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Russian Energy and Climate Policy Remains Inconsistent – Challenges for the EU

Christian von Hirschhausen, Claudia Kemfert and Franziska Holz

The relations between Russia and the EU with respect to energy and climate policies have been characterized in recent months by two phenomena. On the one hand, the EU has to deal with questions regarding the security of energy supply. The Russian government's high-handed treatment of domestic and foreign energy enterprises operating in the country is irritating potential investors. There is reason to seriously doubt that genuine progress is being made with market economy reforms in the Russian energy sector. While Russia will remain an important energy supplier for Germany and the EU in the medium term, the importance of other crude oil and natural gas exporters, including some North African countries, is likely to grow.

On the other hand, it can be noted positively that Russia (in response to intense pressure from the EU) has ratified the Kyoto Protocol on reduction of greenhouse gas emissions, enabling the protocol to enter into force in February 2005. But Russia is expected to withhold emissions permits for strategic reasons, i.e. in order to allow the price of CO₂ certificates to rise. The value of the CO₂ emissions permits allocated to Russia under the Kyoto Protocol could earn the country a revenue of up to 30 billion euro. However, whether this will actually happen will also depend on the National Allocation Plans of the EU member states.

Energy production in Russia and energy exports to the EU

In a context of high world market prices for energy, the Russian energy industry is still the primary pillar of economic growth in the country. Following a decline in primary energy production in the 1990s, output has now stabilized again and in some cases is actually rising (cf. table 1). Russia has consolidated its position in recent years as a strategic exporter of energy. Not only Europe but also the United States and China are becoming increasingly important importers of Russian energy sources.

Russian crude oil output has been growing since many years. With external sales amounting to almost 200 million tonnes (2003), Russia is the

Table 1
Primary Energy Production in Russia, 1990 to 2003

| | Brown coal | Black coal | Crude oil | Natural gas | Hydro-electric power | Nuclear power |
|------|----------------|------------|-----------|------------------------|----------------------|---------------|
| | Million tonnes | | | Billion m ³ | Billion kWh | |
| 1990 | 137.3 | 257.4 | 516.2 | 640.5 | 166.8 | 118.3 |
| 1995 | 101.0 | 161.0 | 307.0 | 595.0 | 99.5 | 99.5 |
| 2000 | 95.0 | 161.0 | 323.4 | 583.6 | 131.0 | 131.0 |
| 2001 | 98.0 | 171.0 | 348.1 | 581.2 | 137.0 | 137.0 |
| 2002 | 93.0 | 160.0 | 379.0 | 593.0 | 142.0 | 142.0 |
| 2003 | 98.5 | 184.4 | 420.7 | 617.8 | 135.9 | 150.4 |

Sources: BP: Statistical Review 2004; IEA Coal Information 2004; DIW Berlin calculations.

second-largest exporter (after Saudi Arabia) of crude oil in the world. Russia is also an important supplier of crude oil to the EU-15. Imports from the former Soviet Union accounted for around 25% of total EU imports in 2003 (cf. table 2). The accession of the countries of eastern Europe to the EU has further strengthened Russia's position, given that most of the new members from eastern Europe traditionally have ties with Russia. Many observers expect that Russia's share of European crude oil imports will continue to expand in the future.¹ In actual fact, this would only be possible if substantial augmentations to the transport infrastructure are realized, because most of the existing facilities (cf. figure 1) are already being used to full capacity.

¹ Cf., for example, European Commission: 'Green Paper: Towards a European strategy for the security of energy supply.' Brussels 2002.

Russia's output of just under 600 billion m³ makes it the world's largest producer of natural gas. And given its proven reserves of 47 000 million m³, Russia is also the country with by far the most natural gas in the world (around 27% of world reserves).² The country's importance for the EU with respect to natural gas has also increased. EU imports from Russia accounted for almost one-third of total imports in 2003; and this figure was even higher for Germany (44%).

Russian coal production has stabilized at a high level. However, given the relatively bad quality of the coal deposits and the high transport costs, the export potential for coal is negligible. The same applies to the Russian electricity sector at present. The very limited transmission capacities between Russia and the EU as

² Cf.: 'BP Statistical Review of World Energy 2004.'

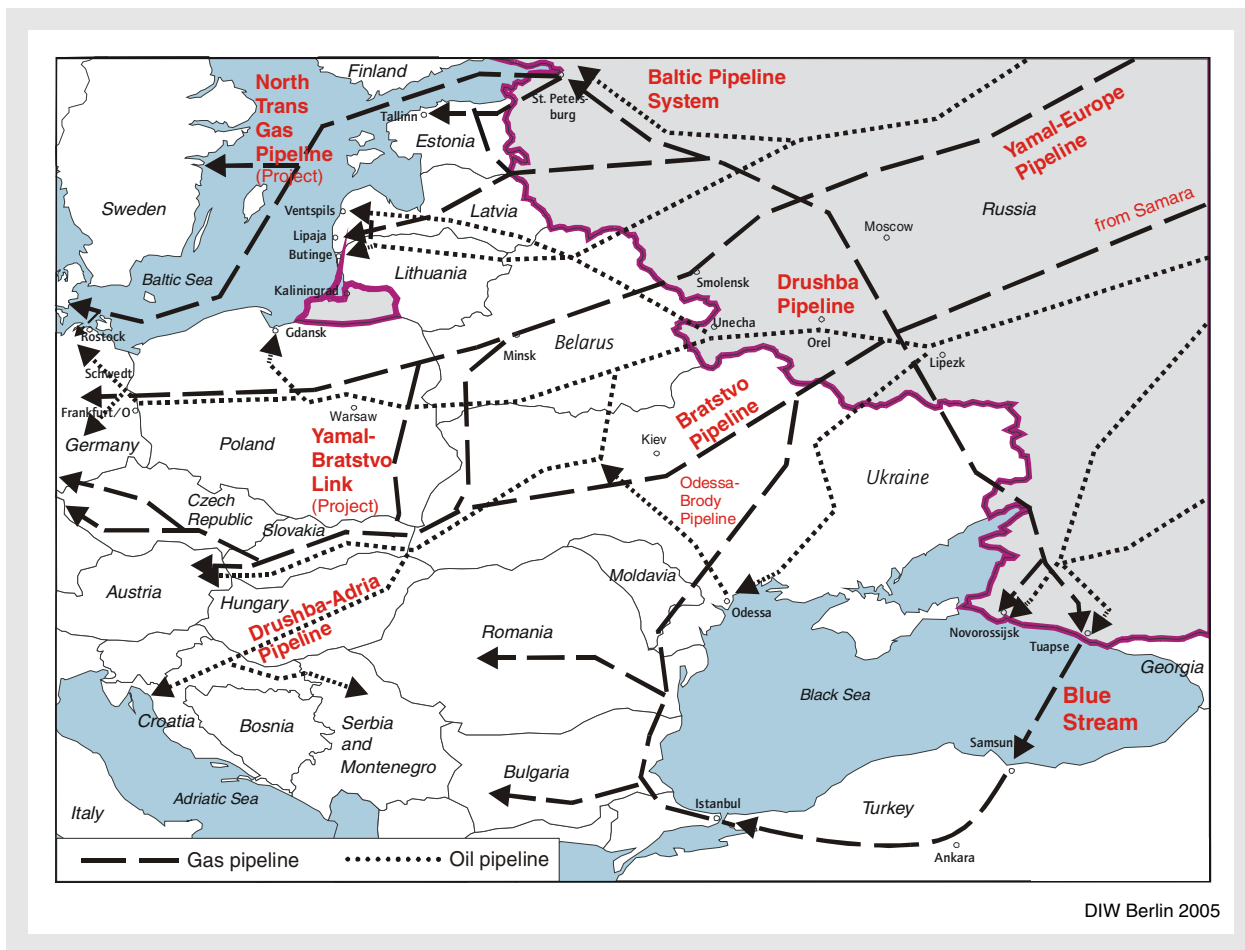
Table 2
European Mineral Oil and Natural Gas Imports, 1999 to 2003, by Country of Origin

| | 1999 | 2000 | 2001 | 2002 | 2003 |
|--|-------|-------|-------|-------|-------|
| Mineral oil (million tonnes) ¹ | | | | | |
| Former Soviet Union | 87.5 | 98.1 | 110.3 | 135.8 | 154.2 |
| Other countries | 460.4 | 467.7 | 456.7 | 423.4 | 480.9 |
| Total | 547.9 | 565.8 | 567.0 | 559.2 | 635.1 |
| Natural gas (billion m ³) ² | | | | | |
| Russia | 108.8 | 112.6 | 108.8 | 104.7 | 111.2 |
| Other countries | 159.5 | 172.4 | 183.2 | 210.6 | 238.5 |
| Total | 268.2 | 285.0 | 292.0 | 315.3 | 349.6 |

¹ EU-15. — ² EU-25.

Sources: IEA Natural Gas Information 2003 and 2004; IEA Monthly Oil Market Report, December 2004; DIW Berlin calculations.

Figure 1
Russian Natural Gas and Crude Oil Export Pipelines to Europe



Source: DIW Berlin.

well as high transport costs mean there will be virtually no electricity exports in this direction in the medium term. In these circumstances, there seems to be little justification for fears that European electricity suppliers could decide to invest in Russian power plants and deliver electricity to Europe from there.

Russian energy policy opts for nationalization

The energy policy pursued by the Russian government has been characterized in recent years by a steady increase in state influence. The break-up of the Yukos oil company and the subsequent integration of its oil unit into the state-controlled firm Gazprom alarmed many observers – especially foreign investors. The transfer of ownership of the Rosneft state oil company to Gazprom provides further evidence of the Russian

government's desire to strengthen its influence in the energy sector. In addition, the government is planning to introduce a law that will prohibit enterprises with majority foreign ownership from extracting resources in Russia. The government's long-term objective seems to be building up and controlling a large, state energy firm (natural gas and oil) which will dominate the market.

The fact that the Russian energy policy is unpredictable complicates relations with foreign firms and investors. In order to modernize its production capacities and pipelines, Russia needs investments of up to US \$ 1000 billion for the next 25 years.³ The attempts made to date by the European Union to increase the transparency of Russian energy policy, for example within the framework of technical assistance programs, and to create a positive investment climate have not been very successful. Likewise, the EU-Russia Energy Dialogue has so far

³ IEA: 'World Energy Investment Outlook.' OECD, Paris 2003.

The GASMOD model

DIW Berlin is currently developing a numerical simulation model of the European natural gas market named GASMOD. GASMOD represents natural gas flows to Europe and trade between European countries in two successive stages. In the model, gas-producing countries export it to individual EU countries. For simplification, it is assumed that exactly one natural gas enterprise operates in each country that trades gas. The demand behavior of the importers is characterized by a constant price elasticity of demand. The model is based on the idea of non-linear profit maximization on the part of the enterprises ('players'). GASMOD calculates the trade flows and the wholesale market prices under the assumption of certain competitive conditions.

The following exporting countries and regions are considered in the model: Russia, Norway, Great Britain, Netherlands, Algeria, Middle East, Libya, Egypt, Iran, Iraq, Nigeria, Trinidad, and Venezuela. Within Europe, there are the following importing countries: Germany, Austria, France, Spain/Portugal, Belgium/Luxembourg, Italy/Switzerland, Great Britain, Netherlands, Denmark, Sweden/Finland, Poland, Czech Republic/Slovakia/Hungary, Romania/Bulgaria, Baltic States, former Yugoslavia, Turkey, and Greece.

GASMOD takes into account the current or predicted production costs of the exporting countries. In addition, transport costs to the EU border are included.¹ Under competitive conditions, it is above all the supplier's cost situation that deter-

mines the result. The objective function of the natural gas exporters is their profits. Based on the input data, the resulting prices and flows of natural gas are calculated by the program using non-linear optimization. Two scenarios are simulated with respect to the behavior of the exporters:

- In the Oligopoly scenario, the exporters act strategically and exert market power, i.e. they are able to add a markup on the marginal cost price (Cournot-Nash equilibrium).
- In the Competition scenario, by contrast, all natural gas exporters are price takers. In this case, prices and quantities are calculated in accordance with the assumptions of full competition.

Another important characteristic is the specific problem for this market of the available transport capacities. Natural gas is transported over long distances either by pipeline or in liquefied form (LNG) in tankers. Both pipeline and liquefaction/gasification capacities are limited, and GASMOD identifies potential capacity bottlenecks.

¹ The data sources used are official EU statistics as well as recent studies, for example Observatoire Méditerranéen de l'Energie: 'Assessment of Internal and External Gas Supply Options for the EU. Executive Summary.' Sophia-Antipolis 2002; F. van Oostvoorn (ed.): 'Long-term gas supply security in an enlarged Europe: Final Report ENGAGED Project.' Energy research Centre of the Netherlands (ECN), Amsterdam 2003. Transport costs are partly estimated.

produced little more than political statements.⁴ Russia has still not signed the Energy Charter Treaty, which was adopted over ten years ago to promote the development of the infrastructure between eastern and western Europe.⁵ In light of the growing importance of the Russian energy sector, the step backward with respect to market economy reforms must be viewed critically.⁶

Prospects for European natural gas imports – new import sources

Many forecasts predict that Russia's importance with respect to EU imports of natural gas will increase.⁷ The high growth in the EU countries of demand for natural

⁴ Also cf. http://europa.eu.int/comm/energy/russia/overview/index_en.htm.

⁵ Cf. www.encharter.org.

⁶ Cf. Hella Engerer: 'Russische Energiewirtschaft: Hohe Exporterlöse verschleiern Reformbedarf.' In: *Wochenbericht des DIW Berlin*, no. 15/2003. Also cf. the special issue of *Osteuropa* journal: 'Europa unter Spannung – Energiepolitik zwischen Ost und West', vol. 54, issue 9-10, 2004.

⁷ Cf., for example, European Commission: 'Green Paper ...', loc. cit.

gas (an environmentally friendly energy source), coupled with the decline in domestic output, leads observers to expect an increase in the share of imports originating from Russia to between 50% and 67%. The authors of the EU Green Paper on supply security, as well as some member states, view such dependency on Russian natural gas exports with some unease, and are therefore calling for greater diversification. Norway, for example, which has enough reserves for the next few decades, is considered a reliable trading partner. There are abundant and low-cost natural gas reserves in North Africa (Algeria, Libya, Egypt), too.⁸ The existing pipelines through the Mediterranean Sea (Transmed, Medigaz) are currently being extended and additional transport links are planned (originating in Libya, for example). Moreover, one of the consequences of the rapidly advancing globalization of the natural gas markets is that it renders possible supply of liquefied natural gas (LNG) from more distant regions.⁹ Thus, countries in the

⁸ Observatoire Méditerranéen de l'Energie: 'Assessment of Internal and External Gas Supply Options for the EU. Executive Summary.' Sophia-Antipolis 2002.

⁹ Transport by pipeline is cheaper for distances of up to around 3000 kilometers, while tanker transport in the form of LNG is cheaper over longer distances.

Table 3

Model Results: European Natural Gas Imports by Country of Origin

| | Scenario | | | | Memo item: 2003 market share in % |
|------------------------------|-----------------------------|-------------------|-----------------------------|-------------------|---|
| | Competition | | Oligopoly | | |
| | Exports in bcm ¹ | Market share in % | Exports in bcm ¹ | Market share in % | |
| Algeria | 110.0 | 22.9 | 110.0 | 24.8 | 13.5 |
| Libya | 3.6 | 0.8 | 3.6 | 0.8 | 0.2 |
| Egypt | 28.6 | 6.0 | 28.6 | 6.4 | 0.0 |
| Iraq | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Iran | 15.2 | 3.2 | 15.2 | 3.4 | 0.0 |
| Middle East | 0.0 | 0.0 | 9.9 | 2.2 | 0.7 |
| Former Soviet Union | 140.4 | 29.3 | 124.6 | 28.1 | 26.6 |
| Nigeria | 0.0 | 0.0 | 3.0 | 0.7 | 2.4 |
| Trinidad | 0.0 | 0.0 | 0.4 | 0.1 | 0.0 |
| Venezuela | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total non-European countries | 297.8 | 62.1 | 295.2 | 66.6 | 43.4 |
| Netherlands | 105.7 | 22.0 | 105.7 | 23.9 | 15.9 |
| Great Britain | 26.4 | 5.5 | 26.4 | 6.0 | 23.4 |
| Norway | 49.5 | 10.3 | 15.7 | 3.6 | 17.3 |
| Total | 479.3 | 100.0 | 443.0 | 100.0 | 100.0 |

1 bcm (billion cubic meters) = billion m³.

Sources: IEA Natural Gas Information 2004; DIW Berlin calculations.

Middle East (Iran and Qatar, in particular), but also Nigeria, Trinidad, and Venezuela, are expanding their export capacities, while numerous import terminals for LNG are being constructed in Europe.

DIW Berlin has developed a model of the European natural gas market (cf. box) to simulate different market scenarios and analyze the importance of Russia and of the other exporting countries for the European market. The point of departure for the scenarios is the cost structure of the exporting countries examined. Russia remains an important supplier of natural gas to Europe in both presented scenarios, but its significance declines in comparison to the current situation. Russia's market share would fall from 32% today to less than 30% (cf. table 3). Amongst the other suppliers, in particular Algeria's low production costs could lead to an increase in its share of the European natural gas market from around 16% to 25% in the oligopolistic scenario.¹⁰ Dutch

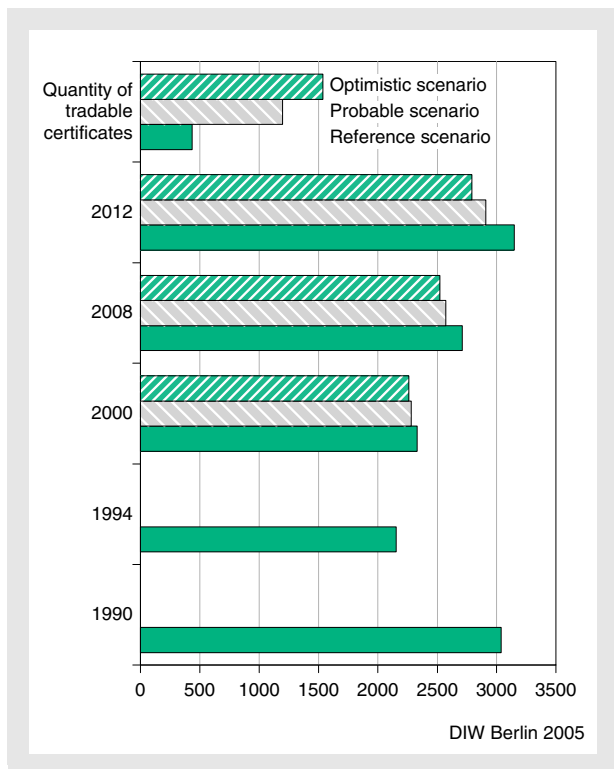
¹⁰ This result coincides with the findings of another study on the outcome of more intense competition on the European natural gas market. Cf. Ferdinand Pavel et al.: 'Is the Ukrainian-Russian Gas Consortium in the Economic Interest of Ukraine? Lessons from a European Gas Model'. Report prepared for the German Advisory Group to the Government of Ukraine. Berlin and Kiev 2003.

exports could also benefit from comparatively low production and transport costs and expand the Netherlands' market share. Norway would decline in importance in an oligopolistic market structure as a result of its high production costs.¹¹ Because the production and transport costs for LNG are assumed to be relatively high, few producers from overseas are present on the European market in the simulation scenarios. However, given the dramatic fall in transport costs of LNG, the competitiveness of LNG suppliers is rapidly increasing. Therefore, a substantial shift in EU imports from pipeline gas to LNG can be expected in the medium term. The gas market will thus become increasingly similar to the oil market.

Existing transport capacities prove to be a constraint in both scenarios. This applies especially to supplies from the North African low-cost countries. However, in the medium term, Russia's export pipelines will not suffice either to cover demand. The construction of a direct pipeline through the Baltic Sea from St. Peters-

¹¹ It must be emphasized here that so-called 'soft' criteria for market decisions, e.g. the reliability of a supplier, are not represented in the model.

Figure 2
CO₂ Emissions in Russia, 1990 to 2012
 In million tonnes of CO₂ equivalents



Sources: Third National Communication; Interagency Commission of the Russian Federation on Climate Change Problems, Moscow 2002.

burg to Greifswald in Germany is therefore under discussion (cf. figure 1). The more likely solution, however, will be the expansion of the transit pipeline system through Ukraine, despite the associated political risks.¹²

Will Russia benefit from emissions trading?

Russia also plays a strategic role within the emissions trading system of the Kyoto Protocol. Human induced greenhouse gas emissions cause climate change.¹³ Russia is the fourth-largest emitter of greenhouse gases in the world after the USA, China, and Europe.¹⁴ Under the Kyoto Protocol, which was adopted in 1997, the industri-

¹² Cf. Christian von Hirschhausen, Berit Meinhart, and Ferdinand Pavel: 'Transporting Russian Gas to Europe - A Simulation Analysis.' In: *Energy Journal*, vol. 26, no. 2, pp. 49-68.

¹³ Cf. Claudia Kemfert: 'The Economic Costs of Climate Change.' In: *DIW Berlin Weekly Report*, no. 2/2005.

¹⁴ Cf. Hans-Joachim Ziesing: 'Worldwide climate protection policy - still no visible success.' In: *DIW Economic Bulletin*, vol. 41, no. 10, October 2004.

alized countries have committed themselves to reduce their greenhouse gas emissions.

Following Russia's ratification of the Kyoto Protocol last November, the Protocol is now binding law for those countries that are listed in Annex I of the Framework Convention and have actually ratified the agreement (e.g. Russia, Europe, Japan, Australia, and Canada). The Russian ratification also means that the Protocol's 'flexible' mechanisms, which include emissions trading, will be fully operative from 2008 onward. A pilot project to reduce greenhouse gas emissions in the period 2005 to 2007 on the basis of a European emissions permit system was already launched in Europe on 1 January 2005.¹⁵

In 2002, the USA decided not to ratify the Kyoto Protocol because of feared high economic losses. Furthermore, the USA insist that developing countries such as China, which is already the world's second-largest emitter of greenhouse gases, should also commit to binding greenhouse gas emission reductions.

Figures 2 and 3 show the trends for CO₂ and total greenhouse gas emissions in Russia from 1990 to 2012. Emissions fell sharply between 1990 and 1994 as a result of the economic downturn in Russia.¹⁶ The forecast drawn up in the Third National Communication of the Russian Federation on future CO₂ emissions is based on different assumptions. The reference scenario assumes a strong economic growth (5.2% per annum) and also high consumption of resources, which causes a sharp rise in emissions. The optimistic scenario assumes that the use of innovative technology will result in a reduction of energy intensity. The probable scenario is based on the assumption of moderate rates of economic growth (3.3% per annum), so that emissions will rise less strongly than in the reference scenario.

Potential Russian earnings of 30 billion euro from emissions trading

Under Article 3 of the Kyoto Protocol, within the commitment period 2008 to 2012, the Annex I countries are bound to reduce their greenhouse gas emissions to below their 1990 level.¹⁷ Under the emissions trading

¹⁵ In Germany, the emissions certificates were allocated in February 2005; trading was to officially open on 28 February 2005.

¹⁶ Past emissions trends are summarized in the Third National Communication of the Russian Federation. Cf. Interagency Commission of the Russian Federation on Climate Change Problems: 'Third National Communication of the Russian Federation.' Moscow 2002. Also cf. <http://unfccc.int/resource/docs/natc/rusnce3.pdf>, data from 11 February 2005, p. 17.

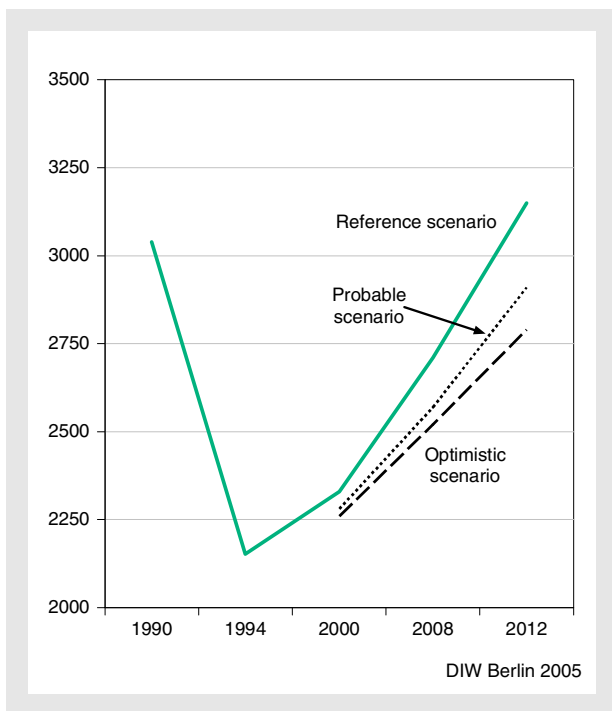
¹⁷ Under the Kyoto Protocol, Russia has committed itself to stabilizing its emissions at the 1990 level.

system, Russia will be able to sell whatever amount of greenhouse gases emitted in the period 2008 to 2012 that lies below the 1990 emission level. Even if the Russian economy and Russian energy consumption are expected to experience a relatively robust growth, emissions in the years 2008 to 2012 are unlikely to exceed those of the base year 1990 significantly. In the event of the probable scenario realizing, under the emissions trading system, Russia could sell up to nearly 1300 million tonnes of CO₂ equivalents and thereby earn a significant revenue. If Russia were to participate in emissions trading, the country could realize accumulated earnings of up to 30 billion euro in the period 2008 to 2012 (cf. figure 4).¹⁸

Unlike the USA, for whom – according to the model simulations carried out to date – the economic incentives to rejoin the climate agreement are minimal,¹⁹ Russia will benefit substantially from the ratification of the Kyoto Protocol. Under moderate assumptions about

Figure 3
Trend for Greenhouse Gas Emissions in Russia, 1990 to 2012

In million tonnes CO₂ equivalents per annum

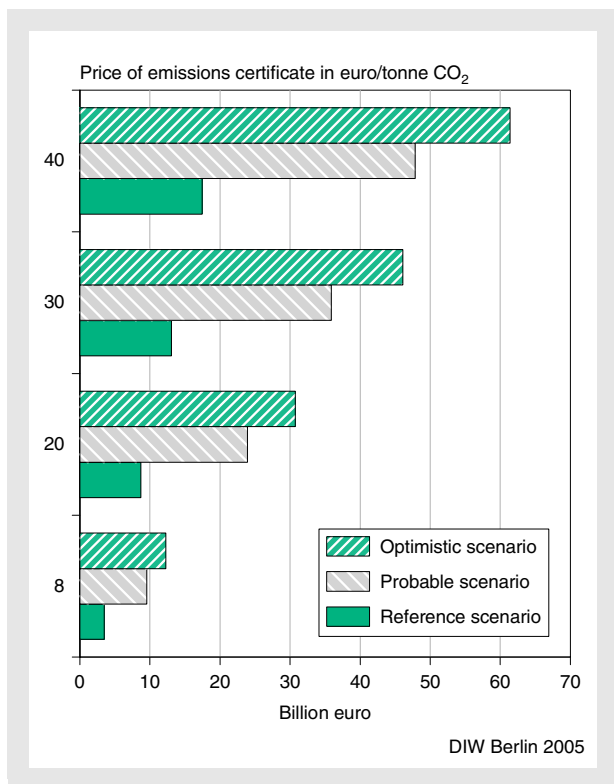


Sources: Third National Communication; Interagency Commission of the Russian Federation on Climate Change Problems, Moscow 2002.

¹⁸ Cf. Claudia Kemfert: 'International Climate Coalitions and Trade – Assessment of Cooperation Incentives by Issue Linkage.' In: *Energy Policy*, vol. 32, no. 4, 2004, pp. 455-465; Erik F. Haites, Farhana Yamin, Odile Blanchard, and Claudia Kemfert: 'Implementing the Kyoto Protocol without Russia.' In: *Climate Policy*, vol. 4, no. 2, 2004, pp. 143-152.

Figure 4
Russian Revenue from Trading in Emissions Certificates

In billion euro at respective certificate price



Sources: DIW Berlin calculations.

Russian economic growth and energy consumption (probable and optimistic scenarios), and at an emission permit price of 20 euro per tonne of CO₂ equivalents, Russia could earn accumulated revenue of between 23 and 30 billion euro. In the event of strong economic growth and high energy consumption, the country could earn a maximum of 8.7 billion euro. The reason is that strong economic growth along with the associated high level of energy consumption would cause emissions to rise in Russia and almost reach the 1990 level. The level of the emission permit price will depend essentially on the quantity of emissions certificates demanded by both Europe and Japan. On the European emissions trading market, which opened at the beginning of 2005, the allocation of emissions permits via the National Allocation Plans for the first trading period 2005 to 2007 has resulted in an initial price of around 8 euro per tonne of

¹⁹ Cf. Claudia Kemfert, Erik F. Haites, and Fanny Missfeldt: 'Can Kyoto Protocol Parties Induce the United States to Adopt a More Stringent Greenhouse Gas Emissions Target?' In: *Interdisciplinary Environmental Review*, vol. 5, no. 2, 2003, pp. 119-141.

CO₂. However, even in the event of a low price for emissions permits, Russia could still realize earnings through the sale of emissions permits. In addition, it is conceivable that Russia will strategically withhold its emissions permits in order to drive up the price.

Conclusion

Russia is an important but difficult partner for the EU with respect to energy and climate policy. It remains a major guarantor of Europe's energy supply security. However, other energy suppliers, especially those from North Africa, also have good prospects, of expanding their market shares. Russia's ratification of the Kyoto Protocol represented an important step forward with respect to climate policy. Nevertheless it is very difficult to predict how Russia will behave with regard to emissions trading. The quantity of emissions permits sold by Russia will depend not only on the strategic behavior of the Russian Federation, but also on the level of demand from the EU.