



Mexico: Environmental Issues

Introduction

Over the past few decades, Mexico has experienced rapid economic growth. Despite several serious economic crises, Mexico's real gross domestic product (GDP) grew 205% between 1971 and 2001, from \$265 billion (1995-PPP) to \$807 billion 1995-PPP.* While this economic expansion succeeded in raising average incomes for Mexico's growing population, inadequate attention to pollution controls and infrastructure considerations led to significant environmental degradation.

Though there had been public health elements to previous pieces of legislation, Mexico only began to seriously address environmental protection in the late 1980s and 1990s. The first comprehensive environmental bill, the General Law of Ecological Balance and Environmental Protection (LGEEPA), was enacted in 1988. In 1996, it was amended to make sustainable development an explicit concern of the federal government. Mexico has given principal responsibility for environmental policy to the [Secretariat of Environment and Natural Resources \(SEMARNAT\)](#), although important enforcement duties are delegated to state and local governments.

Much discussion of Mexico's environment now occurs within the context of the North American Free-Trade Agreement (NAFTA), which mandates that Mexico raise its environmental protection standards to those in the United States. The incongruities between Mexican and United States environmental laws are being addressed through [bilateral negotiations](#). The signatories to NAFTA attempted to address the issue in 1993 through two "side agreements" that established [North American Commission for Environmental Cooperation \(CEC\)](#) and the [North American Development Bank \(NADBank\)](#). Both of these bodies were designed to help provide funding for Mexico to develop the infrastructure needed to deal with environmental issues along the border region. These include: an absence of sewage systems, running water, and electricity. At present, a case concerning the right of Mexican trucks, which do not necessarily adhere to United States environmental standards, to come into the United States is awaiting consideration from the United States Supreme Court.

The attention that Mexico is now paying to environmental protection has achieved some benefits according to the [OECD](#). For example, pollution control measures that went into effect in the mid-1990s have succeeded in visibly improving air quality in Mexico City. Nevertheless, economic and population growth continue to place pressure on the Mexican environment.

Air pollution

The Mexican Health Secretariat says that more than a third of Mexico's disease burden is the result of environmental factors, the most serious of which is air pollution. A recent [CEC study](#) found that respiratory ailments related to air pollution were the cause of death for at least half of the more than 2,800 minors who died in the northern border city of Ciudad Juarez. Though especially pressing in the country's largest cities (e.g. Mexico City, Guadalajara, and Ciudad Juarez), air pollution also has intensified along the border with the United States because of the growing number of factories ("maquiladoras") located there, as well as the increased truck traffic with the United States. Air pollution in northern Mexico also impacts the United States [border areas](#).



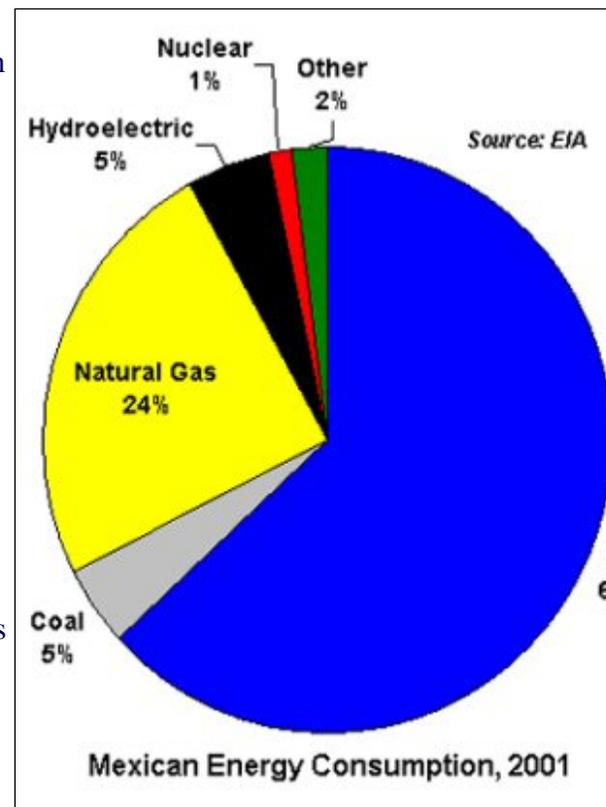
Mexico City is the most polluted city in the country and ranks among the most polluted

cities in the world. Its ozone levels exceed World Health Organization standards 300 days a year, and SEMARNAT has estimated that the air in Ciudad Juarez is 40% less contaminated than in the capital. Exhaust fumes from Mexico City's estimated 4 million motor vehicles, many of which are old and especially environmentally damaging, are the main source of air pollutants. The city's air problem is aggravated by its unique geography. Mexico City resides in a basin more than 7,400 feet above sea level and is surrounded on three sides by mountains. These isolate the city from regional weather disturbances and trap pollution.

The Mexican government recognizes the severity of its air pollution problem and has proposed innovative solutions to address it. These include providing incentives for using cleaner fuels and smog control measures. In major urban centers, private car drivers are required to have catalytic converters and refrain from driving one day a week. The state-owned oil company Pemex is also contributing to the pollution reduction effort. Since Mexico began to produce cars with emission controls in 1991, Pemex has been reducing its production of leaded gasoline. It has also moved to replace its high-sulfur diesel with a new variety containing only 0.05% sulfur.

Mexico City has its own [Secretariat of the Environment](#) (DFSME), which is actively involved in improving the capital's air. In 2002, Claudia Sheinbaum, Mexico City's environment secretary, signed an agreement with the [World Resources Institute \(WRI\)](#) to create the [Center for Sustainable Transport in Mexico City \(CSTMC\)](#). The broad mission of the CSTMC is to devise a sustainable transport network for the city of 20 million. Between 2002 and 2005, it will focus on: 1) establishing a bus rapid transit system with at least two corridors; 2) selecting the best new engine/fuel combinations for new high capacity transit buses that will run on the corridors; and 3) pilot-testing a program to retrofit existing diesel vehicles to reduce conventional air pollutants.

In addition to setting up the CSTMC, the DFSME has worked to create incentives both to spur the owners of approximately 2 million old cars to upgrade to newer models and companies to invest in cleaner vehicles. Dozens of manufacturers are taking advantage of government subsidies to outfit gasoline



powered delivery trucks with cleaner liquefied petroleum gas. The pollution fighting measures put in place in the mid-1990s have already improved visibility and air quality in the city.

Energy Use and Carbon Emissions

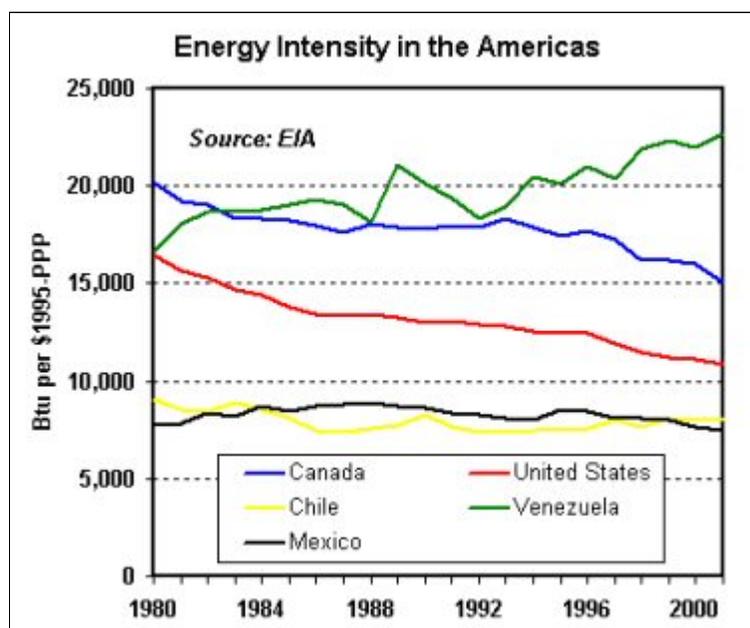
Mexico has proven crude oil reserves of 15.7 billion barrels (1/04E) , the fourth largest in the Western Hemisphere after Canada, Venezuela, and the United States. In 2001, Mexico consumed 6 quadrillion Btu (quads) of commercial energy, the vast majority of which came from fossil fuels. In 2001, oil accounted for 62.8% of total Mexican energy consumption; natural gas comprised 24.2%; and coal, a relatively carbon intensive and polluting fuel, made up 4.5%. Mexico's non-fossil energy came mostly from hydroelectric power plants, which accounted for 4.8% of total energy consumption. Non-hydroelectric renewables (solar, wind, geothermal, etc.) contributed 2%, while nuclear energy made up 1.3%.

Between 1980 and 1998, Mexico's carbon emissions rose 61.3%, from 64.7 million metric tons to 104.4 million metric tons. Mexican carbon emissions then remained stable until 2001, when they declined to 96.1 million metric tons (1.5% of the world total). The decline likely reflects the effect of the United States economic downturn.

Mexico ratified the [Kyoto Protocol](#) in September 2000. The Protocol will take effect only if 55 nations, which accounted for at least 55% of carbon dioxide emissions from industrialized countries in 1990, ratify the treaty. Because of its status as a developing nation, Mexico is exempted from the need to reduce carbon emissions.

Energy and Carbon Intensity

Mexico's energy consumption per dollar of GDP (energy intensity) decreased slightly between 1980 and 2001. Following a modest increase during most of the 1980s, Mexico's energy intensity decreased 16.5% between 1988 and 2001, from 8,900 Btu per \$1995-PPP to 7,400 Btu per \$1995-PPP. Mexico's 2001 energy intensity was comparable to Chile's, but significantly less than the United States, Canada, and Venezuela.



Between 1980 and 2001, the ratio of carbon emissions to GDP (carbon intensity) in Mexico behaved like Mexico's energy intensity. Carbon intensity rose gradually through the 1980s, and then declined to end the period slightly below its 1980 level. In 2001, Mexico's carbon intensity was 0.12 metric tons per thousand \$1995-PPP, 11% lower than its 1980 level.

Mexico's 2001 carbon intensity was slightly higher than in Chile (0.11 metric tons), and noticeably lower than in the United States (0.17 metric tons), Canada (0.19 metric tons), and Venezuela (0.30 metric tons). If current policies continue, Mexico's carbon

intensity could decrease considerably in coming years. These policies include the promotion of natural gas, hydroelectric power, geothermal, solar and wind power, as well as efforts to enforce mandatory environmental standards.

Per Capita Energy Use and Carbon Emissions

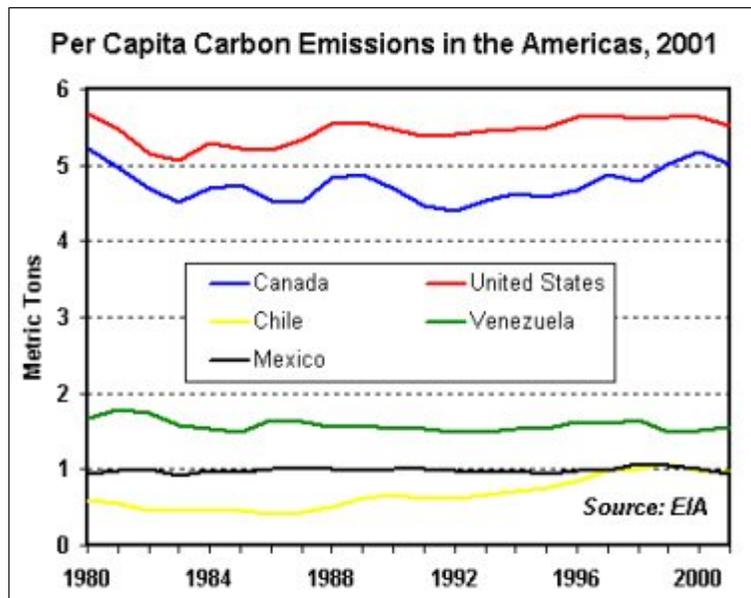
Mexico has a relatively low per capita energy consumption rate. In 2001, the country consumed 59 million Btu per person, far less than its NAFTA partners: Canada (403 million Btu) and the United States (342 million Btu). Mexico also consumes less energy per person than either Chile (69 million Btu) or Venezuela (120 million Btu). Between 1980 and 2001, Mexico's per capita energy consumption grew very little, rising just 10% from its 1980 level of 54 million Btu per person.

As with energy, Mexico's per capita carbon emissions are low relative to other countries in North America. In 2001, Mexico released 0.9 metric tons per person, considerably lower than either the United States (5.5 metric tons) or Canada (5.0 metric tons), but comparable to both Venezuela (1.6 metric tons) and Chile (1.0 metric ton). Mexico's per capita emissions remained almost unchanged from 1980 to 2001.

Renewable Energy

There is great potential for the use of renewable energy in Mexico. Currently, hydroelectric power is the largest renewable energy source, providing 20% of Mexico's total electricity supply. There are plans to construct new hydroelectric capacity over the next decade. The most ambitious of these plans is the 750-megawatt (MW) El Cajon project, which should be completed during 2007.

Amongst non-hydroelectric renewable sources of energy, geothermal is the most widely established in Mexico. In 2002, Mexico was the **third largest producer** of geothermal electricity in the world behind the United States and the Philippines, with 855 MW of installed geothermal capacity. According to the **United States Department of Energy (USDOE)**, Mexico's installed geothermal capacity in fall 2003 was 955 MW. It is estimated that Mexico could reach as high as 8,000 MW.



At the present time, there is little exploitation of solar or wind energy in Mexico. This does not reflect a lack of opportunities. Especially with wind, there are rich resources that have not yet been exploited. For example, some **estimates** suggest that just the southern La Ventosa region could support up to 2,000 MW of installed capacity. These opportunities notwithstanding, Mexico's 2003 installed capacity from wind energy is less than 3 MW.

There are no commercial solar energy facilities in Mexico, but the **International Energy Agency (IEA)** estimates that Mexico installed photovoltaic capacity is 14 MW. Most of this derives from development projects like those designed to provide power to communities that are not connected to the grid. One of the most prominent projects is the Renewable Energy for Agriculture Program



(REAP), which was established in 1994. Its mission is to deliver low cost, renewable energy to farmers. REAP is a cooperative effort between USAID, the Sandia National Laboratory and the Fideicomiso de Riesgo Compartido (FIRCO), a federal agency

under the Mexican Secretary of Agriculture. Many other projects occur under the aegis of the [Mexico Renewable Energy Program](#), which is co-funded by USDOE and USAID.

Outlook

According to the Energy Information Administration's *International Energy Outlook*, Mexico's energy consumption and carbon emissions will grow less rapidly than GDP through 2025. Energy consumption is predicted and carbon emissions are expected to grow at the same pace, however. Renewable energy consumption will grow slowly relative to all of the different fossil fuels. The most rapid increase is expected to occur in Mexico's consumption of natural gas. This reflects Mexico's industrial energy policy, under which a significant percentage of Mexico's thermoelectric plants are slated for conversion to natural gas by 2005.

With improved awareness and enforcement of environmental regulations combined with creative new pollution fighting policies, the Mexican government hopes to achieve its goals of improving air quality and preventing large scale environmental damage.

**GDP figures are based on OECD figures using purchasing power parity (PPP) exchange rates.*

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