U.S. Energy Information Administration

‹ Countries

Russia

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full report

Background

Russia holds the world's largest natural gas reserves, the second-largest coal reserves, and the ninth-largest crude oil reserves.

Russia is a major producer and exporter of oil and natural gas and its economy largely depends on energy exports. Russia's economic growth continues to be driven by energy exports given its high oil and gas production and the elevated prices for those commodities. Internally, Russia gets over half of its domestic energy needs from natural gas.

Russia was the world's second-largest producer of oil (after Saudi Arabia) and the second-largest producer of natural gas in 2011 (second to the United States). However, preliminary data through June 2012 indicate that Russia had surpassed Saudi Arabia as the top crude oil producer in four out of the six months.

Russia's oil and gas sector continues to be affected by high taxes and export duties. While export duties for crude oil and petroleum products were lowered to 60 and 65 percent, respectively, in 2011, producers still face high mineral extraction taxes and a revenue-based tax system.

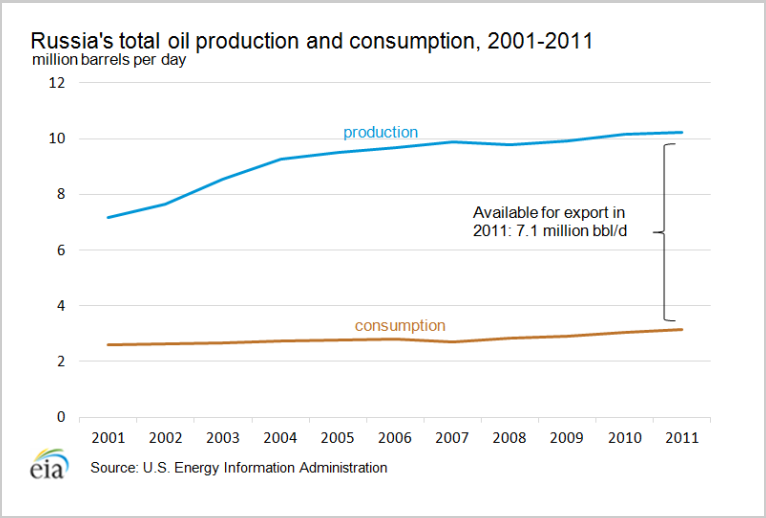
Oil

Russia was the second-largest producer of total petroleum liquids in 2011, second only to Saudi Arabia. During the year, production averaged more than 10 million bbl/d.

Russia's proven oil reserves were 60 billion barrels as of January 2012, according to the *Oil and Gas Journal*. Most of Russia's resources are located in Western Siberia, between the

Ural Mountains and the Central Siberian Plateau and in the Volga-Urals region, extending into the Caspian Sea. Eastern Siberia holds some reserves, but the region has had little exploration.

In 2011 Russia produced an estimated 10.2 million bbl/d of total liquids (of which 9.8 million bbl/d was crude oil), and consumed roughly 3.1 million bbl/d. Russia exported around 7 million bbl/d in 2011 including roughly 4.9 million bbl/d of crude oil and the remainder in products. Russia's pipeline oil exports fall under the jurisdiction of the state-owned pipeline monopoly, Transneft. Monthly data thus far in 2012 show that Russia's total liquids production has consistently remained above 10.0 million bbl/d.



Exploration and production

Most of Russia's oil production continues to originate in Western Siberia, most notably from the Priobskoye and Samotlor fields. The Sakhalin group of fields in the Far East only contributes about 3 percent of Russia's total production, though it has yet to fulfill the expectation that it would contribute significantly to Russia's total oil production. In the longer-term, however, Sakhalin, along with the untapped oil reserves in Eastern Siberia and the Russian Arctic, may play a larger role and several international oil companies are actively working in this area. The Russian sector of the Caspian Sea and the undeveloped areas of Timan-Pechora in northern Russia also may hold large hydrocarbon reserves.

A number of new projects are in development; however these new projects may only be able to offset declining output from aging fields and not result in significant output growth in the near-term. The use of more advanced technologies and the application of improved recovery techniques are resulting in increased oil output from existing oil deposits. Fields in the Western Siberian Basin produce the majority of Russia's oil, with developments at the Samotlor (TNK-BP) and Priobskoye (Rosneft) fields extracting more than 750,000 bbl/d and 800,000 bbl/d, respectively. The region is dominated by Russian firms, although foreign companies, notably Shell, have secured access to production in Western Siberia as well.

The untapped oil reserves of Eastern Siberia, the Russian Arctic, the northern Caspian Sea, and Sakhalin Island are attracting attention. ExxonMobil, Shell, and BP have secured acreage and are investing heavily in exploration and development on hydrocarbon-rich Sakhalin Island, although the government is pushing for a greater role for domestic companies in these projects. Gazprom acquired control of the Sakhalin-2 project from Shell, and the Russian state company is continuing to seek control of the marketing of gas

supplies from the Sakhalin I project, led by ExxonMobil.

Russian companies are also expanding into the Arctic and Eastern Siberian regions, spurred on by tax holidays and lower oil export tariffs. While several new fields have come on stream since 2009, including Rosneft's Vankor field and TNK-BP's Verkhnechonskoye, bringing additional fields into production will take time and may require a reformed oil tax regime from the government.

Production by Region, 2010

Region	'000 bbl/d
Western Siberia	6,507
Urals-Volga	2,101
Arkhangelsk	454
Sakhalin	295
Komi Republic	277
Krasnoyarsk	255
Yakutiya	88
North Caucasus	78
Irkutsk	58
Kaliningrad	28

Source: Eastern Bloc Energy

Russia's producing regions

West Siberia

West Siberia is Russia's main producing region, accounting for around 6.5 million bbl/d of liquids production, nearly two-thirds of Russia's total production. While this region is mature, West Siberian production potential is still significant, but will depend on improving production economics at fields that are more complex and that contain a significant portion of remaining reserves.

The two largest oil fields in West Siberia were North Priobskoye and Samotlor, which account for about 20 percent of West Siberian production. Urnegoy is the largest gas field in the region. Other large oil fields in the region include Mamontovskoye and Salymskoye fields.

Many of the largest Western Siberian fields have been declining, although new applications of existing technologies has boosted recovery rates of brownfields in the region. For example, Samotlor, which accounts for 24 percent of TNK-BP's output, saw its decline rate fall to 7 percent in 2011.The use of so-called Smart Field Technologies may result in a decline rate of 1 percent by 2016. LUKoil, too, is fighting declining crude oil production in the region using multi-zone hydraulic fracturing (MZHF) at its Tevlinsko-Russkinskoye, Uryevskoye, Vat-Yeganskoye and Pokachevskoye fields in Western Siberia. According to LUKoil, use of MZHF led to a halt in field declines, though the use of the technology may be limited due to its high cost.

In addition to well-established oil fields, a number of wet gas developments in Western Siberia are under way. It is likely that gas condensate volumes from these fields will grow within the next few years as a result of these developments.

Urals-Volga

Urals-Volga was the largest producing region of the Soviet Union until 1970s, when it was surpassed by West Siberia. Today, this region is a distant-second producing region, accounting for about 20 percent of Russia's total output. The giant Romashkinskoye field (discovered in 1948) is the largest in the region and it is operated by Tatneft. While the field reached peak sometime in the late 1970s, it likely will continue to produce until at least 2030. Romashkinskoye field produced approximately 306,000 bbl/d in 2011, according to Tatneft.

Urals-Volga is home to a number of other fields, though their average size is relatively small at about 140 million barrels of recoverable liquids, according to Wood Mackenzie. A significant portion of the oil produced in this region is heavy.

East Siberia

With the traditional oil producing regions in decline, East Siberian fields will be central to continued oil production expansion efforts in Russia. The region's potential was increased with the inauguration of the ESPO Phase 1 pipeline in December 2009, which created an outlet for East Siberian oil as 400,000 bbl/d of crude oil was supplied to the pipeline in its first year of operation.

The region's development was spurred by tax breaks and the removal of export duties; however, most of these were lifted in 2011. East Siberia has become the center of production growth for Rosneft, the state oil giant. The start-up of the Vankorskoye (Vankor) oil and gas field in August 2009 has dramatically increased production in the region and has been a significant contributor to Russia's increase in oil production since 2010. Vankor was the largest discovery in Russia in the last 25 years and so far in 2012, the field has produced about 330,000 bbl/d. Geographically, it is located north of the arctic circle.

There are a number of other fields in the region, including the Verkhnechonskoye oil and gas condensate field, Yurubcheno-Tokhomskoye field, and Agaleevkoye gas and condensate fields.

Yamal Peninsula/Arctic Circle

This region is located in the Yamal-Nenets Autonomous region and it straddles both East and West Siberia. This region is mostly known for gas production, while crude oil development is relatively new for the region. In the near term, the region is facing transportation infrastructure constraints, although the construction of the Purpe-Samotlor pipeline ameliorated some of these constraints. Additionally, Transneft is constructing the Zapolyarye-Purpe pipeline, which will connect the Zapolyarye gas and condensate field to the Purpe-Samotlor pipeline.

In addition to the Zapolyarye gas and condensate field, the area is home to Vostochno Messoyakha and Zapadno Messoyakha, Suzun, Tagul, and Russkoye, all of which will benefit from the additional transportation availability. On the Yamal Peninsula itself, gas fields such as Yuzhno Tambey, Severno Tambey, and Kharasavey dominate the landscape, as well as the Vostochno Bovanenkov and Neitin gas and condensate fields.

North Caucasus

North Caucasus is a mature region that consists of a number of small fields. LUKoil has been active in developing some of the deposits situated in the North Caspian, such as the Yurii Korchagin, launched in 2010. Other discoveries in the area include the Khvalynksoye, Rakushechnoye, Sarmatskoye, and Zapadno Rakushechnoye. The development of the region is highly sensitive to tax and export duties, and any change or cancellation in these may negatively affect the region's development.

Timan-Pechora and Barents Sea

Timan-Pechora and Barents are situated in north-western Russia. Much like those in North Caucasus, liquids fields in these areas also are relatively small. However, producers in these areas can take advantage of the developed infrastructure and can maximize their export potential via the Arctic Sea ports, including the Varandey port.

Exploration and production in Timan-Pechora has been somewhat disappointing. For example, LUKoil's development of the Khylchuikoye project appears to have reached its peak as early as June 2010. Gazprom is planning to develop the 530-million barrel Prirazlomnoye field in the Pechora Sea after the company was granted tax breaks in July 2012, without which the project would have been uneconomical. Much like Prirazlomnoye, fields in these areas are challenging and expensive to develop, particularly under the current tax and tariff system. The Barents offshore production likely will have very little effect on liquids production as the region is home to dry gas fields. Gazprom is planning to develop the Shtokman gas field in the Barents Sea. However, the long-delayed development faced another hurdle after Statoil gave up its stake in the project in August 2012. The project's cost (estimated above $40 billion) and a lack of tax incentives are some of the reasons that the project has not begun.

Sakhalin Island

Located off Russia's eastern shore, Sakhalin Island is home to a number of large oil and gas fields. The areas of the island are being developed in phases, with Sakhalin I and II producing oil and gas, with continued growth expected to come from Odoptu (2010) and Arkutun-Dagi (2013) fields. Other sizeable fields include Chaivo (Sakhalin I), Piltun-Astokhskoye, and Lunksoye (Sakhalin II), Kirinsky and Veninsky (Sakhalin III).

Both Russian exploration companies and international consortia are involved in the development of the Sakhalin Island resources. Even though all of the consortia have extensive export plans via liquefied natural gas (LNG) terminals and export pipelines to the mainland, there has been little progress beyond the first two developments on the island: Sakhalin I and Sakhalin II. There is also an oil export terminal on the island.

Estimated Oil and Natural Gas Reserves in Sakhalin Island

	Oil Reserves (billion barrels)	Natural Gas Reserves (trillion cubic feet)
Sakhalin I	0.9	11.0
Sakhalin II	1.0	17.0
Sakhalin III	4.0	27.0
Sakhalin IV	0.9	19.0
Sakhalin V	4.4	15.0
Sakhalin VI	0.6	n/a

Source: Petroleum Economist

Sector organization

Most of Russia's production remains dominated by domestic firms. Following the collapse of the Soviet Union, Russia privatized its oil industry, however the consolidation that followed transformed the sector into one dominated by a few privately-owned companies that drove the growth in the sector starting in the late 1990s. In 2003, BP invested in TNK, forming TNK-BP, one of country's major oil producers. This was followed by the entrance of ConocoPhillips into Russian oil exploration and production. Subsequent attempts by foreign firms to increase their investment in Russia were unsuccessful. The state-run Rosneft is the largest oil producer in Russia. Rosneft emerged as the top producer following the liquidation of Yukos assets, which Rosneft acquired. While foreign companies can invest in Russia, this is generally done with a Russian company, usually Rosneft.

LUKoil is the second-largest holder of oil reserves and producer in Russia, second only to Rosneft. LUKoil holds an impressive portfolio of both upstream and downstream assets. In 2004, the company signed a strategic agreement with ConocoPhillips, although in 2010 ConocoPhillips sold its 20 percent stake in LUKoil. Still, the two companies are planning to develop projects jointly in the Timan-Pechora region.

With the possible exception of Exxon, which signed an agreement with Rosneft to develop the Arctic shelf, foreign operators experience difficulty operating in Russia. This is particularly the case for BP, which had to cancel a planned Arctic partnership with Rosneft as a result of a dispute with its Russian partners and whose Moscow offices were raided by the government. In June 2012, BP announced that it is seeking to sell its 50 percent share in the TNK-BP partnership and it is unlikely that the BP share would be purchased by a non-Russian company.

Despite the resource nationalism that is present, foreign operators continue to be interested in Russia because of its resource base and the opening of new areas for exploration and production.

A number of ministries are involved in the oil sector. The Ministry of Natural Resources issues field licenses, monitors compliance with license agreements, and levies fines for violations of environmental regulations. The Finance Ministry is responsible for tax policy for the energy sector, while the Ministry of Economic Development has influence over regulations of tariffs and energy sector reforms. The Ministry of Energy oversees policy.

Within these ministries, regulatory agencies involved in the sector include Federal Energy Commission (oil transportation tariffs), Commission for State Policy on the Oil Market (formulates policy for regulating the oil and oil product markets), and Commission on Protective Measures in Foreign Trade and Customs and Tariff Policy (sets crude oil export tariffs).

Production by Company

Company	'000 bbl/d
Rosneft	2.509

Lukoil	1,788
TNK-BP	1,432
Surgutneftegaz	1,186
Gazprom Neft	595
Tatneft	520
Others	502
Slavneft	366
Russneft	290
PSA operators	287
Bashneft	282
Gazprom	247
Novatek	72
Penzaneft	4

Source: Eastern Bloc Energy

Refinery sector

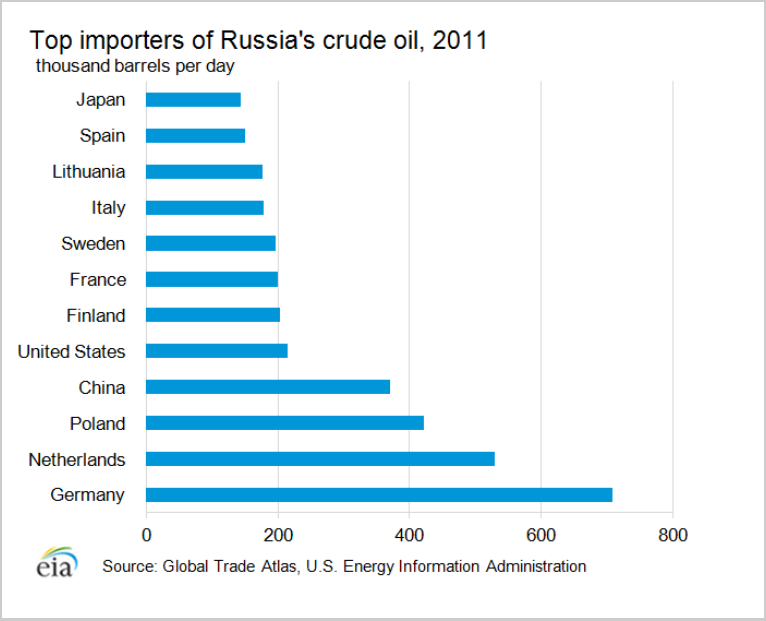
Russia has 40 oil refineries with a total crude oil processing capacity of 5.4 million bbl/d, according to *Oil and Gas Journal*. Rosneft, the largest refinery operator, controls 1.3 million bbl/d and operates Russia's largest refinery, the 385,176-bbl/d Angarsk facility. Other companies with sizeable refining capacity in Russia include LUKoil (975,860 bbl/d), and TNK-BP (690,000 bbl/d).

Oil Exports

Russia's Transneft holds a monopoly over Russia's pipeline network, however pipeline exports have been displaced somewhat by seaborne exports over the last year.

In 2011, Russia exported roughly 7.1 million bbl/d of total liquids. Data for 2011 show that Russia exported about 4.8 million bbl/d of crude oil in 2011. The majority of Russian exports (78 percent) are destined for European markets, particularly Germany, Netherlands, and Poland. Around 16 percent of Russia's oil exports go to Asia, while 6 percent are exported to North and South America. Russia's main export blend is the Urals blend and it is a mixture of mostly Russian crudes of varying quality and smaller amounts of Azeri and Kazakh crudes.

About 80 percent of Russia's oil is exported via the Transneft pipeline system, and the remainder is shipped on vessels that load at independently owned terminals. Exports from Black Sea ports, such as Novorossiysk fell, though other ports such as the Kozmino Bay have more than offset the declines in terms of volumes loaded.



Pipelines

Russia has an extensive domestic distribution and export pipeline network. Russia's entire pipeline network is dominated by the state-run Transneft, which transports about 90 percent of all oil produced in Russia. These include a number of domestic pipeline networks, pipelines that transport oil to export terminals such as Novorossiysk on the Black Sea and Primorsk on the Baltic Sea, as well as a number of export pipelines that deliver oil to western European markets. Russian export pipelines include Druzhba, Baltic Pipeline System, North-Western Pipeline System, Tengiz-Novorossiysk, and Baku-Novorossiysk. All of these pipelines with the exception of the Tengiz-Novorossiysk are Transneft-controlled.

Druzhba is Russia's largest pipeline, transporting oil to European markets on two routes: (1) northern via Belarus, Poland, and Germany, and (2) southern via Belarus, Ukraine, Slovakia, Czech Republic, and Hungary. Druzhba is more than 2,300 miles long and has the capacity to carry up to 2.0 million bbl/d of oil.

Baltic Pipeline System or the Timan Pechora to Primorsk Pipeline was commissioned in December 2001 and exports oil via the Russian port of Primorsk on the Baltic Sea. Initial capacity of 240,000 bbl/d has been increased to 1.5 million bbl/d. The BPS-2 pipeline with capacity of 600,000 bbl/d was completed in March 2012, which runs from Unecha near the Russia-Belarus border to Ust-Luga terminal on the Baltic Sea. Phase 2 of the expansion is expected to be completed in 2013 and will increase BPS-2 capacity to 1 million bbl/d.

The North-Western Pipeline System (Polotsk to Butinge and Ventspils) branches off of Druzhba near Russia-Belarus border and transports Russian oil via Belarus to Latvia and Lithuania. This pipeline's total capacity is about 300,000 bbl/d.

Tengiz to Novorossiysk Pipeline is operated by the Caspian Pipeline Consortium (CPC) and it was commissioned in November 2001. This pipeline transports crude oil from the western Kazakh oilfield Tengiz to the Russian Black Sea port Novorossiysk. CPC shareholders in late 2008 approved an expansion of the pipeline, which would increase its peak design throughput to 1.34 million bbl/d by 2014.

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

building the Eastern Siberia-Pacific Ocean pipeline in two stages, with the first phase (1,491-mile, 600,000 bbl/d) completed in September 2010. Once completed, this pipeline will deliver crude oil from Eastern Siberia to Russia's Pacific Coast, giving Russia's crude oil easier access to Asia-Pacific markets. It is expected to be completed in December 2012 and it will transport 1.6 million bb/d of crude oil.

Kharyaga-Indiga Pipeline was proposed by Transneft and it would serve as an export line for crude oil produced in the Timan-Pechora region and oilfields in northern Russia. If built, the 267-mile pipeline is expected to transport 240,000 bbl/d. 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.

Purpe-Samotlor Pipeline was launched in October 2011 and was placed into service to facilitate oil exports to China and to speed up production from the new Arctic crude oil deposits. The 270-mile line also is intended to spur the development of Rosneft's largest new field, Vankor.

The Zapolyarye-Purpe Pipeline's construction began in March 2012 and once completed, the 310-mile pipeline will connect to the Purpe-Samotlor line. The Zapolyarye-Purpe pipeline is expected to have a capacity of 900,000 bbl/d and it will connect oil fields on the Yamal Peninsula to the ESPO trunk line, facilitating Russian oil exports to China and other Asian markets. It is expected to be completed by 2016 at around the same time as exploration of large fields in Zapolyayre is completed, allowing the crude oil supplies to be monetized.

Ports

There are at least eighteen ports serving as export outlets for Russian oil to various markets, including Europe, North and South America, as well as Asia. Among these, eight stand out because of their importance:

Primorsk is Russia's largest oil terminal with a loading capacity of 1.5 million bbl/d. It is located near St. Petersburg and is a two-berth harbor that can accommodate ships with maximum length of 307 meters.

Kozmino Bay is located in Russia's far eastern Primorsky province. Crude loaded at Kozmino Bay is transported via the ESPO pipeline and rail to the terminal. The port's initial capacity of 300,000 bbl/d will eventually be expanded to 1 million bbl/d.

Novorossiysk is Russia's main oil terminal on the Black Sea coast. Its load capacity is 950,000 bbl/d and it can load tankers up to 150,000 deadweight tons (dwt).

Tuapse is located on the northeastern shore of the Black Sea, southeast of Novorossiysk. Two of the six berths load crude oil. The port mainly exports Siberian Light and its loading capacity is about 350,000 bbl/d. In addition, the terminal has more than 580,000 bbl of oil and oil products storage capacity. The port can accommodate tankers with deadweight tonnage of up to 80,000 metric tons.

DeKastri is located in Russia's Far East, southwest of the Tatar Strait that separates Sakhalin Island from the Russian mainland. Its export capacity is 250,000 bbl/d and the port can accommodate Aframax vessels.

Yuzhny terminal is located in Ukraine, near Odessa although it mainly exports Russian and Kazakh crude oil via the Black Sea. This port's load capacity is 315,000 bbl/d and it can accommodate vessels up to 70,000 dwt.

Prigorodnoye is located on Sakhalin Island on the Aniva Bay. The port is capable of loading 100 Aframax and 160 LNG vessels each year.

Varandey is a fixed, ice-resistant offshore oil export terminal in Russian Arctic, owned and operated by Lukoil. The terminal's capacity was expanded from 30,000 bbl/d to approximately 150,000 bbl/d. Oil loaded at Varandey is shipped west to Murmansk for reloading onto larger vessels.

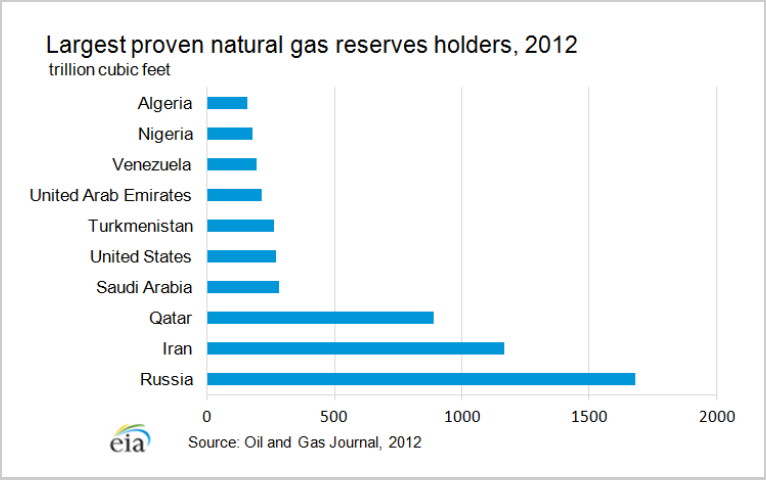
Rail export routes

Rail exports comprise roughly 5 percent of Russian oil exports. Rail is generally used as an alternative to Transneft's pipeline network, although rail shipments generally are costlier than pipeline exports. Russia exports crude oil and petroleum products by rail through Estonia and Latvia. Additionally, crude oil is transported to China via rail to the northeast cities of Harbin and Daqing and to central China via Mongolia.

Natural gas

Russia holds the largest natural gas reserves in the world, and is the largest producer and exporter of dry natural gas.

According to the *Oil and Gas Journal*, Russia holds the world's largest natural gas reserves, with 1,680 trillion cubic feet (Tcf), and Russia's reserves account for about a quarter of the world's total proven reserves. The majority of these reserves are located in Siberia, with the Yamburg, Urengoy, and Medvezh'ye fields alone accounting for about 45 percent of Russia's total reserves. More than half of all reserves are located in Siberia. Significant reserves are also located in northern Russia.



Sector organization

The state-run Gazprom dominates Russia's upstream, producing about 80 percent of Russia's total natural gas output. Gazprom also controls most of Russia's gas reserves,

with more than 65 percent of proven reserves being directly controlled by the company â additional reserves being controlled by Gazprom in joint ventures with other companies.

While independent producers have gained importance, with producers such as Novatek and LUKoil contributing increasing volumes to Russia's production in recent years, upstream opportunities remain fairly limited for independent producers and other companies, including Russian oil majors. Gazprom's position is further cemented by its legal monopoly on Russian gas exports.

While non-Gazprom production of natural gas has been increasing, Gazprom has attempted to increase further its dominance with several acquisitions, including a 10 percent stake in Novatek, and purchase of fields operated by Itera.

Much like the oil sector, a number of ministries are involved in the gas sector. The Ministry of Natural Resources issues field licenses, monitors compliance with license agreements, and levies fines for violations of environmental regulations. The Finance Ministry is responsible for tax policy for the energy sector, while the Ministry of Economic Development has influence over regulations of tariffs and energy sector reforms. The Ministry of Energy oversees energy policy.

Within these ministries, regulatory agencies involved in the sector include Federal Energy Commission (wholesale gas prices), Regional Energy Commission (retail gas prices), and Commission for State Policy on the Oil Market (formulates policy for regulating the gas market).

Production by Company, 2010

Company	Bcf/d
Gazprom	49.2
Novatek	3.7
PSA operators	2.3
ITERA	1.7
Lukoil	1.3
Surgutneftegaz	1.3
Rosneft	1.2
Others	1.2
Total	62.9

Source: Eastern Bloc Energy

Exploration and production

The bulk of the country's reserves under development and production are in the Nadym-Pur-Taz (NPT) region of upper Western Siberia. However, Gazprom is increasingly investing in new regions, such as the Yamal Peninsula, Eastern Siberia, and Sakhalin Island, in order to bring gas deposits in these areas into production. Some of the most prolific fields in Siberia include Yamburg, Urengoy, and Medvezh'ye, all of which are licensed to Gazprom. These three fields have seen output declines in recent years. A substantial amount of natural gas is also associated with oil deposits in the country's oil heartland in Western Siberia.

In 2011 Russia was the world's largest dry natural gas producer (23.6 Tcf), regaining its status as the world top producer after trailing U.S. production in 2009 and 2010. Russia is also the world's largest exporter (7.2 Tcf).

Independent gas producers such as Novatek have been increasing their production rates, with non-Gazprom sources expected to increase further in the future. This is due to the increasing number of companies entering the sector, including oil companies looking to develop their gas reserves. The Russian government has increased domestic gas prices, providing oil companies and independent gas producers further incentive to explore and develop gas resources for the domestic market, since these companies are prevented from exporting their gas due to Gazprom's export monopoly.

Russian government efforts to decrease the widespread practice of gas flaring and to enforce gas utilization requirements for oil extraction may result in additional increases in production.

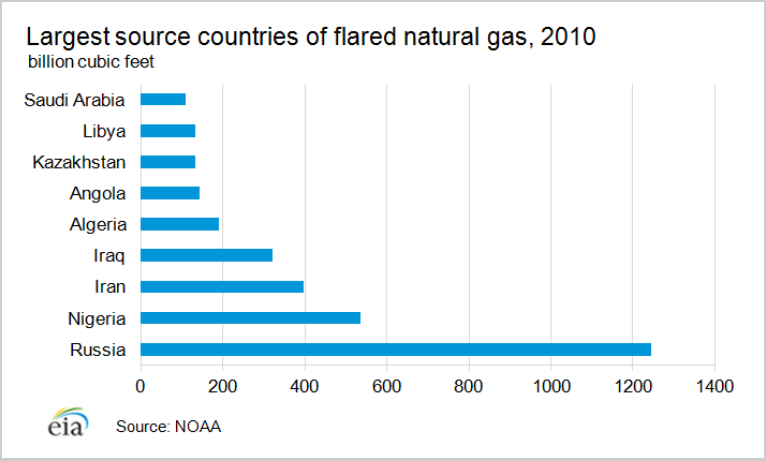
Gas flaring

Natural gas associated with oil production is often flared. According to the U.S. National Oceanic and Atmospheric Administration, Russia flared an estimated 1,244 Bcf of natural gas in 2010, the most of any country in the world. At this level, Russia alone accounted for about 30 percent of total volumes of gas flared globally in 2010. The Russian government has taken steps to reduce natural gas flaring and set a target of 95 percent utilization of associated gas by the end of 2012. However, given current the volume of gas flared, it is unlikely companies will achieve this target.

Production by Region, 2010

Region	Bcf/d
Siberia	60.3
Urals Volga	2.2
Komi Republic	0.3
North Caucasus	0.1
Total	**62.9**

Source: Eastern Bloc Energy



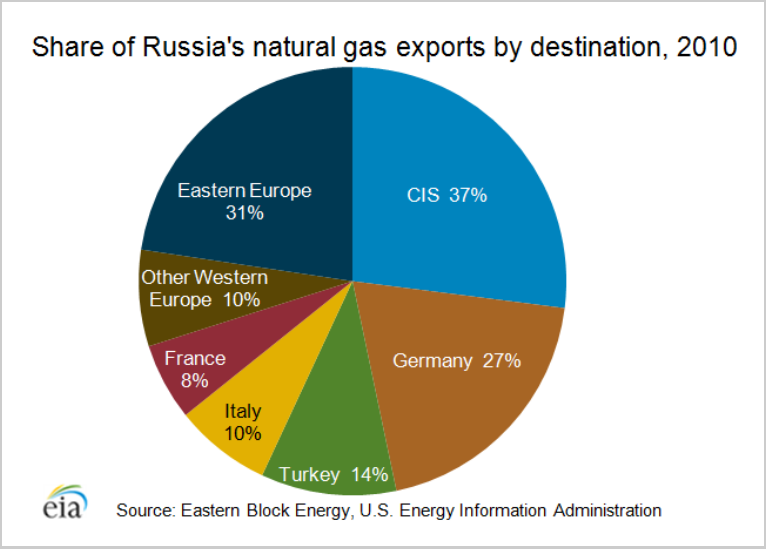
Natural gas exports

Russia exports significant amounts of natural gas to customers in the Commonwealth of Independent States (CIS) – about 35 percent of total exports. 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.

About 70 percent of Russia's non-CIS exported natural gas is destined for Europe, with Germany, Turkey, and Italy receiving the bulk of these volumes. The remainder of Russia's European gas exports are sold to the newest EU members such as Czech Republic, Poland, and Slovakia.

Export disputes

Russia's natural gas exports to Eastern and Western Europe that are transported through pipelines traversing Ukraine and Belarus have in the past been affected by political and economic disputes between Russia and these natural gas hubs. The disputes with Ukraine and Belarus were centered around natural gas prices since 2006. Disputes between Russia and its immediate neighbors resulted in natural gas being cut off to much of Europe. Some European countries are seeking out alternate sources of natural gas and alternate pipeline routes to ensure security of natural gas supplies.



Pipelines

In addition to dominating the upstream, Gazprom dominates Russia's natural gas pipeline system. There are currently nine major pipelines in Russia, seven of which are export pipelines. The Yamal-Europe I, Northern Lights, Soyuz, and Bratrstvo pipelines all carry Russian gas to Eastern and Western European markets via Ukraine and/or Belarus. These four pipelines have a combined capacity of 4 Tcf. Three other pipelines – Blue Stream, North Caucasus, and Mozdok-Gazi-Magomed – connect Russia's production areas to consumers in Turkey and Former Soviet Union (FSU) republics in the east.

Gazprom's ownership of the Russian pipeline system continues to stifle competition, including with independent gas producers who have unsuccessfully tried to gain access to the system through a third-party access (TPA) mechanism. While the Russian government agreed to ensure TPA to the domestic pipeline system, actual changes have not occurred. Allowing open access to other producers would allow oil companies to monetize their associated gas production rather than flare the gas.

Notable current and proposed natural gas pipelines

Unified Gas Supply System is Russia's domestic gas pipeline system owned and controlled by Gazprom. It operates about 96,000 miles of high-pressure gas pipelines, as well as 268 compressor stations, six gas processing facilities and 25 underground gas storage facilities with a combined storage capacity of 2.2 Tcf.

Yamal-Europe carries Russian gas to Poland and Germany via Belarus with a throughput capacity of 1 Tcf. The currently proposed **Yamal-Europe II** would expand the existing pipeline by 1 Tcf, though disputes between Poland and Gazprom on routing of the pipeline make the project less likely.

Blue Stream is a 750-mile long pipeline that connects Izobilnoye in Russia to Samsun, Turkey via the Black Sea. The pipeline's capacity is approximately 560 Bcf.

North Caucasus is a 350-Bcf pipeline that runs to Georgia and Armenia. This pipeline is a frequent target of sabotage in the Northern Caucasus.

Yamburg-Uzhgorod, **Orenburg-Uzhgorod**, **Urengoy-Uzhgorod**, and **Dolina-Uzhgorod** are four pipelines with throughput capacity of between 700 Bcf and 1 Tcf that carry Russian gas to Western European countries (mainly Germany, Italy, France) via Ukraine.

Gazi-Magomed-Mozdok pipeline connects southern Russia with Azerbaijan. Initially, this pipeline was used to export Russian gas to Azerbaijan but it has been reversed and now it can ship about 200 Bcf of Azeri gas to Russia. It is approximately 400 miles long.

Nord Stream is a 760-mile offshore pipeline that runs between Vyborg, Russia and Greifswald, Germany along the Baltic seabed. Its throughput capacity is 1.9 Tcf and it ships gas from Yuzhno-Russkoye field directly to Germany and northern Europe. The pipeline was launched in November 2011. Construction of a second parallel line was completed in April 2012, which added about 900 Bcf of additional capacity. Pre-commissioning activities for Line 2 have started, and once completed, the pipeline will be placed into operation. The pipeline is expected to be commissioned at the end of 2012, according to the pipeline operator.

South Stream pipeline would transport natural gas from Izobilnoye in Russia and would run for 560 miles under the Black Sea, achieving a maximum water depth of over 6,500 feet. The second, onshore component will cross Bulgaria. As a result of the Russia-Ukraine disputes, the pipeline will be constructed through Turkey's waters, avoiding Ukraine's territory altogether. Gazprom expects the pipeline to be completed by 2015.

Liquefied natural gas

Russia is an exporter of liquefied natural gas (LNG). The majority of the LNG has been contracted to Japanese and Korean buyers under long-term supply agreements. In 2011, Sakhalin LNG exports went to Japan (69.5 percent), South Korea (25.7 percent), China (2.4 percent), Taiwan (1.7 percent), and Thailand (0.6 percent). The Sakhalin Energy's LNG plant has been operating since 2009 and it can export up to 10 million tons of LNG per year on two trains.

Project partners have considered additional trains and plan to have a third train in operation between 2016 and 2018. However, the new trains would require additional sources of gas in addition to Lunskoye and Piltun-Astonkhskoye fields. To this end, Gazprom is exploring the Kirinskoye Block in Sakhalin III.

There are a number of proposals in various stages of planning and construction for new LNG terminals in Russia, including:

Yamal LNG, which is a Novatek-led project in partnership with Total expected to be launched in 2016 with a total capacity of 15 million tons. The Arctic Yamal peninsula project is technologically challenging because the plant will be situated on unstable permafrost and shipping will take place via the Kara Sea, which is icebound for about ten months of the year. Primary feedstock for the plant will be the 45 Tcf South Tambeyskoye field, according to PFC Energy.

Shtokman LNG is a Gazprom-led project to be built in conjunction with developing the 3.9 Tcf Barents Sea field. Shtokman is expected to come online in 2017 and reach 7.5 million tons of capacity, although it is likely the start date will be delayed due to ongoing redesign of the plant.

Vladivostok is in earlier stages of planning, with a feasibility study completed thus far. Nonetheless, Gazprom expects that the plant will be online in 2016 with a liquefaction capacity of 10 million tons.

Electricity

Russia is one of the top producers and consumers of electric power in the world, with more than 220 million kilowatts of installed generation capacity.

Thermal power (oil, natural gas, and coal-fired) accounts for roughly 67 percent of Russia's electricity generation, followed by hydropower (17 percent) and nuclear (16 percent). Russia's power sector includes over 440 thermal (approximately 77 of which are coal-fired) and hydropower plants as well as 32 nuclear reactors in 10 nuclear power plants. Economic expansion contributed to an increase in Russia's total electricity consumption over the past decade from 675 billion KWh (kilowatt hours) in 1998, to roughly 800 billion

kWh in 2009.

Sector organization

Russia's Ministry of Energy has jurisdiction over the country's power sector with the exception of nuclear energy, which is administered by the State Atomic Energy Corporation (Rosatom).

There are eight separate regional power systems in the Russian electricity sector, seven of which are connected to an integrated power system. These systems are: Northwest, Center, South, Volga, Urals, Western Siberia, Siberia, and Far East. The Far East region is the only one not connected to an integrated power system. Federal Grid Company (FGC), which is more than 70 percent owned by the Russian government, controls most of the transmission and distribution in Russia. The grid comprises almost 2 million miles of power lines, 73,000 miles of which are high-voltage cables over 220 kilovolts (Kv).

The Russian power sector recently restructured in the last decade and much of it was privatized. The reform divided the electricity sector into wholesale companies that participate in a new wholesale market. The country's transmission grid remains mostly under state control, however the government continues to try and attract private investment into the wholesale and regional generating companies. As part of the market reform, most of Russia's thermal power was also privatized, however nuclear and hydropower remain under state control.

Nuclear power

Russia has an installed nuclear capacity of 23.2 million kilowatts, distributed across 32 operational nuclear reactors at 10 locations, nine of which are located west of the Ural Mountains. The only exception is the Bilibino plant. However, Russia's nuclear power facilities are aging. Eleven of the country's 31 nuclear reactors use the RBMK design employed in Ukraine's Chernobyl plant. The working life of a reactor is considered to be 30 years and 17 of Russia's nuclear reactors are 30 or more years old. Russia's newest reactor, the 950-MW Kalinin 3 reactor, was connected to the grid in November 2011.

Coal

Despite its sizeable reserves, production of coal in Russia is relatively low.

With 173 billion short tons, Russia holds the world's second largest recoverable coal reserves, behind the United States, which holds roughly 263 billion short tons. Russia produced 372 million short tons in 2011, less than a third of U.S. coal production and consumed roughly 262 million short tons, making it the sixth-largest producer and consumer of coal in the world. Most of Russia's coal is produced using the opencast mining method and 76 percent of the coal produced is hard coal.

Following a restructuring of the sector a few years ago, more than 80 percent of domestic coal production comes from independent producers. Russian coal production increased substantially in 2011, reaching the highest post-Soviet production level. 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.

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