

COUNTRY ANALYSIS BRIEFS

Russia

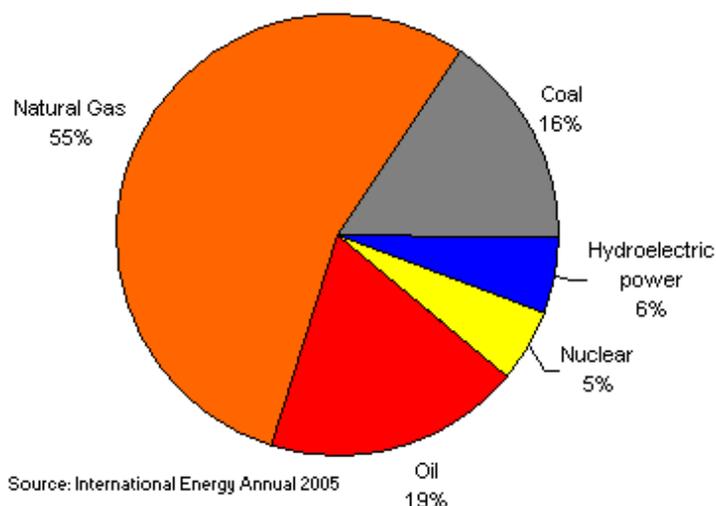
Last Updated: May 2008

Background

Russia holds the world's largest natural gas reserves, the second largest coal reserves, and the eighth largest oil reserves. Russia is also the world's largest exporter of natural gas, the second largest oil exporter and the third largest energy consumer.

In 2007, Russia's real gross domestic product (GDP) grew by approximately 8.1 percent, surpassing average growth rates in all other G8 countries, and marking the country's seventh consecutive year of economic expansion. Russia's economic growth over the past seven years has been driven primarily by energy exports, given the increase in Russian oil production and relatively high world oil prices during the period. Internally, Russia gets over half of its domestic energy needs from natural gas, up from around 49 percent in 1992. Since then, the share of energy use from coal and nuclear has stayed constant, while energy use from oil has decreased from 27 percent to around 19 percent.

Total Energy Consumption in Russia, by Type (2005)



Russia's economy is heavily dependent on oil and natural gas exports. In order to manage windfall oil receipts, the government established a stabilization fund in 2004. By the end of 2007, the fund was expected to be worth \$158 billion, or about 12 percent of the country's nominal GDP. According to calculations by Alfa Bank, the fuel sector accounts for about 20.5 percent of GDP, down from around 22 percent in 2000. According to [IMF](#) and [World Bank](#) estimates, the oil and gas sector generated more than 60 percent of Russia's export revenues (64% in 2007), and accounted for 30 percent of all foreign direct investment (FDI) in the country.

Kremlin policy makers continue to exhibit an inclination to advance the state's influence in the energy sector. Taxes on oil exports and extraction are still high, and Russia's state-influenced oil and gas companies are obtaining controlling stakes in previously foreign-led projects. State-owned export facilities have grown at breakneck pace, while private projects have progressed more slowly or have been met with roadblocks by state-owned companies or by various government agencies. (see [Oil Exports](#)).

Oil

Reserves

According to the *Oil and Gas Journal's* 2008 survey, Russia has proven oil reserves of 60 billion barrels, most of which are located in Western Siberia, between the Ural Mountains and the Central Siberian Plateau. Eastern Siberia is one area where little exploration has taken place. The Russian Ministry of Natural Resources estimated in 2005 that A+B+C1 reserves (roughly equivalent to Proven + Probable reserves) in E. Siberian provinces totaled 4.7 billion barrels.

Russia is a major world oil producer, sometimes producing even more than Saudi Arabia. Russia's output rebounded during the early 2000s, but the effects

of high government taxation and a mature field base threaten an overall decline in production.

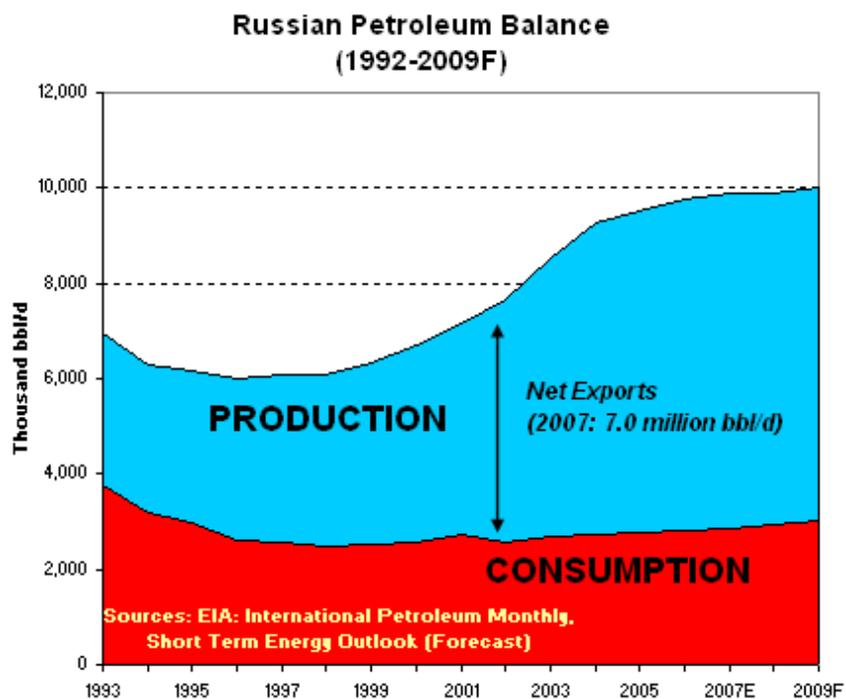
Russia's Oil Balance

With production of 9.8 million bbl/d of liquids (not including oil products), and consumption of roughly 2.8 million bbl/d, Russia exported (in net) around 7 million bbl/d. According to official Russian statistics, roughly 4.4 million bbl/d of this total is crude oil. Over 70 percent of Russian crude oil production is exported, while the remaining 30 percent is refined locally. Crude oil exports via pipeline fall under the exclusive jurisdiction of Russia's state-owned pipeline monopoly, [Transneft](#).

Production

In the 1980s, the Western Siberia region, also known as the "Russian Core," made the Soviet Union a major world oil producer, allowing for peak production of 12.5 million barrels per day in total liquids in 1988. Following the collapse of the Soviet Union in 1991, Russia's oil production fell precipitously, reaching a low of roughly 6 million bbl/d, or around one-half of the Soviet-era peak (see Fig. 1). According to observers, several other factors are thought to have caused the decline, including the depletion of the country's largest fields due to state-mandated production surges and the lack of investment in field maintenance.

A turnaround in Russian oil output began in 1999. Many analysts attribute the rebound in production to the privatization of the industry following the collapse of the Soviet Union. The privatization clarified incentives and increased less expensive production. Higher world oil prices beginning in 2002, the use of technology that was standard practice in the West, and the rejuvenation of old oil fields also helped raise production levels. Other experts partially attribute the increase to after-effects of the 1998 financial crisis, the fall in oil prices, and the subsequent devaluation of the ruble.



In 2007 Russian total liquids production averaged over 9.8 million bbl/d, including 9.4 million bbl/d of crude oil, a 200,000 bbl/d increase over 2006. This growth rate was down from annual growth of roughly 700,000 bbl/d annually between 2002-2004.

Short-Term Outlook

Growth in output from the Sakhalin projects, (see EIA's [Sakhalin Fact Sheet](#)) will be a main contributor to overall Russian oil output growth. In the upcoming decade, a few major oil fields (listed in Table 1 below) will contribute to most of Russia's supply growth and others will offset decreasing production from mature fields. In the short term, however, there are only a few large new fields that are planned. They include Gazprom's 100,000 bbl/d Prirazlomnoye field (2010), Lukoil's 150,000 bbl/d South Khylichuyu field (mid-2008), and year-round production from the Sakhalin II field. Lukoil/ConocoPhillips's TimanPechora project, and Rosneft's Vankorskoye

(300,000 bbl/d) and Komsomolskoye fields will also help stem production losses at older fields. Lukoil also expects around 30,000 bbl/d of production from its North Caspian fields after 2010.

In 2006, around 24 percent (or 2.3 million bbl/d) of Russia's oil production came from fields that had already produced 60 percent of their total recoverable reserves. Achieving continued growth at post-peak fields will become more problematic as oil companies run out of easy and less costly opportunities to manage the rate of decline.

Updated assessments of EIA's short-term outlook for Russian oil supply growth are available each month from [Table 3b](#) of the Short Term Energy Outlook.

Depletion at Russia's Largest Producing Oil Fields				
Field	Production		Online Date	Depletion [*]
	2005	2006		
Samotlor	868	844	1964	73%
Fedorovo-Surgutskoye	482	433	1973	70%
Priobskoye	466	552	1989	14%
Romashkinskoye (Tatarstan/Samara)	300	301	1949	85%
Tevlinsko-Russkinskoye	247	223	1986	49%
Ust-Balyk-Mamontovskoye	241	242	1964	85%
Tyanskoye	214	246	1995	31%
Pokachevsko-Uryevskoye	190	178	1977	63%
Sugmutskoye	190	186	1995	67%
Vatyeganskoye	164	167	1984	37%
Malo-Balykskoye	156	165	1984	41%
Krasnoleninskoye	123	139	1985	13%
Povkhovskoye	116	122	1978	99%
Pravdinsko-Salymskoye	114	124	1968	29%

^{*} Depletion is defined as Cumulative Production/Recoverable Oil Reserves (P+P)
Source: Cited with permission from IHS Energy, Feb. 2008: www.ihsenergy.com

Oil Sector Taxation

Government taxation of production and export revenues along with the continued lack of clarity concerning the ownership of subsoil resources contributed to lower output for 2007 and could possibly contribute to stagnating or even negative output growth during 2008. Export duties on crude oil are directly linked to the global pricing environment. The tariff schedule for export duty for crude oil at \$25/bbl and higher is 65 percent of the market price minus \$21/ barrel. Using this formula, the government is receiving around \$47 per barrel from export taxes at current prices. Therefore, absent changes to the tax structure itself, Russian oil companies are only very modestly affected by changes in global crude prices.

At current oil prices, the government is also receiving an additional \$20 per barrel in extraction taxes. The government plans to introduce preferential treatment for those producers that extract resources at fields exceeding 80 percent depletion, which they hope will encourage oil companies (mostly in the Volga-Urals region) to bring some idle wells back into production.

Several proposals are currently being discussed to reduce the tax burden. One is a proposal to raise the non-taxable threshold level from \$9 to \$15 per barrel. Prime Minister Putin has also proposed a seven-year mineral extraction tax holiday for oil companies that develop fields in Timan-Pechora, Yamal, or on the continental shelf beginning in 2009. A second proposal would provide tax holidays for firms carrying out offshore exploration or granting them mineral extraction tax breaks. Another proposal by the Finance Ministry seeks to reduce annual oil company taxes by \$4.2 billion from 2009. According to analysts, this is only a fraction of the \$40 billion in extraction taxes and \$45 billion in export duties that the government collected from oil companies in 2007.

Exports

See the separate section on [Oil Exports](#).

Refinery Sector

Russia has 41 oil refineries with a total crude oil processing capacity of 5.4 million bbl/d, but many of the refineries are inefficient, aging, and in need of modernization. According to *Energy Intelligence*, refinery throughput at Russian refineries increased by roughly 4 percent to around 4.6

million bbl/d in 2007. This total includes some crude oil exports from neighboring countries. Russian refineries produced around 1.2 million bbl/d of Mazut (heavy fuel oil), 1.3 million bbl/d of middle distillates, and 815,000 bbl/d of gasoline.

The draft proposals mentioned above for the oil sector are also geared to provide incentives for refiners to produce more high-quality and environmentally cleaner fuels. Currently oil companies pay around \$21/barrel (\$154/tonne) for high-octane gasoline, \$15/barrel for low-octane gasoline, and \$6/barrel of diesel.

Oil Exports

Russia's production growth in the upcoming decade will depend on the availability of viable export routes for the country's crude oil. Transneft currently has a monopoly over Russia's pipeline network.

Destinations of Russian Oil Exports

During 2007, Russia exported almost 4.4 million bbl/d of crude oil, and over 2 million bbl/d of oil products. Roughly 1.3 million bbl/d were exported via the Druzhba pipeline to Belarus, Ukraine, Germany, Poland, and other destinations in Central and Eastern Europe (including Hungary, Slovakia, and the Czech Republic), around 1.3 million bbl/d via the new flagship Primorsk port near St. Petersburg, and around 900,000 bbl/d via the Black Sea.

The majority of Russia's oil exports transit via Transneft-controlled pipelines, but around 300,000 bbl/d of oil is transported via other non-Transneft-controlled sea routes or via rail. Because of higher world oil prices recently, almost 170,000 bbl/d of Russia's oil is transported via railroad (see table below).

Oil Product Exports and Balance

Most of Russia's product exports consist of [fuel oil](#) and [diesel fuel](#), which are used for heating in European countries and, on a small scale, in the United States. Russian oil exports to the U.S. have almost doubled since 2004, rising to over 400,000 bbl/d of crude oil and products in 2007. Updated monthly and annual data are available from [EIA's Petroleum Navigator](#). Increases in product exports can be attributed to political pressures to maintain refinery operations and higher international oil product prices. A draft plan for the refining sector's development for 2005-2008 foresees continued increases in the production of high quality light oil products, catalysts and raw material for the petrochemical industry. As production of fuel oil is reduced, local refineries are only meeting about half of the country's demand for high octane gasoline. Consequently, Russia must import the remainder.

Russian Crude Oil Exports by Export Outlet (2006-2007) (in thousand bbl/d)		
Outlet	2006	2007
Novorossiysk	768	885
Other Black Sea	217	476
Primorsk	1,255	1,484
Druzhba Pipeline	1,261	1,269
Germany	437	420
Poland	466	516
Hungary	136	160
Czech Republic	104	92
Slovakia	118	111
Other Baltic Sea (Butinge, Lithuania)	158	0
Total Transneft Crude Oil Exports	3,660	4,114
Non-Transneft Sea	170	307
China (Rail)	178	179
Murmansk (Rail)	47	48
Other Non-Transneft Rail	47	45
Caspian Pipeline Consortium (CPC)	53	72
Total Crude Oil Exports (includes non-Russian exports)*	4,155	4,764
of which Russian Crude Oil Exports	3,953	3,947
<i>Reprinted by Permission: Energy Intelligence (Nefte Compass, January 2007, 2008)</i>		
<i>*Includes trans-shipped oil from Azerbaijan, Kazakhstan, and Belarus</i>		

In the last ten years OECD Europe's reliance on Russian crude exports has grown from around 12 percent of total crude imports to around 29 percent in 2007.

Proposed Oil Pipeline Routes and Pipeline Expansion Projects

North and West: Baltic Pipeline System (BPS) Expansion

The BPS came online in December 2001 carrying crude oil from Russia's West Siberian and Timan-Pechora oil provinces westward to the newly completed port of [Primorsk](#) in the Russian Gulf of Finland (see [Maps](#) section). The BPS gives Russia a direct outlet to northern European markets, allowing the country to reduce its dependence on transit routes through Estonia, Latvia, and Lithuania. Unfortunately for the Baltic countries, the growth of the BPS has come at considerable cost, as Russian crude which traditionally moved through the Baltic region has been re-routed through the BPS.

Throughput capacity at Primorsk has steadily increased, reaching around 1.5 million bbl/d during 2007 on average. With the usage of larger-sized Baltimax tankers, throughput from the port should continue to increase this year. Although the port's actual export capacity is allegedly twice as large (around 3 million bbl/d), pipeline capacity to the port keeps exports constrained. The Baltic Pipeline System-II (BPS-II) expansion will add new export outlets to the region, and in May 2008 the Russian government decided that a new line will run to the port of Ust-Luga with a branch going to the Kirishi oil refinery. The first stage of the Baltic Pipeline System (BPS), designed to transport oil from both Russia's oil-producing regions and Kazakhstan, was commissioned in 2001. Transneft has estimated the cost of the second stage to Ust-Luga at around \$3.3 billion.

Russian product line operator Transnefteproduct expects began shipments of oil products from Primorsk in May 2008. Exports of around 180,000 bbl/d of products (8.4 million tons/year) were originally expected to begin during the third quarter of 2007.

Related information on energy in the Baltic Sea Region is discussed in the [Baltic Sea Region Country Analysis Brief](#).

North and West: Murmansk Area, Kharyaga-Indiga Pipeline, and Varandei Terminal

International shipping from the Murmansk area has two advantages: the port is ice-free most of the year, and it is deep enough to make shipping to the United States economic without reloading in Europe. Several pipeline proposals connecting the Murmansk area to existing producing areas in the south in the last several years have been met with lukewarm reactions by Transneft (see [Maps](#) section) The state-owned company now plans a pipeline to Indiga, 240 miles from the Timan-Pechora producing basin, that is closer but iced over in winter. No timeline has been set for construction. Oil from Timan-Pechora has a lower sulfur content and is lighter than the rest of the Urals blend.

Now, Russian oil is delivered to the Murmansk area by rail, and in 2007 around 270,000 bbl/d of crude oil and products were shipped from the area. Lukoil will complete its \$1 billion, 240,000-bbl/d terminal at Varandei in June 2008, which will allow shipments from the northern part of Timan-Pechora. Lukoil's major source of oil for this terminal will be the Yuzhno-Khylchuyu field where production is expected to begin during the summer of 2008 and rise to 150,000 bbl/d by the end of 2009.

West: Druzhba Pipeline and Adria Reversal Project

Of the 1.3 million bbl/d of oil transported via the Druzhba Pipeline, only around 350,000 bbl/d flows to the south to Hungary, the Czech Republic and Slovakia. Reversal of the Adria pipeline, which spans between Croatia's port of Omisalj on the Adriatic Sea and Hungary (see map), has been under consideration since the 1990s. The pipeline, which was completed in 1974, was originally designed to load Middle Eastern oil at Omisalj, then pipe it northward to Yugoslavia and on to Hungary. However, given both the Adria pipeline's existing interconnection with the Russian system, and Russia's booming production, the pipeline's operators and transit states have since considered reversing the pipeline's flow, thus giving Russia a new export outlet on the Adriatic Sea. The proposal included expanding the pipeline's capacity from 100,000 bbl/d to 300,000 bbl/d at a cost of around \$320 million.



In 2005, Croatia determined that an environmental impact study of such a reversal was incomplete and not based on enough expert knowledge, thereby killing the proposal. During the Belarus-Russia oil dispute in 2007, Hungary said that it could technically reverse its portion of the pipeline within 20-30 days.

Eastern Siberia Pacific Ocean Pipeline (ESPO): Taishet - Skovorodino - Kozmino Bay

Until 2004, Russian energy officials were unwilling to commit to one of two oil transit pipelines to eastern Asia. President Putin announced that Russia would commit to building a 2,500-mile pipeline route from the Russian city of Taishet to Kozmino Bay, southeast of Nakhodka in two stages. The endpoint for the pipeline was moved from Perevoznaya Bay to protect endangered species there.

The 1,200-mile first stage of the 600,000 bbl/d-pipeline will flow from Taishet to Skovorodino along with a port facility at Kozmino Bay. Although Transneft expects first commissioning of the pipeline by December 2009, as of December 2007 roughly 28% of the first stage of the pipeline route has not been welded and buried. Oil will be shipped via rail to the Pacific coast until the second stage of the pipeline is constructed. China has agreed to finance the 43-mile, 300,000-bbl/d spur from

Skovorodino to the Chinese border. Transneft now estimates that the first stage of the project will cost around \$12.5 billion, up from an original estimate of around \$6 billion. In April 2008, around 1.5 million barrels filled the first stage of the pipeline, which will first operate in reverse mode to bring oil production from East Siberia to refining centers in West Siberia. The second stage of the pipeline will run from Skovorodino to the Pacific Coast, with planned designed capacity of 1.6 million bbl/d.



(Source: US Government, click to enlarge)

The route to Kozmino Bay is significantly more expensive than an alternative route to Daqing, China, since it covers a greater distance and involves more investment. However, the new route will open up a new Pacific port from which Russian oil exports could be shipped by tanker to other Asian markets and possibly even to North America.

The initial stage of the ESPO pipeline will get significant volumes of sweet crude from the TNK-BP-led East Siberian Verkhnechonsk field, in which Rosneft is a partner, and from Surgutneftegas' Talakan field. Also, significant volumes (up to 270,000 bbl/d by 2010 according to Degolyer & McNaughton) would come from Rosneft's Vankor field. Production from the three fields alone should be able to fill the pipe by around 2011.

Some hurdles exist to the Eastern Pipeline's plan. First, financing the project is challenging. Russia has obtained Japanese promises of \$7 billion for the project, but the first stage will be financed with a \$2.4 billion revolving credit from state-owned Sberbank. The route passes through multiple environmentally sensitive areas which could have the potential to further delay the project. Finally, the government estimates that transportation tariffs could be roughly \$6 per barrel, but other outside analysts estimate the level at up to \$10 per barrel, which would help pay for increasing capital costs.

Black Sea/Turkish Straits

After Russian oil flows through the various pipelines described above, crude oil and products are shipped onward to Europe, the United States, and Asia via tanker. The bulk of Russia's oil (roughly 1 million bbl/d of crude) is shipped to the Mediterranean and to Asia via tankers in the Black Sea, mostly from the port of Novorossiysk. With the opening of the BTC pipeline in early 2006 and rising oil production exports from Caspian countries, Black Sea port shipments through the Bosphorus will likely remain at around the same levels for the next couple years. The new Russian support for the Bourgas Alexandroupolis pipeline route, combined with existing support, makes this option one of the more commercially-feasible routes to help alleviate flows via the

Bosporus.

Rail Export Routes

Rail exports comprise roughly 5% of Russian crude oil exports. But unless significant investment flows into expanding the Russian pipeline network's capacity, non-pipeline transported exports are poised to increase even more in the upcoming years. As China's growth continues, rail routes are the only way to provide Russian crude oil to East Asia. In the absence of a dedicated pipeline route, Russian crude oil is exported via rail to the northeast cities of Harbin and Daqing and to central China via Mongolia. Rail exports of crude oil to China increased from approximately 200,000 bbl/d in 2005 to 300,000 bbl/d by 2006 according to China's Ministry of Railways.

Major Russian Oil Pipeline Projects							
Name	Length (miles)	Cost	Current Capacity (th. bbl/d)	Expected Capacity (th. bbl/d)	Location	Completion Date	Notes
Adria Reversal Project	470	\$300 Million for expansion.	100	300	Central Europe (Hungary, Slovakia) to Croatian Adriatic Port of Omisalj	Unknown - but once approval given--> immediate	Environmental hold-up in Croatia; Unlikely to move forward
CPC - Caspian Pipeline Consortium Expansion	940	\$1.5 billion	540	1,330	Kazakhstan to Novorossiysk, RF	2009	Some agreements made, but still held up due to Russian insistence on higher tariffs
Baltic Pipeline System (BPS-II)	1,600	\$500 million	1,000	1,300	Exports from Timan-Pechora region via Baltic Sea port of Primorsk and/or Ust-Luga	2011	Latest export capacity of 1.2 million bbl/d
Kharyaga-Indiga	320	\$2-6 billion	0	500	Baltic Sea (NE of Primorsk)		Transneft proposal. Not ice-free like Murmansk.
Murmansk	various	\$6 billion	0	3,000	Baltic Sea (NE of Primorsk)	none	Project for pipeline and terminal - Lukoil pipeline proposal, lost out to Indiga route
Eastern Pipeline (Taishet-Skovorodino-Perevoznaya)	2,480	\$16-18 billion	0	1,000	Phase 1: Taishet to Skovorodino (near Lake Baikal). Phase 2: Skovorodino to Pacific Coast	2009 (First Stage)	2 stages: first to Skovorodino, and then to Pacific Coast. Environmental concerns with Lake Baikal and Perevoznaya Bay

A map that shows most of these pipeline projects is available in the [Maps](#) section.

Natural Gas

Overview

According to the *Oil and Gas Journal's* 2008 survey, Russia holds the world's largest natural gas reserves, with 1,680 trillion cubic feet (Tcf), which is nearly twice the reserves in the next largest country, Iran. In 2006 Russia was the world's largest natural gas producer (23.2 Tcf), as well as the world's largest exporter (6.6 Tcf). According to official Russian statistics, production during 2007 totaled around 23.1 Tcf, of which 85 percent (19.4 Tcf) was produced by Gazprom. Russian government forecasts expects gas production to total 31.1 Tcf by 2030.

Gazprom's natural gas production forecast calls for modest growth of 1-2 percent per year by 2010. Russia's natural gas production growth reflects its aging fields, state regulation, Gazprom's monopolistic control over the industry, and insufficient export pipelines. Although the company projects increases in its natural gas output between 2008 and 2030, most of Russia's natural gas production growth will come from independent gas companies such as Novatek, Itera, and Northgaz. A Gazprom [web page](#) discusses these projections in detail.

Russia has the largest natural gas reserves in the world, but the industry will face investment challenges in bringing new, more challenging fields online. In the meantime, production from Gazprom's four largest fields are in decline.

The Mid-term outlook for Gas Supply from Russia

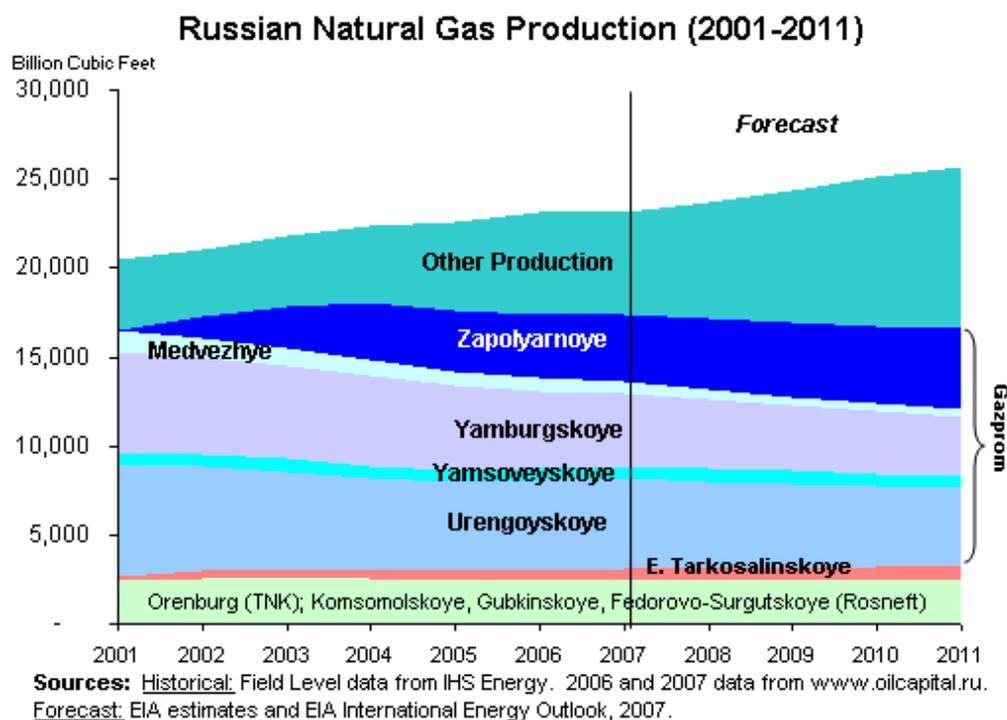
For Gazprom to fulfill its long-term aim of increasing European sales, it will need to boost its production, as well as to secure more reliable export routes to the region. According to recent data from IHS Energy:

- Gas production at Gazprom's top four gas producing fields (not including the newly online Zapolyarnoye field) declined by 4% or 430 Bcf (12 billion cubic meters or Bcm) from 2005 to 2006.

- Gazprom's newest field, Zapolyarnoye, is responsible for much of the growth in Russia's gas industry, but only increased by about 170 Bcf (5 Bcm) in 2006. Overall, Gazprom's production growth was flat year-on-year.

- Based on EIA analysis, Gazprom's production from its largest four fields is expected to decline by around 1,800 Bcf in the next four years. Gazprom's targeted production for 2011 is an increase of around 1,000 Bcf from 2007 levels. Therefore, net of increases from the Zapolyarnoye field (800 Bcf), Gazprom must increase its production by around 2,000 Bcf to meet its targets. On an annual basis, that translates to around 500 Bcf per year (or 14 Bcm).

- The average level of depletion at Russia's five largest producing fields (not including Zapolyarnoye) was almost 50 percent in 2006, weighted by production.



During 2008 Gazprom intends to invest a total of \$20.4 billion in natural gas production and transportation, including \$8.7 billion in production. Of this, Gazprom will allocate a little more than \$2.7 billion on construction at the Bovanenkovo field in the Yamal Peninsula including a railway extension, twice as much as in 2007. The bulk of the upstream-targeted funds will go towards maintaining pressure in the pipelines that deliver gas from the large fields in Western Siberia. Gazprom expects its investment in maintaining production to increase to around \$45 billion in 2010.

Oil companies, whose natural gas is largely flared, and independent gas companies will play an important role by increasing their share of Russian total production from 11 percent in 2007 to around 17 percent by 2010. Their success, however, depends largely on gaining access to Gazprom's transmission system.

Shtokhman

Discovered in 1988 in the Barents Sea, the Shtokhman field contains reserves of an estimated 19 billion barrels of oil equivalent. The field's location, roughly 340 miles northeast of the Russian mainland and 1000 feet deep, makes its development particularly challenging. International Oil Companies (IOCs) had hoped to participate in the field's development, but in Fall 2006, Russia announced it would develop the field on its own. Originally, Gazprom planned to export all of the gas from the field via LNG, but Gazprom is now tentatively planning to pipe some of the gas via the Nord Stream pipeline (see below). In May 2008, Deputy Gazprom Chairman Alexander Medvedev announced that 50 percent of the field's LNG exports would go towards the [Rabaska LNG](#) facility in Canada.

According to Gazprom, initial stages of the project will envisage production of around 795 Bcf of natural gas and 5,500 bbl/d of gas condensate. Gazprom has allocated \$260 million in capital expenditures during 2008. The partners in the project expect first gas from Shtokhman in 2013, although Norwegian experts developing the nearby Snohvit field do not expect the field to come online before 2015.

A 2006 Deutsche Bank report estimated that the pipeline option's capital expenditures might be twice as expensive as small-scale LNG exports. IOCs may still be involved in the giant field's development but on a contractor basis.

Domestic Gas Prices

Gazprom is also Russia's largest earner of hard currency, and the company's tax payments account for around 25 percent of federal tax revenues. Despite its enormous size and significance, Gazprom faces domestic regulation. By law, the company must supply the natural gas used to heat and power Russia's vast domestic market at government-regulated prices (approximately \$28 per thousand cubic meters), regardless of profitability.

Domestic gas prices in Russia are only around 15-20 percent of the market rate at which Russia's gas is sold to Germany, and Gazprom lost around \$420 million in 2006 on domestic natural gas sales. Low prices have impacted the gas industry's ability to finance capital spending and have hurt incentives to increase efficiency. Raising domestic prices towards parity with market rates in Europe is now a major component of the country's energy strategy that will play a significant role in avoiding supply shortfalls in the future. Planned increases in gas prices are listed in the table below.

Planned Natural Gas and Electricity Price Increases (2008-2011)				
<i>Annual Percentage Change</i>				
	2008	2009	2010	2011
Natural gas				
Wholesale market	28.6	19.9	28	40
Regulated prices	25	20.3	28	--
For households	25	25	30	40
For all others	25	19.6	27.7	--
Electricity				
For households	14	25	25	25
For all others	16.7	26	22	18

Gas Flaring

Estimates of gas flaring range from 390 Bcf (RosStat) to 2,400 Bcf ([US National Oceanic and Atmospheric Organization](#)), or 11-70 Bcm. Official statistics show that Russia produces roughly 2.1 Tcf of associated gas, of which around 25% is flared. It is difficult to obtain an exact number with a lack of metering equipment. The government plans to reduce associated natural gas flaring to help increase production. Rostekhadzor, a government agency, has introduced legislation to increase fines for associated flaring above 15 percent of the total associated gas output from January 2009. Russia's current limit for gas flaring is 25 percent of the total gas output, and penalties are small. The government would like to reduce flaring by 5% by 2011.

Import and Export Markets

Russia exports significant amounts of natural gas to customers in the Commonwealth of Independent States (CIS). In addition, Gazprom (through its subsidiary Gazexport) has shifted

much of its natural gas exports to serve the rising demand in countries of the EU, as well as Turkey, Japan, and other Asian countries. Exports to Europe are shown in Table 4 below.

TABLE 4: Major Recipients of Russian Natural Gas Exports, 2006-2007				
Rank	Country	2006 Exports (bcf/y)	2007 Exports (bcf/y)	2006 % of Domestic NG Consumption
1	Germany	1,300	1,378	36%
2	Turkey	703	827	64%
3	Italy	756	742	25%
4	France	353	346	20%
5	Czech Republic	261	247	79%
6	Poland	272	247	47%
7	Hungary	272	226	54%
8	Slovakia	240	223	100%
9	Austria	233	191	74%
10	Finland	173	166	100%
11	Romania	180	138	28%
12	Bulgaria	113	120	96%
13	Greece	95	113	82%
14	Serbia & Montenegro	74	74	87%
15	Croatia	35	35	37%
16	Slovenia	25	18	64%
17	Switzerland	14	11	12%
18	Macedonia	4	4	100%
Sales to Baltic & CIS States				
1	Ukraine	2,085	2,240	66%
2	Belarus	724	763	98%
3	Baltic States	173	243	78%
4	Azerbaijan	141	0	35%
5	Georgia	67	36	100%
Sources: "Domestic Consumption" EIA International Energy Annual, 2007; "Exports 2006 and 2007" Gazexport as cited by Energy Intelligence, March 2008; "Sales to Baltic and CIS States 2007", CIS and E. European Databook, 2006 from Gazprom Annual Report.				

According to Russia's Federal Customs Service and Ministry of Industry and Energy data, Russia exported 6.75 Tcf (191 Bcm) of natural gas in 2007, which includes 5.4 Tcf to outside FSU and to Baltic States and 1.3 Tcf to Commonwealth of Independent States (CIS) countries. Exports to CIS states also travel through intermediaries ZMB (Switzerland) and RosUkrEnerg and are mixed with gas volumes from Central Asia. RosUkrEnerg shipped 1.9 Tcf (54.3 Bcm) in 2007, all of which went to Ukraine. Gazprom chairman Alexei Miller expects gas exports to non-CIS states to increase by 4-5% during 2008.

Russian Gas Sales Prices (2008)	
<i>in \$/thousand cubic meters</i>	
Lithuania	\$ 280.00
Latvia	\$ 280.00
Estonia	\$ 280.00
Georgia	\$ 230.00
Moldova	\$ 191.25
Ukraine	\$ 179.50
Belarus (Q1)	\$ 119.00
Armenia	\$ 110.00
Note: Sales to other countries are occurring at European market prices (around \$370/mcm).	
Source: EasternBloc Research Ltd.	

Exports to Ukraine

Due to an ongoing dispute about natural gas prices, on January 1, 2006, Gazprom shut off gas supplies to Ukraine, and as a result supplies to Europe were also affected. Gazprom resumed natural gas deliveries to Ukraine three days later. Even though Russia has used the threat of a cutoff to demand higher natural gas prices in recent years, this was the first time that a supply disruption affected flows to Europe. More recently in 2008, for no longer than a day, Gazprom cut exports by 25-35 percent after Ukraine failed to pay its debt.

Various agreements have been signed on natural gas pricing since this time. The latest, signed in March 2008, specifies that at least 1,750 Bcf (49.8 Bcm) of Central Asian gas will be delivered during March-September 2008 at a price of \$6.34/Bcf or \$179.50/thousand cubic meter (mcm). An additional 265 Bcf (7.5 Bcm) will be delivered by a subsidiary or affiliate of Gazprom to Ukrainian industrial consumers at a price of \$11.12/Bcf or \$314.70/thousand cubic meter (mcm) that would include January and February 2008 shipments. The contracts are also subject to review each year and may be adjusted to new market prices.

The role of RosUkrEnergo, the intermediary between Gazprom and Ukrainian consumers, is currently under negotiation between Russia and Ukraine. The intermediary blends some of the natural gas sent to Ukraine with less expensive natural gas from Central Asia. According to the latest data for 2007, RosUkrEnergo supplied 1,919 Bcf of Ukraine's 2,240 Bcf in imports. Itera, an independent Russian gas company, provided a little over 120 Bcf, which leaves around 210 Bcf that was provided in-kind for transit fees.

Gazprom will increase the price of gas sold to Belarus from \$100 to \$200 per thousand cubic metres starting in 2009.

Major Proposed Natural Gas Pipelines

Yamal-Europe II

The Yamal-Europe I pipeline (1 Tcf), which carries natural gas from Russia to Poland and Germany via Belarus, would be expanded another 1 Tcf under this proposal. Gazprom and Poland currently disagree on the exact route of the second branch as it travels through Poland. Gazprom is seeking a route via southeastern Poland to Slovakia and on to Central Europe, while Poland wants the branch to travel through its own country and then on to Germany. Expansion is expected to be completed by 2010 at a cost of around \$10 billion.

South Stream

In June of 2007 Italy's Eni and Gazprom signed a [memorandum of understanding](#) (MoU) on a feasibility study for the underground and first component of the South Stream project. The first component of the South Stream project plans to send natural gas from the same starting point as the Blue Stream pipeline at Bregovaya for 560 miles under the Black Sea, achieving a maximum water depth of over 6,500 feet. The second, onshore component will cross Bulgaria with two alternatives: one directed towards the northwest, crossing Serbia and Hungary and linking with existing gas pipelines from Russia; and the other directed to the southwest through Greece and Albania, linking directly to the Italian network. Russia and Bulgaria signed an intergovernmental agreement on the pipeline in January 2008. Gazprom expects the project to be completed in

2013.

Blue Stream Expansion and Interconnection

The Blue Stream natural gas pipeline connects the Russian system to [Turkey](#) through a 750-mile pipeline, 246 miles of which extends underneath the Black Sea (see Eni's [map](#)). Natural gas began flowing through the pipeline in December 2002, under an initial schedule of 71 Bcf per year, which was to increase by 71 Bcf annually. Even though flows through the pipeline totaled only 113 Bcf during 2004, the launch of a new gas compressor station in Russia will allow the pipeline to run at its design capacity of 565 Bcf per year. During 2007, roughly 330 Bcf of natural gas was transported via Blue Stream, a 10 percent increase from 2006.

Nord Stream Pipeline (or North European Gas Pipeline)

A northern pipeline extending over 2,000 miles from Russia to Finland and the United Kingdom via the Baltic Sea, was proposed in June 2003 by Russia and the UK, and was renamed Nord Stream by the stakeholders in 2006. About 700 miles of the pipeline will pass under the Baltic Sea. In November 2006, Gazprom (51% shareholder), and Germany's BASF and E.ON (24.5% each) submitted project information to Baltic Sea countries for the start of an environmental impact assessment. Offshore pipe laying is expected to begin between 2008 and 2010. The project is expected to cost more than \$11 billion (or 7.4 billion euros, two times as much as originally planned) and to transport approximately 0.9-1.0 Tcf of natural gas via two parallel pipelines. Project sponsors currently expect test deliveries by spring of 2011.

The main advantage of this pipeline is Russia will no longer have to negotiate transit fees with nearly half a dozen countries or pay them in natural gas. A possible spur connection to Sweden has also been considered. Polish and Latvian leaders have expressed frustration that they were not included in the negotiations.

Eastern Siberia and Natural Gas for China

IHS Energy estimates that Eastern Siberia contains around 135 Tcf of proven plus probable natural gas reserves. The [Kovykta](#) natural gas field could provide China with natural gas in the next decade via a proposed pipeline (see [Maps](#) section). The field is believed to have reserves of around 81 Tcf and 920 million barrels of condensate. The project is producing small volumes of gas for local markets after the completion of an 80-mile pipeline to Irkutsk. China has stated it is ready to import up to 700 Bcf per year from the project; but since the natural gas would not arrive until 2012 at the earliest and since China is pursuing other natural gas import plans in the meantime, it is possible that Kovykta natural gas will not have a buyer. A [comprehensive, independent analysis](#) of the transportation options from the field is available from TNK-BP's website.

The Kovykta field is operated by RUSIA Petroleum, which is 63 percent owned by TNK-BP. The finalization of a June 2007 "heads of terms" agreement stipulates that TNK-BP will be selling its stake in RUSIA Petroleum to Gazprom for \$700-\$900 million. A final agreement is expected during 2008.

Coal

Russia has the second-largest amount of recoverable coal reserves in the world.

With 173 billion short tons, Russia holds the world's second largest recoverable coal reserves, behind the United States, which holds roughly 274 billion short tons. Russia produced 321 million short tons in 2006 (roughly a quarter of U.S. coal production), making it the fifth largest in the world. The country consumed roughly 260 million short tons, leaving 61 million short tons for export. Updated statistics are available from the EIA [Country Energy Profiles](#).

According to the government's energy strategy, Russia should produce between 441 and 496 million short tons by 2020. After restructuring in the last couple years, almost 80 percent of domestic coal production comes from independent producers. Russian coal production began a three-year upswing in 1999. After a slight decline earlier in the decade, production has increased markedly in recent years. The Russian government's strategy to increase coal production and build more coal-fired plants will help reduce demand for natural gas, thus allowing for more natural gas exports.

There is currently a proposal to reduce the excise duty on coal production by 50 percent. This would also involve a tax system with diversified rates that would help replace gas by coal at power stations and reduce gas consumption.

Russia's electricity reforms will be completed in July 2008 when Russian electricity monopoly RAO UES is dissolved. The government sees electricity sector reform as a crucial component of reducing domestic natural gas consumption.

Electricity

Overview

After the collapse of the Soviet Union, economic recovery contributed to an increase in total electricity consumption from 715 billion kWh (kilowatt hours) in 1998, to roughly 980 billion kWh in 2007. Thermal power (oil, natural gas, and coal-fired) accounts for roughly 63 percent of Russia's electricity generation, followed by hydropower (21%) and nuclear (16%), (See EIA's [International Electricity data](#)). According to state data, these plants produced 913 billion kWh in 2007, an increase of 2.2% over 2006.

Russia's power sector includes over 440 thermal and hydropower plants (approximately 77 of which are coal-fired) plus 31 nuclear reactors. Some capacity in the far-eastern part of the country is not connected to the power grid.

The system has a total electric generation capacity of 217 gigawatts (GW), with 2005 output of approximately 904 billion kWh. Updated statistics are available from EIA's [Country Energy Profiles](#).

Privatization and Electricity Market Reform

After many years, the restructuring of Russia's power generation sector will be complete as of July 1, 2008, when state monopoly RAO UES dissolves. Tariff rates on the domestic market are to be made more universal instead of geographically-specific. The country's transmission grid will remain under state control. The reform has created a generating sector divided into multiple wholesale electricity companies (commonly called OGKs), which participate in a new competitive wholesale market. The creation of all 6 OGKs was completed in September 2006. Fourteen territorial generating companies (TGKs) will also be created, and these TGKs generated over \$24 billion in investment from private investors in 2007. Germany's E.ON and RWE, Italy's Enel, and the Finnish Fortum are some of the most prominent foreign entities who have paid premiums for strategic or controlling stakes in the generating companies.

The current plan is to transfer the state share in the generating companies to two companies, the Federal Grid Company and the Hydro-OGK, which will remain state-controlled after UES ceases to exist on July 1, 2008. The goal is for the market to become completely liberalized by 2011.

Gazprom and UES

Gazprom would like to have a key role in the electricity sector during the deregulation process in order to influence decision-making on the fuel mix and to benefit from electricity and natural gas tariff liberalization. As a result, in March 2007, Gazprom and UES signed a long term, take-or-pay agreement for gas supplies for Russian electricity generation through 2010 where UES will receive around 3.6 Tcf per year of gas directly from Gazprom. Independent gas producers will meet the remainder of UES's fuel needs.

Nuclear Power

The Russian government has stated that it intends to expand the role of nuclear and hydropower generation in the future to allow for greater export of fossil fuels. Russia has an installed nuclear capacity of 21.2 million kilowatts, distributed across 31 operational nuclear reactors at 10 locations, all west of the Ural Mountains. However, Russia's nuclear power facilities are aging. Roughly half of the country's 31 nuclear reactors use the RBMK design employed in Ukraine's ill-fated Chernobyl plant. The working life of a reactor is considered to be 30 years: nine of Russia's plants are between 26 and 30 years old, and six are between 21 and 25 years old.

Investment in the nuclear sector is expected to double to \$960 million in 2008. Gazprom has also expressed interest in building nuclear stations to free up natural gas for export. The Russian government has also made hydroelectric generation a priority, particularly in the country's Far East, where provision and delivery of electricity supply can be problematic.

Transmission and Distribution Sector

There are seven separate regional power systems in the Russian electricity sector: Northwest, Center, Middle Volga, North Caucasus, Urals, Siberia, and Far East. The Far East region is the only one not connected to an integrated power system. UES, which is 52 percent owned by the Russian government (Gazprom now has a 10% stake), controls most of the transmission and distribution in Russia. UES owns 96 percent of the transmission and distribution system, the central dispatch unit, and the federal wholesale electricity market (FOREM). The grid comprises

almost 2 million miles of power lines, 93,000 miles of which are high-voltage cables over 220 kilovolts (Kv).

Electricity Exports

Russia exports significant quantities of electricity to the countries of the former Soviet Union, as well as to China, Poland, Turkey and Finland. UES also has plans to export electricity to Iran and possibly Afghanistan and Pakistan from two hydroelectric stations it is currently building in Tajikistan. There are currently two efforts underway to integrate the Russian and Western European electricity grids. UES is participating in the Baltrel program, designed to create an energy ring of power companies in the Baltic states. Also, the Union for the Coordination of Transmission of Electricity (UCTE), of which 20 European countries are members, has entered into discussions with Russian colleagues over the technological and operational aspects of interconnecting their systems.

Maps

FSU Energy Map 2007 (click maps for high resolution versions):



(Source: CIA)

Major Pipelines to Europe:



(Source: CIA)

Russian Proposed Oil and Natural Gas Pipelines to China



(Source: CIA)

Major Russian Oil and Natural Gas Basins:

Major Russian oil basins



Major Russian gas basins



Bosphorus Bypass Options (please click below for a full map)



Other Non-U.S. Government Maps:

Oil and Capital (www.oilcapital.ru): Gas pipelines and production in Central Asia and Western China.

[University of Texas: Perry-Castaneda Map Collection: Link to Detailed Map of Caspian Sea \(North Region\)](#)

[University of Texas: Perry-Castaneda Map Collection: Link to Detailed Map of Caspian Sea \(South Region\)](#)

[University of Texas: Perry-Castaneda Map Collection: Link to Detailed Map of Caspian Sea \(Legend\)](#)

Profile

Energy Overview

Minister of Energy	Sergei Shmatko
Proven Oil Reserves (January 1, 2008E)	60 billion barrels
Oil Production (2007E)	9,800 thousand barrels per day, of which 96% was crude oil
Oil Consumption (2007E)	2,800 thousand barrels per day
Crude Oil Distillation Capacity (2007E)	5,400 thousand barrels per day
Proven Natural Gas Reserves (January 1, 2008E)	1,680 trillion cubic feet
Natural Gas Production (2006E), (2007E)	23.17 trillion cubic feet (tcf), 23.09 tcf
Natural Gas Consumption (2006E)	16.6 Trillion cubic feet (tcf)
Recoverable Coal Reserves (2003E)	173,073.9 million short tons
Coal Production (2005E)	320 million short tons
Coal Consumption (2005E)	258 million short tons
Electricity Installed Capacity (2005E)	217.16 gigawatts
Electricity Production (2005E)	904.4 billion kilowatt hours
Electricity Consumption (2005E)	779.4 billion kilowatt hours
Total Energy Consumption (2005E)	30.3 quadrillion Btus*, of which Natural Gas (55%), Oil (19%), Coal (16%), Hydroelectricity (6%), Nuclear (5%), Other Renewables (0%)
Energy Intensity (2005E)	14,935 Btu per \$2000-PPP**

Environmental Overview

Energy-Related Carbon Dioxide Emissions (2005E)	1,696 million metric tons, of which Natural Gas (52%), Coal (26%), Oil (22%)
Per-Capita, Energy-Related Carbon Dioxide Emissions (2005E)	11.88 metric tons
Carbon Dioxide Intensity (2004E)	0.84 Metric tons per thousand \$2000-PPP**

Oil and Gas Industry

Organization	Transneft is predominant pipeline operator. State has majority ownership of Gazprom and Rosneft.
Major Oil/Gas Ports	Primorsk, Novorossiysk

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

**GDP figures from OECD estimates based on purchasing power parity (PPP) exchange rates.

Links

EIA Links

[EIA - Country Information on Russia](#)

[EIA – International Energy Outlook, 2005 \(Table E2: World Oil Production Capacity 1990-2025\)](#)

[EIA – Selected oil and natural gas infrastructure of the Former Soviet Union \(Map\)](#)

U.S. Government

[U.S. Agency for International Development](#)
[U.S. Department of Commerce, Business Information Service for the Newly Independent States \(BISNIS\)](#)
[U.S. Department of Commerce, Business Information Service for the Newly Independent States \(BISNIS\) - Sakhalin Region](#)
[U.S. Department of Commerce, Country Commercial Guides](#)
[U.S. Department of Commerce, International Trade Administration: Energy Division](#)
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[U.S. Department of Commerce: Gazprom's Natural Gas Projects in Northwest Russia](#)
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