



Federal Ministry for the  
Environment, Nature Conservation  
and Nuclear Safety



# CLIMATE PROTECTION PAYS OFF

Opportunities for  
innovation, growth and  
employment



## IMPRINT

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Ice masses breaking off from a glacier (calving)

## DEAR READER,

The Secretary General of the United Nations, Ban Ki-Moon, considers climate change to be potentially more dangerous than all the world's conflicts put together. It is causing huge damage, not just in other countries of the world but also here in Germany – through flood disasters, droughts, storms and heat waves. Last year science repeatedly provided new evidence to corroborate the fact that climate change is not only already occurring, but that it is also advancing a great deal faster than was previously assumed. If climate change continues unabated, the global temperature could rise by six degrees Celsius by 2100. This would have catastrophic consequences for humankind. Germany and the EU have therefore set themselves the goal of limiting the average rise in the global temperature to two degrees above the pre-industrial level.



Germany has already implemented numerous climate protection measures – as part of, but also above and beyond, its international commitments, such as the Kyoto Protocol – thus



playing an important pioneering role in this area. If we are to maintain this position and use it to induce others to become more committed, we have to step up our efforts to reduce greenhouse gases even further.

This brochure provides information about the scientific background to climate change, the policy measures to combat it that are being put in place, and the huge economic opportunities that are arising for Germany as climate protection acts as a motor for innovation.

Sigmar Gabriel  
Federal Minister for the Environment, Nature Conservation  
and Nuclear Safety

## WEATHER AND CLIMATE - WHAT ARE THEY EXACTLY?

Weather and climate are part of our daily experience, influencing people and nature alike. We talk of weather when referring to shorter periods of time: changes in temperature, atmospheric pressure, wind, humidity, cloud cover and precipitations within a space of hours or several days.

The term climate, on the other hand, describes the development of the weather over longer periods of time – ranging from a few years to many millennia. Not only average temperatures and precipitation are important here but also extreme events such as storm surges, very heavy rainfall and floods. Climate scientists are studying how climate extremes are changing and how frequently they are occurring. The climate differs from place to place – mountain climates are different from coastal climates and the climate in temperate zones is different from that in polar or tropical regions.

Whereas it is only possible to gauge what the weather will be like a few days in advance, the climate and its changes can to some extent be calculated over longer periods of time. For example, by measuring ice cores it is possible to infer climate throughout the Earth's history. Findings in this field show that there have always been climate variations throughout the Earth's history, some of them extreme. One example of this is the shift between warm periods and ice ages in the past millions of years.

However, over the past 10,000 years the climate has been particularly stable. During this time, which is recent in the history of the Earth, humankind and the environment have gone through a decisive development.

Hurricane Katrina in the US, 2005



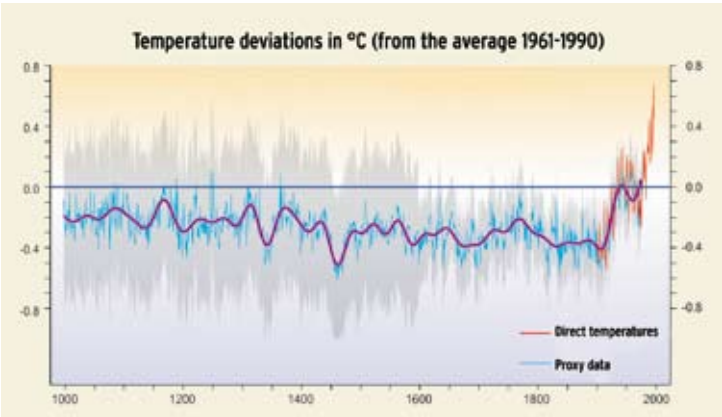
# CLIMATE CHANGE

In its Fourth Assessment Report published in 2007, the Intergovernmental Panel on Climate Change (IPCC), which produces reports bringing together the latest findings on climate science of hundreds of scientists from all over the world, reaffirmed:

Over the last 100 years, the Earth's temperature has risen by an average of  $0.74^{\circ}\text{C}$  – faster than ever before in the last 1,000 years. In recent decades, the warming of our atmosphere has accelerated sharply. This has been accompanied by changes in the global climate system: the sea level is rising, glaciers around the world are melting, and the hydrological cycle has intensified, leading to more extreme precipitation.

Climate change has a serious impact on our environment, affecting things such as ecosystems, water supply and agricultural production. The IPCC has established that there is more serious cause for concern than ever before.

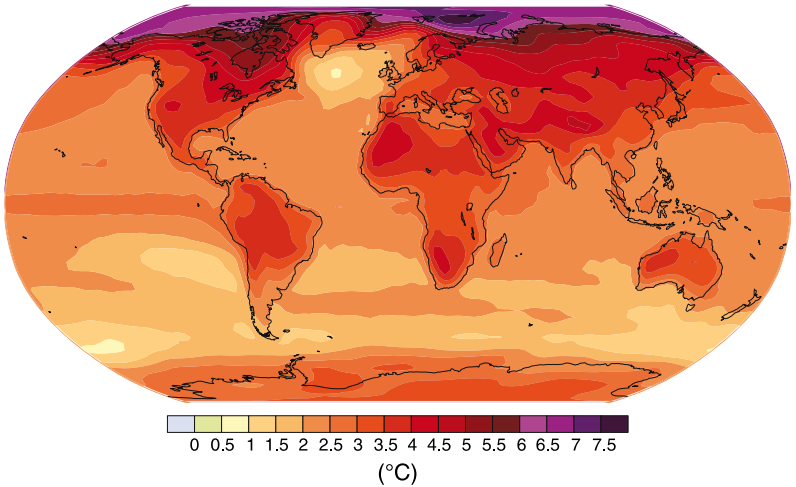
## Fluctuations in the temperature of the Earth's surface (northern hemisphere) over the past 1000 years



Source: German IPCC Coordination Office of the BMBF and BMU, 2002



## Expected change in the annual mean temperature in °C (average 2090-2099 compared to 1990)



Source: IPCC 4th Assessment Report 2007

The IPCC is a subsidiary body of the United Nations (UN) and was established in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organization in Geneva. Its task includes assessing the global risks of climate change and developing strategies for preventing and adapting to it. In 2007, the IPCC was awarded the Nobel Peace Prize for its work.

## CLIMATE CHANGE: MAN-MADE?

The IPCC report also clearly demonstrates that the warming that has occurred since the mid-20th century is largely due to human interventions – particularly as a result of burning the fossil fuels coal, oil and gas, which releases greenhouse gases such as carbon dioxide (CO<sub>2</sub>) or methane. Today’s level of greenhouse gases is significantly higher than the natural level throughout the last 650,000 years. A higher concentration of greenhouse gases in the atmosphere reduces the amount of heat radiated into outer space and increases the natural greenhouse effect.

The consequence: anthropogenic (man-made) climate change – “global warming.”

## GLOBAL CONSEQUENCES OF CLIMATE CHANGE

Depending on the assumptions they make about economic and population trends, scientists of the IPCC estimate that by the year 2100 global warming will be between 1.8 and 4.0 degrees or in a worst-case scenario 6.4 degrees even – unless emissions of greenhouse gases are reduced. The consequences would be serious: more frequent and more intensive storms, heavy rain, floods, and droughts. Added to that, there is a risk of abrupt and irreversible climate changes such as the melting of the polar ice caps. It is crucial to take into account here that the rise in temperature is unevenly distributed: Regions around the equator will warm up less, those around the poles will warm up more.

Even a rise in the global temperature of just one degree above the pre-industrial level significantly jeopardizes ecosystems and species, with coral reefs, the Amazon region and parts of the world's tropical rainforests being particularly af-



ected. We must also expect people to suffer greater harm if extreme weather events increase. That includes economic hardship.

If there is a warming of more than two degrees, the consequences and risks of climate change will become so serious that it will probably no longer be possible to take adequate measures to adapt. For example, 20-30% of species of flora and fauna throughout the world are at an increasing risk of extinction if the average global temperature rises by 2-3 degrees Celsius above pre-industrial values. We have the power to determine the extent of warming: active climate protection limits climate change. The Kyoto Protocol at the international level and the federal government's Integrated Energy and Climate Programme at national level are important steps in this direction.



## CLIMATE CHANGE BEGAN A LONG TIME AGO AND THE WARNING SIGNS ARE NOW BECOMING MORE FREQUENT

The consequences of global warming are already plain to see: the ice at the poles is melting much faster than previously expected. Since the drift ice is also decreasing, the habitats of polar bears, seals and sea-birds are shrinking.

Nine of the warmest years since meteorological records began occurred within the last 11 years (1998-2008). Worldwide, 2005 was the warmest year since observations began in 1861. Unfortunately, the year also broke many other records: 27 tropical storms over the Atlantic, 15 of them hurricanes. Wilma was the most powerful hurricane ever recorded and Hurricane Katrina caused horrendous devastation: New Orleans' levees broke and vast areas of the city were flooded. In the same year, the Amazon Basin suffered its worst drought in over 60 years. In 2006, special meteorological factors such as dust particles from the Sahara and the climate phenomenon El Niño hampered the formation of hurricanes, bringing brief respite. However, this did not herald a reversal of the rising number of environmental disasters. We were reminded of this in January 2007 when Hurricane Kyrill left a trail of damage and destruction across the whole of Europe, costing billions of euros.



Devastation after Hurricane Katrina in Florida, 2005



Flooding in Lauenburg on the Elbe river, 2006

No single extreme weather event can be linked with absolute certainty to climate change. And yet, taken together, the extreme weather events fit into the climate change picture that science is painting. They must be seen as warning signs that are becoming alarmingly more frequent.

Due to their geographical position and limited ability to adapt, developing countries are particularly affected by the consequences of climate change. But the effects are already being felt in the industrialised countries too. The heat wave of 2003 affected the whole of Europe and parts of the USA and Asia. According to reinsurance company Münchner Rückversicherung, up to 35,000 people died in Europe alone. The extreme drought caused economic losses totalling 13.6 billion euros, with agriculture accounting for 10 billion euros of that sum.

In Germany too flood disasters that in the past were classed as “floods of the century” are occurring at almost regular intervals: the flooding of the River Oder of 1997, the Northern Alps in 1999 and 2005, and the Elbe and Danube in 2002. The 2002 flood alone cost the German economy 9.3 billion euros. But lack of rain has also caused problems in Germany: during the hot record-breaking summer of 2003, which not only led to massive crop failures but also triggered a rise in the mortality rate, 7,000 people died – more than die each year in road traffic accidents.



## Effects on food and health

Climate change is accompanied by heat waves, which in turn – often aggravated by higher humidity and air pollution – cause a higher incidence of heat-related illnesses such as cardiovascular disorders and heat-related deaths. Tropical diseases such as malaria or dengue fever will occur in areas previously not affected by them, such as Southern and Central Europe. Far-reaching effects on agricultural production are also to be feared, and drinking water supply is threatened. Even now, global water resources are under severe strain from rapid population growth and the expansion of economic activities. Climate change will cause a sharp rise in the number of people living under the threat of water scarcity.

## The sea level is rising; glaciers are melting

The average global sea level has risen over the last century by around 10 to 20 centimetres. The reason for this is not only the expansion of the oceans due to higher temperatures but also melting glaciers in the mountains. From 1850 to 2000, 50% of the glacier area in the Alps was lost. A rise in the summer air temperature of three degrees Celsius would further decrease glacier cover in the Alps, leaving only 10% of the surface area of 1850. Models for the 21st century predict a rise in the sea level of 18-38 cm depending on the quantity of greenhouse gas emissions assumed, possibly even 26-59 cm. These models do not even take into account the accelerated dynamics of the ice melt in polar regions that have already been observed. These observations suggest a greater rise in sea level is to be feared than the models are currently calculating.

If the average global temperature rises by more than two degrees Celsius, there is even a danger that Greenland's entire ice will melt. Over several centuries the sea level would rise by several metres as a result - by seven metres if it melted completely.



## Environmental refugees and security risks

Since many megacities are situated on the coast, a rise in sea level would trigger internal migration and conflicts on a vast scale. In other words: the number of environmental refugees would increase worldwide. Studies carried out by the United Nations and the German government's advisory council have shown that the number of people forced to leave their homes as a result of climate change will increase dramatically. These people can no longer stay in the place they have always lived because their environment has changed due to soil erosion, desertification, water poverty or rising sea level. They flee in search of conditions under which they can survive, heading for cities in developing countries, fertile regions in their own countries, neighbouring countries or the industrialised countries. This development could lead to dangerous conflicts such as violent disputes over habitable land or natural resources such as fresh water.

## CLIMATE PROTECTION PAYS OFF

Failure to act will cost us all dearly. Following scientists warnings, the report published in October by British economist Sir Nicholas Stern entitled “The Economics of Climate Change” reaffirmed that climate change is an existential threat to our economic development. According to the report, the global costs of climate change amount to between 5% and 20% of global gross domestic product. That represents greater economic destruction than was caused in the period 1914 - 1945 by the combined effects of two world wars and the Great Depression. By contrast, implementing the necessary measures in terms of climate policy requires an investment amounting to slightly more than one per cent of the global gross domestic product.

Thus, climate protection pays off: an active commitment to combating climate change will cost a lot less than making good the damage it will cause or putting in place adaptation measures. To take a graphic example: promoting efficient technologies and renewable energies costs less than building dams to provide protection against sea level rise.







Assembling the rotor blade of a wind turbine

## INTERNATIONAL CLIMATE PROTECTION EFFORTS

Since the causes of climate warming are global, effective climate protection is only possible if all countries - and in particular the industrialised countries as major emitters – assume their national responsibility. That requires long-term international cooperation and a fair sharing of responsibility.

To this end, a global Framework Convention on Climate Change was adopted at the Earth Summit in Rio in 1992 with the goal of stabilising the concentration of greenhouse gases at a level that would prevent interference with the climate system. The aim was to reach this level within a time frame that would guarantee that ecosystems could adapt to climate change in a natural way, ensuring that food production was not threatened and that sustainable development remained possible. The Convention was signed by 154 countries and entered into force in 1994.

The secretariat of the Framework Convention on Climate Change is based in Bonn. This means that Germany not only hosts the Convention's secretariat with a staff of around 150, but is also the venue for many events, seminars and conferences on international climate protection.

Trinithaven Bight, Spitsbergen



The third Meeting of the Conference of the Parties in Japan in 1997 adopted the [HYPERLINK „http://www.bmu.de/klimaschutz/internationale\\_klimapolitik/glossar/doc/2902.php“](http://www.bmu.de/klimaschutz/internationale_klimapolitik/glossar/doc/2902.php) \l „kyoto“ \t „\_top“ Kyoto Protocol to the Framework Convention, under which the industrialised countries that bear the principal responsibility for the additional greenhouse effect were for the first time obliged by law to make concrete reductions to their emissions: under the Protocol, it was agreed that the industrialised countries would reduce their emissions of the six major greenhouse gases by 2008 to 2012 by a total of at least five per cent as compared with 1990, with the individual countries being obliged to contribute to differing degrees to achieving this goal. It was also agreed in the Protocol that the countries could to a limited extent fulfil their reduction obligations by implementing measures abroad. Thus, the Protocol created for the first time the indispensable conditions for cooperation needed to achieve effective international climate protection.

The Kyoto Protocol entered into force under international law on 16 February 2005. By March 2008, it had been ratified by 182 signatory states, which are responsible for a total of 63.7% of greenhouse gas emissions worldwide. However, the USA - the world's largest emitter of CO<sub>2</sub> - has not yet ratified the international agreement.



The Kyoto Protocol is one of international climate policy's great successes. Under the Protocol, many countries for the first made an internationally binding commitment to limit their greenhouse gas emissions. But it is clear that the agreements made for the first commitment period can only be a first step. Because to date no regulations have yet been passed for a large proportion of the greenhouse gases emitted throughout the world. Not all industrialised countries, for example, have ratified the Kyoto Protocol. In addition to that, emissions in many developing countries are on the increase. Currently, the countries that have made binding commitments under the Kyoto Protocol are responsible for about 30% of worldwide emissions of greenhouse gases.

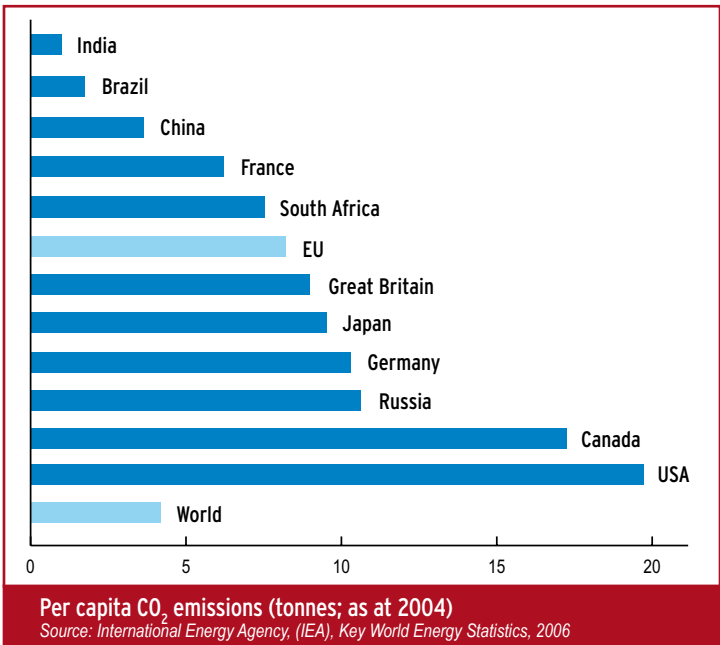


Climate Summit in Kyoto, 1997

International climate protection policy must not be abandoned in 2012 when the first commitment period of the Kyoto Protocol comes to an end. It is therefore important for further international negotiations that - by 2009 at the latest - medium and long-term climate protection goals be established that continue beyond the first commitment period and build on the pioneering architecture of the Kyoto Protocol.

## MORE STRINGENT CUTS TO THE OUTPUT OF GREENHOUSE GASES

In the future, the rich industrialised countries must continue to shoulder the major share in reducing greenhouse gases. Fairness commands this, because these countries have the highest per capita emissions of greenhouse gases in the world. An inhabitant of the USA causes on average about 20 tonnes of carbon dioxide (CO<sub>2</sub>) emissions per year – four times more than the global average. In Germany, the average is currently around ten tonnes of CO<sub>2</sub> per year. In March 2007, European Union heads of state and government therefore decided that industrialised countries should cut their emissions by 60 to 80% compared with 1990 levels – which would represent a greater reduction than the global average.





At the G8 Summit in June 2007 in Heiligendamm, the leading industrialised nations agreed on a process for achieving a successor agreement. All countries – including the USA – want to continue negotiations under the aegis of the United Nations, i.e. under the 1992 Framework Convention on Climate Change. At the world climate summit in Bali in December 2007, the community of states decided to negotiate a successor agreement to the Kyoto Protocol over the next two years. The industrialised countries and developing countries alike intend to redouble their efforts to protect the climate. The negotiation mandate is based on the scientific findings of the UN’s Intergovernmental Panel on Climate Change (IPCC) and reference is made to its latest Synthesis Report. In Bali, the signatories to the Kyoto Protocol also adopted an ambitious timetable for the negotiations with concrete targets. Making explicit reference to the IPCC Report, the signatories acknowledged that the industrialised countries must cut their emissions by 25 to 40 per cent by 2020.

## EUROPEAN CLIMATE PROTECTION POLICY

In March 2007 the European Union heads of state and government, under the leadership of Federal Chancellor Merkel, drafted an historic resolution: by 2020 the EU's greenhouse gas emissions would be cut to 30% below the 1990 level, provided that other industrialised countries commit to comparable emission reductions and that newly industrialising countries commit to making a contribution that is commensurate with their responsibilities and individual capabilities. The EU also unilaterally committed to a 20% reduction – irrespective of other countries' contributions. To this end, by 2020, 20% of energy consumption should be covered by renewable energies, and energy efficiency increased by 20%. In a second step, by 2050 industrialised countries are to achieve an overall cut of 60 to 80% in their total emissions compared to 1990, in order to reduce global emissions by at least 50% by that date. The introduction of emissions trading for CO<sub>2</sub> was already among the EU's specific measures in 2005.

At the end of 2008, a major climate and energy package was adopted. It comprises concrete targets for emissions reduction and the expansion of renewables for all member states. A Europe-wide upper ceiling was laid down for the emissions trading sector – i.e. power plants and major industry.

All this underlines the pioneering role Europe is playing in climate protection, but that cannot mean that all other countries have been released from their obligations. On the contrary: we can only halt climate change if we all work together.

## CLIMATE PROTECTION IN GERMANY

Implementing Europe's climate protection goals requires nothing less than a root-and-branch restructuring of industrialised society. It is tantamount to a second industrial revolution, a transition from an energy system based on fossil fuels to a low-carbon society with renewable energies and high energy efficiency. Proactive research and development, rapid market penetration for new, efficient products, innovative production processes and new transport concepts are the answers to the challenge.





## Where do we stand now?

Under the Kyoto Protocol, Germany committed to reducing its CO<sub>2</sub> emissions by 21% compared with 1990 by the time frame 2008-2012. In 2007, we achieved a cut of 20.4%. This achievement is due to the fact that climate protection has always been a key priority in German politics. For example, between 1990 and 1998, significant emission reductions were achieved largely as a result of thorough modernisation of East Germany's energy supply system. Between 1998 and 2005, the federal government passed many pieces of climate-friendly legislation, including, for example, the ecological tax reform in 1999, the Renewable Energy Sources Act in 2000, the CHP Act (combined heat and power) in 2002, and the emissions trading scheme at the beginning of 2005.

## The federal government's Integrated Energy and Climate Programme

Climate protection is a priority area in German politics. Our ambitious goals illustrate this: if the EU reduces its greenhouse gases by 30% below the 1990 level by 2020, Germany will make a contribution of -40%. At its meeting in Meseberg on 23 August 2007, the federal cabinet adopted 29 key points for an Integrated Energy and Climate Programme that will lead to emission reductions of about 35% and therefore rep-



resents a huge step towards achieving our climate protection goal. Building on these key points, the first package of measures was passed by the federal government that same year. In the course of 2008, the measures were brought into force by the Bundestag and Bundesrat (lower and upper house of the German parliament respectively). The cabinet also adopted a second package of measures on 18 June 2008. Both packages hinge on expanding renewables and improving energy efficiency. The following points represent the key elements of the Integrated Energy and Climate Programme:

### Climate protection targets:

- ▶ 40% reduction in greenhouse gas emissions by 2020 compared with 1990
- ▶ At least 30% of electricity should be generated from renewable sources by 2020
- ▶ At least 14% of heat demand should be generated from renewable sources by 2020
- ▶ Doubling of energy productivity by 2020 compared with 1990 (3% per year)
- ▶ Doubling of combined heat and power share to 25% of electricity generated by 2020



Thermal insulation of a building



## Expansion of renewable energies

In 2006, Germany emitted approximately 968 million tonnes of CO<sub>2</sub>. 807 million tonnes of CO<sub>2</sub> came from burning fossil fuels. The main source is the energy industry with 370 million tonnes, followed by emissions from heat generation and other combustion installations in industry and private households with 170 million tonnes of CO<sub>2</sub> and the transport sector with 162 million tonnes of CO<sub>2</sub>.

By using renewable energies in the electricity, heat and vehicle fuel sectors, Germany was able to save about 115 million tonnes of CO<sub>2</sub> in 2007. Energy-related emissions for Germany in 2007 are estimated to have totalled 774 million tonnes of CO<sub>2</sub>. Thus, had renewable energies not been used, emissions would have been about 15% higher.

## The amended Renewable Energy Sources Act (EEG)

Renewable energies make a decisive contribution to climate protection. In 2007, the renewables' share in electricity production was 14.3%. This is more than twice the 2001 share. The intention is to double the share again to 30% by 2020. The Renewable Energy Sources Act is the most effective instrument for promoting renewable energies and numerous countries such as China, France, Spain and Brazil have modelled their own legislation on it. To date, no other climate

protection measure has saved more CO<sub>2</sub> than the Renewable Energy Sources Act.

In order to continue the successful expansion of renewable energies, the Act was fine tuned in a number of respects to produce the amended version. For example, payment rates for offshore wind farms have risen. Similarly, highly efficient biogas plants that produce electricity and heat at the same time now also receive higher rates of payment. On the other hand, progress in productivity in the field of photovoltaics means that payment rates will be significantly lowered.

### **The Renewable Energies Heat Act makes its debut**

In the field of heat supply, the aim is for renewable energies to reach a 14 per cent share in the same period. To do this, the Renewable Energies Heat Act was developed. This Act stipulates that from 1 January 2009 all new buildings must use a certain percentage of renewable energies in their heat supply. This stipulation applies to all owners, be they private individuals, the state or industry. The use of geothermal or solar thermal systems, heat pumps or pellet boilers is becoming more intensive. The existing funding programmes are being raised to a total of 500 million euros per year.





## **Speeding up expansion of electricity grids**

The Energy Grid Expansion Act ensures the rapid expansion of electricity grids, which is necessary so that environmentally friendly electricity from future offshore wind farms in the North Sea and Baltic can be brought to where it is needed. There are plans to deal with the issue of transporting the electricity over long distances using underground high-voltage direct current transmission technology, which reduces losses. With this, the federal government is giving its full support to innovation, while at the same time creating investment security.

## **Increasing energy efficiency in the building sector**

With a view to energy saving, buildings offer one of the greatest potentials for improving efficiency in Germany. Around 40% of final energy is used for heating purposes (space heating and provision of hot water). Three-quarters of Germany's building stock was built before 1979. Today's modernisation methods could easily bring about permanent ener-



gy savings of 30-50% in most older buildings. The federal government has launched a raft of measures designed to exploit this untapped potential as quickly as possible.

### **Amendment to the Heating Charges Regulation**

The amended Heating Charges Regulation means that in communal heating bills in rented properties a higher proportion of charges (70%) will be allocated in future on the basis of actual consumption instead of dividing the costs equally across all the flats in a building as was the case in the past. This will benefit those people who save heating energy.

### **Amendment to the Energy Saving Regulation:**

Current energy standards for buildings are no longer state of the art. To increase energy efficiency in buildings, the federal government has resolved to increase energy standards for buildings by an average of 30% from 2009. Given the drastic rise in energy prices, these measures will pay off in just a few years.

## Increasing energy efficiency in the transport sector

With a share of around 20%, the transport sector is Germany's second highest emitter, after the energy industry. A number of measures have been adopted to make transport as environmentally sound as possible and ensure the mobility society needs.

### Promoting low-emission trucks

In line with the amendment of the Toll Act and Toll-Rate Regulation, the toll for heavy goods vehicles has been increased slightly and the differential between rates has become greater. This means that lower-emission HGVs will in future be significantly cheaper to run than those with high emissions, which will have to pay a higher toll rate. Revenue from the toll is used to expand transport infrastructure.

Automatic tolling of HGVs







Holiday airline

### **Basing motor vehicle tax on CO<sub>2</sub> emissions**

The federal cabinet has also adopted key points for changing the basis on which vehicle tax is charged from engine size to CO<sub>2</sub> output. That has opened up the way for a long overdue reform that is scheduled to come into force on 1 January 2010. This change will make tax cheaper for fuel efficient vehicles. Motorists stand to gain twice over by investing in efficiency, paying less at the petrol pump and enjoying tax breaks. Furthermore, CO<sub>2</sub> output from new cars will be limited to 130 grams per kilometre throughout the EU. Additional measures are also planned that should ultimately lower emissions to 120 grams.

### **Including aviation in climate protection**

Since 1990, aviation has been responsible for the greatest increase in traffic-related CO<sub>2</sub> emissions. To effectively limit emissions, aviation will be included in the emissions trading scheme from 2012. In the first year, the emissions cap will be set at 97 per cent of average emissions for the period 2004-2006. From 2013, that level is due to be lowered to 95 per cent.



Jämschwäde power plant, Brandenburg

## **Improving energy efficiency in two respects: generation and consumption**

### **More funding for combined heat and power (CHP)**

To use fuel efficiently, the share of highly efficient combined heat and power plants in electricity production is to be doubled to 25% by 2020. The amended CHP Act is designed to help achieve this goal, promoting the building and comprehensive modernisation of CHP plants and the expansion of heating grids.

### **Emissions trading**

The changes to the emissions trading scheme that have already been passed are important for businesses: for 2008-2012, the volume of CO<sub>2</sub> for which the federal government will issue emission allowances will be 57 million tonnes lower than for the 2005-2007 period; just under 10% of the emission allowances will be auctioned. This will impact principally on the energy sector: plants will receive on average 30% fewer free emissions allowances than they need, with the greatest cuts affecting the most inefficient installations. This will promote a switch from old and inefficient plants to new, more efficient ones.



### **We are introducing intelligent electricity meters**

Numerous studies have shown that intelligent electricity meters can help households to save 5% or more electricity per year. In an average three-person household that represents a saving of over 40 euros a year. This means that the payback period for a meter costing 100 to 150 euros is less than four years.

All new buildings and those undergoing refurbishment will by law have to have intelligent meters fitted from 2010. Similarly from 2010, electricity suppliers will be obliged to offer time-of-use tariffs. This will enable consumers to make further savings on energy costs and will also make more efficient use of power plants.

### **Environmentally friendly procurement**

Federal, state and local authorities purchase products and services worth over 260 billion euros per year. Federal authorities will now set a good example: in future, when assessing bids, they will be required to take into account not only purchasing costs but also energy costs for the entire lifetime of the appliances (lifecycle cost analysis). That means that only energy-efficient appliances will be purchased.

### **Making more money available for climate protection**

The budget figures also clearly show just how serious the federal government is about climate protection. Funds for climate protection are being drastically increased. 3.3 billion euros are scheduled to be made available in the federal budget for climate policies in the budget year 2008. That is an increase of 1.8 billion over 2005.

**For details of the Integrated Energy and Climate Programme and implementation status, visit <http://www.bmu.de/klimaschutz>.**

## CLIMATE PROTECTION AS AN ENGINE TO DRIVE INNOVATION

All too often the man and woman on the street – but also decision-makers in politics and industry – believe that measures that are good for the environment are automatically bad for economic growth and employment.

But this way of thinking is now obsolete. In his report commissioned by the British government, former World Bank chief economist Sir Nicolas Stern calculated that climate change would cause worldwide losses amounting to 20% of global gross domestic product (GDP). That is more damage to the economy than was caused by two world wars and the global economic crisis of the Great Depression in the last century.

By spending less than 1% of global GDP, the majority of this damage could be averted. Effective environmental and climate protection can save Germany and the world from enormous damage costs.



Offshore wind farm, Denmark



Solar power plant in Spain

## Climate protection, investment and economic growth

A research group at the Potsdam Institute for Climate Impact Research (PIK) and the Fraunhofer Institute for Systems and Innovation Research (ISI) has analysed the economic effect for Germany of its Integrated Energy and Climate Programme and a number of other measures that together can achieve the 40% reduction target. The scientists reached the following conclusions:

- 1) The entire package of measures will require an investment volume for the period between 2008 and 2020 of just over € 400 billion. From 2014, annual investment will surpass the € 30 billion mark and in 2020 reach almost € 35 billion per year. This would mean an approximately one-third increase in net investment in Germany to date.

2) The enormous investment in climate protection measures, in building refurbishment, for example, will create more contracts and more jobs in the construction industry. The intensive promotion of modern efficiency technologies and renewable energies will secure German businesses a leading position on the world market. Worldwide sales in the field of environmental technologies currently exceed € 1,000 billion. This is expected to grow to € 2,200 billion by 2020. According to market studies for Germany, this sector will outstrip vehicle manufacturing within the next 15 years. Even now, the renewable energies sector provides almost 250,000 jobs. Overall, the federal government's implementation of its climate policy goals is expected to create an additional 500,000 jobs by 2020. By 2030, this figure could exceed 800,000.



Energy-saving building modernisation



Thermographic image of a house

- 3) Efficiency measures will bring about a further reduction in Germany's energy demand of 1.3% compared with the reference development. Primary energy intensity will correspondingly improve overall by 2.5% per year. These measures and the use of renewable energies will by 2020 replace annual energy imports worth around € 20 billion; by 2030, savings will rise to almost € 35 billion per year.
- 4) Overall, the climate protection measures studied will produce an average savings effect of € 34 for each tonne of CO<sub>2</sub> avoided ("negative avoidance costs"). That means the climate protection measures in their entirety will pay off and represent a sensible investment in the future.

"The markets of the future are green," declared the President of the Club of Rome, Prince Hassan of Jordan. With the Integrated Energy and Climate Programme Germany will simultaneously be protecting the climate and developing technologies for the future.

Effective climate protection preserves our vital ecological resources and creates sustainable economic conditions – for today's generations and for generations to come.





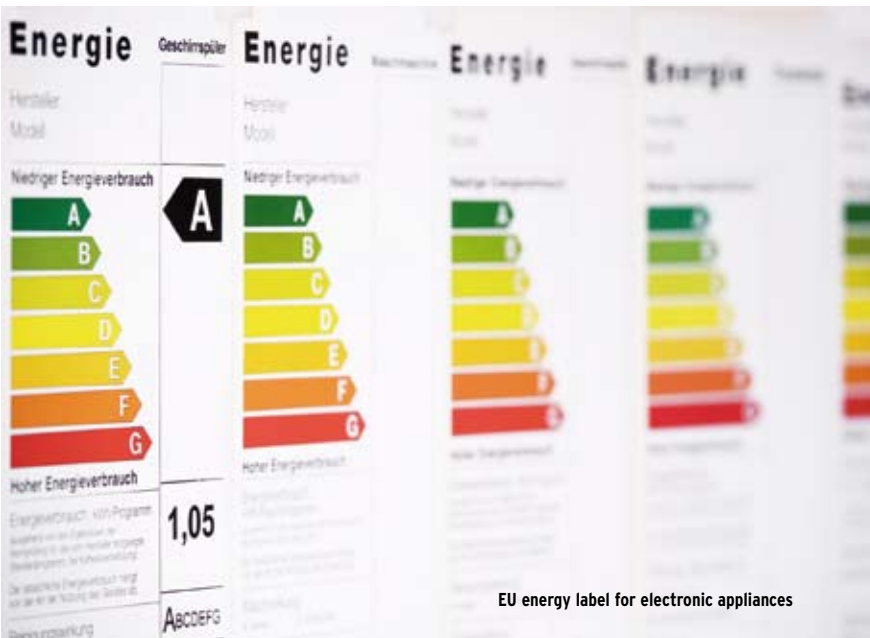
## WHAT CAN I DO?

However, important steps towards a climate-friendly future are not only taken within international and national climate protection policies. Each and every individual who acts in line with the motto “Waste not, want not!” is making an active contribution to climate protection – and can at the same time save themselves a lot of money. In Germany, over 70% of energy used in the private sphere goes into heating. The remaining 30% is distributed across electricity and other areas. The opportunities for saving are therefore plain to see: lowering the room temperature by just one degree Celsius reduces the heating energy demand by six per cent. Not leaving televisions, CD players, computers and other electrical and electronic appliances on stand-by can also save a great deal of energy and money. Stand-by losses are huge – they account for almost 14% of the electricity consumed by private households in Germany. On average, each household can save at least 80 euros a year in electricity costs. And, what is more: that would mean that throughout the whole of Germany some 14 million tonnes less carbon dioxide per year would be emitted – representing over five per cent of the reduction in greenhouse gases to which Germany has committed under the Kyoto Protocol.

Saving energy does not mean a loss in quality of life or comfort. It means opting for cutting-edge technologies that conserve raw materials and energy, opting to act in a way that respects the environment. The results will also have a positive effect on your bank balance. The numerous opportunities for helping to protect the climate are shown in the examples below, which are based primarily on the situation in Germany.

## Save energy

- ▶ Turn electrical appliances off completely (the television, for example), instead of leaving them on stand-by.
- ▶ Do not overheat rooms (as a guide: 18 to 20 degrees Celsius is adequate).
- ▶ When buying new appliances pay attention to their energy consumption: take notice of the energy logos and, if possible, choose energy-efficient A-rated - or better still A+ or A++ - appliances.
- ▶ Replace old inefficient boilers with new energy-saving technology such as a condensing boiler. This will pay for itself within 5-8 years.
- ▶ Buy local products that do not need to be transported over long distances.



EU energy label for electronic appliances



### Climate-conscious mobility

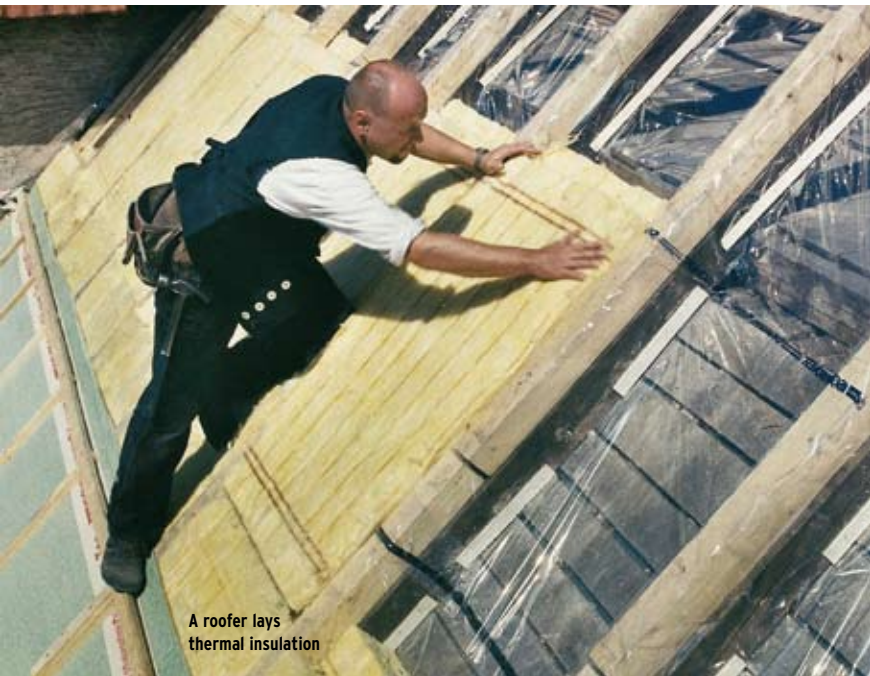
- ▶ Drive defensively and do not speed. Driving at 120 km/h uses 15 to 20% more fuel than driving at 90 km/h.
- ▶ Set up car pools and use car-sharing schemes.
- ▶ Even better: switch to public transport or a bicycle.
- ▶ If you need to buy a car, enquire about energy-saving models. Vehicles that run on natural gas offer an economical, environment-friendly alternative: they cause no problems with particulate matter or nitrogen oxides, have only low carbon dioxide emissions and are eligible for lower fuel duty in Germany until 2020.
- ▶ There are beautiful holiday destinations close to home or in neighbouring countries offering good recreational opportunities. Opting for one of these places avoids long-distance air travel that harms the climate.
- ▶ If air travel is unavoidable, offset the emissions it causes. This can be done through the “Atmosfair” project, which is sponsored by the Federal Environment Ministry. From the voluntary contributions it receives, “Atmosfair” finances projects where renewable energies, for example, save the same amount of greenhouse gases as specific flights have caused. ([www.atmosfair.de](http://www.atmosfair.de))



## Around the home

- ▶ A solar hot water system provides enough energy in the summer months to supply all the hot water needed – helping your wallet and saving fossil energies at the same time. Grant programmes run by the federal government offer financial support in Germany.
- ▶ If you are building a new house: today, the low-energy house is nothing out of the ordinary anymore in terms of technology. Be sure to include solar technology for hot water or electricity generation.
- ▶ The Federal Environment Ministry’s “Climate Seeks Protection” campaign provides information about the vast range of things you can do in your own home to help lower CO<sub>2</sub> emissions ([www.klima-sucht-schutz.de](http://www.klima-sucht-schutz.de)).

As an individual, you can make a decisive contribution to our goal of achieving globally effective climate protection – for the benefit of both humankind and nature. Get involved – it’s worth it!



A roofer lays  
thermal insulation



## INTERNET ADDRESSES

Everyone can access the following websites to find out more about climate protection:

### Websites of political institutions:

- ▶ [www.bmu.de/klimaschutz](http://www.bmu.de/klimaschutz): The German Federal Environment Ministry has a wealth of background information available under the keyword “climate protection.” You can also download educational resources.
- ▶ [www.bmu.de/klimaschutzinitiative](http://www.bmu.de/klimaschutzinitiative): This will take you to the Federal Environment Ministry’s funding programmes for climate protection measures, available to private households, businesses and local authorities.
- ▶ [www.europa.eu.int/comm/environment/climat/home\\_en.htm](http://www.europa.eu.int/comm/environment/climat/home_en.htm): The EU Commission’s homepage presents the EU’s climate policy.
- ▶ [www.unfccc.int](http://www.unfccc.int): The secretariat of the Framework Convention on Climate Change in Bonn provides information about the Convention and the Kyoto Protocol.
- ▶ [www.unep.org/themes/climatechange](http://www.unep.org/themes/climatechange): The United Nations Environment Programme provides information on the environment and the climate.

### Websites of scientific bodies

- ▶ [www.umweltbundesamt.de/klimaschutz](http://www.umweltbundesamt.de/klimaschutz): The Federal Environment Agency provides well-founded scientific guidance on climate protection, including publications on the costs of failing to protect the climate.
- ▶ [www.ipcc.ch](http://www.ipcc.ch): The Intergovernmental Panel on Climate Change publishes reports on climate change.
- ▶ [www.wbgu.de](http://www.wbgu.de): The German Advisory Council on Global Change (WBGU) has produced numerous reports on climate change.



- ▶ [www.munichre.com](http://www.munichre.com): Clicking the “Publications” button on the website of Reinsurer Münchner Rückversicherung will enable you to download studies on natural disasters and the costs of climate change.
- ▶ [www.pik-potsdam.de](http://www.pik-potsdam.de): At the Potsdam Institute for Climate Research you will find a wealth of information and studies on climate change and its consequences.
- ▶ [www.mpimet.mpg.de](http://www.mpimet.mpg.de): The Max Planck Institute’s website has scientific data, information on projects, and details of seminars on climate change.

### Climate protection in society

- ▶ [www.dena.de](http://www.dena.de): The German Energy Agency provides information on projects, events and legislation on various aspects of energy.
- ▶ [www.atmosfair.com](http://www.atmosfair.com): Here you will find information on climate-conscious air travel with the “Atmosfair” project.
- ▶ [www.gibgas.de](http://www.gibgas.de): This is a comprehensive guide to natural gas vehicles: everything from the vehicles themselves, to filling stations and the latest news.
- ▶ [www.klima-sucht-schutz.de](http://www.klima-sucht-schutz.de): A climate protection campaign with numerous tips about how to save energy.
- ▶ [www.klimabuendnis.org](http://www.klimabuendnis.org): The Climate Alliance has established a partnership between European towns and cities and indigenous peoples and provides a checklist for planning and implementing climate protection measures at local authority level.
- ▶ [www.es-ist-dein-klima.de](http://www.es-ist-dein-klima.de): This interactive portal gives private individuals, local authorities, schools, associations and businesses the opportunity to register on an online atlas and present their own ideas or activities on climate protection through texts, photos or videos.

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