

# Rhetoric versus reality: Russian threats to European energy supply

Andreas Goldthau\*

*RAND Corporation, 1200 South Hayes Street, Arlington, VA 22202-5050, USA*

Received 7 August 2007; accepted 16 October 2007

Available online 28 November 2007

---

## Abstract

European gas demand will rise from presently 540 billion cubic meters (bcm) to around 800 bcm in 2030. As more than 50 percent of overall European imports originate from Russia, fears have been expressed that the Kremlin could use energy resources as a foreign policy tool. A thorough assessment of domestic consumption, production and investment volumes however reveals that Russian supply will have difficulties in matching growing domestic and European demand. Hence, as the author argues, the threat to European gas supply does not lie in geopolitics, but rather in a lack of investment in the Russian upstream sector. Higher domestic Russian gas prices, enhanced energy efficiency and increases in non-Gazprom production would however make it possible for Russia to meet domestic demand and its export commitments for natural gas.

© 2007 Elsevier Ltd. All rights reserved.

*Keywords:* European energy security; Gas; Russia

---

## 1. Introduction

Global primary energy demand is about to soar. Despite efforts to increase the share of renewables in the overall energy mix, fossil fuels will remain the most important sources of energy supply in the foreseeable future. Especially natural gas, a relatively clean source of energy, will experience a worldwide boom during the upcoming 20 years. In line with this trend, European gas demand will rise from presently 540 billion cubic meters (bcm) to around 800 bcm in 2030, rendering Europe the largest gas market in the world (IEA, 2006a). Oil demand will increase, too, from present 16 million barrels per day (mbd) to 20 mbd in 2030. At the same time, generic European resources in the North Sea have peaked and will contribute to future European energy supplies only at sharply reduced proportions. In a consequence, according to EU estimates, European import dependence on oil will increase from present 82 to 93 percent in 2030, and in gas from present 57 to 80 percent in 2030 (European Commission, 2007). While oil is traded globally (i.e. it

does not provide a single producer with significant leverage over a single consumer), gas relations typically involve only few contractual parties. This is due to the bilateral character of the gas market, a result of its strong dependence on pipeline infrastructure. Since more than 50 percent of overall European imports stem from one supplier country—Russia,—strong fears have been voiced that the Kremlin could exploit Europe's dependence and use energy resources as a foreign policy tool.

In fact, a series of recent events have alarmed observers. Especially the often cited 'gas disputes' with Georgia, Ukraine and Belarus seemed to prove that the world's largest gas producer has become all but reluctant to enforce its political interests by playing the energy card. Further, recent deliberations of Russian officials on a 'Gas OPEC' nourished old fears and stimulated intensive debates in the Western hemisphere on suitable counter-measures against a suppliers' cartel. Open threats of Gazprom's CEO Alexei Miller to redirect gas supplies to Asian markets in case Gazprom's activities in the European downstream sector are limited served as a final wake-up call for European politicians (FT, 2006).

While European officials kept on appealing to Russia to fulfill its export commitments, the EU released an Energy Strategy this January, in which it centrally featured the

---

\*Tel.: +1 703 413 1100.

E-mail addresses: [goldthau@rand.org](mailto:goldthau@rand.org), [andreas@goldthau.com](mailto:andreas@goldthau.com) (A. Goldthau).

need to increase security of supplies and to diversify import sources (European Commission, 2007). The 2007 German EU Presidency promoted energy security to the top of its agenda, while at the same time making it subject of G8 talks at this year's Heiligendamm Meeting. Finally, some EU member states even called for an 'Energy NATO' to ensure Western supplies in case Russia cuts off oil and gas deliveries. In all, a consensus has emerged among Western policy analysts and commentators that regards gas primarily as a mighty weapon of a Russian elite, which does not think in terms of win-win but rather sticks to international zero sum type of games (for a random sample of voices see among others, Smith, 2007; Webb, 2006; *Businessweek* (2006) and Norman, 2005).

This paper challenges this consensus. Does Russia really have leverage over European consumer countries? Or is there an alternative rationale underlying Russian energy policies than the all-too-often cited 'gas weapon'? To assess these questions, the following analysis first examines the demand side of European and Russian gas markets. Next, by assessing Russian production forecasts and investment activities, it sketches the overall European–Russian gas balance. As will become obvious, a serious lack of investment in the Russian upstream sector is likely to render Gazprom unable to serve soaring domestic and European demand. Finally, the paper asks what measures may contribute to prevent the perceived supply gap by addressing the potential of domestic Russian energy savings and price increases.

The aim of this paper is to provide an alternative view to prevailing geopolitical perspectives on energy security. In contrast to common argumentative lines, it pinpoints to production and investment as crucial however neglected aspects of European energy supply.

## 2. Four groups of European gas consumers

On the demand side, there are basically four groups of European gas consumers, three of which at least partly depend on Russian gas supplies. As for the first two, they can roughly be divided into 'Old' and 'New' EU member states. While old members import less than half to no gas from Russia, with Germany marking the upper end of that group with a 46 percent import share, new member states virtually entirely depend on Russian gas deliveries. The Baltics import almost 100 percent of their gas demand, Poland or the Czech Republic more than two-thirds from their big neighboring country. As their market is at the same time of much smaller size than the Western European ones—Poland's annual consumption is presently about 14 bcm, Slovakia's less than 6 bcm and the Baltics' on average less than 3 bcm, compared with Germany's almost 90 bcm market –, to a certain extent their gas supplies depend on the contracting policies of the European heavyweights (IEA, 2007a; EIA, 2007b). Put differently, while it does not make much economic sense to build a new pipeline to serve the, say, Slovakian gas market, it certainly

does so to supply the German one. This fact explain the fear of Central and Eastern European states to become subject of Russia's good will in energy deliveries—especially if future demand increases render their import dependency even more pronounced.<sup>1</sup>

While old member states pay the highest gas prices on the European market, price levels of the new member states are significantly lower. Especially, the Baltics still enjoy considerably lower prices on gas imports from Russia than even other Central European countries. The German gas price ranged around 250 EUR per thousand cubic meters (tcm) in 2006; the Czech gas price hovered around 170 EUR per tcm, whereas Poland's gas price was around 150 EUR per tcm, and the Baltic States paid around 105 EUR per tcm (around EUR 140 adjusted by transport costs). East European gas prices have however already risen significantly during recent years, and will further adjust to Western European levels, given annual price increases of up to 30 percent on average (Eurostat, 2007, p. 68; see also Tirpak, 2006).

A third major group of consuming nations of Russian gas are Western CIS countries. As part of Russian efforts to foster re-integration of the former Soviet sphere, countries such as Ukraine, Belarus, Georgia and Moldova have been enjoying Russian gas deliveries at preferential prices. Partly as a result of historical path dependencies, partly due to the preferential prices regime, these countries' import share of Russian gas tends to be significant, amounting to more than 70 percent in Ukraine and to almost 100 percent in Georgia and Belarus (EIA, 2007b)<sup>2</sup> (Graph 1). As for Ukraine, recent gas contracts with Central Asia producers have helped the country to lower its historically much higher import dependence from Russia. At the same time, due to highly inefficient energy use, gas consumption per capita in these countries is much higher than in Western Europe. As a result, overall Gazprom sales to CIS countries amounted to 100 bcm in 2006, compared with total exports to the much larger Western European economies of only 160 bcm (Gazprom, 2007). Gas price levels in this third group are traditionally much lower than in Western or Central Europe, as Russia subsidized CIS countries throughout the past 15 years through cheap gas supplies. After recent re-negotiations and even several 'gas disputes' between Russia and its CIS customers, Belarus now pays 100 USD per 1 tcm, up from the old subsidized price of 46 USD. Ukraine's net price has also risen to 95 USD from 50 USD for 1 tcm in 2006, and has reached 130–135 per tcm in 2007 (Stern, 2006, p. 9; IHT, 2007).

<sup>1</sup>It also reveals the reasons for sensitivities of Poland and the Baltic states regarding pipeline projects complementing the existing main routes of Yamal and Soyuz: remaining transit countries for the bulk of Western European imports provides them with a pivotal role in transit and may thus serve as a quasi-fallback if bad things happen.

<sup>2</sup>It is important to note that, given shady intermediary RosUkrEnergo, it is difficult to determine exact figures on the origins of natural gas consumed in Ukraine, i.e., what portion stems from Russian sources and what parts are 'swapped' gas for Central Asian gas consumed in Russia.

Country	Percent of total imports, 2004	Market size in bcm, 2005
Estonia	100	1
Lithuania	93.5	3.2
Hungary	84.5	13.4
Slovakia	79.5	5.9
Czech Republic	69.4	8.5
Poland	69.2	13.6
Ukraine	75	72.9
Germany	46	85.9
Italy	31	79
France	2	45

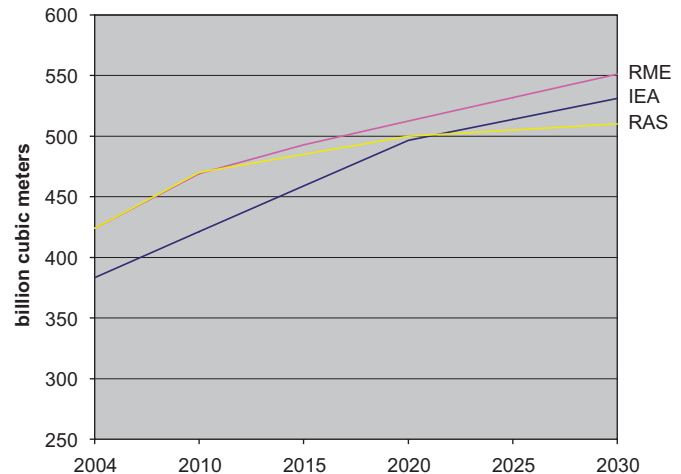
Graph 1. Russian share in total imports and market size for selected European countries. Sources: EIA (2007b), BP (2006) and Tirpak (2006, p. 6).

A fourth and final group of consuming countries in Europe comprises present net exporters such as the Netherlands, Great Britain and Norway. Since the generic resources of the first two, stemming mainly from the North Sea, are about to deplete, they will however soon become importers, too. While Great Britain is presently already turning into a net importer, the Netherlands will do so by 2020 (PFC Energy, 2007). Besides LNG imported from Qatar or Algeria, traditional pipe gas will have to replace generic production—most probably also from Russia.

In line with general trends, the gas demand of all of these four groups of European consumers will rise significantly during the upcoming years. At the same time, the decline of generic European gas production accelerates growing import dependency. As a result, and despite a slight fall in its relative import shares, absolute European imports of Russian gas will increase. While Gazprom supplied 161 bcm or 29 percent of total European demand in 2006, the company has already contracted to supply up to 180 bcm of gas by 2010, according to UBS. UBS also expects the ‘European call’ on Russian gas to be about 215 bcm in 2015 (UBS, 2006, p. 33; Gazprom, 2007, p. 45).

### 3. Growing Russian gas market

In order to match increasing European demand, Gazprom, the partially privatized and state-controlled Russian gas monopolist, has recently signed a number of long-term contracts with its European customers that include substantial increases in exports. At the same time, however, given annual GDP growth rates of up to 10 percent since the turn of this century, domestic Russian gas demand is projected to grow significantly, too. In recent years, Russian consumption has hovered around 400 bcm. It has grown by more than 2 percent annually during the last 5 years and is projected to continue to rise in all existing forecasts. The Russian Energy Strategy projects that Russian consumption will increase by an average of 1.3 percent per year through 2020, reaching 499 bcm in



Graph 2. Projections of Russian gas consumption. IEA: International Energy Agency; RME: Russian Ministry of Energy; RAS: Russian Academy of Science. Sources: IEA (2006a), Ananenkov et al. (2003) and, Russian Ministry of Energy (2003).

2010 and 512 bcm in 2020 in its ‘optimistic’ scenario. In a ‘pessimistic’ scenario, it still forecasts a consumption of 439 bcm in 2010 and 464 bcm in 2020. In contrast, the IEA forecasts consumption of 458 bcm in 2015 and 531 bcm in 2030, less than Russian projections (IEA, 2006a; Russian Ministry of Energy, 2003; EIA, 2006c). Implicit in the projections of both agencies is a significant improvement in energy efficiency. The Russian economy is likely to grow four to five times more rapidly than gas consumption over this period (Graph 2).

Moreover, the domestic Russian gas market is highly politicized as gas makes up for more than half of Russian primary energy consumption (IEA, 2004). Out of more than 600 bcm of annually produced gas, around 400 bcm are used in domestic households, industry, transport and heating and power plants. Russia is a highly inefficient user of energy, using 3.2 times more energy per unit of GDP than the EU-25, most of this gas (EBRD, 2007). This is mainly due to Russia’s dual pricing system, which is designed to subsidize Russian households and domestic manufacturers. In 2006, domestic gas prices were only 17 percent of West European gas prices, 29 percent when taking into account transit charges (UBS Investment Research, 2006). As a consequence of the internal system of rationing and regulating prices, Gazprom earns all its profits from exports to Western Europe, although this market only accounts for 30 percent of total production (Gazprom, 2007).

Regardless of the market situation, Russian federal law provides that Gazprom has to serve the domestic gas demand. Hence, the company has to cover the rising consumption of Russian households and industry despite low domestic gas prices. This raises a central and crucial question: will domestic production keep pace with increasing domestic consumption and rising exports commitments?

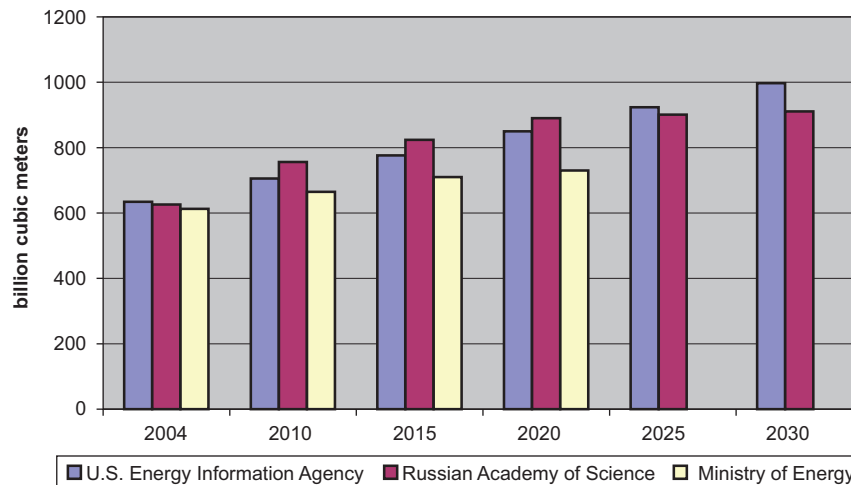


Fig. 1. Projections of gas production. Sources: Russian Ministry of Energy (2003), Ananenko et al. (2003) (for 2015 production projection) and EIA (2007a).

#### 4. A negative overall gas balance

After peaking at the end of the 1980s, Russian gas production declined about 10 percent during the 1990s. But by 2005, output had recovered to pre-transition levels and marginally surpassed the previous peak when output hit 598 bcm. Output rose to 612 bcm in 2006, using definitions provided by British Petroleum (BP, 2006). Using Russian data, which include more associated gas, production ran 656 bcm in 2006. According to the Russian Energy Strategy, overall production is projected to increase from 656 bcm in 2006 to 730 bcm in 2020 under its 'optimistic' scenario. Its 'pessimistic' scenario envisages a rise in gas production to 680 bcm by 2020. Alternative Russian sources regard output levels between 770 and 901 bcm as possible (Ananenko et al., 2003). Western sources project Russian gas production to run between 801 bcm (IEA) and 850 bcm (EIA) in 2020, and to hit even 1000 bcm by 2030 (IEA, 2004; EIA, 2007a) (Fig. 1).

Such optimistic views are however questionable, for two reasons. First, the structure of the domestic Russian gas market is likely to prevent necessary increases in gas production. Gazprom, which controls the entire pipeline system, has restricted access to the grid despite legal obligations to provide third parties with access. Gazprom also prevents other producers from exporting gas, leaving them the less profitable domestic market. Consequently, independent gas producers have little incentive to invest or increase production. Oil producers often flare associated gas rather than feeding it into the pipeline system because sales are unprofitable. While the Russian Ministry of Energy projects that production from companies other than Gazprom will account for 20 percent of Russian production by 2020, Gazprom's hostility to other producers and its ability to restrict access to the pipeline system raise serious doubts whether this goal will be met. Even in the case of the less ambitious forecasts in the Russian Energy Strategy, Gazprom's output, projected to reach

580–590 bcm over the period to 2020, has to be however complemented by a sharp rise in non-Gazprom production, amounting to 105–115 bcm in 2010 and 140–150 bcm in 2020, in order to meet demand (see OECD, 2004). Without more incentives for private producers to invest in production, this output will not materialize, though.

A second and even more pressing issue that raises doubts about Russian gas production capacities is investment. In order to maintain or even increase its current production levels, Gazprom must invest heavily. The company's major producing fields are already in decline, including the 'Big Three' (Yamburg, Urengoy and Medvezh'ye), which currently account for more than 60 percent of total Russian production. Production at Zapolyarnoye, a fourth giant field, which came on stream in 2001, has recently reached its peak at 100 bcm per year (IEA, 2002a; UBS Investment Research, 2006). To compensate for declining output from these fields, Gazprom has to develop new ones, most of which are in the far north, where costs for exploration and production (E&P) are significantly higher, due to difficult geological conditions and the arctic climate. According to the Organization for Economic Cooperation and Development, developing fields on the Yamal Peninsula and on the Ob-Taz shelf will cost up to USD 25 billion; pipelines connecting these fields to the existing system will cost another USD 40 billion (Ahrend and Thompson, 2004). The giant Shtokman field, located offshore in the Barents Sea and projected to come on stream between 2010 and 2014, is projected to cost USD 34 billion to develop (UBS Investment Research, 2006). The IEA estimates that Gazprom will have to spend an average of USD 17 billion per year through 2030 in E&P projects and maintenance of current fields.<sup>3</sup> Currently, Gazprom has

<sup>3</sup>The Russian Energy Strategy forecasts investment needs of USD 120–200 bn between 2002 and 2020 (Russian Ministry of Energy (2003); Ivanov (2003)); APERC estimates total investment needs between 2004 and 2030 at USD 295–401 bn; APERC (2006).



however committed to capital spending of only up to USD 13 billion per year (IEA, 2006, p. 123). As past business behavior has revealed, Gazprom will moreover also use a considerable part of this spending to make acquisitions abroad and on investments outside its core business rather than on gas production or pipelines. Further, Gazprom's recent USD 13 billion takeover of Sibneft (now Gazprom-Neft) and bids for foreign companies have imposed a heavy debt burden on the company. Finally, moves to exclude Western companies from promising Russian upstream projects leave Gazprom with the burden of developing these fields without foreign capital and managerial and technical expertise. In a nutshell, and paradoxically enough, the country that owns the world's largest gas reserves risks to virtually run out of gas (Fig. 2).

In all, the overall gas balance risks to become negative. Increased Russian production and additional purchases from Central Asia might be adequate to satisfy rising domestic demand and expand exports to meet demand in the European Union. According to a United Bank of Switzerland evaluation, if Gazprom is to cover projected Russian and European demand in 2010, it has to meet 100 percent of its 560 bcm production target, utilize all of Central Asia's 70 bcm export potential for re-export to Europe, and an additional increment of 148 bcm in 2010 from other producers in Russia has to materialize (UBS Investment Research, 2006). Such a best-case scenario however implies that investment is directed into the 'right' projects, that investment targets are met in time and, crucially, that independent producers gain access to the domestic Russian market. As past developments on the Russian domestic gas market have revealed, fulfillment of these conditions is all but guaranteed, though.

## 5. Overall assessment: a Russian leverage?

With regards to the underlying questions of this contribution, several conclusions can be drawn from the preceding analysis. First, Russia has less leverage on

European customers than assumed. In order to exert credible threat, Russia has to dispose off sufficient gas volumes that can be reduced if politically desired. In fact, there is serious doubt on Gazprom's ability to even meet its export commitments—let alone to artificially reduce supplies for political reasons. With regards to the first two European consumer groups, the old and new member states, any attempt of Gazprom to use energy deliveries for political leverage would immediately result in painful revenue cuts, given the fact that Gazprom earns all of its profits on European markets. As for the third group, the CIS countries, there in fact exists a higher incentive for Gazprom to preferentially serve alternative customers at higher profit margins—or raise prices. Hence, second, recent Russian policies vis-à-vis consuming nations in its Near Abroad may follow a different logic than commonly assumed. Given the Russian dual pricing policy, which renders domestic gas sales unprofitable and deprives Gazprom of pricing power, the company has a strong incentive to sell more of its gas on more profitable foreign markets—or render yet non-profitable foreign markets more attractive. In a consequence, after heavily subsidizing CIS countries throughout the past 15 years, Gazprom has recently increased prices to CIS countries and is pushing to equalize prices net of transit fees with those it charges its West European clients. This policy has resulted in several 'gas disputes' with Russia's neighbors, even with Belarus, which is a strong supporter of Russia. These moves are however less part of a geopolitical game of the Kremlin, but rather reveal a quite rational approach of a company that has to compensate for a loss-generating home market. Gazprom's strong—and occasionally undiplomatic—attempts to enter the lucrative European downstream sector incidentally follow an identical logic.

Third, the real threats to European energy security in natural gas lie in insecure investments activities and in the future development of the domestic Russian gas market. In a nutshell: European households could in fact remain cold during one of the upcoming winters; this will however not be the result of Russia's use of a 'gas weapon', but rather

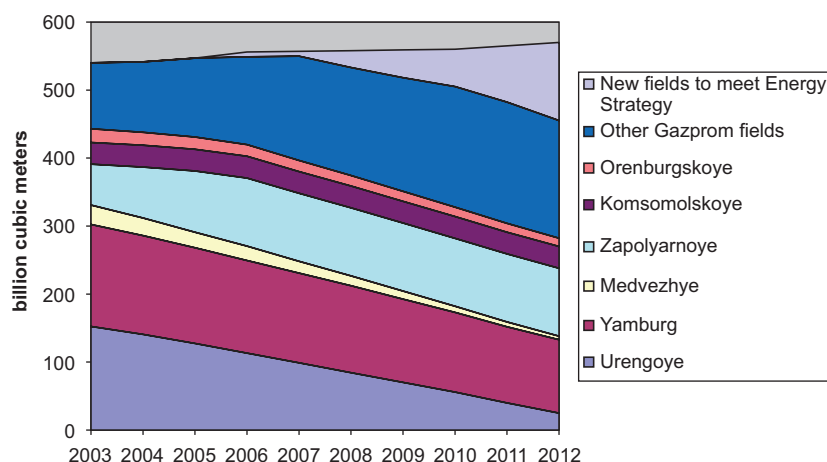


Fig. 2. Gazprom's gas production 2003–2012. Source: Institute of Energy Policy (2005); own calculations.

due to a serious lack of upstream investments and a persistently inefficient Russian use of gas.

## 6. Potential ways out: independent producers, rise in energy efficiency and increase in domestic prices

In view of these findings, what are potential ways to prevent a looming European gas shortage? In fact, a combination of higher domestic Russian gas prices, enhanced energy efficiency, and increases in production would make it possible for Russia to meet both domestic demand and export commitments for natural gas.

As for the first, the impact of higher natural gas prices on energy efficiency in Central Europe has been impressive; higher prices have also begun to generate improvements in efficiency and moderate demand in Ukraine. In fact, domestic Russian prices are presently already being raised. On November 30, 2006, the Russian Cabinet approved a plan to increase natural gas prices for industry from USD 45 to USD 125 per tcm by 2011, reducing the gross differential between Western Europe and Russia from one-fifth to one-half (IHT, 2006. See also Worldbank, 2006). At this price, the netback to Gazprom from domestic sales will be almost the same as what it gets from sales to Western Europe, where Russian federal taxes and transit fees paid to Russia's neighbors take a significant bite from revenues. These price increases are to partially exclude the residential sector, although prices have been raised here as well as district heating prices have been increased to try to keep pace with inflation. However, the greatest impact of the price increases will be on users such as power companies and industrial consumers, not on households, which make up 12 percent of consumption (IEA, 2007b).

As for enhanced energy efficiency, a reduction of distribution losses and flared gas could save considerable amounts of gas. According to IEA estimations, in 2004, almost 70 bcm—equivalent to one-third of total Russian exports—either leaked from pipelines during transmission and distribution, was burned in compressor stations, or was flared by oil companies instead of being fed into the distribution system. According to IEA, 30 bcm could be saved annually by reducing flaring, reducing losses by investing in maintaining and improving transmission and distribution systems, and other such measures (Fig. 3) (IEA, 2006b).

Finally, as for an increase in domestic production, independent producers will play a crucial role. Presently, given restricted access to the domestic pipeline system, independent gas producers have little incentive to invest or increase production. Oil producers, as mentioned, often flare associated gas because sales are unprofitable. It is therefore crucial that the Russian government shifts policies to render investments into gas production economically feasible for independent producers in the upcoming years.

Yet, while these three steps are imperative to ease the situation, the critical question arises whether the Russians

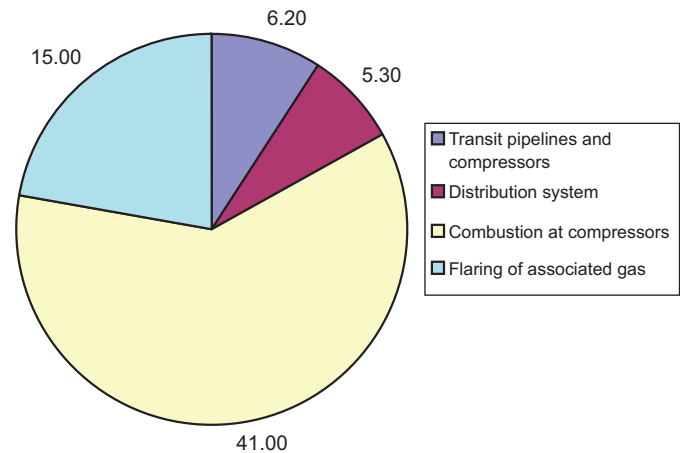


Fig. 3. Losses and flared gas in 2004 (bcm). Source: IEA (2006b).

will in fact take them. The raise of domestic gas prices to a level in 2011 that is only half what Europe pays now may trigger some domestic efficiency gains—but assumably not enough. Further, repeated official announcements to the contrary, the Russian government has made few moves to further liberalize the domestic Russian gas market in recent years, which would allow Russian independent producers to compete with Gazprom on a level playing field and to curb flaring of associated gas. Apparently, the goal of a strategic control of the domestic gas sector outweighs the goal of increasing the overall efficiency of the sector. Finally, while investment is critical, the timing of new production is, too. The ability of Gazprom to develop reserves in complex arctic areas in time is however questionable without the managerial and technical support of IOCs. Hence, even if all necessary E&P investments were made, the entailed technical challenges may considerably delay new fields from starting producing. While the recent re-inclusion of Western companies in critical E&P projects such as Shtokman may indicate a cautious turn in Russian policy, such moves may prove too selective to compensate for the loss of skills implied by the recent pull-outs.

In all, a combination of price signals and efficiency measures on the domestic Russian market and of directing sufficient investments into the 'right' projects will be the most accurate response to future European supply constraints. It is thus crucial to redirect public awareness from geo-strategic exercises towards the categories that are in fact at stake: markets and investments. At the same time, however, Western policy efforts have to focus on facilitating investment in Russian energy assets by foreign companies in order to avert a veritable gas shortage on major consumer markets. The latter may however provide for the best argument to make the Kremlin rethink its policy: failing to serve its important European customers implies immediate negative effects on the energy-dependant Russian state budget—not an attractive outlook for a government that has come to cherish its newly strengthened role on the international scene.

## Acknowledgments

I would like to thank Keith Crane, Steven Pfifer and two anonymous reviewers for their valuable comments on previous versions of this paper.

## References

- Ahrend, R., Tompson, W., 2004. Russia's gas sector: the endless wait for reform? 402 OECD Economics Department Working Papers, OECD Publishing, Paris.
- Ananenko, A., Kontorovich, A., Kulezhov, V., Yermilov, O., Kozhubaev, A., Livshits, V., 2003. Russia's gas strategy at a glance. 16 Oil and gas vertical, at [http://www.ngv.ru/article\\_en.aspx?articleID=22326#16-2006-6\\_5](http://www.ngv.ru/article_en.aspx?articleID=22326#16-2006-6_5).
- APERC, 2006. APEC Energy Demand and Supply Outlook 2030, Tokyo.
- BP, 2006. Statistical Review of World Energy. BP, London.
- Businessweek, 2006. Russia's Energy Weapon, 28 March.
- EBRD, 2007. Sustainable Energy in Russia. EBRD Sector Factsheet, at <http://www.ebrd.com/pubs/factsheet/themes/eeus.pdf>.
- EIA, 2007a. International Energy Outlook 2006. EIA, Washington, DC.
- EIA, 2007b. Country analysis briefs, at <http://www.eia.doe.gov/emeu/cabs/>.
- EIA, 2007c. Country analysis briefs: Russia, at <http://www.eia.doe.gov/emeu/cabs/Russia/Full.html>.
- European Commission, 2007. An Energy Policy for Europe, Communication from the Commission to the European Council and the European Parliament. European Commission, Brussels, 10 January.
- Eurostat, 2007. Gas and electricity market statistics. Data 1990–2006. Eurostat, Brussels.
- FT, 2006. Gazprom threat adds to EU fears on supply. 20 April, at <http://www.ft.com/cms/s/1bfa611c-d09c-11da-b160-0000779e2340.html>.
- Gazprom, 2007. Annual Financial Report 2006. Gazprom, Moscow.
- IEA, 2002. Russia Energy Survey 2002. IEA, Paris.
- IEA, 2004. World Energy Outlook 2004. IEA, Paris.
- IEA, 2006a. World Energy Outlook 2006. IEA, Paris.
- IEA, 2006b. Optimising Russian Natural Gas. Reform and Climate Policy, Paris.
- IEA, 2007a. Country statistics, at <http://iea.org/Textbase/country/index.asp>.
- IEA, 2007b. Natural gas in Russia in 2004, at [http://iea.org/Textbase/stats/gasdata.asp?COUNTRY\\_CODE=RU](http://iea.org/Textbase/stats/gasdata.asp?COUNTRY_CODE=RU).
- IHT, 2006. Russia approves plan to double domestic natural gas prices, November 30, at <http://www.iht.com/articles/2006/11/30/business/rusgas.php>.
- IHT, 2007. Gazprom to slash Belarus gas supply, August 1, at <http://www.iht.com/articles/2007/08/01/business/gazprom.php>.
- Institute for Energy Policy, 2005. Russian gas sector developments and new European projects. Presentation by A. Milov held in London on September 2005, at <http://www.energypolicy.ru/files/Presentation-Milov-Sept.20-2005.ppt>.
- Ivanov, V., 2003. Russian energy strategy 2020: balancing Europe with the Asia-Pacific region. 53 ERINA Report.
- OECD, 2004. Economic Survey Russian Federation. OECD, Paris.
- Norman, Z., 2005. Russia's gas weapon. International Herald Tribune, 21 December.
- PFC Energy, 2007. Global Gas Supply Forecast. PFC Energy, Washington, DC, at <http://www.pfcenergy.com/contentDispatcher.aspx?id=3260>.
- Russian Ministry of Energy, 2003. Energy Strategy of Russia for up to 2020. Russian Ministry of Energy, Moscow.
- Smith, K., 2007. Putin checkmates Europe's energy hopes. CSIS Commentary, June.
- Stern, J., 2006. The Russian–Ukrainian Gas Crisis of January 2006. Oxford Institute for Energy Studies, Oxford.
- Tirpak, M., 2006. Energy supply in Central Europe and the Baltics. IMF Regional Office Note, July.
- UBS Investment Research, 2006. Russian gas, Moscow, at <http://www.ubs.com/investmentresearch>.
- Webb, T., 2006. Gas: Russia's secret agenda. Energy supply is a 'political weapon'. The Independent on Sunday, 8 January.
- World Bank, 2006. Russian Economic Report no. 13. World Bank, Washington, DC.