Federal Ministry
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BMZ TOPICS

Renewable Energies

in German Development Cooperation

Contents

Preface

More than two billion people – one third of the world's population – have no access to modern, clean energy. Their most important source of energy is firewood and plant residues. It is mostly women and children who are exposed to health risks when food is cooked on an open and poorly ventilated fire. It is also they who spend many hours a day collecting firewood – hours that could be more wisely spent, for instance at school. If we cannot ensure an appropriate supply of energy, however, social and economic development will be doomed to failure. Abolishing energy poverty is an important lever for successfully combating poverty, which is the declared goal of the international community, as reflected in the Millennium Development Goals. What we need more of are advanced, sustainable energy sources such as renewable energies. At the same time we need to revolutionise the energy supply for people in both industrialised and developing countries, who are already connected to the grid and have access to fuels for cooking and heating. Today, this energy supply is so inefficient and so highly dependent on fossil fuels that it represents a serious threat to the environment and the global climate. It would be fatal to meet the additional demand for energy from the same old sources – coal and oil.

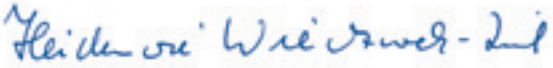
Renewable energies, side by side with technologies to increase energy efficiency, are helping many countries worldwide to become more independent of oil imports. In this way too we

can enhance stability and security. What we need in view of diverse threats, such as scarcity of resources, are strategic and forward-looking answers that will have a sustainable effect on the environment. Renewable energies are part of this answer, because they are available practically everywhere in the world. Recent experience has shown us time and again that energy policy is also security policy. Intelligent energy policy is part of crisis prevention. In the past wars have been fought over access to oil reserves. There cannot and will not be wars over access to the sun and to solar energy.

Heidemarie Wieczorek-Zeul
Federal Minister for Economic Cooperation and Development

The rich industrialised nations have to put their innovative power to use in order to develop the markets for renewable energies and technologies to boost energy efficiency, and to lower the costs of these products. Only then will sustainable energy be affordable for the poor countries too in future. Until then the developing countries need our support so that they, too, can already start building an energy supply in line with the needs of humankind and the environment.

Additional funding has been mobilised in recent years, in order to expand cooperation with developing countries in the energy and environment sector into a strategic partnership. At the World Summit on Sustainable Development in Johannesburg in 2002 the German government pledged to provide a total of one billion euros over a five-year period for renewable energies and energy efficiency. We met this pledge by 2005, within only three years. The same purpose is fulfilled by a special facility worth 500 million euros, to be used by the KfW development bank to grant low-interest loans for investments in partner countries, provided the projects are in the fields of renewable energies or energy efficiency. This special facility was the brainchild of the international conference, renewables 2004, held in Bonn, which ushered in a new era in energy policy. The German government intends to help cooperation countries to improve access to clean energies, to combat poverty and to replace types of energy harmful to climate and environment by expanding sustainable energy systems.



Sustainable Energy for Development

Access to modern energy services is a central precondition for poverty reduction and development. Energy will help people to become more productive in their work and thus enhance their income. Small businesses will be given new opportunities to foster production and generate income.

Ever since the beginning of the industrial age, the countries of the North have used huge quantities of fossil fuels for their development. The resulting burden on the environment and the risks for the global climate are well known. The problem is currently being exacerbated, as developing, threshold and transition countries try to catch up in economic terms, basing this process on conventional energy technologies. Thus, it is becoming increasingly urgent to promote the use of renewable energies and explore possible ways of boosting energy efficiency in all parts of the world.

The main responsibility for developing technologies for a viable global energy system and for preparing them for marketing lies with the industrialised countries. However, developing countries can be encouraged to participate in this global task, and where they are willing to do so they deserve our support. In this context, one merely has to look at the favourable natural conditions in these countries that would facilitate the use of renewable energies, such as solar irradiation in desert regions, wind potential along the shores of many countries and the geothermal potential of the East African Rift Valley.

> Dual Presidency

In 2007 the German government will be called on to assume leadership responsibility on two fronts. During the first six months of the year it is Germany's turn hold the rotating EU Presidency, while for the full twelve months of 2007 the German government will be determining the fate of the G8, the group of the eight leading industrialised nations.

EU

Energy is to be a core topic of the German presidency of the EU. Given the rapidly growing demand for energy worldwide, and the continuing high prices of gas and oil, the adoption of a European Energy Action Plan is to be one priority of the European Council in early 2007. At international level, European energy strategy aims to put in place a reliable, affordable and environmentally sound energy supply system in developing countries. To this end, the German government will be working to ensure a pro-development European energy policy.

G8

The G8 states have for years been working on energy supply issues. At the 2005 Gleneagles Summit climate change was high on the agenda. One year later, under the Russian presidency, the focus switched to ensuring reliable supplies. One of the main outcomes of the St. Petersburg Summit was a commitment to expanding the use of renewables, also in developing countries, the declared will to make energy markets more transparent, and to push forward with innovative technologies in cooperation with private industry. These approaches are to be further pursued under the German presidency. Dependence on fossil fuels and the political, social, economic and ecological consequences thereof, make it essential to involve more and more parts of the world in deliberations leading to an energy shift. Germany will thus be making an increasing effort to initiate and maintain a dialogue with threshold and developing countries.

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> The responsibility of the industrialised countries

In the process of increasing the percentage of the global energy mix accounted for by renewable energies in the coming decades, the industrialised countries bear a special responsibility: they must spearhead global climate protection. After all, they have produced more than 75 % of the rising CO^2 content in the atmosphere and thus bear the lion's share of the responsibility for the resulting climate change. Now they must lead the way in substituting sustainable types of energy for fossil fuels in order to lower climate-damaging emissions of CO^2.

If the industrialised countries push ahead with the increased use of renewable energies, this will not only be to the benefit of the global climate. In the wake of increased demand for renewables and technological progress, infrastructure costs for these technologies could fall drastically. That will also benefit the developing world. The establishment of sustainable energy supply systems in these countries could become noticeably more economical and thus affordable, thanks to the inputs of the industrialised countries.

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Future prospects for the poor population

Electricity generated from renewable sources can be fed into large grids, but the greatest advantage of renewable energies is their suitability for decentralised use. Here, the benefits of renewables truly come into their own. Particularly in poor rural areas where it would be uneconomical to set up an electricity network, renewable energies can offer new prospects to the rural population and thus make a valuable contribution to the fight against poverty.

Independent from energy imports

Renewable energies – along with activities to increase energy efficiency – can help many developing countries to reduce their dependency on fossil fuel imports and lessen the strain on their finances caused by price fluctuations on the world market. The funds thus liberated can be used for urgently needed development activities.

One billion euros for energy projects

At the World Summit on Sustainable Development in Johannesburg in 2002 the German government sent out an important signal: It announced the launch of the programme "Sustainable Energy for Development" with a funding volume of 1 billion euros up to 2007. After only three years, in 2005, this full sum had been pledged for projects to expand the use of renewable energies and enhance energy efficiency. At the international conference on renewable energies, renewables 2004, in Bonn an additional Special Facility for Renewable Energies and Energy Efficiency was set up, under the aegis of the KfW development bank. From the total funding of 500 million euros, low-interest loans are awarded to state and parastatal organisations for investments in partner countries. In individual instances, private companies too can make use of the special facility. In 2005 a total of 170 million euros was pledged to assist projects in Azerbaijan, India, Chile and Morocco, as well as a regional project in Latin America.

> Promoting energy projects

The Federal Ministry for Economic Cooperation and Development (BMZ) is currently promoting development interventions in about 50 partner countries, with a total funding volume of some 1.6 billion euros. Of the 132 ongoing projects, 65 will serve to disseminate renewable energies such as hydropower and wind power, solar power, geothermal power and the sustainable use of biomass. Sixty-seven projects aim to enhance energy efficiency in cooperation countries.

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> A panoply of energy projects

Energy projects are agreed between the German government and the government of the respective partner country. Generally the responsibility for implementing these projects is delegated to the KfW development bank and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). The KfW development bank accords grants and low-interest loans, while the GTZ provides advisory services. The projects cover a vast range of issues. Contents and objectives vary depending on the conditions in and requirements of the individual countries, ranging from general energy policy advisory services to financial support for projects aimed at increasing the use of renewable energies both within the electricity grid and in decentralised energy systems. The wide spectrum of measures also, however, embraces energy saving measures and initiatives to enhance energy efficiency in power plants, industry and private households.

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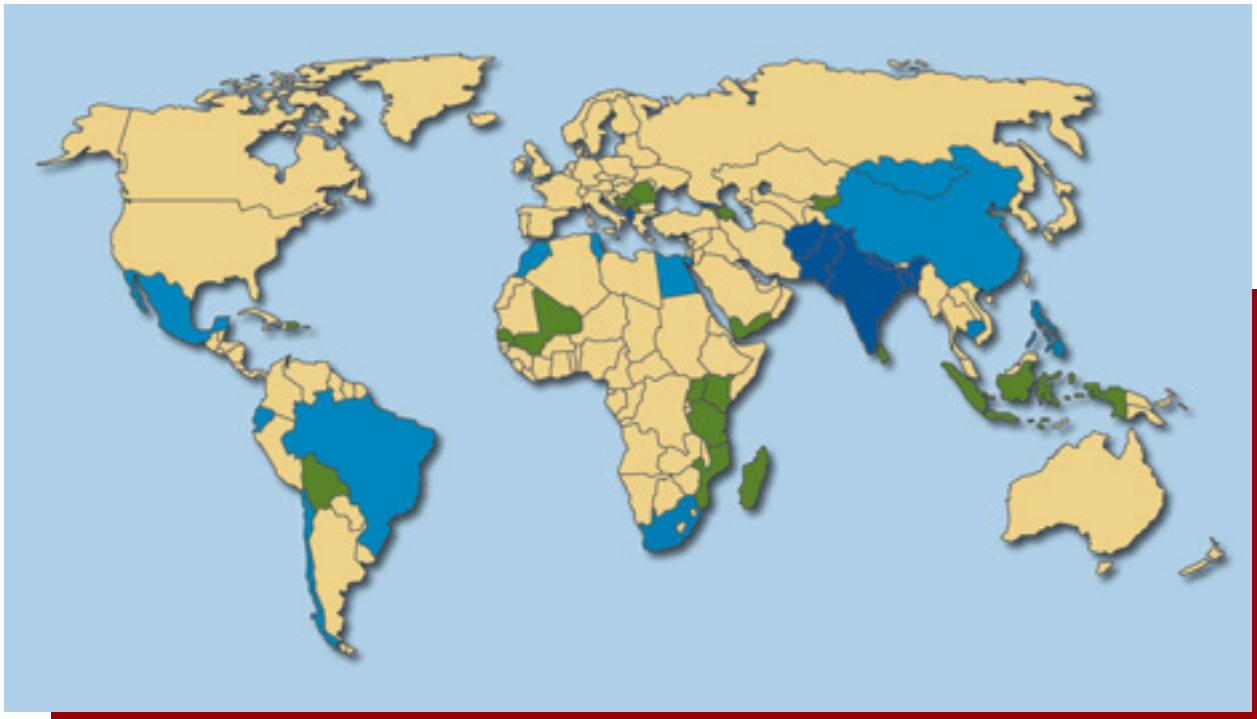
Countries cooperating with BMZ in the energy sector



Group A:
Energy is a priority area

Afghanistan
Albania
Bangladesh
Georgia
India
Nepal
Pakistan

Group B:
Energy projects within the framework of other priority areas

Egypt
Bosnia and Herzegovina
Brazil
Chile
China
Ecuador
Cambodia
Morocco
Mexico
Mongolia
Philippines
South Africa
Tunisia

Group C:
Energy projects outside the framework of agreed priority areas

Armenia
Azerbaijan
Bolivia
Dominican Republic
Indonesia
Yemen
Kenya
Kyrgyzstan
Madagascar
Mali
Montenegro
Mozambique
Romania
Senegal
Serbia
Sri Lanka
Tanzania
Uganda

The special facility is designed to foster investment in renewable energies such as wind power plants, biogas power plants, solar thermal power, photovoltaics, geothermal power or hydropower plants, and in projects to enhance energy efficiency all the way along the line from the primary generation of power up to the end user. The Sustainable Energy for Development Programme and the special facility are to help partner countries to improve access to environmentally sound forms of energy, overcome poverty and replace forms of power generation that are detrimental to the environment and the global climate by alternative methods that do not have negative environmental implications.

Strategic cooperation arrangements

Funds from the Sustainable Energy for Development Programme and the Special Facility for Renewable Energies and Energy Efficiency are used within the framework of the proven instruments of financial and technical development cooperation. However, through these programmes, the German government not only wants to strengthen bilateral cooperation in the energy sector, it also aims to open up new scope for public-private partnerships and for more strategic cooperation arrangements at multilateral level focused on promoting sustainable energy.

> Special Facility for Renewable Energies and Energy Efficiency

With the 170 million euros pledged in 2005, a total of five projects are already receiving support:

> In Morocco, 37,000 households, which have hitherto had to do without electricity, have been granted access to modern power through so-called solar home systems. Maintenance services for the plants are guaranteed for a period of ten years.

> In Azerbaijan transmission plants are being expanded with the help of the project, in order to reduce the number of power cuts and the negative impacts they have on the economy.

> In India high transmission losses are being reduced by repairing distribution networks. Households which have hitherto had no electricity are also being given access to electrical power for the first time.

> In Chile a loan programme is being run in conjunction with partner banks, offering low-interest loans for investments in the fields of renewable energies and energy efficiency. These funds are available to both private businesses and public-sector applicants.

> The same approach is being pursued by a project with the supraregional development bank Corporación Andina de Fomento (CAF) in the Andean states.

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> German involvement

Several initiatives were launched at the World Summit on Sustainable Development in Johannesburg in 2002 and at the international conference renewables 2004 in order to promote the use of energy for global sustainable development and to increase the use of renewable energies worldwide. Germany is actively involved in these initiatives:

Renewable Energy Policy Network for the 21st Century (REN21)
See page 36
www.ren21.net

Global Network on Energy for Sustainable Development (GNESD)
The GNESD is a network of developing world centres of excellence renowned for their work on energy, environment and development issues. This initiative aims at enhancing the capacities of national institutions so that they will be better able to elaborate sustainable development strategies. The focus is on environmentally sound energy services in line with energy requirements. The GNESD receives support from UNEP and various national donors.
www.gnesd.org

Global Village Energy Partnership (GVEP)
The aim of the GVEP is to ensure that people in developing countries have access to modern energy services, to combat poverty and to promote economic development. The members of the GVEP include developing and industrialised country governments, multilateral organisations, private businesses and non-governmental organisations.
www.gvep.org

EU Energy Initiative (EUEI)
The focus of the EU's Energy Initiative for Poverty Eradication and Sustainable Development (EUEI) lies on ensuring access to sustainable energy services for the more than 2 billion "energy poor" individuals around the globe. In this effort the EUEI builds on close cooperation with developing countries, private industry, financial institutions and civil society.
www.euei.org

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> The Millennium Declaration

On 8 September 2000 the General Assembly of the United Nations adopted the Millennium Declaration, in which 189 governments worldwide committed themselves to a comprehensive package of development policy goals. The focus is on sustainable development and the fight against poverty. The aim is to halve the proportion of the world's people surviving on an income of less than one dollar a day by the year 2015.

Apart from basic education, primary health care, access to clean and affordable drinking water and a fundamental transportation infrastructure, access to energy resources is one of the central requirements for improving the living conditions and manufacturing opportunities in developing countries.

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The World Needs Renewables

Sufficient energy supply is a central factor for the economic development of any country. The poor can benefit most from access to modern types of energy. The development and expansion of an energy supply system is an important contribution to achieving the United Nations' Millennium Development Goals. Renewable energies, along with technologies for improving energy efficiency measure up to these goals, in developing countries in particular. They facilitate decentralised access to energy, so that even in remote regions the issue of energy supply will no longer constitute an obstacle to development. But from a global perspective too, renewable energies offer many benefits: they help to reduce CO^2 emissions, thus promoting climate protection, and they replace fossil fuels, reducing the economic dependency on energy imports that many nations struggle with.

Access to energy is a basic need

Energy is needed in order to generate employment and income and for advancing the economy. Energy is used to produce all the commodities we use in everyday life. Our food is prepared using energy. Electrical pumps provide clean drinking water from pipes and wells. Drugs can be stored much longer if refrigerated. All of this presupposes a reliable and efficient energy supply.

Energy demand is on the increase

Global energy policy is facing an immense challenge: the world population and its food, commodities and service needs are expanding unabated. This is paralleled by a strong rise in the demand for energy. According to forecasts of the International Energy Agency (IEA) in Paris, by 2030 global energy consumption will have increased by between 50 and 70 % as compared with today's levels. At the same time it will become more and more difficult to meet these energy demands using primarily fossil fuels. Experts fear that oil could become so scarce within the next 20 years that prices will rocket. Developments on the crude oil market are already having dramatic impacts on those developing countries that are forcedto import

Cooking demonstration at the Malawi Trade Fair: the "rocket stoves" use up to 90% less fuelwood than traditional three-stone hearths

oil. The price of a barrel of crude oil (equivalent to some 159 litres) has risen within four years from 18 US dollars to over 65 US dollars, and the additional costs to these countries now more than offsets total official development assistance provided by the international community. According to World Bank calculations, a rise in oil prices of one dollar per barrel costs low-income developing countries one billion dollars. In 2005 sub-Saharan African states saw their national incomes shrink by 2.7 percent on average in the wake of rising oil prices. This cancels out development-policy efforts and debt-cancellation initiatives for poor countries. This is why it is vitally important to find alternatives to oil.

> Renewable energies in Germany

Worldwide, Germany is considered a pioneer in increasing the share of renewable energies in its energy mix. Renewable sources generate 10 % of Germany's electricity supply and account for approximately 4.6 % of the total energy supply. Under the provisions of the 2004 Renewable Energy Sources Act, this figure is to rise to a minimum of 12.5 % by 2010 and a minimum of 20 % by 2020. By 2050, the share of renewable energies could even go up to 50 %. Germany is also supporting the intensified use of renewables through special incentive programmes in addition to the Renewable Energy Sources Act (EEG).

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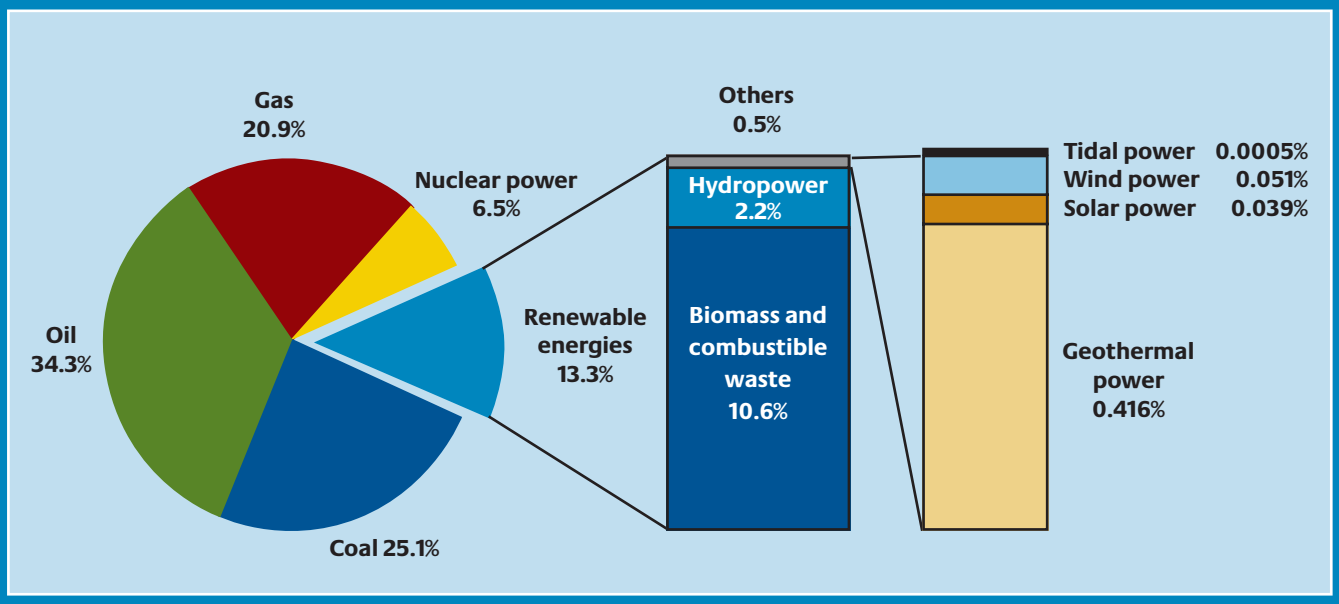
Renewable energies offer a vast potential

In future the world's energy supply must become more sustainable. This means that it must meet the basic needs of the poor worldwide without exhausting limited natural resources to the detriment of future generations. This can be achieved both by making more efficient use of energy and by relying on renewable sources of energy, particularly wind, hydropower, solar and geothermal energy and biomass. So far, the potential of these types of energies has been used to only a minor extent.

A thousand times more energy than needed

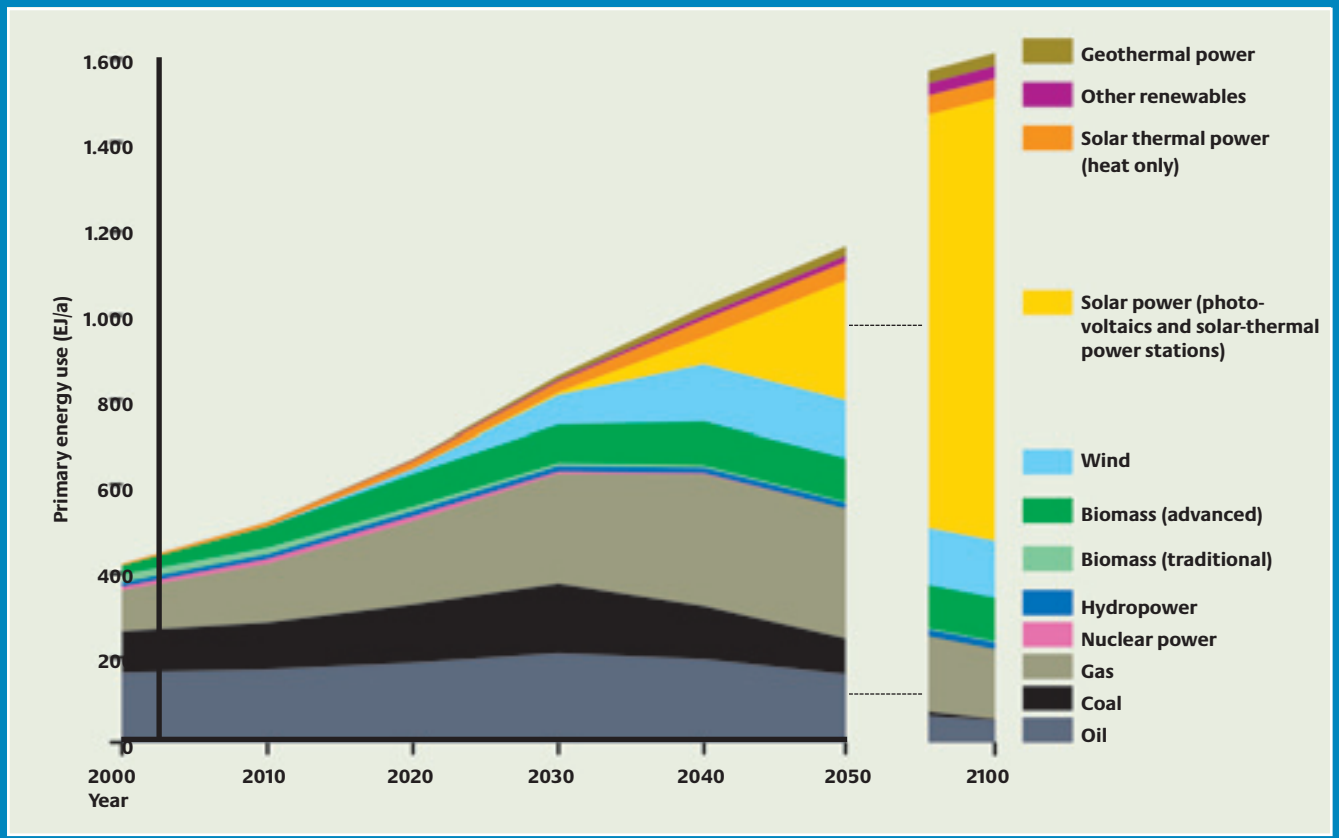
At present, renewable energies account for only slightly more than 13 % of the worldwide total primary energy supply. However, a large share of this is accounted for by the traditional and often unsustainable use of biomass. The potential of advanced renewable energies is far greater. The Earth receives enough energy from the sun alone to meet the total energy require-

Breakdown of the world's total primary energy supply



In 2003, renewables accounted for 13.3 % of the 10.579 million tons of oil equivalent (mtoe) energy used worldwide (Source: International Energy Agency, IEA)

The potential of renewables



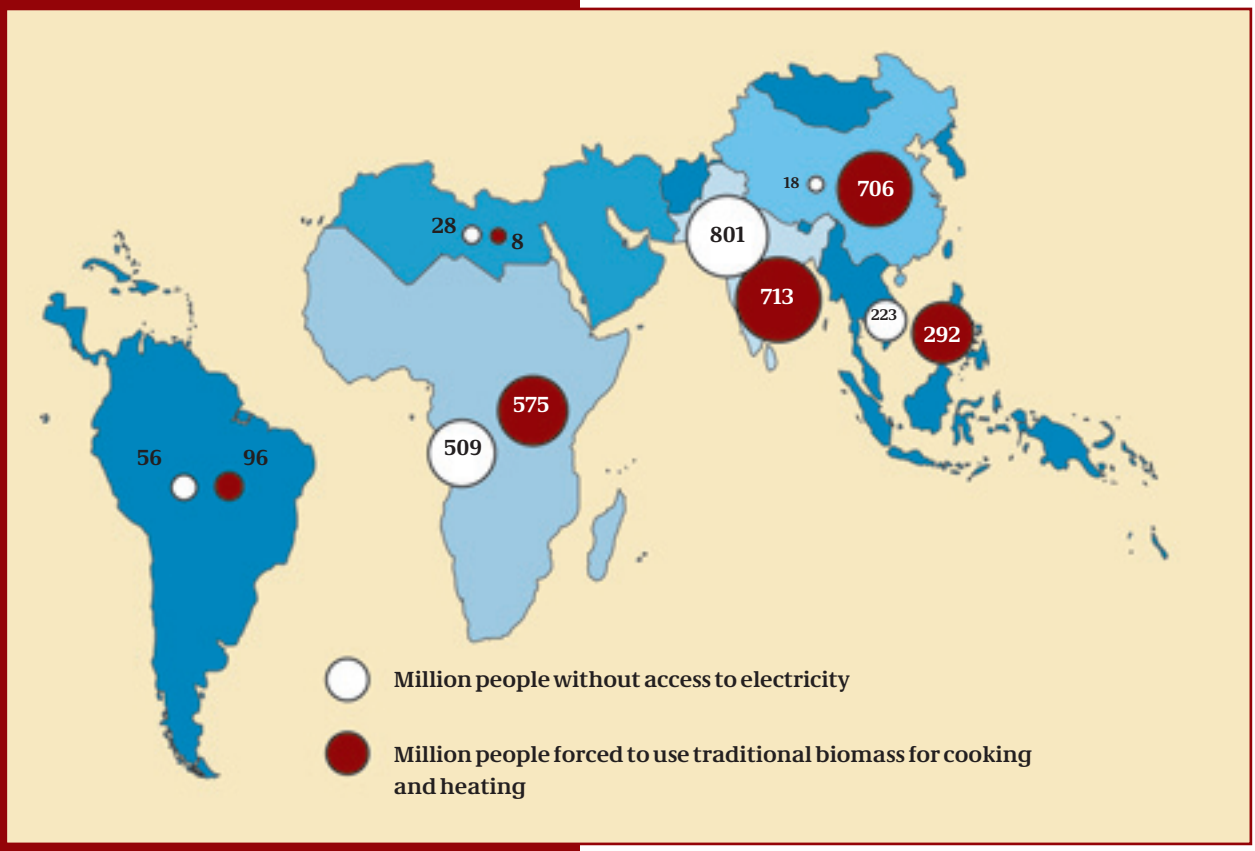
Given appropriate support, renewables could generate half of the power needed worldwide by 2050, and could meet as much as 85 % of total needs 100 years from now (Source: WBGU, 2006)

ments of our planet 15,000 times over – in theory. What we must now do is access a fraction of this potential and put it to use for humankind. Experts believe that in practice about half of global energy demand could be met from renewable sources by 2050.

Renewable energy comes in many guises

Renewable energy is multifarious, ranging from huge hydropower plants and wind farms for electricity production to small photovoltaic installations that operate water pumps not connected to the grid or that serve as a power source for individual homes or small settlements. Biogas can be used for cooking, while geothermal power offers a cost-efficient way of heating and generating electricity.

Power shortages



Regional distribution of people without access to electricity, and whose energy supply depends on biomass (Source: International Energy Agency, IEA)

> The beneficiaries: women, children and environment

It is a common sight in developing countries: women and children walking home for miles with huge bundles of brushwood on their heads. Often, they spend many hours a day just collecting fuel wood. During that time the children cannot attend school, and mothers are kept from more productive activities that could help them generate an income. In addition, when preparing meals they are constantly exposed to smoke and soot from the open fire, which is detrimental to their health. According to the UN, every year approximately 1 million children die from respiratory diseases related to indoor air pollution. Renewable energies and upgraded conventional technologies bring many advantages to women, children and the environment. Substantial progress can be achieved just by installing small-scale biogas plants or replacing open fires with wood-fired stoves. These still use biomass, but cause less pollution, are less detrimental to human health, and improve energy efficiency.

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> Energy situation in Africa

Africa is still a long way from having a modern energy supply. In sub-Saharan Africa in particular, the majority of the population have no access to electricity. Seventy percent of the population is dependent on traditional biomass, with far-reaching consequences for human health and the over-exploitation of natural resources. Inhabitants of remote rural and urban areas are not generally able to access the national power grid, and are caught up in a vicious circle of energy and income poverty. German development cooperation is working at bilateral and multilateral levels to promote renewable energies and energy efficiency in Africa, in order to offer more people access to modern sources of energy for domestic and productive use.

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Better energy supply for developing countries

In many developing and threshold countries the energy supply is still insufficient. Vast regions are not connected to a national electricity network. The population traditionally satisfies its energy requirements largely from natural sources, mostly wood. That contributes to deforestation, leading to massive environmental problems in many places, because without vegetation cover the soil erodes. This constitutes a major obstacle to economic development in these countries.

New sources of income

There is a close correlation between a poor energy supply and poverty. More than two billion people worldwide have no access to modern types of energy. Other than fuel wood they resort to such sources as batteries, candles and kerosene. The purchase of these goods puts a considerable strain on their financial situation. Even though poor people on average need only one kWh per day, they often have to spend approximately one third of their income to obtain this. Access to advanced energies offers people new opportunities to spend their meagre income in a better way. At the same time, once they are hooked up to a power supply system, craftspeople and other small businesses gain access to new production opportunities and sources of income.

Poverty reduction pushes up demand for energy

One thing is clear: success in the fight against poverty and rising demands for energy are closely linked. Therefore, in the interest of achieving sustainability it becomes important to meet this need economically without harming either the environment or the climate. To this end, modern renewable energies provide

an important option – especially when remote rural areas are to be supplied with energy. The costs of connecting remote villages to a national grid would be prohibitive in many places. Small-scale local power stations based on renewable energies are far better suited for decentralised power supply than conventional energy supply systems.

A contribution to peace building

The increasing scarcity of energy resources gives us ground to fear that problems relating to access to affordable energy could increasingly become the trigger for violent hostilities in future. Since renewable energies are available locally, they can help avoid conflicts and go some way to lessening the ruthless competition for worldwide oil.

> Many advantages

Renewable energies have many advantages. These come to bear at global, national or regional and local level:

+ Climate protection – fewer greenhouse gas emissions
+ Energy security – reduced dependence on energy imports (oil price fluctuation, political dependencies) if countries can use local energy resources
+ Poverty alleviation - lights for schools, refrigeration for drugs, more time for productive work instead of spending time on collecting fuel wood, first choice especially in remote regions of the world
+ Economic boost – new jobs with developers, manufacturers and operators of power plants (especially small and medium-sized companies). Decentralised energy services generate new production opportunities for companies in remote regions.
+ Environmental and health protection – less air pollution
+ Considerate resources utilisation – reduced demand for fossil resources and threat to overuse biomass (deforestation)
+ Peace building: fewer conflicts and violent competition for access to oil resources, because renewable energies are available locally.

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> World Bank invests in clean energy

In 2004 at the conference renewables 2004 in Bonn, the World Bank undertook to raise the total funds it pledges in the field of renewable energies (not including large-scale hydropower projects) and energy efficiency by a minimum of 20 % per annum over the period 2005 – 2009. It has demonstratively more than met this commitment in the first two years, and is today the second largest lender to projects to promote the use of renewables in developing countries. Only the German KfW development bank lends more. In coming years too the World Bank aims to provide partner countries with more support than ever before to help them integrate renewable energies and energy efficiency into their longer-term development strategies and project designs.

The G8 states called on the World Bank at the 2005 Gleneagles Summit to make proposals for the increased use of clean energy in developing and threshold countries. The World Bank picked up on this in its report, "Clean Energy and Development – Towards an Investment Framework", and lays out three paths for progress: an action plan for sub-Saharan Africa, financing instruments to cut industrial CO^2 emissions in developing countries and measures to help countries adjust to climate change. The Bank is thus for the first time ever playing the part of a crucial link at top international level between moves to expand the available energy supply in developing countries in an environmentally acceptable way on the one hand, and worldwide efforts to restrict emissions on the other.

The Energy Sector Management Assistance Programme (ESMAP) was established in 1983 as a joint initiative of the World Bank and UNDP. ESMAP advises the governments of developing and threshold countries on energy sector management, and provides support in the form of a knowledge and technology transfer. It promotes poverty reduction and sustainable economic growth on the basis of an environmentally sound energy supply. It receives support within the framework of the BMZ's multilateral cooperation.

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> The Global Environment Facility (GEF)

The GEF is an international financing mechanism which supports projects in developing countries and in Central and Eastern Europe that have a positive effect on the global environment. Usually, the GEF finances only the additional costs of a project entailed by taking into account global environmental interests, such as climate protection. The GEF is jointly managed by the World Bank, UNDP and UNEP. Since it was founded 15 years ago the GEF has spent 1.17 billion US dollars on projects to promote renewable and low-emission energy options. Germany provides approximately 11 % of the total GEF funds, making it the third largest donor.

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Renewable Energies: Important for Climate Protection

> Agreements on climate protection

In view of the impending global climate disaster, the Protocol to the UN Framework Convention on Climate Change was adopted in the Japanese city of Kyoto in 1997. In the Kyoto Protocol a number of industrialised countries pledged to reduce their annual greenhouse gas emissions by 5.2 % by 2012, taking 1990 as a base year. The Protocol leaves states the option of going beyond their own national boundaries to achieve CO^2 reductions. So-called flexible mechanisms enable the private sector in particular to invest in climate protection projects abroad. The underlying idea is that the industrialised countries may meet their reduction targets wherever this is most cost-efficient. The flexible mechanisms comprise three instruments:

1. Emission Trading: Industrialised countries that have achieved a greater reduction than required may sell their "surplus" in the form of emission certificates to other industrialised nations that have not yet reached their target.
2. Joint Implementation (JI): Industrialised countries may carry out climate protection projects in other industrialised countries.
3. Clean Development Mechanism (CDM): Industrialised countries finance emission reduction projects in developing nations.

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Ever since the onset of industrialisation, the CO^2 content of the atmosphere has increased by approximately 30 %, and it is continuing to rise. In the course of the past 100 years the industrialised countries in particular have burned huge amounts of coal, oil and natural gas, releasing large quantities of CO^2 into the atmosphere. CO^2 is a greenhouse gas that causes temperatures near ground level to rise. Worldwide temperatures are today, on average 0.6 °C higher than they were only 100 years ago. Furthermore, in recent years there has been a discernible increase in severe weather events such as storms, floods and droughts. If current emission trends are not reversed, by the end of the century the amounts of CO^2 in the Earth's atmosphere could rise to three times the level of the pre-industrial age. The Intergovernmental Panel on Climate Change (IPCC) predicts further temperature rises of up to 5.8 °C by the year 2100.

An enormous challenge

Climate change has become one of the major challenges for humankind. If model calculations are correct, in the decades to come we will see a shifting of entire climatic zones. Today's fertile agricultural regions may possibly turn into deserts, while rainforests may dry up. Storms could rage more forcefully and more frequently, causing incalculable damage.

Weisweiler lignite-fired power station

Island states and flat coastal zones along continental shores could be lost completely as sea levels rise. The natural sources of livelihood of millions of people would be destroyed. The situation is further compounded by the fact that many of these factors are mutually reinforcing. As temperature rise, the oceans and the biosphere absorb less carbon dioxide, which has a further negative impact on the climate.

Developing countries are especially hard hit

Climate change will hit the developing world the hardest. Firstly, many of these states are predominantly agricultural. Severe weather events and changing climate conditions can cause lost harvests and hence lost income. Poverty will rise, and with it hunger. Secondly, poor countries rarely have the capacities they would need to adjust to climate change, for instance by building protective dams along their coastlines. Climate change poses a truly existential threat to the people living in developing countries thus affected, especially to the poorer sections of the population.

Reducing carbon dioxide emissions

In order to bring climate change to a halt or at least to alleviate its effects, a drastic reduction in CO^2 emissions is necessary. The main responsibility for this lies with the industrialised countries. They must convert their energy systems to renewable and CO^2-free power production as soon as possible. Another important pillar of climate change policy is investment in improved energy efficiency. There is an enormous potential for this both in industrialised and in developing countries.

> KfW Carbon Fund

The KfW Carbon Fund is a programme to procure emission certificates in line with the project-based mechanisms laid out in the Kyoto Protocol (Clean Development Mechanism, Joint Implementation). When projects are selected, one main criterion is that the certificates must be usable within the EU emissions trading scheme. The KfW Carbon Fund procures

> Certified Emission Reductions (CERs) from CDM projects in developing countries
> Emission Reduction Units (ERUs) from Joint Implementation projects inside and outside the European Union).

Projects are selected by the KfW Carbon Fund, taking into account risks and costs. The first phase was successfully completed in the first quarter of 2006. A total of 26 businesses and institutions inside and outside Germany were involved in the purchasing programme, with a total volume of 83.9 million euros. The originally planned 50 million euros funding framework was thus topped by almost 70 percent thanks to the huge demand. In the meantime, KfW development bank has successfully entered into four Emission Reduction Purchasing Agreements (ERPAs) and six preliminary agreements (Letters of Intent), which should bring some 4.8 million certificates into the Fund by 2012. The agreements have a total value of about 43.5 million euros, accounting for half of the volume of the fund. Thanks to the positive response to the Carbon Fund, the KfW development bank is planning a second phase.

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Different Types of Renewable Energies

Renewable energies have been used for thousands of years. Long before industrialisation, when coal, oil and gas assumed the role of main power providers to the Earth, wind, running water, wood and animal fat were the most important sources of energy. In line with the vision of sustainability, we will have to make greater use of renewable energies once again in future. This is in no way a step backwards, however. "Modern" renewable energies are based on progressive technologies. When linked to new technologies for saving energy, they are able to meet all the demands of environmental and climate protection. The largest cost factor in renewable energies is not the operation but the production of the plants required. Thanks to technical innovation and of course the increased quantities produced, these costs have been dropping for some years now. For instance, wind power plants are one third cheaper, while photovoltaic plants are as much as 60 % cheaper to produce today than they were 15 years ago. By contrast the prices of fossil fuels are expected to rise, as resources become increasingly scarce and less economical to extract. The costs of renewables and of fossil fuels should thus become more and more similar.

Enormous potential

Renewable energies have an enormous potential. The calculated output of solar, wind, geothermal and hydropower as well as the modern use of biomass could generate enough energy to meet the demands of the world's population several thousand times over. From a practical point of view, however, only a few technologies for using renewable energies have yet proven to be economically competitive, and even they are viable only in certain regions of the world. This is not only the result of the high investment costs involved in technologies of this sort. Often, fossil fuels are subsidised, seriously distorting markets and leaving renewable energies at a disadvantage. Here, political solutions are needed that will help to quickly dismantle the obstacles facing renewable energies. If the further development and application of these technologies are promoted systematically and policy-makers establish fair conditions on the energy market, great progress can be made.

Solar power

Solar power has huge potential – even though at present it meets only a very minor portion of global energy demand (0.04 % of the total primary energy consumption). At the moment photovoltaic power generates less than 1 ‰ of the total electricity supply, because solar power is still considered the most expensive type of renewable energy. But even today it can be the best way to provide a decentralised electricity supply in remote parts of the Earth.

Solar energy can be used in two different ways: to generate heat (solar thermal application) or directly to generate electricity (photovoltaic application). In solar thermal applications, water or another liquid runs through tubes that are heated by the sun. Installations that use mirrors to send bundled sun rays to the heating containers are particularly efficient. The hot water can be used for heating, as warm process water or indirectly as steam for generating electricity. However, solar thermal applications are efficient power generators only when carried out in large-scale power plants with large mirror panels. These panels can collect enough energy to heat the water such that steam turbines can be used.

In photovoltaic applications the energy of the sunlight is directly converted into electricity.

> Photovoltaic installations in Chinese villages

In China there are still some 30 million people without access to electricity. The rate of electrification is low, especially in the less densely populated provinces in the west of the country. Since the cost of connecting them to the transregional public grid would be prohibitive, in 1996 the Chinese government launched the Brightness Programme. The aim of this programme is to supply approximately 23 million people in rural regions with electricity from decentralised power plants on the basis of solar, wind and hydropower by the year 2010. Germany is supporting this project. The KfW development bank is financing the installation of 300 photovoltaic systems which, as hybrid power plants in combination with diesel generators, ensure the energy supply to villages in the four provinces of Xinjiang, Gansu, Qinghai and Yunnan. To ensure that these plants operate sustainably and to encourage the installation of additional systems, the GTZ is helping to expand the market for renewable energy technologies, for instance, by advising institutions, training local technicians and improving the technical quality of systems.

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> Promoting power in Afghanistan

More than ninety per cent of the Afghan people have no access to modern energy. The rural population in particular lack an affordable and reliable energy supply and non-electric energy for cooking and heating. This also affects public facilities such as schools and health stations. The GTZ is helping the Afghan Ministry of Energy and Water to develop economically, socially and technically sound energy supply concepts and to realise these in rural areas in particular. Moreover, German development cooperation is promoting the maintenance and repair of existing hydropower plants and the construction of new small-scale plants, as well as ensuring that the power generated is used productively. Afghan women are being trained to produce solar lamps and cookstoves, with the aim of producing and selling affordable solar lamps commercially, in order to give people an alternative to the kerosene and oil lamps that are detrimental to their health and can so easily cause fires.

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> Wind power: Egypt's best bet

Thermal power plants account for 80 % of Egypt's electric energy supply, the remaining 20 % being produced in hydropower plants along the River Nile. In order to meet the country's rapidly growing demand for energy, the Egyptian government is planning to increase the share of renewable energy sources in its energy mix. On behalf of the Federal Ministry for Economic Cooperation and Development, the KfW development bank is helping the Egyptian side build a huge wind farm along the shores of the Red Sea. Due to the local wind conditions, the region around Zafarana is considered one of the best sites worldwide for wind power. When completed, the Zafarana wind farm is to produce a total output of 600 MW, enough to supply 170,000 Egyptian households with electricity. The German government is contributing a total of 149 million euros in four phases. The first three phases, which have produced a total output of 80 MW have been completed. The fourth phase is to generate another 80 MW output. The German contribution alone will help to save 110,000 t of CO^2 emissions every year. Within the framework of the KfW Carbon Fund, an Emission Reduction Purchase Agreement has been concluded with Egypt for the period 2008 – 2012. The additional revenue will help ensure the sustainability of the project.

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> Technical expertise in the wind power sector

Since 1988 the GTZ has been running the TERNA programme (Technical Expertise for Renewable Energy Application), on behalf of the Federal Ministry for Eco-

nomic Cooperation and Development. TERNA's objectives are to support wind power projects in partner countries. In this process, TERNA offers the technical expertise needed to identify suitable locations for wind farms, to assess their energy potential and investigate the economic feasibility of these projects. In addition, TERNA advises the project partners on financing, although it does not contribute to the financing itself. Columbia is a case in point: Since the beginning of 2001 the GTZ has helped the municipal utility of Medellín (EPM) to plan a 19.5 MW wind farm on the Caribbean coast. EPM based its investment decision on TERNA's studies and analyses. The wind farm went online in December 2003. Compared to a conventional power plant, by the year 2012 it will have saved around 1 million t of CO^2.

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To that end special solar cells are needed. Today they are mostly made out of silicon. In future, though, it is conceivable that solar cells could be made from organic matter, which would be much cheaper to produce. Experts reckon that within a few decades solar cells will be efficient and economical enough to compete with all other types of energy. Since there are no moving parts, cells are very robust and low in maintenance, which makes them particularly attractive in decentralised energy supply systems for sun-rich developing countries.

Wind power

In recent years wind power has experienced a genuine boom. Although it currently accounts for only about 0.05 % of the worldwide primary energy consumption, its growth rates outstrip those of all other renewable energies. Modern wind turbines have made such technological progress that in wind-rich regions in particular they can produce electricity at a comparable cost to that of conventional power plants.

Wind power offers a strong economic potential for application in developing countries. Admittedly, investment costs are often higher than in industrialised countries, because the manufacturers have to pay more for transport, installation and maintenance of the plants, but these disadvantages are compensated for by excellent wind conditions at some of the sites. In addition, very often wind power can replace the use of expensive diesel fuel in power plants.

The disadvantage of wind power plants, namely that they do not generate any electricity when there is no wind, is actually balanced by creating an energy mix in the national electricity grid. But wind power is also an interesting option in remote areas that are not connected to the grid. Wind turbines can be combined with a diesel generator, to ensure a round-the-clock energy supply. In comparison to a diesel generator alone, a hybrid power installation of this sort saves a significant quantity of fuel and reduces CO^2 emissions.

> Hydropower in Tibet

In the 1960s many small-scale hydropower plants were built in Tibet. However, necessary maintenance and repair work was not performed, with the result that many power stations had not been operational for a number of years. Between 1995 and 2002 German development cooperation supported the regional water board in its efforts to rehabilitate the plants and thus harness the potential offered by hydropower. The local population was involved in the process in under to underpin the sustainable operation of the plants. For instance, turbines, generators, switchgear, actuators and metering devices were bought from local manufacturers who also ensure the supply of spare parts. Training courses in maintenance and management of the restored plants, which are operated independently by local lessees, are an integral part of the project. The electrification laid the foundations for a large number of GTZ-assisted development measures, including training and upgrading courses in various crafts. Today, some 40 per cent of the electricity generated is used in manufacturing and the average per capita income has risen significantly. Thanks to this success, the water board has introduced the concept throughout Tibet.

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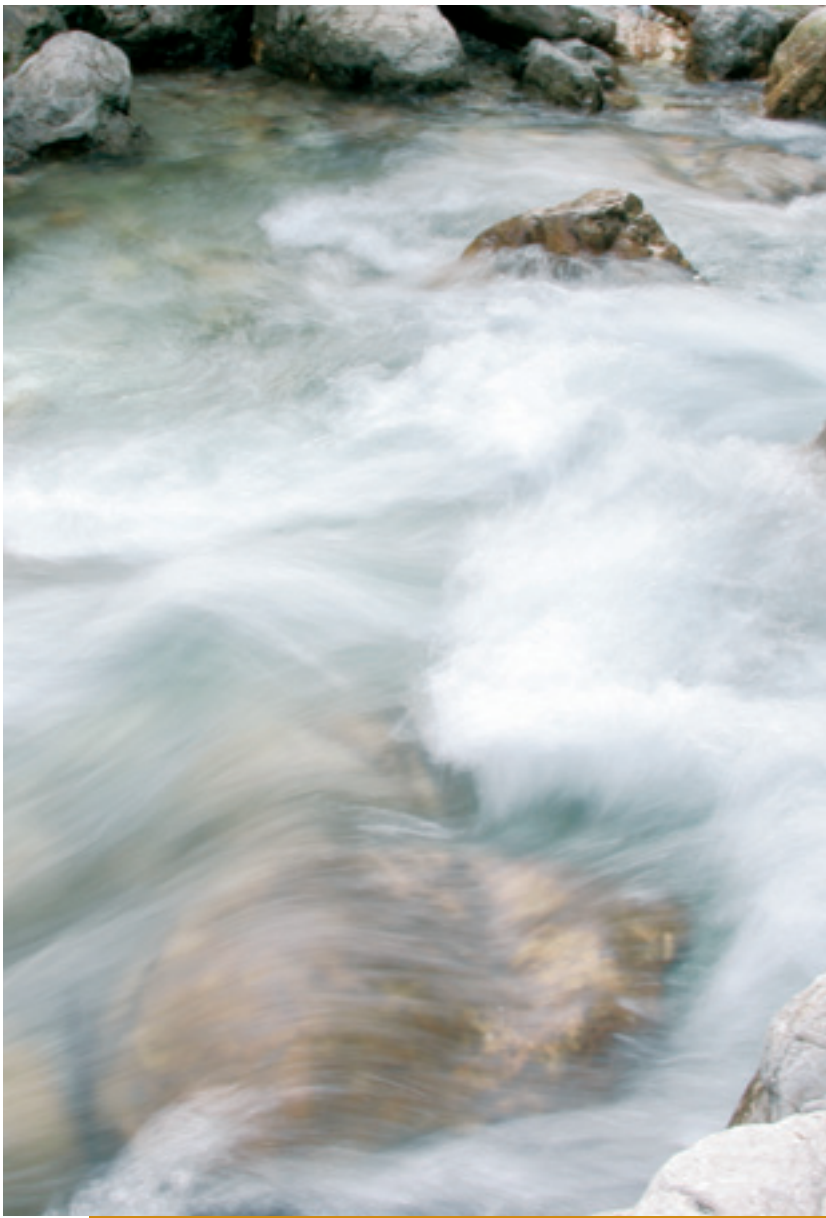
Hydropower

Hydropower is the only renewable energy source that can already boast a substantial share of today's electricity generation. Worldwide its share amounts to about 20 %, which corresponds roughly to the total power generated in the EU. Latin America meets about three quarters of its energy requirements from hydropower. What makes this technology so



attractive is, among other things, the low cost of electricity generation. In addition, in contrast to solar or wind power plants, hydropower plants produce energy without interruption – as long as there is enough water in the reservoir and droughts do not prevent the inflow of more water.

Hydropower can make considerable contributions to the increased use of renewable energies. However, for each new power plant construction project the issue of sustainability should be looked into very carefully, because the construction of new hydropower plants – especially of very large dams - is a massive intervention in the natural and social balance of the region. Such projects entail severe hardship for the local population, if they have to stand by and watch their homes vanish under water and they are given no adequate compensation. Also, the downstream riparians are affected, because the new dam can dry up their traditional sources of income. For example, farmers may see harvests decline as soil fertility is lost now that their fields are no longer flooded regularly. Merchants and traders who used to travel the river by boat can no longer do so, as the dam is blocking their way.

> Indonesia: a major role for small-scale energy solutions

Indonesia has a huge potential for small-scale hydropower, which can generate affordable, clean electricity if the correct technology is used. In rural areas in particular, where some 65 million people have no access to electricity, the population is often forced to spend a large percentage of their income on alternative forms of energy, including batteries, kerosene or small diesel generators. In order to make better use of the country's hydropower potential, the GTZ is currently implementing the project, "Small-scale Hydropower for Sustainable Economic Development" on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ). The project aims to make the power generated by small-scale hydropower plants sustainable and to help establish an independent market for energy services in the small-scale hydropower sector. The project also transfers the technical expertise required to build plants, and advises public institutions, helping them to create an enabling environment. The successes of the project are very apparent: 85 per cent of technical equipment can already be produced locally, cutting costs as compared to imported plants, by 40 per cent or so. Local plant manufacturers are even exporting their products to eight countries in Asia, Africa and Europe. If proof was needed that the products are of a high quality, there we have it. More than 100 small-scale hydropower plants have been built on the basis of a standard design developed within the framework of the project. This has made it possible to supply electricity to 20,000 households, rural entrepreneurs and public facilities. Since 2006 the project has also received support from the Netherlands, making it possible to expand activities to include particularly isolated areas.

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> Nepalese farmers cook with biogas

Three quarters of the total energy demand of Nepal is met by wood that the local people use for cooking and heating. The logging activities, though, have made serious inroads into the country's forest resources. In many regions fuel wood has become scarce, while environmental problems such as erosion are on the increase. In response to this dilemma, the government of Nepal has, since 1975, been promoting the construction of small-scale biogas plants for farmers with livestock. The installations consist of an underground reactor container that is fed with animal dung. The biogas thus generated is used for cooking and lighting homes. The composted sewage sludge is used on the fields as fertiliser. This simple and robust technology has proved its worth over many years. On behalf of the BMZ, the KfW development bank has been financing the Nepalese biogas programme since 1997 to the tune of around 15 million euros. So far, approximately 100,000 biogas plants have been installed. This figure is set to triple by 2009. In addition, within the framework of its Carbon Fund, the KfW development bank reached an agreement with the Nepalese government in October 2006 under which it will purchase one million carbon dioxide emission certificates generated by the programme, thus ensuring additional revenue.

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Biomass

Biomass is the oldest form of renewable energy. As far back as the Stone Age, people gathered around a log fire for warmth. Today biomass still constitutes the most important renewable source of energy. Worldwide, more than two billion people use fuel wood and charcoal for cooking and heating. In sub-Saharan Africa almost 90 % of the total population are completely dependent on these fuels as their sole source of energy.

Nonetheless, the traditional use of biomass brings with it many problems. Firstly, the energy content of biomass is used only very inefficiently, which means that the consumption is high. Secondly, open fires pose a threat to human health. In developing countries, many women and children who spend year after year at smoky fireplaces in poorly vented huts suffer from respiratory diseases.

Therefore, in future the use of biomass needs to be made more efficient. Very often the relevant technologies are neither complicated nor expensive. Simple wood stoves as a replacement for open fireplaces or small biogas installations could greatly increase energy efficiency in developing countries.

Biomass is more than just wood. Straw, animal dung, vegetable oil, biodiesel and biogas can also be used as a renewable energy source. The burning of biomass has one advantage over the combustion of fossil fuels: it releases no more CO^2 than the plants have previously absorbed from the air.

Geothermal power

The enormous heat inside the Earth can be used continuously for heating and electricity generation. Worldwide, geothermal power accounts for only about 0.4 % of the total primary energy supply. However, its potential is nearly inexhaustible. Expert calculations suggest that theoretically more than ten times the global energy demand of today could be generated by geothermal power every year. To harness geothermal power, geothermal wells are drilled to tap hot water or steam from deep under the Earth's surface. Depending on the temperature of the water or steam, they can be used in different ways. If the temperature exceeds 150 °C, it is generally used to generate electricity.

> The "cooking revolution" in southern Africa

In southern Africa almost 90 % of the population use biomass, especially wood, to meet their day-to-day energy needs. Of this, 90 % is used to cook on traditional stoves and open fires. But wood has become scarce, and the costs and time involved in gathering or purchasing fuel wood are rising. And the generally inefficient stoves pose a serious health risk. According to estimates of the World Health Organization, every day about 4,000 people in the world die as a consequence of smoky unhealthy kitchens. Strategies for the widespread dissemination of improved cookstoves are being elaborated and put into practice in eight member states of the Southern African Development Community (SADC) in cooperation with state institutions and local small-scale manufacturers within the framework of the Programme for Biomass Energy Conservation in Southern Africa (ProBEC). The simple clay and metal stoves are produced locally and help cut the amount of fuel wood used by up to 90 %. Stove producers are trained and users instructed in the use of the new cookstoves. The GTZ is contributing 3.1 million euros to the programme on behalf of the BMZ, while Dutch co-financing totalling 6 million euros has made it possible to extend the programme. In 2006, ProBEC won second place in the Ashden Award for Sustainable Energy in the Africa category. The jury was particularly impressed by the strategy of promoting local businesses, which were involved in developing and disseminating the innovative and clean "rocket stove" technology.

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Under favourable circumstances this can be done at a cost of between two and ten cents per kilowatt-hour. Electricity can also be generated at a lower temperature, however, using binary power plants. Heat exchangers are used to transfer the heat of the thermal water to a special organic fluid, which produces steam at a fairly low temperature. This is then used to drive turbines.

> Geothermal power in East Africa

Olkaria II is the name of the biggest geothermal power plant in Africa. It is located in Kenya's Rift Valley. From about 20 geothermal wells, steam at temperatures of up to 300° C flows from a depth of 2,000 m to the two turbines that have a combined output of 70 MW. Today 11 % of the electricity generated in Kenya is of geothermal origin, and there are plans to increase this figure. Experts assess the harnessable potential of geothermal power in Kenya alone at a rough 2,000 MW. That is almost twice the current national power production. The Olkaria II project cost 200 million euros, 17 million of which the KfW development bank is funding on behalf of the Federal Ministry for Economic Cooperation and Development. First and foremost, the KfW is financing the exploration and development of the geothermal field. In the context of a regional programme for the advancement of geothermal power in the East African Rift Valley planned by the Global Environment Facility (GEF) and the United Nations Environment Programme (UNEP), similar projects are planned for Kenya, Uganda, Tanzania and Ethiopia. The Bundesanstalt für Geowissenschaften und Rohstoffe (BGR – the Federal Institute for Geosciences and Natural Resources) is also involved in these plans through its GEOTHERM programme.

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Energy from deep within the Earth

And finally, geothermal heat can also be used directly to heat buildings or greenhouses and fish farms. Temperatures of 38°C and upwards are enough to do so.

To date geothermal power has been used very little because of uncertainties in assessing these underground resources. In order to determine the geothermal potential of a region, preliminary studies must be conducted at the surface along with expensive exploratory drillings. This pushes up the costs of investment before it is certain that the resource actually exists. Thereafter it can be exploited with fairly little risk.

> BMZ supports geothermal projects

On behalf of the BMZ, the Bundesanstalt für Geowissenschaften und Rohstoffe (BGR – the Federal Institute for Geosciences and Natural Resources) is promoting the use of geothermal energy. With its GEOTHERM programme, the BGR is helping Germany's partner countries to develop geothermal power resources within the framework of technical cooperation. In line with the specific needs of a partner country, the support services available range from training and upgrading to geological exploration and evaluation of geothermal resources, through to ecological, technical and economic aspects. This is to facilitate well-founded investment decisions before developing selected geothermal sites. The BGR is currently promoting promising approaches in Ethiopia, Chile, Kenya, Tanzania and Uganda. With BGR support, Eritrea's Geological Service has investigated the feasibility of using the volcano Alid to generate electricity. This has made Eritrea an attractive possibility for a major international power generator, who now intends to develop the Alid volcanic centre.

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Energy Efficiency

Renewable energies are not the only relevant factors for ensuring a sustainable energy supply worldwide. About 70 % of the total worldwide primary energy used is lost somewhere along the energy supply chain, from the production and transport of energy all the way to the final consumer. There is huge potential here for saving energy. Without marked improvements in energy efficiency it will be impossible to achieve sustainable energy management and a successful climate protection policy.

There are many ways to use energy more efficiently. In many cases, simple changes can bring enormous improvements. For instance, brushwood can be used much more efficiently in a simple cookstove than on an open fire. Better insulation reduces the energy needed for heating. Often it is more effective to backfit existing power stations, boost efficiency and invest in energy-saving appliances than to build new power plants.

Impressive improvements for minimum input

Energy efficiency is also a particular concern of developing countries. Firstly, many power plants in these countries are obsolescent. With just a little extra input, such as an upgrade of the turbines, their energy efficiency can be improved significantly. Secondly, many developing countries are faced with the question of how to meet the increasing energy needs of their population. The most important point is the proper dimensioning of new supply systems to meet the demands. As a general rule, the more efficient the supply system is as a whole, the less power generation capacities need to be built, reducing investment costs.

High energy efficiency is also beneficial for renewable energies. The less energy the population needs, the easier it will be to meet the demand from renewable sources alone – and the less money needs to be spent on expensive power plants and giant distribution grids. One thing is therefore clear: A sustainable energy supply is only possible if the promotion of renewable energies goes hand in hand with efficiency gains.

> Less CO^2 pollution through modernised power plants

After the US, China is already the world's biggest producer of CO^2 emissions. It is estimated that the electricity consumption of China's 1.3 billion inhabitants will increase six-fold by 2050, meaning than China will overtake the United States of America. China generates 75 % of its electricity in coal-fired power plants, mostly from coal with a high sulphur content. Some of the technologies applied in this process have become very obsolete, at a high cost for the environment. Dust and sulphur dioxide, which is responsible for acid rain, pollute the major population centres. Many Chinese suffer from respiratory diseases.

Germany, a traditional coal country, can help by supplying energy-efficient, environmentally friendly technologies. Efforts to improve power plant efficiency have proven highly effective: less coal is needed to generate the same quantity of electricity. That is good for the environment, uses fewer resources, and costs less.

Using financial cooperation funds totalling 38.1 million euros, the turbines in six Chinese power plants are being modernised. In addition, German industry has delivered 15 measurement vehicles equipped with mobile measurement instrumentation. The GTZ is helping to ensure that the vans are used correctly and sustainably, by providing training and upgrading measures. The modernisation of the turbines has cut the average specific consumption of coal by eleven grammes per kilowatt-hour. Together the modernised turbines cut carbon dioxide emissions by some 600,000 t per annum. The measuring vehicles are helping to prevent the release of up to 7 million t of CO^2 every year. The programme is thus making a major contribution to climate protection.

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> Clean coal

Lignite and hard coal will continue to be an important part of the energy mix in the years to come. In the interests of achieving a sustainable energy and climate policy, research work is thus focusing on technologies which can make coal-fired power stations cleaner and more efficient. In addition to increasing energy efficiency, these involve removing and storing carbon dioxide; it is removed directly from the flue gases of power stations and industrial plants and stored underground. There are three technical options for doing this:

1. Separating carbon dioxide from the flue gas
2. Gasification of coal prior to combustion
3. The oxyfuel procedure (combustion in pure oxygen).

These methods can be used practically anywhere, because potential storage capacity is available everywhere underground in exhausted oil and gas fields or in deep artesian aquifers. So that the technology can be successfully used, a suitable legal framework must be put in place and a representative number of demonstration projects launched. In developing countries tried and tested techniques can be promoted. It is important to get high-emission countries more involved.

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Ushering in a New Era in Energy Use: renewables 2004

> Policy Network for Renewables

To consolidate the progress made at renewables 2004 it was decided in the political declaration to establish a global policy network for renewable energies. The Renewable Energy Policy Network for the 21st Century (REN21) creates a forum for governments, international institutions, non-governmental organisations and representatives of industry, and brings them together with the local population. The aim is to support political developments and decision-making processes at regional, national and international level, thus facilitating a rapid expansion of the use of renewable energies in developing countries and industrialised states. REN21 is not an organisation, but a multi-stakeholder network, in which all actors join forces to promote the use of renewable energies. In June 2005 the network began work; the Secretariat is based in Paris. In its global status report on renewable energies, REN21 published a comprehensive overview of worldwide developments in the renewable energies sector. Another main task of REN21 is to document the current implementation status of the renewables 2004 International Action Programme. In June 2006 REN 21 published its first report in this context.

www.ren21.net

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In June 2004 the international conference renewables 2004 was held in Bonn. Former Federal Chancellor Gerhard Schröder had announced the conference at the 2002 World Summit on Sustainable Development in Johannesburg. With more than 3,000 participants from around the globe, it was an impressive demonstration of commitment to expanding the use of renewable energies and the ushering in of a new global era. 154 government delegations (including 121 government ministers), 30 international organisations and a large number of representatives of private industry and civil society agreed on two major messages. First: Renewable energies can make a contribution to overcoming poverty. Second: Along with efficiency gains, renewable energies are indispensable for an environmentally sound, safe energy supply that is independent from oil.

The conference generated three outputs. The political declaration underlines the contribution made by renewable energies to sustainable development, climate protection and poverty reduction, and emphasises the increasing importance of renewables in the energy mix.

The policy recommendations, the second output of the conference, contain strategies and options for the further expansion of the use of renewable energies. They offer decision-makers approaches for political frameworks, financing options and the strengthening of international capacities.

Actions for renewables

The heart of the success of the conference can be seen in the third output, the International Action Programme, which comprises some 200 concrete actions and voluntary commitments made by governments, international organisations, and civil society and business institutions. If the International Action Programme is fully

realised, an estimated 1.2 billion t of carbon dioxide emissions can be avoided every year as of 2015. This is equivalent to about five per cent of global carbon dioxide emissions, and is more than Germany's total carbon dioxide emissions in 1990. The central German contribution to the Action Programme is a Special Facility for Renewable Energies and Energy Efficiency. With a volume of up to 500 million euros, over and above the one billion euros pledged at the 2002 Johannesburg Summit for renewable energies and energy efficiency, this facility has since 2005 made available low-interest loans to state or parastatal institutions, banks and private-sector bodies to fund investments in developing countries. The facility was set up in cooperation with the KfW development bank. New, outstanding German development cooperation projects have also been included in the Action Programme. The policy network REN21 documents implementation status. The realisation of the International Action Programme is closely linked to the World Summit on Sustainable Development held in Johannesburg in 2002. The Plan of Implementation adopted in Johannesburg too is to be monitored regularly, which would suggest close cooperation with the UN Commission for Sustainable Development (CSD), whose agendas for 2006 and 2007 include energy.

www.renewables2004.de

> China hosts follow-up conference

In November 2005, with the support of the German government, the Chinese government hosted the follow-up conference, Beijing International Renewables Conference 2005, at which the importance of renewable energies for developing countries in particular was spotlighted. The Beijing Declaration underlines the need for international cooperation to extend the use of renewable energies. It thus calls on governments, industry and other stakeholders to redouble their efforts in the fields of research and development, promotion policy, financing and development of markets at national and international levels. The Declaration also contains the proposal that the UN Commission for Sustainable Development adopt formal monitoring in May 2007 of the commitments laid out in the Johannesburg Plan of Implementation and the International Action Programme, so as to clearly identify progress made by moves to extend the use of renewable energies.

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renewables 2004 in Bonn

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