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**The Russian Energy Sector 1990-2005
and Climate Policy - Special Emphasis on
Energy Production and External Trade**

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The Russian Energy Sector 1990-2005 and Climate Policy

Special Emphasis on Energy Production and External Trade

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Content

Content	I
List of Tables	II
List of Figures	II
1 Introduction	1
2 A snapshot of the Russian economy	2
3 Primary energy production	4
3.1 Overall development.....	4
3.2 Regional production patterns (crude oil, natural gas and coal).....	6
3.3 A first brief conclusion	7
4 Electricity generation	9
5 External energy trade	11
5.1 Mineral oil and natural gas export volumes.....	11
5.2 Export revenues	12
6 Future projections: Russian scenarios and international critique	14
6.1 The Russian Energy Strategy	14
6.2 International critique	16
7 Russia and Climate Policy	19
8 The past and the future: summary and prospects	22
9 Bibliography	24

List of Tables

Table 3-1 Russian energy production, million tonnes of coal equivalent, 1990, 1995, 2000 –2005	5
Table 3-2 Russian energy production, physical volumes, 1990, 1995, 2000-2005	5
Table 3-3 Oil production per region, Mill. t. 1990, 1995, 2000-2005	6
Table 3-4 Natural gas production per region, Bill m ³ , 1990, 1995, 2000-2005	7
Table 3-5 Coal production per region, Mill t 1990, 1995, 2000-2005	7
Table 4-1 Capacity of power plants, Mill. kW, 1990, 1995, 2000-2005*	9
Table 4-2 Production of power plants, Bill kWh, 1990, 1995, 2000-2005	9
Table 4-3 Generation, net exports and gross consumption of electricity, Bill. kWh, 119, 200-2004.....	10
Table 4-4 Regional power generation, Bill kWh , 1990, 1995, 2000-2005.....	10
Table 5-1 Energy exports, 1990, 1995, 200-2005	11
Table 5-2 Exports of goods, mineral oil and natural gas , 200-2006, Bill. US-\$.....	12
Table 5-3 Exports of mineral oil and natural gas, Bill US-\$.....	13
Table 6-1 Russian Urals prices, 1990,1995, 2000-2007, US-\$/barrel.....	15
Table 6-2 Gazprom average gas export price for sales to Europe, US-\$/1000cbm.....	15
Table 6-3 Production scenarios for 2010 and 2020, production level 2005	15
Table 6-4 Russian mineral oil and natural gas exports scenarios for 2010, 2020, level 2005	16

List of Figures

Figure 7-1 Development of GHG emissions in Russia	20
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1 Introduction

The energy sector is the most important industrial sector of the Russian economy. In addition, oil and natural gas exports dominate Russian external trade and are the main source of Russian foreign exchange revenues. Thus, the development of the energy sector influences the overall development of the Russian economy. During the 1990s the energy sector had been confronted with production losses which, however, had been less pronounced than in other branches of the economy. Due to shrinking internal demand and export regulations, energy exports had not been affected by the negative production development during the 1990s. Since 2000, energy production has recovered. It has increased by 22 % during the period 2000-2005; in the same period crude oil export volumes even rose by 75 % and gas exports increased by 7 %. As a result, Russian energy exports have regained their level of the pre-transition period. Today, Russia is the worldwide largest exporter of natural gas and the second largest oil exporter.

In the following, we will first take a snapshot of the Russian economy (chapter 2). Then we turn to the facts and figures of Russian energy production (chapter 3). Here, the development of the Russian economy and production of crude oil, natural gas and coal is discussed. In addition, regional production patterns are briefly introduced. An overview on electricity generation follows in chapter 4. Then, energy exports are analysed (chapter 5). The prospects of the energy sector are discussed in a separate chapter (chapter 6) where the Russian energy strategy is presented and the international critique is summarized. In chapter 7 we highlight the climate policy of Russia. In the final section we will summarize the main findings.

The agenda above covers only a part of the debate on the Russian energy sector. Beyond energy supply, there are quite interesting aspects of the Russian energy sector which we will not analyze in detail. These aspects, among others, are the question of ownership of energy industries, the concentration ratios and market entry barriers. In addition, we will not discuss in detail domestic energy consumption and energy prices. A third neglected aspect refers to governmental and political involvement as well as the overall institutional framework. As we can't go into detail we at least try to mention some of these aspects where it is necessary.

2 A snapshot of the Russian economy

The development of the Russian energy sector to some extent depends on the overall economic development and institutional framework of the Russian economy. Therefore, we first present some general remarks on the development of the Russian economy.

During the 1990s the Russian economy had faced real GDP decreases and (severe) losses of industrial production. In particular, in the first half of the decade the Russian economy was confronted with the so-called transition crises. During the period 1991-1995 real GDP shrank by 9 % annually and industrial production by 12.8 %. In the second half of the decade, in particular, in 1997, evidence suggested economic recovery (GDP: 0.8 %, industrial production: 1.9 %). However, one year later, the Russian economy suffered a setback of economic development due to the financial crisis in autumn 1998. Again, a decrease of real GDP (-4.6 %) and industrial production was observed. The situation changed in the following two years (1999/2000). Since then Russian economy has recovered. Real GDP has increased by 7 %/a on average; industrial production changes amounted to 6.5 %, on average.

Since the year 2000 the changes of real oil and gas production values are also positive. During the first five years (2000-2004) annual changes varied between 4.9 – 10.3 % (see table 2-1). The growth rate has sharply decelerated in 2005 (1.8 %). According to preliminary results only a slight increase can be observed in 2006 (2.6 %). Obviously, the oil and gas production nowadays are on a path of moderate growth.

Table 2-1

Real GDP, industrial production, oil and gas production, changes in %, 2000-2006

	2000	2001	2002	2003	2004	2005	2006 ¹
GDP	10.0	5.1	4.7	7.3	7.2	6.4	6.7
Industrial production ²	8.7	2.9	3.1	8.9	8.3	4.0	
Fuel production	4.9	6.1	7.3	10.3	7.7	1.8	

¹) Preliminary. - ²) Based on gross production of raw materials, production and distribution of electricity and production of manufactured goods.

Sources: Goskomstat, various issues, DIW (2007).

Private consumption still plays the major role on the consumption side (see EBRD, 2007). It increases by 9.6 % on average during the period 2000-2005; it has also slightly increased in the second half of the 1990 (except in 1997). In contrast, cross fixed capital formation has

drastically decreased during the 1990s. According EBRD data which is available for the years beginning in 1995, gross fixed capital formation has decreased between 1995 and 1998 by 12.3 %, on average. During 1999-2005 average annual increases amounted to 10.6 %. These investment increases are judged positive; however, it is also argued that higher investment outlays are needed to modernize the Russian economy.

In addition to production outcomes, there are other positive economic developments: Inflation rates have steadily decreased (according to preliminary data 2006: 7.2 %, 2005:10.9 %) and the state budget is in surplus (2006: 6.5 % of GDP, 2005: 7.5 % of GDP). There is also evidence for an improvement on the labour market where the employment rate has reduced to 7.6 % in 2005 (2004:8.2 %). In sum, the Russian economy has overcome many problems of the 1990s which was the decade of the so-called transition crisis with its typical phenomena such as drastic production losses, soft- budget constraints and widespread non-payments.

3 Primary energy production

3.1 Overall development

During the transition period the Russian energy sector faced heavy production losses. According to Russian official statistics in the period 1990-2000¹ overall primary energy production decreased by approximately 25 % (as measured in coal equivalent, see table 3-1).² The reduction of energy production volumes was far below the reduction of other industrial sectors (e.g. during the last decade steel production shrank by one third, cement production even by 60%).³ Thus, the energy sector has survived the so-called transition crises with less losses than other industrial branches. This, in particular, holds true for the Russian natural gas sector. Natural gas production only decreased by 9 %, whereas the decrease of crude oil production had amounted to 37 %. The coal production had also decreased by 37 %. A slight increase (4 %) could only be observed for the production of hydro and nuclear electricity; electricity generation will be separately analysed (see chapter 4).

Since the year 2000 overall energy production is recovering. During the period 2000-2005 the increase has amounted to 22%. Again, the production recovery differs between the various energy carriers. Oil production has increased by 45 %; and coal by 18.5 %. The recovery of the natural gas production has started somewhat later - in 2001. Since then, gas production has increased by 10 %.

¹ It is difficult to define a starting point for the transformation of the Russian economy. We take the year 1990 (among others, because of statistical purpose). This means that until the dissolution of the Soviet Union in 1992 Russia is defined as the RSFSR.

² The Russian statistics is based on conversion factors which diverges from international practice. The average coal equivalent factor for crude oil is 1,43, for natural gas 1,15 (which is quite high), for (hard and brown) coal 0,65 and primary electricity 0,34.

³ These two examples provide only a first impression on the harsh decreases of industrial production during the transformation period which affects almost all industrial branches including consumer industries.

Table 3-1
Russian energy production, million tonnes of coal equivalent, 1990, 1995, 2000 –2005

	1990	1995	2000	2001	2002	2003	2004	2005
Oil , including condensate	738	439	463	498	543	603	657	672
Natural gas	739	687	674	671	687	716	730	739
Coal	262	176	163	171	164	177	183	193
Primary electricity	98	95	102	108	105	106	111	112
Others*	20	11	6	7	6	5	6	6
All	1857	1408	1408	1455	1505	1607	1687	1722

* Wood, peat etc.

Source: Goskomstat, various issues.

Table 3-2 shows the development of production based on the commonly used physical terms. The figures also demonstrate the huge pre-transition production levels, in particular for natural gas and crude oil. In 2005 the natural gas production has exceeded its pre-transition level, whereas the crude oil production and the coal extraction still remain below their peak levels. In contrast to the oil sector, where several producers are engaged in field development and exploitation, natural gas production is concentrated in the hand of Gazprom (about 85 % of annual production).⁴

Table 3-2
Russian energy production, physical volumes, 1990, 1995, 2000-2005

	brown coal Mill. t	hard coal Mill. t	crude oil* Mill. t	natural gas Bill m ³	electricity (hydro) Bill kWh	electricity (nuclear) Bill. kWh
1990	137.3	257.4	516.2	640.5	166.8	118.3
1995	101.0	161.0	306.3	595.0	176.4	99.5
2000	86.2	172.0	323.4	583.6	165.0	131.0
2001	83.0	187.0	348.1	581.2	175.0	137.0
2002	74.2	182.0	379.3	595.0	164.0	142.0
2003	79.4	197.0	421.7	620.0	158.0	150.0
2004	70.4	211.0	459.2	633.0	178.0	145.0
2005	75.3	223.0	470.3	641.0	175.0	149.0
2006**			480.0	656.0		

* Including gas condensate.

** preliminary data.

Source: Goskomstat, various issues, Bofit 26.01.2007.

⁴ Independent gas producers (e.g. oil companies, small gas companies) play an increasing but still minor role in the Russian gas sector. Their main problem is the access to the pipeline system which is controlled by Gazprom. Nevertheless, gas production of independent gas companies has increased recently and amounted to 94 Bill m³ in 2005 (IEA 2006) or 15 % of gas production. According to the Russian energy In the long run this share will increase to 20 %.

According to preliminary data in 2006 oil production reached 480 Mill. t. Natural gas production has even further increased to 656 Bill m³. This is the highest natural gas production volume in the long history of the Russian gas industry!

3.2 Regional production patterns (crude oil, natural gas and coal)

Regional production still follows the typical production patterns. Oil production is concentrated in the Ural okrug, in particular in the Tjumen area. Here, the Chanti-Mansijskij field has regained importance. The role of the North-Western region (including the Komi Republic and the Nentskii autonomnij okrug) is also increasing. Within the Privolschkij okrug the oil production of Orenburg fields has amounted to 17.5 Mill. t in 2005 (1990 10.3 Mill.t). In Siberia the most important fields are in the Tomsk area (2005 Mill.t).

Table 3-3

Oil production per region, Mill. t. 1990, 1995, 2000-2005

	1990	1995	2000	2001	2002	2003	2004	2005
Russia	516	307	324	348	380	421	459	470
North-Western region	16.9	10.3	13.4	14.4	15.4	18	21.6	24.5
South-Federal region	11.9	7.8	10.6	11.5	12.3	12.7	13.3	13.4
Privolschkij f. region	110	78.3	75.1	78.6	82.9	89.2	92.9	93.1
Urals	365	202	213	231	254	283	310	320
of which Chanti Mansijskii	306	169	181	194	210	233	256	268
Jamal-Nenetskij	59.3	32.3	32	36.3	43.4	49.1	53	50.7
Siberia	10.3	6.8	7	7.9	10.9	14.5	17.6	14.3
Far East	2	1.9	3.7	4.2	3.6	3.5	3.9	4.4

Source: Goskomstat, various issues.

Natural gas production is also concentrated in the Urals okrug. Within the Tjumen area the most important gas fields are located in the Jamal-Nenetskij okrug. These fields have produced the main part of gas production increases in the last few years. A small increase of natural gas production can also be observed in the Far East.

Table 3-4

Natural gas production per region, Bill m³, 1990, 1995, 2000-2005

	1990	1995	2000	2001	2002	2003	2004	2005
Russia	640.0	595.4	583.8	581.1	594.9	620.0	633.0	656.0
North-Western okrug	8.3	3.7	4.0	4.2	3.9	3.9	4.0	
South-Federal okrug	8.4	8.5	14.4	15.4	16.0	16.6	16.7	
Privolschkij f. okrug	46.1	35.2	28.5	27.5	26.6	25.6	24.3	
Urals f. okrug	574.1	544.6	530.4	526.4	539.9	564.4	577.7	
of which Chanti Mansijnskii	28.9	17.6	20.1	20.4	20.8	24.4	26.2	
Jamal-Nenetskij	545.2	527.0	510.2	505.9	519.0	540.0	551.5	
Sibirskij f. okrug	0.2	0.1	3.0	4.1	4.8	5.8	6.1	
Dal'nejshebostot. f.o.	3.2	3.3	3.5	3.5	3.5	3.6	3.6	

Source: Regioni Rossiii 2003, part II, Goskomstat, various issues.

The coal production is concentrated in Siberia. Within the region the highest production level is observed in the Kemerowo area (2005: 164 Mill. t; here: Kuznetsk basin hard coal) and Krasnojarsk (2005: 36.6 Mill t). The share of hard coal in coal production is increasing. In 2005 the share of hard coal in coal production amounted to 75 % (1990: 65 %). In addition, an increasing share of coal is produced by open cast mining. Nowadays about two thirds of production are extracted by surface mining (1990: 55 %).

Table 3-5

Coal production per region, Mill t 1990, 1995, 2000-2005

	1990	1995	2000	2001	2002	2003	2004	2005
Russia	395.0	263.0	258.0	270.0	256.0	277.0	282.0	299.0
North-Western region	29.8	22.7	18.8	19.1	13.1	13.8	14.8	13.1
South-Federal region	29.8	19.5	9.7	9.5	8.4	6.9	6.4	7.7
Privolschkij region	7.3	2.8	0.2	0.1	0.2	0.2	0.2	0.2
Urals	16.6	9.0	6.7	5.1	4.6	4.7	4.7	4.6
Siberia	250.0	171.0	194.0	207.0	199.0	220.0	224.0	240.0
Far East	49.8	33.9	28.4	28.2	30.1	30.7	31.9	32.5

Source: Goskomstat, various issues.

3.3 A first brief conclusion

Recent figures of Russian primary energy production are quite impressive, in particular with regard to the oil sector and the natural gas sector. Both sectors had faced problems during the transition period of the Russian economy. However, the energy sector was less affected than other sectors of the Russian economy. One reason might be that the oil and gas sector are still "strategic sectors" with special political interest and support. During the 1990s special regula-

tion had been applied for the restructuring and – concerning the oil industry - the partly privatization of the strategic sectors (see for example Ahrend and Tompson 2005). As a result the energy sector still is characterized by monopolistic or oligopolistic ownership structures.

In recent years, a recovery of energy production can be observed. Production has regained their pre-transition level, on principle. Thereby, the typical patterns did not change significantly. One example are regional production patterns which still follow past investment decisions. In addition, the attraction of new investments and the development of new fields are obviously neglected. These are limiting factors for future production development. We will come back to the prospects of oil and gas production in chapter 6.

4 Electricity generation

The transition did not have a negative influence on the electricity sector with regard to overall generation capacities and electricity production, on principle. Plant capacity was maintained during the phase of shrinking industrial production and economic recession (see table 4-1). Electricity generation decreased by approximately 19 % during the 1990s (see table 4-2). Since the year 2000 the overall capacity of electricity generation has only slightly increased. Electricity production rose by 8.5 % during 2000-2005. In the same period the structure of electricity generation by power plants did not significantly change. The majority of electricity is generated by thermal power plants (66 %) (production by hydro: 18 % and nuclear power plants: 15 %)

Table 4-1

Capacity of power plants, Mill. kW, 1990, 1995, 2000-2005*

	1990	1995	2000	2001	2002	2003	2004	2005
all	213.30	215.00	212.80	214.80	214.90	216.00	216.60	219.20
thermal	149.70	149.70	146.80	147.40	147.30	148.00	148.30	149.50
hydro	43.40	44.00	44.30	44.70	44.80	45.20	45.50	45.90
nuclear	20.20	21.30	21.70	22.70	22.70	22.70	22.70	23.70

* At the beginning of the year.

Source: Goskomstat, various issues.

Table 4-2

Production of power plants, Bill kWh, 1990, 1995, 2000-2005

	1990	1995	2000	2001	2002	2003	2004	2005
all	1082	860	878	891	891	916	932	953
thermal	797	583	582	578	585	608	609	629
hydro	167	177	165	176	164	158	178	175
nuclear	118	100	131	137	142	150	145	149

Source: Goskomstat, various issues.

Russian gross consumption of electricity has followed the electricity production development, because external trade of electricity plays a minor role in Russian power sector. This can be shown by the following data:

Table 4-3
Generation, net exports and gross consumption of electricity, Bill. kWh, 199, 200-2004.

	1995	2000	2001	2002	2003	2004
electricity production	860.0	877.8	891.3	891.3	916.3	931.9
net electricity exports	23.9	15.7	11.1	12.9	7.1	12.3
gross electricity consumption	836.1	862.1	880.2	878.4	909.2	919.6

Source: Goskomstat, various issues.

During the second half of the 1990s the decrease of electricity consumption was far less pronounced than the estimated real GDP decrease of approximately 40 %. Thus, electricity intensity of the economy increased during the transition period.⁵ Since the year 2000 the Russian economy is characterized by significant industrial production increases, in particular in energy and electricity intensive branches (e.g. during 2000-2005 cement production has increased by 50 % and reaches 48,5 Mill t; steel production by 12 % to 66,3 Mill. t). Electricity consumption did not follow this trend of industrial production. This implies a declining electricity intensity of the Russian economy.

The regional pattern of power generation (table 4-4) show a quite balanced picture of power generation, in particular if regional numbers of population are considered.⁶ Regional differences still exist with regard to the type of power plant.

Table 4-4
Regional power generation, Bill kWh , 1990, 1995, 2000-2005

	1990	1995	2000	2001	2002	2003	2004	2005
Russia	1082.2	860.0	877.8	891.3	891.3	916.3	931.9	953.1
Central region	246.6	189.7	195.8	196.3	196.7	207.1	200.4	209.8
North-Western region	101.6	79.3	84.2	90.4	89.9	89.8	94.5	95.0
South-Federal region	81.4	66.6	59.3	64.9	67.3	65.6	68.7	70.0
Privolschkij region	220.2	172.7	175.8	177.7	177.0	181.8	187.5	187.5
Urals	169.0	122.3	128.7	126.3	130.4	139.1	144.7	150.2
Siberia	215.9	191.2	195.2	196.7	191.3	194.0	195.9	199.9
Far East	47.5	38.5	38.8	39.0	38.6	38.9	40.1	40.6

Source: Goskomstat, various issues.

⁵ The figures for real GDP changes during the 1990s can only be estimated. The EBRD (200) gives an estimation for the level of GDP in 1999 compared to 1989 of 57%.

⁶ Electricity production in Russia amounts to 6,7 Bill. kWh/habitant, on average. The central region (5.6 Bill. kWh/habitant) is well in line with the average value, whereas the production/habitant is lower in the South Federal Region (3.1 Bill. kWh/habitant) and higher in the Urals (12.3 Bill. kWh/habitant).

5 External energy trade

Russian external trade is dominated by energy exports, in particular by oil and natural gas exports. Exports of coal and electricity play a minor role. Therefore, in the following the analysis concentrates on mineral oil and natural gas. We first present the export figures; then we provide an overview on export revenues.

5.1 Mineral oil and natural gas export volumes

As can be seen from table 5-1 during the first half of the 1990s crude oil exports had decreased; since 1995 crude oil exports have recovered. The pre-transition level has been reached 2003. In contrast to crude oil, exports of oil products have been increased from 54 Mill. t to about 97 Mill. t. during the period 1990-2005. One reason for this development is that Russia tries to increase exports of refined products. Natural gas exports have not regained their pre-transition level until 2005. First signs for a slight recovery of gas exports also date back to the year 2002. It has to be mentioned, that during the 1990s oil exports were limited by licenses or regulated by customs duties. The export of natural gas to western countries is dominated by Gazprom.

Table 5-1
Energy exports, 1990, 1995, 2000-2006

	1990	1995	2000	2001	2002	2003	2004	2005	2006
mineral oil									
crude oil, Mill. t	235.0	122.3	145.0	160.0	175.0	232.0	258.0	253.0	252*
other CIS		26.1	16.9	22.5	18.0	46.0	40.1	47.5	
third countries		96.2	128.1	137.5	157.0	186.0	217.9	205.5	
oil products	54.0	47.5	62.7	71.0	75.0	77.0	82.4	97.1	
other CIS	30.0	3.5	3.5	2.5	2.0	2.8	4.1	3.9	
third countries	24.0	44.0	59.2	68.5	73.0	74.2	78.3	93.2	
natural gas, Bill. m ³	249.0	192.0	193.8	181.0	187.0	189.0	200.0	207.0	203*
other CIS	140.0	70.0	60.0	50.0	50.0	47.0	55.1	47.5	
third countries	109.0	122.0	133.8	131.0	137.0	142.0	144.9	159.5	
brown coal, Mill. T			0.3	0.2	0.1	0.1			
hard coal, Mill. T			1.6	2.1	3.2	3.5			
electricity, Bill. kWh			15.1	19.6	18.0	21.1	19.2	22.6	
* preliminary data.									
Sources: Goskomstat, various issues, Bofit 26. January 2007.									

A typical phenomenon of the transition period is the change of the regional patterns of energy trade. Deliveries to CIS countries with low ability to pay their energy bill in hard currencies had been reduced during the 1990s in favour for increases of mineral oil and natural gas exports to "western" countries. With regard to natural gas exports and oil products this new pattern has been maintained to date. In contrast, crude oil exports to CIS countries have increased since 2003.

5.2 Export revenues

Since the year 2000 the role of mineral oil and natural gas in Russian foreign trade of goods has increased significantly (table 5-2). Whereas in 2000 these exports accounted for more than a half of foreign trade revenues, in 2006 the share of mineral oil and natural gas exports has amounted to almost 62 %. This is not only the result of increasing world energy prices; trade volumes have also increased. As a result, Russian foreign trade revenues are unilaterally structured with a high share of raw materials and a relatively low share of manufactured goods. Thus, Russian export revenues are dependent on world energy price developments, on principle.

Table 5-2

Exports of goods, mineral oil and natural gas , 2000-2006, Bill. US-\$

	2000	2001	2002	2003	2004	2005	2006
exports of goods, Bill. US-\$	105.0	101.9	107.3	135.9	183.2	243.6	310.8
of which: mineral oil a.natural gas, Bill US- \$	52.9	51.8	55.1	72.8	99.4	148.5	191.5
mineral oil and natural gas, %	50.4	50.8	51.4	53.6	54.3	61.0	61.6

Source: Goskomstat, DIW 2007.

The majority of energy trade revenues are earned by mineral oil deliveries (79 %), in particular by crude oil exports (see table 5-3). Natural gas exports have also doubled in the period 2000-2005. However, the share of natural gas export revenues remains relative low (about 21 %).

Table 5-3
Exports of mineral oil and natural gas, Bill US-\$

	1995	2000	2001	2002	2003	2004	2005
mineral oil	18.3	36.2	34	39.2	52.9	77.5	117.2
of which: crude oil	13.3	25.3	24.6	28.3	38.8	58.3	83.4
oil products	5	10.9	9.4	10.9	14.1	19.2	33.8
natural gas	12.1	16.7	17.8	15.9	19.9	21.9	31.3
mineral oil and natural gas	30.4	52.9	51.8	55.1	72.8	99.4	148.5

Sources: Goskomstat, various issues.

In 2004 Russia has established a so-called stabilization fund. Oil revenues above an crude oil price of 20 \$/barrel are allocated to this fund. By this, the volatility of world market prices on raw materials have a reduced influence on the domestic economy. In addition, the fund is created to absorb excessive liquidity. In rouble terms the amount of the stabilization fund has grown from 106 Bill. Rbl at the beginning of 2004 to 2346 Bill. Rbl. at the beginning of 2007. At the beginning of August 2007 the amount has increased to 3263 Bill. Rbl. (127.5 Bill. US-\$). From 1st 2008 the Stabilization Fund will be split into a Reserve Fund and a National Prosperity Fund. The Reserve Fund will invest in low risk securities and will serve as security fund if energy prices will fall. Its amount will be about 10 % of GDP. Revenues above this limit will be allocated to the National Prosperity Fund.⁷ Thus, the new funds serve different tasks which are also discussed in the relevant literature under the label of "stabilization funds" and "saving funds". Whereas "stabilization funds" are created for short or middle term purposes (e.g. to minimise effects on fiscal budgets), so called "savings funds" serve long-term objectives (e.g. intergenerational distribution). As we cannot discuss the issue of stabilization funds here in length we want to refer to some basic analysis and experience (Fasano 2000, David, Ossowski, Daniel and Barnett 2001).

⁷ The funds do not only accumulate revenues of crude oil exports, but also revenues from natural gas and oil products exports.

6 Future projections: Russian scenarios and international critique

The figures on the recent Russian oil and gas production increases and the resulting energy exports are impressive. From this background the prospects for further energy production seem to be quite promising. Indeed, the Russian energy strategy foresees large production increases in particular for the gas industry. However, there are also critical views on the future of the Russian energy sector. In the following, we first present some basic assumption of the Russian energy strategy with special focus on the gas and oil industry. Then, we summarize the main arguments and recent critiques of the debate among experts (see Gaddy 2004, Juurikkala and Ollus 2006, Riley 2006).

6.1 The Russian Energy Strategy

The Russian energy strategy dates back to August 2003. Since then, the energy strategy was not officially revised although the worldwide economic framework (e.g. world oil and gas prices) and the internal situation of the Russian economy have changed significantly. The energy strategy is based on an optimistic and a low scenario for the development of the energy sector until 2020. Thus, the combination of the scenarios provide a corridor for the development of the Russian energy sector.

The energy strategy is based on specific assumptions for economic and price developments. In the optimistic scenario real GDP will more than triple until 2020 compared to the year 2000, investments into the energy sector will rise by 700 %. In addition, world crude oil prices will reach 30 US-\$/barrel and prices for natural gas 138 US-\$/1000 cbm. In the low variant GDP growth will increase by 220 %, investment will increase by 360 %. Oil prices will amount to 18.5 US-\$/barrel and gas prices to 118 US-\$/1000 cbm.

Today, the economic development supports the assumption of the optimistic scenario. If the average GDP growth of 6.5 % (2000-2005) will also be sustained in subsequent years, then the assumed optimistic growth of real GDP will be achieved even before the year 2020. Also current world price developments support the optimistic scenario: With regard to crude oil prices, since 2004 the prices for Russian Urals exceeds even the assumption of the optimistic

scenario (see table 6-1). According to Gazprom figures the same holds true for the price for Russian natural gas exports (see table 6-2).

Table 6-1

Russian Urals prices, 1990, 1995, 2000-2007, US-\$/barrel

1990	1995	2000	2001	2002	2003	2004	2005	2006	2007
20.25	16.40	24.71	21.40	20.85	30.31	27.42	33.06	53.70	56.09

Source: Energy Information Administration, <http://www.eia.doe.gov/iea/price.html>.

Table 6-2

Gazprom average gas export price for sales to Europe, US-\$/1000cbm

2000	2001	2002	2003	2004
129	126.5	128.5	132.9	140.5

Source: RPI (2006).

Although the overall economic and price development is impressive, the optimistic scenario will only be achieved if increases in investment can be realized. On average investment growth has amounted to 9.7 % during the period 2000-2005 (Goskomstat 2006). This increase is not in line with the optimistic scenario, it can only sustain the low scenario. In addition, there are no signs (and no real incentives) for a huge investment growth in near future.

Notwithstanding the problems of the underlining assumptions on the overall economic development, the Russian energy strategy contains a number of important assertions on the future development of the energy sector. In the following, the central settings are summarized with special focus on energy production and exports of mineral oil and natural gas.

Table 6-3

Production scenarios for 2010 and 2020, production level 2005

	2010		2020		2005
	low	optimistic	low	optimistic	
crude oil, Mill t	445	490	450	520	470.3
natural gas, Bill. m ³	635	665	680	730	641
coal, Mill t	310	330	375	430	298.3
electricity, Bill. KWh	1015	1070	1215	1365	953

Sources: Russian energy strategy (2003), Goskomstat 2006.

The figures in table 6-3 show that the development of crude oil and natural gas production are well in line with the optimistic scenario. The targets for the year 2010 can be realized if – in simple calculation – current production levels will be maintained. The same does not hold

true for the production of coal and electricity. Here, even the targets of the low scenario are a challenge which will not easily be met.

In the energy strategy the high production levels for crude oil and natural gas are combined with high export figures (see table 6-4). The export of oil and oil products is assumed to amount to 305-340 Mill. t in 2010 and 305-350 Mill t. in 2020. The high volume of the optimistic scenario has already been achieved in 2005 and it is doubtful whether this high export level could be maintained over the next 15 years.

Table 6-4

Russian mineral oil and natural gas exports scenarios for 2010, 2020, level 2005

	2010		2020		2005
	low	optimistic	low	optimistic	
mineral oil, Mill t	305	340	305	350	350*
natural gas, Bill. m ³	250	265	273	281	203

Sources: Russian energy strategy (2003), Goskomstat 2006.

The future of natural gas exports is also dependent on the level and the fuel mix of Russian domestic consumption. The question arise to which amount domestic gas demand can be substituted by other domestic fuels in order to allocate more natural gas for deliveries abroad. The energy strategy foresees a higher share of domestic coal consumption. In addition, it is assumed that energy intensity will significantly decrease. In sum, the optimistic scenario assumes that domestic consumption will amount to 1270 Mill t coal equivalent in 2020 (low scenario: 1145 Mill. t coal equivalent) and about 760 Mill. t coal equivalent will be exported (low scenario: 665 Mill. t coal equivalent).

Today, the Russian energy sector seems to produce impressive outcomes. In addition, the energy strategy draws a promising picture of the future. However, there are also critical views.

6.2 International critique

International experts doubt that the high production volumes can be maintained in the future. In the following we summarize the main arguments of the debate of the oil and natural gas sector development without going into the details of the various projections (for a detailed analysis see Gaddy 2004, Götz 2005, IEA 2006, Juurikkala and Ollus 2006, Riley 2006).

We start with the oil industry. Here the main three points of discussion are:

First, the low reserve-production ratio in Russia compared to other countries. Although Russia is the second largest oil producer, it is only on rank "7" with regard to reserves, well behind Saudi Arabia, Iran, Iraq and others. At the same time, the extraction of huge existent oil fields is decreasing. In the future only smaller fields (in remote areas) will go into production.⁸ In contrast to this reasoning, other experts believe that there are still undiscovered and important oil reserves on the Russian territory.

The second aspect is the non-sufficient investment into the oil industry. The equipment of the oil industry is assumed to be outdated. Modern technology is needed in particular if extraction becomes more difficult in the future. In sum, there is need of replacement as well as modernization of production capacity.

The third point refers to the investment climate and the overall institutional framework in Russia. The investment climate still suffers from state involvement into the energy sector and state regulation. The attitude towards foreign investors remains – at best – unclear. In addition, political involvement hampers long-term investment decisions. During the last years the Yukos affair and the government attitude towards the oligarchs overshadow the impressive production development.

The arguments of the debate on the future Russian gas production are quite similar to the oil production discussion (see for example Riley 2006, IEA 2006). Again, it is doubted that current production levels can be stabilised or even increased in the long run.⁹ Compared to the oil industry, the peak of natural gas production is expected to occur later. However, super-giant gas fields which will replace gas production from existent fields have not been developed, so far.¹⁰ The gas sector is confronted with a similar investment problem as the oil sector. The argument is repeated that huge investment outlays will be needed to modernize the outdated equipment and the infrastructure of the gas industry.¹¹ The lack of investment and the unfavourable investment climate are the main arguments for those experts who have a

⁸ A much debated issue are the Arctic oil and gas resources. In contrast to some optimistic views, Wood Mackenzie (2006) has provided a moderate estimation.

⁹ In contrast to the oil industry, the situation of gas reserves looks quite promising: Russian gas reserves are estimated to amount to 47,8 Ttill.m³; the reserve/production ratio for natural gas in 2005 was 80 years (DIW 2006)

¹⁰ The IEA (2006) estimates that Gazprom's production from existent fields will decline by 20 Bill m³/year. Thus by 2015 almost 200 Bill m³ must be produced from new gas fields in order to stabilize production.

¹¹ Gas leakages, pipeline losses and inefficiency of compressor stations are some examples of the outdated gas infrastructure. According to the IEA (2006) Gazprom has increased its investment programme to 10.8 Bill. US-\$ in 2005. The IEA emphasizes her concerns about Gazprom's priority on foreign acquisition and export infrastructure compared to the needs to upgrade investment outlays in the domestic gas infrastructure.

pessimistic view on the further development of gas production and the future Russian gas export potential.¹²

In sum, there are quite distinct projections on the further development of the Russian energy sector. Whereas the Russian energy strategy presents quite positive scenarios, international experts are more sceptical. However, it is not an easy task to compare these different projections as they are based on quite different underlying assumptions with regard to the various parameters related to the energy sector as well as to overall economic development.

¹² According to Riley's (2006) overview a "gas deficit" of about 126 Bill m³ will occur in 2010. One possible consequence will be a reduction of energy exports to Western Europe, and in particular to Germany as the most important western European customer of Russian gas deliveries. However, this scenario is based on various assumptions, among others, a stable gas production of Gazprom, a growing domestic natural gas consumption and increasing gas exports to CIS countries.

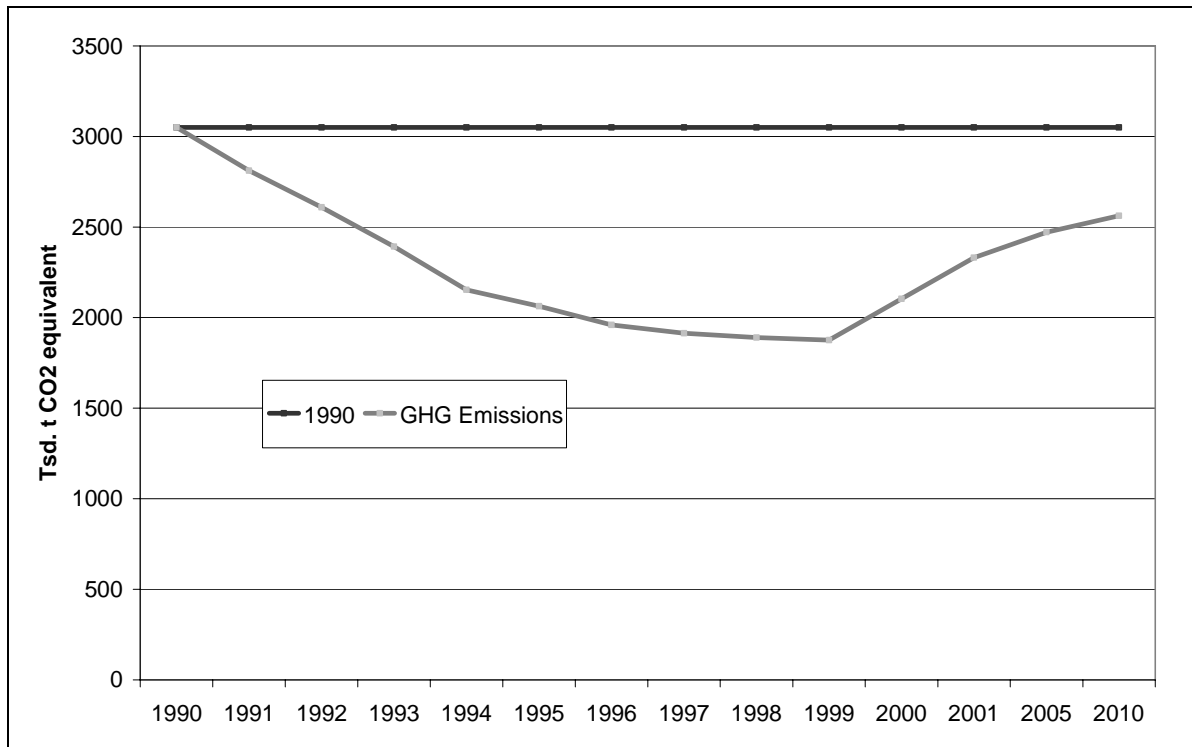
7 Russia and Climate Policy

The first concrete action plan to reduce greenhouse gas emissions, the so called Kyoto protocol, started in 2005 because of the ratification of Russia in November 2004. With the Kyoto protocol, so called Annex I countries, i.e. Europe, Japan, Russia, Ukraine, Australia and Canada, have committed themselves to reduce greenhouse gas emissions by 5,2 % compared to the level of 1990. Europe has declared according to their burden sharing agreement to reduce 8 %, Japan and Canada 6 % and Russia, Australia and Ukraine have to maintain the emissions level of 1990. The USA did not ratify the Kyoto protocol. However, as more than 55 countries¹³ which represent more than 55 % of the 1990 emissions have ratified the Kyoto protocol, the agreement became legally binding with Russias ratification. Russia played a crucial role in this process, as without Russia the 55 % share would have not reached. In November 2004, Russia ratified the Kyoto protocol.

Within the Kyoto protocol, emissions trading allow that emissions permits can be traded between the Annex I countries. The so called joint implementation (JI) projects, i.e. investment projects that aim to reduce emissions within Annex I countries allow for example that concrete projects between Russia and Europe. If for example a German energy companies invests in concrete projects that reduces emissions in Russia, the emissions credits that are reached due to the project can be attributed to Germany. Russia in this case would gain from direct investment and project transfers. The same procedure is allowed between Annex I and non Annex I countries as so called Clean Development Mechanism (CDM).

¹³ More than 55 countries have ratified the Kyoto protocol, but only so called Annex I countries have binding emissions reduction targets, the other countries, as for example China, has ratified the Kyoto protocol, but does not have concrete emissions reduction targets.

Figure 7-1
Development of GHG emissions in Russia



Source: Russian Government (2007, p. 9)

Because of the economic decline of the Russian economy after 1990, emissions diminished heavily, in 2004, Russian greenhouse gas (GHG) emissions still were some 33 % below the Kyoto commitment. emissions of CO₂ accounted for the largest share (80 %) of total emissions in 1999. A large share of the decrease on CO₂ emissions since 1990 comes from the reduction in energy consumption but can also be attributed to the increase in the share of natural gas and a shift from nuclear power to hydro power. As emissions reduced drastically after 1990 (figure 7-1), Russia potentially can sell emissions permits and therefore gain large revenues (Kemfert 2002 and Haites et al 2004). As it seems that within the Kyoto commitment time period of 2008-2012 Russian emissions will most likely below the 1990 level, selling emissions permits could gain a revenue of up to 10 Mio per year.¹⁴ Annex I parties with an emission reduction obligation in the first commitment period is eligible to transfer so called emission reduction units (ERU) if the compliance criteria are fulfilled.¹⁵ However, it is unlikely that Russia will create a domestic emissions trading system within the first commit-

¹⁴ If emissions permits price of 20 Euro per ton of CO₂ equiv. would be reached on average.

¹⁵ See Korpoo and Moe (2007)

ment period. Russia is also very attractive to create joint JI projects. Currently, there are 23 JI projects that have been contracted and submitted to the approval procedures. Russia established national guidelines for JI procedures, it remains still unsolved though which ministry will secure project approval.¹⁶ Because of this, it might be unattractive for Russian firms to lobby directly with different Ministries and facing such kind of uncertainties regarding the transfer of ERUs by the Russian government. The legislative basis for the JI projects will most likely be linked to the Federal Law on Capital Investments.

The Russian climate policy was never very high on the political agenda. As many scientists even do not see that there might by any man made human threat to the climate and if, it could be beneficial for Russia, the ratification discussion before 2004 seems to be most likely primarily driven by the Russian aim to get accession to the WTO. Therefore, Russia identifies the domestic climate policy more or less as energy policy. In fact, Russia is one of the most energy-intensive and CO₂-emitting economies in the world. According to Russia's energy strategy for 2020 the current energy consumption can be reduced by nearly 50% if energy resources are used more efficiently. Although a certain amount of progress has been made in recent years, there is still a vast potential to enhance energy efficiency.

If Russia however grows as fast as in the past few years, Russia could turn from a seller of emissions permits to a buyer. Russia also expressed that any kind of climate policy in Russia could limit the economic growth. If Western nations want to substitute fossil fuels, Russia as the main seller of fossil fuels in the world might not benefit from such kind of development. Therefore, it is unlikely that Russia would build any kind of strong position in any future climate pact. Public awareness of the impacts of climate change, also in Russia may change this position. However, it is much more likely that the USA will agree soon to a future climate pact than Russia. It could be that Russia will take over the USA's position to block any further effort towards an international climate policy.

¹⁶ The Ministry of Industry and Energy and the Ministry of Natural Resources and the Ministry of Economic Development and Trade (MEDT) still negotiate about their within the project approval procedures.

8 The past and the future: summary and prospects

Current Russian energy production volumes are quite impressive. A decade ago, when the transition crisis had led to massive industrial production losses which had also affected the energy industry, this recovery had not been anticipated. At that time, projections (at best) have assumed a stabilization of further production volumes; production decreases had not been excluded. The IEA (1995) in the survey of the Russian Federation pointed to severe shortage of investment in the fuel and energy sector and the deterioration of the resource base. In addition, the IEA mentioned problems with energy infrastructure and regional supply as well as typical difficulties of the transition period (e.g. soft budget constraints and non-payment as well as financial problems of companies, price regulations and cross subsidies). Two years before, in 1993, an energy strategy had been adopted with quite ambitious goals but opaque means. The IEA (1995) summarized: "The directions outlined in the Strategy are broadly correct. However, the role of the market in achieving them is not always made explicit." According to the old energy strategy Russian crude oil production (incl. condensate) should amount to 270-310 Mio. t in year 2000. In fact, this goal was achieved (323 Mill. t). In contrast, the estimated natural gas production (incl. oil gas) of 660-740 Bill m³ could not be realized (compared to 583 Bill. m³).

The current situation in some aspects resembles the past diagnosis. Again, the main point of critique is the lack of investment in the energy sector which constrains, among others, the development of new fields and infrastructure construction. It is argued, that the ambitious (production) goals of the (new) energy strategy cannot be achieved without substantial investment increases. A second point refers to the (oligopolistic or monopolistic) structure of the oil sector respectively gas sector. With regard to market mechanisms and concentration in the energy sector the lack of an adequate competition policy and prudent regulation are causes for concern. Today, the typical problems of transition (e.g. non-payment) are not visible any more; however, there are still non transparent regulations in place. A third point is the inadequate (economic) framework, e.g. institutional deficiencies and political involvement into the energy sector, with negative impacts on the investment climate. All of these points are valid counter-arguments why the ambitious goals of the Russian energy strategy will not be achieved in the long run. However, the experience of the past also shows that regardless of economic reasoning Russian energy policy and the strong state will stick to its strategic plans.

The recent developments of energy production and exports bear also their risks. One of them is the increasing role of the energy sector in Russian foreign trade. Volumes of energy exports (in particular mineral oil) have increased in recent years. In addition energy prices have increased on the world market. The combined effect is that the share of Russian oil and gas export revenues has increased from 50.4 % (2000) to 61.6 % (2006). As a result, Russian foreign trade has become more dependent on energy exports and the energy price developments on international markets. Russia has faced this problem and has established the Stabilization Fund (from 2008 labelled Reserve Fund) as a security fund if energy prices will fall. Nevertheless, Russia did not succeed in diversifying its structure of export goods. This seems not to be worrisome as long as energy prices are high or almost steadily increasing. However, the unbalanced structure of Russian foreign trade can have negative effects in the long run.

A wide gap exists between the current (positive) development and the long-run projections of the Russian energy sector. The targets of the energy strategy for crude oil and natural gas production can only be achieved if investment in both sectors increases. Thus, the improvement of the investment climate remains the main task of Russian energy policy.

Regarding the climate policy of Russia, because of strong economic growth and the interest to further export fossil energy, future climate policy activities most likely will be very low on the political agenda. As many scientists in Russia believe that there is no man made climate threat and if there should be any climate change it could be beneficial for Russia, climate policy action will be slow or negligible. The main concern of Russia is that climate policy could limit economic growth and could reduce gains from trade of fossil fuel.

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