

Dear Reader,

the world's energy system stands at a crossroads. It is possible to stabilize the climate and limit the rise in temperature to a maximum of two degrees. But to do this we must now invest forcefully in energy efficiency and renewable energy. The participants at the United Nations Climate Change Conference in Copenhagen can work the decisive switches here. In this Energy Special we give you examples of how the intelligent usage of energy works in practice and what Germany can contribute within the framework of international partnerships.

Yours sincerely,

Stephan Kohler,
Chief Executive
Deutsche Energie-Agentur
GmbH (dena) - German
Energy Agency



The Earth by night: humanity has brought light to the darkness. So things stay this way, the world today is concerned with the efficient use of available energy, increasing the use of renewable energy and intelligently networking all energy sources. It slows the greenhouse effect and secures the planet's future.

Five inconvenient truths and courageous measures

Why global climate change policy is trapped | By Ottmar Edenhofer

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Global climate change policy is trapped for five reasons:

First, the atmosphere's dumping space for greenhouse gases is limited. If the world community wants to avoid dangerous climate change, aggregated global CO₂ emissions from fossil-fuel combustion should remain below 850 billion tons until the end of this century. Global warming could then be confined to no more than 2°C above pre-industrial levels with a chance of 75 percent. Among others, this would reduce the risk of sharp sea level rises, acidified oceans, and derailed monsoon patterns in China and India. With other words: We would make sure to bestow to coming generations a planet that can still support human life under reasonable conditions. Yet this budget is very tight and ambitious in light of currently projected emission trajectories. Nevertheless, the newly elected German government should try to persuade world leaders at the upcoming UN climate change conference to agree on this global carbon budget. Such an outcome would mean a great success for Copenhagen.

Second, the global carbon budget needs to be split and allocated to individual countries. Yet any nation state will only be willing to negotiate over an individual carbon budget if it has an idea of the economic cost involved. In Copenhagen, the German government should therefore promote the proposal to commission an international

expert group of leading scientists to assess these costs. This cross-national collaborative work on this analysis would further mutual trust and form a common ground for subsequent negotiations.

Third, there is no viable alternative to global emissions trading. The idea to introduce a carbon tax ignores important dynamics: if the policy aimed at keeping the global emission budget, a carbon tax would need to increase over time for economic reasons. But how are owners of fossil resources likely to react to such an outlook? Most likely they will want to accelerate resource extraction in order to escape higher taxes in the future. This embodies the risk that the carbon budget will be missed in spite, or precisely because, of a rising carbon tax. Alternatively, if the budget is converted into tradable permits, resource owners will have no means to circumvent the quantitative emissions restriction.

Fourth, a carbon budget will require an institution, which makes sure that the budget is met and managed efficiently. This institution could take the form of a 'carbon trust' or 'carbon central bank'. The carbon central bank would allocate emission permits such that firms can decide individually when and how to use them. This institutional framework is necessary but it will not come overnight. An important step towards such a regime is a reform of the EU Emissions Trading Scheme.

Fifth, the carbon budget needs to cover the entire global economy and the global carbon market should be designed accordingly. A major weakness of the European emissions trading system lies in the fact

that important economic sectors are excluded from cap and trade. For example, this is true for the buildings sector although it offers a particularly promising potential for cheap emission reductions. One

could integrate all economic sectors into emissions trading by including all upstream sources of fossil fuels: importers and distributors of coal, gas, or oil would be required to buy one emission permit for each ton of carbon they bring into the economy. This way all sectors participate in emissions trading, ensuring that emissions are reduced where this is cheapest. In addition to sectoral extension, emissions trading should also be broadened to include more regions. The US Senate is currently debating to install a cap and trade system for the US economy and the German government should continue to explore options to link this emerging system to the European carbon market. Eventually, a EU-US carbon market could emerge which would be attractive for many players. Among them are, for instance, German car manufacturers, because linking could harmonize and stabilize carbon price regulations on both sides of the Atlantic. A transatlantic carbon market would also provide a strong signal for current bystanders such as China, India, Brazil, and Russia to participate in a future global carbon market.

Overall, it is my belief that the five measures outlined above are essential for tackling dangerous climate change with sufficient chances. International climate change policy would have escaped its trap – with active help from the German government! ■

“ Overall, it is my belief that the five measures outlined are essential for tackling dangerous climate change with sufficient chances. ”



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Climate change conference and emissions trade

From Kyoto to Copenhagen

In December 1997, representatives of 158 countries met in the Japanese city of Kyoto and agreed, for the first time, to set binding limits on the emission of greenhouse gases in industrialized nations. According to the agreement, known as the Kyoto Protocol, by the year 2012 emissions should be down an average of 5 percent on 1990's levels.

In December 2009, 192 countries are due to gather at the United Nations Climate Change Conference in Copenhagen to thrash out a follow-up agreement to

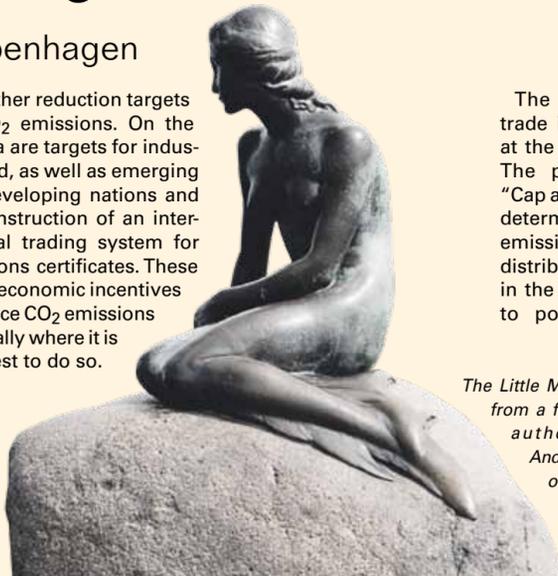
set further reduction targets for CO₂ emissions. On the agenda are targets for industrialized, as well as emerging and developing nations and the construction of an international trading system for emissions certificates. These create economic incentives to reduce CO₂ emissions especially where it is cheapest to do so.

The EU emissions trade

The EU introduced a trade in emissions rights at the beginning of 2005. The principle is called “Cap and Trade.” Politicians determine how much CO₂ emission is permitted and distribute this permission in the form of certificates to power stations and

industrial concerns. If they emit more CO₂ they have to purchase certificates from dedicated exchanges, brokers or directly from other participating companies.

In Germany, currently 8.8 percent of certificates are sold by the state-owned KfW Bankengruppe via emissions exchanges. Well-established are Leipzig's European Energy Exchange, or EEX, the EXAA in Vienna and the ECX in London. The European Union Emission Trading System (EU ETS) is considered an archetype for an international emissions trading system.



The Little Mermaid is a character from a fairytale by the Danish author Hans Christian Andersen and the emblem of Copenhagen, the location of the 15th United Nations Climate Change Conference.

'Russia will make a significant, positive contribution'

Sergei Shmatko, Minister for Energy, explains how Russia supports global efforts to stabilize greenhouse-gas emissions

Russia has adopted a New Energy Strategy for the Year 2030. In this context, Russian President Dmitri Medvedev has even spoken of an "energy-efficiency revolution." Is today's Russia going new ways in energy efficiency and renewable sources of energy?

The main thrust of Russia's state energy policy is its New Energy Strategy for the Year 2030 (ES-2030), a project introduced by the Russian Energy Ministry and authorized by the Russian government. ES-2030 aims to make the most effective use of Russia's energy potential in order to achieve full integration into the global energy market, consolidate its positions on that market, and gain the greatest possible benefit for the national economy.

of the state as an agent of economic activity will increase in terms of creating innovations in the energy sector (non-hydrocarbon forms of energy, etc.), whereas in the traditional branches of the energy sector its role will be reduced to a largely regulatory one – ensuring a stable institutional and regulatory/legal framework for the effective functioning of private business.

Two of the most important strategic initiatives of ES-2030 are the development of alternative energies and the realization of the potential of energy saving and improved energy efficiency. This year the Russian Energy Ministry drafted a state energy-saving program flanking the ES-2030 policy. After approval by the ministries and agencies concerned,



Sergei Ivanovich Shmatko is Minister for Energy of the Russian Federation. In this interview he answers questions about Russia's New Energy Strategy, the recently inaugurated Russo-German Energy Agency (rudea) and the Russian role in the post-Kyoto process.



Yekaterinburg, formerly Sverdlovsk, is a major city in the central part of Russia, the administrative center of Sverdlovsk Oblast. An agreement signed in Moscow in February 2009 by Russian and German partners shows how energy-saving potential can be harnessed. The aim is to transform Yekaterinburg into an energy-efficient city.

We anticipate that implementation of ES-2030 will produce results across all sectors of the fuel and energy complex, including such crucial areas of state energy policy as energy saving and increasing energy efficiency. The following goals are to be achieved:

- reduction in the energy intensity of GDP by a factor of at least 2.3,
- development of a social partnership between energy corporations and society,
- innovative renewal of productive assets and energy infrastructure, the creation and development of new types of energy and energy technologies,
- environmental security and the efficient development and functioning of the fuel and energy complex so as to curb greenhouse-gas emissions; this is to be achieved by realizing energy-saving potential and improving energy efficiency.

The goals of ES-2030 are divided into groups to be achieved in phases. The direct involvement of the state in ensuring the functioning and development of the energy sector is to be gradually supplanted by various forms of public-private partnership, particularly in the construction and modernization of energy infrastructure and in developing the innovative basis for transition to a new technological era in the energy sector.

The objectives of the final phase of ES-2030, which is to end in 2030, include the efficiency-oriented use of traditional energy resources and the gradual transition to energies of the future. The role of the fuel and energy complex in the Russian economy will have been significantly curtailed by this third phase. This will fundamentally alter the role of the state in developing the energy sector. The signifi-

which is forthcoming, the draft program will be submitted to the Russian government for consideration. The program will facilitate the large-scale application of energy-saving technologies, the use of renewable sources of energy and the realization of innovative, energy-efficiency projects, particularly in the public sector and housing.

The Russo-German Energy Agency (rudea) was founded recently. Why did you choose to cooperate primarily with German partners, and what are your expectations of rudea?

The founding documents of the Russo-German Energy

Agency (rudea) were signed following the eleventh round of Russo-German consultations on 16 July 2009 in Munich during the meeting of President Medvedev and Chancellor Angela Merkel. Both emphasized the need to develop economic cooperation

despite the current economic crisis.

The establishment of this Russo-German agency to promote energy efficiency is an important step in developing cooperation between the two countries. Now is an opportunity time for implementing

energy-saving projects. The introduction of new energy-efficient technologies holds promise for the future and opens up a wide range of possibilities for long-term partnership between Russia and Germany.

The main goals of the agency are in line with this ministry's emphasis on energy saving and improved energy efficiency. Russia is a major supplier of energy resources, and these dependable deliveries serve to buttress the German economy. The growth of trust is very important both in the political sphere and the economy.

This potential must be maintained and further developed. Germany is a global leader in energy efficiency and related technologies, and as such it is an ideal partner for Russia.

energy-efficient technologies in energy-intensive industries such as steel and aluminum production.

An agreement signed in Moscow in February 2009 by the Russian Energy Ministry, the company Siemens AG, the Administration of Sverdlovsk Oblast (region) and the Office of the Mayor of Yekaterinburg shows how energy-saving potential can be harnessed. The Parties agreed to cooperate in studying and introducing energy-saving technology in Yekaterinburg, the largest industrial center of the Urals. Their cooperation aimed at transforming Yekaterinburg into an energy-efficient city is a pilot project for the implementation of similar measures in other regions of Russia. Projects of this kind must also constitute the basis for mutually beneficial Russo-German cooperation in the field of energy efficiency.

The agency's activities look set to be successful, and everyone stands to gain from them – businesses, consumers and the state alike. German companies are pioneers and market leaders in energy saving and energy efficiency, and their experience stands us in very good stead. Choosing Germany as a partner was therefore a correct and natural move.

Increasing energy efficiency involves various challenges, and the Russian Energy Ministry is actively involved in meeting them through goal-oriented planning. This creates favorable conditions for international cooperation, for the use of experience in the interests of all, and for joint involvement in the development of new energy-saving and energy-efficiency projects.

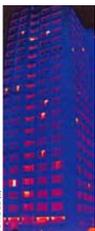
Demand for energy has declined slightly during the global crisis. But it will rise again and every country will look to satisfy the energy requirements of its economy. Russia will be no exception. It is therefore essential that our country now begins to develop its potential for energy saving and energy efficiency.

The international community will meet in Copenhagen in December 2009 to discuss a new, post-Kyoto Protocol agreement. What role will Russia play in this process?

Russia has ratified the Kyoto Protocol on the UN Framework Convention on Climate Change. There is no doubt that greenhouse-gas emissions and their dynamics constitute an increasingly important aspect of environmental security.

Currently Russia successfully fulfills the requirements of the Kyoto Protocol. For 2008–2012 Russia has vowed not to exceed its greenhouse-gas emissions of 1990. Although the Russian economy has grown by almost 70 percent since 2000, greenhouse-gas emissions have remained significantly below the 1990 level; predictions are that Russia will be able to keep its average annual greenhouse-gas emissions at least 20 percent below the 1990 level until 2012.

Thus Russia not only fulfills its obligations but will also make a significant, positive contribution to global efforts to stabilize greenhouse-gas emissions. Russia has submitted a full account of its efforts to the Secretariat of the Parties to the UN Framework Convention on Climate Change/Kyoto Protocol and is undergoing international audit; as such it is in full compliance with the obligations of the Kyoto Protocol. ■



A house facade as seen by a thermographic camera, before (top left) and after (left) modernization: the red and yellow color shows the parts with a loss of warmth. A thermographic view of an unimproved house (above). Germany and Russia will cooperate in pushing energy-efficient refurbishment of residential and non-residential buildings.

“ Germany is a global leader in energy efficiency, and as such it is an ideal partner for Russia. ”

Russia's partnership with Germany for a new energy strategy

The Russo-German Energy Agency (rudea) provides know-how and motivation

Newly founded rudea organizes modernization: Russia wants to lower its energy consumption by 40 percent by 2020.

Saving large amounts of energy helps protect the climate – but it's also a significant economic factor. In the past this knowledge played only a small role in resource-rich Russia. Energy was available for industry and private households in quantity and cheaply. Now Russia, too, is becoming increasingly aware that economic energy use brings big economic advantages.

Following a decree by President Medvedev energy consumption per unit of production in Russia is to be lowered in the next eleven years by 40 percent on 2007's level. Stephan Kohler, Chief Executive of the German Energy Agency (dena), points out the size of the project: "This corresponds to double the amount of energy Russia exports today in the form of natural gas to Western Europe." Measures to raise energy efficiency are also a great deal cheaper than are new natural gas fields in Siberia. And the more efficiently Russia uses its energy at home, the more energy it can export at world market prices. In tapping its potential Russia can profit from Germany's experience.

With July's foundation of the Russo-German Energy Agency, rudea for short, Russia is now



Dena Chief Executive Stephan Kohler and Sergei A. Mikhailov, chairman of the board of the Energy Carbon Fund, sign in the presence of Chancellor Merkel and President Medvedev the founding charter of rudea at the summit meeting in Munich.

targeting energy efficiency with German know-how. "The founding of rudea is a milestone in German-Russian cooperation," says dena CEO Stephan Kohler. "Energy has played for more than 30 years a central role in both countries' relations. A reliable partnership has developed

here. Rudea will expand this process and advance the development of energy efficiency markets so that both sides gain: Russia's economy and infrastructure are being modernized and so made more competitive, whilst German companies can tap new markets for their efficiency technol-

ogy. Experience in Germany has shown that a central, independent and capable energy agency plays an important role in raising energy efficiency." Dena has a 40 percent share in rudea. The Russian Energy Carbon Fund holds 60 percent. The aim is to raise energy effi-

ciency throughout the whole value creation chain and accelerate the use of regenerative energy sources in Russia with the assistance of German know-how. Important projects are to be established in the fields of building renovation, in industry and commerce as well as the

Investing in China's future

The reconstruction of an elementary school will be an exemplar of energy efficiency – in the center of a region devastated by an earthquake

When learning, it goes: first the theory, then the practice. According to this concept the German Energy Agency (dena) is now implementing the practice-test in its engagement with China.

Two years ago dena unveiled its "Energy-efficient Construction in the People's Republic of China" handbook, which lays out the most important areas with regard to energy efficiency in new buildings. Its publication was accompanied at the time with several regional informational events. That was the theory. The practice is – since the foundation stone was laid on 18 September 2009 – the construction site of the Experimental Primary School in Mianyang. The city in the province of Sichuan lay at the center of the severe quake of May 2008. The elementary school's two buildings were both damaged, one heavily, the other lightly. Both have since been put back into use but don't meet the tightened earthquake-safety and building standards, and have too few classrooms. That's why the construction of another school building is needed.

What makes the new building special is that it will need especially little energy and is intended to serve as an example for sustainable architecture in China. Construction costs are being borne jointly by dena, Fresenius Medical Care and the Sichuan Changhong Group. The project is part of the German foreign office's "Eight Schools for Sichuan" initiative, by which the earthquake region's destroyed schools are being rebuilt with the assistance of German business and industry. "This school

points the way to the future, for students just as much as for architects, engineers, politicians and civil servants," says dena CEO Stephan Kohler with conviction. "The number of buildings in China is growing very rapidly. If modern energy efficiency standards are adhered to in the process, then that has great significance for China, the international energy market and climate protection. Because wherever less energy is consumed it also means lower energy costs and fewer climate-damaging emissions."

Here, the standards of the Deutsche Energieeffizienz-Paraverordnung (German Energy Saving Ordinance) are those being applied. They are higher by far than those currently applied in China. The construction and design of the buildings' shells are a decisive factor for future energy consumption. In the short hot and cold seasons efficient buildings ensure pleasant temperatures in the classrooms. The four-story new building, with 6,700 square meters of usable space for up to 18 classes and 900 students, is due to open in September 2010. The Experimental Primary School in Mianyang will then, thanks to German assistance, again have sufficient space for its almost 3,000 students from first to sixth grade.

The Chinese government has acknowledged the significance of energy efficiency. It wants to lower energy consumption per unit of GDP in all areas by 20 percent by the year 2010. German experience and technology can play a valuable part here. In cooperation with the Chinese Ministry of Construction dena is supporting politicians and civil servants in creating suitable framework conditions, defining efficiency standards, training experts and realizing pilot projects. ■



The laying of the foundation stone ceremony for the new building of the Mianyang Experimental Primary School on 18 September 2009 (from l. to r.): LIAO Minyi (Vice General Manager, Bancor Management & Consulting Co., Ltd.), Betty Ma (Senior Vice President, Fresenius Medical Care Asia-Pacific Ltd), Consul General Hans Mondorf (German General Consulate Chengdu), HUANG Zhengliang (Deputy Mayor of the City of Mianyang), Stephan Kohler (Chief Executive, German Energy Agency), XU Jianwu (Deputy Head of Section, Ministry of Construction, China), WANG Chao (Principal, Mianyang Experimental Primary School). A computerized model of the new school building (left).

A continent gets wired up

The expansion of renewable energy presents

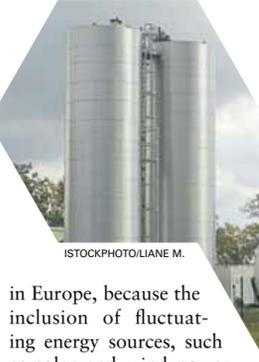
Europe's power system with new challenges

Europe's electricity grid of the future works across borders and balances lack of wind in the North and Baltic seas with hydroelectricity from Sweden and Norway. Germany lies in the center of this large energy alliance, which continues to develop in all directions.

The energy mix of the future needs flexible power systems. Here, the networks play an important role: electricity no longer comes solely from a few large power stations. When the wind is strong the network will have to react very quickly. Windmills on land and at sea will then produce large amounts of electricity. When the sun shines photovoltaic plants will feed electricity to the network. If more electricity is produced than actually needed, it will be stored. If there is no wind and sun then electricity will be produced in highly efficient coal and gas-fuelled power stations. The energy network reacts to fluctuations thanks to intelligent control and brings electricity to the consumer safely and reliably. The EU's plans call for 20 percent of energy consumed by the year 2020 to come from renewable sources. To achieve that each country must change the ways it produces, transports and uses energy. This is because production and consumption must be in balance at every moment. Conditions for the use of renewable energy vary from region to region in Europe. Thus offshore wind farms offer great potential in Great Britain due to the long

coastline. In Spain conditions are ideal for the use of solar energy. The same goes for Italy, where conditions are also favorable for geothermic energy. In alpine Austria and mountainous Norway the best possibilities are for large storage power stations that use hydro energy. Energy storage plays a key role in renewable energy generation

In the lowlands Europe is counting on biomass. Where there is agriculture there is energy to be harvested.



ISTOCKPHOTO/LIANE M.

in Europe, because the inclusion of fluctuating energy sources, such as solar and wind power, requires the increased use of energy storage systems. Pump storage hydro power plants support a secure electricity supply. In these power stations water is pumped to a height, if more electricity is produced than needed, to drive the turbines when required. The increased use of these technologies and the transportation of electricity means the power grid and associated border power transfer stations must be expanded on a Europe-wide scale. In Ger-

In the south Europe is counting on solar energy. Where the sun shines intensively there is energy in abundance. It is absorbed by solar arrays and fed into the grid.

In Europe an electricity grid is being constructed that collects energy from various sources, balances out fluctuations and assuredly brings electricity to where it is needed.

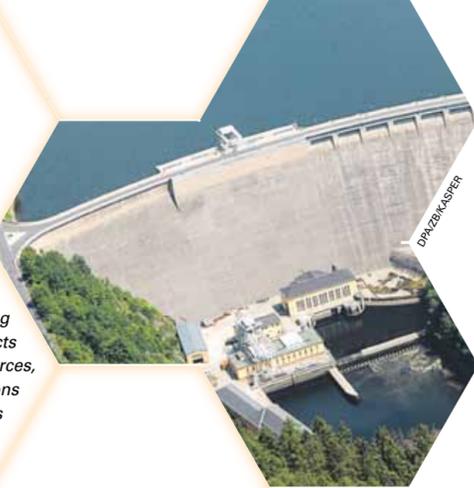


FOTOLIA/PANTHESJA

On the coast and at sea Europe is counting on wind energy, with wind farms in the North and Baltic seas.

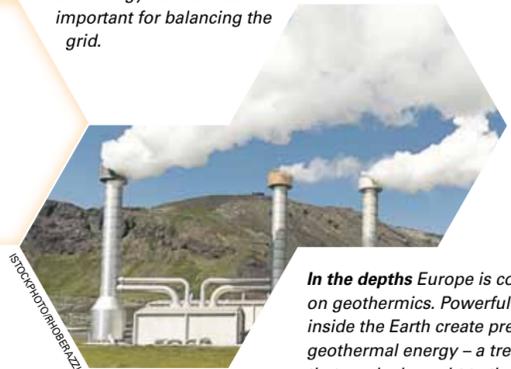


FOTOLIA/DEVICE



DPA/ZEISSER

In the mountains Europe is counting on hydropower. Here water can be dammed and energy stored. That's important for balancing the grid.



ISTOCKPHOTO/BERAZZI

In the depths Europe is counting on geothermics. Powerful forces inside the Earth create precious geothermal energy – a treasure that can be brought to the surface.

Bringing it all together.

dena
German Energy Agency

dena wants a turn towards energy efficiency in all walks of life.

If we would like secure and affordable energy services we must look at the broader picture: from the use of electricity and building refurbishments to traffic systems and renewable energies. And if we want the efficient use of energy to become the norm in companies and private homes, we need the right knowledge and expertise today.

Which is why the Deutsche Energie Agentur GmbH (dena) – the German Energy Agency – provides information to end consumers, works with all social groups active in politics and the economy and develops strategies for sustainable energy services. dena is competent, independent and pioneering.

Efficiency decides.

www.dena.de/en