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Perspectives for Germany's Energy Policy

Claudia Kemfert and Jochen Diekmann

For various reasons, the policies governing the energy sector have a central role to play in Germany. Thus, for example, competition on the electricity and gas markets will have to be increased considerably in the course of the markets' liberalization. At the same time, a secure supply of energy must also be ensured, in other words, the matters of preventing short-term power outages while ensuring the long-term availability of energy resources must be dealt with. Last but not least, the environmental compatibility of the energy sector must be improved, in particular with a view towards global climate change. In the coming years, considerable replacement investments will need to be made, in particular where the electricity sector is concerned. That is why any decision taken today in the context of energy policy is important for the future.

Energy policy must pursue the objectives of security of supply, competitiveness and environmental compatibility, giving them equal rank. In this context, it is necessary to establish specific and binding targets for the reduction of greenhouse gas emissions, both at the international and at the national level. In order to attain these objectives, it will be absolutely necessary to save energy, to increase energy efficiency, to phase out the use of high-emission energy carriers and, in particular, to more intensively use renewable energies. Furthermore, the capture and storage of carbon (CCS) could contribute to reducing the output of gases that have a detrimental effect on global climate. While subsidies for the German hard coal mining industry must be reduced further, the research into and development of CCS technologies should be granted greater support. The consensus reached as to nuclear power plants should not be taken as an excuse to have old nuclear facilities operate for a longer time while reducing the life cycles of nuclear power plants that were built more recently at the same time. Increasing the amounts of electrical power generated in safe nuclear power plants for a limited period of time could provide the sector with the flexibility it needs while achieving an energy mix that is sustainable in the long term.

In order to improve energy efficiency and to increase the use of renewable energies, specifically targeted political measures need to be taken. In this way, it will be possible to open up new market potential that also promises competitive advantages in the long term. The coalition agreement

Framework of the European Guidelines for Energy and Climate Politics

- White Paper: An energy policy for the European Union (COM (1995) 682)
- Directive concerning common rules for the internal market in natural gas (Directive 2003/55/EC)
- Directive concerning common rules for the internal market in electricity (Directive 2003/54/EC)
- Conditions for access to the network for cross-border exchanges in electricity (Regulation No. 1228/2003)
- Decision concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol (Decision 280/2004/EC)
- Directive establishing a scheme for greenhouse gas emission allowance trading within the Community (Directive 2003/87/EC)
- Linking Directive (in respect of the Kyoto Protocol's project mechanisms) (2004/101/EC)
- Programme for action "Intelligent Energy - Europe" (Decision No. 1230/2003/EC)
- Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market (2001/77/EC)
- Directive on the promotion of the use of biofuels or other renewable fuels for transport (Directive 2003/30/EC)
- Directive on the energy performance of buildings (Directive 2002/91/EC)
- Directive on the promotion of cogeneration based on a useful heat demand in the internal energy market (Directive 2004/8/EC)
- Voluntary commitment of the European Automotive Manufacturers Association (ACEA) (1999/2000)
- Directive on the landfill of waste (Directive 1999/31/EC)
- Directive restructuring the Community framework for the taxation of energy products and electricity (2003/96/EC)
- Seventh Framework Programme for Research (2007-2013) (COM (2005) 119)
- Directive establishing a framework for the setting of ecodesign requirements for energy-using products (Directive 2005/32/EC)
- Proposal for a Directive on energy end-use efficiency and energy services (COM (2003) 739)
- Winning the battle against global climate change (Communication COM (2005) 35)

signed by the new Federal German Government sets ambitious goals which need to be implemented promptly.

Objectives and Context of the National Energy Policy

Energy policy must be oriented by the magic triangle of the objectives of security of supply, competitiveness and environmental compatibility, while also taking into account other policy sectors such as technology policy and structural policy. Furthermore, national energy policy cannot be viewed in isolation from European requirements and measures (Box 1). Where the power and gas markets are concerned, the directives to increase competition on the internal market dating from 1996 and 2003 play a strong role. In order to achieve the objectives set for reducing emissions in the Kyoto Protocol, a 2003 directive established a European emissions trading system that is currently being deployed in a first phase (to last from 2005 until 2007). National targets have been formulated specifically for the promotion of electricity produced from renewable sources of energy in a directive issued in 2001. Including the new member states of the European Union, the share of renewables in electricity consumption in Europe is to be increased, by 2010, to 21%.¹

Taking into account such requirements, numerous actions have been taken in Germany in terms of energy policy and climate policy that have been provided for in a number of laws and ordinances (Box 2). On the one hand, they focus on the new regulation framework for the power and gas markets, while on the other hand dealing with the manifold approaches towards ensuring an economical and environmentally compatible energy supply.

Energy policy and climate policy are important components of the Coalition Agreement concluded in November of 2005 (Boxes 3 and 4). When the German government was taken over from the so-called Red-Green Coalition (formed by the Social Democrats and the Green Party) by the Black-Red Coalition (formed by the Christian Democrats and the Social Democrats), the political program's continuity became apparent, with new accents being set in rather smaller issues concerning partial aspects. Thus, regardless of the differing views held by the coalition partners, the termination by the old government of nuclear power use continues in force. Likewise, renewables in the sectors power, heat and fuels are to be given strong government support.

¹ In 2003, the share of renewable energy sources in power generation was a total of 14% in the 25 member states; cf. Communication from the Commission: The support of electricity from renewable energy sources. COM(2005) 627 final. Brussels, December 7th, 2005.

Current Measures of Energy and Climate Policy in Germany (A Selection)

- Amendment of the *Energiewirtschaftsgesetz* (EnWG, German Energy Industry Act) 2005
- *Netzzugangsverordnungen* (StromNZV, GasNZV, Power/Gas Network Access Ordinances) 2005
- *Netzentgeltverordnungen* (StromNEV, GasNEV, Power/Gas Network Fee Ordinances) 2005
- National Climate Protection Program 2005
- *Treibhausgasemissionshandelsgesetz* (TEHG, Greenhouse Gas Emissions Trading Act) 2004
- *Zuteilungsgesetz* 2007 (ZuG, Allocation Act 2007) 2004
- *Projekt-Mechanismen-Gesetz* (ProMechG, Project Mechanisms Act) 2005
- Ecological Tax Reform (progressively from 1999 to 2003)
- Amendment of the *Erneuerbare-Energien-Gesetz* (EEG, Renewable Energies Act) 2004
- *Biomasseverordnung* (Ordinance on the Generation of Energy from Biomass) 2001
- Market Incentive Program for the Promotion of Renewable Energies as per 1999
- Agreement as to the Phasing out of Nuclear Energy Usage 2000/2001
- Amendment to the *Atomgesetz* (Atomenergiewirtschaftsgesetz (Nuclear Power Law)) 2002
- Agreement on Climate Protection Concluded with German Industry 2000
- CHP Cogeneration Agreement 2001
- *Kraft-Wärme-Kopplungsgesetz* (CHP Cogeneration Act) 2002, 2005
- *Energieeinsparverordnung* (EnEV, Energy Saving Ordinance) 2002
- *Energieverbrauchshöchstwertverordnung* (EnVHV, Ordinance on Maximum Energy Consumption) 2002
- *Energieverbrauchskennzeichnungsgesetz* (Energy Consumption Categorization Act) 2002
- *Energiestatistikgesetz* (Energy Statistics Law) 2003
- Subsidies to reduce CO₂ emissions granted by the *Kreditanstalt für Wiederaufbau* (German Bank for Reconstruction and Development)
- Promotion of research and development
- Foundation of the *Deutsche Energie Agentur* (German Energy Agency) 2000

Energy efficiency is another aspect that is to be more strongly funded. The expenditures for promoting energy research will be increased, while the environmental tax “Ökosteuern” will continue in force. Simultaneously, competition on the power and gas markets is to be intensified as a result of the new energy law and by improving the infrastructure for international trade.

Where climate protection is concerned, the existing program for the protection of the climate passed in 2005 is to be developed further. Within Europe, the new federal government is prepared to strive to reduce emissions at an above-average rate. Internationally, a binding and extended climate protection treaty is being strived for, and Germany has stated its position of old, and very clearly so, at the Climate Change Conference held in December of 2005 in Montreal. The National Allocation Plan (NAP) for the next period of European emissions trading (2008 until 2012) is to be prepared on the basis of the targets defined in 2004 by the *Zuteilungsgesetz* (ZuG, German Allocation Law, 2007).

Promote Competition in the Electricity Sector

Germany, in contrast to a few other European countries, has liberalized its electricity market as early as in the year 1998. France and a few Eastern European countries

have thus far opened their markets only to a certain degree. This may result in market distortions while strategically segregating the domestic market. However, only if all national electricity markets in Europe are liberalized and a sufficient number of suppliers exist will the market be characterized by true competition.

Following the liberalization of the electricity market, Germany experienced considerable reductions of electricity prices, which, however, did not last long. Today, 80% of the total power produced is generated by four large energy suppliers. In the view held by the German Federal Cartel Office and the European Commission, two companies – E.ON and RWE – control the German market.² For the largest part, German power is traded at the bilateral level, with only a small share (10%) being traded on the European Energy Exchange (EEX). Since long, the European Commission has been demanding that competition in the German electricity market intensify. An important step in this direction is the introduction of the regulatory authority *Bundesnetzagentur* (Federal Network Agency), which is to primarily control network access and network tariffs. In this regard, the *Energiewirtschaftsgesetz* (EnWG, German Energy Sec-

² The European Commission has analyzed the development of the European electricity and gas market and has expressly demanded increased competition. Cf. European Commission: Communication from the Commission to the Council and the European Parliament: Report on Progress in Creating the Internal Gas and Electricity Market. Brussels 2005.

tor Law 2005) prescribes that prices must be controlled in terms of costs by using comparative analyses. Furthermore, the Energy Sector Law provides for the introduction of incentive regulation which provides for caps on the development of prices or revenues while setting efficiency and quality targets for a regulation period of two to five years.³ When compared to the prices charged in other European countries, the network tariffs are very high⁴; they are double what is charged in the Netherlands and France, for example.

Promote Competition in the Gas Sector

The European gas market is likewise faced with the considerable challenge of having to increasingly face competition. Since Russia is the main gas provider in Europe, thus entailing great dependency, it is urgently necessary to intensify the diversification of gas suppliers. The reason is that an intensified competition – also by increasing international trade with liquid natural gas – can serve to minimize political and strategic risks.⁵

Gas suppliers active in Germany have thus far pursued the policy of binding local distribution companies by giving them long-term contracts with terms of up to 20 years. In addition, high network tariffs prevent competition and increase the gas price. In addition, the gas price is still bound to oil prices. It was over 30 years ago that the gas price was linked to the oil price; this was done to cover the high investments required for the infrastructure while nonetheless ensuring that gas could compete with oil. In view of the great importance that gas supply has attained in the meantime, this sort of a price linkage is no longer justifiable and should be abol-

³ The regulation of prices based on costs using comparative analyses is similar in its concept to that of a yardstick regulation. On the other hand, the incentive regulation consists of provisions as to a price cap or a revenue cap. The *Bundesnetzagentur* (Federal Network Agency) is to submit a report by July 1st, 2006 setting out a concept for the incentive regulation that can be implemented. The German government will then decide on that basis (provided the *Bundesrat* (Federal Council, second chamber of the German parliament) has consented) whether and starting when an incentive regulation will be introduced in Germany. The incentive regulation will be provided for in an Ordinance (*Verordnung*).

⁴ Bundesverband Neuer Energieanbieter (BNE, Federal Association of New Energy Providers) / Verband der Industriellen Energie- und Kraftwirtschaft (VIK, Association of the Industrial Energy and Power Sector): *Angemessenheit der Netznutzungsentgelte der Übertragungsnetzbetreiber* (Are the network tariffs being levied by the transmission network operators appropriate?), Berlin 2005.

⁵ Cf. Christian von Hirschhausen, Claudia Kemfert and Franziska Holz: Russian Energy and Climate Policy Remains Inconsistent - Challenges faced by the European Union In: DIW Berlin Weekly Report No. 10/2005.

ished in the course of intensifying competition⁶; this is also a demand made by the European Commission.⁷

Germany depends almost completely on importing natural gas, which is being used increasingly in the energy sector and in traffic. 44% of the amounts imported are brought in from Russia. Since Russia has the world's largest natural gas reserves, it will continue to be an important trading partner, not only for Germany, but also for Europe as a whole. An important strategic decision, taken recently to intensify the trade relations of Germany and Russia, was to enter into the project of a new gas pipeline to pass through the Baltic Sea.⁸ The pipelines existing thus far pass through Eastern European countries. This is why the gas standoff between Russia and the Ukraine resulted in short-term supply shortages in Germany and other Western European nations.

Because of the supplier structure currently given on the gas market, the competition it evidences is insufficient – there are too few competitors and insufficient transport capacities. For two reasons, the European Commission is demanding more competition – the three largest gas suppliers in Germany have a market share of 80%, which is tantamount to a domination of the market. And the other reason is that new suppliers have too few opportunities of accessing the German gas market. The Cartel Office therefore intends to reduce to two years the term of supply agreements concluded by supply companies and distribution companies, which thus far were concluded with durations of up to twenty years. It is currently being analyzed whether the gas price increases implemented in 2005, which the gas suppliers are justifying by the increased oil prices and procurement costs, are founded in actual fact. Regardless of that, the network tariffs will have to be controlled. A few gas suppliers have therefore been asked to disclose their cost calculations.

Take Climate Protection Seriously

Germany has undertaken to reduce the greenhouse gas emissions in the period from 2008 until 2012 by 21%, as compared to the base year (1990/1995). Thus far, emis-

⁶ Cf. Claudia Kemfert and Manfred Horn: Wohin entwickelt sich der Ölpreis? (Where is the Oil Price Headed?) DIW Berlin Wochenbericht No. 41/2005.

⁷ European Commission, loc. cit.

⁸ In 2005, Germany and Russia have decided to construct a new gas pipeline that is to connect the cities of St. Petersburg and Greifswald. The pipeline is to be completed in 2010 and will entail costs in the range of US \$ 4 billion. This project is a joint venture of Gazprom (52%), BASF-Wintershall (24%) and E.ON Ruhrgas (24%).

Key Issues of Energy Policy of the new Federal Government

1. Halting the Rise in Energy Prices, Stimulating Competition

- Conceive energy policy to be a basic economic, structural and climate policy while pursuing an overall concept of energy policy based on a balanced energy mix,
- No changes or amendments to the Phasing-out Agreement concluded in the year 2000 and to the corresponding provisions in the *Atomenergieweggesetz* (Nuclear Power Law), this being due to differences of opinion regarding the usage of nuclear energy,
- Provide solutions for the final storage of radioactive waste,
- Intensify and expand energy research,
- Review the reduction of subsidies for hard coal mining for the period after 2008.

2. Renewable Energies

- Increase the share of renewable energies in power generation to a minimum of 12.5% by 2010 and to a minimum of 20% by 2020, increase the share of renewable energies in total energy consumption to 4.2% by 2010 and to 10% by 2020, then continue to increase further, in particular significantly increase the share of biomass in the medium term,
- Maintain the *Erneuerbare-Energien-Gesetz* (EEG, Renewable Energies Act) in its basic structure, review individual feed-in fees by 2007 and focus on new key issues, if applicable; concentrate on repowering and off-shore technology in the field of wind energy,
- Improve the provisions made for hardship cases as set out in the German Renewable Energies Act regarding power intensive industry sectors and make the allocation provided for in the EEG more transparent,
- Continue the market incentive program in the field of heating and deploy further instruments such as, for example, a renewable heat use act,
- Continue international activities and initiate the foundation of an International Agency for Renewable Energies,
- Intensify the initiative for exporting renewable energies.

3. Biofuels and Renewable Raw Materials

- Increase share of biofuels in the entire fuel consumption by the year 2010 to 5.75 %,
- Replace the exemption from mineral oil taxation for biofuels by introducing an obligation for admixtures,
- Promote the introduction on the market of synthetic biofuels (BTL, biomass-to-liquid) in cooperation with the economic sector,
- Collaborate with the economic sector in order to promote research, development and market introduction of renewable raw materials.

4. Energy Efficiency

- Double the energy efficiency of the national economy by 2020 as compared to 1990,
- Increase CO₂ Building Modernisation Programme to at

least Euro 1.5 billion per year and improve its efficiency (for example by granting subsidies for investments, providing for tax relief measures, including rental accommodation) and introduce an energy passport for buildings so that each year, 5% of the buildings constructed prior to 1978 will be refurbished in terms of energy per year,

- Promote the modernization of power plants and the expansion of decentralized power plants and highly efficient heat and power plants,
- Review the funding structure of the *Kraft-Wärme-Kopplungsgesetz* (CHP Cogeneration Act), provide support to European initiatives taken to improve energy efficiency, and promote the idea of a top-runner-program.
- Continue and intensify the dena-initiatives dedicated to conserving energy in the fields of buildings, electricity consumption (such as stand-by, for example) and transport.

5. Innovations Offensive "Energy for Germany"

- Gradually increase funding for energy research, promote renewable energies and biomass, efficient technologies in terms of demand (industry, products, transport, buildings), central and decentral efficiency technologies in energy production (including storage technologies) and a national innovation program for hydrogen technologies (including fuel cells),
- Reach an agreement with the economic sector to the effect that it also additionally invest into research and market introduction of energy technologies,
- Increase competition in the supply with power and gas by consistently deploying the new *Energiewirtschaftsgesetz* (EnWG, German Energy Sector Law (controls, determination of network fees and deconcentration of networks by the regulatory authorities) and by creating the required transit capacities and infrastructures for liquid natural gas,
- No further increase of the environmental tax "*Ökosteuer*", maintain the provisions reducing the burden on the industrial sector, and make full use of the opportunities to reduce the burdens when transposing the EU Directive on Energy Taxation,
- Actively take part in the definition of framework conditions in energy policy in the EU and in international committees and stress innovative and competitive abilities, while taking a stand for European strategies on sustainable and affordable supply with energy and raw materials.

Source: Coalition Agreement between CDU, CSU and SPD "Gemeinsam für Deutschland – mit Mut und Menschlichkeit" (Working together for Germany – With courage and compassion) dated November 11th, 2005, Chapter I. 5.

Key Issues of Climate Protection Policy of the New German Government

1. Climate Protection and Energy

- Develop the national program for climate protection further and take additional measures so that Germany can reach its Kyoto-target for 2008 until 2012,
- Strive for an international regime on the protection of the climate by 2009 for the period following 2012, which is based on the Kyoto Protocol and involves other industrialized nations as well as threshold countries,
- Suggest that the EU enter into obligation to reduce its greenhouse gas emissions by 2020 by a total of 30% as compared to 1990, strive for a reduction going beyond this ratio for the emissions in Germany,
- Evaluate the agreement on the protection of the climate concluded with the economic sector in 2000,
- Initiate a partnership for climate and innovation with the German economic sector and civil society,
- Based on the G-8 initiative, promote a new partnership between industrialized and developing countries to increase energy efficiency and to further promote renewables (however, this is not intended to replace a binding regime on the protection of the climate in any way),
- Strive for an international afforestation program in order to bind carbon.

2. Emissions Trading

- Make emissions trading more efficient in terms of ecological and economic benefits.
- Draw up the National Allocation Plan for the period from 2008 until 2012 on the basis of the targets set out in the *Zuteilungsgesetz* (ZuG, German Allocation Law) 2005/

2007, avoid windfall profits and take special care to the international competitiveness of the energy-consuming industry,

- Make the allocation system more transparent and less bureaucratic and exempt small installations to the extent possible under European law,
- Ensure that incentives are given for the construction of efficient and environmentally friendly power plants in the second allocation period,
- Strengthen the market opportunities of the German industry abroad by making international climate protection projects according to the Kyoto Protocol easier to use (such as JI and CDM),
- Support the EU Commission in its review of whether air traffic should be involved in an appropriate way in the emissions trading scheme,
- Promote the involvement of other industrial countries and large newly industrialised countries in world-wide emissions trading,
- Strive for a revision of the EU Directive on emissions trading in order to reduce the burden for industry resulting from the CO₂ emissions trading, under certain circumstances,
- Increase the flexibility of the CO₂ emissions trading by promptly implementing the flexible Kyoto mechanisms.

Source: Coalition Agreement between CDU, CSU and SPD "Gemeinsam für Deutschland – mit Mut und Menschlichkeit" (Working together for Germany – With courage and compassion) dated November 11th, 2005, Chapters I. 7. 1 and I. 7. 2.

sions have been reduced by 19.2% to around 834 million tons, mainly as a result of the transformation process underway in East Germany.⁹ In order to close the gap remaining, further efforts will need to be made in all of the sectors. European emissions trading essentially concerns installations in the areas of the energy supply economy and the industrial sector.¹⁰ According to the national allocation plan established for Germany, the emissions in these areas are to be lowered in the course of the first period (2005 until 2007) by a total of 2 million tons of CO₂, in other words, they are to be reduced by 0.4% vis-à-vis the base period (2000 until 2002). In most

⁹ Cf. Hans-Joachim Ziesing, *Weltweite CO₂-Emissionen auf dem Höchststand* (CO₂ Emissions Worldwide at an All-Time Peak). In: DIW Berlin Wochenbericht No. 39/2005.

¹⁰ The European Directive issued in 2003 (2003/87/EG) was linked, in 2004, with flexible mechanisms provided for in the Kyoto Protocol (Linking Directive, 2004/101/EG). In order to implement this at the national level, national allocation plans had to be prepared in 2004. In Germany, the allocation planning has been provided for in the *Zuteilungsgesetz* (German Allocation Law) 2007.

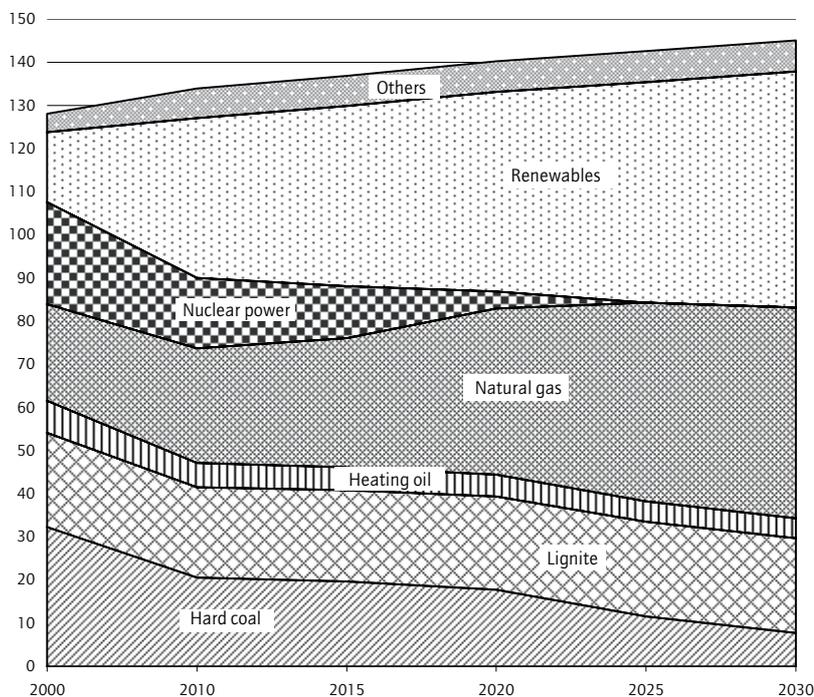
of the other member states, it is even planned to increase emissions within this period, so that the total allocation of emissions rights, when seen in the global perspective, was in fact quite generously implemented.

Nonetheless, the price of emissions certificates rose sharply in 2005. In the meantime, it has reached Euro 29 per ton of CO₂. On the one hand, it is coal-fired power plants that are increasingly being used, due to the high price of gas. On the other hand, demand has reached a relative high level because of a sense of insecurity and strategically oriented behavior.

Since about half of the electricity produced in Germany is generated using coal technology (illustration 1), the variable power generation costs increase if the price of emissions certificates also increases.¹¹ The practice

¹¹ Depending on the age of the coal-fired power plants, a price of Euro 10 per ton of CO₂ would increase the variable power generation costs for hard coal by 0.74 to 0.87 Cent/kWh and in the case of lignite by 0.90 to 1.18 Cent/kWh.

Illustration 1
Capacities for Power Generation in Germany
 Reference Forecast until 2030



DIW Berlin 2006

Source: EWI, Prognos: Die Entwicklung der Energiemärkte bis zum Jahr 2030 (The development of the energy markets until 2030). Cologne / Basle 2005.

usual in the year 2005 (illustration 2) and model simulations both show that the power prices also rise whenever the price of certificates increases – regardless of the fact that emissions rights were allocated free of charge. According to model simulations done by DIW Berlin, an emissions certificate price of Euro 10 per ton of CO₂ increases the price of electricity, in the case of imperfect competition, by 30%.¹² A simple regression analysis shows that the increased price of emissions certificates resulted in the price of power rising in the year 2005. As depicted in illustration 3, the regression coefficient of the EEX Phelix-Base-Year-Future 2006 is 0.58 kg CO₂ per kWh. This value is comparable to the average CO₂ intensity of power generation¹³ and indicates a rela-

tively strong passing through of the opportunity costs to the price of electricity.

If the opportunity costs are passed through to a considerable degree, in the case of emissions rights that have been allocated for free, the scarcity indicators are thus passed on to production sectors dependent on such power, and to the consumers. However, it is linked with undesirable distribution effects (windfall profits). In the future, at least a part of the emissions rights should not be distributed free of charge, but should instead be auctioned off.¹⁴

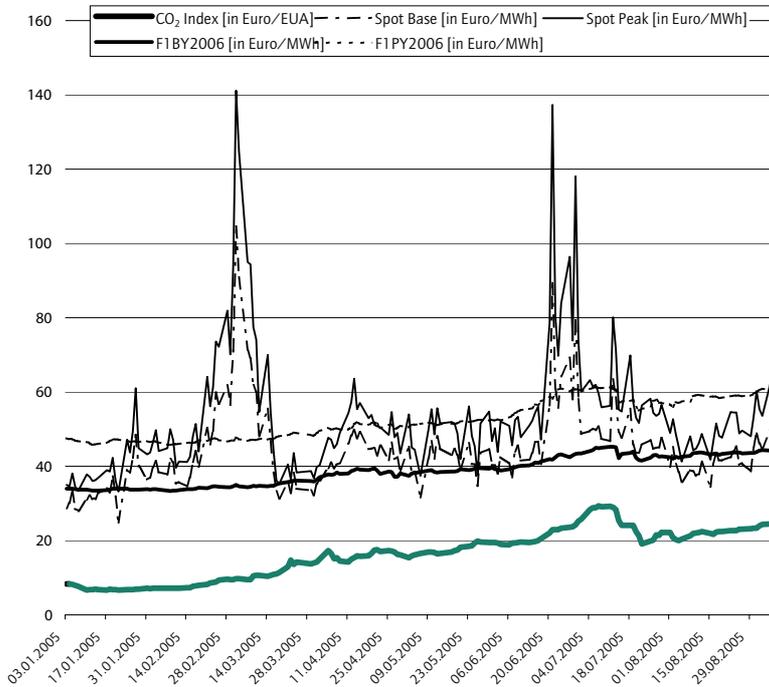
The situation of emissions trading as it is currently is not sufficient to reach the objectives in terms of climate policy. The objective set out in Kyoto, which was to reduce the emissions within the European Union by 8% by 2008/2012 can be attained only “if Member States implement additional domestic measures and use

¹² Cf. Claudia Kemfert: “Der Strommarkt in Europa: Zwischen Liberalisierung und Klimaschutz” (The Power Market in Europe – Somewhere between Liberalization and Climate Protection). In: DIW Wochenbericht No.31/2004.

¹³ Cf. also Chr. Bauer and J. Chr. Zink: “Korrelation zwischen Strompreisen und CO₂-Zertifikatspreisen” (Correlations between Electricity Prices and the Prices of CO₂ Certificate) In: *Energiewirtschaftliche Tagesfragen*. 55th volume (2005), issue 8, pp. 574–577.

¹⁴ According to EC Directive 2003/87, at least 90% of the certificates must be allocated free of charge for the coming trading period from 2008 until 2012.

Power prices (Base, Peak) and Emissions Certificate Price (CO₂-Index)



Source: European Energy Exchange (2005).

DIW Berlin 2006

flexible mechanisms, as planned”.¹⁵ The as yet unsatisfactory development in Europe could jeopardize the position taken by the European Union in its negotiations, in which it is the trailblazer for climate policy, and could create an obstacle for future negotiations. And if the EU were to fail to reach its own objectives within the Kyoto period, this would have even more devastating effects on global climate policy.

In order to successfully avert climate change, the emissions reductions targets will have to be set at considerably stricter levels than has been the case thus far. What must be achieved is that greenhouse gas emissions are stabilized at the levels they currently have. This will be possible only if nations such as the United States and China enter into obligation to reduce their greenhouse gas emissions and if technology changes such that energy consumption and emissions are no longer factors directly linked to economic growth.

If the European Union enters into obligation to reduce greenhouse gas emissions by 30% by the year 2020, Germany would strive for a reduction of its emissions in excess of this amount” (Coalition Agreement dated November 11th, 2005). However, concrete emissions reduction targets should be set as soon as possible in order to give investors a clear signal that investing in sustainable and climate-friendly technologies is a sensible idea.

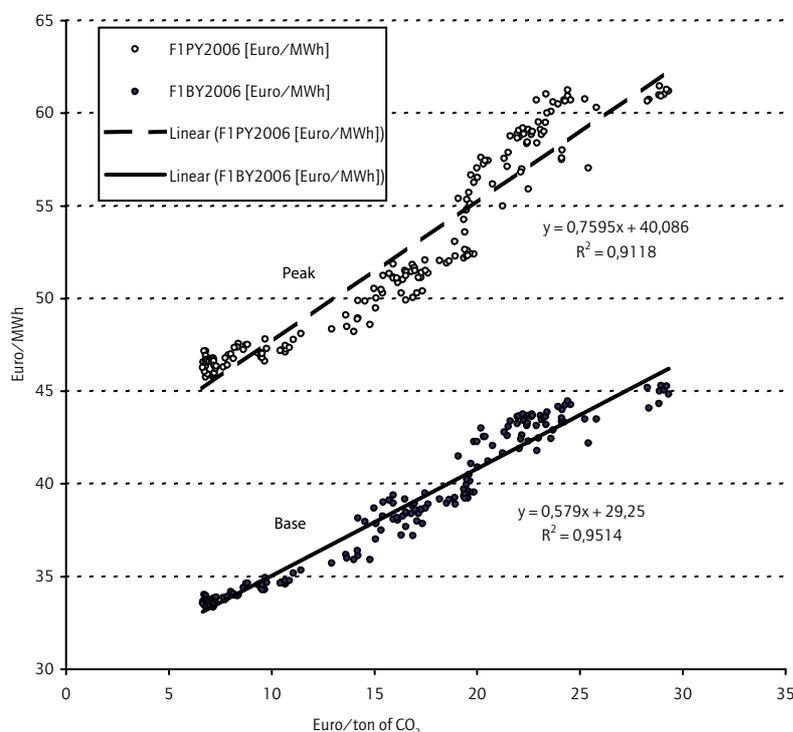
In particular also where allocation planning for emissions trading is concerned, stricter objectives must be taken into account. A higher price for emissions certificates would also contribute to making the use of renewable energies as well as the capture and storage of carbon (CCS) competitive at an earlier point in time, which technology enables the use of coal in an environmentally friendly manner (illustration 4).¹⁶

¹⁵ European Commission: Report on demonstrable progress under the Kyoto Protocol. COM (2005) 615 final. Brussels, December 1st, 2005. Cf. also Hans-Joachim Ziesing, loc. cit.

¹⁶ The economic potential that the CCS technology has is still unclear. A recently published IPCC study assess the additional costs of producing power using CCS to amount to 0.01 to 0.05 US \$ per kWh; cf. Intergovernmental Panel on Climate Change (IPCC): Carbon Dioxide Capture and Storage. IPCC Special Report 2005.

Illustration 3

Correlation of Power Prices and the Prices of Emissions Certificates



DIW Berlin 2006

Source: European Energy Exchange (2005); Calculations done by DIW Berlin.

Energy Supply must be Secure

In 2000/2001, the German federal government reached an agreement with the energy sector to terminate the use of nuclear energy in Germany in a well-ordered manner.¹⁷ For this purpose, residual amounts of power were calculated on the basis of a standard operating life of 32 calendar years from the beginning of commercial operation; any transfer of such production rights among nuclear power plants was provided for only under certain circumstances. The nuclear power plants Obrigheim and Stade were taken out of operation in 2002 and 2004, respectively. The next nuclear power plants to be shut down in accordance with the agreement, following the expiry of their operating life, are Biblis A in 2007 and Neckarwestheim in 2008 (cf. table).

The production of electrical power using nuclear energy does not emit greenhouse gases, but it does entail other important risks for the environment. That is

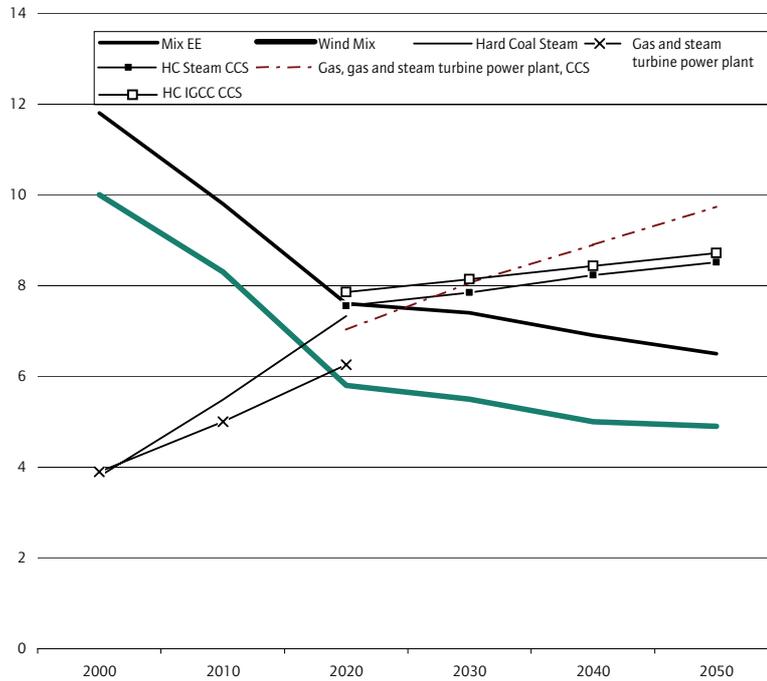
why its future role is disputed also in connection with the replacement investments that will need to be made. In the coalition negotiations between CDU, CSU and SPD, widely diverging positions were taken up until the very end of the negotiations process, so that the phasing-out agreement and the corresponding stipulations of the Atomenergiewirtschaftsgesetz (Nuclear Power Law) cannot be changed. As a matter of principle, however, the agreement on phasing out nuclear power provides for specific amounts of energy being transferred from older power plants to more recently constructed ones. This is something that merits support as a matter of principle. Transferring such amounts of power in the other direction – from more recently constructed power plants to older ones – should be forgone.¹⁸ Basically, the most sensible approach would be to increase the amounts of power produced by the most secure facilities in order to thus ensure that the necessary flexibility in terms of

¹⁷ The agreement reached by the German federal government and the energy supply companies on June 14th, 2000 was signed on June 11th, 2001. The amended version of the German Law on Nuclear Power entered into force on April 27th, 2002.

¹⁸ Except for the case of a closure of a facility that has been built more recently, the transfer of power amounts from a more recently built facility to an older one requires the consent by the Federal government. (German Law on Nuclear Power Section 7 paragraph 1b).

Illustration 4

Development of Power Production Costs in Differing Systems, taking into Account the Increasing Prices of Energy and Emissions Certificates



DIW Berlin 2006

Increase of Certificate Prices (per t CO₂) from Euro 20 in 2010 to Euro 30 in 2020 and to Euro 60 in 2050. Sources: WI, DLR, ZSW, PIK, June of 2005 (upper price variant); Calculations done by DIW Berlin.

time is given in order to arrive at a sustainable energy mix.

Support Renewables

In the Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market,¹⁹ a share of renewable energies in the gross electricity consumption has been set out for Germany for 2010 of 12.5%. This objective has also been set out in the German *Erneuerbare-Energien-Gesetz* (EEG, Renewable Energies Act) of 2004, which furthermore stipulates a minimum share of 20% for 2020. In the Coalition Agreement, these targets have been confirmed. This is to contribute towards increasing the total share of re-

newables in the primary energy consumption to 4.2% by 2010, and to 10% by 2020, and continuously thereafter.

Not least because of their respective natural resources, for example in terms of their use of hydro power, other Member States have agreed targets of different amounts. However, there are considerable differences to be seen also in the selection of instruments serving to promote electricity produced from renewable energy sources: As Germany has done also, many countries have instituted minimum compensation schemes that provide for a higher price to be paid than the market price for power that is fed into public networks, in which context the additional costs are allocated to power consumers. Some countries (currently Sweden, United Kingdom, Italy, Belgium and Poland) have developed a quota model in which the amounts of renewable energy are stipulated and so-called green certificates are traded. The respective success of these different subsidization schemes cannot be assessed in any final way at the present time. However, experience gathered thus far shows that the promotion has greater effect in countries practicing feed-in fees than they do in countries using a

¹⁹ Directive 2001/77/EC issued by the European Parliament and the Council on September 27th, 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market. Published in the Official Journal of the European Union L 283/33 on October 27th, 2001.

Table 1

Residual Power Amounts and Standard Operating Lifetime of Nuclear Power Plants in Germany

Nuclear power plant	Residual amount of power from January 1st, 2000 (TWh net)	End of standard operating life
Obrigheim	8.70	December 31, 2002
Stade	23.18	May 19, 2004
Biblis A	62.00	February 26, 2007
Neckarwestheim 1	57.35	December 1, 2008
Biblis B	81.46	January 31, 2009
Brunsbüttel	47.67	February 9, 2009
Isar 1	78.35	March 21, 2011
Unterweser	117.98	September 6, 2011
Philippsburg 1	87.14	March 26, 2012
Grafenrheinfeld	150.03	June 17, 2014
Krümmel	158.22	March 28, 2016
Gundremmingen B	160.92	July 19, 2016
Philippsburg 2	198.61	April 18, 2017
Grohnde	200.90	February 1, 2017
Gundremmingen C	168.35	January 18, 2017
Brokdorf	217.88	December 22, 2018
Isar 2	231.21	April 9, 2020
Emsland	230.07	June 20, 2020
Neckarwestheim 2	236.04	April 15, 2021
Sum	2 516.05	
Mühlheim-Kärlich	107.25	
Total	2 623.30	

Source: Agreement reached by the German federal government and the energy supply companies on June 14th, 2000.

quota system.²⁰ A particular advantage of the feed-in fees is that they create greater planning security for long-term investments. In quota systems, the target amounts can be achieved only if correspondingly severe penalties are provided for non-performance. Also, the risks of “marketing your own” are considerably higher, so that investors require relatively high financial incentives. Furthermore, the burden on electricity consumers is increased when the different technologies, which may entail different costs, are not differentiated so that high seller yields result (windfall gains).

²⁰ Cf. Communication from the Commission: The support of electricity from renewable energy sources. COM(2005) 627 final. Brussels, December 7th, 2005. Cf. also Jochen Diekmann and Claudia Kemfert: Erneuerbare Energien: Weitere Förderung aus Klimaschutzgründen unverzichtbar. In: DIW Berlin Wochenbericht No. 29/2005. (Renewable Energies: If the Climate is to be Protected, we Absolutely must Promote them.)

The most important characteristics of the German compensation system in accordance with the *Erneuerbare-Energien-Gesetz* (EEG, Renewable Energies Act) are the obligation of the utilities to accept such feed-ins, the definition of the feed-in fee for an installation for a usual term of twenty years, the degression of the feed-in fees depending on the year in which the investment was made, and the differentiation of the compensation and degression amounts depending on technologies and other characteristics relevant for costs. As a result of the degression, so-called learning curves are taken into account, in other words cost reductions in dependence of the aggregate amount produced.

This basic structure for promoting electricity produced from renewables must be adhered to. In this context, the promotion focus may shift in future, depending on the development the market takes. Although it is not recognizable that the promotion instruments will be harmonized anytime soon in Europe, this promotion policy

must be more closely coordinated at the international level, and also where other instruments are deployed. It is of particular importance that great efforts are made in the Member States in order to reach the ambitious goals they have jointly set themselves. In addition to power generation, heat supply and the provision of fuels using renewables must all be supported to a greater extent.

Maintain Instrument Mix

Theoretically, trading emissions rights is an instrument using which the external costs of emissions can be efficiently internalized. However, emissions trading cannot be used in future as the sole instrument for ensuring that the climate is protected. This all the more the case since only some of the parties emitting pollutants and only a part of the greenhouse gases are covered by the trading system. Also, emissions trading does not create sufficient incentives, in particular if emissions rights are being allocated very generously, for anyone to invest on a long-term basis into sustainable technologies. In order to create the necessary incentives for investing in renewable sources of energy, long-term targets for emissions reductions will have to be enforced. This will hardly be possible on the political level, in particular in view of the most recent developments in climate policy. That is why special promotion policies for energy saving, for enhancing energy efficiency and for increasing the use of renewables are necessary, since they serve to increase the competitiveness of the necessary technologies by providing learning effects. It must also be noted that special promotion measures such as the *Erneuerbare-Energien-Gesetz* (EEG, Renewable Energies Act) not only have set themselves the goal of reducing emissions, but also of supporting new, future-oriented technologies which are absolutely necessary for reasons of ensuring security of supply.

The deployment of new and future-oriented technologies cannot be supported only by providing aid for the introduction to the market. Instead, this project requires an increased promotion of research and development done in the area of energy supply and transformation, in the field of emissions capture, and last but not least in the transport sector.

Conclusion

In the seven years of the Red-Green government (formed by a coalition of the Green Party and the SPD), energy policy took center stage. In addition to liberalizing the

energy markets, measures serving to obtain a sustainable supply with energy were focused on in particular. The phase-out process of the use of nuclear power was commenced, and in particular, renewable energies were promoted more strongly.

The new federal government will also have to focus on energy policy. This is because the signals given by energy policy today will define the direction that the long-term development will have. German energy policy will need to continue to pursue the objectives of ensuring security of supply, competitiveness and environmental compatibility.

Since competition is as insufficient on the electricity market as it is on the gas market, energy policy must continue to place great stress on ensuring that competition intensifies. The regulation authority is a good start. The specific conditions for an incentive regulation that is to improve the efficiency of grid-bound energy must still be developed and implemented, however. In order to ensure improved competition on the gas market, the linkage to the oil price should be abolished.

The efforts being made in the interests of climate protection must be increased further. In particular at the international and national level, long-term specific targets in terms of protecting the climate must be defined. Only in this way can the right signals be given for a sustainable energy system and can failed investments be avoided. Emissions trading will have to be developed further in a consistent way. In addition, special measures in terms of technologies serving the secure and climate-friendly supply with energy are required.

The field of power generation will continue to be characterized in the coming decades by a major share of fossil fuels such as coal and gas. Coal technologies will have a chance of surviving in the long term only if it is possible to capture and store carbon (CCS). This will need to be supported by ensuring higher spending on research and development. While the subsidies for the German hard coal mining industry will have to be further cut, CCS technologies should be promoted to a greater degree. This is important not least in order to replace nuclear power by an energy source that is climate-friendly. Increasing the amounts of power produced in safe nuclear power plants for a limited period of time could provide the flexibility needed in order to reach the objective of a mix of energy that is sustainable in the long term.

In order to improve energy efficiency and to use renewable energy sources to a greater extent, targeted policies and measures continue to be required. In this way, market potentials can also be opened up that promise long-term competitive advantages. The Coalition Agreement has set ambitious goals in this regard that have to be implemented promptly.