Energy Insight:

Conventional onshore oil & gas in Russia

Russia is a major producer and exporter of both oil and natural gas. Russia was the world's largest producer of crude oil in 2016, with average production of 11.2 million barrels per day (b/d) and the second-largest producer of dry natural gas (second to the United States), producing an estimated 21 trillion cubic feet. The country's economy is highly dependent on revenues from the sector which accounted for more than half of the federal budget revenues in the early 2010s and dropped to approximately a third in recent years due to a global fall in oil prices. Crude oil accounts for the larger share of hydrocarbon revenues (around 90%), though natural gas has a higher importance for the domestic energy consumption.

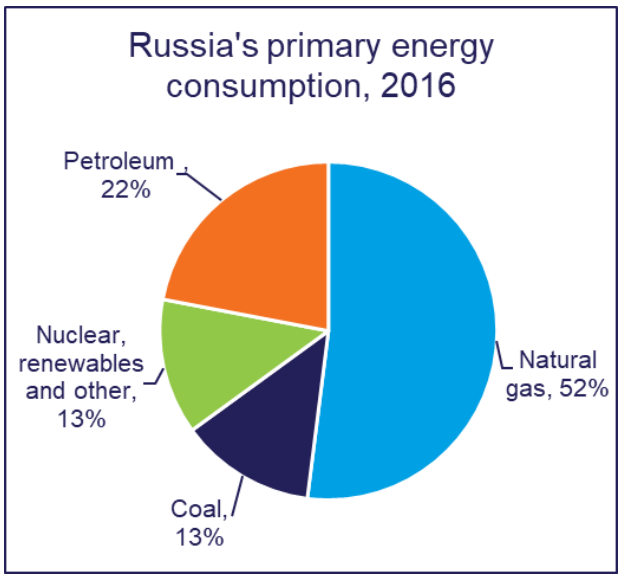

Figure 1. Russia's primary energy consumption, 2016

Source: Ministry of Energy of Russian Federation (2017)

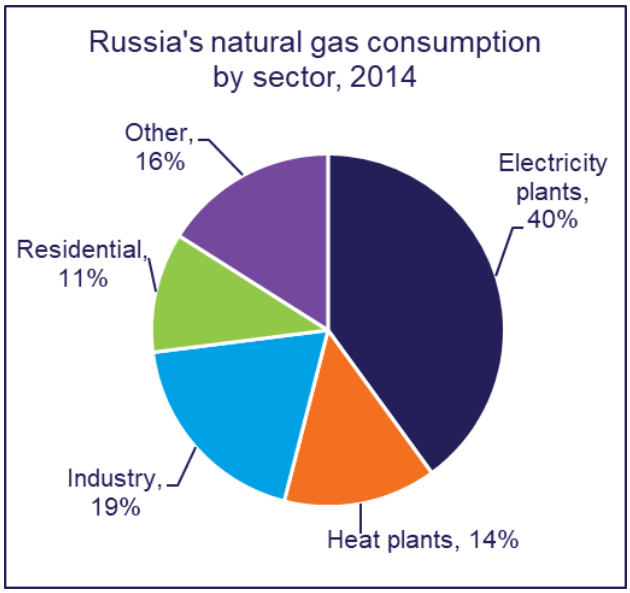

Figure 2. Russia's natural gas consumption by sector, 2014

Source: Ministry of Energy of Russian Federation (2017)

Approximately two-thirds of Russia's natural gas production is consumed domestically. As of 2016, natural gas accounted for the majority of Russia's primary energy consumption (52%). Around half of Russia's electricity production is generated from natural gas. The industrial sector, mainly the chemical industry, is also dependent on the supply of natural gas. From a labour market perspective, the significance of the oil and gas sector is small: production and transport of oil and gas as well as the oil refining industry employ approximately one million people in Russia, or 1.5% of the workforce.

Early history

Birth of the modern petroleum industry

The history of the oil and gas industry in Russia dates back to the 19th century, though oil has been mentioned as a discovery as early as the 16th century. The world's first oil well was drilled on the Absheron Peninsula near Baku in 1846, which was at that time part of the Russian empire. The Nobel brothers and the Rothschild family played a major role in the development of the oil industry in Baku. The industry grew rapidly, and by the turn of the century Russia accounted for over 30% of world oil production. Shell Transport & Trading, which later became part of Royal Dutch Shell, began life by ferrying oil produced by the Rothschilds to Western Europe. In the second half of the nineteenth century, Russia began to discover oil fields in other parts of the country.

Communism, black gold and OPEC

The revolution of 1917 and the subsequent nationalisation of oil fields in 1920 by the communist party had a bad impact on oil production. However, the continued inflow of Western funds from companies such as ExxonMobil helped Russian oil production to recover, and by 1923 oil exports had climbed back to their pre-revolutionary levels. The Caspian and North Caucasus remained the centre of the Soviet oil industry until the Second World War when development of the Volga-Urals region was accelerated. Exploitation of the vast territories of Western Siberia got underway in the 1960s and within a few years the Soviet Union had replaced Venezuela as the second largest oil producer in the world. The increase in Soviet oil exports led to a decline in world oil prices, and was one of the reasons for the establishment of the Organization of the Petroleum Exporting Countries (OPEC) in 1960. Nonetheless, in 1988 production hit a new record at 11.4 million b/d, making the nation the largest producer in the world, with output significantly higher than in either the US or Saudi Arabia. The production boom was halted after the collapse of the Soviet Union.

A new era

Nowadays, domestic companies dominate most of Russia's oil production. Following the collapse of the Soviet Union, Russia initially privatized its oil industry in an attempt to boost oil production. Starting in the late 1990s, privately-owned companies drove growth in the sector, and a number of international oil companies attempted to enter the Russian market with varying degrees of success. More recently, the Russian oil industry has consolidated into fewer firms with more state control. In 2016, the top five firms in Russia accounted for more than 80% of total Russian oil production.

Oil production today

Oil production in Russia has been growing for the past few years, peaking at 11.29 m b/d in 2016, a level not seen since the late 1980s.

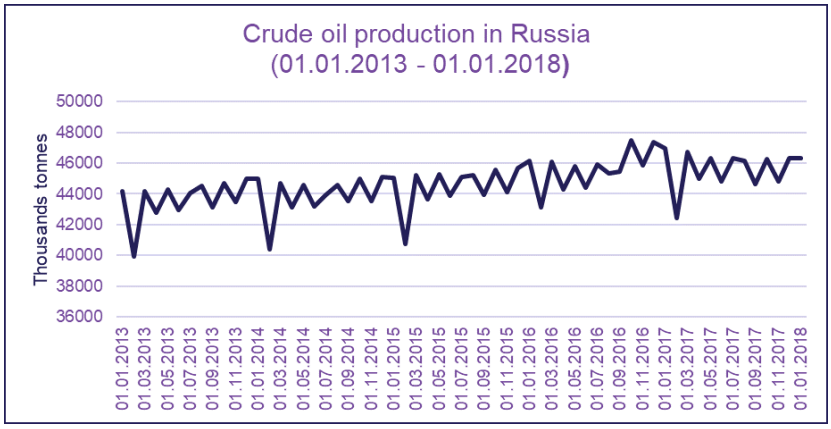

Figure 3. Data source: Ministry of Energy of Russian Federation, 2018

This growth can be attributed to three main factors: substantial investments in the maintenance of declining existing oil fields, growth of production in new "greenfield" sites and the rapid uptake of horizontal drilling.

Brownfield sites

If left without intervention, oil fields in Siberia would naturally decline at around 10-15% per annum. However, since 2013 the average rate has slowed to just over 2% per annum. This reflects the much greater effort being placed on maintenance of production at existing fields, which has been encouraged by the Russian government. In 2011, President Putin encouraged the Russian oil industry to upgrade the country's refining system in order to upgrade the quality of Russian oil by introducing a gradually harsher tax burden on lower quality oil. As a result, the quality of the Russian oil has increased. However, since the oil price crash in 2014, the priority for the Russian government and the oil companies has shifted towards the maintenance of existing fields.

Greenfield sites

Several new oil fields have begun operations, the largest of which is the Yarudeyskoye field. However, due to lower costs of operation the focus of the oil and gas sector in Russia has been on maintaining existing fields, rather than exploring new ones.

Horizontal drilling

Horizontal drilling is often used to enhance reservoir productivity. Over the past decade the number of horizontal wells drilled in Russia has increased by a factor of four. All companies in Russia are now incorporating horizontal drilling into their development plans and their brownfield recovery operations. Rosneft estimates that around 30% of its wells in the first nine months of 2016 were horizontal, while Gazprom Neft has stated that horizontals account for around half of all new wells. By 2025, 50% of all new wells in Russia will be horizontal, up from around 30% today.

Location of fields

Most of Russia's oil production originates in Western Siberia, between the Ural Mountains and the Central Siberian Plateau, and in the Urals-Volga region, extending into the Caspian Sea.

Region	Thousand b/d
Western Siberia	6,294
Urals-Volga	2,498
Eastern Siberia	1,338
Arkhangelsk	328
Komi Republic	284
Caspian	41
Arctic offshore	36

Table 1. Russia's oil production by region, 2016 Data source: EIA, 2016

Oil grades

Russia has several oil grades, ranging from heavy sour to light sweet. Urals blend is the country's largest export.

Grade	Characteristic
Urals blend	A mix of heavy sour crude oils from the Urals-Volga region and light sweet crude oils from West Siberia.
Siberian light	Light and sweet
Eastern Siberia-Pacific Ocean (ESPO)	Medium light and fairly sweet
Sakhalin I	Light and sweet
Sakhalin II	Light and sweet
Arctic oil	Medium-heavy and sour

Table 2. Russia's oil grades, 2017

Oil exports

Russia exports most of the produced crude oil and the federal budget is heavily dependent on revenues from those exports.

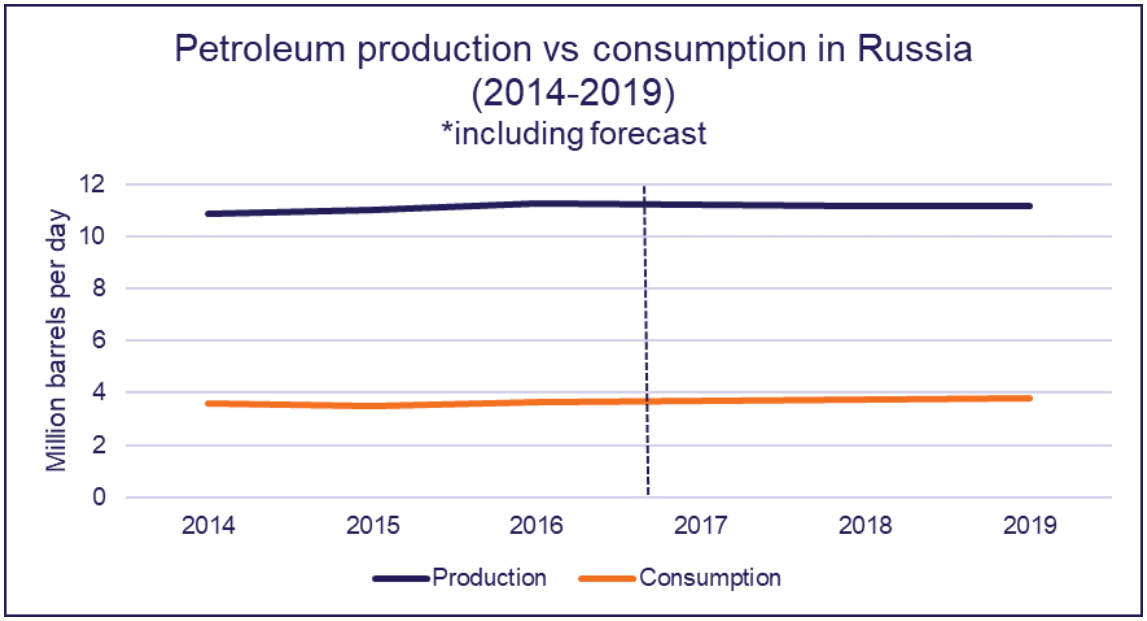

Figure 4. Data source: EIA Short Term Energy Outlook 2018

Most Russian exports (70%) went to European countries, particularly the Netherlands, Germany, Poland, and Belarus. Asia and Oceania accounted for 26% of Russian crude oil exports in 2016, with China accounting for a growing share of total Russian exports. In 2017, Russia was the largest supplier of crude oil to China, surpassing Saudi Arabia.

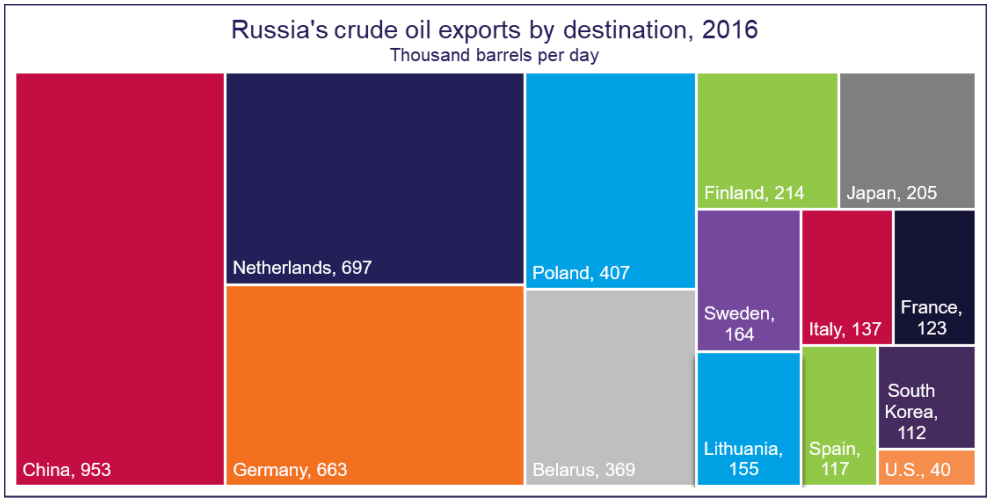

Figure 5. Data source: EIA, 2016

There are many factors behind the change in the geographical structure of exports. Oil demand has grown significantly faster in Asia than in Europe. Russia's new oil production regions are located mainly in Eastern Siberia and the Russian Far East, so it is significantly less expensive to transport their production to the closer Asian market. With the onset of production from the new oil fields, Russia has also built the transport infrastructure necessary for this, particularly the Eastern Siberia Pacific Ocean (ESPO) pipeline. Russian ESPO crude oil does not have to travel as far as Middle East crude to reach Chinese ports. This shorter distance allows Russian crude oil to be shipped in smaller volumes and with more flexible scheduling, which makes it more desirable.

Natural gas production

Russia holds the largest natural gas reserves in the world, accounting for about one quarter of the world's total proved natural gas reserves.

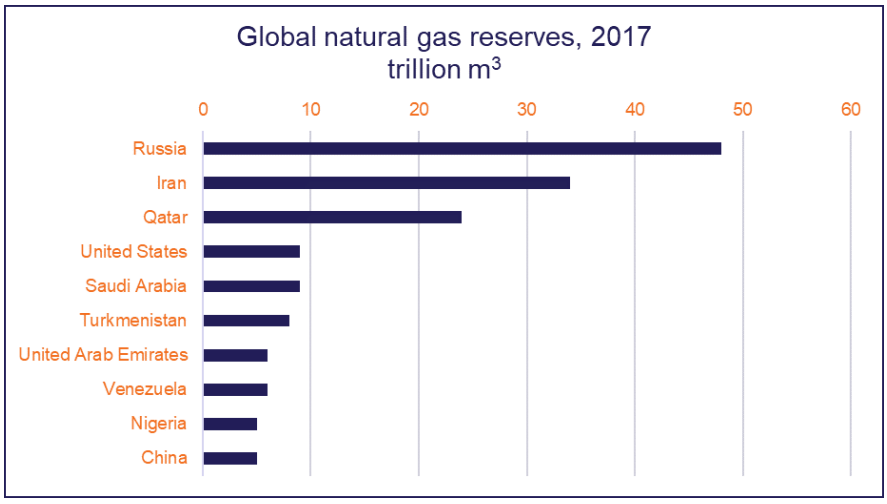

Figure 6. Data source: CIA World Factbook, 2017

Most of these reserves are located in large natural gas fields in Western Siberia.

Region	Trillion cubic feet
Western Siberia	19.3
Eastern Siberia	1.7
Urals-Volga	1.1
Komi Republic	0.1

Table 3. Russia's natural gas production by region, 2016 Data source: EIA, 2016

As of 2016, the country is the second-largest producer of dry natural gas after the United States.

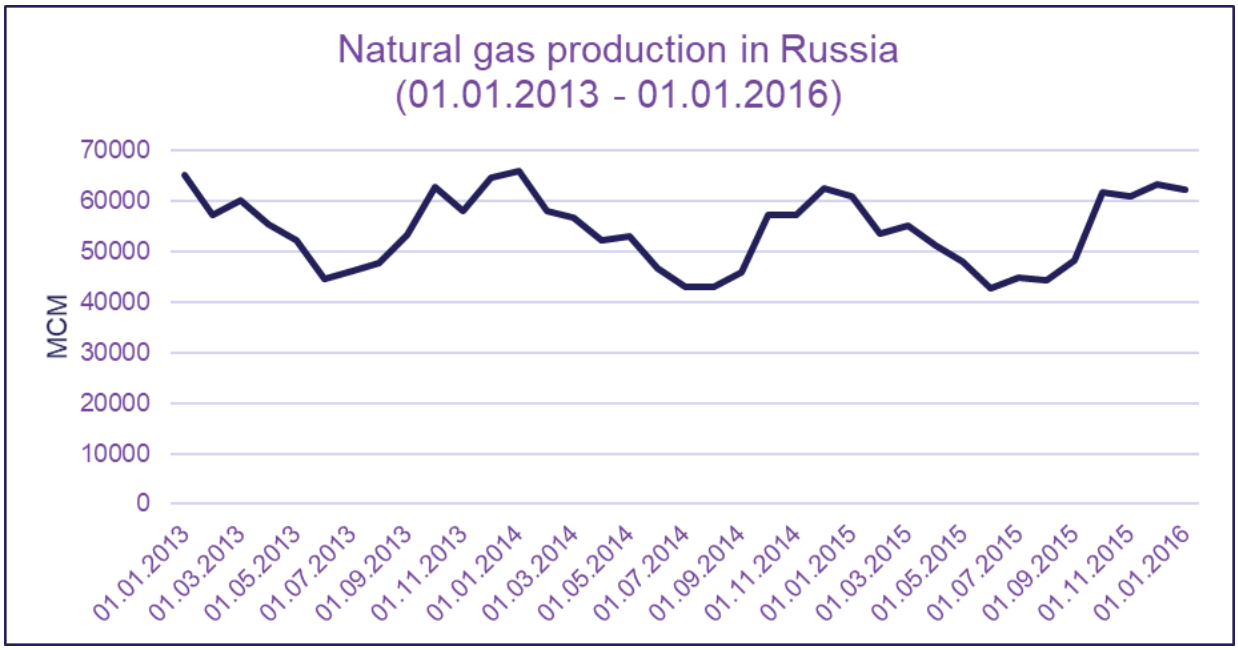

Figure 7. Data source: Ministry of Energy of Russian Federation, 2018

Despite multiple companies being engaged in gas production, the state-run Gazprom dominates the country's upstream natural gas sector, producing about two-thirds of Russia's total natural gas output in 2016. Gazprom's dominant upstream position is also reinforced by its legal monopoly on pipeline gas exports.

Pipelines

Russia's natural gas infrastructure includes about 171,000 km of transmission pipelines and 22 underground natural gas storage facilities.

Gazprom monopoly

In Russia, pipeline gas exports are a state monopoly, which is managed by Gazprom. However, in a bid to stimulate liquefied natural gas (LNG) production, the Russian government has broken Gazprom's monopoly in natural gas exports, allowing rival companies Rosneft and Novatek to enter the market.

Pivot to the West

Russia's gas export pipelines run from east to west, mainly from Western Siberia to Central Europe and Turkey. The largest pipeline routes in terms of capacity run through Ukraine and Slovakia towards Western Europe. Due to the wider tensions between the two countries, Ukraine has stopped importing natural gas directly from Russia. Currently, most of the gas exports to Europe go via Slovakia. The EU market is also served via Nord Stream, which began operating in 2012, and the Yamal-Europe pipeline, which opened in 2006. Not a single export pipeline goes towards the growing Asian market. Russia hopes to change this, and in 2014 Russia and China agreed on the massive Power of Siberia pipeline, aiming to begin gas exports to China after 2019.

Natural gas exports

Revenues from natural gas exports in 2015 accounted for 3.17% of Russia's GDP. In 2016, almost 90% of Russia's 7.5 trillion cubic feet of natural gas exports were delivered to customers in Europe via pipeline. Much of the remainder is delivered to Asia as LNG. Since the mid-2000s, natural gas consumption in OECD Europe has generally been flat to declining, prompting Russia to look to Asia and LNG as a means to

diversify its natural gas exports. U.S. and European Union (EU) sanctions, implemented in 2014, accelerated Russia's pivot to the east, with Russia signing two pipeline deals with China in 2014.

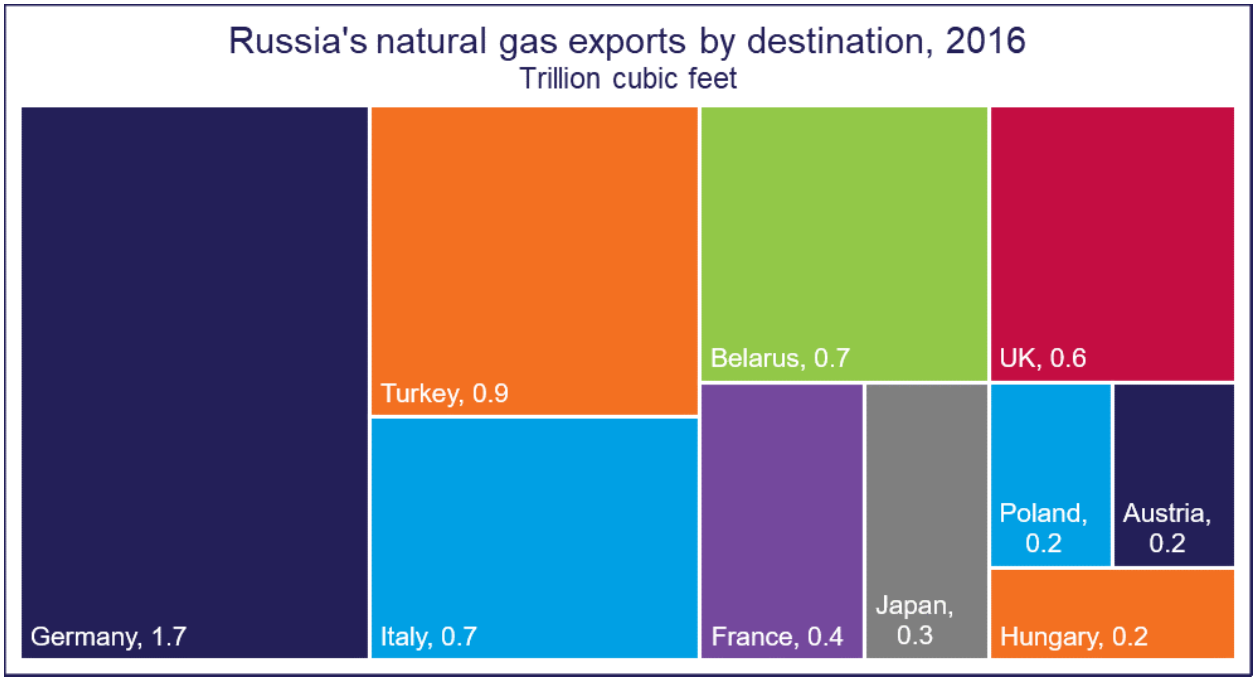

Figure 8. Data source: EIA, 2016

LNG

Currently, Russia has two operating liquefied natural gas (LNG) export plants, Sakhalin LNG and Yamal LNG. Yamal LNG launched operations in late 2017, while Sakhalin LNG has been exporting LNG to Asian countries (Japan 65%, South Korea 23%, Taiwan 10%, China 3%) under long-term supply agreements since 2009. Further proposals for new LNG terminals by Gazprom and Rosneft are in various stages of planning.

How the oil price crash impacted the Russian economy

Prior to 2014, the share of budget revenues made up by oil and gas had reached 50%, with oil making by far the largest contribution (around 90% of the hydrocarbon revenues). However, by 2016 this had fallen to only 36% and is forecasted to remain at this level until 2019. Nonetheless, despite a global crash in oil prices and sanctions imposed by the U.S. and the EU, Russia's oil industry has been remarkably resilient, and production is even growing. In 2016, the Russian government declared its intention to sell some of its shares in the state-controlled Rosneft. Later in the year, it announced that it had sold a 19.5% stake for $11 billion to Glencore and the Qatar Investment Authority.

Impact of OPEC cut

Under an agreement between OPEC and non-OPEC countries, Russia has agreed to reduce output by a maximum of 300,000b/d from the peak level seen in 2016 (11.24mb/d). However, the impact of this cut is questionable. Oil production in Russia is generally cut in the first few months of the year due to a harsh weather. The drops in production can be also seen in Figure 3. As a result, a large portion of the agreed OPEC cut would have occurred anyway. Furthermore, the Energy Ministry in Russia has clarified that the cuts Russian oil companies introduce are voluntary and will not be aggressively monitored by the government. The agreement was extended at the end of 2017 through the end of 2018.

Free floating rouble

In 2014, the Russian government decided to allow the rouble exchange rate to float freely and be set by market forces. This has had a dramatic impact on the profitability of the Russian oil sector. Since then, the movements of the rouble and the oil price have tended to mirror each other very closely, with the rouble

falling in value versus the dollar as the oil price declines. This has been of great benefit to all exporting companies in Russia, with the oil and gas industries the main beneficiaries.

Hydrocarbon taxes

The key hydrocarbon taxes in Russia are a royalty on all output (Mineral Extraction Tax or MET) and an export duty on all oil sold to countries outside the Eurasian Customs Union. Both taxes are calculated relative to the oil price and have a sliding scale. Hence, when oil prices fall, it is government revenues that take the largest hit. Oil companies stay protected as company cashflow changes much less than government revenue. In 2015, the government introduced a Tax Manoeuvre. Previously, the export tax was nearly twice higher than the MET. The new legislation raised the MET and lowered export taxes. In addition, starting from 1st of January 2019, the Finance Ministry plans to test a new profits-based tax system, applying it to several small fields.

Breakeven price

The average barrel of current production in Russia can breakeven at below $10/barrel, underlining why companies have invested increasing amounts of funds in maintaining output from existing fields. Investment in new production can breakeven at around $20/barrel. Generally, Russian oil companies are incentivised to maintain and grow oil output at an oil price below $30/barrel.

Pivot to Asia

The importance of China as an economic partner was highlighted in 2014, when relations between Western countries and Russia became strained. On the other hand, China has endeavoured to diversify its oil supply in order to be less dependent on oil from the Middle East. The attractiveness of Russian oil has also been increased by the pipeline transport possibility, considering oil is brought to China mainly by sea. In natural gas, cooperation between Russia and China has progressed even more slowly than in the oil sector. Natural gas accounts for a very small proportion of China's energy consumption (around 6% in 2014), and exports are still highly dependent on suitable transport infrastructure. There is no gas pipeline between the countries, and the gas produced by Russia's LNG plants is shipped to elsewhere in Asia. However, under the "Pivot to Asia" campaign, many new cooperation projects, such as a gas pipeline between the two countries, have been initiated.

Regulation

Several ministries are involved in the regulation of the oil and gas sector. The function of each ministry is described in the table below.

Ministry	Function in the gas sector
Ministry of Natural Resources and Environment	Issues field licenses, monitors compliance with license agreements, and levies fines for violations of environmental regulations.
Ministry of Energy	Develops and implements general energy policy and oversees LNG exports.
Ministry of Finance	Responsible for export taxes.
Ministry of Economic Development	Supervises tariffs.
Federal Antimonopoly Service	Main regulatory agency involved in the natural gas sector. It regulates pipeline tariffs and oversees charges of abuse of market dominance, including charges related to third-party access to pipelines.

Table 4. Regulation of the oil and gas sector in Russia

The general direction of the oil and gas sector in Russia is guided by the country's energy strategy. The two main objectives of this strategy are to increase the share of Asian markets in total gas exports, and to achieve direct contact with customers without transit countries and transit related problems.

Future forecasts

The Oxford Institute for Energy Studies predicts that Russian oil production will be at least 10mb/d by 2020, and is likely to be above 11mb/d. In the long-term, production in Western Siberia and the Volga-Urals region will decline, giving priority to three new areas of development: Eastern Siberia, the Arctic and the production of shale gas.

The huge resource potential of Eastern Siberia has made the area a strategic government priority. Estimates indicate as much as 160 billion barrels of oil and 52.4 trillion cubic meters of onshore gas reserves. Oil and gas producers are increasingly investing in the region, with Gazprom currently developing four natural gas fields, two of which will connect to the Power of Siberia pipeline and serve demand in Eastern Russia and China.

Russia's Arctic region has in recent years received greater attention due to estimates of vast oil and gas reserves. Oil and gas have been produced for a long time on the mainland of Russia's Arctic region, with slightly more than 80% of Russia's natural gas in 2015 being produced in the Arctic region. Oil has also been produced for decades, but the region's significance in oil production is considerably smaller. Not more than 15% of oil production was derived from the Arctic region in 2015. Russia's Arctic offshore region is considered to possess extensive, but mainly unproven, offshore oil and gas resources. Only the majority state-owned Gazprom and Rosneft have the right to exploit them. High costs, difficult conditions and environmental concerns are some of the obstacles preventing the further exploration of the region. U.S and EU sanctions have also impacted and delayed operations, as foreign companies whose expertise, technology and finance are badly needed, have been banned from participation. Domestic investment in the region has also been constrained by the present low price of oil which does not cover the cost of production – it is estimated that the production cost of Arctic oil is $60-80 per barrel.

The third growth opportunity is Russia's shale oil potential. ExxonMobil, Shell, BP, and Statoil had all signed agreements with Russian companies to explore shale resources, yet progress has been delayed in light of U.S. and EU sanctions. The key initial work has been done in the Bazhenov shale, located below the existing fields in Western Siberia. The asset could contain up to 75 billion barrels of oil resources, making Russia potentially the largest shale oil producer in the world.

Further reading:

Gazprom statistics. http://www.gazpromexport.ru/en/statistics/

Overview of Russia's oil and gas sector regulation. https://uk.practicallaw.thomsonreuters.com/0-527-3028?transitionType=Default&contextData=(sc.Default)&firstPage=true&bhcp=1

Environmental impact of the Russian oil and gas sector. http://www.worldwatch.org/node/4455

Russia offers to sell gas to Saudi Arabia. https://www.reuters.com/article/us-russia-lng-novatek/russia-offers-to-sell-gas-to-saudi-arabia-from-yamal-lng-idUSKBN1E22HR

Upcoming Russian oil and gas projects. https://www.mioge.ru/en-GB/press/news/4882.aspx

Progress of Russia's LNG. https://www.oxfordenergy.org/publications/russian-lng-progress-delay-2017/

Russia and Saudi Arabia form an energy pact. https://www.ft.com/content/7af38c26-0801-11e8-9650-9c0ad2d7c5b5