ^f
32	Charlottetown, Prince Edward Island	n/a	294	n/a	Oil
33	Tracy, Quebec	n/a	103 ^e	n/a	Oil
34	Calstock Power Plant, Ontario	n/a	29	n/a	Wood refuse
35	Meridian, Saskatchewan	n/a	27	n/a	Natural gas
36	Bayside Power LP, New Brunswick	n/a	17	n/a	Natural gas
37	Brooklyn Energy Centre, Nova Scotia	n/a	5	n/a	Wood refuse
38	Joffre, Alberta	n/a	1	n/a	Natural gas

^a Data for 2002 annual net generation were not available, so output emission rates are for 2001, derived from power plant information reports available from the Canadian Electricity Association at <http://www.ceamercuryprogram.ca/index.html>.

^b Net generation obtained from ATCO Power report, *Environment, Health and Safety Review 2002*. Online at http://www.atcopower.com/Environment_Health_&_Safety/Reports/environmental_reports.htm.

^c Net generation estimated assuming Grand Lake was in operation 90% of the time during 2002. See the methodology discussion in the Appendix.

^d Net generation obtained from Ontario Power Generation report, *Towards Sustainable Development: 2002 Progress Report*. Online at http://www.opg.com/envComm/E_annual_report.asp.

^e Information provided by the Province of Quebec in September 2004 differs from the SO₂ values contained in the NPRI March 2004 update for these facilities. Quebec gives 1,032.1 tonnes SO₂ from Iles-de-la-Madeleine, and 109.8 tonnes SO₂ from Tracy.

^f Selkirk converted to natural gas in July 2002.

Table 3.5
MEXICO SO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS

	PLANT, STATE	ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
1	C.T. PDTE. A. López Mateos (Tuxpan), Veracruz	15,030,690	253,430	16.86	Oil
2	C.T. Francisco Pérez Ríos (Tula), Hidalgo	9,734,170	158,326	16.26	Oil
3	C.T. Plutarco Elias Calles (Petacalco), Guerrero	13,879,470	113,207	8.16	Coal
4	C.T. Gral. Manuel Alvarez (Manzanillo I), Colima	6,449,140	107,032	16.60	Oil
5	C.T. José López Portillo (Río Escondido), Coahuila	7,515,560	104,213	13.87	Coal
6	C.T. Carbón II, Coahuila	8,636,350	102,729	11.89	Coal
7	C.T. Altamira, Tamaulipas	4,655,850	86,451	18.57	Oil
8	C.T. Salamanca, Guanajuato	4,841,380	83,019	17.15	Oil
9	C.T. Manzanillo II, Colima	5,034,400	75,416	14.98	Oil
10	C.T. Puerto Libertad, Sonora	3,349,740	61,159	18.26	Oil
11	C.T. José Acevez Pozos (Mazatlan II), Sinaloa	3,284,120	61,155	18.62	Oil
12	C.T. Villa De Reyes (San Luis Potosí), San Luis Potosí	2,925,990	45,727	15.63	Oil
13	C.T. Carlos Rodríguez Rivero (Guaymas II), Sonora	2,259,290	41,972	18.58	Oil
14	C.T. Guadalupe Victoria (Lerdo), Durango	1,980,460	36,173	18.27	Oil
15	C.T. Juan De Díos Batis P. (Topolobampo), Sinaloa	1,996,550	36,131	18.10	Oil
16	C.T. Francisco Villa (Delicias), Chihuahua	1,919,730	29,196	15.21	Oil
17	C.T. Monterrey, Nuevo León	2,538,090	26,792	10.56	Oil
18	C.T. Emilio Portes Gil (Río Bravo), Tamaulipas	1,745,990	24,388	13.97	Oil
19	C.T. Benito Juárez (Samalayuca I), Chihuahua	1,232,800	22,379	18.15	Oil
20	C.T. Campeche II (Lerma), Campeche	812,720	17,742	21.83	Oil
21	C.T. Mérida II, Yucatán	1,099,710	17,497	15.91	Oil
22	C.T. Poza Rica, Veracruz	654,040	12,768	19.52	Oil
23	C.T. Felipe Carrillo P. (Valladolid), Yucatán	414,970	8,409	20.27	Oil
24	C.T. Presidente Juárez (Tijuana), Baja California	1,488,840	7,019	4.71	Oil
25	C.T. Punta Prieta II, Baja California Sur	621,830	6,004	9.66	Oil
26	C.Cl. Puerto San Carlos, Baja California Sur	470,680	5,933	12.61	Oil
27	C.T. Nachi-Cocom, Yucatán	249,470	5,838	23.40	Oil
28	C.T. Guaymas I, Sonora	186,750	5,106	27.34	Oil
29	C.TG. Cancún, Quintana Roo	77,770	326	4.19	Diesel
30	C.TG. Las Cruces, Guerrero	46,400	198	4.27	Diesel
31	C.C.C. El Sauz, Querétaro	1,370,540	176	0.13	Natural gas
32	C.TG. Ciudad Constitución, Baja California Sur	33,690	171	5.08	Diesel
33	C.TG. Los Cabos, Baja California Sur	30,900	134	4.34	Diesel
34	C.C.C. Felipe Carrillo P. (Valladolid), Yucatán	1,517,600	123	0.08	Diesel
35	C.Cl. Guerrero Negro, Baja California Sur	36,390	117	3.22	Diesel
36	C.TG. Caborca Industrial, Sonora	26,140	109	4.19	Diesel
37	C.TG. Nizuc, Quintana Roo	27,630	99	3.60	Diesel
38	C.Cl. Santa Rosalía, Baja California Sur	26,220	87	3.30	Diesel
39	C.TG. Culiacan, Sinaloa	17,550	63	3.60	Diesel
40	C.TG. Parque, Chihuahua	15,580	62	3.97	Diesel
41	C.TG. Tecnológico, Nuevo León	13,400	57	4.24	Diesel

PLANT, STATE		ELECTRICITY GENERATION, MWh	SO ₂ EMISSIONS, metric tonnes	SO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
42	C.TG. Ciudad Obregón, Sonora	10,780	53	4.95	Diesel
43	C.TG. Punta Prieta I (La Paz), Baja California Sur	9,870	51	5.17	Diesel
44	C.CI. Villa Constitución, Baja California Sur	17,170	50	2.93	Diesel
45	Pueblo Nuevo (Movil), Sonora	12,050	46	3.83	Diesel
46	C.TG. Cipres, Baja California	10,120	45	4.44	Diesel
47	C.TG. El Verde, Jalisco	29,110	44	1.53	Natural gas
48	C.TG. Arroyo De Coyote, Tamaulipas	6,540	41	6.21	Diesel
49	C.TG. Xul-Ha, Quintana Roo	8,770	40	4.59	Diesel
50	C.TG. Chihuahua I, Chihuahua	7,980	37	4.60	Diesel
51	Nuevo Nogales (Movil), Sonora	7,730	28	3.67	Diesel
52	C.TG. Mexicali, Baja California	5,330	26	4.92	Diesel
53	C.TG. Presidente Juárez (Tijuana), Baja California	648,420	25	0.04	Natural gas
54	C.TG. Esperanzas, Coahuila	4,590	23	4.92	Diesel
55	C.TG. Industrial (Juárez), Chihuahua	1,980	19	9.41	Diesel
56	C.T. La Laguna, Durango	179,590	15	0.08	Natural gas
57	C.TG. Portes Gil (Río Bravo), Tamaulipas	1,031,400	14	0.01	Natural gas
58	C.C.C. Chihuahua II (El Encino), Chihuahua	2,949,700	12	0.00	Natural gas
59	C.T. Valle de México, México	3,894,120	11	0.00	Natural gas
60	C.C.C. Benito Juárez (Samalayuca II), Chihuahua	3,901,950	10	0.00	Natural gas
61	C.C.C. FCO. Pérez Ríos (Tula), Hidalgo	3,260,940	8	0.00	Natural gas
62	C.C.C. Dos Bocas, Veracruz	2,428,890	7	0.00	Natural gas
63	C.C.C. Huinala, Nuevo León	2,331,460	6	0.00	Natural gas
64	C.CI. Yecora, Sonora	1,890	5	2.84	Diesel
65	C.C.C. Presidente Juárez (Rosarito), Baja California	2,077,250	4	0.00	Natural gas
66	C.TG. El Sauz, Querétaro	1,495,570	4	0.00	Natural gas
67	C.TG. Monclava, Coahuila	n/a	4	n/a	Natural gas
68	C.C.C. Gómez Palacio, Durango	1,045,260	3	0.00	Natural gas
69	C.C.C. Huinala II, Nuevo León	1,333,060	3	0.00	Natural gas
70	C.TG. La Laguna, Durango	62,260	2	0.03	Natural gas
71	C.T. Jorge Luque (LFC), México	497,160	2	0.00	Natural gas
72	C.TG. Hermosillo, Sonora	507,150	2	0.00	Natural gas
73	C.TG. Chihuahua II (El Encino), Chihuahua	329,140	1	0.00	Natural gas
74	C.TG. Huinala, Nuevo León	259,700	1	0.00	Natural gas
75	C.T. San Jerónimo, Nuevo León	222,010	1	0.00	Natural gas
76	C.TG. Jorge Luque (Lechería) (LFC), México	145,390	1	0.00	Natural gas
77	C.TG. Nonalco (LFC), DF	131,470	1	0.00	Natural gas
78	C.TG. Valle de México (LFC), México	104,780	0.45	0.00	Natural gas
79	C.TG. Chávez, Coahuila	25,250	0.12	0.00	Natural gas
80	C.TG. Universidad, Nuevo León	17,220	0.09	0.01	Natural gas
81	C.TG. Leona, Nuevo León	16,570	0.09	0.01	Natural gas
82	C.TG. Fundidora, Nuevo León	4,810	0.03	0.01	Natural gas

Table 3.6
 UNITED STATES NO_x POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
1	Cumberland, Tennessee	16,384,132	45,309	2.8	Coal
2	Paradise, Kentucky	14,130,150	42,663	3.0	Coal
3	J M Stuart, Ohio	15,351,286	42,429	2.8	Coal
4	Belews Creek, North Carolina	16,912,850	40,717	2.4	Coal
5	Gen J M Gavin, Ohio	15,617,077	39,771	2.5	Coal
6	John E Amos, West Virginia	17,995,089	39,464	2.2	Coal
7	Monroe, Michigan	16,720,823	37,762	2.3	Coal
8	Four Corners, New Mexico	13,674,415	37,719	2.8	Coal
9	Mount Storm, West Virginia	11,671,736	36,176	3.1	Coal
10	W H Sammis, Ohio	15,521,117	35,040	2.3	Coal
11	La Cygne, Kansas	9,517,909	34,854	3.7	Coal
12	Gibson, Indiana	20,522,153	34,692	1.7	Coal
13	New Madrid, Missouri	7,606,958	33,988	4.5	Coal
14	Bowen, Georgia	21,674,542	33,839	1.6	Coal
15	Navajo Generating Station, Arizona	17,832,139	32,268	1.8	Coal
16	Crystal River, Florida	14,465,667	31,806	2.2	Coal
17	Rockport, Indiana	16,643,319	31,065	1.9	Coal
18	Colstrip, Montana	13,886,845	29,603	2.1	Coal
19	Jeffrey Energy Center, Kansas	15,330,637	28,396	1.9	Coal
20	Jim Bridger, Wyoming	14,593,034	27,979	1.9	Coal
21	San Juan, New Mexico	12,398,506	27,536	2.2	Coal
22	Intermountain, Utah	13,485,597	27,448	2.0	Coal
23	Bruce Mansfield, Pennsylvania	15,974,911	27,097	1.7	Coal
24	Big Bend, Florida	8,518,176	26,893	3.2	Coal
25	Mitchell, West Virginia	9,231,567	26,851	2.9	Coal
26	Clifty Creek, Indiana	7,838,812	26,518	3.4	Coal
27	E C Gaston, Alabama	12,639,541	26,464	2.1	Coal
28	Harrison, West Virginia	12,927,422	26,390	2.0	Coal
29	James H Miller Jr, Alabama	18,592,131	25,434	1.4	Coal
30	Harlee Branch, Georgia	9,018,458	25,228	2.8	Coal
31	Scherer, Georgia	20,817,252	25,062	1.2	Coal
32	Muskingum River, Ohio	8,359,764	24,802	3.0	Coal
33	Powerton, Illinois	7,858,082	24,694	3.1	Coal
34	Conesville, Ohio	10,158,928	24,185	2.4	Coal
35	Sherburne County, Minnesota	15,344,648	23,849	1.6	Coal
36	Kingston, Tennessee	9,866,292	23,664	2.4	Coal
37	Kyger Creek, Ohio	6,852,119	22,968	3.4	Coal
38	Homer City, Pennsylvania	10,938,699	22,834	2.1	Coal
39	Widows Creek, Alabama	8,868,307	22,826	2.6	Coal
40	St. Johns River, Florida	9,795,546	22,366	2.3	Coal
41	F J Gannon, Florida	4,815,528	22,166	4.6	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
42	Barry, Alabama	16,718,579	22,136	1.3	Coal
43	Johnsonville, Tennessee	8,275,776	21,694	2.6	Coal
44	Roxboro, North Carolina	14,281,069	21,461	1.5	Coal
45	Cardinal, Ohio	8,555,500	21,209	2.5	Coal
46	Hatfield's Ferry, Pennsylvania	9,753,564	20,924	2.1	Coal
47	Milton R Young, North Dakota	5,117,272	20,725	4.0	Coal
48	Seminole, Florida	9,241,176	20,527	2.2	Coal
49	Baldwin, Illinois	12,454,874	20,298	1.6	Coal
50	Gerald Gentleman, Nebraska	9,549,816	20,035	2.1	Coal
51	Winyah, South Carolina	7,720,938	19,669	2.5	Coal
52	Pleasant Prairie, Wisconsin	7,898,581	19,493	2.5	Coal
53	Eastlake, Ohio	6,724,187	19,137	2.8	Coal
54	W H Zimmer, Ohio	9,734,563	19,020	2.0	Coal
55	Kincaid, Illinois	5,847,334	18,965	3.2	Coal
56	Wansley, Georgia	11,197,521	18,446	1.6	Coal
57	Mohave, Nevada	10,170,230	18,386	1.8	Coal
58	Petersburg, Indiana	11,641,137	18,370	1.6	Coal
59	Shawnee, Kentucky	8,826,178	18,199	2.1	Coal
60	Big Cajun 2, Louisiana	11,125,719	18,061	1.6	Coal
61	Hunter (Emery), Utah	9,403,388	18,016	1.9	Coal
62	Conemaugh, Pennsylvania	12,584,027	17,655	1.4	Coal
63	Craig, Colorado	9,807,407	17,583	1.8	Coal
64	Ghent, Kentucky	11,533,151	17,399	1.5	Coal
65	Marshall, North Carolina	14,498,223	17,391	1.2	Coal
66	Sam Seymour, Texas	11,749,703	17,344	1.5	Coal
67	Laramie River, Wyoming	12,398,253	17,200	1.4	Coal
68	Morgantown, Maryland	7,550,506	17,066	2.3	Coal
69	Walter C Beckjord, Ohio	6,756,632	17,013	2.5	Coal
70	Martin Lake, Texas	14,825,001	16,751	1.1	Coal
71	Thomas Hill, Missouri	6,865,414	16,580	2.4	Coal
72	Keystone, Pennsylvania	11,790,991	16,514	1.4	Coal
73	Northeastern, Oklahoma	9,623,635	16,408	1.7	Coal
74	Avon Lake, Ohio	4,169,683	16,401	3.9	Coal
75	Bull Run, Tennessee	6,760,080	16,250	2.4	Coal
76	Muskogee, Oklahoma	10,275,348	16,097	1.6	Coal
77	White Bluff, Arkansas	8,850,935	16,062	1.8	Coal
78	Warrick, Indiana	5,066,020	15,921	3.1	Coal
79	Tanner's Creek, Indiana	5,872,947	15,907	2.7	Coal
80	R M Schahfer, Indiana	8,756,429	15,759	1.8	Coal
81	Gorgas, Alabama	7,216,594	15,248	2.1	Coal
82	W A Parish, Texas	20,026,008	14,939	0.7	Coal

Table 3.6
 UNITED STATES NO_x POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
83	George Neal North, Iowa	5,703,855	14,870	2.6	Coal
84	Bailly, Indiana	2,831,251	14,860	5.2	Coal
85	Independence, Arkansas	10,510,564	14,801	1.4	Coal
86	Brunner Island, Pennsylvania	9,994,684	14,688	1.5	Coal
87	Miami Fort, Ohio	7,587,241	14,660	1.9	Coal
88	Monticello, Texas	13,127,881	14,443	1.1	Coal
89	Chesterfield, Virginia	9,502,996	14,363	1.5	Coal
90	Cross, South Carolina	8,126,251	14,311	1.8	Coal
91	Centralia, Washington	9,500,972	14,034	1.5	Coal
92	J H Campbell, Michigan	9,269,258	14,000	1.5	Coal
93	Grand River Dam Auth, Oklahoma	6,501,431	13,959	2.1	Coal
94	Chalk Point, Maryland	6,041,207	13,894	2.3	Coal
95	Colbert, Alabama	6,305,034	13,872	2.2	Coal
96	Big Sandy, Kentucky	5,752,379	13,743	2.4	Coal
97	Dave Johnston, Wyoming	5,759,784	13,625	2.4	Coal
98	Big Stone, South Dakota	3,119,519	13,566	4.3	Coal
99	Welsh Power Plant, Texas	11,000,083	13,545	1.2	Coal
100	Clay Boswell, Minnesota	7,266,941	13,411	1.8	Coal
101	Mill Creek, Kentucky	9,075,622	13,244	1.5	Coal
102	Allen, Tennessee	4,879,343	13,128	2.7	Coal
103	Coffeen, Illinois	5,257,211	13,009	2.5	Coal
104	Merom, Indiana	6,643,503	13,003	2.0	Coal
105	Sioux, Missouri	6,296,711	12,783	2.0	Coal
106	Leland Olds, North Dakota	4,576,988	12,488	2.7	Coal
107	Limestone, Texas	11,385,520	12,481	1.1	Coal
108	Pleasants, West Virginia	7,629,209	12,442	1.6	Coal
109	Riverside, Minnesota	2,436,997	12,377	5.1	Coal
110	Crist, Florida	4,572,235	12,370	2.7	Coal
111	St. Clair, Michigan	6,965,047	12,300	1.8	Coal
112	Council Bluffs, Iowa	5,794,189	12,207	2.1	Coal
113	Phil Sporn, West Virginia	5,361,190	11,961	2.2	Coal
114	Kammer, West Virginia	4,029,061	11,951	3.0	Coal
115	Coyote, North Dakota	3,060,200	11,951	3.9	Coal
116	Harrington Station, Texas	7,831,512	11,920	1.5	Coal
117	Ninemile Point, Louisiana	6,187,124	11,878	1.9	Natural gas
118	Naughton, Wyoming	5,019,304	11,714	2.3	Coal
119	Mountaineer, West Virginia	8,985,024	11,713	1.3	Coal
120	Cholla, Arizona	6,706,864	11,686	1.7	Coal
121	Clinch River, Virginia	4,620,670	11,633	2.5	Coal
122	Brayton Point, Massachusetts	8,263,163	11,494	1.4	Coal
123	Watson, Mississippi	4,731,902	11,470	2.4	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
124	Springerville, Arizona	5,830,542	11,405	2.0	Coal
125	Montour, Pennsylvania	9,263,444	11,213	1.2	Coal
126	Sooner, Oklahoma	6,953,110	11,185	1.6	Coal
127	Tolk Station, Texas	7,662,008	10,990	1.4	Coal
128	Mercer, New Jersey	2,752,449	10,860	3.9	Coal
129	Allen S King, Minnesota	3,311,959	10,826	3.3	Coal
130	Coronado Generating, Arizona	5,063,164	10,825	2.1	Coal
131	Gallatin, Tennessee	7,271,777	10,716	1.5	Coal
132	Antelope Valley, North Dakota	6,317,269	10,699	1.7	Coal
133	Brandon Shores, Maryland	7,160,408	10,586	1.5	Coal
134	Sibley, Missouri	3,061,409	10,425	3.4	Coal
135	Fort Martin, West Virginia	7,855,193	10,193	1.3	Coal
136	Columbia, Wisconsin	6,472,154	10,183	1.6	Coal
137	Huntington, Utah	5,977,918	10,145	1.7	Coal
138	Wabash River, Indiana	5,744,472	10,034	1.7	Coal
139	C P Crane, Maryland	2,132,214	9,745	4.6	Coal
140	Reid Gardner, Nevada	4,191,103	9,739	2.3	Coal
141	Will County, Illinois	5,419,706	9,634	1.8	Coal
142	Presque Isle, Michigan	3,140,761	9,502	3.0	Coal
143	Daniel, Mississippi	10,839,532	9,408	0.9	Coal
144	Dolet Hills, Louisiana	4,667,313	9,408	2.0	Coal
145	Coal Creek, North Dakota	8,559,089	9,394	1.1	Coal
146	Greene County, Alabama	3,892,941	9,356	2.4	Coal
147	Williams, South Carolina	4,428,464	9,266	2.1	Coal
148	John Sevier, Tennessee	4,880,298	9,263	1.9	Coal
149	Clover Power Station, Virginia	6,307,712	9,197	1.5	Coal
150	Michigan City, Indiana	2,487,472	8,979	3.6	Coal
151	Cape Canaveral, Florida	3,257,614	8,978	2.8	Oil
152	Belle River, Michigan	7,716,451	8,921	1.2	Coal
153	Mayo, North Carolina	4,737,089	8,809	1.9	Coal
154	Charles R Lowman, Alabama	3,472,719	8,766	2.5	Coal
155	Chesapeake, Virginia	4,141,111	8,695	2.1	Coal
156	Elmer Smith, Kentucky	2,185,345	8,673	4.0	Coal
157	Cherokee, Colorado	4,335,810	8,596	2.0	Coal
158	Meramec, Missouri	4,434,627	8,545	1.9	Coal
159	Port Everglades, Florida	4,497,763	8,527	1.9	Oil
160	Wateree, South Carolina	4,282,531	8,510	2.0	Coal
161	Yates, Georgia	5,368,046	8,279	1.5	Coal
162	G G Allen, North Carolina	5,071,389	8,181	1.6	Coal
163	L V Sutton, North Carolina	2,622,440	8,171	3.1	Coal
164	Hudson, New Jersey	3,356,373	8,159	2.4	Coal

Table 3.6
 UNITED STATES NO_x POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
165	Edwards Station, Illinois	3,536,593	8,025	2.3	Coal
166	Stanton Energy, Florida	6,070,495	8,022	1.3	Coal
167	Comanche, Colorado	4,697,167	7,992	1.7	Coal
168	Edgewater, Wisconsin	4,786,914	7,939	1.7	Coal
169	Louisa, Iowa	4,927,254	7,865	1.6	Coal
170	Hayden, Colorado	3,631,182	7,805	2.1	Coal
171	Dan E Karn, Michigan	4,474,257	7,780	1.7	Coal
172	D B Wilson, Kentucky	2,849,550	7,726	2.7	Coal
173	Anclote, Florida	4,133,979	7,643	1.8	Oil
174	Bay Shore, Ohio	3,538,463	7,636	2.2	Coal
175	Hammond, Georgia	3,935,825	7,629	1.9	Coal
176	Boardman, Oregon	3,773,750	7,621	2.0	Coal
177	Ottumwa, Iowa	4,480,923	7,555	1.7	Coal
178	Oklauion, Texas	4,686,707	7,499	1.6	Coal
179	George Neal South, Iowa	4,586,420	7,491	1.6	Coal
180	Manatee, Florida	6,116,586	7,485	1.2	Oil
181	H L Spurlock, Kentucky	6,080,970	7,470	1.2	Coal
182	Pulliam, Wisconsin	2,349,544	7,463	3.2	Coal
183	Nebraska City, Nebraska	4,104,546	7,451	1.8	Coal
184	Rodemacher, Louisiana	4,279,337	7,347	1.7	Coal
185	Elrama, Pennsylvania	2,321,405	7,330	3.2	Coal
186	Dallman, Illinois	1,796,111	7,285	4.1	Coal
187	Killen Station, Ohio	3,612,949	7,198	2.0	Coal
188	E W Brown, Kentucky	3,992,354	7,189	1.8	Coal
189	R S Nelson, Louisiana	5,927,840	7,161	1.2	Coal
190	North Valmy, Nevada	4,081,381	7,140	1.7	Coal
191	Sheldon, Nebraska	1,442,114	7,113	4.9	Coal
192	Labadie, Missouri	14,406,589	7,094	0.5	Coal
193	Yorktown, Virginia	4,238,965	7,067	1.7	Coal
194	Cayuga, Indiana	5,930,084	7,051	1.2	Coal
195	AES Somerset (Kintigh), New York	5,453,551	7,015	1.3	Coal
196	Sandow, Texas	3,943,323	6,958	1.8	Coal
197	Iatan, Missouri	4,017,999	6,891	1.7	Coal
198	R D Green, Kentucky	3,501,986	6,714	1.9	Coal
199	A B Brown Generating, Indiana	3,194,749	6,713	2.1	Coal
200	Dickerson, Maryland	3,263,673	6,695	2.1	Coal
201	Martin, Florida	12,834,607	6,637	0.5	Natural gas
202	Big Brown, Texas	7,920,848	6,536	0.8	Coal
203	Huntley Power, New York	2,923,168	6,493	2.2	Coal
204	C D McIntosh, Florida	2,810,883	6,482	2.3	Coal
205	State Line Generating, Indiana	2,923,229	6,478	2.2	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
206	San Miguel, Texas	2,855,097	6,459	2.3	Coal
207	Northport, New York	7,278,114	6,237	0.9	Oil
208	Coleman, Kentucky	2,864,421	6,213	2.2	Coal
209	R E Burger, Ohio	2,000,668	6,132	3.1	Coal
210	Bonanza, Utah	3,923,323	6,089	1.6	Coal
211	Marion, Illinois	1,136,616	6,081	5.3	Coal
212	Harding Street Stn. (Elmer W Stout), Indiana	3,784,144	6,018	1.6	Coal
213	South Oak Creek, Wisconsin	5,393,774	5,929	1.1	Coal
214	Shawville, Pennsylvania	2,991,436	5,927	2.0	Coal
215	Apache Station, Arizona	2,799,861	5,923	2.1	Coal
216	Black Dog, Minnesota	1,662,585	5,904	3.6	Coal
217	Baxter Wilson, Mississippi	2,551,638	5,784	2.3	Natural gas
218	F B Culley, Indiana	2,417,245	5,732	2.4	Coal
219	R D Morrow, Mississippi	2,537,751	5,701	2.2	Coal
220	Cane Run, Kentucky	3,068,114	5,693	1.9	Coal
221	Turkey Point, Florida	3,030,547	5,682	1.9	Oil
222	Weston, Wisconsin	3,202,588	5,677	1.8	Coal
223	Lawrence Energy Center, Kansas	3,759,861	5,625	1.5	Coal
224	Asbury, Missouri	1,213,990	5,597	4.6	Coal
225	Kanawha River, West Virginia	2,571,055	5,596	2.2	Coal
226	Dunkirk, New York	3,591,017	5,572	1.6	Coal
227	R Gallagher, Indiana	2,977,365	5,564	1.9	Coal
228	J T Deely, Texas	5,656,468	5,550	1.0	Coal
229	North Omaha, Nebraska	3,403,969	5,541	1.6	Coal
230	Potomac River, Virginia	2,331,055	5,452	2.3	Coal
231	Willow Island, West Virginia	1,151,588	5,394	4.7	Coal
232	Niles, Ohio	1,126,711	5,363	4.8	Coal
233	Trenton Channel, Michigan	4,339,844	5,305	1.2	Coal
234	Joppa Steam, Illinois	8,075,552	5,258	0.7	Coal
235	High Bridge, Minnesota	1,308,587	5,253	4.0	Coal
236	Cheswick, Pennsylvania	3,021,295	5,227	1.7	Coal
237	Herbert A Wagner, Maryland	3,001,247	5,178	1.7	Coal
238	HMP&L Station 2, Kentucky	2,056,044	5,157	2.5	Coal
239	Decordova, Texas	3,042,636	5,108	1.7	Natural gas
240	Canal Station, Massachusetts	4,602,939	5,079	1.1	Oil
241	Montrose, Missouri	2,662,960	5,068	1.9	Coal
242	Michoud, Louisiana	2,416,824	5,049	2.1	Natural gas
243	River Rouge, Michigan	3,401,765	5,009	1.5	Coal
244	Lee, North Carolina	1,969,494	5,004	2.5	Coal
245	East Bend, Kentucky	2,941,427	4,949	1.7	Coal
246	Sunbury, Pennsylvania	1,714,652	4,909	2.9	Coal

Table 3.6
 UNITED STATES NO_x POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
247	Sabine, Texas	7,087,729	4,871	0.7	Natural gas
248	Tradinghouse, Texas	3,007,375	4,851	1.6	Natural gas
249	Arapahoe, Colorado	1,412,418	4,847	3.4	Coal
250	Duck Creek, Illinois	2,066,628	4,833	2.3	Coal
251	Nelson Dewey, Wisconsin	1,172,335	4,796	4.1	Coal
252	Newton, Illinois	7,241,019	4,764	0.7	Coal
253	Trimble County, Kentucky	3,929,027	4,730	1.2	Coal
254	Asheville, North Carolina	2,628,074	4,707	1.8	Coal
255	Martins Creek, Pennsylvania	2,402,706	4,666	1.9	Coal
256	Flint Creek, Arkansas	3,655,965	4,623	1.3	Coal
257	Possum Point, Virginia	3,005,462	4,560	1.5	Coal
258	Waukegan, Illinois	4,230,118	4,486	1.1	Coal
259	Eddystone, Pennsylvania	2,750,581	4,448	1.6	Coal
260	Dynegy Danskammer, New York	2,449,593	4,432	1.8	Coal
261	Jack McDonough, Georgia	3,728,220	4,430	1.2	Coal
262	Jefferies, South Carolina	1,878,197	4,421	2.4	Coal
263	Glen Lyn, Virginia	1,718,635	4,390	2.6	Coal
264	Gerald Andrus, Mississippi	2,319,949	4,363	1.9	Natural gas
265	John S Cooper, Kentucky	2,100,208	4,328	2.1	Coal
266	H W Pirkey, Texas	4,504,102	4,308	1.0	Coal
267	Lansing Smith, Florida	4,020,641	4,283	1.1	Natural gas
268	Bremo, Virginia	1,609,047	4,282	2.7	Coal
269	Wyodak, Wyoming	2,858,420	4,261	1.5	Coal
270	Albright, West Virginia	1,374,335	4,239	3.1	Coal
271	J P Madgett, Wisconsin	2,097,984	4,187	2.0	Coal
272	Pawnee, Colorado	3,316,714	4,166	1.3	Coal
273	James River, Missouri	1,587,089	4,159	2.6	Coal
274	Indian River, Delaware	2,129,702	4,081	1.9	Coal
275	Eagle Valley (H T Pritchard), Indiana	1,332,751	4,077	3.1	Coal
276	Genoa, Wisconsin	2,203,168	4,036	1.8	Coal
277	Muscatine, Iowa	1,259,121	4,020	3.2	Coal
278	Riviera, Florida	2,450,156	4,010	1.6	Oil
279	Canadys Steam, South Carolina	2,124,590	3,990	1.9	Coal
280	P L Bartow, Florida	2,193,974	3,841	1.8	Oil
281	Martin Drake, Colorado	1,813,674	3,815	2.1	Coal
282	McIntosh, Georgia	1,162,224	3,794	3.3	Coal
283	Cope Station, South Carolina	3,243,770	3,774	1.2	Coal
284	Northside, Florida	3,668,086	3,762	1.0	Oil
285	J K Spruce, Texas	4,135,806	3,761	0.9	Coal
286	Armstrong, Pennsylvania	2,140,768	3,745	1.7	Coal
287	AES Cayuga (Milliken), New York	2,353,387	3,643	1.5	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
288	Rawhide, Colorado	2,078,175	3,642	1.8	Coal
289	Frank E Ratts, Indiana	1,517,924	3,640	2.4	Coal
290	Seminole, Oklahoma	3,398,357	3,630	1.1	Natural gas
291	Rush Island, Missouri	7,483,574	3,621	0.5	Coal
292	Little Gypsy, Louisiana	2,358,145	3,612	1.5	Natural gas
293	Havana, Illinois	2,499,684	3,602	1.4	Coal
294	Putnam, Florida	2,220,194	3,545	1.6	Natural gas
295	Nearman Creek, Kansas	1,452,206	3,502	2.4	Coal
296	Holcomb, Kansas	2,454,689	3,492	1.4	Coal
297	Merrimack, New Hampshire	2,874,174	3,490	1.2	Coal
298	Hugo, Oklahoma	3,030,995	3,476	1.1	Coal
299	Meredosia, Illinois	1,326,609	3,462	2.6	Coal
300	Joliet 29, Illinois	5,411,689	3,456	0.6	Coal
301	Salem Harbor, Massachusetts	2,496,128	3,442	1.4	Coal
302	Riverbend, North Carolina	1,660,438	3,441	2.1	Coal
303	J C Weadock, Michigan	2,205,966	3,439	1.6	Coal
304	Sutherland, Iowa	940,504	3,402	3.6	Coal
305	J R Whiting, Michigan	2,262,790	3,382	1.5	Coal
306	B L England, New Jersey	1,191,120	3,372	2.8	Coal
307	Cliffside, North Carolina	2,723,353	3,296	1.2	Coal
308	Hennepin, Illinois	2,045,489	3,285	1.6	Coal
309	Deerhaven, Florida	1,588,281	3,278	2.1	Coal
310	Sanford, Florida	4,998,936	3,275	0.7	Natural gas
311	Los Medanos, California	3,712,422	3,254	0.9	Natural gas
312	Coletto Creek, Texas	4,201,689	3,224	0.8	Coal
313	Eckert Station, Michigan	1,540,404	3,181	2.1	Coal
314	New Castle, Pennsylvania	1,577,573	3,179	2.0	Coal
315	Lovett, New York	1,736,083	3,164	1.8	Coal
316	H B Robinson, South Carolina	1,021,242	3,157	3.1	Coal
317	Prewitt Escalante, New Mexico	1,653,093	3,148	1.9	Coal
318	Tecumseh Energy Center, Kansas	1,510,699	3,091	2.0	Coal
319	Carbon, Utah	1,323,395	3,065	2.3	Coal
320	Lake Road, Missouri	668,090	3,057	4.6	Coal
321	Kraft, Georgia	1,221,647	3,031	2.5	Coal
322	Lansing, Iowa	1,257,821	3,016	2.4	Coal
323	Edge Moor, Delaware	1,911,750	3,004	1.6	Coal
324	Valley (WEPCO), Wisconsin	1,147,954	2,976	2.6	Coal
325	W H Weatherspoon, North Carolina	794,816	2,956	3.7	Coal
326	B C Cobb, Michigan	2,188,545	2,956	1.4	Coal
327	Ravenswood, New York	4,940,254	2,937	0.6	Natural gas
328	Richard Gorsuch, Ohio	1,297,873	2,928	2.3	Coal

Table 3.6
 UNITED STATES NO_x POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
329	AES Greenidge, New York	1,031,345	2,891	2.8	Coal
330	Stanton, North Dakota	1,399,737	2,811	2.0	Coal
331	Dolphus M Grainger, South Carolina	931,468	2,782	3.0	Coal
332	Rochester 7, New York	1,506,960	2,780	1.8	Coal
333	Portland, Pennsylvania	1,915,994	2,743	1.4	Coal
334	Riverside, Oklahoma	2,342,296	2,729	1.2	Natural gas
335	P H Robinson, Texas	2,917,855	2,720	0.9	Natural gas
336	Alma, Wisconsin	690,029	2,719	3.9	Coal
337	Comanche, Oklahoma	1,338,064	2,698	2.0	Natural gas
338	Ashtabula, Ohio	1,236,725	2,672	2.2	Coal
339	Permian Basin, Texas	2,263,521	2,653	1.2	Natural gas
340	Lauderdale, Florida	6,436,413	2,646	0.4	Natural gas
341	Morgan Creek, Texas	1,121,868	2,641	2.4	Natural gas
342	Southwestern, Oklahoma	783,636	2,604	3.3	Natural gas
343	Crawford, Illinois	2,575,482	2,585	1.0	Coal
344	Ray D Nixon, Colorado	1,680,513	2,571	1.5	Coal
345	O H Hutchings, Ohio	772,666	2,528	3.3	Coal
346	AES Westover (Goudey), New York	863,979	2,493	2.9	Coal
347	Quindaro, Kansas	965,065	2,437	2.5	Coal
348	Southwest, Missouri	1,182,527	2,424	2.0	Coal
349	Cape Fear, North Carolina	1,857,910	2,400	1.3	Coal
350	Prairie Creek, Iowa	878,699	2,340	2.7	Coal
351	Joliet 9, Illinois	1,292,531	2,324	1.8	Coal
352	McMeekin, South Carolina	1,265,428	2,316	1.8	Coal
353	Irvington Generating, Arizona	1,403,955	2,304	1.6	Coal
354	Astoria Generating Stn, New York	3,172,909	2,256	0.7	Natural gas
355	Fisk, Illinois	1,299,559	2,234	1.7	Coal
356	Willow Glen, Louisiana	3,054,850	2,211	0.7	Natural gas
357	Mustang, Oklahoma	1,010,802	2,203	2.2	Natural gas
358	Wood River, Illinois	2,205,841	2,201	1.0	Coal
359	Twin Oaks Power, LP, Texas	2,689,521	2,186	0.8	Coal
360	Hawthorn, Missouri	4,346,949	2,176	0.5	Coal
361	Gibbons Creek, Texas	3,230,078	2,161	0.7	Coal
362	AES Deepwater, Inc., Texas	1,287,524	2,152	1.7	Pet. Coke
363	Gordon Evans Energy, Kansas	875,810	2,095	2.4	Natural gas
364	Mitchell, Pennsylvania	1,256,106	2,064	1.6	Coal
365	Vermilion, Illinois	1,102,939	2,011	1.8	Coal
366	Fort Churchill, Nevada	1,052,429	2,006	1.9	Natural gas
367	Syl Laskin, Minnesota	622,586	2,005	3.2	Coal
368	Lewis Creek, Texas	2,276,678	2,004	0.9	Natural gas
369	Sikeston, Missouri	1,693,365	2,000	1.2	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
370	Green River, Kentucky	719,410	1,994	2.8	Coal
371	Valley, Texas	1,628,130	1,975	1.2	Natural gas
372	Buck, North Carolina	1,249,807	1,914	1.5	Coal
373	Graham, Texas	1,216,627	1,869	1.5	Natural gas
374	Valmont, Colorado	1,281,144	1,866	1.5	Coal
375	Bowline Generating, New York	1,706,219	1,841	1.1	Natural gas
376	Rivesville, West Virginia	386,259	1,839	4.8	Coal
377	Handley Steam, Texas	2,232,746	1,835	0.8	Natural gas
378	Sterlington, Louisiana	1,070,959	1,826	1.7	Natural gas
379	Mount Tom, Massachusetts	915,318	1,806	2.0	Coal
380	Taconite Harbor, Minnesota	865,126	1,797	2.1	Coal
381	William C Dale, Kentucky	918,000	1,794	2.0	Coal
382	Charles Poletti, New York	2,282,203	1,771	0.8	Natural gas
383	Edwardsport, Indiana	344,544	1,746	5.1	Coal
384	Gadsden, Alabama	484,718	1,740	3.6	Coal
385	Jones Station, Texas	2,066,025	1,729	0.8	Natural gas
386	Collins Station, Illinois	2,070,864	1,717	0.8	Natural gas
387	Mitchell, Georgia	589,174	1,712	2.9	Coal
388	Cedar Bayou, Texas	3,584,591	1,706	0.5	Natural gas
389	Erickson, Michigan	809,058	1,701	2.1	Coal
390	Waterford 1 & 2, Louisiana	1,473,543	1,699	1.2	Natural gas
391	Schiller, New Hampshire	873,475	1,694	1.9	Coal
392	Hoot Lake, Minnesota	830,157	1,666	2.0	Coal
393	Indian River (55318), Florida	1,152,524	1,634	1.4	Oil
394	Hutsonville, Illinois	591,199	1,632	2.8	Coal
395	Titus, Pennsylvania	1,105,401	1,628	1.5	Coal
396	Seward, Pennsylvania	864,338	1,589	1.8	Coal
397	Bridgeport Harbor, Connecticut	1,739,266	1,575	0.9	Coal
398	Port Washington, Wisconsin	747,511	1,568	2.1	Coal
399	J E Corette, Montana	1,132,762	1,545	1.4	Coal
400	Newman, Texas	1,574,783	1,523	1.0	Natural gas
401	W S Lee, South Carolina	925,685	1,504	1.6	Coal
402	Dynegy Roseton, New York	1,211,549	1,498	1.2	Oil
403	Louisiana 1, Louisiana	2,857,455	1,490	0.5	Natural gas
404	Sweeny Cogeneration, Texas	1,727,172	1,469	0.9	Natural gas
405	Horseshoe Lake, Oklahoma	1,188,522	1,458	1.2	Natural gas
406	J L Bates, Texas	328,219	1,449	4.4	Natural gas
407	Tracy, Nevada	1,308,301	1,445	1.1	Natural gas
408	Lake Catherine, Arkansas	1,182,799	1,424	1.2	Natural gas
409	Blount Street, Wisconsin	438,398	1,374	3.1	Coal
410	East River, New York	737,620	1,369	1.9	Natural gas

Table 3.6
 UNITED STATES NO_x POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
411	Lake Shore, Ohio	860,853	1,335	1.6	Coal
412	Riverside, Iowa	707,625	1,331	1.9	Coal
413	Mystic, Massachusetts	1,584,556	1,331	0.8	Oil
414	Riverton, Kansas	475,354	1,324	2.8	Coal
415	Somerset, Massachusetts	800,515	1,317	1.6	Coal
416	Cromby, Pennsylvania	629,734	1,285	2.0	Coal
417	Barney M Davis, Texas	1,563,689	1,273	0.8	Natural gas
418	Dan River, North Carolina	516,712	1,247	2.4	Coal
419	Nucla, Colorado	707,378	1,209	1.7	Coal
420	Port Jefferson Energy, New York	1,646,561	1,200	0.7	Oil
421	Cunningham, New Mexico	1,215,956	1,195	1.0	Natural gas
422	Platte, Nebraska	563,701	1,195	2.1	Coal
423	Robert Reid, Kentucky	369,652	1,175	3.2	Coal
424	Harbor Beach, Michigan	240,305	1,169	4.9	Coal
425	Burlington, Iowa	1,225,990	1,140	0.9	Coal
426	R P Smith, Maryland	503,446	1,140	2.3	Coal
427	Urquhart, South Carolina	1,703,794	1,079	0.6	Natural gas
428	Red Hills Generation, Mississippi	2,450,000	1,068	0.4	Coal
429	Noblesville, Indiana	196,577	1,046	5.3	Coal
430	Clark, Nevada	761,622	1,041	1.4	Natural gas
431	New Haven Harbor, Connecticut	1,435,307	1,037	0.7	Oil
432	Picway, Ohio	380,217	996	2.6	Coal
433	North Lake, Texas	1,271,870	988	0.8	Natural gas
434	Wilkes Power Plant, Texas	1,393,954	971	0.7	Natural gas
435	E F Barrett, New York	1,789,225	953	0.5	Natural gas
436	Greenwood, Michigan	1,138,043	946	0.8	Natural gas
437	Deepwater, New Jersey	423,355	928	2.2	Coal
438	Rex Brown, Mississippi	424,614	896	2.1	Natural gas
439	Nueces Bay, Texas	1,046,627	882	0.8	Natural gas
440	Plant X, Texas	835,626	872	1.0	Natural gas
441	Coolwater Generating, California	1,547,033	861	0.6	Natural gas
442	Newington, New Hampshire	660,451	855	1.3	Oil
443	Eagle Mountain, Texas	821,805	849	1.0	Natural gas
444	Milton L Kapp, Iowa	1,146,286	846	0.7	Coal
445	R M Heskett, North Dakota	523,027	833	1.6	Coal
446	Rio Grande, New Mexico	720,534	828	1.1	Natural gas
447	Nichols Station, Texas	805,424	825	1.0	Natural gas
448	Teche, Louisiana	797,974	822	1.0	Natural gas
449	Fort Myers, Florida	6,578,229	820	0.1	Natural gas
450	Sim Gideon, Texas	1,309,562	815	0.6	Natural gas
451	CoGen Lyondell, Inc., Texas	3,423,308	802	0.2	Natural gas

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
452	Humboldt Bay, California	376,679	790	2.1	Natural gas
453	Suwannee River, Florida	625,659	775	1.2	Oil
454	Sunrise, Nevada	357,148	772	2.2	Natural gas
455	Decker Creek, Texas	1,719,800	771	0.4	Natural gas
456	Agua Fria Generating, Arizona	625,908	770	1.2	Natural gas
457	Neil Simpson II, Wyoming	878,364	744	0.8	Coal
458	Waterside, New York	474,701	738	1.6	Natural gas
459	Arvah B Hopkins, Florida	740,853	731	1.0	Natural gas
460	Moselle, Mississippi	474,705	717	1.5	Natural gas
461	Blackhawk Station, Texas	1,629,786	715	0.4	Natural gas
462	V H Braunig, Texas	738,602	711	1.0	Natural gas
463	Pittsburg, California	3,884,118	694	0.2	Natural gas
464	Middletown, Connecticut	564,810	691	1.2	Oil
465	Fort Phantom, Texas	870,584	689	0.8	Natural gas
466	Kendall Square, Massachusetts	349,753	675	1.9	Natural gas
467	Mountain Creek Steam, Texas	971,731	669	0.7	Natural gas
468	Brunot Island Power, Pennsylvania	70,668	639	9.0	Natural gas
469	Payne Creek, Florida	2,424,966	622	0.3	Natural gas
470	Tyrone, Kentucky	253,778	615	2.4	Coal
471	O W Sommers, Texas	814,900	611	0.8	Natural gas
472	Doc Bonin, Louisiana	428,186	597	1.4	Natural gas
473	Arkwright, Georgia	141,283	591	4.2	Coal
474	S A Carlson, New York	242,156	586	2.4	Coal
475	T C Ferguson, Texas	701,794	585	0.8	Natural gas
476	Polk, Florida	1,955,959	579	0.3	Coal
477	Ray Olinger, Texas	794,042	573	0.7	Natural gas
478	Pasadena Power Plant, Texas	4,555,258	571	0.1	Natural gas
479	La Palma, Texas	574,479	570	1.0	Natural gas
480	Stryker Creek, Texas	1,115,276	569	0.5	Natural gas
481	Lake Hubbard, Texas	1,684,853	559	0.3	Natural gas
482	Guadalupe Generating, Texas	3,804,525	541	0.1	Natural gas
483	Lamar Power (Paris), Texas	5,685,767	539	0.1	Natural gas
484	Moss Landing, California	6,393,111	538	0.1	Natural gas
485	Arthur Kill, New York	1,204,507	535	0.4	Natural gas
486	Tiger Bay, Florida	1,412,706	522	0.4	Natural gas
487	William F Wyman, Maine	407,834	511	1.3	Oil
488	Lake Creek, Texas	311,442	508	1.6	Natural gas
489	Knox Lee Power Plant, Texas	618,463	503	0.8	Natural gas
490	Oswego Harbor Power, New York	415,194	494	1.2	Oil
491	Gregory Power Facility, Texas	2,965,571	493	0.2	Natural gas
492	Tenaska Frontier, Texas	4,139,042	486	0.1	Natural gas

Table 3.6
 UNITED STATES NO_x POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
493	Hamilton, Ohio	289,025	482	1.7	Coal
494	Sam Bertron, Texas	775,429	452	0.6	Natural gas
495	Fort St. Vrain, Colorado	4,663,215	448	0.1	Natural gas
496	Parkdale, Texas	286,669	445	1.6	Natural gas
497	Odessa-Ector, Texas	4,381,108	436	0.1	Natural gas
498	Laredo, Texas	475,725	435	0.9	Natural gas
499	Rock River, Wisconsin	279,656	410	1.5	Natural gas
500	Tulsa, Oklahoma	214,917	397	1.8	Natural gas
501	Delaware City Refinery, Delaware	356,319	394	1.1	Natural gas
502	New Boston, Massachusetts	767,936	389	0.5	Natural gas
503	R W Miller, Texas	717,635	388	0.5	Natural gas
504	San Angelo Power Station, Texas	597,742	383	0.6	Natural gas
505	Maddox, New Mexico	441,736	383	0.9	Natural gas
506	Mistersky, Michigan	244,285	380	1.6	Natural gas
507	Montville, Connecticut	298,902	378	1.3	Oil
508	Hines Energy Complex, Florida	3,034,621	373	0.1	Natural gas
509	Lon D Wright, Nebraska	337,950	372	1.1	Coal
510	Benning, District of Columbia	218,124	372	1.7	Oil
511	Eagle Point Cogen, New Jersey	959,951	371	0.4	Natural gas
512	Judson Large, Kansas	276,019	370	1.3	Natural gas
513	M L Hibbard, Minnesota	18,257	368	20.2	Wood
514	Tenaska Gateway, Texas	4,426,124	364	0.1	Natural gas
515	Robert E Ritchie, Arkansas	224,982	357	1.6	Natural gas
516	Midlothian Energy, Texas	5,966,805	348	0.1	Natural gas
517	McKee Run, Delaware	157,768	346	2.2	Oil
518	Bastrop Clean Energy, Texas	1,697,296	337	0.2	Natural gas
519	Eastex Cogeneration, Texas	2,565,604	336	0.1	Natural gas
520	Sweetwater, Texas	573,906	334	0.6	Natural gas
521	Gould Street, Maryland	192,843	330	1.7	Oil
522	Mustang Station, Texas	2,902,235	328	0.1	Natural gas
523	Glenwood, New York	838,938	318	0.4	Natural gas
524	Intercession City, Florida	811,379	317	0.4	Natural gas
525	Hay Road, Delaware	1,219,432	315	0.3	Natural gas
526	Grand Tower, Illinois	1,136,680	311	0.3	Natural gas
527	Richmond County Plant, North Carolina	1,479,857	307	0.2	Natural gas
528	Devon, Connecticut	458,926	303	0.7	Oil
529	Norwalk Harbor Station, Connecticut	268,015	302	1.1	Oil
530	Freestone Power, Texas	3,363,526	299	0.1	Natural gas
531	AES Alamos, California	4,221,013	288	0.1	Natural gas
532	Vienna, Maryland	151,030	288	1.9	Oil
533	Linden, New Jersey	435,762	285	0.7	Natural gas

PLANT, STATE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
534	El Centro, California	421,736	277	0.7	Natural gas
535	Gadsby, Utah	655,259	273	0.4	Natural gas
536	Bergen, New Jersey	3,370,171	273	0.1	Natural gas
537	SRW Cogen Facility, Texas	2,912,891	271	0.1	Natural gas
538	Holly Street, Texas	443,027	266	0.6	Natural gas
539	Kyrene Generating Stn, Arizona	829,674	263	0.3	Natural gas
540	Murray Gill Energy, Kansas	149,892	263	1.8	Natural gas
541	Delaware, Pennsylvania	115,348	262	2.3	Oil
542	Manchester Street, Rhode Island	2,124,155	261	0.1	Natural gas
543	Morro Bay, California	1,528,517	257	0.2	Natural gas
544	McClellan, Arkansas	175,521	253	1.4	Natural gas
545	Cabrillo Power I (Encina), California	2,355,455	249	0.1	Natural gas
546	Sewaren, New Jersey	343,799	246	0.7	Natural gas
547	Magic Valley, Texas	2,476,733	245	0.1	Natural gas
548	Hutchinson Energy, Kansas	154,476	242	1.6	Natural gas
549	J K Smith Generating, Kentucky	255,803	238	0.9	Natural gas
550	Washington County, Alabama	852,951	235	0.3	Natural gas
551	Trinidad, Texas	218,526	230	1.1	Natural gas
552	Contra Costa, California	1,951,799	226	0.1	Natural gas
553	Debary, Florida	514,580	223	0.4	Natural gas
554	Chevron Cogenerating, Mississippi	1,136,535	217	0.2	Natural gas
555	San Jacinto Steam, Texas	1,326,910	216	0.2	Natural gas
556	Big Cajun 1, Louisiana	85,259	213	2.5	Natural gas
557	Manchief Electric, Colorado	794,580	213	0.3	Natural gas
558	Grays Ferry Cogen, Pennsylvania	860,624	212	0.2	Natural gas
559	Pine Bluff Energy Center, Arkansas	1,260,496	207	0.2	Natural gas
560	John S Rainey, South Carolina	2,211,598	205	0.1	Natural gas
561	Orlando Cogen, Florida	860,496	203	0.2	Natural gas
562	Hidalgo Energy Center, Texas	1,926,715	201	0.1	Natural gas
563	Haynes Gen Station, California	2,328,262	200	0.1	Natural gas
564	Garden City, Kansas	153,401	190	1.2	Natural gas
565	Reliant Energy Channelview, Texas	3,385,962	190	0.1	Natural gas

^a To limit its length, this table presents only the US power plants that emitted more than 190 tonnes of NO_x emissions in 2002. The facilities in the table account for 99.5% of the total NO_x emissions. There are more than 300 additional fossil fuel power plants in the database that reported fewer than 190 tonnes of NO_x emissions during 2002.

Table 3.7
CANADA NO_x POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS

PLANT, PROVINCE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
1	Nanticoke, Ontario	22,236,000	38,204	1.72	Coal
2	Sundance, Alberta	n/a	22,609	1.56 ^a	Coal
3	Boundary Dam, Saskatchewan	6,057,364	17,191	2.84	Coal
4	Lambton, Ontario	10,455,000	15,323	1.47	Coal
5	Keephills, Alberta	n/a	13,565	2.21 ^a	Coal
6	Genesee, Alberta	n/a	13,316	2.14 ^a	Coal
7	Lingan, Nova Scotia	n/a	12,871	2.43 ^a	Coal
8	Coleson Cove, New Brunswick	n/a	12,260	n/a	Oil
9	Poplar River, Saskatchewan	4,457,200	11,668	2.62	Coal
10	Battle River, Alberta	4,867,000 ^b	11,367	2.34	Coal
11	Sheerness, Alberta	5,810,000 ^b	9,830	1.69	Coal
12	Trenton, Nova Scotia	n/a	8,883	1.48 ^a	Coal
13	Wabamun, Alberta	n/a	8,160	2.17 ^a	Coal
14	Shand Power, Saskatchewan	2,150,000	5,863	2.73	Coal
15	Belledune, New Brunswick	3,616,790	5,730	1.58	Coal
16	Lakeview, Ontario	2,455,000	4,934	2.01	Coal
17	Holyrood, Newfoundland-Labrador	n/a	4,553	n/a	Oil
18	Iles-de-la-Madeleine 2, Quebec	n/a	4,242 ^c	n/a	Oil
19	Tufts Cove, Nova Scotia	n/a	3,680	n/a	Oil
20	Thunder Bay, Ontario	1,522,000	3,202	2.10	Coal
21	Dalhousie, New Brunswick	n/a	3,070	n/a	Orimulsion
22	Lennox, Ontario	2,762,000 ^d	2,999	1.09	Oil
23	Point Tupper, Nova Scotia	n/a	2,951	2.57 ^a	Coal
24	Sarnia Regional Cogen Plant, Ontario	n/a	2,699	n/a	Natural gas
25	Iroquois Falls, Ontario	n/a	2,605	n/a	Natural gas
26	HR Milner, Alberta	790,000 ^b	2,332	2.95	Coal
27	Point Aconi, Nova Scotia	n/a	1,783	1.64 ^a	Coal
28	Kirkland Lake, Ontario	n/a	1,679	n/a	Natural gas
29	Atikokan, Ontario	823,000	1,585	1.93	Coal
30	Grand Lake, New Brunswick	449,388 ^e	910	2.02	Coal
31	Meridian, Saskatchewan	n/a	774	n/a	Natural gas
32	Medicine Hat, Alberta	n/a	757	n/a	Natural gas
33	Joffre, Alberta	n/a	722	n/a	Natural gas
34	Williams Lake, British Columbia	n/a	551	n/a	Wood refuse
35	Queen Elizabeth, Saskatchewan	n/a	546	n/a	Natural gas
36	Brandon GS, Manitoba	273,053	543	1.99	Coal
37	Mississauga, Ontario	n/a	503	n/a	Natural gas
38	Cardinal, Ontario	n/a	466	n/a	Natural gas
39	Tunis, Ontario	n/a	465	n/a	Natural gas
40	Brooklyn Energy Centre, Nova Scotia	n/a	371	n/a	Wood refuse
41	Clover Bar, Alberta	n/a	363	n/a	Natural gas
42	Landis, Saskatchewan	n/a	360	n/a	Natural gas
43	Calstock Power Plant, Ontario	n/a	354	n/a	Wood refuse
44	Courtenay Bay, New Brunswick	n/a	340	n/a	Oil

PLANT, PROVINCE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
45	Nipigon Power Plant, Ontario	n/a	317	n/a	Natural gas
46	Rossdale, Alberta	n/a	307	n/a	Natural gas
47	Selkirk GS, Manitoba	143,765	268	1.86	Coal ^f
48	Rainbow Lake (Units 4-5), Alberta	627,000 ^b	255	0.41	Natural gas
49	Ottawa Health Science Center, Ontario	n/a	242	n/a	Natural gas
50	Cochrane Generating Station, Ontario	n/a	223	n/a	Wood refuse
51	Rainbow Lake (Units 1-3), Alberta	33,000 ^b	196	5.95	Natural gas
52	Balzac Power Station, Alberta	n/a	175	n/a	Natural gas
53	Cavalier Power Plant, Alberta	n/a	167	n/a	Natural gas
54	Carseland, Alberta	n/a	163	n/a	Natural gas
55	Bayside Power L.P., New Brunswick	n/a	163	n/a	Natural gas
56	Windsor Powerhouse, Ontario	n/a	131	n/a	Natural gas
57	Fort Nelson Generating Station, British Columbia	n/a	127	n/a	Natural gas
58	Brock West Landfill Gas Power Plant, Ontario	n/a	125	n/a	Waste gas
59	Fort Saskatchewan, Alberta	n/a	114	n/a	Natural gas
60	Burnside, Nova Scotia	n/a	112	n/a	Diesel
61	Windsor Essex, Ontario	n/a	99	n/a	Natural gas
62	Keele Valley Landfill Gas Power Plant, Ontario	n/a	91	n/a	Waste gas
63	Redwater, Alberta	n/a	79	n/a	Natural gas
64	Kapuskasing Power Plant, Ontario	n/a	76	n/a	Natural gas
65	North Bay, Ontario	n/a	70	n/a	Natural gas
66	Charlottetown, Prince Edward Island	n/a	68	n/a	Oil
67	Poplar Hill, Alberta	138,000 ^b	37	0.27	Natural gas
68	Tracy, Quebec	n/a	38 ^c	n/a	Oil
69	Millbank, New Brunswick	n/a	26	n/a	Diesel
70	Valleyview, Alberta	55,000 ^b	23	0.42	Natural gas

- ^a 2002 annual generation was not available, so output emission rates are for 2001, derived from power plant information reports available from the Canadian Electricity Association at <http://www.ceamercuryprogram.ca/index.html>.
- ^b Net generation obtained from ATCO Power report, *Environment, Health and Safety Review 2002*. Online at http://www.atcopower.com/Environment_Health_&Safety/Reports/environmental_reports.htm.
- ^c Information provided by the Province of Quebec in September 2004 differs from the NO_x values contained in the NPRI March 2004 update for these facilities. Quebec gives 4,013 tonnes NO_x from Îles-de-la-Madeleine, and 31.9 tonnes NO_x from Tracy.
- ^d Net generation obtained from Ontario Power Generation report, *Towards Sustainable Development: 2002 Progress Report*. Online at http://www.opg.com/envComm/E_annual_report.asp.
- ^e Net generation estimated assuming Grand Lake was in operation 90% of the time during 2002. See the methodology discussion in the **Appendix**.
- ^f Selkirk converted to natural gas in July 2002.

Table 3.8

MEXICO NO_x POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS

	PLANT, PROVINCE	ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
1	C.T. José López Portillo (Río Escondido), Coahuila	7,515,560	45,932	6.11	Coal
2	C.T. Carbón II, Coahuila	8,636,350	40,099	4.64	Coal
3	C.T. Plutarco Elías Calles (Petacalco), Guerrero	13,879,470	30,931	2.23	Coal
4	C.T. PDTE. A. López Mateos (Tuxpan), Veracruz	15,030,690	15,899	1.06	Oil
5	C.T. Francisco Pérez Ríos (Tula), Hidalgo	9,734,170	10,949	1.12	Oil
6	C.T. Altamira, Tamaulipas	4,655,850	6,899	1.48	Oil
7	C.T. Gral. Manuel Álvarez (Manzanillo I), Colima	6,449,140	6,146	0.95	Oil
8	C.T. Salamanca, Guanajuato	4,841,380	5,393	1.11	Oil
9	C.T. Manzanillo II, Colima	5,034,400	4,555	0.90	Oil
10	C.C.C. Benito Juárez (Samalayuca II), Chihuahua	3,901,950	4,140	1.06	Natural gas
11	C.C.C. FCO. Pérez Ríos (Tula), Hidalgo	3,260,940	4,088	1.25	Natural gas
12	C.T. José Acevez Pozos (Mazatlan II), Sinaloa	3,284,120	4,056	1.23	Oil
13	C.C.C. Dos Bocas, Veracruz	2,428,890	3,712	1.53	Natural gas
14	C.TG. Portes Gil (Río Bravo), Tamaulipas	1,031,400	3,437	3.33	Natural gas
15	C.T. Monterrey, Nuevo León	2,538,090	3,429	1.35	Oil
16	C.T. Puerto Libertad, Sonora	3,349,740	3,289	0.98	Oil
17	C.C.C. Chihuahua II (El Encino), Chihuahua	2,949,700	3,264	1.11	Natural gas
18	C.T. Valle de México, México	3,894,120	3,096	0.80	Natural gas
19	C.C.C. Huinala, Nuevo León	2,331,460	3,009	1.29	Natural gas
20	C.T. Carlos Rodríguez Rivero (Guaymas II), Sonora	2,259,290	2,958	1.31	Oil
21	C.T. Villa De Reyes (San Luis Potosí), San Luis Potosí	2,925,990	2,882	0.98	Oil
22	C.T. Francisco Villa (Delicias), Chihuahua	1,919,730	2,871	1.50	Oil
23	C.T. Juan De Díos Batis P. (Topolobampo), Sinaloa	1,996,550	2,775	1.39	Oil
24	C.T. Presidente Juárez (Tijuana), Baja California	1,488,840	2,392	1.61	Oil
25	C.C.C. Presidente Juárez (Rosarito), Baja California	2,077,250	2,242	1.08	Natural gas
26	C.TG. El Sauz, Querétaro	1,495,570	2,221	1.49	Natural gas
27	C.C.C. Felipe Carrillo P. (Valladolid), Yucatán	1,517,600	2,025	1.33	Natural gas
28	C.C.C. El Sauz, Querétaro	1,370,540	1,955	1.43	Natural gas
29	C.T. Guadalupe Victoria (Lerdo), Durango	1,980,460	1,892	0.96	Oil
30	C.T. Benito Juárez (Samalayuca I), Chihuahua	1,232,800	1,814	1.47	Oil
31	C.C.C. Gómez Palacio, Durango	1,045,260	1,668	1.60	Natural gas
32	C.T. Emilio Portes Gil (Río Bravo), Tamaulipas	1,745,990	1,634	0.94	Oil
33	C.C.C. Huinala II, Nuevo León	1,333,060	1,418	1.06	Natural gas
34	C.TG. Presidente Juárez (Tijuana), Baja California	648,420	1,222	1.88	Natural gas
35	C.T. Mérida II, Yucatán	1,099,710	1,151	1.05	Oil
36	C.Cl. Puerto San Carlos, Baja California Sur	470,680	1,148	2.44	Oil
37	C.T. Poza Rica, Veracruz	654,040	1,124	1.72	Oil
38	C.T. Campeche II (Lerma), Campeche	812,720	1,005	1.24	Oil
39	C.Cl. Guerrero Negro, Baja California Sur	36,390	903	24.80	Diesel
40	C.TG. Hermosillo, Sonora	507,150	875	1.73	Natural gas
41	C.T. Jorge Luque (LFC), México	497,160	847	1.70	Natural gas
42	C.T. Punta Prieta II, Baja California Sur	621,830	833	1.34	Oil
43	C.T. Felipe Carrillo P. (Valladolid), Yucatán	414,970	709	1.71	Oil
44	C.Cl. Santa Rosalía, Baja California Sur	26,220	667	25.42	Diesel
45	C.TG. Chihuahua II (El Encino), Chihuahua	329,140	582	1.77	Natural gas

PLANT, PROVINCE		ELECTRICITY GENERATION, MWh	NO _x EMISSIONS, metric tonnes	NO _x EMISSION RATE, kg/MWh	PRIMARY FUEL
46	C.TG. Cancún, Quintana Roo	77,770	508	6.54	Diesel
47	C.TG. Huinala, Nuevo León	259,700	427	1.64	Natural gas
48	C.T. Guaymas I, Sonora	186,750	403	2.16	Oil
49	C.CI. Villa Constitución, Baja California Sur	17,170	386	22.51	Diesel
50	Pueblo Nuevo (Movil), Sonora	12,050	355	29.49	Diesel
51	C.T. Nachi-Cocom, Yucatán	249,470	332	1.33	Oil
52	C.TG. Jorge Luque (Lechería) (LFC), México	145,390	326	2.24	Natural gas
53	C.TG. Las Cruces, Guerrero	46,400	309	6.66	Diesel
54	C.T. La Laguna, Durango	179,590	303	1.69	Natural gas
55	C.TG. Nonalco (LFC), DF	131,470	281	2.13	Natural gas
56	C.TG. Ciudad Constitución, Baja California Sur	33,690	267	7.91	Diesel
57	C.TG. Valle de México (LFC), México	104,780	242	2.31	Natural gas
58	C.T. San Jerónimo, Nuevo León	222,010	219	0.99	Natural gas
59	Nuevo Nogales (Movil), Sonora	7,730	219	28.28	Diesel
60	C.TG. Monclava, Coahuila	n/a	217	n/a	Natural gas
61	C.TG. Los Cabos, Baja California Sur	30,900	209	6.77	Diesel
62	C.TG. Caborca Industrial, Sonora	26,140	171	6.53	Diesel
63	C.TG. La Laguna, Durango	62,260	159	2.56	Natural gas
64	C.TG. Nizuc, Quintana Roo	27,630	156	5.64	Diesel
65	C.TG. El Verde, Jalisco	29,110	114	3.93	Natural gas
66	C.TG. Culiacan, Sinaloa	17,550	98	5.61	Diesel
67	C.TG. Parque, Chihuahua	15,580	96	6.19	Diesel
68	C.TG. Tecnológico, Nuevo León	13,400	89	6.61	Diesel
69	C.TG. Ciudad Obregón, Sonora	10,780	83	7.71	Diesel
70	C.TG. Punta Prieta I (La Paz), Baja California Sur	9,870	79	8.05	Diesel
71	C.TG. Cipres, Baja California	10,120	70	6.92	Diesel
72	C.TG. Chávez, Coahuila	25,250	65	2.58	Natural gas
73	C.TG. Arroyo De Coyote, Tamaulipas	6,540	63	9.68	Diesel
74	C.TG. Xul-Ha, Quintana Roo	8,770	63	7.15	Diesel
75	C.TG. Chihuahua I, Chihuahua	7,980	57	7.16	Diesel
76	C.TG. Universidad, Nuevo León	17,220	50	2.93	Natural gas
77	C.TG. Leona, Nuevo León	16,570	48	2.91	Natural gas
78	C.CI. Yecora, Sonora	1,890	41	21.83	Diesel
79	C.TG. Mexicali, Baja California	5,330	41	7.67	Diesel
80	C.TG. Esperanzas, Coahuila	4,590	35	7.66	Diesel
81	C.TG. Industrial (Juárez), Chihuahua	1,980	29	14.66	Diesel
82	C.TG. Fundidora, Nuevo León	4,810	13	2.79	Natural gas

Table 3.9
 UNITED STATES MERCURY POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a

PLANT, STATE		ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
1	Monticello, Texas	13,127,881	849	0.065	Coal
2	Keystone, Pennsylvania	11,790,991	787	0.067	Coal
3	Homer City, Pennsylvania	10,938,699	743	0.068	Coal
4	James H Miller Jr, Alabama	18,592,131	717	0.039	Coal
5	Montour, Pennsylvania	9,263,444	634	0.068	Coal
6	Powerton, Illinois	7,858,082	584	0.074	Coal
7	Martin Lake, Texas	14,825,001	547	0.037	Coal
8	Bruce Mansfield, Pennsylvania	15,974,911	528	0.033	Coal
9	Mount Storm, West Virginia	11,671,736	521	0.045	Coal
10	Scherer, Georgia	20,817,252	515	0.025	Coal
11	San Juan, New Mexico	12,398,506	486	0.039	Coal
12	Big Brown, Texas	7,920,848	473	0.060	Coal
13	Jeffrey Energy Center, Kansas	15,330,637	467	0.030	Coal
14	Rockport, Indiana	16,643,319	467	0.028	Coal
15	Conesville, Ohio	10,158,928	451	0.044	Coal
16	John E Amos, West Virginia	17,995,089	450	0.025	Coal
17	E C Gaston, Alabama	12,639,541	417	0.033	Coal
18	Limestone, Texas	11,385,520	407	0.036	Coal
19	Four Corners, New Mexico	12,914,233	407	0.031	Coal
20	H W Pirkey, Texas	4,504,102	382	0.085	Coal
21	Eastlake, Ohio	6,724,187	381	0.057	Coal
22	Shawville, Pennsylvania	2,991,436	377	0.126	Coal
23	Gorgas, Alabama	7,216,594	374	0.052	Coal
24	Joliet 29, Illinois	5,411,689	364	0.067	Coal
25	Sam Seymour, Texas	11,749,703	361	0.031	Coal
26	Roxboro, North Carolina	14,281,069	352	0.025	Coal
27	Will County, Illinois	5,419,706	348	0.064	Coal
28	Colstrip, Montana	13,886,845	347	0.025	Coal
29	Monroe, Michigan	16,720,823	344	0.021	Coal
30	Bowen, Georgia	21,674,542	339	0.016	Coal
31	Pleasant Prairie, Wisconsin	7,898,581	338	0.043	Coal
32	J M Stuart, Ohio	15,351,286	318	0.021	Coal
33	Waukegan, Illinois	4,230,118	317	0.075	Coal
34	Labadie, Missouri	14,406,589	316	0.022	Coal
35	Paradise, Kentucky	14,130,150	296	0.021	Coal
36	Sherburne County, Minnesota	19,161,794	289	0.015	Coal
37	Gibson, Indiana	20,522,153	282	0.014	Coal
38	Belews Creek, North Carolina	16,912,850	269	0.016	Coal
39	Cardinal, Ohio	8,555,500	266	0.031	Coal
40	W H Sammis, Ohio	15,521,117	263	0.017	Coal
41	Joppa Steam, Illinois	8,075,552	262	0.032	Coal
42	Jim Bridger, Wyoming	14,593,034	255	0.017	Coal
43	Coal Creek, North Dakota	8,559,089	249	0.029	Coal
44	Kingston, Tennessee	9,866,292	248	0.025	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
45	J H Campbell, Michigan	9,269,258	248	0.027	Coal
46	Centralia, Washington	9,500,972	247	0.026	Coal
47	Marshall, North Carolina	14,498,223	243	0.017	Coal
48	W A Parish, Texas	20,026,008	240	0.012	Coal
49	Gen J M Gavin, Ohio	15,617,077	238	0.015	Coal
50	Big Cajun 2, Louisiana	10,094,370	236	0.023	Coal
51	Brunner Island, Pennsylvania	9,994,684	235	0.024	Coal
52	Laramie River, Wyoming	12,398,253	234	0.019	Coal
53	Phil Sporn, West Virginia	5,361,190	230	0.043	Coal
54	Rush Island, Missouri	7,483,574	230	0.031	Coal
55	Avon Lake, Ohio	4,169,683	228	0.055	Coal
56	Hatfield's Ferry, Pennsylvania	9,753,564	227	0.023	Coal
57	Conemaugh, Pennsylvania	12,584,027	224	0.018	Coal
58	Baldwin, Illinois	12,454,874	223	0.018	Coal
59	Clifty Creek, Indiana	7,838,812	221	0.028	Coal
60	Welsh Power Plant, Texas	11,000,083	217	0.020	Coal
61	Barry, Alabama	16,718,579	213	0.013	Coal
62	Mountaineer (WV), West Virginia	8,985,024	211	0.023	Coal
63	J T Deely, Texas	5,656,468	211	0.037	Coal
64	Chesterfield, Virginia	9,502,996	210	0.022	Coal
65	Kyger Creek, Ohio	6,852,119	209	0.030	Coal
66	Brandon Shores, Maryland	7,160,408	208	0.029	Coal
67	White Bluff, Arkansas	8,850,935	207	0.023	Coal
68	Johnsonville, Tennessee	8,275,776	207	0.025	Coal
69	Muskogee, Oklahoma	10,275,348	206	0.020	Coal
70	Mitchell, West Virginia	9,231,567	204	0.022	Coal
71	Ghent, Kentucky	11,533,151	203	0.018	Coal
72	La Cygne, Kansas	9,517,909	200	0.021	Coal
73	Milton R Young, North Dakota	5,117,272	199	0.039	Coal
74	Muskingum River, Ohio	8,359,764	198	0.024	Coal
75	Fort Martin, West Virginia	7,855,193	195	0.025	Coal
76	Big Sandy, Kentucky	5,752,379	189	0.033	Coal
77	Chalk Point, Maryland	6,041,207	187	0.031	Coal
78	Clay Boswell, Minnesota	7,266,941	183	0.025	Coal
79	George Neal North, Iowa	5,703,855	183	0.032	Coal
80	Coyote, North Dakota	3,060,200	181	0.059	Coal
81	Widows Creek, Alabama	8,868,307	181	0.020	Coal
82	Bull Run, Tennessee	6,760,080	179	0.026	Coal
83	Morgantown, Maryland	7,550,506	178	0.024	Coal
84	Walter C Beckjord, Ohio	6,756,632	178	0.026	Coal
85	Gallatin, Tennessee	7,271,777	171	0.023	Coal
86	Antelope Valley, North Dakota	6,317,269	169	0.027	Coal
87	Newton, Illinois	7,886,447	168	0.021	Coal
88	Harlee Branch, Georgia	9,018,458	168	0.019	Coal

Table 3.9
 UNITED STATES MERCURY POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
89	R M Schahfer, Indiana	8,756,429	167	0.019	Coal
90	Kincaid, Illinois	3,888,878	166	0.043	Coal
91	Gerald Gentleman, Nebraska	9,549,816	166	0.017	Coal
92	Wansley, Georgia	11,197,521	162	0.015	Coal
93	Independence, Arkansas	10,510,564	162	0.015	Coal
94	Crawford, Illinois	2,575,482	162	0.063	Coal
95	Miami Fort, Ohio	7,587,241	160	0.021	Coal
96	Council Bluffs, Iowa	5,794,189	156	0.027	Coal
97	Daniel, Mississippi	10,839,532	155	0.014	Coal
98	Armstrong, Pennsylvania	2,140,768	154	0.072	Coal
99	Springerville, Arizona	5,830,542	153	0.026	Coal
100	H L Spurlock, Kentucky	6,080,970	152	0.025	Coal
101	Navajo Generating Station, Arizona	17,832,139	149	0.008	Coal
102	Columbia, Wisconsin	6,472,154	147	0.023	Coal
103	Leland Olds, North Dakota	4,576,988	147	0.032	Coal
104	Dave Johnston, Wyoming	5,759,784	146	0.025	Coal
105	Louisa, Iowa	4,927,254	143	0.029	Coal
106	Tanner's Creek, Indiana	5,872,947	143	0.024	Coal
107	Grand River Dam Auth, Oklahoma	6,501,431	137	0.021	Coal
108	George Neal South, Iowa	4,586,420	136	0.030	Coal
109	Sunbury, Pennsylvania	1,714,652	135	0.079	Coal
110	Sooner, Oklahoma	6,953,110	135	0.019	Coal
111	Harrison, West Virginia	12,927,422	133	0.010	Coal
112	F J Gannon, Florida	4,815,528	132	0.028	Coal
113	Dickerson, Maryland	3,263,673	131	0.040	Coal
114	Harrington Station, Texas	7,831,512	130	0.017	Coal
115	New Madrid, Missouri	7,606,958	127	0.017	Coal
116	Crystal River, Florida	6,903,533	124	0.018	Coal
117	Mayo, North Carolina	4,737,089	123	0.026	Coal
118	South Oak Creek, Wisconsin	5,393,774	122	0.023	Coal
119	Gibbons Creek, Texas	3,230,078	122	0.038	Coal
120	Lawrence Energy Center, Kansas	3,759,861	120	0.032	Coal
121	Coleman, Kentucky	2,864,421	119	0.042	Coal
122	Kammer, West Virginia	4,029,061	117	0.029	Coal
123	Cumberland, Tennessee	16,384,132	117	0.007	Coal
124	Brayton Point, Massachusetts	8,263,163	116	0.014	Coal
125	Sadow, Texas	3,943,323	116	0.029	Coal
126	Dan E Karn, Michigan	4,474,257	116	0.026	Coal
127	J K Spruce, Texas	4,135,806	114	0.028	Coal
128	Sioux, Missouri	6,296,711	112	0.018	Coal
129	Watson, Mississippi	4,731,902	110	0.023	Coal
130	Mohave, Nevada	10,170,230	110	0.011	Coal
131	John Sevier, Tennessee	4,880,298	108	0.022	Coal
132	Cholla, Arizona	6,157,206	108	0.018	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
133	Coronado Generating, Arizona	5,063,164	106	0.021	Coal
134	Cheswick, Pennsylvania	3,021,295	105	0.035	Coal
135	New Castle, Pennsylvania	1,577,573	105	0.066	Coal
136	Petersburg, Indiana	11,641,137	104	0.009	Coal
137	Hawthorn, Missouri	4,346,949	103	0.024	Coal
138	Bay Shore, Ohio	3,538,463	103	0.029	Coal
139	Northeastern, Oklahoma	9,623,635	102	0.011	Coal
140	Wateree, South Carolina	4,282,531	102	0.024	Coal
141	R D Morrow, Mississippi	2,329,127	102	0.044	Coal
142	Thomas Hill, Missouri	6,865,414	101	0.015	Coal
143	Greene County, Alabama	3,892,941	100	0.026	Coal
144	R S Nelson, Louisiana	5,927,840	98	0.017	Coal
145	Colbert, Alabama	6,305,034	98	0.016	Coal
146	Belle River, Michigan	7,716,451	98	0.013	Coal
147	G G Allen, North Carolina	5,071,389	98	0.019	Coal
148	St. Clair, Michigan	6,965,047	97	0.014	Coal
149	E W Brown, Kentucky	3,992,354	97	0.024	Coal
150	Coffeen, Illinois	5,257,211	97	0.019	Coal
151	Warrick, Indiana	1,044,762	96	0.092	Coal
152	Dolet Hills, Louisiana	4,667,313	96	0.021	Coal
153	R Gallagher, Indiana	2,253,862	96	0.042	Coal
154	Cayuga, Indiana	5,930,084	92	0.015	Coal
155	Edgewater, Wisconsin	4,786,914	92	0.019	Coal
156	Huntley Power, New York	2,923,168	91	0.031	Coal
157	Nebraska City, Nebraska	4,104,546	90	0.022	Coal
158	W H Zimmer, Ohio	9,734,563	90	0.009	Coal
159	Eckert Station, Michigan	1,540,404	90	0.058	Coal
160	Mill Creek, Kentucky	9,075,622	89	0.010	Coal
161	Joliet 9, Illinois	1,292,531	89	0.069	Coal
162	Winyah, South Carolina	7,720,938	89	0.011	Coal
163	Wabash River, Indiana	5,744,472	88	0.015	Coal
164	Dunkirk, New York	3,591,017	86	0.024	Coal
165	Naughton, Wyoming	5,019,304	85	0.017	Coal
166	Wyodak, Wyoming	2,858,420	85	0.030	Coal
167	North Omaha, Nebraska	3,403,969	84	0.025	Coal
168	Crist, Florida	4,572,235	84	0.018	Coal
169	Fisk, Illinois	1,299,559	84	0.064	Coal
170	Craig, Colorado	9,807,407	83	0.008	Coal
171	Chesapeake, Virginia	4,141,111	82	0.020	Coal
172	Meramec, Missouri	4,434,627	82	0.019	Coal
173	East Bend, Kentucky	2,941,427	81	0.027	Coal
174	Ashtabula, Ohio	1,236,725	79	0.064	Coal
175	L V Sutton, North Carolina	2,622,440	78	0.030	Coal
176	Oklauion, Texas	4,264,449	78	0.018	Coal

Table 3.9
 UNITED STATES MERCURY POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

	PLANT, STATE	ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
177	Yates, Georgia	5,368,046	77	0.014	Coal
178	Hugo, Oklahoma	3,030,995	76	0.025	Coal
179	Boardman, Oregon	3,773,750	76	0.020	Coal
180	Clinch River, Virginia	4,620,670	75	0.016	Coal
181	Muscatine, Iowa	1,259,121	73	0.058	Coal
182	Bremo, Virginia	1,609,047	73	0.046	Coal
183	Iatan, Missouri	4,017,999	73	0.018	Coal
184	Weston, Wisconsin	3,202,588	72	0.022	Coal
185	Charles R Lowman, Alabama	3,472,719	72	0.021	Coal
186	Big Bend, Florida	8,518,176	72	0.008	Coal
187	Killen Station, Ohio	3,612,949	71	0.020	Coal
188	Trenton Channel, Michigan	4,339,844	70	0.016	Coal
189	J R Whiting, Michigan	2,262,790	70	0.031	Coal
190	John S Cooper, Kentucky	2,100,208	70	0.033	Coal
191	Kanawha River, West Virginia	2,571,055	70	0.027	Coal
192	Tolk Station, Texas	7,662,008	69	0.009	Coal
193	Harding Street Stn (Elmer W Stout), Indiana	3,784,144	69	0.018	Coal
194	R E Burger, Ohio	2,000,668	68	0.034	Coal
195	Indian River, Delaware	2,129,702	68	0.032	Coal
196	Niles, Ohio	1,126,711	67	0.060	Coal
197	Edwards Station, Illinois	3,536,593	66	0.019	Coal
198	Asheville, North Carolina	2,628,074	64	0.025	Coal
199	Albright, West Virginia	1,374,335	64	0.047	Coal
200	Allen, Tennessee	4,879,343	64	0.013	Coal
201	Flint Creek, Arkansas	3,655,965	63	0.017	Coal
202	Huntington, Utah	5,977,918	62	0.010	Coal
203	San Miguel, Texas	2,855,097	60	0.021	Coal
204	B C Cobb, Michigan	2,188,545	59	0.027	Coal
205	J C Weadock, Michigan	2,205,966	59	0.027	Coal
206	Dynegy Danskammer, New York	2,449,593	59	0.024	Coal
207	Hudson, New Jersey	3,356,373	58	0.017	Coal
208	Herbert A Wagner, Maryland	3,001,247	58	0.019	Coal
209	Possum Point, Virginia	3,005,462	58	0.019	Coal
210	Portland, Pennsylvania	1,915,994	57	0.030	Coal
211	St. Johns River, Florida	9,795,546	57	0.006	Coal
212	J P Madgett, Wisconsin	2,097,984	57	0.027	Coal
213	Pleasants, West Virginia	7,629,209	56	0.007	Coal
214	Michigan City, Indiana	2,487,472	56	0.023	Coal
215	Yorktown, Virginia	4,238,965	56	0.013	Coal
216	Cross, South Carolina	8,126,251	56	0.007	Coal
217	Stanton, North Dakota	1,399,737	55	0.040	Coal
218	Sibley, Missouri	3,061,409	55	0.018	Coal
219	Lee, North Carolina	1,969,494	55	0.028	Coal
220	Ottumwa, Iowa	4,480,923	54	0.012	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
221	Jefferies, South Carolina	1,878,197	53	0.028	Coal
222	Stanton Energy, Florida	6,070,495	53	0.009	Coal
223	Apache Station, Arizona	2,799,861	53	0.019	Coal
224	River Rouge, Michigan	3,401,765	52	0.015	Coal
225	Merom, Indiana	6,643,503	52	0.008	Coal
226	Lansing Smith, Florida	4,020,641	51	0.013	Coal ^b
227	State Line Generating, Indiana	1,599,873	51	0.032	Coal
228	Richard Gorsuch, Ohio	1,297,873	50	0.038	Coal
229	Seminole, Florida	9,241,176	49	0.005	Coal
230	Gadsden, Alabama	484,718	48	0.100	Coal
231	Coletto Creek, Texas	3,780,383	48	0.013	Coal
232	Allen S King, Minnesota	3,311,959	48	0.014	Coal
233	Williams, South Carolina	4,428,464	48	0.011	Coal
234	Big Stone, South Dakota	3,119,519	48	0.015	Coal
235	Montrose, Missouri	2,662,960	47	0.018	Coal
236	Lansing, Iowa	1,257,821	46	0.037	Coal
237	Reid Gardner, Nevada	4,191,103	46	0.011	Coal
238	AES Cayuga (Milliken), New York	2,353,387	46	0.020	Coal
239	Edge Moor, Delaware	1,911,750	46	0.024	Coal
240	Canadys Steam, South Carolina	2,124,590	45	0.021	Coal
241	Cape Fear, North Carolina	1,857,910	45	0.024	Coal
242	Hennepin, Illinois	2,045,489	45	0.022	Coal
243	Hammond, Georgia	3,935,825	44	0.011	Coal
244	Wood River, Illinois	2,205,841	42	0.019	Coal
245	Trimble County, Kentucky	3,929,027	42	0.011	Coal
246	Tecumseh Energy Center, Kansas	1,510,699	42	0.028	Coal
247	Rodemacher, Louisiana	4,279,337	40	0.009	Coal
248	Riverbend, North Carolina	1,660,438	40	0.024	Coal
249	Presque Isle, Michigan	3,140,761	40	0.013	Coal
250	Comanche, Colorado	4,697,167	39	0.008	Coal
251	Prewitt Escalante, New Mexico	1,653,093	39	0.023	Coal
252	Hunter (Emery), Utah	9,403,388	39	0.004	Coal
253	Rochester 7, New York	1,506,960	38	0.025	Coal
254	Sikeston, Missouri	1,693,365	38	0.023	Coal
255	AES Somerset (Kintigh), New York	5,453,551	37	0.007	Coal
256	Pulliam, Wisconsin	2,349,544	37	0.016	Coal
257	Willow Island, West Virginia	1,151,588	37	0.032	Coal
258	Pawnee, Colorado	3,316,714	36	0.011	Coal
259	Jack McDonough, Georgia	3,728,220	36	0.010	Coal
260	Nelson Dewey, Wisconsin	1,172,335	36	0.031	Coal
261	Milton L Kapp, Iowa	1,146,286	35	0.031	Coal
262	Cliffside, North Carolina	2,723,353	35	0.013	Coal
263	Buck, North Carolina	1,249,807	35	0.028	Coal
264	Glen Lyn, Virginia	1,718,635	35	0.020	Coal

Table 3.9
 UNITED STATES MERCURY POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

	PLANT, STATE	ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
265	Riverside, Minnesota	2,436,997	35	0.014	Coal
266	Havana, Illinois	2,499,684	34	0.013	Coal
267	Sheldon, Nebraska	1,442,114	33	0.023	Coal
268	Martins Creek, Pennsylvania	2,402,706	33	0.014	Coal
269	Meredosia, Illinois	1,326,609	33	0.025	Coal
270	Genoa, Wisconsin	2,203,168	32	0.015	Coal
271	Shawnee, Kentucky	8,826,178	32	0.004	Coal
272	Picway, Ohio	380,217	32	0.083	Coal
273	Potomac River, Virginia	2,331,055	31	0.013	Coal
274	Elrama, Pennsylvania	2,321,405	31	0.013	Coal
275	Titus, Pennsylvania	1,105,401	31	0.028	Coal
276	Frank E Ratts, Indiana	1,517,924	31	0.020	Coal
277	Dolphus M Grainger, South Carolina	931,468	30	0.032	Coal
278	Nearman Creek, Kansas	1,452,206	30	0.021	Coal
279	Seward, Pennsylvania	864,338	30	0.034	Coal
280	Elmer Smith, Kentucky	2,185,345	30	0.014	Coal
281	Polk, Florida	1,955,959	29	0.015	Coal
282	Bailly, Indiana	2,831,251	29	0.010	Coal
283	Holcomb, Kansas	2,454,689	28	0.011	Coal
284	AES Greenidge, New York	929,230	28	0.030	Coal
285	James River, Missouri	1,587,089	27	0.017	Coal
286	Rawhide, Colorado	2,078,175	27	0.013	Coal
287	H B Robinson, South Carolina	1,021,242	27	0.026	Coal
288	W S Lee, South Carolina	925,685	26	0.029	Coal
289	O H Hutchings, Ohio	772,666	26	0.034	Coal
290	R D Green, Kentucky	3,501,986	26	0.008	Coal
291	Eagle Valley (H T Pritchard), Indiana	1,332,751	26	0.020	Coal
292	Burlington, Iowa	1,225,990	26	0.021	Coal
293	Hoot Lake, Minnesota	830,157	26	0.031	Coal
294	Arapahoe, Colorado	1,412,418	26	0.018	Coal
295	Black Dog, Minnesota	1,662,585	26	0.015	Coal
296	B L England, New Jersey	1,191,120	25	0.021	Coal
297	Dallman, Illinois	1,796,111	25	0.014	Coal
298	Asbury, Missouri	1,213,990	25	0.021	Coal
299	Marion, Illinois	1,136,616	25	0.022	Coal
300	Prairie Creek, Iowa	878,699	24	0.028	Coal
301	Neil Simpson II, Wyoming	878,364	23	0.026	Coal
302	Southwest, Missouri	1,182,527	23	0.019	Coal
303	McIntosh, Georgia	1,162,224	22	0.019	Coal
304	F B Culley, Indiana	2,417,245	22	0.009	Coal
305	A B Brown Generating, Indiana	3,194,749	22	0.007	Coal
306	R P Smith, Maryland	503,446	22	0.043	Coal
307	Eddystone, Pennsylvania	2,750,581	21	0.008	Coal
308	Port Washington, Wisconsin	747,511	21	0.028	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
309	Valley (WEPCO), Wisconsin	1,147,954	21	0.018	Coal
310	Mount Tom, Massachusetts	915,318	21	0.023	Coal
311	Erickson, Michigan	809,058	21	0.026	Coal
312	Quindaro, Kansas	965,065	20	0.021	Coal
313	Green River, Kentucky	719,410	20	0.028	Coal
314	W H Weatherspoon, North Carolina	794,816	20	0.025	Coal
315	Carbon, Utah	1,323,395	20	0.015	Coal
316	Rivesville, West Virginia	386,259	20	0.051	Coal
317	D B Wilson, Kentucky	2,849,550	19	0.007	Coal
318	Cane Run, Kentucky	3,068,114	19	0.006	Coal
319	William C Dale, Kentucky	1,207,356	18	0.015	Coal
320	Hutsonville, Illinois	591,199	18	0.031	Coal
321	Riverside, Iowa	707,625	18	0.025	Coal
322	Lovett, New York	1,736,083	18	0.010	Coal
323	C P Crane, Maryland	2,132,214	18	0.008	Coal
324	Duck Creek, Illinois	2,066,628	17	0.008	Coal
325	High Bridge, Minnesota	1,308,587	17	0.013	Coal
326	Twin Oaks Power, LP, Texas	2,689,521	16	0.006	Coal
327	AES Westover (Goudey), New York	863,979	16	0.018	Coal
328	Sutherland, Iowa	940,504	15	0.016	Coal
329	Vermilion, Illinois	1,102,939	15	0.014	Coal
330	Kraft, Georgia	1,221,647	15	0.012	Coal
331	C D McIntosh, Florida	2,810,883	15	0.005	Coal
332	J E Corette, Montana	1,132,762	14	0.013	Coal
333	Deerhaven, Florida	1,588,281	14	0.009	Coal
334	HMP&L Station 2, Kentucky	1,414,624	14	0.010	Coal
335	Platte, Nebraska	563,701	14	0.025	Coal
336	Urquhart, South Carolina	1,703,794	14	0.008	Coal ^b
337	Mitchell, Georgia	589,174	14	0.023	Coal

^a To limit its length, this table presents only the US coal power plants that emitted more than 14 kilograms (30 pounds) of mercury emissions in 2002. The facilities in the table account for 99.5% of the total mercury emissions from the electricity sector. There are 39 additional coal-fired power plants in the database that reported less than 14 kilograms (30 pounds) of mercury emissions.

^b This plant's EIA 906 generation report for 2002 indicates that the largest share of its 2002 generation is from natural gas. We base the mercury estimate, however, on the amount of coal it burned as a secondary fuel.

Table 3.10
CANADA MERCURY POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS

PLANT, PROVINCE		ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
1	Sundance, Alberta	n/a	275	0.019 ^a	Coal
2	Nanticoke, Ontario	22,236,000	241	0.011	Coal
3	Boundary Dam, Saskatchewan	6,057,364	191	0.032	Coal
4	Wabamun, Alberta	n/a	153	0.039 ^a	Coal
5	Lambton, Ontario	10,455,000	130	0.012	Coal
6	Poplar River, Saskatchewan	4,457,200	116	0.026	Coal
7	Battle River, Alberta	4,867,000 ^b	108	0.022	Coal
8	Keephills, Alberta	n/a	108	0.017 ^a	Coal
9	Grand Lake, New Brunswick	449,388 ^c	106	0.24	Coal
10	Lingan, Nova Scotia	n/a	104	0.027 ^a	Coal
11	Genesee, Alberta	n/a	83	0.005 ^a	Coal
12	Sheerness, Alberta	5,810,000 ^b	77	0.013	Coal
13	Thunder Bay, Ontario	1,522,000	72	0.047	Coal
14	Shand Power, Saskatchewan	2,150,000	56	0.026	Coal
15	Lakeview, Ontario	2,455,000	46	0.019	Coal
16	Trenton, Nova Scotia	n/a	43	0.025 ^a	Coal
17	Atikokan, Ontario	823,000	38	0.046	Coal
18	Point Tupper, Nova Scotia	n/a	15	0.012 ^a	Coal
19	Belledune, New Brunswick	3,616,790	12	0.003	Coal
20	HR Milner, Alberta	790,000 ^b	6	0.007	Coal
21	Brandon GS, Manitoba	273,053	5	0.019	Coal
22	Point Aconi, Nova Scotia	n/a	1	0.001 ^a	Coal

^a 2002 annual generation was not available, so output emission rates are for 2001 calculated from generation data in power plant information reports available from the Canadian Electricity Association at <http://www.ceamercuryprogram.ca/index.html>.

^b Net generation obtained from ATCO Power report *Environment, Health and Safety Review 2002*. Online at http://www.atcopower.com/Environment_Health_&Safety/Reports/environmental_reports.htm.

^c Net generation estimated assuming Grand Lake was in operation 90% of the time during 2002. See the methodology discussion in the Appendix.

Table 3.11
MEXICO MERCURY POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS

PLANT, STATE		ELECTRICITY GENERATION, MWh	MERCURY EMISSIONS, kilograms	MERCURY EMISSION RATE, kg/GWh	PRIMARY FUEL
1	C.T. Carbón II, Coahuila	8,636,350	361	0.042	Coal
2	C.T. José López Portillo (Río Escondido), Coahuila	7,515,560	349	0.046	Coal
3	C.T. Plutarco Elias Calles (Petacalco), Guerrero	13,879,470	314	0.023	Coal

Table 3.12
 UNITED STATES CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a

	PLANT, STATE	ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
1	Bowen, Georgia	21,674,542	19,968,520	921	Coal
2	Scherer, Georgia	20,817,252	19,943,187	958	Coal
3	W A Parish, Texas	20,026,008	18,785,896	938	Coal
4	Navajo Generating Station, Arizona	17,832,139	18,559,738	1,041	Coal
5	James H Miller Jr, Alabama	18,592,131	17,798,791	957	Coal
6	Gibson, Indiana	20,522,153	17,461,300	851	Coal
7	Cumberland, Tennessee	16,384,132	17,289,553	1,055	Coal
8	Jeffrey Energy Center, Kansas	15,330,637	16,985,550	1,108	Coal
9	Sherburne County, Minnesota	15,344,648	16,529,771	1,077	Coal
10	Martin Lake, Texas	14,825,001	16,074,955	1,084	Coal
11	John E Amos, West Virginia	17,995,089	15,811,948	879	Coal
12	Rockport, Indiana	16,643,319	15,274,755	918	Coal
13	Jim Bridger, Wyoming	14,593,034	15,078,065	1,033	Coal
14	Paradise, Kentucky	14,130,150	14,832,801	1,050	Coal
15	Colstrip, Montana	13,886,845	14,753,691	1,062	Coal
16	Monroe, Michigan	16,720,823	14,737,086	881	Coal
17	W H Sammis, Ohio	15,521,117	14,383,271	927	Coal
18	Belews Creek, North Carolina	16,912,850	14,243,864	842	Coal
19	Monticello, Texas	13,127,881	14,169,801	1,079	Coal
20	J M Stuart, Ohio	15,351,286	14,130,223	920	Coal
21	Bruce Mansfield, Pennsylvania	15,974,911	13,981,403	875	Coal
22	Gen J M Gavin, Ohio	15,617,077	13,928,980	892	Coal
23	Crystal River, Florida	14,465,667	13,784,360	953	Coal
24	Intermountain, Utah	13,485,597	13,593,178	1,008	Coal
25	Roxboro, North Carolina	14,281,069	13,549,679	949	Coal
26	Four Corners, New Mexico	13,674,415	13,544,627	991	Coal
27	Barry, Alabama	16,718,579	13,336,254	798	Coal
28	Labadie, Missouri	14,406,589	13,268,814	921	Coal
29	San Juan, New Mexico	12,398,506	13,144,865	1,060	Coal
30	Laramie River, Wyoming	12,398,253	12,764,448	1,030	Coal
31	Harrison, West Virginia	12,927,422	12,698,743	982	Coal
32	Big Cajun 2, Louisiana	11,125,719	12,602,933	1,133	Coal
33	Petersburg, Indiana	11,641,137	12,233,441	1,051	Coal
34	E C Gaston, Alabama	12,639,541	12,028,111	952	Coal
35	Welsh Power Plant, Texas	11,000,083	12,016,128	1,092	Coal
36	Baldwin, Illinois	12,454,874	11,860,193	952	Coal
37	Limestone, Texas	11,385,520	11,795,683	1,036	Coal
38	Mount Storm, West Virginia	11,671,736	11,628,503	996	Coal
39	Marshall, North Carolina	14,498,223	11,614,641	801	Coal
40	Sam Seymour, Texas	11,749,703	11,318,045	963	Coal
41	Independence, Arkansas	10,510,564	11,102,254	1,056	Coal
42	Ghent, Kentucky	11,533,151	11,087,101	961	Coal
43	Wansley, Georgia	11,197,521	10,937,470	977	Coal
44	Homer City, Pennsylvania	10,938,699	10,623,100	971	Coal

Table 3.12
 UNITED STATES CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
45	Conemaugh, Pennsylvania	12,584,027	10,526,358	836	Coal
46	Keystone, Pennsylvania	11,790,991	10,452,773	887	Coal
47	Muskogee, Oklahoma	10,275,348	10,432,795	1,015	Coal
48	Gerald Gentleman, Nebraska	9,549,816	10,355,153	1,084	Coal
49	La Cygne, Kansas	9,517,909	10,293,421	1,081	Coal
50	Shawnee, Kentucky	8,826,178	9,950,274	1,127	Coal
51	Kingston, Tennessee	9,866,292	9,934,027	1,007	Coal
52	Widows Creek, Alabama	8,868,307	9,857,988	1,112	Coal
53	Craig, Colorado	9,807,407	9,675,496	987	Coal
54	Coal Creek, North Dakota	8,559,089	9,604,570	1,122	Coal
55	Centralia, Washington	9,500,972	9,511,212	1,001	Coal
56	St. Johns River, Florida	9,795,546	9,499,119	970	Coal
57	White Bluff, Arkansas	8,850,935	9,376,480	1,059	Coal
58	R M Schahfer, Indiana	8,756,429	9,331,146	1,066	Coal
59	Big Bend, Florida	8,518,176	9,279,977	1,089	Coal
60	Conesville, Ohio	10,158,928	9,265,753	912	Coal
61	J H Campbell, Michigan	9,269,258	9,230,309	996	Coal
62	Mohave, Nevada	10,170,230	9,210,898	906	Coal
63	Hunter (Emery), Utah	9,403,388	9,146,178	973	Coal
64	Seminole, Florida	9,241,176	9,127,351	988	Coal
65	Hatfield's Ferry, Pennsylvania	9,753,564	9,111,573	934	Coal
66	Harrington Station, Texas	7,831,512	8,788,458	1,122	Coal
67	Big Brown, Texas	7,920,848	8,709,218	1,100	Coal
68	Johnsonville, Tennessee	8,275,776	8,687,167	1,050	Coal
69	Mill Creek, Kentucky	9,075,622	8,674,744	956	Coal
70	Northeastern, Oklahoma	9,623,635	8,589,075	892	Coal
71	Pleasant Prairie, Wisconsin	7,898,581	8,516,084	1,078	Coal
72	Joppa Steam, Illinois	8,075,552	8,353,182	1,034	Coal
73	Belle River, Michigan	7,716,451	8,288,770	1,074	Coal
74	W H Zimmer, Ohio	9,734,563	8,195,255	842	Coal
75	Harlee Branch, Georgia	9,018,458	8,155,905	904	Coal
76	Montour, Pennsylvania	9,263,444	8,123,577	877	Coal
77	Chesterfield, Virginia	9,502,996	8,032,459	845	Coal
78	Brunner Island, Pennsylvania	9,994,684	7,959,091	796	Coal
79	Winyah, South Carolina	7,720,938	7,870,322	1,019	Coal
80	Mitchell, West Virginia	9,231,567	7,839,431	849	Coal
81	Mountaineer, West Virginia	8,985,024	7,827,466	871	Coal
82	Cross, South Carolina	8,126,251	7,717,151	950	Coal
83	Tolk Station, Texas	7,662,008	7,700,236	1,005	Coal
84	Daniel, Mississippi	10,839,532	7,672,573	708	Coal
85	Cardinal, Ohio	8,555,500	7,629,316	892	Coal
86	Cholla, Arizona	6,706,864	7,575,745	1,130	Coal
87	Clay Boswell, Minnesota	7,266,941	7,532,501	1,037	Coal
88	Gorgas, Alabama	7,216,594	7,509,691	1,041	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
89	Clifty Creek, Indiana	7,838,812	7,479,966	954	Coal
90	Martin, Florida	12,834,607	7,413,132	578	Natural gas
91	Muskingum River, Ohio	8,359,764	7,406,103	886	Coal
92	Newton, Illinois	7,241,019	7,368,510	1,018	Coal
93	New Madrid, Missouri	7,606,958	7,332,462	964	Coal
94	Powerton, Illinois	7,858,082	7,302,428	929	Coal
95	Antelope Valley, North Dakota	6,317,269	7,195,135	1,139	Coal
96	Grand River Dam Auth, Oklahoma	6,501,431	7,181,127	1,105	Coal
97	Miami Fort, Ohio	7,587,241	7,179,069	946	Coal
98	Merom, Indiana	6,643,503	7,121,785	1,072	Coal
99	Columbia, Wisconsin	6,472,154	7,074,706	1,093	Coal
100	Pleasants, West Virginia	7,629,209	6,990,738	916	Coal
101	Gallatin, Tennessee	7,271,777	6,962,202	957	Coal
102	Brandon Shores, Maryland	7,160,408	6,871,076	960	Coal
103	Fort Martin, West Virginia	7,855,193	6,850,859	872	Coal
104	St. Clair, Michigan	6,965,047	6,837,376	982	Coal
105	Thomas Hill, Missouri	6,865,414	6,780,664	988	Coal
106	Morgantown, Maryland	7,550,506	6,745,708	893	Coal
107	Brayton Point, Massachusetts	8,263,163	6,745,172	816	Coal
108	Walter C Beckjord, Ohio	6,756,632	6,730,419	996	Coal
109	Sooner, Oklahoma	6,953,110	6,700,882	964	Coal
110	Rush Island, Missouri	7,483,574	6,688,192	894	Coal
111	Colbert, Alabama	6,305,034	6,568,807	1,042	Coal
112	Dave Johnston, Wyoming	5,759,784	6,404,969	1,112	Coal
113	Clover Power Station, Virginia	6,307,712	6,148,890	975	Coal
114	Eastlake, Ohio	6,724,187	6,139,401	913	Coal
115	Kyger Creek, Ohio	6,852,119	6,010,300	877	Coal
116	Kincaid, Illinois	5,847,334	6,003,851	1,027	Coal
117	South Oak Creek, Wisconsin	5,393,774	5,977,481	1,108	Coal
118	J T Deely, Texas	5,656,468	5,965,871	1,055	Coal
119	Springerville, Arizona	5,830,542	5,852,414	1,004	Coal
120	Council Bluffs, Iowa	5,794,189	5,823,420	1,005	Coal
121	Chalk Point, Maryland	6,041,207	5,794,860	959	Coal
122	H L Spurlock, Kentucky	6,080,970	5,742,484	944	Coal
123	Sioux, Missouri	6,296,711	5,695,530	905	Coal
124	Warrick, Indiana	5,066,020	5,667,250	1,119	Coal
125	Will County, Illinois	5,419,706	5,662,452	1,045	Coal
126	Milton R Young, North Dakota	5,117,272	5,593,475	1,093	Coal
127	Joliet 29, Illinois	5,411,689	5,570,469	1,029	Coal
128	George Neal North, Iowa	5,703,855	5,560,720	975	Coal
129	Stanton Energy, Florida	6,070,495	5,532,535	911	Coal
130	Bull Run, Tennessee	6,760,080	5,455,316	807	Coal
131	F J Gannon, Florida	4,815,528	5,419,324	1,125	Coal
132	Leland Olds, North Dakota	4,576,988	5,415,336	1,183	Coal

Table 3.12
 UNITED STATES CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
133	Wabash River, Indiana	5,744,472	5,382,984	937	Coal
134	Tanner's Creek, Indiana	5,872,947	5,382,507	916	Coal
135	Huntington, Utah	5,977,918	5,319,455	890	Coal
136	Coffeen, Illinois	5,257,211	5,223,089	994	Coal
137	Northport, New York	7,278,114	5,193,350	714	Oil
138	Cayuga, Indiana	5,930,084	5,188,419	875	Coal
139	Naughton, Wyoming	5,019,304	5,180,030	1,032	Coal
140	Coronado Generating, Arizona	5,063,164	5,175,207	1,022	Coal
141	Comanche, Colorado	4,697,167	5,165,030	1,100	Coal
142	Yates, Georgia	5,368,046	5,131,553	956	Coal
143	Louisa, Iowa	4,927,254	5,112,358	1,038	Coal
144	R S Nelson, Louisiana	5,927,840	5,098,818	860	Coal
145	Manatee, Florida	6,116,586	5,061,615	828	Oil
146	Ottumwa, Iowa	4,480,923	5,036,546	1,124	Coal
147	Crist, Florida	4,572,235	5,014,382	1,097	Coal
148	Meramec, Missouri	4,434,627	4,964,082	1,119	Coal
149	Edgewater, Wisconsin	4,786,914	4,935,895	1,031	Coal
150	Mayo, North Carolina	4,737,089	4,902,549	1,035	Coal
151	Big Sandy, Kentucky	5,752,379	4,892,865	851	Coal
152	AES Somerset (Kintigh), New York	5,453,551	4,883,919	896	Coal
153	Allen, Tennessee	4,879,343	4,868,464	998	Coal
154	Reid Gardner, Nevada	4,191,103	4,855,241	1,158	Coal
155	H W Pirkey, Texas	4,504,102	4,777,065	1,061	Coal
156	Lawrence Energy Center, Kansas	3,759,861	4,728,305	1,258	Coal
157	John Sevier, Tennessee	4,880,298	4,710,957	965	Coal
158	Dolet Hills, Louisiana	4,667,313	4,678,630	1,002	Coal
159	Phil Sporn, West Virginia	5,361,190	4,583,252	855	Coal
160	Iatan, Missouri	4,017,999	4,501,197	1,120	Coal
161	Watson, Mississippi	4,731,902	4,462,904	943	Coal
162	G G Allen, North Carolina	5,071,389	4,461,506	880	Coal
163	Hawthorn, Missouri	4,346,949	4,370,904	1,006	Coal
164	Dan E Karn, Michigan	4,474,257	4,331,724	968	Coal
165	Cherokee, Colorado	4,335,810	4,318,928	996	Coal
166	George Neal South, Iowa	4,586,420	4,298,026	937	Coal
167	Trenton Channel, Michigan	4,339,844	4,291,048	989	Coal
168	Oklauion, Texas	4,686,707	4,274,464	912	Coal
169	Williams, South Carolina	4,428,464	4,260,157	962	Coal
170	Waukegan, Illinois	4,230,118	4,241,483	1,003	Coal
171	Avon Lake, Ohio	4,169,683	4,215,319	1,011	Coal
172	Sandow, Texas	3,943,323	4,175,622	1,059	Coal
173	Bonanza, Utah	3,923,323	4,136,897	1,054	Coal
174	Chesapeake, Virginia	4,141,111	4,117,777	994	Coal
175	North Valmy, Nevada	4,081,381	4,090,471	1,002	Coal
176	J K Spruce, Texas	4,135,806	4,028,622	974	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
177	Hayden, Colorado	3,631,182	4,021,778	1,108	Coal
178	Sabine, Texas	7,087,729	4,011,756	566	Natural gas
179	Clinch River, Virginia	4,620,670	3,990,468	864	Coal
180	Coleto Creek, Texas	4,201,689	3,971,983	945	Coal
181	Rodemacher, Louisiana	4,279,337	3,933,827	919	Coal
182	E W Brown, Kentucky	3,992,354	3,895,614	976	Coal
183	Hammond, Georgia	3,935,825	3,875,616	985	Coal
184	Wateree, South Carolina	4,282,531	3,825,820	893	Coal
185	Nebraska City, Nebraska	4,104,546	3,807,140	928	Coal
186	Trimble County, Kentucky	3,929,027	3,765,203	958	Coal
187	Yorktown, Virginia	4,238,965	3,744,934	883	Coal
188	Boardman, Oregon	3,773,750	3,744,011	992	Coal
189	Greene County, Alabama	3,892,941	3,741,492	961	Coal
190	Charles R Lowman, Alabama	3,472,719	3,724,923	1,073	Coal
191	Ninemile Point, Louisiana	6,187,124	3,717,711	601	Natural gas
192	Bay Shore, Ohio	3,538,463	3,694,797	1,044	Coal
193	Canal Station, Massachusetts	4,602,939	3,691,411	802	Oil
194	Harding Street Stn (Elmer W Stout), Indiana	3,784,144	3,656,041	966	Coal
195	Anclote, Florida	4,133,979	3,653,588	884	Oil
196	Edwards Station, Illinois	3,536,593	3,653,185	1,033	Coal
197	Weston, Wisconsin	3,202,588	3,649,498	1,140	Coal
198	Pawnee, Colorado	3,316,714	3,600,101	1,085	Coal
199	R D Green, Kentucky	3,501,986	3,593,384	1,026	Coal
200	Coyote, North Dakota	3,060,200	3,582,290	1,171	Coal
201	North Omaha, Nebraska	3,403,969	3,542,484	1,041	Coal
202	San Miguel, Texas	2,855,097	3,530,384	1,237	Coal
203	Flint Creek, Arkansas	3,655,965	3,529,112	965	Coal
204	Port Everglades, Florida	4,497,763	3,478,447	773	Oil
205	Presque Isle, Michigan	3,140,761	3,455,928	1,100	Coal
206	D B Wilson, Kentucky	2,849,550	3,406,545	1,195	Coal
207	Killen Station, Ohio	3,612,949	3,394,184	939	Coal
208	Kammer, West Virginia	4,029,061	3,351,383	832	Coal
209	C D McIntosh, Florida	2,810,883	3,339,091	1,188	Coal
210	Dunkirk, New York	3,591,017	3,334,297	929	Coal
211	Big Stone, South Dakota	3,119,519	3,327,909	1,067	Coal
212	Wyodak, Wyoming	2,858,420	3,321,577	1,162	Coal
213	Sibley, Missouri	3,061,409	3,278,007	1,071	Coal
214	River Rouge, Michigan	3,401,765	3,252,726	956	Coal
215	Allen S King, Minnesota	3,311,959	3,247,027	980	Coal
216	East Bend, Kentucky	2,941,427	3,244,717	1,103	Coal
217	Eddystone, Pennsylvania	2,750,581	3,206,532	1,166	Coal
218	Hudson, New Jersey	3,356,373	3,204,041	955	Coal
219	Cope Station, South Carolina	3,243,770	3,189,898	983	Coal
220	A B Brown Generating, Indiana	3,194,749	3,182,697	996	Coal

Table 3.12
 UNITED STATES CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
221	Huntley Power, New York	2,923,168	3,177,790	1,087	Coal
222	Elrama, Pennsylvania	2,321,405	3,147,105	1,356	Coal
223	Montrose, Missouri	2,662,960	3,098,470	1,164	Coal
224	Cheswick, Pennsylvania	3,021,295	3,063,153	1,014	Coal
225	Bailly, Indiana	2,831,251	3,041,546	1,074	Coal
226	Northside, Florida	3,668,086	3,029,248	826	Oil
227	Moss Landing, California	6,393,111	3,023,667	473	Natural gas
228	Hugo, Oklahoma	3,030,995	3,023,642	998	Coal
229	Coleman, Kentucky	2,864,421	3,016,958	1,053	Coal
230	Ravenswood, New York	4,940,254	3,006,488	609	Natural gas
231	Jack McDonough, Georgia	3,728,220	2,998,820	804	Coal
232	State Line Generating, Indiana	2,923,229	2,968,260	1,015	Coal
233	Cane Run, Kentucky	3,068,114	2,928,547	955	Coal
234	Herbert A Wagner, Maryland	3,001,247	2,921,654	973	Coal
235	Gibbons Creek, Texas	3,230,078	2,916,781	903	Coal
236	Pulliam, Wisconsin	2,349,544	2,886,951	1,229	Coal
237	Dickerson, Maryland	3,263,673	2,886,884	885	Coal
238	Merrimack, New Hampshire	2,874,174	2,863,834	996	Coal
239	R Gallagher, Indiana	2,977,365	2,823,399	948	Coal
240	Apache Station, Arizona	2,799,861	2,784,043	994	Coal
241	Shawville, Pennsylvania	2,991,436	2,768,637	926	Coal
242	Possum Point, Virginia	3,005,462	2,741,859	912	Coal
243	Lansing Smith, Florida	4,020,641	2,726,898	678	Natural gas
244	Crawford, Illinois	2,575,482	2,696,937	1,047	Coal
245	L V Sutton, North Carolina	2,622,440	2,688,330	1,025	Coal
246	Michigan City, Indiana	2,487,472	2,686,822	1,080	Coal
247	Mercer, New Jersey	2,752,449	2,673,722	971	Coal
248	Havana, Illinois	2,499,684	2,661,842	1,065	Coal
249	Lauderdale, Florida	6,436,413	2,654,469	412	Natural gas
250	Riverside, Minnesota	2,436,997	2,652,370	1,088	Coal
251	Fort Myers, Florida	6,578,229	2,651,563	403	Natural gas
252	Potomac River, Virginia	2,331,055	2,624,785	1,126	Coal
253	Cliffside, North Carolina	2,723,353	2,578,021	947	Coal
254	Twin Oaks Power, LP, Texas	2,689,521	2,527,874	940	Coal
255	J R Whiting, Michigan	2,262,790	2,519,231	1,113	Coal
256	Elmer Smith, Kentucky	2,185,345	2,508,423	1,148	Coal
257	R D Morrow, Mississippi	2,537,751	2,505,097	987	Coal
258	Asheville, North Carolina	2,628,074	2,498,896	951	Coal
259	Red Hills Generation, Mississippi	2,450,000	2,478,806	1,012	Coal
260	Holcomb, Kansas	2,454,689	2,475,592	1,009	Coal
261	F B Culley, Indiana	2,417,245	2,452,357	1,015	Coal
262	Indian River, Delaware	2,129,702	2,446,152	1,149	Coal
263	Sanford, Florida	4,998,936	2,429,425	486	Natural gas
264	AES Cayuga (Milliken), New York	2,353,387	2,412,052	1,025	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
265	AES Alamitos, California	4,221,013	2,385,103	565	Natural gas
266	Kanawha River, West Virginia	2,571,055	2,372,774	923	Coal
267	Salem Harbor, Massachusetts	2,496,128	2,355,753	944	Coal
268	Cape Canaveral, Florida	3,257,614	2,350,210	721	Oil
269	Astoria Generating Stn, New York	3,172,909	2,345,190	739	Natural gas
270	Dynegy Danskammer, New York	2,449,593	2,326,118	950	Coal
271	Sweeny Cogeneration, Texas	1,727,172	2,302,505	1,333	Natural gas
272	Midlothian Energy, Texas	5,966,805	2,298,884	385	Natural gas
273	Martins Creek, Pennsylvania	2,402,706	2,294,086	955	Coal
274	Rawhide, Colorado	2,078,175	2,278,587	1,096	Coal
275	Pittsburg, California	3,884,118	2,276,526	586	Natural gas
276	Sunbury, Pennsylvania	1,714,652	2,272,631	1,325	Coal
277	Lee, North Carolina	1,969,494	2,266,986	1,151	Coal
278	B C Cobb, Michigan	2,188,545	2,258,119	1,032	Coal
279	Cedar Bayou, Texas	3,584,591	2,251,010	628	Natural gas
280	HMP&L Station 2, Kentucky	2,056,044	2,250,396	1,095	Coal
281	J C Weadock, Michigan	2,205,966	2,221,071	1,007	Coal
282	C P Crane, Maryland	2,132,214	2,219,243	1,041	Coal
283	J P Madgett, Wisconsin	2,097,984	2,191,443	1,045	Coal
284	Turkey Point, Florida	3,030,547	2,180,126	719	Oil
285	Wood River, Illinois	2,205,841	2,157,739	978	Coal
286	Reliant Energy Channelview, Texas	3,385,962	2,150,973	635	Natural gas
287	Duck Creek, Illinois	2,066,628	2,106,629	1,019	Coal
288	Dallman, Illinois	1,796,111	2,102,173	1,170	Coal
289	Fort St. Vrain, Colorado	4,663,215	2,093,854	449	Natural gas
290	Hennepin, Illinois	2,045,489	2,071,923	1,013	Coal
291	Lamar Power (Paris), Texas	5,685,767	2,055,226	361	Natural gas
292	Canadys Steam, South Carolina	2,124,590	2,045,456	963	Coal
293	Eckert Station, Michigan	1,540,404	2,044,910	1,328	Coal
294	Jefferies, South Carolina	1,878,197	2,022,025	1,077	Coal
295	Edge Moor, Delaware	1,911,750	2,012,520	1,053	Coal
296	Armstrong, Pennsylvania	2,140,768	1,994,882	932	Coal
297	Martin Drake, Colorado	1,813,674	1,989,493	1,097	Coal
298	Arapahoe, Colorado	1,412,418	1,983,670	1,404	Coal
299	R E Burger, Ohio	2,000,668	1,974,057	987	Coal
300	John S Cooper, Kentucky	2,100,208	1,972,202	939	Coal
301	Sikeston, Missouri	1,693,365	1,969,522	1,163	Coal
302	Willow Glen, Louisiana	3,054,850	1,954,483	640	Natural gas
303	Seminole, Oklahoma	3,398,357	1,947,062	573	Natural gas
304	Pasadena Power Plant, Texas	4,555,258	1,903,434	418	Natural gas
305	P L Bartow, Florida	2,193,974	1,875,026	855	Oil
306	Tecumseh Energy Center, Kansas	1,510,699	1,856,083	1,229	Coal
307	Riviera, Florida	2,450,156	1,833,844	748	Oil
308	Portland, Pennsylvania	1,915,994	1,824,895	952	Coal

Table 3.12
 UNITED STATES CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
309	Genoa, Wisconsin	2,203,168	1,819,196	826	Coal
310	High Bridge, Minnesota	1,308,587	1,817,385	1,389	Coal
311	Odessa-Ector, Texas	4,381,108	1,789,186	408	Natural gas
312	Louisiana 1, Louisiana	2,857,455	1,779,180	623	Natural gas
313	Polk, Florida	1,955,959	1,774,571	907	Coal
314	New Castle, Pennsylvania	1,577,573	1,768,160	1,121	Coal
315	Tiger Bay, Florida	1,412,706	1,754,136	1,242	Natural gas
316	Sheldon, Nebraska	1,442,114	1,745,910	1,211	Coal
317	Nearman Creek, Kansas	1,452,206	1,744,606	1,201	Coal
318	Tenaska Frontier, Texas	4,139,042	1,719,276	415	Natural gas
319	Ray D Nixon, Colorado	1,680,513	1,715,965	1,021	Coal
320	Riverbend, North Carolina	1,660,438	1,712,453	1,031	Coal
321	Black Dog, Minnesota	1,662,585	1,710,076	1,029	Coal
322	Bridgeport Harbor, Connecticut	1,739,266	1,709,437	983	Coal
323	Gregory Power Facility, Texas	2,965,571	1,702,067	574	Natural gas
324	Lovett, New York	1,736,083	1,695,437	977	Coal
325	P H Robinson, Texas	2,917,855	1,693,676	580	Natural gas
326	Tradinghouse, Texas	3,007,375	1,668,751	555	Natural gas
327	Muscatine, Iowa	1,259,121	1,645,353	1,307	Coal
328	Glen Lyn, Virginia	1,718,635	1,622,462	944	Coal
329	Decordova, Texas	3,042,636	1,622,328	533	Natural gas
330	Bremo, Virginia	1,609,047	1,613,017	1,002	Coal
331	Valley (WEPCO), Wisconsin	1,147,954	1,612,962	1,405	Coal
332	Prewitt Escalante, New Mexico	1,653,093	1,596,485	966	Coal
333	Richard Gorsuch, Ohio	1,297,873	1,570,381	1,210	Coal
334	Michoud, Louisiana	2,416,824	1,557,369	644	Natural gas
335	Cape Fear, North Carolina	1,857,910	1,556,156	838	Coal
336	Southwest, Missouri	1,182,527	1,553,831	1,314	Coal
337	Albright, West Virginia	1,374,335	1,544,218	1,124	Coal
338	Gerald Andrus, Mississippi	2,319,949	1,542,011	665	Natural gas
339	SRW Cogen Facility, Texas	2,912,891	1,540,373	529	Natural gas
340	James River, Missouri	1,587,089	1,537,323	969	Coal
341	Collins Station, Illinois	2,070,864	1,532,642	740	Natural gas
342	Frank E Ratts, Indiana	1,517,924	1,532,568	1,010	Coal
343	Rochester 7, New York	1,506,960	1,532,474	1,017	Coal
344	Deerhaven, Florida	1,588,281	1,528,019	962	Coal
345	Stanton, North Dakota	1,399,737	1,522,602	1,088	Coal
346	Eagle Valley (H T Pritchard), Indiana	1,332,751	1,516,994	1,138	Coal
347	Little Gypsy, Louisiana	2,358,145	1,516,565	643	Natural gas
348	Baxter Wilson, Mississippi	2,551,638	1,512,936	593	Natural gas
349	Guadalupe Generating, Texas	3,804,525	1,502,773	395	Natural gas
350	Meredosia, Illinois	1,326,609	1,498,211	1,129	Coal
351	Ashtabula, Ohio	1,236,725	1,490,932	1,206	Coal
352	Marion, Illinois	1,136,616	1,477,913	1,300	Coal

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
353	Charles Poletti, New York	2,282,203	1,470,397	644	Natural gas
354	Handley Steam, Texas	2,232,746	1,468,624	658	Natural gas
355	Cabrillo Power I (Encina), California	2,355,455	1,451,293	616	Natural gas
356	Maine Independence, Maine	3,766,773	1,435,201	381	Natural gas
357	Westbrook Energy Center, Maine	3,932,713	1,434,233	365	Natural gas
358	Tenaska Gateway, Texas	4,426,124	1,432,345	324	Natural gas
359	B L England, New Jersey	1,191,120	1,431,247	1,202	Coal
360	Lansing, Iowa	1,257,821	1,419,844	1,129	Coal
361	Reliant Energy Desert Basin, Arizona	3,543,743	1,419,664	401	Natural gas
362	Eastex Cogeneration, Texas	2,565,604	1,416,896	552	Natural gas
363	Carbon, Utah	1,323,395	1,390,417	1,051	Coal
364	Asbury, Missouri	1,213,990	1,380,109	1,137	Coal
365	Lake Road Generating, Connecticut	3,831,019	1,375,055	359	Natural gas
366	Los Medanos, California	3,712,422	1,374,527	370	Natural gas
367	Calpine Sutter Energy, California	2,018,272	1,371,121	679	Natural gas
368	Fisk, Illinois	1,299,559	1,363,563	1,049	Coal
369	Riverside, Oklahoma	2,342,296	1,359,949	581	Natural gas
370	Burlington, Iowa	1,225,990	1,341,888	1,095	Coal
371	Joliet 9, Illinois	1,292,531	1,337,441	1,035	Coal
372	Haynes Gen Station, California	2,328,262	1,330,943	572	Natural gas
373	El Segundo, California	2,447,368	1,329,297	543	Natural gas
374	Freestone Power, Texas	3,363,526	1,324,386	394	Natural gas
375	Lewis Creek, Texas	2,276,678	1,320,736	580	Natural gas
376	Bowline Generating, New York	1,706,219	1,318,663	773	Natural gas
377	El Dorado Energy, Nevada	3,326,924	1,307,405	393	Natural gas
378	Mystic, Massachusetts	1,584,556	1,302,277	822	Oil
379	Ormond Beach, California	2,330,737	1,298,675	557	Natural gas
380	Nelson Dewey, Wisconsin	1,172,335	1,284,668	1,096	Coal
381	Buck, North Carolina	1,249,807	1,260,600	1,009	Coal
382	Lost Pines 1, Texas	3,406,262	1,258,344	369	Natural gas
383	Bridgeport Energy, Connecticut	3,335,252	1,254,956	376	Natural gas
384	Permian Basin, Texas	2,263,521	1,245,551	550	Natural gas
385	New Haven Harbor, Connecticut	1,435,307	1,245,151	868	Oil
386	Willow Island, West Virginia	1,151,588	1,241,972	1,078	Coal
387	Kraft, Georgia	1,221,647	1,240,727	1,016	Coal
388	Valmont, Colorado	1,281,144	1,235,891	965	Coal
389	Port Jefferson Energy, New York	1,646,561	1,235,782	751	Oil
390	Prairie Creek, Iowa	878,699	1,231,830	1,402	Coal
391	Milton L Kapp, Iowa	1,146,286	1,222,384	1,066	Coal
392	Blackhawk Station, Texas	1,629,786	1,208,356	741	Natural gas
393	J E Corette, Montana	1,132,762	1,208,113	1,067	Coal
394	McMeekin, South Carolina	1,265,428	1,194,327	944	Coal
395	Waterford 1 & 2, Louisiana	1,473,543	1,187,035	806	Natural gas
396	Hines Energy Complex, Florida	3,034,621	1,181,285	389	Natural gas

Table 3.12
 UNITED STATES CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
397	Sutherland, Iowa	940,504	1,177,553	1,252	Coal
398	Dynegy Roseton, New York	1,211,549	1,176,941	971	Oil
399	Bergen, New Jersey	3,370,171	1,176,429	349	Natural gas
400	Jones Station, Texas	2,066,025	1,175,124	569	Natural gas
401	Niles, Ohio	1,126,711	1,173,719	1,042	Coal
402	Channel Energy Center, Texas	1,484,762	1,171,517	789	Natural gas
403	Mitchell, Pennsylvania	1,256,106	1,168,715	930	Coal
404	AES Greenidge, New York	1,031,345	1,166,483	1,131	Coal
405	Mustang Station, Texas	2,902,235	1,157,452	399	Natural gas
406	AES Redondo Beach, California	2,075,007	1,152,358	555	Natural gas
407	Hermiston, Oregon	3,294,305	1,143,109	347	Natural gas
408	Putnam, Florida	2,220,194	1,134,201	511	Natural gas
409	Titus, Pennsylvania	1,105,401	1,124,450	1,017	Coal
410	Vermilion, Illinois	1,102,939	1,120,446	1,016	Coal
411	South Point Energy, Arizona	3,331,352	1,117,670	336	Natural gas
412	Irvington Generating, Arizona	1,403,955	1,113,205	793	Coal
413	McIntosh, Georgia	1,162,224	1,090,709	938	Coal
414	Contra Costa, California	1,951,799	1,071,072	549	Natural gas
415	Quindaro, Kansas	965,065	1,070,349	1,109	Coal
416	Lake Hubbard, Texas	1,684,853	1,062,207	630	Natural gas
417	Schiller, New Hampshire	873,475	1,052,331	1,205	Coal
418	Urquhart, South Carolina	1,703,794	1,024,863	602	Natural gas
419	Lake Shore, Ohio	860,853	1,015,998	1,180	Coal
420	Brooklyn Navy Yard, New York	1,865,308	1,010,082	542	Natural gas
421	V H Braunig, Texas	738,602	1,005,803	1,362	Natural gas
422	William C Dale, Kentucky	918,000	1,001,166	1,091	Coal
423	Manchester Street, Rhode Island	2,124,155	997,723	470	Natural gas
424	Payne Creek, Florida	2,424,966	991,090	409	Natural gas
425	E F Barrett, New York	1,789,225	988,118	552	Natural gas
426	Newman, Texas	1,574,783	966,184	614	Natural gas
427	Mount Tom, Massachusetts	915,318	961,342	1,050	Coal
428	AES Westover (Goudey), New York	863,979	960,969	1,112	Coal
429	Port Washington, Wisconsin	747,511	958,912	1,283	Coal
430	Neil Simpson II, Wyoming	878,364	956,270	1,089	Coal
431	Dolphus M Grainger, South Carolina	931,468	954,920	1,025	Coal
432	W S Lee, South Carolina	925,685	953,638	1,030	Coal
433	Hoot Lake, Minnesota	830,157	947,160	1,141	Coal
434	Valley, Texas	1,628,130	944,398	580	Natural gas
435	Wilkes Power Plant, Texas	1,393,954	943,834	677	Natural gas
436	Barney M Davis, Texas	1,563,689	943,333	603	Natural gas
437	CoGen Lyondell, Inc., Texas	3,423,308	935,591	273	Natural gas
438	H B Robinson, South Carolina	1,021,242	935,513	916	Coal
439	Coolwater Generating, California	1,547,033	924,961	598	Natural gas
440	Hay Road, Delaware	1,219,432	920,628	755	Natural gas

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
441	Millennium Power, Massachusetts	2,471,188	912,822	369	Natural gas
442	Klamath Cogeneration, Oregon	2,346,920	906,433	386	Natural gas
443	Magic Valley, Texas	2,476,733	903,868	365	Natural gas
444	John S Rainey, South Carolina	2,211,598	896,815	406	Natural gas
445	Decker Creek, Texas	1,719,800	894,568	520	Natural gas
446	San Jacinto Steam, Texas	1,326,910	889,741	671	Natural gas
447	W H Weatherspoon, North Carolina	794,816	869,444	1,094	Coal
448	O H Hutchings, Ohio	772,666	861,570	1,115	Coal
449	Indian River (55318), Florida	1,152,524	859,414	746	Oil
450	Syl Laskin, Minnesota	622,586	849,880	1,365	Coal
451	Green River, Kentucky	719,410	846,889	1,177	Coal
452	AES Huntington Beach, California	1,397,072	842,745	603	Natural gas
453	East River, New York	737,620	842,423	1,142	Natural gas
454	Cane Island, Florida	2,101,547	840,304	400	Natural gas
455	Nucla, Colorado	707,378	837,343	1,184	Coal
456	Morro Bay, California	1,528,517	836,625	547	Natural gas
457	Somerset, Massachusetts	800,515	824,592	1,030	Coal
458	Seward, Pennsylvania	864,338	819,916	949	Coal
459	AES Deepwater, Inc., Texas	1,287,524	815,711	634	Pet. Coke
460	Erickson, Michigan	809,058	812,236	1,004	Coal
461	Cromby, Pennsylvania	629,734	805,900	1,280	Coal
462	Horseshoe Lake, Oklahoma	1,188,522	805,177	677	Natural gas
463	Greenwood, Michigan	1,138,043	801,738	704	Natural gas
464	North Lake, Texas	1,271,870	794,926	625	Natural gas
465	Tracy, Nevada	1,308,301	784,233	599	Natural gas
466	Hidalgo Energy Center, Texas	1,926,715	784,020	407	Natural gas
467	McWilliams, Alabama	1,855,549	778,423	420	Natural gas
468	ANP Blackstone Energy, Massachusetts	1,967,066	763,739	388	Natural gas
469	Taconite Harbor, Minnesota	865,126	754,661	872	Coal
470	Bucksport Clean Energy, Maine	1,480,991	752,513	508	Natural gas
471	Hays Energy Project, Texas	2,047,817	745,271	364	Natural gas
472	Sim Gideon, Texas	1,309,562	742,958	567	Natural gas
473	Alma, Wisconsin	690,029	740,346	1,073	Coal
474	Green Country Energy, Oklahoma	2,149,918	733,602	341	Natural gas
475	Lake Catherine, Arkansas	1,182,799	730,814	618	Natural gas
476	Arthur Kill, New York	1,204,507	725,555	602	Natural gas
477	Duke Energy South Bay, California	1,101,837	724,126	657	Natural gas
478	Pine Bluff Energy Center, Arkansas	1,260,496	721,436	572	Natural gas
479	Rumford Power, Maine	1,832,383	710,247	388	Natural gas
480	Scattergood, California	1,284,789	705,800	549	Natural gas
481	Cunningham, New Mexico	1,215,956	705,336	580	Natural gas
482	Lake Road, Missouri	668,090	704,855	1,055	Coal
483	Riverside, Iowa	707,625	703,594	994	Coal
484	Bosque County Power, Texas	1,675,865	697,372	416	Natural gas

Table 3.12
 UNITED STATES CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
485	Graham, Texas	1,216,627	693,351	570	Natural gas
486	Newington, New Hampshire	660,451	686,258	1,039	Oil
487	S O Purdom, Florida	1,623,738	681,501	420	Natural gas
488	Platte, Nebraska	563,701	675,295	1,198	Coal
489	Gadsden, Alabama	484,718	674,033	1,391	Coal
490	Comanche, Oklahoma	1,338,064	671,661	502	Natural gas
491	Tiverton Power Assoc, Rhode Island	1,723,622	659,351	383	Natural gas
492	Griffith Energy LLC, Arizona	1,643,659	631,151	384	Natural gas
493	Cleburne Cogeneration, Texas	1,429,066	622,068	435	Natural gas
494	Theodore Cogeneration, Alabama	1,258,507	614,873	489	Natural gas
495	Hutsonville, Illinois	591,199	614,667	1,040	Coal
496	Mountain Creek Steam, Texas	971,731	612,623	630	Natural gas
497	Riverton, Kansas	475,354	611,958	1,287	Coal
498	Morgan Creek, Texas	1,121,868	611,218	545	Natural gas
499	Stryker Creek, Texas	1,115,276	602,097	540	Natural gas
500	Bastrop Clean Energy, Texas	1,697,296	601,402	354	Natural gas
501	Fort Churchill, Nevada	1,052,429	599,655	570	Natural gas
502	R M Heskett, North Dakota	523,027	596,291	1,140	Coal
503	Hermiston, Oregon	1,616,638	594,949	368	Natural gas
504	Intercession City, Florida	811,379	594,693	733	Natural gas
505	Eagle Mountain, Texas	821,805	593,615	722	Natural gas
506	Sterlington, Louisiana	1,070,959	591,174	552	Natural gas
507	Mustang, Oklahoma	1,010,802	590,375	584	Natural gas
508	Rio Nogales, Texas	1,258,785	581,170	462	Natural gas
509	Dan River, North Carolina	516,712	576,042	1,115	Coal
510	Mitchell, Georgia	589,174	573,469	973	Coal
511	Blount Street, Wisconsin	438,398	572,229	1,305	Coal
512	Attala Generating Plant, Mississippi	1,396,170	566,747	406	Natural gas
513	Etiwanda Generating, California	902,769	564,942	626	Natural gas
514	River Road, Washington	1,531,925	563,773	368	Natural gas
515	R P Smith, Maryland	503,446	561,062	1,114	Coal
516	Nueces Bay, Texas	1,046,627	557,816	533	Natural gas
517	Tenaska Lindsay Hill, Alabama	1,325,113	557,719	421	Natural gas
518	Southwestern, Oklahoma	783,636	554,480	708	Natural gas
519	Androscoggin Cogen, Maine	692,184	552,449	798	Natural gas
520	Frontera Power Facility, Texas	1,345,813	551,097	409	Natural gas
521	O W Sommers, Texas	814,900	551,062	676	Natural gas
522	State Line, Missouri	1,359,024	545,779	402	Natural gas
523	Ray Olinger, Texas	794,042	544,211	685	Natural gas
524	Edwardsport, Indiana	344,544	536,539	1,557	Coal
525	Sacramento Power Auth, California	1,208,871	534,141	442	Natural gas
526	Berkshire Power, Massachusetts	1,379,085	533,692	387	Natural gas
527	Richard M Flynn (Holtsville), New York	1,249,774	531,375	425	Natural gas
528	Mandalay Generating, California	986,069	531,314	539	Natural gas

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
529	Richmond County Plant, North Carolina	1,479,857	530,470	358	Natural gas
530	Grays Ferry Cogen, Pennsylvania	860,624	528,781	614	Natural gas
531	McClain Energy Facility, Oklahoma	1,459,050	521,232	357	Natural gas
532	Michigan Power, Michigan	1,095,496	518,328	473	Natural gas
533	Rivesville, West Virginia	386,259	517,603	1,340	Coal
534	Brandy Branch, Florida	631,959	515,508	816	Natural gas
535	Plant X, Texas	835,626	514,910	616	Natural gas
536	Batesville Generation, Mississippi	1,176,849	511,923	435	Natural gas
537	Coyote Springs, Oregon	1,255,078	509,956	406	Natural gas
538	Fort Phantom, Texas	870,584	509,369	585	Natural gas
539	Linden Cogeneration, New Jersey	4,339,848	504,718	116	Natural gas
540	Glenwood, New York	838,938	498,821	595	Natural gas
541	Sam Bertron, Texas	775,429	498,529	643	Natural gas
542	Washington County, Alabama	852,951	494,267	579	Natural gas
543	Duke Energy Hinds, Mississippi	1,369,581	487,981	356	Natural gas
544	Grand Tower, Illinois	1,136,680	484,810	427	Natural gas
545	Deepwater, New Jersey	423,355	481,611	1,138	Coal
546	Manchief Electric, Colorado	794,580	478,489	602	Natural gas
547	Nichols Station, Texas	805,424	477,697	593	Natural gas
548	Liberty Electric Power, Pennsylvania	1,292,916	473,313	366	Natural gas
549	Sabine Cogeneration, Texas	679,830	472,260	695	Natural gas
550	Robert Reid, Kentucky	369,652	471,328	1,275	Coal
551	Indeck Corinth Energy, New York	1,075,913	464,037	431	Natural gas
552	Teche, Louisiana	797,974	463,127	580	Natural gas
553	Picway, Ohio	380,217	459,099	1,207	Coal
554	Suwannee River, Florida	625,659	459,060	734	Oil
555	Clark, Nevada	761,622	457,736	601	Natural gas
556	Arvah B Hopkins, Florida	740,853	457,132	617	Natural gas
557	Rio Grande, New Mexico	720,534	455,232	632	Natural gas
558	AES Ironwood, Pennsylvania	1,452,370	453,401	312	Natural gas
559	New Boston, Massachusetts	767,936	442,982	577	Natural gas
560	Chouteau Power Plant, Oklahoma	862,622	440,386	511	Natural gas
561	Newington Power Facility, New Hampshire	1,171,300	438,880	375	Natural gas
562	R W Miller, Texas	717,635	436,160	608	Natural gas
563	Kendall County, Illinois	1,136,067	426,493	375	Natural gas
564	Middletown, Connecticut	564,810	425,881	754	Oil
565	Chevron Cogenerating, Mississippi	1,136,535	424,105	373	Natural gas
566	Rathdrum Power, LLC, Idaho	999,500	419,096	419	Natural gas
567	Knox Lee Power Plant, Texas	618,463	417,955	676	Natural gas
568	Rex Brown, Mississippi	424,614	414,969	977	Natural gas
569	Lon D Wright, Nebraska	337,950	413,779	1,224	Coal
570	Auburndale Cogen, Florida	1,070,513	412,973	386	Natural gas
571	Gordon Evans Energy, Kansas	875,810	412,415	471	Natural gas
572	SCA Cogen II, California	846,492	403,709	477	Natural gas

Table 3.12
 UNITED STATES CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
573	Oswego Harbor Power, New York	415,194	398,807	961	Oil
574	MEP Pleasant Hill-Aries, Missouri	996,916	396,371	398	Natural gas
575	Shady Hills, Florida	608,977	392,118	644	Natural gas
576	T C Ferguson, Texas	701,794	385,180	549	Natural gas
577	Ennis-Tractebel Power, Texas	1,029,797	384,160	373	Natural gas
578	Agua Fria Generating, Arizona	625,908	383,559	613	Natural gas
579	Orlando Cogen, Florida	860,496	383,317	445	Natural gas
580	Broad River, South Carolina	570,850	376,688	660	Natural gas
581	Harbor Generating Stn, California	624,712	376,084	602	Natural gas
582	Duke Energy Hot Springs, Arkansas	1,174,335	363,114	309	Natural gas
583	Gadsby, Utah	655,259	362,248	553	Natural gas
584	William F Wyman, Maine	407,834	360,214	883	Oil
585	Debary, Florida	514,580	358,675	697	Natural gas
586	Devon, Connecticut	458,926	356,878	778	Oil
587	Cordova Energy Center, Illinois	869,964	344,261	396	Natural gas
588	Duke Energy Murray, Georgia	189,729	339,803	1,791	Natural gas
589	Tyrone, Kentucky	253,778	338,475	1,334	Coal
590	San Angelo Power Station, Texas	597,742	336,847	564	Natural gas
591	Linden, New Jersey	435,762	335,680	770	Natural gas
592	Mistersky, Michigan	244,285	322,642	1,321	Natural gas
593	Potrero, California	572,925	319,562	558	Natural gas
594	Whitewater Cogen, Wisconsin	731,388	317,460	434	Natural gas
595	Kyrene Generating Stn, Arizona	829,674	317,414	383	Natural gas
596	Moselle, Mississippi	474,705	317,044	668	Natural gas
597	Decatur Energy Center, Alabama	783,755	316,504	404	Natural gas
598	Laredo, Texas	475,725	314,731	662	Natural gas
599	Perryville Power Station, Louisiana	930,971	309,818	333	Natural gas
600	Elwood Energy Facility, Illinois	524,560	309,772	591	Natural gas
601	Montville, Connecticut	298,902	306,997	1,027	Oil
602	S A Carlson, New York	242,156	304,734	1,258	Coal
603	Kendall Square, Massachusetts	349,753	301,520	862	Natural gas
604	Delaware City Refinery, Delaware	356,319	297,303	834	Natural gas
605	Sweetwater, Texas	573,906	292,380	509	Natural gas
606	Hunters Point, California	413,104	286,836	694	Natural gas
607	Ouachita Power, LLC, Louisiana	556,983	285,108	512	Natural gas
608	Hamilton, Ohio	289,025	283,404	981	Coal
609	Duke Energy Arlington Valley Energy, Arizona	266,188	276,391	1,038	Natural gas
610	Reliant Energy Osceola, Florida	453,288	271,763	600	Natural gas
611	Bellemeade, Virginia	523,006	267,405	511	Natural gas
612	Rockingham Power, North Carolina	416,994	266,906	640	Natural gas
613	Humboldt Bay, California	376,679	265,569	705	Natural gas
614	West Georgia Generating, Georgia	449,915	265,331	590	Natural gas
615	La Palma, Texas	574,479	262,879	458	Natural gas

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
616	Holly Street, Texas	443,027	260,610	588	Natural gas
617	Sewaren, New Jersey	343,799	259,963	756	Natural gas
618	Doc Bonin, Louisiana	428,186	259,803	607	Natural gas
619	El Centro, California	421,736	255,306	605	Natural gas
620	Harbor Beach, Michigan	240,305	254,759	1,060	Coal
621	Benning, District of Columbia	218,124	253,502	1,162	Oil
622	Maddox, New Mexico	441,736	252,950	573	Natural gas
623	Eagle Point Cogen, New Jersey	959,951	250,911	261	Natural gas
624	Dighton, Massachusetts	580,585	250,814	432	Natural gas
625	Corpus Christi Energy, Texas	330,321	250,150	757	Natural gas
626	Oleander Power Project, Florida	524,561	248,330	473	Natural gas
627	Norwalk Harbor Station, Connecticut	268,015	248,108	926	Oil
628	Fountain Valley, Colorado	435,954	248,094	569	Natural gas
629	Carson Cogeneration, California	416,857	239,473	574	Natural gas
630	Lagoon Creek, Tennessee	378,882	232,560	614	Natural gas
631	Noblesville, Indiana	196,577	224,646	1,143	Coal
632	West Valley Generation, Utah	363,703	223,080	613	Natural gas
633	St. Francis, Missouri	246,140	222,832	905	Natural gas
634	J K Smith Generating, Kentucky	255,803	217,396	850	Natural gas
635	Heard County Power, Georgia	370,812	216,527	584	Natural gas
636	Cottage Grove Cogen, Minnesota	476,120	216,481	455	Natural gas
637	Acadia Power Station, Louisiana	234,737	216,281	921	Natural gas
638	Hog Bayou Energy Center, Alabama	387,479	215,822	557	Natural gas
639	J L Bates, Texas	328,219	213,038	649	Natural gas
640	Cutler, Florida	306,195	212,418	694	Natural gas
641	Lake Creek, Texas	311,442	206,210	662	Natural gas
642	West Phoenix Power CC4, Arizona	415,475	205,544	495	Natural gas
643	Far Rockaway, New York	403,232	204,213	506	Natural gas
644	Parkdale, Texas	286,669	197,731	690	Natural gas
645	West Lorain, Ohio	286,970	196,572	685	Natural gas
646	Judson Large, Kansas	276,019	196,186	711	Natural gas
647	Gould Street, Maryland	192,843	189,780	984	Oil
648	Mirant Zeeland, Michigan	603,514	189,147	313	Natural gas
649	Sunrise, Nevada	357,148	187,487	525	Natural gas
650	Hartwell Energy Facility, Georgia	283,463	187,157	660	Natural gas
651	Larsen Memorial, Florida	343,806	186,677	543	Natural gas
652	Sunrise Power Company, California	327,030	186,342	570	Natural gas
653	Neenah Power Plant, Wisconsin	332,319	185,855	559	Natural gas
654	Yucca, Arizona	400,642	185,564	463	Natural gas
655	Dahlberg (Jackson Co), Georgia	291,870	184,935	634	Natural gas
656	Orange Cogeneration, Florida	482,757	184,436	382	Natural gas
657	Cherokee County Cogen, South Carolina	415,688	184,058	443	Natural gas
658	Taft Cogeneration, Louisiana	340,596	177,536	521	Natural gas
659	Mulberry Cogeneration, Florida	405,358	176,792	436	Natural gas

Table 3.12
 UNITED STATES CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a (continued)

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
660	Greens Bayou, Texas	277,313	175,996	635	Natural gas
661	Jackson, Michigan	433,146	175,134	404	Natural gas
662	Mid-Georgia Cogen, Georgia	388,372	174,455	449	Natural gas
663	La Paloma Generating, California	467,321	171,979	368	Natural gas
664	Ocotillo, Arizona	295,374	170,699	578	Natural gas
665	Kearny, New Jersey	251,488	167,175	665	Natural gas
666	Rock River, Wisconsin	279,656	167,059	597	Natural gas
667	Duke Energy Washington Energy Facility, Ohio	434,468	164,317	378	Natural gas
668	Dansby, Texas	268,603	163,291	608	Natural gas
669	Gilbert, New Jersey	260,724	161,662	620	Natural gas
670	Rhode Island State, Rhode Island	559,920	161,363	288	Natural gas
671	Robert E Ritchie, Arkansas	224,982	159,613	709	Natural gas
672	Riverside Generating, Kentucky	157,548	157,510	1,000	Natural gas
673	AES Red Oak, New Jersey	217,822	156,554	719	Natural gas
674	Vienna, Maryland	151,030	154,047	1,020	Oil
675	ANP Bellingham Energy, Massachusetts	417,731	153,737	368	Natural gas
676	Burlington, New Jersey	341,560	151,132	442	Natural gas
677	Doyle Generating Facility, Georgia	245,211	150,401	613	Natural gas
678	Oneta Energy Center, Oklahoma	330,842	148,358	448	Natural gas
679	J R Kelly, Florida	243,107	145,877	600	Natural gas
680	Wrightsville Power, Arkansas	233,653	143,942	616	Natural gas
681	Delaware, Pennsylvania	115,348	142,457	1,235	Oil
682	Grayson, California	176,451	141,775	803	Natural gas

^a To limit its length, this table presents only the US power plants that emitted more than 141,030 tonnes (155,457 tons) of CO₂ emissions in 2002. The facilities in the table account for 99.5% of the total CO₂ emissions. There are 211 fossil-fired power plants in the database that reported fewer than 141,030 tonnes of CO₂ emissions.

Table 3.13
CANADA CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS^a

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
1	Nanticoke, Ontario	22,236,000	21,370,000	961	Coal
2	Lambton, Ontario	10,455,000	8,990,000	860	Coal
3	Sheerness, Alberta	5,810,000	6,346,000	1092	Coal
4	Battle River, Alberta	4,867,000	5,331,000	1095	Coal
5	Lakeview, Ontario	2,455,000	2,340,000	953	Coal
6	Thunder Bay, Ontario	1,522,000	1,663,000	1093	Coal
7	Lennox, Ontario	2,762,000	1,460,000	529	Oil
8	H.R. Milner, Alberta	790,000	984,000	1246	Coal
9	Atikokan, Ontario	823,000	889,000	1080	Coal
10	Rainbow Lake (Units 4-5), Alberta	627,000	328,000	523	Natural gas
11	Poplar Hill, Alberta	138,000	76,000	551	Natural gas
12	Rainbow Lake (Units 1-3), Alberta	33,000	31,000	939	Natural gas
13	Valleyview, Alberta	55,000	31,000	564	Natural gas

^a CO₂ emissions data are incomplete in Canada for 2002. Only ATCO Power in Alberta and Ontario Power Generation (OPG) in Ontario publicly published individual power plant annual CO₂ emissions for 2002. ATCO Power provides 2002 CO₂ emissions and net generation in the report *Environment, Health and Safety Review 2002*. Online at http://www.atcopower.com/Environment_Health_&Safety/Reports/environmental_reports.htm. Ontario power plant data are from OPG's report *Towards Sustainable Development: 2002 Progress Report*. Online at http://www.opg.com/envComm/E_annual_report.asp.

Table 3.14

MEXICO CO₂ POWER PLANT EMISSIONS, SORTED BY ANNUAL EMISSIONS

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
1	C.T. PDTE. A. López Mateos (Tuxpan), Veracruz	15,030,690	10,603,037	705	Oil
2	C.T. Plutarco Elias Calles (Petacalco), Guerrero	13,879,470	8,247,112	594	Coal
3	C.T. Francisco Pérez Ríos (Tula), Hidalgo	9,734,170	7,270,331	747	Oil
4	C.T. Carbón II, Coahuila	8,636,350	6,465,622	749	Coal
5	C.T. José López Portillo (Río Escondido), Coahuila	7,515,560	6,277,829	835	Coal
6	C.T. Gral. Manuel Alvarez (Manzanillo I), Colima	6,449,140	4,802,602	745	Oil
7	C.T. Salamanca, Guanajuato	4,841,380	3,762,227	777	Oil
8	C.T. Altamira, Tamaulipas	4,655,850	3,710,679	797	Oil
9	C.T. Manzanillo II, Colima	5,034,400	3,582,059	712	Oil
10	C.T. Puerto Libertad, Sonora	3,349,740	2,604,163	777	Oil
11	C.T. José Acevez Pozos (Mazatlan II), Sinaloa	3,284,120	2,601,296	792	Oil
12	C.T. Valle de México, México	3,894,120	2,182,656	561	Natural gas
13	C.T. Villa De Reyes (San Luis Potosí), San Luis Potosí	2,925,990	2,175,635	744	Oil
14	C.T. Monterrey, Nuevo León	2,538,090	2,046,405	806	Oil
15	C.T. Carlos Rodríguez Rivero (Guaymas II), Sonora	2,259,290	1,784,843	790	Oil
16	C.T. Guadalupe Victoria (Lerdo), Durango	1,980,460	1,498,768	757	Oil
17	C.T. Juan De Dios Batis P. (Topolobampo), Sinaloa	1,996,550	1,496,539	750	Oil
18	C.T. Francisco Villa (Delicias), Chihuahua	1,919,730	1,484,702	773	Oil
19	C.C.C. Benito Juárez (Samalayuca II), Chihuahua	3,901,950	1,467,057	376	Natural gas
20	C.C.C. FCO. Pérez Ríos (Tula), Hidalgo	3,260,940	1,449,006	444	Natural gas
21	C.C.C. Dos Bocas, Veracruz	2,428,890	1,315,693	542	Natural gas
22	C.T. Emilio Portes Gil (Río Bravo), Tamaulipas	1,745,990	1,262,872	723	Oil
23	C.TG. Portes Gil (Río Bravo), Tamaulipas	1,031,400	1,216,356	1,179	Natural gas
24	C.T. Presidente Juárez (Tijuana), Baja California	1,488,840	1,161,186	780	Oil
25	C.C.C. Chihuahua II (El Encino), Chihuahua	2,949,700	1,155,436	392	Natural gas
26	C.C.C. Huinala, Nuevo León	2,331,460	1,066,807	458	Natural gas
27	C.T. Benito Juárez (Samalayuca I), Chihuahua	1,232,800	972,697	789	Oil
28	C.T. Mérida II, Yucatán	1,099,710	897,935	817	Oil
29	C.T. Campeche II (Lerma), Campeche	812,720	796,032	979	Oil
30	C.C.C. Presidente Juárez (Rosarito), Baja California	2,077,250	794,694	383	Natural gas
31	C.TG. El Sauz, Querétaro	1,495,570	787,424	527	Natural gas
32	C.C.C. Felipe Carrillo P. (Valladolid), Yucatán	1,517,600	685,122	451	Natural gas
33	C.C.C. El Sauz, Querétaro	1,370,540	645,602	471	Natural gas
34	C.T. Poza Rica, Veracruz	654,040	606,247	927	Oil
35	C.C.C. Gómez Palacio, Durango	1,045,260	591,390	566	Natural gas
36	C.T. Punta Prieta II, Baja California Sur	621,830	570,497	917	Oil
37	C.C.C. Huinala II, Nuevo León	1,333,060	502,788	377	Natural gas
38	C.TG. Presidente Juárez (Tijuana), Baja California	648,420	427,061	659	Natural gas
39	C.T. Felipe Carrillo P. (Valladolid), Yucatán	414,970	381,132	918	Oil

PLANT, STATE		ELECTRICITY GENERATION, MWh	CO ₂ EMISSIONS, metric tonnes	CO ₂ EMISSION RATE, kg/MWh	PRIMARY FUEL
40	C.T. Jorge Luque (LFC), México	497,160	362,650	729	Natural gas
41	C.TG. Hermosillo, Sonora	507,150	310,190	612	Natural gas
42	C.CI. Puerto San Carlos, Baja California Sur	470,680	286,608	609	Oil
43	C.T. Nachi-Cocom, Yucatán	249,470	262,614	1,053	Oil
44	C.T. Guaymas I, Sonora	186,750	217,070	1,162	Oil
45	C.TG. Chihuahua II (El Encino), Chihuahua	329,140	206,266	627	Natural gas
46	C.T. San Jerónimo, Nuevo León	222,010	154,502	696	Natural gas
47	C.TG. Huinala, Nuevo León	259,700	151,433	583	Natural gas
48	C.T. La Laguna, Durango	179,590	129,843	723	Natural gas
49	C.TG. Jorge Luque (Lechería) (LFC), México	145,390	115,683	796	Natural gas
50	C.TG. Nonalco (LFC), DF	131,470	99,471	757	Natural gas
51	C.TG. Cancún, Quintana Roo	77,770	90,686	1,166	Diesel
52	C.TG. Valle de México (LFC), México	104,780	85,676	818	Natural gas
53	C.TG. Monclava, Coahuila	n/a	75,926	n/a	Natural gas
54	C.TG. La Laguna, Durango	62,260	56,003	899	Natural gas
55	C.TG. Las Cruces, Guerrero	46,400	55,123	1,188	Diesel
56	C.TG. Ciudad Constitución, Baja California Sur	33,690	47,566	1,412	Diesel
57	C.TG. Los Cabos, Baja California Sur	30,900	37,315	1,208	Diesel
58	C.CI. Guerrero Negro, Baja California Sur	36,390	33,226	913	Diesel
59	C.TG. Caborca Industrial, Sonora	26,140	30,438	1,164	Diesel
60	C.TG. El Verde, Jalisco	29,110	28,391	975	Natural gas
61	C.TG. Nizuc, Quintana Roo	27,630	27,941	1,011	Diesel
62	C.CI. Santa Rosalía, Baja California Sur	26,220	24,540	936	Diesel
63	C.TG. Chávez, Coahuila	25,250	23,100	915	Natural gas
64	C.TG. Universidad, Nuevo León	17,220	17,884	1,039	Natural gas
65	C.TG. Culiacán, Sinaloa	17,550	17,572	1,001	Diesel
66	C.TG. Parque, Chihuahua	15,580	17,206	1,104	Diesel
67	C.TG. Leona, Nuevo León	16,570	17,121	1,033	Natural gas
68	C.TG. Tecnológico, Nuevo León	13,400	15,794	1,179	Diesel
69	C.TG. Ciudad Obregón, Sonora	10,780	14,827	1,375	Diesel
70	C.CI. Villa Constitución, Baja California Sur	17,170	14,228	829	Diesel
71	C.TG. Punta Prieta I (La Paz), Baja California Sur	9,870	14,173	1,436	Diesel
72	Pueblo Nuevo (Móvil), Sonora	12,050	13,082	1,086	Diesel
73	C.TG. Ciprés, Baja California	10,120	12,499	1,235	Diesel
74	C.TG. Arroyo De Coyote, Tamaulipas	6,540	11,297	1,727	Diesel
75	C.TG. Xul-Ha, Quintana Roo	8,770	11,192	1,276	Diesel
76	C.TG. Chihuahua I, Chihuahua	7,980	10,198	1,278	Diesel
77	Nuevo Nogales (Móvil), Sonora	7,730	8,047	1,041	Diesel
78	C.TG. Mexicali, Baja California	5,330	7,296	1,369	Diesel
79	C.TG. Esperanzas, Coahuila	4,590	6,276	1,367	Diesel
80	C.TG. Industrial (Juárez), Chihuahua	1,980	5,178	2,615	Diesel
81	C.TG. Fundidora, Nuevo León	4,810	4,762	990	Natural gas
82	C.CI. Yécora, Sonora	1,890	1,519	804	Diesel

4



Appendix: Methodology

INTRODUCTION

The availability of emission inventory data for North American power plants has been improving over the past decade and there will be further improvements in the future as the three North American countries work together to enhance the development and exchange of air emissions information. Currently, the US has a large amount of information available from the US EPA and Energy Information Administration. The availability of emissions data in the US is in part the result of public right-to-know reporting legislation as well as the country's implementation of market-based regulatory mechanisms, such as the SO₂ emissions trading program. Implementation of a cap-and-trade system requires the collection of high-quality emissions information in order to ensure the integrity of the program. Canada currently requires reporting of SO₂, NO_x and mercury from power plants, and is expanding its reporting by requiring all larger emitting

facilities to report their CO₂ emissions beginning in 2004. All power plants in Mexico report fuel consumption, emissions and several other operating characteristics in their annual operating reports, known as *Cédula de Operación Anual* (COA), submitted to the Ministry of Environment and Natural Resources (Semarnat). These documents, however, are generally not available to the public. We were able to obtain data for this report from a publicly available document by researchers at the Massachusetts Institute of Technology. The document contains emission estimates from individual power plants in Mexico based on fuel consumption data provided by Mexico's *Secretaría de Energía* (Sener) using emission factors for specific types of power plants.³¹ Newly passed reporting legislation with implementing regulations in Mexico will increase the public availability of this information in 2005.

CANADA

SO₂, NO_x, and mercury emissions data are from the National Pollutant Release Inventory (NPRI) database for 2002, accessible at http://www.ec.gc.ca/pdb/npri/npri_dat_rep_e.cfm. Canada requires owners or operators of facilities that manufacture, process or otherwise use a threshold amount of one or more of the NPRI-listed substances to report their emissions to NPRI. For SO₂ and NO_x, the threshold is 20 metric tons (tonnes), while for mercury, the threshold is 5 kg. We use data from the NPRI 12 March 2004 updates, which Environment Canada qualifies as preliminary data still subject to review and analysis by the agency. We limited our search to sources listed under SIC codes 4911 and 4111 in the NPRI database.

At the time of this report, CO₂ data for individual power plants were only available from two companies in Canada—ATCO Power (Alberta) and Ontario Power Generation (OPG). ATCO Power published CO₂ emissions for its fossil fuel power plants in a 2002 annual report.³² OPG also publishes information in annual company progress reports from which we were able to obtain 2002 CO₂ emissions.³³ In the future, we expect annual CO₂ emissions information to become available for most fossil fuel power plants in Canada. Under the Canadian Environmental Protection Act, 1999, the Canadian government recently gave formal notice that CO₂ reporting will be required for all facilities which emit at least 100 thousand metric tons (tonnes) of greenhouse gases in calendar year 2004. The first round of national reporting will be due in June 2005.

Annual net electricity generation by individual power plants is not generally publicly available in Canada, unlike information we could obtain from Mexico and the United States. We were able to collect some annual net generation data, however, from Canadian Electricity Association (CEA) information reports for many coal power plants that are participating in the CEA's Mercury Program.³⁴ Not all information reports, however, contained complete generation for 2002 so these values could not be included in the tables for Canada. In cases where 2002 data were incomplete, we show

output emission rates based on 2001 generation and emissions that are also given in the CEA information reports. We indicate these instances in the tables, and present the 2001 output rates as an indication of power plant performance that we would not expect to change significantly between 2001 and 2002 unless there was a significant shift in the type of fuel used or in the application of new control technologies. ATCO Power and Ontario Power Generation also published generation numbers for their power plants in 2002 editions of the same annual reports we obtained CO₂ emissions information from, and we use these for power plants not appearing in the CEA Mercury Program information reports. Using these various information sources, we were able to collect 2001 or 2002 generation information for almost all coal-fired power plants in Canada, with the lone exception of the Grand Lake Generating Station in New Brunswick. For completeness, we conservatively estimated Grand Lake's 2002 generation assuming the 57 MW power plant was available to generate electricity 90 percent of the time during 2002. As its actual operation in 2002 was likely somewhat less than 90 percent of the time during that year, this provides a conservative lower estimate for the output emissions rates of the various pollutants it reports. Therefore, the estimated output rates for the Grand Lake power plant are likely a lower limit from which to compare its relative environmental performance with other coal power plants in North America in terms of pollution emitted per output of electricity.

In creating the maps of North American SO₂, NO_x, mercury and CO₂ power plant emissions, we combined the emissions of a small number of Canadian facilities with identical latitude and longitude coordinates to present a single circle of summed emissions in the maps. Simply leaving the circles of individual facilities to overlap would obscure the collective amount of emissions at the same location. We list these overlapping facilities in **Table 4.1**.

Table 4.1
CANADA EMISSIONS TALLIED FOR MAPPING PURPOSES

FACILITY NAME	Latitude	Longitude	SO ₂ (tonnes)	NO _x (tonnes)	Hg (kg)	CO ₂ (tonnes)
Boundary Dam, Saskatchewan	49.133	-102.983	42,945	17,191	191	-
Shand Power, Saskatchewan	49.133	-102.983	13,740	5,863	56	-
Rainbow Lake (Units 1-3), Alberta	58.5	-119.5	-	196	-	31,000
Rainbow Lake (Units 4-5), Alberta	58.5	-119.5	-	255	-	328,000

MEXICO

Data for all four pollutants (SO₂, NO_x, mercury, and CO₂) were obtained from the report *Estimating Air Pollution Emissions from Fossil Fuel Use in the Electricity Sector in Mexico*, prepared by the Integrated Program on Urban, Regional, and Global Air Pollution at the Massachusetts Institute of Technology.³⁵ Because data were not available for each individual power plant in Mexico, the authors had to make some estimates. Using the *Informe de Operación* published by Mexico's *Comisión Federal de Electricidad* (CFE), the authors found the installed and effective generation capacity of thermal power units, as well as gross generation and fossil-fuel consumption data at the plant (not unit) level. For most of the plants, the CFE also provided information on boiler types and combustion configurations to enable more accurate unit-level emission estimates. For each power plant, the report's authors multiplied the total annual fuel consumption by the respective emission factors for the four pollutants.

In creating the maps of North American SO₂, NO_x, mercury, and CO₂ power plant emissions, we combined individual plant emissions from the Mexico facilities with the same latitude and longitude coordinates to present a single point of the summed emissions, rather than simply leaving the points to overlap, which would have obscured the total emissions at the locations. We list the facilities with combined emissions (those with the same latitude and longitude coordinates) in **Table 4.2**. The two coal plants in Coahuila (Carbón II and Río Escondido) were also combined because their locations, while not identical, nearly overlap, thus obscuring their aggregate emissions if mapped separately.

Table 4.2
MEXICO EMISSIONS TALLIED FOR MAPPING PURPOSES

FACILITY NAME	Latitude	Longitude	SO ₂ (tonnes)	NO _x (tonnes)	Hg (kg)	CO ₂ (tonnes)
C.T. Jorge Luque (LFC), México	19.62	-99.18	2	847	-	362,650
C.TG. Jorge Luque (Lechería) (LFC), México	19.62	-99.18	1	326	-	115,683
C.C.C. Huinala, Nuevo León	25.72	-100.10	6	3,009	-	1,066,807
C.C.C. Huinala II, Nuevo León	25.72	-100.10	3	1,418	-	502,788
C.TG. Huinala, Nuevo León	25.72	-100.10	1	427	-	151,433
C.Cl. Puerto San Carlos, Baja California Sur	26.00	-111.50	5,933	1,148	-	286,608
C.TG. Ciudad Constitución, Baja California Sur	26.00	-111.50	171	267	-	47,566
C.TG. Los Cabos, Baja California Sur	26.00	-111.50	134	209	-	37,315
C.Cl. Guerrero Negro, Baja California Sur	26.00	-111.50	117	903	-	33,226
C.Cl. Villa Constitución, Baja California Sur	26.00	-111.50	50	386	-	14,228
C.T. San Jerónimo, Nuevo León	26.00	-100.00	1	219	-	154,502
C.TG. Universidad, Nuevo León	26.00	-100.00	0	50	-	17,884
C.TG. Leóna, Nuevo León	26.00	-100.00	0	48	-	17,121
C.TG. Fundidora, Nuevo León	26.00	-100.00	0	13	-	4,762
C.T. Carlos Rodríguez Rivero (Guaymas II), Sonora	27.50	-110.50	41,972	2,958	-	1,784,843
C.T. Guaymas I, Sonora	27.50	-110.50	5,106	403	-	217,070
C.C.C. Chihuahua II (El Encino), Chihuahua	28.38	-106.05	12	3,264	-	1,155,436
C.TG. Chihuahua II (El Encino), Chihuahua	28.38	-106.05	1	582	-	206,266
C.TG. Parque, Chihuahua	28.38	-106.05	62	96	-	17,206
C.TG. Chihuahua I, Chihuahua	28.38	-106.05	37	57	-	10,198
C.T. Carbón II, Coahuila	28.46	-100.70	102,729	40,099	361	6,465,622
C.T. José López Portillo (Río Escondido), Coahuila	28.47	-100.68	104,213	45,932	349	6,277,829
C.TG. Ciudad Obregón, Sonora	29.00	-111.00	53	83	-	14,827
Pueblo Nuevo (Movil), Sonora	29.00	-111.00	46	355	-	13,082
Nuevo Nogales (Movil), Sonora	29.00	-111.00	28	219	-	8,047
C.Cl. Yecora, Sonora	29.00	-111.00	5	41	-	1,519

UNITED STATES

We obtained SO₂, NO_x, and CO₂ emissions data from the EPA's Clean Air Markets Division online data system, accessible at <http://cfpub.epa.gov/gdm>, and the data we downloaded from this site were the available reports as of March 2004. Power plants report these data to the Agency under the auspices of the Acid Rain Program. In general, all units over 25 megawatts are required to measure and report emissions under the Acid Rain Program. We limited the number of United States facilities that we compiled emissions for in this report to those 100 megawatts or greater in capacity. Therefore, the total emissions in this report are slightly lower than the national totals from the Acid Rain Program.

Many of the affected facilities in the Acid Rain Program database rely on continuous emissions monitoring devices to measure their stack emissions. However, smaller units sometimes rely on alternative measurement techniques. For example, oil-fired units can use fuel sampling to estimate their SO₂ emissions, and peaking units are allowed to use periodic stack tests as the basis for estimating their NO_x emissions.

For mercury, we calculated 2002 emissions from a 1999 database developed by the United States EPA, coupled with 2002 coal use data from the Energy Information Administration (EIA) of the United States Department of Energy. In 1999, EPA conducted an Information Collection Request (ICR) which involved coal sampling at virtually every power generating facility, as well as stack emissions testing at a smaller number of facilities. In order to estimate the 2002 mercury emissions, we calculated mercury emissions ratios for each facility using EPA's 1999 ICR mercury emissions estimate divided by the quantity (tons) of coal used by each plant in 1999. We then multiplied this plant-specific ratio (which represents mercury emissions per ton of coal consumed) by the amount of coal used by each of the facilities in 2002. This methodology is consistent with the approach used by EPA in its eGRID database of power plant emissions.³⁶

The EPA 1999 ICR Mercury results covered a little over 450 power plants,³⁷ while we compile emissions for 376 plants. There are several reasons for the fewer facilities covered in this report. As mentioned earlier, we limited the United States facilities covered in this report to those over 100 MW in capacity, while EPA's ICR effort included smaller facilities. Also, we only included those facilities reporting to EPA's Acid Rain Program, and not all facilities covered by the EPA ICR effort report emissions to this program. Furthermore, a few plants

converted from coal to natural gas or no longer operated in 2002, so would no longer have mercury emissions using the coal-based methodology we employ. Finally, not every coal plant included in EPA's 1999 ICR power plant list actually operated or burned coal in 1999, therefore we had no reference point to estimate their emissions if the plants were operating and burning coal in 2002.

We obtained power plant electricity generation data from the Energy Information Administration (EIA), including the EIA-906 and EIA-767 databases. In general, we relied on the EIA-906 database for annual generation data. If a facility did not appear in the EIA-906 database or its monthly generation data were incomplete, we would default to the EIA-767 data. In some cases, it was clear that not all boilers (or stacks) within an individual power plant report emissions to EPA's Acid Rain Program. Where we were able to identify these instances, we use only the generation from the EIA databases that is attributable to the portion of the facility reporting emissions. Therefore, to the extent we could identify these situations, the generation we use corresponds only to those boilers or stacks that having corresponding emissions data in the Acid Rain Program database.

We qualitatively compared the 2002 output rates with the year 2000 output rates reported by EPA's eGRID database to identify any gross discrepancies in the rates between the two years to help identify possible errors. In most cases, the 2002 output rates were within 10 percent or less of the eGRID 2000 rates. In cases where there were larger differences, we were able to identify changes in fuel use or other differences that made the changes appear reasonable. There were some instances where we could not determine why large changes in output rates occurred between the two years. These may be due to new pollution controls, fuel quality differences, or other operational changes for which we did not have information, or reporting discrepancies between the electricity generation and emissions databases.

In creating the maps of North American SO₂, NO_x, mercury, and CO₂ power plant emissions, we combined individual plant emissions from the United States facilities with the same latitude and longitude coordinates to present a single point of the summed emissions, rather than simply leaving the points to overlap, which would have obscured the total emissions at the locations. We list the facilities with combined emissions (those with the same latitude and longitude coordinates) in **Table 4.3**.

Table 4.3
UNITED STATES EMISSIONS AGGREGATED FOR MAPPING PURPOSES

FACILITY NAME	Latitude	Longitude	SO ₂ (tonnes)	NO _x (tonnes)	Hg (kg)	CO ₂ (tonnes)
Frontera Power Facility, Texas	26.42	-98.22	3	149	-	551,097
Hidalgo Energy Center, Texas	26.42	-98.22	4	201	-	784,020
Cane Island, Florida	27.99	-81.26	6	142	-	840,304
Intercession City, Florida	27.99	-81.26	160	317	-	594,693
Hines Energy Complex, Florida	28.00	-81.62	6	373	-	1,181,285
Tiger Bay, Florida	28.00	-81.62	9	522	-	1,754,136
Orange Cogeneration, Florida	28.00	-81.62	1	77	-	184,436
Mulberry Cogen, Florida	28.00	-81.62	1	40	-	176,792
San Jacinto Steam, Texas	29.83	-95.44	5	216	-	889,741
CoGen Lyondell, Inc., Texas	29.83	-95.44	5	802	-	935,591

Table 4.3
 UNITED STATES EMISSIONS AGGREGATED FOR MAPPING PURPOSES (continued)

FACILITY NAME	Latitude	Longitude	SO ₂ (tonnes)	NO _x (tonnes)	Hg (kg)	CO ₂ (tonnes)
Pasadena Power Plant, Texas	29.83	-95.44	10	571	-	1,903,434
Robins, Georgia	32.49	-83.68	11	9	-	17,699
Dahlberg, Georgia	32.49	-83.68	0	50	-	184,935
Mid-Georgia Cogen, Georgia	32.49	-83.68	1	46	-	174,455
Doyle Generating Facility, Georgia	33.76	-83.74	1	55	-	150,401
MPC Generating, LLC, Georgia	33.76	-83.74	1	26	-	28,774
Cherokee County Cogen, South Carolina	35.01	-81.62	1	37	-	184,058
Broad River Energy, South Carolina	35.01	-81.62	2	106	-	376,688
Reeves, New Mexico	35.04	-106.67	0	157	-	85,734
Person Generating, New Mexico	35.04	-106.67	0	11	-	23,463
Carson Cogeneration, California	38.38	-121.44	1	26	-	239,473
SCA Cogen II, California	38.38	-121.44	2	54	-	403,709
Sacramento Power Auth, California	38.38	-121.44	3	44	-	534,141
Woodsdale, Ohio	39.44	-84.58	0	116	-	113,043
Madison Generating, Ohio	39.44	-84.58	1	44	-	129,706
Hay Road, Delaware	39.57	-75.60	9	315	-	920,628
Delaware City Refinery, Delaware	39.57	-75.60	940	394	-	297,303
Elwood Energy Facility, Illinois	41.47	-87.89	1	95	-	309,772
Lincoln Generating, Illinois	41.47	-87.89	-	14	-	64,495
Joliet 29, Illinois	41.49	-88.08	18,746	3,456	364	5,570,469
Joliet 9, Illinois	41.49	-88.08	4,136	2,324	89	1,337,441
WPS Empire State, New York	43.01	-76.19	2	12	-	61,615
Carr Street, New York	43.01	-76.19	1	30	-	39,187
Concord, Wisconsin	43.02	-88.77	0	20	-	31,134
Whitewater Cogen, Wisconsin	43.02	-88.77	2	50	-	317,460

ENDNOTES

- 1 Alpine Geophysics. *Availability and Infrastructure of North American Electric Generating Utility Emission Inventories and Opportunities for Future Coordination*. Prepared for the Commission for Environmental Cooperation. 10 October 2003. Online at http://www.cec.org/files/PDF/POLLUTANTS/Availability-Infrastructure_en.pdf.
- 2 United States Environmental Protection Agency. *Inventory of Greenhouse Gas Emissions and Sinks: 1990–2002*. EPA 430-R-04-003. April 2004. Online at <http://www.epa.gov/globalwarming/publications/emissions>.
- 3 Statistics Canada. *Report on Energy Supply and Demand*. Catalogue No. 57-003. Table 18 (October 2003).
- 4 Environment Canada. Backgrounder—*Canada's 2002 Greenhouse Gas Inventory*. Online at http://www.ec.gc.ca/pdb/ghg/1990_02_report/ghg_backgrounder_e.cfm.
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- 8 Environment Canada. *Op. cit.* in endnote 5.
- 9 OECD. *Op. cit.* in endnote 6.
- 10 US EPA. *Op. cit.* in endnote 7.
- 11 Environment Canada. Mercury and the Environment. Online at <http://www.ec.gc.ca/MERCURY/SM/EN/sm-cr.cfm>.
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- 14 World Resources Institute. *EarthTrends Country Profiles. Climate and Atmosphere—Canada. 2003*. Online at http://earthtrends.wri.org/pdf_library/country_profiles/Cli_cou_124.pdf.
- 15 World Resources Institute. *EarthTrends Country Profiles. Climate and Atmosphere—Mexico. 2003*. Online at http://earthtrends.wri.org/pdf_library/country_profiles/Cli_cou_484.pdf.
- 16 US EPA. *Op. cit.* in endnote 2.
- 17 Mercury emission estimates exist for oil and natural gas power plants in Mexico based on fuel consumption and standard emission factors (Vijay, Samudra, Molina, Luisa T. and Molina, Mario J. *Estimating Air Pollution Emissions from Fossil Fuel Use in the Electricity Sector in Mexico*. Prepared by the Integrated Program on Urban, Regional, and Global Air Pollution at the Massachusetts Institute of Technology, April 2004. Available online at www.cec.org). We do not include them here to be consistent with the available data from Canada and the United States. The estimates for Mexico indicate coal is the dominant source of mercury air emissions from Mexico's electricity sector even though coal's share of national generation is small.
- 18 Based on each fuel's relative generation share and the total national generation amounts given in Figure 2.1.
- 19 The relative contribution of different fossil fuels to North American CO₂ emissions from the electricity generation sector is not available for 2002 at this time due to lack of CO₂ information by fuel type and power plant in Canada, with the exception of plants owned by ATCO Power (Alberta) and Ontario Power Generation.
- 20 Vijay *et al.* *Op. cit.* in endnote 17.
- 21 United States Environmental Protection Agency. *Engineering and Economic Factors Affecting the Installation of Control Technologies for Multipollutant Strategies*. Online at <http://www.epa.gov/clearskies/pdfs/multi102902.pdf>.
- 22 Scrubber installations were determined based on a review of United States EPA's National Electric Energy Data System (NEEDS). NEEDS, updated for version 2.1.6 of the Integrated Planning Model, reports emission controls on existing coal and oil/gas steam electric generating units.
- 23 Vijay *et al.* 2004. *Op. cit.* in endnote 17.
- 24 Canadian Electricity Association. CEA Mercury Program. Online at <http://www.ceamercuryprogram.ca/index.html> (accessed 16 July 2004).
- 25 United States Energy Information Administration. *Assumptions to the Annual Energy Outlook 2003*. Table 72. Production, Heat Content, and Sulfur, Mercury and Carbon Dioxide Emissions by Coal Type and Region, page 117. Online at <http://www.energyjustice.net/coal/p117.pdf>.
- 26 Vijay *et al.* *Op. cit.* in endnote 17.
- 27 We also combined emissions of other co-located power plants in North America to better reflect collective emissions at their locations on each of the maps in this chapter. We list the plants with combined emissions for mapping purposes in the Appendix.
- 28 United States Environmental Protection Agency, Clean Air Markets Division. Memorandum entitled: "Allocation Adjustment Factors for the Proposed Mercury Trading Rulemaking." 10 March 2004 (Table 1).
- 29 CEA. *Op. cit.* in endnote 24.
- 30 US EPA. *Op. cit.* in endnote 28.
- 31 Vijay *et al.* *Op. cit.* in endnote 17.
- 32 ATCO Power. *Environment, Health and Safety Review 2002*. Online at http://www.atcopower.com/Environment_Health_&_Safety/Reports/environmental_reports.htm (accessed 26 July 2004).
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- 35 Vijay *et al.* *Op. cit.* in endnote 17.
- 36 United States Environmental Protection Agency. *Users Manual: Emissions & Generation Resource Integrated Database—eGRID*. Prepared by E.H. Pechan & Associates, Inc. April 2003. Online at <http://www.epa.gov/cleanenergy/egrid/index.htm>.
- 37 The list of power plants covered by the EPA 1999 ICR effort is at <http://www.epa.gov/ttn/atw/combust/utiltox/pltxpl4.pdf> (accessed 30 September 2004).