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THE BELARUS CONNECTION: EXPORTING RUSSIAN GAS TO GERMANY AND POLAND

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About the Geopolitics of Natural Gas Study

Natural gas is rapidly gaining in geopolitical importance. Gas has grown from a marginal fuel consumed in regionally disconnected markets to a fuel that is transported across great distances for consumption in many different economic sectors. Increasingly, natural gas is the fuel of choice for consumers seeking its relatively low environmental impact, especially for electric power generation. As a result, world gas consumption is projected to more than double over the next three decades, rising from 23% to 28% of world total primary energy demand by 2030 and surpassing coal as the world's number two energy source and potentially overtaking oil's share in many large industrialized economies.

The growing importance of natural gas imports to modern economies will force new thinking about energy security. The Energy Forum of the James A. Baker III Institute for Public Policy and the Program on Energy and Sustainable Development at the Stanford University Institute for International Studies are completing a major effort to investigate the geopolitical consequences of a major shift to natural gas in world energy markets. The study utilizes historical case studies as well as advanced economic modeling to examine the interplay between economic and political factors in the development of natural gas resources; our aim is to shed light on the political challenges that may accompany a shift to a gas-fed world.

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This paper was written by a researcher (or researchers) who participated in the joint Baker Institute/Stanford PESD *Geopolitics of Natural Gas Study*. Where feasible, this paper has been reviewed by outside experts before release. However, the research and the views expressed within are those of the individual researcher(s), and do not necessarily represent the views of the James A. Baker III Institute for Public Policy or Stanford University.

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The Belarus Connection: Exporting Russian Gas to Germany and Poland

David G. Victor and Nadejda Makarova Victor¹

INTRODUCTION

In the early 1990s the giant Soviet enterprise of Gazprom began work on a new project to export gas across Belarus to Poland and Germany. Close examination of this project offers crucial insights into the potential for Russia's future gas exports because it was the first (and so far only) large new Russian gas pipeline project constructed after the dissolution of the CMEA system and the Soviet Union. The Russian government envisions that total gas exports to Western Europe will rise to 200 billion cubic meters (bcm) per year by 2020 (up from about 130 bcm today); whether and how such ambitions are realized depends on the practical experiences with this project—the first constructed in an era where markets have played a larger role than state-controlled financing in determining the size and route of pipelines.

This project remains the single largest expansion of gas transmission through Belarus. Whereas nearly all Russian gas exports to Western Europe traveled through Ukraine (and still do today), by the middle 1990s theft and risk of interruption of gas during Ukrainian transit had focused Russian minds on finding alternative routes. Finally, although this project was mainly conceived to serve the German market, it also was pursued partly with the aim of supplying the largely virgin gas market in Poland. Unlike most other CMEA nations, Poland had not been part of the centrally mandated gasification in the 1960s to 1980s; coal retained a vastly dominant share of Polish primary energy supply, and very few gas import pipelines from Russia served Poland. Although market forces did not yet rule in the Polish energy system in the middle 1990s

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when this project was conceived, the liberalization of Poland's energy markets would mean that gas would have to penetrate without strong direction from the central government; in contrast, in all other CMEA nations gasification had been directed by the state.

We call this project the Belarus Connector (BC). In Gazprom's vision, this project would have originated in the giant gas fields on the Yamal Peninsula and supply large volumes of gas to European markets. So far, development of the Yamal fields—a venture that would cost more than \$10b for exploration and development alone—has not attracted investment. Nonetheless, Gazprom and many analysts often call the built pipeline the “Yamal-Europe” project, but we avoid that terminology since the Yamal fields are still a dream rather than reality. Instead, Gazprom and its partners created the BC by connecting to existing trunk gas pipelines in Russia and running these new pipes through Belarus then Poland and into Germany—that smaller vision began with two large pipelines, but so far just one has been built with compressors that deliver a much smaller volume than its potential.

The Belarus connection projects are quite distinct from the large gas pipelines that the Soviet Union built from the 1960s through the 1980s that already have been the subject of extensive analysis (e.g., Stern, 1980; Gustafson, 1985; Stent, 1982; Stern 1993). Those projects crossed territory that was either part of the Soviet Union (e.g., Belarus and Ukraine) or firmly under the Soviet Thumb (e.g., Czechoslovakia)—creating essentially no transit risk. Those projects were financed as grand state projects—either by Western banks with state guarantees or by the Soviet Union itself. In the Soviet Union, the Soviet Ministry for the Gas Industry (Gazprom's predecessor) rewarded managers for the size of their visions rather than commercial practicability. In the consuming countries, as well, Soviet era gas projects were conceived as vital state missions—Germany, for example, supplied concessionary loans, implicit state guarantees, and used the power of the government to assure deliveries of key technologies such as pipe and compressors. In that era of state control, project planning was relatively easy because the political and financial resources of a few large governments could be mobilized for grand projects; governments not only eased the construction of these projects but they also directed state-owned enterprises to accept long-term agreements that specified the quantity and (usually oil-linked) pricing formulas.

We make two arguments. First, the experience with building the Belarus Connector contrasts sharply with the era of complete state control over gas markets. The 1990s were a period during which the German gas market slowly saw the introduction of very limited competition, and the role of the state as maker and guarantor of markets declined, not least because political and financial resources of the German government were distracted by the task of unification. Actual construction of the Belarus Connector began when the largest single user of gas in Germany (BASF) sought alternative supplies that would be less costly than those of state monopolist Ruhrgas. Gazprom welcomed this overture since it, too, sought to bypass Ruhrgas but for different reasons; it thought that alternative marketing arrangements could recover some of the rents that had traditionally gone to Ruhrgas by boosting the prices that Gazprom received for its exports. The German state played little positive role in making this project happen; it cautiously welcomed competition but stood ready to intervene if these new entrants caused too much harm to the well-connected incumbent Ruhrgas. The Russian state favored the project but had few political or economic resources to supply; it welcomed a project

that circumvented troublesome Ukraine, but it had little ability to direct the project nor did it anticipate the troubles it would later have with Belarus. The Polish state favored the project but contributed little as well; Poland remained wary of any scheme that would raise dependence on Russia, but at the same time gas figured in a vision for new cleaner electric power generation and the project would also help to tie Poland to Germany's gas market. The practical effect of this relatively weak involvement of key governments was to raise the risk for commercial investors, slow the pace at which this project actually proceeded (in contrast with the earlier massive Soviet gas export projects), and favor elements of the Belarus Connector that could be brought online with relatively low risk and greater ease once an investor decided to allocate the capital. Thus the smallest and most scalable aspects of the project were pursued, while those that required the grandest visions and the largest capital expenditure languished. As Polish investors found that demand for gas was smaller than originally anticipated, they unilaterally downscaled the project by installing fewer costly compressors than was planned originally, with more compressions to be sequenced into use in line with market-driven demand for the pipeline's gas.

Second, we argue that commentators on Russian gas exports have been prone to overstate the risks associated with crossing transit countries. Threatened and actual shutoffs of gas crossing Ukraine attracted much attention in the middle 1990s, but the logic for a pipeline crossing Belarus was driven principally by the logic of serving the North and Eastern German market (and to a lesser degree Poland). Avoiding Ukraine was convenient and helped to keep Gazprom's attention on the project, but simple bypass was not the primary motivating force. (Ironically, today Belarus has proved to be a more problematic transit country; in February 2004 Gazprom shut the Belarus Connector for 18 hours as part of a dispute with the Belarusian government about ownership of the pipeline segments in Belarus, theft and gas prices.) Disputes with transit countries have affected the allocation of rents between producers and transit nations but have not affected gas prices for offtakers who have priced Russian gas with reference to other potential long-term alternatives. Russia and Gazprom are pushing other projects to bypass Ukraine, including notably the Bluestram pipeline from Russian territory on the Black Sea directly to the Turkish market. In that case, too, the perception of a commercially viable Turkish market was a keystone to the effort—not simply the bypass of Ukraine. Also essential was a willing partner who had deepwater pipeline expertise (ENI). We argue that the credible threat of bypass has exerted considerable discipline on Ukraine in the middle 1990s and on Belarus in recent years, but the root cause of these countries' behavior are internal political developments that cause their political and industrial leadership to focus on immediate survival and thus discount the long-term consequences of their actions. Most of the bypass threats exerted by Russia and also wielded by Poland when it feared dependence on Russia and Belarus for imported gas were not fully credible, but they had sufficient plausibility that they probably averted greater vulnerabilities to transit country risks. Russia exerted such threats against Ukraine with a proposed pipeline through southern Poland that would serve no purpose except to bypass Ukraine—a project that was never built. Poland exerted such threats by contracting with Norway to deliver gas by pipeline across the Baltic Sea—a project not yet consummated—designed to discipline Russia and Belarus.

We begin the story with an overview of the rise of gas in the Russian economy, as that explains both the emergence of Gazprom (and its structure) as well as the design of the gas pipeline network that was bequeathed to Russia as the Soviet Union broke apart in the late

1980s. We include a brief review of major gas export routes and then focus on the deals surrounding the three different aspects of the Belarus Connectors and the alternative projects that might have been pursued at the same time.

SOVIET ENERGY STRATEGY AND THE DASH TO GAS

1819 saw the first use of gas in Russia—for lamps on Aptekarsky Island in St. Petersburg. By the end of that century the major cities of Moscow and St. Petersburg and many others were supplied with gas networks. Although lighting was the first widespread application of gas, industrial applications such as glass melting and metal hardening soon followed. In Baku, where oil pipelines were first laid in 1872 as the city emerged at the epicenter of Russia's largest oil producing region, annual natural gas consumption rose to 33 million cubic meters by the eve of the Russian Revolution in 1917 (Gazprom, 2004). Wherever gas was used in large quantities the supplies were local, as the Soviet Union did not lay many long-distance gas pipelines until well after World War II—several decades after the appearance of the first long distance gas pipelines in the United States. By the early 1930s the Soviet economy consumed 10-15 million cubic meters annually; a decade later this figure grew to 3.4 billion cubic meters (bcm). (For comparison, the United States consumed about 50 bcm in 1935). During this period, the inflexibility of central planning along with Stalin's iron grip impeded the utilization of gas. Job-intensive hydropower and coal dominated in an industrial system that emphasized large industrial projects and electrification. Gross technical inefficiencies coupled with rapid industrial growth—both hallmarks of Stalin era central planning—caused a rapid and dramatic rise in total primary energy consumption—growing at about 6% per year from 1913 to 1940 and more than 9 percent annually from 1945 through 1960.

Not entirely by coincidence, 1953 marked the peak for coal's share in the Soviet economy and also the end of Stalin's rule; the share of primary energy supplied by gas that year stood at only 2%. In 1955, the USSR produced just 9 billion cubic meters of gas from fields that were dispersed across the European part of Russia and in Ukraine (Kosnik, 1975). Khrushchev set the goal of catching the U.S. economically within 25 years; modern industry, Khrushchev and his planners reasoned, required modern fuels. Oil was Khrushchev's principal focus, but gas also occupied a prominent role in his modernization—the desire to develop a gas industry was officially inserted into the sixth Five-Year Plan (1956-1960) and advanced with the Seventh Plan (1959-1965).² (AIC, 1995). Not only were modern fuels more flexible and efficient, but some keystones to modern industry demanded special fuels.

² The sixth five-year plan was discarded in 1957 primarily because it over-committed available resources and could not be fulfilled, and was replaced by a special seven-year plan.

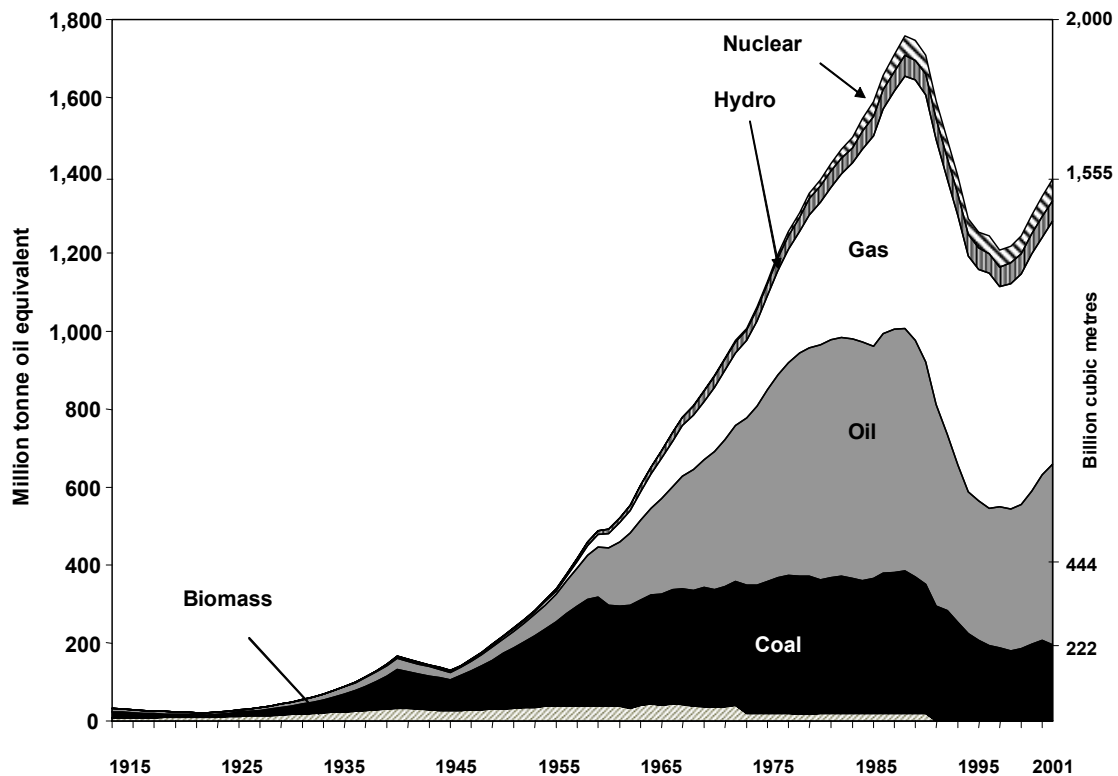


Figure 1. Primary Energy Production on the Soviet Territory, 1913 to 2002. Main chart shows production in absolute value, and inset shows share. Data Source: 1913-1954: Elliot (1974); 1955-1964 Narodnoe khozyaistvo SSSR (various years); 1965-2002: BP (various years); 1970-1990: UN (1993)

A modern chemical industry, for example, requires petrochemical feedstocks and Soviet industry arrived quite late to that cluster of innovations. Investment in long distance pipelines and gas fields in the northern Caucasuses, Ukraine and Turkmenistan followed.

Just fifteen years later (in 1968) persistent state sponsorship of the oil industry had catapulted oil to the top of the Soviet Union's primary energy supply.³ (In the U.S., for comparison, oil rose to #1 in 1950.) Gas rose more slowly because gas was harder to handle and, unlike oil for petrochemicals and internal combustion engines, gas was not uniquely qualified for any particular major use.

Khrushchev's Eighth Plan, which began in 1966, recognized the potential importance of the vast Siberian gas reserves to the east of the Ural mountains; production from these fields began slowly, as shown in figure 2. This plan marked the beginning of the "Siberian period"

³ The share of oil production rose from 21 percent of all primary energy produced in the USSR in 1955 to 38 percent in 1968. Coal retained a large share because it had entrenched itself in the electric power sector. At the same time, gas production rose from 2 percent in 1955 to 17 percent of total primary energy in 1968. These data are calculated on the basis of primary energy production estimates that include biomass fuels (e.g., wood) and thus are slightly incomparable with estimates made for western countries, which typically exclude "traditional" biomass fuels. (Kosnik, 1975)

with the opening of the world class fields in Urengoi—discovered in 1966 and brought into first service in 1978. As the small and dispersed fields west of the Urals and close to demand centers became depleted and the slow process of working in the arctic conditions of western Siberia yielded viable fields, net production shifted east. These new Siberian supplies were injected into the existing network of pipelines that had been established earlier to link the now depleting gas fields to major centers of demand. Thus the export routes from the new Siberian fields travelled southwest and linked to Moscow-bound pipelines that then traversed the industrial heartland and gas fields of Ukraine.

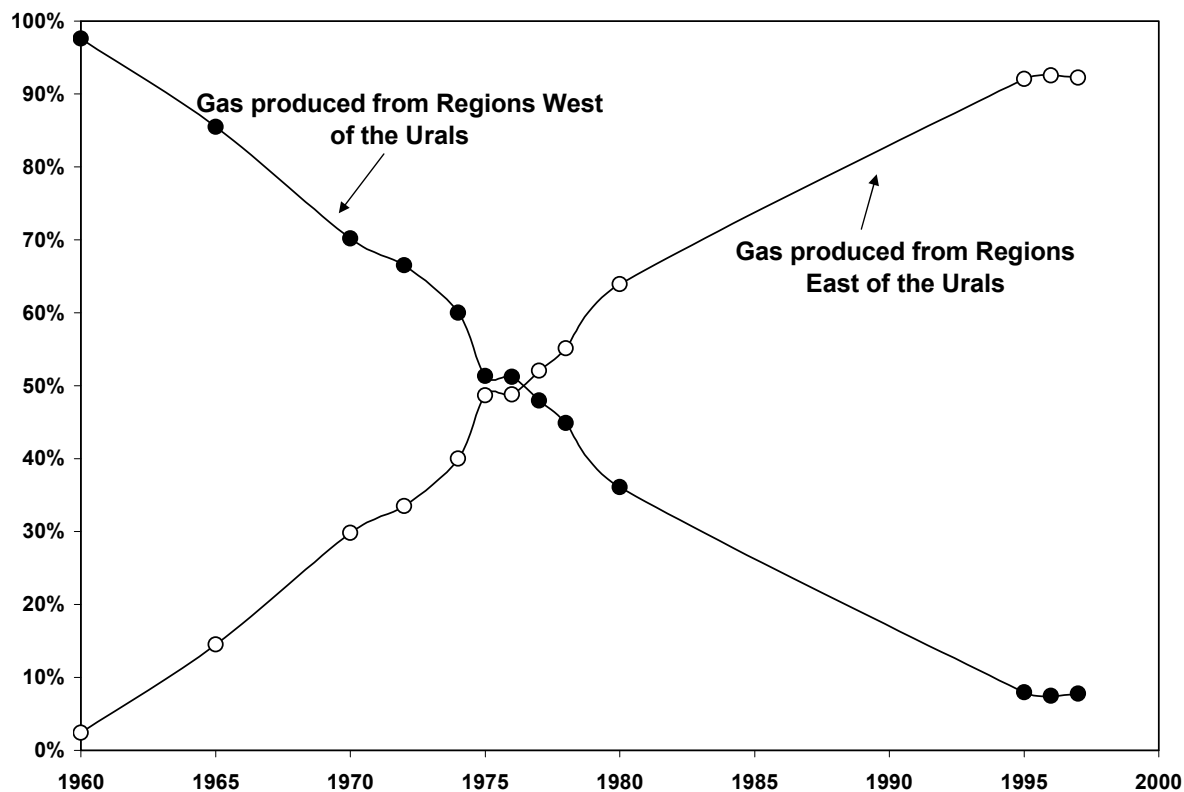


Figure 2. The Shifting Geography of Soviet and Russian Gas Production. Estimated gas production from regions west and east of the Urals. Early production focused on fields close to demand centers as they were easiest to tap and long-distance transportation proved to be especially difficult without access to western technology. Operating fields in arctic permafrost conditions, which characterized the most lucrative fields east of the Urals, was also very challenging as it required special anchors and procedures such as cooling systems so that post-compression gas would not melt the surrounding permafrost, creating a jelly-like slush in which the pipes would float and heave along the tundra surface. Source: 1960-1974: Kosnik, J.T. (1975); 1975-1980: calculated from Table 2-5, p.28, Stern, J.P.(1980); 1995-1997: Goskomstat (1998).

As shown in figure 3, through the 1970s gas remained predominantly for domestic use. International trade was minimal; in fact, the USSR was a slight net importer of gas (from Iran and Afghanistan). Soviet planners extended this same industrial model to other members of CMEA. The first such pipeline—“Brotherhood”—began operation in 1968, linking the

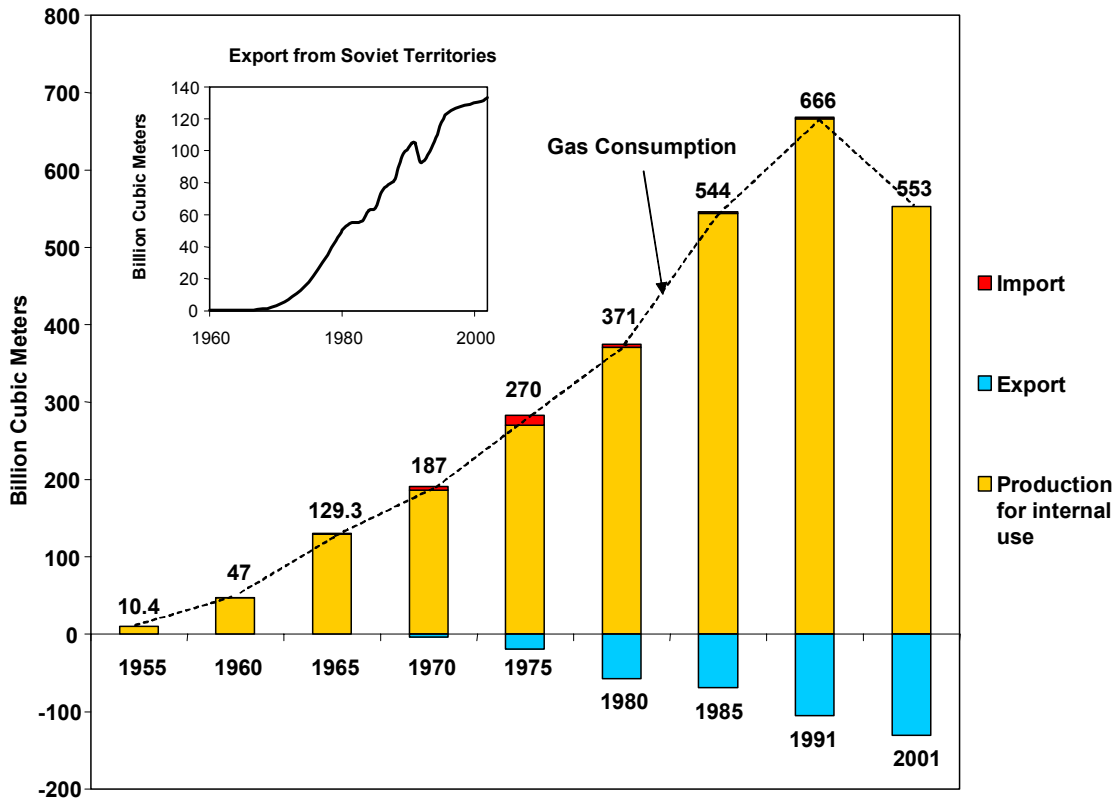


Figure 3: Production, Consumption and International Trade of Gas in the Soviet Territory. Imports from the late 1960s are from Afghanistan (beginning late 1960s) and Iran (the IGAT pipeline, beginning 1970). The IGAT pipelines linked via Georgia to the pipelines that had tapped gas reserves in the Caucasus and delivered gas north to Moscow and other centers, but the Iranian revolution effectively shut this import route in 1979. A series of pipelines mainly for the European market (summarized in this text) provided substantial exports starting in the early 1970s. The effect of the massive pipelines connected to the large new Urengoi field in northwestern Siberia is evident. Data Sources: Stern (1993), 1955-1960; BP (2003), 1965-2001.

Shebelinka gas field east of Kiev to Czechoslovakia. A small extension linked that pipe to Austria, the first Soviet gas exports to the West; a small pipeline also served Poland. As shown in figure 4, that was the sum total of Soviet gas exports in 1970. That same year total hydrocarbon exports (nearly all in the form of oil) amounted to \$US 444 million, or 18.3 percent of the Soviet Union's total hard currency earnings (Stent, 1982). In the early 1970s a few additional pipelines were being considered for other CMEA members as well as extensions to western nations that were geographically and politically close to the Soviet Union—such as Finland, Austria, and Germany.

The oil shock of 1973 changed this strategy. Higher oil prices put a premium on boosting production of gas to replace oil while also lifting the price that the Soviet Union could charge for the gas that it exported. Internal prices remained low, and thus the planning mechanism rather than price incentives were needed to direct gas resources to their most advantageous purposes. Planners took up the task by drawing long lines on maps—linking the west Siberian fields with

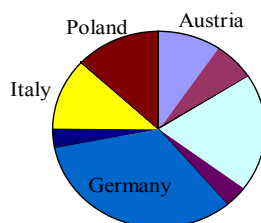
demand centers in central Europe and in the west. When the Soviet Union was planning for internal consumption it created a grid; when it planned for massive exports it sought to match output (from the wellhead) to input (the offtaker).

The gas projects that followed during the 1970s through the middle 1980s followed two basic scripts. Projects for CMEA nations involved the Soviet parent selling gas at depressed prices and through complex barter exchanges. Projects for western nations involved hard prices for the gas—usually indexed to the price of oil, which gas was replacing—and arrangements that typically involved concessionary hard currency loans secured with the proceeds of a long-term gas purchase agreement and usually a guarantee from the Soviet and Western governments. The 1970s atmosphere of *détente* meant that West European nations shared a common interest with the Soviet Union in advancing commercial exchange. Shared infrastructure would bind the two blocs together; from the Western perspective they would give the Soviet Union a stake in the West and make it a less threatening country. At the same time, deals involving hard currency

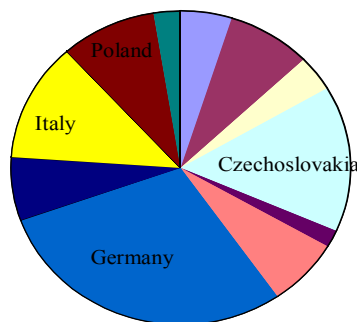
1970, 3.4 Billion Cubic Meters



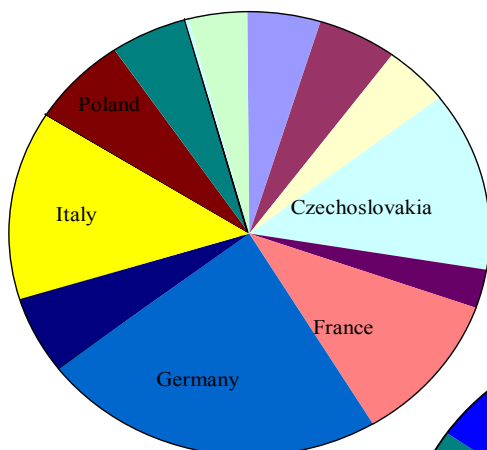
1975, 19.3 Billion Cubic Meters



1980, 57.6 Billion Cubic Meters



1991, 105.2 Billion Cubic Meters



2001, 131.06 Billion Cubic Meters

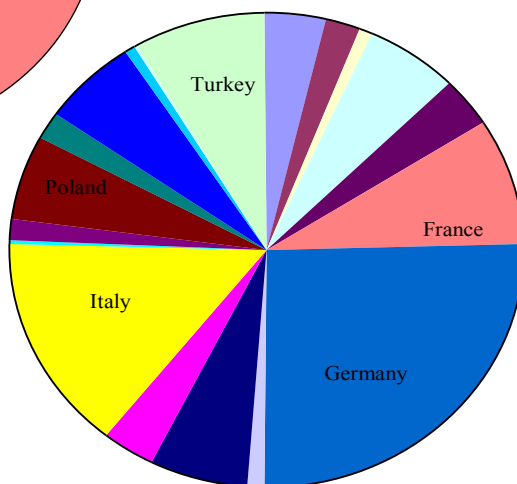


Figure 4: The Composition of Soviet Gas Exports to Europe, 1970 to 2001. Around 1970 the only exports were from small pipes to Poland (dating to 1949) and via a small pipeline from Ukraine to Czechoslovakia and Austria. Offtake diversified in the 1970s with the creation of two large pipeline clusters that first tapped the “warm” west siberian fields (i.e., the fields not in the permafrost region): 1) the “Transgas” pipeline network, which included the TAG I and II pipelines to Czechoslovakia, Austria and Italy (1974) and the MEGAL pipelines to Austria, the two Germanies and France (1974, 1976 and 1979); 2) the Orenburg (“Soyuz”) pipelines to Bulgaria, Hungary and Romania (1975). Ever since those large exports began Germany has been the dominant offtaking country. The dominant German position as offtaker has remained even as large new fields in the permafrost region of northwest Siberia have been tapped—notably the Yamburg and the Urengoi fields. Source: BP (2003).

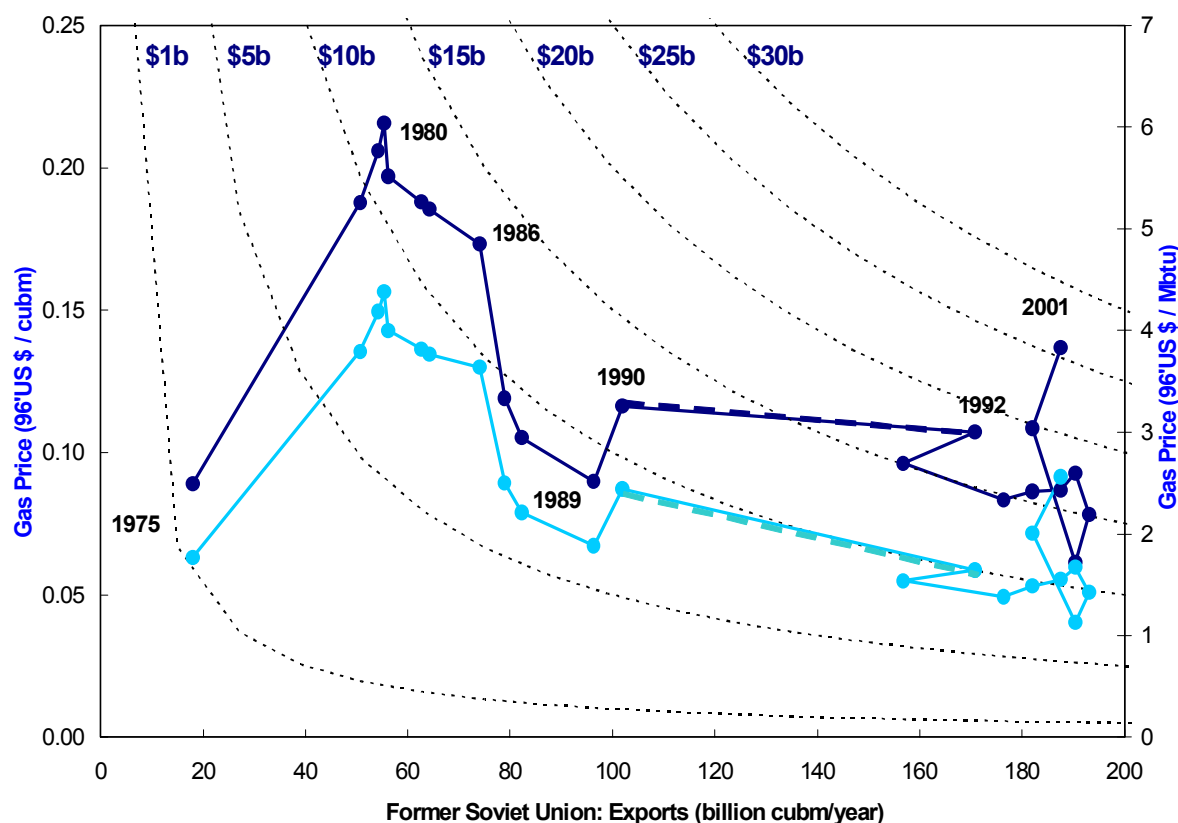


Figure 5: Map of the Major Soviet and Russian Export Routes, 2003. Note, in particular, the large parallel pipelines extending from the Urengoy and Yamburg fields in northwestern Siberia past Moscow and across Ukraine. The dominance of Ukraine as a transit country reflects not just geography but also path dependence. Early fields in Ukraine yielded a gas infrastructure in the region, and the first pipelines to central and Eastern Europe tapped that infrastructure—supplying Czechoslovakia and Austria. The majority of projects serving European customers in the 1970s followed these routes—including all the projects serving Germany, France, Austria and Italy. The few exceptions include generally smaller pipelines across Romania to Bulgaria and Turkey as well as across Hungary to Yugoslavia.

and western technology served the Soviet interest—not only was the currency useful, but western technology made possible the fuller development of west Siberian fields. The effect of all this investment in gas exports was dramatic—in 1980, the year that détente came unstuck, the Soviet Union earned US\$ 14.7 billion from gas and oil exports, or 62.3 percent of its total hard currency earnings. As shown in figure 6, from 1975 to 1980 both the volume and (oil-indexed) price of gas exports tripled, yielding a nine-fold increase in total earnings.

The Soviet invasion of Afghanistan (1979), along with Ronald Reagan’s assumption of power in the U.S. (1980), refroze the cold war and erased the western consensus on Soviet oil and gas exports. U.S. sanctions initiated under the Carter administration and enhanced by Reagan sought to limit the hard currency that the Soviet Union could earn through exports and also to block exports of grain and essential high technology from the west to the Soviet Union. Natural gas provided an immediate test of the US sanction effort and revealed the difficulty of sustaining an anti-Soviet coalition of western nations. In the early 1980s the West German

government, working through its gas monopoly Ruhrgas, launched negotiations to build new pipelines to carry Soviet gas to Europe. The new German projects would expand Russia's export capacity, with two key differences.



Note: Prior to 1992 FSU export, excludes movements between FSU countries.
Data source: BP(1975-1990), EIA (1992-2001)

Figure 6: Russian Earnings from Gas and Oil Exports Dark line shows the total volume of trade computed using European CIF prices in constant 1996 dollars. However, trade with CMEA countries and (after 1992) CIS countries occurred mainly at prices far below the western rate. For these countries we estimated prices and made allowances for barter payment of transit fees in gas (rather than cash). The light line reports total value of exports from the USSR (pre 1992) and Russia (post 1992) revised downward to account for these lower prices. These estimates are based on a simple division of importing countries into three groups: CMEA, Western Europe, CIS. We assume that gas prices for Western Europe are the same as those reported by BP; for CMEA 50% of western levels; for CIS 25%. Barter trade is especially difficult to estimate and can lead to substantial error, although our estimate for the total value of Russian gas exports in recent years are quite close to the actual values reported by the Central Bank (see Appendix). Data sources: total volumes from BP (various years) for 1970-1990; EIA (2003) for 1992-2001. Prices from BP (various years).

One was the new political climate; the other was the size of the projects—rather than tapping into the existing Russian gas production capacity, these new projects would include upstream investments to develop the giant Urengoi gas fields in Northwestern Siberia (see figure 5). In exchange for gas, German banks (backed by the German government) would supply capital; German firms would provide pipe and compressors. For the German government, the project promised not only to reduce import bills by replacing oil but also to employ thousands of German workers in making the huge (56 inch diameter) rolled steel pipes and compressors.

Some of the compressor technologies were subject to collective export controls that were in place in western countries, and thus the US attempted to exert veto control. From the European perspective the U.S. objection was rooted in an imagined geopolitical threat; nonetheless, the risk of U.S. sanctions slowed the project and forced closer attention to constructing a deal that could be tolerated by the Reagan administration. The threat of delay or cancellation led the Soviets to develop their own (quite inferior) compressors, and when the pipeline eventually began operation in 1985 it deployed a combination of western and Soviet technology (Gustafson, 1985). This huge pipeline network delivered 180 bcm from the Urengoi fields to many Soviet destinations, paid for with the 30 billion cubic meters per year exported to Germany, France, Italy, Austria and Switzerland; this single project, as it came on stream, increased Soviet exports to the West by roughly half—by 1991, Soviet Exports to the West (Germany, Italy, France, Austria, Turkey, Finland and Switzerland, in order of volume that year) reached 63 bcm, up from 31 bcm in 1985 (BP, 2003). In the same model of operation—U.S.-led but ineffective sanctions and West European semi-soft financing and technology for gas barter—German and French state-owned gas firms, with government backing, led a coalition of western investors (including the Italian firms and several others) to expand Soviet gas exports with another pipeline (“STEGAL”) that began operation in 1992.

The sudden dissolution of the Soviet bloc had three effects that have altered the environment for Russian gas exports to the West. The first change was the disintegration of the CMEA bloc—a process that began in the middle 1980s with Hungary’s moves for independence through the fall of the Berlin wall and the Czechoslovak Velvet Revolution in 1989. These political changes created transit countries—each with its own distinct interests—where previously there existed a somewhat unified bloc. Although these new transit countries created new uncertainties for gas supply, in most cases there were strong incentives not to disrupt Soviet-era gas export arrangements. Most Russian gas exports to the West traveled through Czechoslovakia, which soon broke into two distinct countries—the Czech Republic and Slovakia. Both these countries were in the midst of developing close ties with western Europe; if they had caused trouble for gas exporters then they would have harmed the interests of their new allies in the west whose consent was essential for membership in the EU and NATO.⁴ In fact, both countries saw their gas bills rise sharply as they were charged Western rather than CMEA discount prices. The Czech Republic quickly moved to the higher west European price as that country sought rapid integration with west European institutions. Slovakia’s internal gas prices remained lower for longer but then rose sharply in the first half of 2000 and today are at western levels. Both countries have reliably paid their increased bills.

A second and more important change was the creation of politically distinct states within the Soviet Union itself. The European part of the Soviet Union formally disintegrated in 1992 into seven states—Russia, Belarus, Ukraine, Moldova and the three Baltic states. Thus instantly transit countries (Belarus and mainly Ukraine) appeared on the routes of all the pipeline projects connecting the European part of Russia to the outside world. (The only exception was a small pipeline to Finland that began operation in 1974 and, until the Blue Stream project started

⁴ Slovakia would have been an interesting case for scholars studying transit countries if its government had continued down a track that was hostile to the West, the Czech Republic and markets—especially as western governments sought to marginalize Slovak president Meciar. But that irrational affair lasted only a short while, and today the Slovak Republic is behaving like a country that has a stake in the West.

pumping gas in 2002, was Russia's only direct gas connection to any non-Soviet market.) In figure 6, nearly all of the 60% jump in gas exports from 1990 to 1992 is the consequence of reclassifying internal Soviet transfers (pre 1992) as external trades (1992 and beyond), notably to Ukraine.⁵ At the time that the Soviet Union dissolved, about 90% of Russia's gas exports traveled through Ukraine.

Third, the collapse of the Soviet Union caused economic shockwaves that dramatically lowered the internal demand for Russian gas. The Soviet economy shrank by about 40% and total energy consumption declined by about one-third (OECD, 1997). With a shrinking economy, gas consumption in Russia declined over 16%--from 420 bcm in 1990 to 350 bcm in 1997 (BP, 2003). Gas exports to CIS countries also declined (by 31% or from 110 bcm in 1990 to 75.6 bcm in 1998) in part because these countries' economies were inter-twined with the Soviet economy and thus suffered severe economic recession. In addition, they were now forced to purchase gas at semi-hard export prices, which were higher than the internal Soviet price but lower than the price charged for western exports, and those higher prices discouraged gas consumption and promoted efficiency (Zhiznin, 2003; Garipov et al, 2003). Even as consumption shrank, reported gas production declined only slightly (about 8%) from 1992 to 1998 (Russia's total oil production, by contrast, fell nearly 23% during the same period).⁶ In principle, this large and growing surplus in the 1990s was available for export—allowing Russia to expand its role as the world's largest exporter of natural gas and earn additional hard currency.

CROSSING BELARUS AND POLAND

The 1990s offered Russia both the possibility of exporting more gas to the West and the urgent need to earn additional hard currency. Whether those potentials would be realized requires looking at the incentives and organization of the exporter (Russia's Gazprom) and the importers (notably the German gas importers). We address each in turn.

Gazprom

The collapse of the Soviet Union brought turmoil to the organization of the gas sector. The Soviet Gas Ministry, which had coordinated all production and transmission of gas, was reorganized in 1989 as a state-controlled committee. By presidential decree following the dissolution of the Soviet Union, it was reorganized into a joint stock company, with the assets

⁵ In 1992 Ukraine consumed 104 bcm of gas and produced only 40bcm—the rest (64bcm) it imported from Russia. Add to that the 17 bcm of consumption in Belarus (which produces no gas and imports all its needs from Russia) and the result is essentially all the increase in Russian exports. For the Commonwealth of Independent States Customs Union, the price in 1992 was about \$50 per thousand cubic metres (tcm), or \$1.39/mmbtu; for a Western European country, the full market price was charged, which was close to \$100 (or \$2.78/mmbtu) (Cohen, 2001). The actual prices charged to CIS members varied, and barter and theft tolerance also varied which makes it hard to assess true relative prices (Kuzio, 2003).

⁶ Reports in the west at the time claimed that gas production did not decline with the same severity as the rest of Russian industry because gas production required relatively low levels of ongoing investment in equipment and maintenance (CERA report cited in *Petroleum Intelligence Weekly*, Jan 27 1992, pp.6-7). This under-investment was not sustainable—as evident today with the deterioration of the gas infrastructure, a problem to which we return shortly.

divided among Belarus (1.5%), Ukraine (9.5%), and Russia (89%)—each controlled by its respective government. The Russian joint-stock company Gazprom (“RAO Gazprom”) was then to be privatized over three years, forming an open joint-stock company (“OAO Gazprom”). The privatization decree required the government to reduce its stake in the company below 40%, and most of the government’s stake was sold to Gazprom employees (which meant managers), while a small fraction over the years has been sold to non-Russian investors, who today hold about 11.5% of all shares.⁷ The Russian state retains 38% ownership of the company, but through insiders the state has probably retained a controlling interest.

During this period Gazprom’s managers faced two often incompatible tasks—retaining control over the enterprise and boosting profits. Retaining control required Gazprom’s managers to integrate all of the functions of gas production, transmission and marketing completely within their grasp so that others could not capture the monopoly rents for themselves. During the highly turbulent period from 1989 through the middle 1990s, when much in Russia was reorganized, Gazprom was not completely successful in this effort. Key gas processing facilities in Siberia, for example, fell into alien hands. And for a brief period in 1990 the central government retained control over *Soyuzgazexport*—the state entity responsible for marketing all gas exports—thus putting the most lucrative western sales contracts outside Gazprom’s control. Gazprom’s managers responded by creating their own export marketing arm (*Zarubeshgaz*).⁸ Gazprom also purchased stakes in gas distribution and marketing companies in Europe, notably in the privatization of central and east European gas pipelines and distributors. Russian gas officials had long thought that western importers—notably Ruhrgas, the largest single customer for Russia’s exports—paid prices that were too low and retained large markups for themselves. Control over transit pipelines, export marketing, and a firmer role in final user markets were all part of a strategy to lift transit revenues. Gazprom eventually obtained control over *Soyuzgazexport* and consolidated control over nearly all Russian gas exports in the early 1990s.

For Gazprom’s managers to retain control also required actions that would appear to undermine the firm’s profitability yet were essential to making the firm uniquely indispensable to Russia’s economy and society—so that political authorities would be reluctant to reorganize the firm or change management. Like all large Soviet-era industrial conglomerates, Gazprom had a large array of non-essential assets and functions—agricultural lands (for producing food for Gazprom employees), equipment manufacturers, banks and so on; whereas most other Russian conglomerates sought to sell those sprawling assets and focus on core business, through the 1990s Gazprom actually purchased larger hordes of non-core assets. Some of the Gazprom menagerie could be transformed into useful entities—Gazprombank, for example, became the collecting agent when Gazprom sought to squeeze local gas distributors in Russian cities by billing customers directly for gas. Although often lamented by Gazprom’s management, low gas prices have been essential to the firm’s control strategy. In the Soviet era and in Russia today, revenues from natural resources largely accrue to the regional authorities where production

⁷ About 4.4% today trades openly on Western markets in the form of American Depository Receipts (i.e., instruments that carry the promise of exchange for normal Gazprom shares, in this case on a 1:10 basis, although it is illegal for non-Russians to own Gazprom shares directly); the rest of the non-Russian shares (7.1%) are owned by non-Russian strategic investors, notably Ruhrgas (which owns nearly 6%).

⁸ By then, however, it had already set in motion the creation of its own export marketing arm and strategy.

occurs, which in principle is a potentially huge windfall that could shift revenues and power from Gazprom and the central government to the regions. However, natural gas producer prices are regulated at low levels. Gazprom sets the fees charged for transit on its pipeline network—also at low levels (in the 1990s, about one-fifth the level in the West), and final prices to consumers are also regulated at low levels. In this system, control over the market flows not to the most efficient producers and marketers but to those who control physical access to the pipeline network.⁹ Low producer prices and uncertain access to pipelines prevented most independent producers from entering the market. Thus Russian gas production includes only miniscule quantities of associated gas, even though Russia's oil industry is one of the world's largest. Lukoil, for example, claims that it costs 57 cents per mmBTU to process its associated gas; yet oil companies are given only 6.7 to 40 cents per mmBTU (2002 figures quoted in *World Gas Intelligence*, August 7 2002, pp.1-2). A few independent producers have arisen in this market, but principally when they have been able to use political connections at Gazprom to assure access to the pipeline system—thus Florida-based Itera thrived through its political connections with Gazprom's early management and occupied a niche selling Russian and Turkmen gas (some of it produced by Itera and some bought from state enterprises) to Belarus and Ukraine. As Itera's connections to Gazprom's management have waned so has their ability to operate in the market, with other independents arising to fill other special niches. Oil producer Lukoil has sharply lifted its gas production while trying to force access to Gazprom's export pipelines; other firms, including Shell, are exploring joint ventures with Gazprom itself for producing and transmitting gas to profitable markets. All the while, Gazprom sits at the center of a rigged competition—an outcome much more convenient to Gazprom than guaranteed third party access to pipelines with transparent tariffs. Periodically, reformers such as Sergei Kiriyenko (Prime Minister from 23 March 1998 to 23 August 1998 under President Yeltsin) would envision sweeping reform of the gas sector, including guaranteed access for independent gas producers and regulated access to the pipeline network. But the reformers' rule has been punctuated by more Gazprom-friendly rulers, notably former Gazprom chairman Viktor Chernomyrdin was prime minister from 1992 to early 1998 then reappointed as acting Prime Minister by Yeltsin in August 1998 (the Duma, however, refused to confirm his permanent appointment).

To boost profits, Gazprom's managers in the 1990s had a plethora of options in principle, but few were practical to implement. Gazprom could attempt to raise internal prices and improve collections, which would both lift revenues and “produce” gas by inducing conservation. That tree was ripe with fruit, but the political obstacles were many; nor would

⁹ Real Gazprom transit fees were largely unknown to Western analysts until the firm started renegotiating contracts with the newly independent former Soviet Republics.” Over the 1990s, Gazprom has adopted a more complex transit fee structure, which has allowed it to retain control over access to its pipeline network and, especially, to the export pipelines. Thus transit fees have risen more rapidly than the spread between producer and offtaker tariffs—in essence, allowing Gazprom to ensure that as controller of the pipelines it extracted as much of the rent for itself. For example, in 1992 a hypothetical seller of contract gas from the Yamburg gas fields to Latvia would pay 33 cents per mmBTU for the 3,300 km of transit from field to market and would receive \$1.47 per mmBTU for the gas in Latvia, leaving \$1.14 for production and profit, which probably would be profitable for an independent producer if they could have gained access to the market. (“Baltic Contracts Reveal Russian Transit Fees,” *World Gas Intelligence*, July 1992, p.2)” If Western transit fees were charged on the whole Gazprom pipeline system it is unlikely that Russian gas would be competitive with alternative European supplies. *World Gas Intelligence* calculated the transit fee at western levels for gas shipped from Urengoi in Western Siberia across 500 km of permafrost (where pipelines are more expensive to build and operate) and then 3500km of rolling hills to the German border. Their estimate was \$2.50/mmBTU—or just about exactly the price that Gazprom got that year for contract sales to Ruhrgas.

rapid movement on that front necessarily serve Gazprom's own interests since a more visibly profitable domestic gas sector could amplify calls for a breakup or reallocation of the firm's assets. Even after many sharp price rises through the 1990s, by 2003 the government-approved price for residential gas was just 68 cents per mmBTU, which was roughly one-fifth the level of wholesale prices for Western exports. While oil product prices in Russia now approach world levels, gas lags far behind. Gazprom could also improve collections from Russian and non-Russian customers alike. In the middle 1990s only one-quarter of Gazprom customers actually fully paid their bills, and accumulated debts (including amounts owed by former Soviet republics) totaled \$2.5b (*World Gas Intelligence*, Aug 11 1995, p.2; *World Gas Intelligence*, Jan 27 1995, p.6). But Gazprom had few tools for extracting these billings—cutting off internal customers was politically impossible.¹⁰ Cutting off external customers, especially those along key transit routes (notably Ukraine) could cause collateral damage to Gazprom's more lucrative customers further along the pipeline, as the experiences with Ukraine and Belarus both revealed. Gazprom could improve efficiency of its own operations and shed non-core assets. Its pipeline system was leaky and inefficient—an early 1990s study by the European Bank for Reconstruction and Development estimated that 15% of the pipeline throughput went just to operate the system, and improving the system could free 60bcm in production (see EBRD, 1995). But with low producer prices it actually didn't make much sense for Gazprom to invest in its own efficiency. Projects such as replacing pipe that had been installed in the Soviet era with poor anti-corrosion coatings or installing more efficient western compressors would require capital (which was unavailable) and a long planning horizon (which did not characterize Gazprom's management approach). A few such projects went ahead where they were attractive to western contractors who could be repayed with gas and were financed, in part, with export credits from their home countries.

The quickest way to boost profits was to lift the price and volume of western exports. Gazprom's closet was full of projects that could be rekindled. For example, in the 1970s the "Northstar" joint project of the U.S. firm Tenneco and the Soviet Gas ministry would have shipped gas from a port just east of Murmansk to Philadelphia, but that effort remained stuck in the planning stages—running afoul of unfavorable economics that shuttered two other LNG reception terminals that had been built at the same time in the US as well as the geopolitical fallout from the 1979 Soviet invasion of Afghanistan.¹¹ In the 1990s the opportunities for LNG exports were expanding as technologies improved, but most of the options were far outside the realm of Gazprom's experience and not competitive with other LNG ventures such as in Indonesia, Qatar and Trinidad. (Projects on Sakhalin were under consideration in the 1990s, but none of the major projects was conceived by Gazprom; Sakhalin was outside the firm's traditional zone of influence, and none of these projects went forward until after the year 2000. Today, arctic fields are again under consideration for LNG exports to Europe and the United States; so far, however, Gazprom has not allocated significant capital to such ventures, although Lukoil has more actively explored a possible LNG project to export Yamal gas.) Pipelines from

¹⁰ Though it is impossible to cut off internal Russian customers (the population of entire regions could easily freeze to death during Russia's long winter), but summer curtailments have occurred. Russian electricity monopolies United Energy System (UES) has been cut off periodically, with the result that electric trams and subways stopped working as some regions plunged into darkness (see Higgins, 1998 and Aris, 2000).

¹¹ For Background on the Northstar project see Kosnik (1975). This idea, updated for new supply and port options, is now being considered actively.

Siberia to China or Korea had been discussed periodically in the 1990s and were considered serious options in the late 1990s (Paik, 1995; Paik, 2002; APEC, 2000; IEA, 2002a). None, however, has advanced to construction due to the lack of serious interest by offtakers, the huge capital requirements, and special geopolitical problems with China for any project that would involve crossing Mongolia. (The most likely project at present is from the Kovytka field near lake Baikal, and the current plans envision traveling hundreds of extra kilometers to avoid Mongolia.) The Chinese are increasingly enthusiastic about these ideas, and Gazprom is agitating for a role in those projects as well, but Gazprom is not the lead player. From the vantage point of the early 1990s, if Gazprom wanted to export to western markets it would need to concentrate on its traditional markets using the traditional pipeline method of transmission.

Gazprom's existing pipeline network offered four broad routes to the West, as summarized in table 1. In the far south, routes that crossed Ukraine to serve markets in southeastern Europe—the former CMEA nations (Romania and Bulgaria) along with Yugoslavia, Greece and Turkey. Romania and Yugoslavia were potentially significant markets for the future. Greece was seen as attractive, and Gazprom created a financially disastrous joint venture (“Prometheus Gas”) to operate and market gas transmission services and generate electricity. (The Greek market may yet prove lucrative as gas consumption is rising sharply.) In the early 1990s Turkey, especially, was seen as a reachable prize. The Turkish population was large, and in the 1980s Turkey's economy had grown about 4% per year on average (only 1.7% per capita), while demand for primary energy rose at more than 7% per year. Russian gas first entered the Turkish market when a pipeline linking Bulgaria to Ankara was completed in the late 1980s, and the capacity of the trans-Bulgaria pipelines were expanded in the 1990s to accommodate the expected surging demand in Turkey. While Turkey offered great potential, demand was slow to rise as it depended, in part, on reorganization of the Turkish energy system and creating incentives for private investment in gas power plants—a process that was underway but slow to take shape. Gazprom formed a marketing joint venture with Turkey's monopoly importer Botas; part of the gas would be sold to two planned power plants where Gazprom was part owner. (Just one is being constructed at present—a joint venture with Entes and ABB near Ankara.) Starting in the late 1990s Gazprom also participated in the Blue Stream project across the Black Sea to Turkey—a 50-50 joint venture between Gazprom and the Italian firm ENI, with each partner providing \$200m and the rest mainly financed with loans from Italian and German banks.

Blue Stream

The project is rooted in a 1997 intergovernmental agreement between Russia and Turkey and financially organized under a 1999 agreement between Gazprom and ENI to form Trustco to build, own, and operate the undersea section the Blue Stream. That project was as much a demonstration of ultra deepwater gas pipeline technology and a potential spearhead into the Russian market as it was an attempt to create a commercially viable enterprise. Indeed, the project has since run afoul of the glut in the Turkish gas market—created by poor strategic planning and a faltering Turkish economy. Botas estimated in the middle 1990s that gas demand in Turkey would rise sixfold by 2010 (*World Gas Intelligence*, Aug 11 1995, p.5); in reality, gas consumption had risen to about 17.4 bcm by 2002 and was increasing at about 10% per year—a

rapidly growing market, but well below the Botas trajectory. Turkey could eventually become the transit point to Europe and thus become a competitor to Belarus (and the hypothetical Baltic sea pipeline and LNG exports from the arctic). But the distances are long and the route is a lot less attractive until the Turkish market itself becomes a major destination for Russian gas. Russia is not the only option for Turkey. Iran, too, has explored pipelines to the West that would put Iranian gas into direct competition with Russian exports for central and southern Europe. The central Asian republics, too, could use Turkey as a transshipment point.

Table 1: Russia's Major International Export Lines, 2003	
	Capacity volume
1. From Russia direct, via the North	
Finland Connector	20 bcm/yr
2. From Russia via Belarus to W. Europe	
(a) Belarus Connector ("Yamal-Europe")	
Belarussian section	33 bcm/yr
Polish section	20 bcm/yr
3. From Russia via Ukraine to W. Europe	
(b) Brotherhood (Bratstvo)	30 bcm/yr
(c) Orenburg (Soyuz)	30 bcm/yr
(d) Urengoi Center	40 bcm/yr
(e) Yamburg (Progress)	30 bcm/yr
(f) Northern lights (Siyaniye Severa)	25 bcm/yr
4. From Russia South to Turkey	
(g) Blue Stream	16 bcm/yr
(h) Bulgaria, Romania and Turkey	20 bcm/yr

Table 2: Russia's Major International Export Lines as of 2003. All these routes were constructed prior to 1990 except the Belarus Connector (a) and Blue Stream (g). Volumes shown are export potential attributed to each project. See Figure 5 for pipe locations. Data source: EIA, 2004b

The total cost of the Blue Stream pipeline was \$3.2 billion, including \$1.7 billion to construct the marine section of the pipeline and Beregovaya compressor station. Though the project qualified as an engineering triumph, it seems far less likely to be a commercial success. Turkey's gas demand was expected to more than double and reach 45 bcm by 2006, but this amount, in fact, was reduced due to the Turkish economic crisis. It became clear in 2001 that the Blue Stream project may face financial problems.¹² Turkey previously committed to buy from Russia over 60% of its total gas import. Analysts have been warning for years that Turkish gas demand forecasts have been far too optimistic.

¹² Turkey's extraordinary financial crisis of 2001, followed by a severe recession, sharply decreased its gas requirements calculated in the 1990s. Facing a free fall of its economy in 2001, it neither needed nor could afford huge amounts of gas imports.

Gas deliveries to Turkey through the Blue Stream stopped in April 2003, with Turkey demanding a price revision and lower supplies. Thus Turkey has shut down the flow of gas from Russia less than a month after commercial supplies started on 20 February 2003. Even before the cutoff, Turkey had negotiated with Gazprom to reduce the flow contracted starting in 2003 by half. It is unclear whether the new government is simply trying to deal with a gas glut, save money, spread its energy sources, or perhaps steer more business to Iran.¹³ In 2002 Turkey also stopped importing Iranian gas on a pretext of quality problems until it negotiated a lower price and Tehran's patience may now be rewarded by the new Turkey government as it tries to reduce its Russian imports. But it seems more likely that Turkey will keep playing one side against the other for economic reasons rather than anything else.

In July 2003 Turkish and Russian officials, apparently keen to reach an out of court settlement. Turkey, which overestimated its future demands, was seeking to re-negotiate its agreement with Gazprom, insisting it could receive the gas at cheaper from suppliers such as Turkmenistan. Gazprom's prices have been rising because they follow higher oil prices with a lag of six to nine months. The price may be only on paper, however, because Turkey's reaction means that Gazprom is getting no Blue Stream revenue at all. Turkey was bound to buy gas from Gazprom by a "take or pay" contract, under which Turkey in 2003 imported at least 0.8 bcm via the Blue Stream.

Recently, Ankara's inability to commit to a steady import of Russian and Iranian gas at an agreed price even after renegotiations suggests that it will likely prevent the implementation of the other new projects at least until a major and sustainable economic recovery in Turkey. Though the Blue Stream project seems to be financial disaster, it has certain advantage: with Turkey's crimp in Blue Stream, Russia will have more than enough gas to keep Europe supplied, making an investment in new lines for Iranian gas just as unprofitable as Blue Stream has turned out to be.

Routes through Ukraine

The central routes through Ukraine corresponded most closely to Gazprom's experience—indeed, nearly all Russian gas traveled to western markets via these routes, and most of that went through Slovakia along the “Transgas” cluster of pipelines then south to Austria and Italy or directly west to the Czech Republic, Germany, Switzerland and France. The Transgas system was rated for 79 bcm per year; in 1990, 73 bcm moved along the route (*World Gas Intelligence*, October 1991, p.4). Gazprom could have created additional capacity along these lines by boosting pressure on existing lines or even building new lines in bottleneck areas. However, Russia was already selling as much gas as it could along these routes. Industry press at the time was filled with articles about the European gas bubble—created by the arrival of large volumes of gas from the giant Norwegian Troll field, which was piped directly to the continent and made inroads deep into the German market with new pipelines. In the early 1990s Ruhrgas designed its expansion of gas transmission lines into East Germany explicitly to allow interconnection with Norwegian and Dutch gas supplies. In the large and growing Italian

¹³ Like Russia and Azerbaijan, Iran has tried to turn the problem of Turkey's gas glut into an advantage by seeking transit routes through the country that could supply Greece and other countries.

market, Gazprom faced competition from Sonatrach, which sold large new volumes as LNG in addition to the Transmed pipeline (see Hayes, this volume). By the middle 1990s gas marketers in continental Europe were also expecting the arrival (in the late 1990s) of U.K. gas through the “Interconnector.”¹⁴

Ukraine also presented a problem. The 1990s saw a constant simmering battle between Gazprom and Ukraine over the latter’s repayment of accumulated debts and demands for more favorable gas contracts and the former’s desire to cross Ukrainian territory with its gas. The effects of these battles were occasionally felt in western nations when contracted gas supplies fell short. The first incident was in October 1992 when unusually cold weather and a shortfall in supplies from Turkmenistan caused a 45% shortfall in gas delivered to the West from trans-Ukraine pipelines (*World Gas Intelligence*, November 1992, p.1; *World Gas Intelligence*, March 1993, p.5). Ukraine’s problems were compounded by the country’s own inability to get its gas customers to pay their bills (*World Gas Intelligence*, May 26 1995, p.5). Lack of confidence in Ukraine further exacerbated Gazprom’s difficulty in marketing higher volumes through the Transgas system operating at capacity into an already glutted market, as many West European distributors signed contracts with non-Russian suppliers to diversify and secure their supply base.

That left two routes by which gas could move to the western markets. One was the far north. Already Russia had built a small pipeline directly to Finland that opened in 1974, but by 1990 the Finnish market was already tapped and further expansion west into Scandinavia was unattractive—existing suppliers already found it difficult to profit in that market. A possible export route via a pipeline along the Baltic seabed had been discussed—we analyze this option later—but that was not really a credible option in the 1990s. Although the Baltic is shallow, underwater pipelines were not Gazprom’s competence; capital for such projects was scarce.

These factors explain the obsessive attention of Gazprom to the one remaining route—a new pipeline network that would bypass Ukraine and, instead, cross Belarus and serve Poland and Germany. Essentially no gas followed that route—even the large pipelines that moved gas across Belarus turned south to join the central corridor, as shown on figure 5.

Delivering gas to Europe via the northern route had been under discussion in the Soviet Union as early as 1978, driven by keen interest in tapping the large Yamal fields.¹⁵ The Yamal was delayed again in 1981 in favor of focusing on the Urengoi field, already under development and

¹⁴ Indeed, as part of its strategy to invest in downstream pipelines and distribution companies, Gazprom took a small stake in the Interconnector. In all, by the late 1990s Gazprom had stakes in 20 pipeline and trading companies in the European market, including incumbents such as Gaz de France as well as upstarts such as Wingas. In addition, Gazprom sought stakes in major gas users, such as power plants in Turkey and a chemical company in east Germany, which it bought along with a subsidy from the German Treuhand privatization agency.

¹⁵ The name “Yamal-Europe,” which is often applied to this project, reflects the supply orientation of the Russian planners and namers. In all the big gas export projects of the Soviet era, the Soviet government sought to couple downstream interest in gas with their upstream interest in developing large new fields. Thus most export projects to the West include a large field in their name, despite the fact that the particular origin of the gas is physically irrelevant to the transit and offtake market.

at the time the largest production gas field in the world.¹⁶ Once Urengoi was in production, logically next in line was the Yamburg field just to the northwest, which once again left the more complicated to develop Yamal field a bridesmaid. In the gas industry's equivalent of the QWERTY keyboard, once infrastructures are in place it is costly to move far from the main line. From the 1970s, whenever large new potential exports to the west came on the Soviet and Russian agenda the lines crayoned on maps often started in Yamal. In the late 1980s the state ministry that was predecessor to Gazprom funded exploratory drilling in Yamal but suspended operations in 1989. The Yamal project would be extremely expensive and required operating in ecologically sensitive permafrost, and there was no market for the gas. Throughout the 1990s, public statements by senior Gazprom officials would nearly always include the following script: gas export prices must be higher to raise the revenue needed to develop the Yamal fields, and development of those fields was always about five years on the horizon.¹⁷ (And next on this wish list was usually the Shtokmanovskoye field in the Barents sea.) Thus the project to move gas across Belarus became called "Yamal-Europe" because the crayons-on-a-map usually started in Yamal; in fact, that project today moves no gas from the Yamal fields nor is likely to any time in the near future.

Belarus Connector

The original plan was to build six 56" pipelines from the giant gas fields of Bovanenko (onshore) and Kharasevey (offshore) at the Yamal peninsula. These pipes would travel to Ukhta, where they would join the existing 56" pipelines that already traveled west from the Urengoi field north of Moscow. From there, two 56" pipelines would follow the existing "Northern Lights" route through Belarus where they would connect at Brest, allowing an expansion of Russia's export potential along this route by about 67 bcm/yr. As the 1990s progressed the project kept being pushed into the future and the export potential reduced. Today, just one pipeline has been built along the final segments from Belarus to Poland and Germany; with a reduced number of compressors from the original plan, the export capacity at the Belarus border is only 20 bcm/yr. Table 3 shows the gas balances for the key countries involved in this project, along with Ukraine.

¹⁶ The Soviet government probably could have developed dispersed fields closer to existing lines before its big new venture in Yamburg; indeed, it probably under-utilized easier fields before it sought to exploit Urengoi in the 1980s. But in the Soviet system rewarded managers who built grand projects as importance in the Soviet bureaucracy was measured by the flow of investment resources and jobs rather than efficiency. Strategically, the coupling of multi-billion dollar upstream projects with new pipelines probably also made sense since it eased the task of leveraging downstream technology and capital for use in developing the fields.

¹⁷ For one of many examples of the Gazprom party line on the urgent need for upstream development and therefore higher export contract prices, see excerpts of the January 28, 1993, press conference by Gazprom Chairman Rem Vyakhirev (*World Gas Intelligence*, February 1992, pp. 16-17).

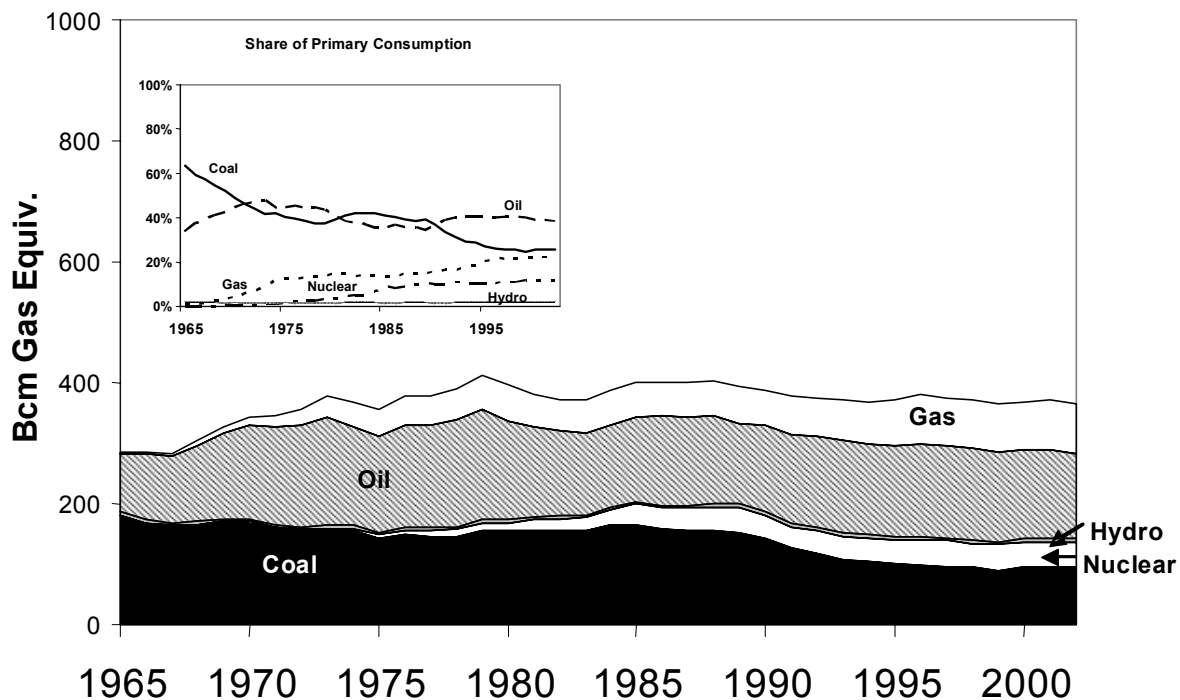


Figure 7: German Demand for Gas and other sources of Primary Energy Data source: BP (2003).

To understand the scaling back of this project requires looking at the demand for gas and the changing markets in Poland and, especially, Germany. During the brief period when Gazprom did not control export contracts the Russian giant found common interest with Wintershall—the largest independent oil and gas producer and marketer in Germany. Created originally as a mining company, BASF—Germany’s largest chemical producer—bought Wintershall in 1969 as part of its effort to gain control over its main oil and gas feedstocks. BASF and Gazprom shared their dislike of the monopoly position that Ruhrgas enjoyed and thus sought to break open the German gas market, creating three joint ventures—Wingas (a pipeline and wholesale marketing company) along with two companies—German-based Wintershall Erdgas Handelshaus GmbH (“WIEH”) and Swiss-based Wintershall Erdgas Handelshaus Zug AG (“WIEE”) that marketed gas in central Europe. Wintershall produces a small amount of its own gas that is accessible to the German market, but the only way to become a significant player in the German market was to secure its own imports, which required both pipelines and a foreign supplier. BASF helped secure Gazprom’s role in Wintershall’s attempt to break open the regional fiefdoms and the Ruhrgas monopoly in gas transmission by agreeing in 1993 to build a huge (\$500m) chemical complex in Western Siberia; in return, Gazprom pledged that WIEH

Table 3: Gas Balances for Key Countries on the Belarus Connector, 2001

	<u>Main Flows</u>	<u>Subtotals</u>
	bcm	bcm
<u>Russia</u>		
Production	574	
Imports (from Turkmenistan)	10	
--of which are barter transit fees/theft		0
--of which are purchased		10
Exports of Russian Production	188	
Consumption	394	
Transit (at exit gates), Turkmen --> Ukraine	5	
<u>Ukraine</u>		
Production	18	
Imports	56	
--from Turkmenistan		5
--from Russia		51
--of which are transit fees/theft		38
--of which are purchased		13
Exports	1	
Consumption	74	
Transit (at exit gates)	122	
<u>Belarus</u>		
Production	0.3	
Imports	16	
--of which are transit fees/theft		11
--of which are purchased		5
Exports	0	
Consumption	17	
Transit (at exit gates) to Poland	14	
Transit (at exit gates) to Ukraine	28	
<u>Poland</u>		
Production	4	
Imports	9	
--of which bought from Russia		7.3
--of which are barter transit fees from Russia		0
--of which from Uzbekistan		0.7
--of which from Germany		0.4
--of which from Norway		0.3
Exports	0	
Consumption	13.8	
Transit (at exit gates)	23.6	
<u>Germany</u>		
Production	22	
Imports	79	
--of which Russia		33
--of which Norway		21
--of which The Netherlands		20
--of which others		5
Exports	7	
Consumption	94	
Transit (at exit gates)	7	

Table 3 (previous page): Gas Balances for Key Countries along the Belarus Connector

Data show gross consumption and production from the International Energy Agency (2002). For IEA member countries (Germany and Poland), available energy balances report trade in gas as well, but for non-member countries the data are more scarce and we have made estimates. Question marks indicate areas where more work is needed. Russian gas imports are difficult to estimate for 2001—we show 10 bcm of imports from Turkmenistan as reported to IEA. We are mindful that potential Turkmen exports are much larger. A new gas deal between Turkmenistan and Itera will deliver 6-7 bcm annually to Russia (via Uzbekistan and Kazakhstan) starting in 2004 and rising to 10bcm in 2006. In addition, Turkmenistan has committed to supply (via the same route and then across Russia) 36 bcm to Ukraine starting in 2004, which (if true) would resolve a long-standing dispute about exorbitant transit fees. In both those deals, payment would be a combination of cash (with prices around \$40/tcm) and barter goods. Turkmenistan has also made loose plans to supply tens of bcm to Russia by around 2010 and beyond (120 bcm total some time after 2010)—a commitment that seems implausible. 2001 shipments from Turkmenistan to Russia may have been as small as 2 bcm; official Turkmen data show total exports for 2001 at 37 bcm, which we assume were consumed mainly in Iran, Ukraine and Russia. Ukraine imports from Russia we estimate; purchases of that gas we get from Gazprom and Itera reports. Transit is reported by the Energy Information Administration (EIA, 2004a) although we lack confidence in that number as it appears to be much higher than the reported imports by the major importers downstream as shown in IEA (2002b); one source of difference may be the inclusion of pipeline fuel and leaks in gross transit volumes reported by EIA. (On the schematic figure we show a lower number of 99bcm actual exports, which is the amount actually consumed at burner tip downpipe.) For Belarus we get imports from IEA and consumption from BP and we estimate sold gas from Itera's reports, which leaves the rest of consumed gas as barter or theft. Total transit in Belarus is reported by EIA at 42bcm, and we estimate the portion exported via the "Belarus Connector" at 16, with the rest in transit to Ukraine. For Poland, all data from IEA except the transit, which is drawn from EIA. [We think that figure (23.6 bcm) is implausibly high as it is larger than the full capacity of the Belarus Connector (20 bcm at the German border); however, we need to investigate whether a pipeline in southern Poland that predates the Belarus Connector can account for the difference.] German data from IEA balances; German transit is estimated from known purchases (reported by EIA) of downpipe countries from suppliers that are up-pipe of Germany.

would hold exclusive marketing rights for the Yamal output—a decision that shocked the industry. By 1994 Gazprom and Wintershall had invested about \$2.6b (in 1994 currencies) in the Wingas pipeline system and contracted 14 bcm of imports from Gazprom, of which only half was sold for the year 2000 (*World Gas Intelligence*, April 15, 1994, pp.1-2). It was implausible that Wintershall could sell perhaps another 50 bcm that would come to Germany and the rest of Western Europe if the full Yamal plan were realized. Gazprom's public infrastructure investment plans were simply unbelievable, but the much smaller volumes that Gazprom directed around Ruhrgas to its partner Wintershall were real. These joint ventures would allow Wintershall to sell directly to large customers (such as BASF itself) and to gas distributors. Costs for new pipelines were shared. The segments on Russian soil were built with traditional very large diameter Russian pipe and funded by Gazprom with loans from Russian banks and from Wintershall that would be repaid with gas revenues (*World Gas Intelligence* June 30 1994, p.10; *World Gas Intelligence*, Feb 9 1996, p.5). Segments in other countries were developed by local affiliates in Belarus (Beltransgas) and Poland (EuroPolGaz), with each relying on bank financing secured with portions of the transit revenues; the local firms repaid their part with transit fees and markups on the same gas.¹⁸ The German section was developed by Wingas, with financing from BASF via Wintershall (*World Gas Intelligence*, Aug 26 1994, p.2).

¹⁸ The Polish entity (EuroPol Gaz) was owned 50% by the Polish government owned Polskie Górnictwo Naftowe and Gazownictwo (PGNiG) 48% by Gazprom and 4% by a Polish marketing company (Gaz Trading).

Gazprom saw bypassing Ruhrgas as a way to get higher export prices (which benefited Gazprom directly) and to secure (through its joint venture with Wintershall) part of the wholesale markup that Ruhrgas had traditionally kept for itself. In the middle 1990s, for example, Ruhrgas paid about \$2.70 per mmBTU for Russian gas, and average consumer prices approached \$6 per mmBTU—Ruhrgas kept much of the difference for itself, which explains why Ruhrgas earned an extraordinary 25% after tax profit margin (*Petroleum Intelligence Weekly*, Nov 13 1995, p.3; *World Gas Intelligence*, July 14 1995, p.6). Wintershall's interests were slightly different—for it, Gazprom was a convenient initial supplier, but Wintershall eventually built pipelines and secured contracts with other key suppliers, and this divergence in interests explains why Gazprom's strategy for circumventing Ruhrgas backfired badly. Gazprom probably achieved higher export volumes through its Wingas partnership with Wintershall, but Wingas secured user markets by cutting prices (*World Gas Intelligence*, Aug 26 1994, pp. 1-2).

The Gazprom strategy through this period was exposed in a rare case where export contract prices and markups were released to the public in a pricing dispute involving the East German gas transmission company VNG. Created from the East German state gas ministry, VNG was crafted as a German joint stock company in 1990 and then privatized by Treuhand in 1991. At the time of privatization, VNG assumed the CMEA-era contracts for gas supplies, which made Gazprom its only supplier. Gazprom handed the task of renegotiating the main supply contracts to WIEH, and in 1994 the firm created new contracts with prices that were only slightly higher than existing arrangements—a huge disappointment for Gazprom, which had originally joined WIEH with the central goal of obtaining much higher margins.

The net effect of this competition between Wintershall and Ruhrgas was to drive down prices for distribution companies and for final consumers. As wholesale contracts between Ruhrgas and distributors expired, WIEH would attempt to entice the distributors with rebates, only to find that Ruhrgas would match the offers and in most cases win the contracts. Margins for Ruhrgas declined, and Wintershall struggled to gain market share. It is hard to assess whether Gazprom would have obtained different prices or volumes in the absence of its role in the Wintershall joint ventures. Our assessment is that Wintershall could have pursued its strategy with any large volume supplier—Gazprom was most convenient but hardly the only one.¹⁹ Throughout this process, Gazprom nonetheless sustained a close relationship with Ruhrgas as its largest customer; Ruhrgas bought the largest non-Russian share of Gazprom (nearly 6% today) and occupies the only non-Russian position on Gazprom's eleven member board of directors (Gazprom, 2002).

Reflecting the interests of its two main advocates—Wintershall and Gazprom—construction began in the middle 1990s on the two opposite ends of the Belarus Connector. With resources on hand, Gazprom starting building the first (and so far only) export line on Russian territory without having lined up firm contracts for hardly any of the output—it built the line because it was part of a larger strategy to lift both volumes and prices while deploying little of its own capital. Through the middle 1990s gas exports accounted for about 15% of the total value of Russian exports. In the West, Wingas (with financial support from BASF) focused on building pipelines that led East but would be of immediate utility for Wintershall's plan to attain

¹⁹ Absent Gazprom Wintershall would have faced severe but not impossible difficulties in securing gas supplies, such as through acquisitions (which Wintershall did pursue later) and contracting from alternate suppliers.

15% of the German gas market by 2000. Thus Wingas gave priority to scalable investments that could rapidly bring new supplies into its network while also bringing Wingas-controlled gas closer to big industrial customers and distributors. By that logic, Wingas opened the first pipeline in the Belarus Connector in 1996—a connection between Poland and Germany that allowed small quantities of gas to flow as WIEH lined up buyers.

Although the project began as part of a grand strategy in Germany, the market for gas in Poland gave additional impetus for building the project along the Belarus corridor rather than simply expanding the corridor that passed through Ukraine and Slovakia (i.e., the Transgas pipelines). Whereas the CMEA nations in Central and Southern Europe were all gasified by Soviet supplies, the role of gas in the Polish and East German economies remained much lower—indeed, that fact made the trans-Belarus route potentially attractive. In the early 1990s gas accounted for less than 10% of Poland’s primary energy (figure 8). Displacement of the dominant coal supplies offered a potentially large market; the environmental consequences of coal-burning created an incentive for the Polish government (often with assistance from the West) to create space for gas.

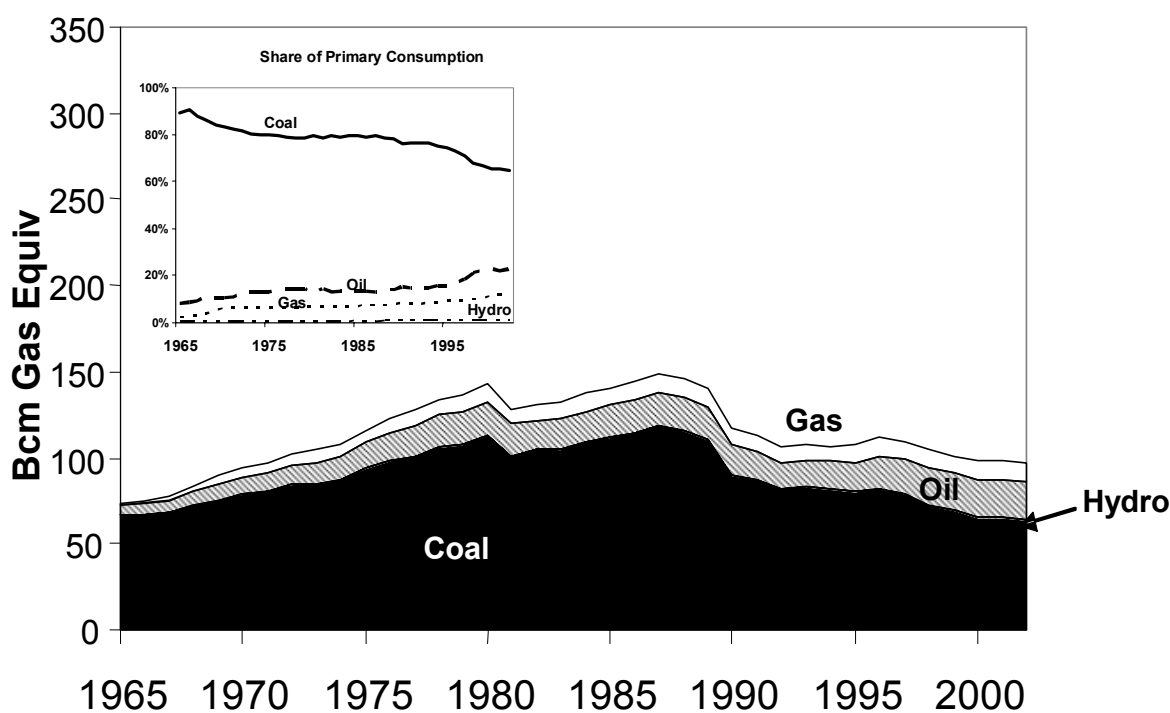


Figure 8: Poland’s demand for Gas and other primary energy sources. Data source: BP (2003).

The investment in Poland, like that in Germany, proceeded in a scalable fashion—capacity was adjusted as the market demanded. Even as Gazprom scaled back its export pipelines from two (a total capacity of 66 bcm) to one (for 33 bcm), achieving the full 33bcm

required compression, and the original plan called for five large compressor stations in Poland. As the project developed, Polish demand did not grow as rapidly as expected, making it difficult to justify the expense of building all the compressor stations. Polish compressor stations were actually constructed in Włocławek and Kondratki; three more compressor stations—at Szamotuły, Ciechanów and Zambrów—so far have not been built owing to a dispute over financing rooted, fundamentally, in the financiers' valid concern that the demand for gas in Poland and the lack of more success by WIEH in obtaining contracts in Germany could not justify additional capacity. The pipeline became operational with these three compressors in the year 2000 and at this time, its annual throughput amounts to 20 bcm.²⁰

All told, the Polish market has been disappointing for Gazprom. A forecast by the Polish Academy of Science (upon which the original plan for Poland's offtake of the Belarus Connector was justified) predicted gas consumption in Poland would grow from about 10 billion cubic meters per year in 1993 to around 20 bcm per year by 2010. In reality, the total market has risen from 9.9 bcm in 1990 to just 11.4 bcm in 2001. The bottleneck is not supply but demand for gas. In electricity, new independently built power plants have had to compete with incumbent coal-fired generators that have much lower costs. Gas prices indexed to oil, even when oil is inexpensive, make little sense for Poland's coal-dominated power system. Just one of Poland's two independent generators built during the 1990s is fired with gas (the other burns coal), and electric power modernization projects have focused on ways to improve the existing coal-fired fleet rather than replace them with gas. This experience is somewhat distinct from that of East Germany, where the industrial stock in 1990 was similarly coal-based, but the rapid integration with West Germany (along with huge infusions of German redevelopment cash) facilitated a much more rapid shift to gas.

ALTERNATIVE PROJECTS

The Belarus Connector was the largest expansion of Russia's export capacity in the 1990s. Here we examine three other options that were considered at the time but did not attract investment—first, a large pipeline that would move additional volumes of gas around Ukraine (what we call the “Ukraine bypass”); second, expansion of the Ukraine export route, which would make it unnecessary to build new pipelines across Poland; and third, a Baltic Sea pipeline that would make it possible to bypass all the CIS and CMEA transit countries and serve lucrative Western markets directly. By comparing these “alternative projects” to the one that was actually built our aim is to reveal better the factors that explain why some projects are constructed while others languish.

²⁰ Interestingly, pipeline corridors offer the possibility of transmitting more than just gas. With the pipeline, Gazprom and EurPol Gaz also laid a state-of-the art fiber optic cable consisting of 24 optic fibers that could transmit 2.4 trillion bits of information per second—about 38 million telephone calls simultaneously. When reports of the cable leaked out in 2000 it was clear that the Polish Communications Ministry had not authorized a telecommunications system as part of the gas project. EurPol Gaz claimed that the line was essential for pipeline control and did not require special authorization from the Communications Ministry. The Polish government, which does not have a controlling stake in EuRoPol Gaz, is poised to lose millions of dollars in telecommunications transit fees (RFERL, 2000).

During the Soviet time cheap energy was used as a way to subsidize the empire and keep republics under Moscow's control. Today, Russia would rather sell their energy in the world markets than to play power games as in Soviet times. Thus Russia no longer tolerates the stealing of gas or unconstructive attitudes to restructuring and repaying past debts, as in the Yeltsin period. In Kyev, a senior official from the Ukrainian foreign ministry commented on this new attitude: "Putin is not Boris Yeltsin, with whom President Leonid Kuchma could drink a glass (of vodka), and solve the problem. It's all business now." (Cohen, 2001).

From the other hand, after the Soviet Union collapsed many of former Soviet republics, and especially Ukraine and Belarus, sought to play on the conflicts between Russia and the West. Today, the West and Russia are both less tolerant of these geopolitical attempts. For example, European leaders have made it clear in recent years to the Belarus President Lukashenko that the union of "flies and cutlets", as Putin once put it, is not attractive. As the West clarifies that it does not have a strategic interest in Belarus as strong as its interests in Russia, Moscow has found it easier to put pressure on Belarus.

Bypassing Ukraine

In the Soviet era, pipelines were built without regard to internal borders. Moscow controlled the entire Union, and even where pipeline planners knew of possible long-term political risks, internal borders were not factors to be considered in the planning process. Invariably, pipelines followed straight line routes. Thus the trunkline that carries gas from the Caucasus north to Moscow links several cities on straight line paths that carry the line a few miles inside Ukraine's territory—an irrelevant fact in Soviet times and now a source of substantial transit revenues for Ukraine

When the giant Urengoi fields in northwestern Siberia were developed starting in the early 1980s it would have been shorter (and thus cheaper) to send their gas straight to Germany. That direct routing might have avoided Ukraine altogether and bequeathed to Russia a very different pipeline network today. However, three factors pushed the line south through Ukraine—one would have been easy to resolve, but the other two were politically immovable. The easy problem to solve was assuring adequate quantities of gas to all the destinations (Austria, France, Germany, Italy and others) that had been crafted into the Urengoi financing and technology deal. Planners could have branched the export lines in Soviet territory and sent just some of the gas south through Ukraine and Slovakia, which was the gateway to Austria and Italy, while sending the rest directly to Germany along a more northern route. Indeed, the Soviet Union built the Northern Lights pipelines to follow a direct export route, and in western Belarus the line takes a sharp turn south in to Ukraine, joining all the other lines that carry gas from Urengoi west.

The immovable objects, however, were political. A straight line to Germany would have required crossing Poland, where the government in the early 1980s was focused on crushing the highly visible Solidarity movement—a severe political liability for any project that relied on Western financing and technology. (U.S. sanctions had threatened the Urengoi deal when it followed the Slovak route; if the Urengoi plan had enriched martial law in Poland the U.S.

probably would have found it easier to build an opposing coalition that included west European countries. Instead, the U.S. sanctions were undercut by the failure to engage any significant west European offtaker.) Second, whether by Poland or Slovakia, a straight route to central or northern Germany would have crossed East Germany—a political impossibility for West German politicians. All roads led south. This was convenient to Ruhrgas and German distributors who kept the German gas market highly segmented into regional fiefdoms. The capacity to move gas between north and south was highly limited until the 1990s—the north German market was based on supplies from Dutch, North Sea and other imports. The south German market was dominated by Russian gas. Interconnections between the two were limited until Wingas helped broker the Stegal pipeline to connect west and east in the newly unified Germany and the Midal pipeline (which linked North and South and began operation in 1993)²¹.

Around 1990, when Gazprom's joint ventures in Germany first put a focus on the need for new supplies in northern and central Germany, the problems with Soviet transit countries were not pressing. The Soviet Union was still a single entity, and the joint venture with Wintershall to supply gas across Poland and Belarus was initiated as part of a grand strategy to change how Russian gas was marketed in Germany. As the risk of stoppage by Ukraine rose in importance from 1992 to 1995, Gazprom also explored the possibility of building a spur from Belarus (where the "Northern lights" pipeline turned south and headed to Ukraine—see the map on figure 5) to the closest point downstream of Ukraine—in Slovakia. This Ukraine bypass spur would be cheaper to build (approximately \$1b) than the whole Belarus Connector since it would be much shorter, but it would not serve any new markets.

Gazprom would have been happy to bypass Ukraine if others paid for it. But most other possible partners did not favor the bypass. In Germany, Gazprom's buyers either sought diversification away from Russia entirely or, as with Wintershall, sought new gas volumes outright (and in the northern and eastern gas markets) and did not worry as much about possible transit risks.

Politically, the bypass would be difficult to construct as Poland's consent would be needed since the spur from Belarus to Slovakia would cross Polish territory. Poland and Ukraine had both suffered under the Soviet thumb and there was enormous concern among Polish politicians that potential allies against Russian meddling—Ukraine, first and foremost—not be split over commercial deals. Polish politicians at the highest level undertook direct negotiations with Ukraine to avoid Russia playing the two countries off each other. A spur through Poland could deliver useful transit fees, but that was a distant and uncertain prospect; such a spur would do little to serve Poland's nascent gas market. Moreover, by the late 1990s 90% of Polish gas consumption was imported from Russia, and the Polish government feared greater Russian domination. As the 1990s progressed and Poland became ever more engaged with the mission of joining the European Union it had further incentive to diversify away from Russia—European

²¹ The Midal pipeline was commissioned in 1993, runs from Emden to Ludwigshafen, and transports gas from western European sources to the north of Germany. The pipeline is owned by Wingas and has a capacity of 13 bcm. Midal is linked at Phillipstal/Heringen to the STEGAL pipeline which was commissioned in 1992 and runs from the Czech Republic to transport gas from Russia to the new east German Länder. The Stegal pipeline is also owned and operated by Wingas and has a capacity of 8 bcm. The RHG pipeline is connected to Midal and supplies the greater Hamburg.

planners typically set a benchmark of about 25 to 30% for the maximum single-source dependency of energy imports. (That goal was somewhat arbitrary but, conveniently, was identical to the value that German planners had long been using to gauge whether their dependence of Soviet and Russian imported gas was excessive.) Indeed, in 2001 Poland announced a speculative long-term deal to import gas from Statoil, which would supply gas starting in 2008 and rise rapidly to 5 bcm.²² That deal has since collapsed since Poland has already attracted much more gas than it could ever use, and Russia is by far the least costly supplier. For Poland, the key to keeping Russia in line is the potential for alternative supplies through interconnections with the West rather than the actual contracting of those supplies. The same logic partly helps to explain why the Ukraine Bypass was never built. For Gazprom, putting Ukraine into line required the credible threat of bypass—not actually building the bypass itself. We remain skeptical that Gazprom was ever in a position to make the threat fully credible, not least because it never had a serious plan for building costly storage facilities on the Belarus line as a hedge against the periodic disruptions that had been experienced on the Urengoi and Yamburg lines; in contrast, Ukraine had 30 bcm in storage available that was essential to ensuring uninterrupted contracted supplies to Western offtakers.

Transiting Belarus did not really solve the Ukraine problem for at least two reasons. First, the west European gas system had neither the capacity nor the markets to hedge against potentially huge shortfalls from Ukraine. Building a much larger Belarus Connector would be costly, and delivering another 10 (if the first Connector pipeline had been built with full compression) to 40 bcm (if both Connector pipelines were built at full compression), on top of the 20 bcm already available starting in 2000, would be of little use in northeastern Germany. A full shutoff from Ukraine would harm central Europe, and there wasn't the spare pipeline capacity to move the hypothetical gas from the Belarus Connector south into those markets. Ukraine would suffer from the reputation as an unreliable transit partner, but Russia was even more exposed. When the two countries settled the matter of Ukraine's past debts to Russia for gas they did so on terms that nearly mirrored Ukraine's interests—\$1.4 billion in arrears (not the much higher value claimed by Russia), a moratorium on principal repayments for three years, and repayment at LIBOR plus 1% (nearly the same rate that Ukraine had negotiated with its western creditors) over ten years. Russia had no choice but to find an accommodation.

Second, Belarus was hardly a paragon of stability itself. Most attention on problematic transit countries has focused on Ukraine because most Russian export gas moves across Ukraine. Problems similar to those with Ukraine beset Belarus as well—having accumulated \$300m in arrears, Belarus saw its supply from Gazprom reduced sharply in 1994 (*World Gas Intelligence*, March 11 1994, p.2). Recently, in February 2004, Gazprom cut all exports to Belarus for 18

²² Poland's Buzek government signed a long term gas supply agreement in September 2001 with Norwegian suppliers for 5 bcm per year starting in 2008. The contract was to be on a take-or-pay basis, was to run for 16 years, and was reported to have a total value of about \$11 billion. An average value for the gas of around \$140 per thousand cubic meters (3.9 /mmBTU) or significantly more than Poland was paying Gazprom in a 10 bcm per year take or pay contract that runs to 2020. Since Poland presently imports slightly more than 8 bcm per year from all suppliers, contracting new supplies makes little sense. Thus, in 2003 this deal appears unworkable. But when Russia cut off natural gas to Belarus in February 2004 a Polish gas official announced that Poland had signed a memorandum of understanding with Norway's Statoil for gas supplies. Gas supplies from Norway, estimated at 2 bln-2.5 bcm annually, would come through an existing pipeline that crosses German territory. (Renik, 2004 and Interfax, 2004)

hours and partly reduced exports through the Belarus Connector to Poland. (Poland offset the loss, in part, through another pipeline from Ukraine.) In the wake of these incidents, calls in Poland to diversify importers (i.e., reduce the role of Russia) gained momentum.

Thus the Ukraine bypass was a weapon that Gazprom periodically brandished but never made sense to utilize. Moreover, Gazprom never had the capital nor the political support in Belarus or Poland (the key transit countries for the bypass) to make the threat fully credible.

Boosting Ukraine's Exports

A second major alternative was to pursue the opposite of bypass—rather, to entice or bludgeon Ukraine into becoming a more reliable partner and then to raise export volumes along the Ukraine transmission system while boosting the capacity of Transgas in Slovakia and the Czech Republic. This option was impractical at the time that the key decisions to build the Belarus Connector were made because Ukraine was far from a reliable partner. Political turmoil in Ukraine had produced short time horizons and in that context the risk of poor reputation had little effect on Ukrainian behavior. Incentives to bring Ukraine into line could have included higher transit fees, but the 1994 deal already put Ukraine's fees at nearly western levels; once the cost of barter gas and tolerated theft were included. These extra fees came out of Gazprom's share of gas sales and could not be passed on to customers in the West where Gazprom found even stiffer competition. Moreover, having Wintershall as Gazprom's western partner required a direct route to Wintershall's own nascent pipeline network in Northern Germany and its attempts (through VNG) to secure a share in Eastern Germany. There was little advantage to following the existing export routes since the German portions were controlled by Ruhrgas; the German market in the middle 1990s did not have provisions for third party access nor the capacity to move additional volumes of gas from the Czech border to northern and eastern German markets.

Over time, this option has become more viable. A series of political changes within Ukraine in recent years—themselves unrelated to gas—created the internal conditions needed for Ukraine to settle its debts and become a more “normal” country for investors, which in turn has probably made downstream countries less wary of relying on Ukraine as a transit route provided that the physical infrastructure in Ukraine is adequate to the task. Some analysts estimate that Ukraine's transit capacity could decline sharply in the coming decade without overdue maintenance and upgrades. Thus the alternative project for investment would entail not so much an expansion of transit capacity but, rather, to invest in avoiding deterioration of the existing system (Füeg, 2001). With this aim, Gazprom and the Russian government have assembled an “international consortium” of Western governments and firms to invest in Ukraine's transmission and storage system.²³ At this writing, Gazprom has mainly used the consortium in

²³ Had the “international consortium” been only Gazprom's idea it probably would not have earned Ukraine's consent. However, key governments—notably Germany—were keen to tame the Ukraine problem. Moreover, foreign firms had already been involved in efforts to invest in Ukraine's pipelines. A British independent gas firm (JKX Energy) produced gas in Ukraine in the 1990s, and Shell had attempted to make a \$1.5b investment in Ukraine's gas pipeline system, and BP was also considering similar investments (*World Gas Intelligence*, July 20 1997, p.6-7). Other gas companies made similar investments along the Russian export route, such as Italy's ENI in Slovakia—in part to secure their exports and in part to earn a direct return (*World Gas Intelligence*, May 14 1998, p.1).

an effort to entangle western interests in Ukraine, thus making it harder for Ukraine to meddle with exports; Ukraine, by contrast, has sought to make the consortium into a gas marketing agent (thus bypassing the downstream marketing companies in which Gazprom has invested since its pathbreaking deal in 1990 to market gas in Germany through WIEH). Western companies, starting with Ruhrgas, appear ready to invest in the system because it holds the promise of yielding higher contract security for affordable Russian gas. Until a concrete commercial framework for the consortium is settled the western companies are unlikely to do much. Systems for monitoring storage and pipeline systems, settling disputes, and creating transparency in the Ukraine transit system are envisioned but remain to be created. Among the first projects in the system will be an additional pipeline that travels west across Ukraine, lifting Ukraine's export capacity by up to 30 bcm and also making it easier to import and transit gas from the central Asian republics.

The Baltic Pipeline

A third alternative project would have involved building a trans-Baltic pipeline that would extend from St. Petersburg underwater, offering the possibility of direct connection to connect directly to the Scandinavian grid, German markets and eventually the United Kingdom. Of these, Germany and the U.K., are the most attractive markets. In its most recent incarnation, known as "North Transgas," this pipeline system would be a grand joint venture—headed by Gazprom with participation of Ruhrgas, Wintershall, and other entities such as the European Bank for Reconstruction and Development.

So long as the Soviet Union was one country there was little need to consider a Baltic Sea pipeline route. Underwater pipelines are difficult to lay and maintain and were not Gazprom's expertise; the route would be about 50% more expensive than a traditional overland route. Nonetheless, the idea has been around for a while. Around 1990 a British-Russian joint venture (*Sovgazco*) was established to investigate the Baltic options with the principal aim of serving the U.K. market. At the time, U.K. demand was 55 bcm and set to rise rapidly as gas was the favorite fuel for the newly liberalized electric power system. Sovgazco worked with a projection of 100 bcm demand in 2000 (actual demand was 96 bcm) and on that basis found that project would be economic. They examined the option of piping gas via Belarus then the Russian enclave of Kaliningrad or directly offshore at St. Petersburg. The final cost for gas from either route was about the same. All told, the landed cost of gas in the U.K. would be about \$4.50/mmBTU, which was only slightly higher than forward gas contracts in the U.K. market at the time (*World Gas Intelligence*, October 1991, p.5). That idea fell apart, however, as Gazprom was a risky partner for a complicated consortium that would need to rely on hard financing and strict timetables if it were to compete successfully in the U.K. market.

The Baltic route has periodically resurfaced during the 1990s. Was it a real proposal or only a negotiating ploy to get Belarus, Poland and Ukraine to make concessions? For western participants, the problem with the Baltic route then and now was uncertainty about supply. A small pipeline would not be economic—the Sovgazco project would have been 10 bcm and

probably not economic even before considering the large political and investment risks in Russia (and in Belarus and Kaliningrad, if that route were followed). A large pipeline (say, 20 to 30 bcm capacity) along with a decade of technological advances in underwater pipelines (in part from the Blue Stream experience) would require a credible plan for long-term supply. In turn, that would require a vision for developing the Yamal fields or the Stokmanovskoye field in the Barents Sea. At the moment, Gazprom's vision for offsetting the decline in its existing fields is higher imports from Central Asia (notably Turkmenistan), which is less costly because the gas transmission infrastructure is already in place but incurs the risks of developments in that region. As outlined earlier, there are also options for improving operational efficiency, offering access for utilizing the large amounts of associated gas available, or in lowering domestic demand through efficiency. But all these options turn mainly on the uncertain prospect of reform of Gazprom.

At this writing, EBRD is performing an environmental assessment of the Baltic export route. We are confident that all the technical issues can be resolved—they include not only environmental impacts but also the laying of pipe on a seabed that has unexploded ordnance. But the environment is not attractive for outside investors until there is greater certainty about the future of Gazprom's role in the Russian pipeline system. As a threat against Belarus during the 1990s the Baltic Route, we think, played no role—it was not an option that was attractive to either Gazprom (supplier) or Wintershall (user). Even today, the project is probably not an option except with substantial political guarantees that might come, for example, with the prominent involvement of EBRD and with the creation of a gas market in Russia that is more attractive to outside investors.

ANALYSIS AND SUMMARY

We summarize by returning to the five factors to be addressed by each case study in this book:

1. General Investment climate;
2. Transit countries;
3. Risk in the quantity of gas sold;
4. Risk in the price of gas sold
5. Roles for international institutions in securing contracts and hedging risks.

For most of the countries involved in this project the general investment climate was terrible. Private investors had no way to secure investments in the gas sector; tariffs and transit fees were controlled by governments that often changed course and had no clear policy strategy. In the Soviet era such large infrastructure projects were controlled directly by the state, but neither the state nor state-controlled enterprises such as Gazprom had the capital on hand to make such strategic decisions. The general investment climate in Germany was more attractive, but in the gas sector the risks were enormous because the Belarus Connector was conceived as part of an effort to break the highly profitable German gas monopoly, Ruhrgas—thus the new entrant was trying to market gas in competition with a deep-pocketed, well-connected incumbent. In this climate, the multibillion dollar vision for developing the Yamal fields—even

if the European Market could have absorbed such large quantities of gas—was not practical. Instead, the project proceeded in a manner that corresponded closely to each party’s narrow interests. Gazprom built what it could to export gas from existing fields and largely utilized the existing gas network, while attempting (albeit with an ill-conceived strategy) to boost profits by getting higher export prices. From Wintershall’s perspective, contracting with Gazprom made sense because it was the easiest source of new volumes that would be needed in their attempt to break open the market—a task that corresponded narrowly with BASF’s interest in low-cost gas and Wintershall’s interest in becoming a viable German gas company. This was not a climate for strategic long-term investments; the result, not surprisingly, was an export that was much smaller than Gazprom’s original vision, corresponded with each party’s narrow and relatively short term interests, and was highly scalable.

Regarding transit countries, our study reveals little evidence of deploying the “gas weapon” by Russia or transit countries. The main argument levied against the large Soviet era projects—especially by the Reagan administration in the period of tension after détente—was concern that Russia would use the gas weapon against the west. That never happened; rather, gas was priced—as in most other markets—by reference to oil. From October 1973 when the first gas crossed the Czech-German border until October 1992 when Ukraine interrupted supplies, the Soviet system never used the gas weapon. In the 1990s Russia (in the name of Gazprom) did cut off fellow CIS countries when they failed to pay their bills or siphoned extra gas during transit, but only as a final measure in long-standing disputes where Gazprom was arguably in a proper position to demand higher prices and payment. The only time that the “weapon” of shutting off supplies has been applied has been by weak states that are bankrupt and beset by internal turmoil that makes it hard to pursue long-term strategies—in those cases, their actions have caused interruptions to users further down the pipeline, but that was not the goal. In contrast with the LNG imports to Japan (see the chapter by Lewis and von der Mehden, this volume), we find little evidence that countries have been willing to pay much of a premium to diversify their suppliers. There is some evidence that when major gas distributors diversified their sources in the 1990s they may have paid some suppliers more than the price at which Russia was willing to sell, but Russia’s strategy was to maximize volumes and the difference between Russian prices and landed gas in the same markets from other suppliers was not substantial. Poland depended heavily on Russian gas for its small gas market; it was willing to sign deals with alternative Norwegian suppliers at prices that were about 20% higher than those charged by Russia; in practice, though, none of those supplies have been delivered—rather, the threatened diversification mainly served imposed discipline on Russia as the low cost supplier. In Germany, interconnection with the rest of the western market made it easier to hedge against transit risks in the Russian supply, and premia for non-Russia supply were small or zero.

The Belarus Connector is often seen as an effort to move gas around Ukraine. In reality, the project made sense mainly on commercial terms for the markets it served—in particular, it was the most direct path on Wintershall’s effort to break open the German market. This was a project that incidentally avoided Ukraine; the projects conceived solely to bypass Ukraine were not credible. Nor has Belarus proved to be a reliable transit country. The Baltic Sea pipeline would avoid both these troublesome partners, but whether that is truly a viable option remains to be seen. If the Russian gas market were restructured so that Gazprom or some other entity could generate a credible plan for supplying a large export pipeline *and* both Belarus and Ukraine

remained unreliable transit countries *and* the North European gas market was highly attractive for a pipeline exporter then the Baltic project will go ahead. So far, only the third of these conditions is rigorously satisfied, and even in that case the cost advantages of piped Russian gas are finding some competition in LNG and in the nascent gas-on-gas competition in the European market.

We suggest that the traditional notion of “transit countries” is prone to oversimplification. The Ukraine case is one of a transit country that also had substantial gas storage facilities. Storage was crucial to Russia’s strategy for exporting gas from Urengoi and Yamburg and other technically complicated areas—poor construction and harsh environments made for unstable supply, but huge storage areas made it possible to assure deliveries and track seasonal loads. Ukraine was thus much more important than simply a transit nation—it also leveled supply.

Regarding risk in the quantities of gas sold, in both the German and Polish markets Gazprom and its partners badly over-estimated demand, but for different reasons in each market. In Germany, total demand for Gazprom gas rose slightly during the 1990s, but most of that was sold by Ruhrgas. Actual demand through the Wintershall/Wingas/WIEH arrangement (which Gazprom favored because it held the promise of higher prices) was much lower than anticipated because it proved difficult for the new entrant to create a market for itself, although Wingas now has 15% of the German market. It did force lower-end user prices (although probably did not much affect import prices, as they were set through the emerging gas-on-gas competition), but in most cases the contracted volumes stayed with Ruhrgas as the supplier. In Poland, gas volumes have fallen far short of expectations because the energy system was dominated by coal and there was no strong central direction to move away from coal, which was much less costly than imported gas. This experience contrasts sharply with the gasification of the Soviet Union, which moved rapidly once central planners gave the word.

Price risks were a regular feature of the European gas market and did not play a significant role in the outcome of this project. While Gazprom had thought it would get higher margins for export, both Gazprom and Wintershall would have gone ahead with the project if export prices were unchanged—for Gazprom, the goal was higher volumes and export earnings, and for Wintershall the goal was obtaining supplies outside the Ruhrgas monopoly. These risks were not appreciably different from those that gas exporters had borne in the European market. Traditionally, Soviet gas export contracts were intergovernmental agreements that set terms for volumes, with price formulae renegotiated every three years and indexed against oil. It is true that during the 1990s this changed. New gas supplies (notably Troll) ushered in an era of gas-on-gas competition; exporters probably welcomed that era since oil prices collapsed at the same time and it was less convenient to stick with traditional oil-based formulae. But those pricing risks were systematic and not unique to the Belarus Connector.

Finally, each study in this book has explored the role of international institutions. During the CMEA era, the CMEA itself played a substantial role in assuring transit of gas and in gasification of the CMEA members. When the Soviet thumb weakened and CMEA dissolved, gas projects required much closer attention to the narrow interests of a much larger number of individual entities. The scaling back of the Belarus Connector from Gazprom’s original grand

“Yamal-Europe” vision reflects that atomization of interests. The European nations had attempted to create a special framework for energy projects that could facilitate collective long-term infrastructure investments—known as the Energy Charter—but that institution figures nowhere in the history of the Belarus Connector. Progress towards Russia's long-awaited ratification of the Energy Charter Treaty is determined to a large extent by the outcome of the negotiations on a Transit Protocol.²⁴ However, the Energy Charter is aspirational in its attempt to create a context for investment, but it has no authority nor collective funds nor much influence inside its member states. The “international consortium” taking shape now in Ukraine may turn out to be an important international institution if it truly fosters collective investment and control of Ukraine’s vital gas transmission and storage infrastructure, but at present it is too early to make an assessment.

²⁴ The aims of the Transit Protocol to build on the existing transit-related provisions of the Energy Charter Treaty, by developing an enhanced set of rules under international law governing energy transit flows across national borders. There remained a few outstanding issues to be resolved before the Protocol could be finalized, all of which related to differences in position between the EU and Russia. Gazprom has put forward two main arguments against ratifying: first, ratification would undercut Gazprom's position on European markets by forcing Russia to open up its network for cheaper gas from Central Asia and second, ratification would place in jeopardy the system of long-term contracts for supplies of Russian gas to Europe.

APPENDIX: RUSSIAN EARNINGS FROM OIL AND GAS EXPORT

Year	<u>Oil and Oil Products</u>		<u>Natural Gas</u>		<u>Total Export</u>
	Million US\$	% in total export	Million US\$	% in total export	Million US\$
1994	14,615	22%	10,591	16%	67,379
1995	18,348	22%	12,122	15%	82,419
1996	23,412	26%	14,683	16%	89,685
1997	22,060	25%	16,414	19%	86,895
1998	14,507	19%	13,432	18%	74,444
1999	19,606	26%	11,352	15%	75,551
2000	36,191	34%	16,644	16%	105,033
2001	34,364	34%	17,770	17%	101,884
2002	40,366	38%	15,897	15%	107,301
2003	51,863	40%	19,383	15%	129,562

Note: 2003 data were estimated on the basis of first 9 months

Source: Bank of Russia, 2004

REFERENCES

AIC (1995), Russian Oil and Gas (History and Perspectives), Association of International Cooperation, Moscow (in Russian).

APEC (2000), Natural Gas Pipeline Development in Northeast Asia, Asia Pacific Energy Research Center, Tokyo.

Aris, B. (2000), *Power wars: Gazprom cuts of UES*, Alexander's Gas&Oil Connections, Volume 5, issue #8, 12/05/2000, online at <http://www.gasandoil.com/goc/company/cnr01973.htm>.

BP, Statistical Review of World Energy, British Petroleum, London, various years

Bank of Russia (2004), The Central Bank of the Russian Federation, online at <http://www.cbr.ru> (last visited 3/20/2004).

Cohen, A., 2001, *The New Tools of Russian Power: Oil and Gas Pipelines*, online at <http://www.cdi.org/russia/johnson/5003.html##16> (last visited 03/20/2004).

EBRD (1995), Russian Gas Supply System Study, The European Bank for Reconstruction and Development, London, United Kingdom.

EIA (2003), Country Analysis Briefs, online at <http://www.eia.doe.gov/emeu/cabs/russexp.html#GAS> (last visited 10/20/2003).

EIA (2004a), Country Analysis Briefs, online at <http://www.eia.doe.gov/emeu/cabs/> (last visited 3/20/2004).

EIA (2004b), World Oil Transit Chokepoints, online at <http://www.eia.doe.gov/emeu/cabs/choke.html> (last visited 5/19/2004).

Elliot, I.F.(1974), *The Soviet energy balance: natural gas, other fossil fuels, and alternative power sources*, Imprint: New York, Praeger.

Füeg, J.-C. (2001), *Ukraine - An Important Energy Supply Corridor to Europe*, International Energy Agency (IEA), online at <http://spider.iea.org/papers/kielcwcl.pdf>, (last visited 3/20/2004).

Garipov V.Z., Kozlovsky E.A., Litvinenko V.S. (2003), Reserves Base of Russian Energy Sector, RAS, Moscow, (in Russian).

Gazeta, online at <http://www.gazeta.ru>, (various values and years).

Gazprom (2002), Annual Report, online at http://www.gazprom.ru/documents/annual_eng.pdf (last visited 3/20/2004).

Gazprom (2004), *History of the gas branch*, online at <http://www.gazprom.com/eng/articles/article8518.shtml> (last visited 3/20/2004).

Gustafson, T. (1985), *Soviet Negotiating Strategy. The East-West Gas Pipeline Deal, 1980-1984*. The Rand Corporation, Santa Monica, CA.

Higgins, A. (1998), *Twilight Economy*, The Wall Street Journal 08/27/98, online at http://www.pulitzer.org/year/1999/international-reporting/works/twilight_economy.html.

Interfax (2004), *Poland and Norway sign memo on Norwegian natural gas supply*, 20/02/2004 online at <http://www.interfax.com/com?item=search&pg=10&id=5698867&req=gas>.

IEA (2002a), *Developing China's Natural Gas Market: The Energy Policy Challenges*, International Energy Agency, Paris, OECD/IEA.

IEA (2002b), *Russia Energy Survey 2002*, International Energy Agency, Paris: OECD/IEA.

IEA (2003), *World Energy Outlook*, IEA, OECD, Paris.

Kosnik, J.T. (1975), *Natural Gas Imports from the Soviet Union*, Praeger Publishers, New York.

Kuzio, T. (2003), *Russia: Ukraine Squeeze*, for Oxford Analytica, online at <http://www.ualberta.ca/~cius/stasiuk/st-articles/an-squeeze.htm> (last visited 3/20/2004).

Narodnoe khozyaistvo SSSR, Moscow, Goskomstat, (various years) (in Russian).

OECD (1997), *Short-Term Economic Indicators Transition Economies*, Organization for economic co-operation and development, The Center for Cooperation with the Economies in Transition, Paris.

Paik, K.-W. (1995). *Gas and Oil in Northeast Asia: Policies, Projects and Prospects* (London: Royal Institute of International Affairs).

Paik, K.-W. (2002), *Natural Gas Expansion in Korea*, in: Ian Wybrew-Bond and Jonathan Stern, eds., *Natural Gas in Asia: The Challenges of Growth in China, India, Japan and Korea* (Oxford: Oxford University Press), chapter 5 (pp. 188-229).

Regiony Rossii (1998), Goskomstat, Moscow, Russia (in Russian).

Renik, K. (2004), *Nothing in the Pipeline*, Warsaw Voice, 25 February 2004, online at <http://www.warsawvoice.pl/view/4899>.

RFERL (2000), *Mysterious Telecommunicatiobs Cable Crosses Poland*, Radio Free Europe/Radio Liberty, online at <http://www.rferl.org/reports/pbureport/2000/11/43-211100.asp> (last visited 3/20/2004).

Russian Energy Pictures (1997), Statistical Bulletin, Center of Energy Efficiency, Moscow.

Russian Government (2003), Russian Energy Strategy 2020, May 2003 (in Russian).

Russian Information Agency Novosti, RIA-Novosti, online at <http://en.rian.ru/rian/index.cfm>, (various values and years).

Stent, A.E.(1982), *Soviet Energy and Western Europe*, Washington DC: Center for Strategic and International Studies, Gertown University; NY.

Stern, J.P. (1980), *Soviet Natural Gas Development to 1990. The Implications for the CMEA and the West*. Lexington Books, D.C. Heath and Company, Lexington, Massachusetts, Toronto.

Stern, J.P. (1993), *Oil and Gas in the Former Soviet Union. The Changing Foreign Investment Agenda*, (London: Royal Institute of International Affairs).

Templeton (2004), *Yamal-Europe Pipeline, Prosecutors charge five in Poland*, Templeton Thorp Ltd, London, online at <http://www.templetonthorp.com/en/news57> (last visited 3/20/2004).

Tacis (1995), *Vade-Mecum for Foreign Investors in the CIS Energy Sector, Kazakhstan, Russian Federation, Ukraine*, Tacis, April.

UN (1993), Human Development Report, UN, UNDP, NY, Oxford.

UN (1997), *World Economic and Social Survey, Trends and Policies in the World Economy*, UN, New York.

Wilson, D.(1982), *Soviet Oil and Gas to 1990*. Cambridge, MA: Abt Books.

World Gas Intelligence (various values and years).

Zhizninn, S.(2003) *Fundamentals of Energy Diplomacy*, Moscow State Institute of International Relations, Ministry of Foreign Affairs of the Russian Federation, International Institute of Fuel and Energy Complex, Moscow (in Russian).