

7

Environment, climate, energy

Changes in the atmosphere and climate system are among the greatest environmental and political challenges of the 21st century. Climate change, which has largely been caused by human activity, is *the* global challenge. For many years now, Germany has been making efforts to avoid greenhouse gas emissions by way of anticipatory national climate change policies and by promoting renewable energy sources and energy efficiency. In the international arena, Germany is a forerunner in climate and energy policies and seeks to achieve ambitious emission-reduction goals.



Renewable energy is a must if we want to save the climate. It will play an important role in the energy mix of the future

Paths to a modern and sustainable climate and energy policy

By Joachim Wille

THE PROTECTION OF THE ENVIRONMENT AND CLIMATE is among the global challenges of the 21st century and is accorded a prime status in German politics, media and civil society. Germany is internationally considered one of the forerunners in climate protection and a pioneer in developing renewable energies. And the government assumes an active role in environmental protection, climate-friendly development strategies and energy partnerships at the global level, too. The Secretariat which supports the operation of the United Nations **Framework Convention on Climate Change** is headquartered in Bonn. Since 1990, Germany has reduced its greenhouse gas emissions by almost 20 percent and thus is already very close to its obligations outlined in the Kyoto Protocol of a 21-percent reduction by 2012. Germany places second in the global Climate Change Performance Index 2008, compiled by independent environmental protection organization “Germanwatch”. For many years now, Germany has been following a course which unites climate and environmental protection in terms of sustainable management. The key: a dual strategy to increase energy and resource efficiency and to develop renewable energies and raw materials. This promotes the development of innovative energy technologies both on the supply side, in power stations and renewable energy plants, and on the demand side, where energy is used, for example, in household appliances, cars and buildings.

Nature conservation (“the conservation and protection of the natural foundations of life”) has been enshrined



Framework Convention on Climate Change

In global terms, the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol linked to it are the only internationally legally binding regulations on climate protection. The 189 signatory countries at present meet annually at the UN Climate Change Conference. The best-known of these conferences took place in 1997 in Kyoto, Japan and resulted in the Kyoto Protocol. It fixed the reduction of greenhouse gas emissions of all developed countries at a certain level. At present, the so-called post-Kyoto process is starting, and will include negotiations on climate change policy from 2012 until 2020.



“World champion in wind energy” Germany: No other country produces a similar amount of electricity from wind power

Greenhouse gas emission

Roughly two thirds of global warming caused by humans (anthropogenic) can be attributed to carbon dioxide (CO₂) emissions. The gas is produced when the fossil fuels gas, oil and coal are burned. They all contain carbon (C) which combines with atmospheric oxygen (O₂) to form CO₂. According to studies by the International Energy Agency (IEA), energy-related anthropogenic activity releases over 26 billion tons of CO₂ into the atmosphere every year. In addition to carbon dioxide, other greenhouse gases regulated by the Kyoto Protocol are nitrous oxide, methane, fluorocarbons and sulfur hexafluoride.

as a state objective in Article 20a of the Basic Law since 1994. Intact natural systems, pure air and clean waterways are preconditions for a high quality of life and of the environment in Germany. Environmental indicators are pointing in a positive direction as regards the prevention of air and water pollution, because many emissions have been considerably reduced in recent years. **Greenhouse gas emissions** from road traffic have been decreasing since 1999, despite a significant increase in traffic; indeed, in 2005, for example, they were at the same level as in 1990. Outfitting motor vehicles with catalytic converters is, along with other measures, partly responsible for a roughly 50 percent reduction in nitrous oxide emissions. Sulfur dioxide emissions from coal and lignite power stations were able to be slashed by 90 percent owing to the mandatory flue gas desulfurization process. In recent years, the daily per capita rate of drinking water consumption has also decreased from 144 liters to 126 liters, the second lowest rate of all industrialized countries.

Fossil fuels still make up the backbone of the energy mix both in private households and for traffic and industry. With a 36-percent share, petroleum is the most important primary energy source, followed by natural gas, coal, nuclear fuel and lignite. Nuclear power, which is only used in the electricity sector, where it accounts for around 25 percent of total generation, is being gradually phased out, in accordance with a “nuclear consensus” concluded in 2000 between the federal government and electricity providers.

Trailblazing and efficient: Renewable energy

Against the background of the consequences of climate change, which science has described in vivid detail and which include increases in temperature, floods, droughts, accelerated melting of the polar icecaps and species extinction, as well as the constantly increasing global consumption of fossil fuels, renewable, climate-friendly alternatives are becoming increasingly more significant. The availability of wind, water, sun, biomass and geothermal energy is unlim-

ited and they release no emissions which are damaging to the climate. Renewable energies now make up 8.4 percent (2007) of all German energy consumption and as much as 14 percent of electricity consumption. Experts project a systematic increase in the latter to a level of 25 to 30 percent by 2020. With almost 30 percent of global wind energy output, Germany is considered the “world champion in wind energy”. Photovoltaic technology, which is used to turn the sun’s rays into electricity, is likewise demonstrating a swift rate of development and innovation. And biomass fuels such as biodiesel and bioethanol are being mixed with petrol in increasing quantities.

Successful and exemplary: State subsidies policy

The subsidies policy implemented as far back as the beginning of the 1990s makes the use of renewable energy attractive and economical. The **Renewable Energy Sources Act**

Renewable Energy Sources Act

The Renewable Energy Sources Act (EEG) is intended to advance the development of energy supply facilities driven by self-renewing sources. The goal is to increase the percentage of renewable energies in electricity consumption from the current level of 14.3 percent to a target corridor of 25-30 percent in 2020. The EEG guarantees producers compensation at fixed rates. The law, which came into force in 2000, is one of a series of measures aimed at reducing dependence on fossil fuels and energy imports from outside the EU. 47 other states have adopted the basic features of the German EEG.



Nature conservation and biological diversity



There are around 45,000 native animal species and over 30,000 native species of land plants, mosses, fungi, lichens and algae in Germany.

Nature conservation is a state goal in the Federal Republic and is entrenched in Article 20a of the Basic Law. There are thousands of designated nature conservation areas in Germany, as well as 14 national parks and an equal number of biosphere reserves. In addition, Germany is party to nine global, 11 regional and almost 30 international agreements which strive to conserve the environment. In Johannesburg the heads of state and government pledged to significantly reduce the current rate of loss of biological diversity by 2010. At the Göteborg Summit in 2001, the EU was even more ambitious resolving to stop biodiversity loss

by 2010. The 9th Conference of the Parties to the Convention on Biological Diversity took place in Bonn in 2008.

Nonetheless, there is still much work to be done. Around 40 percent of animal species and 20 percent of plant species in Germany are deemed endangered. The reasons include the destruction and disintegration of their habitats by housing estates and road construction, the intensification of agriculture and forestry, pollution and excess fertilization. The percentage of organically managed areas has continually increased in Germany from 4.9 percent in 2006 and is projected to rise to 20 percent in the medium term. Consumers are also recognizing the value of organic products; in late 2007, a total of 42,825 notifications of organic products had been sent to the Bio-Siegel information center for official recognition.

Integrated Energy and Climate Program

The Federal government intends to reduce German greenhouse gas emissions by 40 percent by 2020 with an Integrated Energy and Climate Program. The program encompasses measures in 29 fields ranging from the promotion of co-generation (facilities which generate electricity and heat at the same time) and of renewable energy to the continued development of carbon capture and storage technology (CCS), i.e., the separation and storage of carbon dioxide which accumulates in the power-generation process. The Federal government is pursuing three central goals with the Climate Program, namely, improving safe energy supplies, cost-effectiveness and lowering environmental impact.

(EEG), a market incentive program to foster the use of renewable energy, is considered the driver of the boom in climate-friendly energy sources and many countries have adopted its basic features. The increased use of renewable energy and a more efficient use of energy also form the core of the **Integrated Energy and Climate Program**, which the German government adopted in late 2007. The objective of the climate program, which has several stages, is to further separate economic development from emissions, to significantly increase energy efficiency and to guarantee safe energy supplies. This self-set climate package is intended to ensure that CO₂ emissions are reduced by 40 percent of the 1990 level by 2020. Germany has thus put itself at the top of the international leader board; no other comparable industrialized country has a similarly ambitious and concrete program.

Innovative and good for exports: Green technologies

These measures not only serve to protect the environment, but also to promote the development of an innovative future industry, which is a real job creator, is highly internationally competitive and increasingly active in foreign

markets. Now, every third solar cell and almost every second wind turbine come from Germany. In 2007, more than 250,000 people were working in the renewable energies industry. In addition, there are around one million more jobs in environmental technology, which includes water purification, filter technology, recycling and renaturalization. Another job driver are companies, too, which in times of rising energy prices are focusing on energy efficiency technologies (power stations with higher levels of efficiency, combined generation of electricity and heat, energy efficient construction, energetic building renovation, energy-saving cars). According to information from the International Energy Agency (IEA), Germany is already in the top group of countries which demonstrate a substantial economic performance with relatively low energy use. A study by the renowned corporate consultants Roland Berger states that by 2020, the environmental industry may provide more jobs than the machine construction and automobile industries, which still employ a great many people today. Moreover, two thirds of the population are convinced that consistent environmental policies have a positive influence on the competitiveness of the economy.



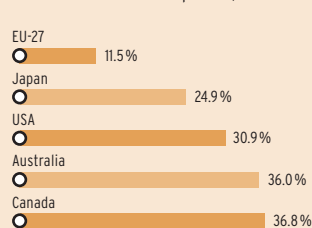
Environmental technologies as job drivers: The eco-industry is projected to be one of the most important job sectors in only 15 years time

Energy and the environment in facts and figures

Greenhouse gas reduction: Europe is making headway

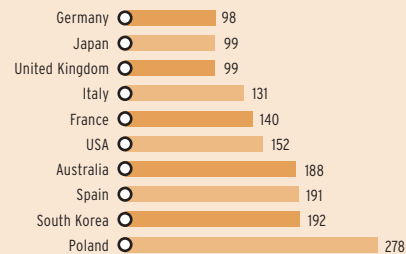
The EU still has to reduce greenhouse gas emissions by approximately 11.5 percent in order to achieve a 20 percent reduction on the 1990 level. On comparison, the EU is doing well

UNFCCC, IEA/OECD, Global Wind Energy Council, BEE



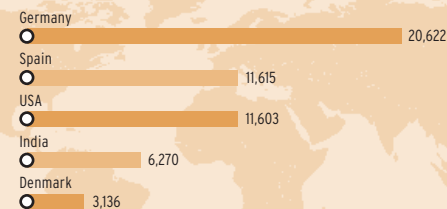
Energy intensity: Efficient Germany

With an energy input of 98 kilograms of oil equivalent, Germany achieves an industrial added value of USD 1,000



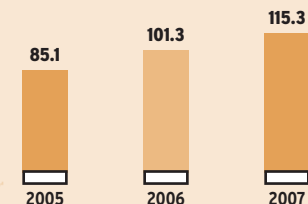
"World champion in wind energy": Germany

With an installed capacity of 20,622 megawatts, Germany is the world's largest market for wind energy



Carbon dioxide: emissions avoided

In 2007, renewable energies reduced CO₂ emissions in Germany by 115.3 million tons - and it is set to increase



EU climate protection objectives

In early 2008, the EU Commission presented its proposals for realizing the EU climate and energy package in national quotas. Germany will make an above-average contribution to cutting greenhouse gas emissions in Europe. In the sectors traffic, buildings and agriculture, a reduction of 14 percent in carbon dioxide emissions by 2020 is projected for the Federal Republic. The percentage of renewable energy in Germany's entire energy consumption is also projected to double, from 9 percent (2007) to 18 percent, by 2020.

Necessary: International cooperation on the climate

Climate change, the hole in the ozone layer and the pollution of the seas do not stop at national borders, therefore the protection of the environment and climate is an important task for the international community of nations.

Thus the German EU and G8 presidencies in 2007 made **climate protection objectives** and energy policy two of their main goals. The European Council, with its challenging resolutions in March 2007 to reduce greenhouse gas emissions, and the declaration of the G8 Summit in Heiligendamm, Germany, where heads of state and government pledged "to seriously test" the objective to halve greenhouse gas emissions by 2050, were important steps towards a global answer to climate change. Accordingly, the EU intends to reduce emissions of greenhouse gas such as CO₂ by at least 20 percent compared to the 1990 level by 2020, or by 30 percent if other industrial nations commit to similar reductions. It also intends to increase the share of renewable energy to 20 percent and lower energy consumption by 20 percent by means of improved energy efficiency. Emissions trading with CO₂ pollution rights for industry and electricity providers is to be an efficient and precise instrument in achieving these objectives. The EU has been testing this measure since 2005, which covers around half of greenhouse gas emissions.

The German Federal Government's seeks to actively involve economically advanced emerging nations such

as China, India, South Africa, Brazil and Mexico in protecting the climate too. This is a decisive point, for according to forecasts by the **United Nations Climate Council IPCC**, global CO₂ emissions must be halved by 2050 if global warming is to remain manageable in this century. As such, it is necessary to prevent the average global temperature rising by more than 2°C. This goal will not be achieved by the Kyoto Protocol, which came into force in February 2005 and in which only the industrialized countries were bound to a CO₂ reduction of 5.2 percent by 2012. As part of the "post-Kyoto process," the German government is calling for a successor protocol with more demanding obligations to reduce emissions. It would expire in 2020 and achieve a reversal of the trend on a global scale.

The Climate Change Conference in Bali in late 2007 laid the foundations for this. After complex negotiations, over 180 countries agreed to a negotiation framework for a regime that will succeed Kyoto. The developed nations want to significantly increase their efforts and, for the first time, developing and emerging nations also want to take measures to control their CO₂ emissions. In addition, in 2008 an adjustment fund was started, designed to help developing countries combat the consequences of global warming. The adjustment fund, managed by the World Bank and the Global Environment Fund (GEF), is projected to hand out an annual sum of USD 300-500 million by 2012. In cooperation with the Federal Ministry for Development, during the German G8 Presidency 2007, the World Bank created a "Forest Carbon Partnership Facility," to which Germany has committed EUR 40 million. It is intended to compensate developing countries if they stop felling tropical rainforests.

States have given themselves until the end of 2009 to pave the way for a new climate change agreement. Then they plan to pass the successor to the Kyoto Protocol in Copenhagen. ●

UN Climate Council IPCC

The Intergovernmental Panel on Climate Change (IPCC) is an international group of hundreds of experts and representatives of over 100 states, who analyze climate change on Earth for the United Nations and propose measures to counter it. The fourth report of the IPCC was published in 2007. Fundamentally, it stated that man is exacerbating the greenhouse effect and increasing the temperature of the planet and must take decisive action to counteract these occurrences. Many scientists from Germany have contributed to the UN IPCC's climate report. In late 2007, the UN Climate Panel was awarded the Nobel Peace Prize together with Al Gore. Leading German institutes which focus on climate change include the Max Planck Institute for Meteorology, the Alfred Wegener Institute for Polar and Marine Research, the Wuppertal Institute and the Potsdam Institute for Climate Impact Research.

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**The topic on the Internet****www.bmu.de**

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) presents on its Web site the most important political fields of action (German, English)

www.umweltbundesamt.de

The Federal Environment Agency (UBA) is Germany's central authority

on the environment regarding virtually all issues of environmental protection. The UBA Web site provides information on relevant environmental topics (German, English)

www.pik-potsdam.de

The Potsdam Institute for Climate Impact Research (PIK) investigates climate change in all its complexity. The

PIK is part of the Leibniz Association and is supported equally by the Federal Republic of Germany and the State of Brandenburg (German, English)

unfccc.int

Website of the United Nations Framework Convention on Climate Change with relevant information (English, French, Spanish)