September 2003

Germany: Environmental Issues

Introduction

The Social Democrat Chancellor Gerhard Schröder, whose party rules in coalition with the environmental-orientated political party, Greens (*die Grüne*), has been in power since 1998. Over the past five years, the inclusion of the Green party in the ruling coalition has greatly influenced Germany's energy and environmental policy objectives. From phasing out nuclear power to promoting energy efficiency and renewables, Germany has become a pioneer in reducing greenhouse gas emissions and in making alternative fuel sources viable. As a result, Germany has become the world's leader in wind energy, having an estimated 39% of the world's installed capacity.

Air Pollution

In the late 1970s and early 1980s, the use of lignite coal in the former East Germany, the proximity to the highly polluting former Soviet bloc countries, and a large transportation sector in the former West Germany harmed forests and air quality throughout Germany. In a 1996 assessment, forests were damaged to the point where only 43% could be considered healthy. The Ministry for Consumer Protection, Food and Agriculture pointed out in its 2002 report of the status on Germany's forests that although there have been marked improvements in all polluting sectors, the health of forests has improved only marginally since 1995. In 2002, 21% of all forests displayed visible forms of defoliation, according to the assessment. The report also pointed out that the decades of pollution are only now beginning to become visible, particularly on the forest floor, where the soil is acidifying after absorbing years of pollutants.

According to German Ministry for the Environment (BMU), air pollution in Germany has decreased during the last decade because of regulations, incentive programs, better quality fuels and improved technology. For example, the government reduced taxes paid on sulphur-free fuels and on natural gas. In 2000, with support from the BMU, the city of Berlin began the 1000 natural gas fueled taxis program (*Tausend Umwelttaxis für Berlin*). According to the program, there were 170 vehicles running on natural gas as of August 2003. The city expects to have over a thousand natural gas-fired vehicles in the coming years. Berlin has 12 natural gas service stations, with 361 in the entire country. In April 2003, the German government announced plans to introduce stricter norms on vehicle diesel emissions by 2010. Germany plans on collaborating with France in order to comply with European Union requirements.

In 2000, the German government introduced the Summer Smog program in order to reduce the levels of ground-level ozone. The program included 17 measures to reduce ozone precursor substances, such as nitrous oxide and volatile organic compounds. By 2010, the government expects to reduce the emissions by 40%. This program is in line with the European Union's National Emission Ceilings for Certain Atmospheric Pollutants (NEC Directive), which came into force in November 2001. NEC is the EU's strategy to combat acidification of soil and water, as well as the presence of ozone smog at low altitudes (troposphere) by setting national emission ceilings for four

pollutants - sulphur dioxide, nitrogen oxide, volatile organic compounds and ammonia.

Energy Use and Carbon Emissions

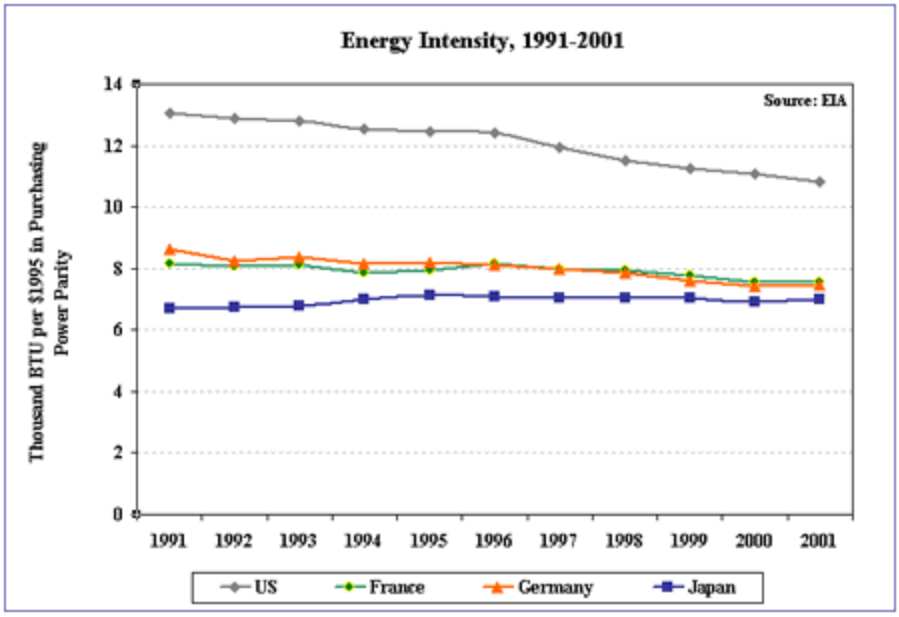
On October 18, 2000, the German Government adopted a new and ambitious climate protection program. The government set goals of reducing CO2 emissions by 25% of 1990 levels by 2005 and reducing the six greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) cited in the Kyoto Protocol by 21% between 2008 and 2012, within the context of the EU burden-sharing program.

In order to fulfill these commitments, the German government has been promoting renewables, as well as energy efficiency initiatives. In 2000, the government passed the **Renewable Energy Act** (*Erneubare Energien Gesetz*) designed to double the amount of electricity generated from renewable sources by 2010. The government's mid-term goal is to increase electricity generated from renewables to 20% by 2020 and to 10% of total energy consumption. In 2000, Germany had 64 initiatives to combat climate change.

Programs and Initiatives

In 1996, nineteen of Germany's leading industrial and trade organizations pledged in the *Erklärung der deutschen Wirtschaft zur Klimavorsorge* (Declaration by the German Industry on Global Warming Prevention) to reduce carbon emissions 20% by 2005. In November 2000, the German industry associations amended this agreement with the German government to reduce emissions 28% by 2005, as well as to reduce the six Kyoto gases by 35% in 2012 over 1990 levels.

In 1999, the **Eco-Tax** (*Ökologische Steuerreform*) was introduced with the goal of encouraging conservation, energy efficiency and the use of renewable energies. On January 1, 2003, the fifth stage of the German eco-tax came into force. It increased the general tax rates on fuel, gas and electricity for consumers and also imposed higher rates for industry and farming. Also in 1999, the German government began the **100,000 solar panel roof program** (*100,000 Dächer-Solarstrom-Programm*), which provided low interest loans to homeowners who installed rooftop solar panels of at least 1 kilowatt. The program ended in June 2003 after reaching its target of 300 MW.



In a move to promote energy efficiency, the German government in February 2002 the **Combined Heat and Power Law** (*Kraft-Wärme-Kopplungsgesetz*), which provided 4.5 billion euro of funding. Through the refurbishment of existing power plants and installation of new smaller plants, the government hopes to reduce greenhouse gas emissions by 23 million metric tons (mmt) per year by 2010. In 2002, the German government also passed the **Energy Saving Ordinance** (*Energieeinsparverordnung*) which requires new buildings to reduce energy consumption by 30% in comparison to current standards. (There are other programs which promote emissions reductions in

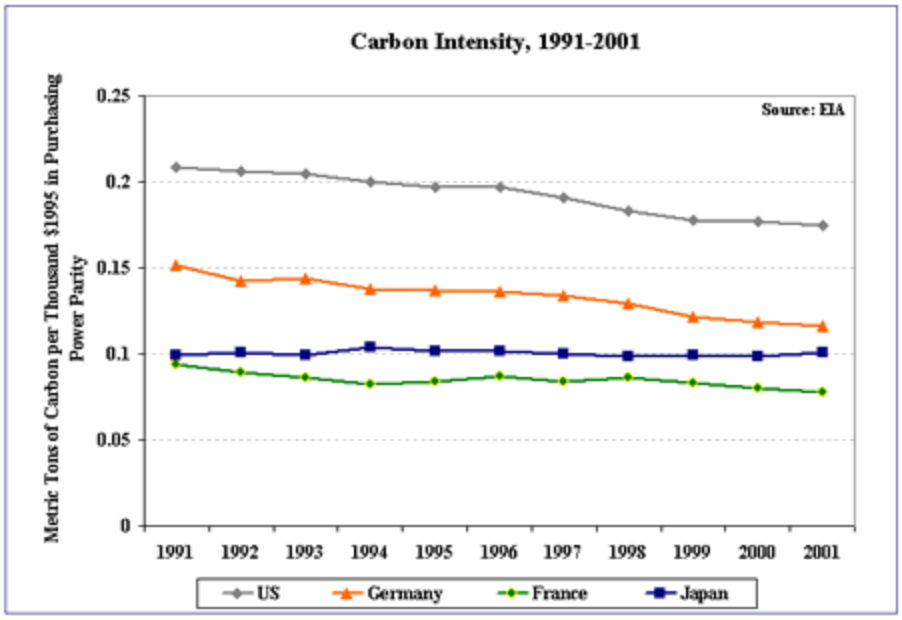
the transportation, residential, agricultural and industrial sectors).

In 2001, Germany's energy related carbon dioxide emissions were 223 mmt of carbon, ranking Germany the sixth largest carbon emitter in the world after the United States (1565 mmt), China (832 mmt), Russia (440 mmt), Japan (316 mmt), and India (251 mmt). German energy consumption in 2001 accounted for 3.6% of the world total (14.35 quadrillion Btus).

Energy and Carbon Intensity

Energy consumed per unit of GDP (energy intensity) in Germany in 2001 was approximately 7.5 thousand Btu per $1995 in PPP (purchasing power parity). Energy intensity was about equal to other industrial Western European countries, above Italy (6.3 thousand Btu per $1995 in PPP) and Ireland (5.5), but below Spain (7.7), and equal to France (7.5). Germany's 2001 energy intensity reflects a 13.3% decrease in energy consumption from 1991 levels despite the country's economic growth over the same period.

Germany's carbon has declined almost 23% since 1991. Carbon emitted per unit of GDP in 2001 was 0.12 metric tons per $1995 in PPP. This level was about equal to industrial Western European countries, and lower than the U.S. level of 0.17 metric tons per $1995 in PPP.



In 2001, Germany was the fifth largest coal consuming country in the world, behind China, the United States, India and Russia. Although consumption has declined by 35% since 1991, coal still plays a significant role in Germany. According to *Statistik der Kohlenwirtschaft*, an organization that provides information on the German coal industry, coal accounted for 24.8% of the country's total energy consumption in 2002. For gross electricity generation, coal represented 50.6%, of which brown coal made up 27.4% and hard coal 23.2%. In addition, the gradual phase-out of nuclear power could help boost most coal's role in Germany's energy mix. Coal, however, is the most carbon intensive fossil fuel, which might make it difficult for Germany to meet its ambitious carbon emissions reductions.

Per Capita Energy Consumption and Carbon Emissions

In 2001, Germany's per capita energy consumption was 174.3 million Btu per person, lower than in the United States (341.8 Btu), Canada (402.6 Btu) and Belgium (270.3 Btu).

In the same year, Germany's per capita carbon emissions were 2.7 tons of carbon per person, higher than France (1.8 tons), Italy (2.1), and the United Kingdom (2.6), but lower than the United States (5.5) and Canada (5.0).

Nuclear

On April 27, 2002, an amendment to the 1959 Atomic Energy Act entered into force. The purpose of the amendment was to phase out Germany's nuclear power industry. The act prohibits the construction of new nuclear power plants in Germany, while limiting the residual operating life of existing nuclear power plants to 32 years from the time of each plant's start-up.

The pact also requires that nuclear power plant operators construct interim waste-storage sites near the plants to reduce the unpopular transport of nuclear waste. Until June 30, 2005, operators are allowed to transport nuclear waste to reprocessing facilities. After that date, radioactive waste will be stored in final storage depots.

Renewable Energy

In recent years, the German government has been strongly promoting the use of renewable energy sources. Germany's Renewable Energy Act sets a goal of doubling renewable energy use by 2010. The long-term goal of the German Ministry for the Environment (BMU) is even more ambitious: renewable energy sources to account for 50% of Germany's primary energy sources by 2050.

Renewables' Contribution to Gross Electricity Consumption

	1998	1999	2000	2001	2002	2010
Gross Electricity Consumption (Bkwh)	556.7	557.3	576.4	580.5	581.7	**580**
Electricity from Renewables (Bkwh)	25	29	36	38	46	**70**
Percentage	4.6%	5.3%	6.3%	6.7%	8.0%	**12.5%**

Source: *German Ministry for the Environment, Nature Conservation and Reactor Safety*

Germany's main renewable resource for generating electricity has been hydropower. In 2002, hydropower accounted for 38% of electricity generated from renewables. Wind, however, has the most potential for expansion in Germany. Currently, the country has the most installed wind power capacity in the world, with 12,828 MW. According to the BMU, wind is expected to provide the same amount of electricity as hydropower in 2003. On the downside, suitable sites for additional wind farms in Germany are becoming scarce. As a result, the government has permitted the building of wind parks offshore. By 2006, the German government hopes to increase offshore installed capacity to 500 MW; by 2010 to 2,000-3,000 MW; and by 2030 to 20,000-25,000 MW. If this plan is realized, wind energy on both land and sea could meet 25% of Germany's electricity demand in 2030, according to the government. However, two environmental organizations, the Alliance for Environment and Nature Preservation in Germany BUND and the Nature Preservation Alliance NABU, have been pressuring the government to conduct more environmental impact studies before the wind parks are erected.

Outlook

According to the Energy Information Administration's *International Energy Outlook 2003*, Germany's total energy consumption is expected to grow at an annual rate of 0.6% through 2025. This figure is lower than projected annual GDP growth for Germany of 2.2% over the same period. Renewable energy sources are expected to increase at an average annual rate of 2.9%, nuclear energy consumption is expected to decrease at a rate of 5.2%, and carbon emissions are expected to increase at a yearly rate of 0.6% for the reference case outlook.

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