Independent Statistics and Analysis
U.S. Energy Information Administration

Country Analysis Brief: Russia

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Overview

Table 1. Russia's energy overview, 2021

	Crude oil and other petroleum liquids	Natural gas	Coal	Nuclear	Hydro	Other renewables	Total
Primary energy production (quadrillion British thermal units)	22.7	26.6	10.5	2.4	--	2.0	64.1
Primary energy production (percentage)	35.4%	41.5%	16.4%	3.7%	--	3.1%	100.0%
Primary energy consumption (quadrillion British thermal units)	7.2	18.1	4.8	2.4	--	1.8	34.2
Primary energy consumption (percentage)	20.9%	52.8%	14.0%	6.9%	--	5.4%	100.0%
Electricity generation (terawatthours)	7.9	464.0	191.2	222.4	214.3	10.0	1109.7
Electricity generation (percentage)	0.7%	41.8%	17.2%	20.0%	19.3%	0.9%	100.0%

Data source: U.S. Energy Information Administration, International Energy Statistics, and BP, *Statistical Review of World Energy 2022*
Note: *Other renewables* includes hydro for primary energy production and primary energy consumption.

- In 2021, Russia was the third-largest energy producer and energy consumer in the world (Table 1).
- On February 24, 2022, Russia launched a full-scale invasion of Ukraine. Following the invasion, the United States enacted a range of sanctions targeting Russian trade, broad economic sectors, and specific entities.[1]
- The European Union (EU), Russia's main market for its energy exports and source for export-based revenues, also implemented several rounds of increasingly punitive sanctions and restrictive measures in response to the February 2022 invasion. Notably, initial rounds of EU sanctions disconnected 10 leading Russian financial institutions from SWIFT and banned coal imports from Russia.[2]
- In early June 2022, the European Union (EU) passed its sixth sanctions package against Russia, which included a complete ban on all seaborne crude oil and petroleum product imports from Russia into the EU. The sixth sanctions package also banned EU-based

companies from providing any maritime transport services for petroleum cargoes from Russia.[3]

- Because companies in the EU, the United Kingdom, and Norway have significant market share in the global maritime insurance and shipping industry, the sixth sanctions package prompted concerns that those sanctions could severely restrict oil flows from Russia and cause global oil prices to increase.[4] As a result, in late June 2022, the Group of Seven (G7) countries announced they would explore a global price cap on crude oil and refined products from Russia. The price cap would allow all members of the G7 to impose their own maritime services ban on oil flows from Russia, unless those cargoes are sold at or below a pre-determined price. The goal for this initiative was to prevent potential oil price increases by providing a way for Russia's oil to continue flowing on the market while limiting the amount Russia could earn for its oil exports.
- In early October 2022, the EU passed its eighth sanctions package, which codified the price cap initiative, and the G7 officially agreed to an initial crude oil price cap of $60/barrel in early December 2022.[5] The price cap for Russia's crude oil came into force on December 5, 2022, and the price cap for Russia's refined products will become effective on February 5, 2023.[6]
- A number of international energy companies have withdrawn or curtailed their Russia-based operations as well. BP, Equinor, Shell, Eni, and ExxonMobil have initiated total divestment from Russian assets. Total Energies, OMV, and Wintershall Dea have paused new investments in Russia.
- Energy flows from Russia to Europe decreased starting in February 2022, but Russia increased trade with countries where it can sell and ship, mostly to China and India.

Petroleum and Other Liquids

- Russia's proved oil reserves were 80 billion barrels as of January 1, 2023.[7] Russian firms Rosneft, Lukoil, Surgutneftegas, Gazprom, and Tatneft account for a majority of total crude oil production (Table 2).

Table 2. Russia's crude oil and condensate production by company, 2021
thousand barrels per day

Company	Total crude oil and condensate production
Rosneft	3,476
Gazprom	1,634
Lukoil	1,473
Surgutneftegas	1,171
Tatneft	557
Others	2,217

Data source: Rystad Energy

- The Russian government released its *Energy Strategy to 2035* in June 2020. The strategy seeks to diversify energy exports, modernize energy infrastructure, increase national competitiveness, and accelerate innovation and digitalization within its energy system, particularly in the Arctic region. Russia is prioritizing exports and revenue.[8]

- Further, Rosneft established the Vostok Oil project to focus on the northern territories, related infrastructure, and transportation via Russia's Northern Sea Route. As part of the Vostok Oil project, Rosneft began constructing an Arctic oil terminal at the Bukhta Sever port in 2022.[9]
- As of December 2022, Russia had 5.4 million barrels per day (b/d) of crude oil refining capacity from more than 25 refineries (Table 3).[10] Rosneft, the largest refinery operator, owns more than 2.0 million b/d of crude oil refining capacity.

Table 3. Russia's crude oil refining capacity by operator, 2022

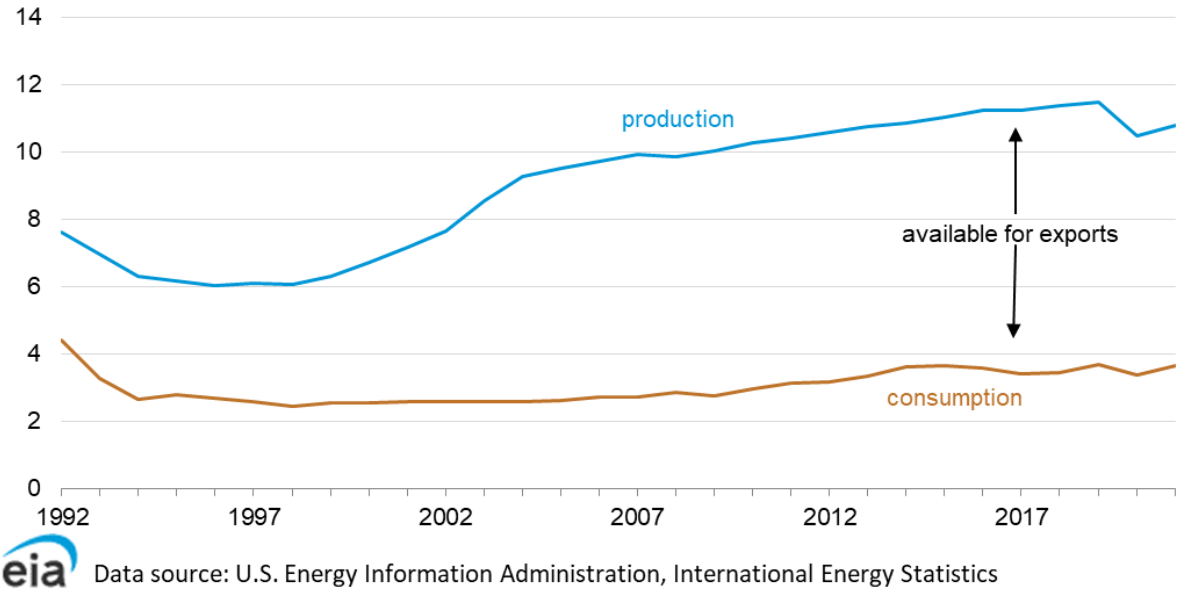
thousand barrels per day

Operator	Crude oil refining capacity
Rosneft	2,189
Lukoil	985
Gazprom	831
Tatneft	210
Others	1,195

Data source: *Oil and Gas Journal*

- In 2022, Gazprom Neft upgraded its Omsk Refinery (which supplies petroleum products to Siberia, the Urals, and Kazakhstan) to produce internationally compliant jet fuel and low-sulfur marine fuel that meets more stringent emission standards.[11] Upgrades to Forte Invest's Orsk Refinery (which delivers petroleum products to neighboring Kazakhstan, Tajikistan, Uzbekistan, Belarus, and Kyrgyzstan as well as to Turkey and Malta) will be completed in 2023, increasing its yield of light oil products to 98%.[12]
- In 2021, 34% of Russia's domestic petroleum and other liquid fuels production was consumed domestically (Figure 1).

Figure 1. Russia petroleum and other liquid fuels production and consumption, 1992–2021

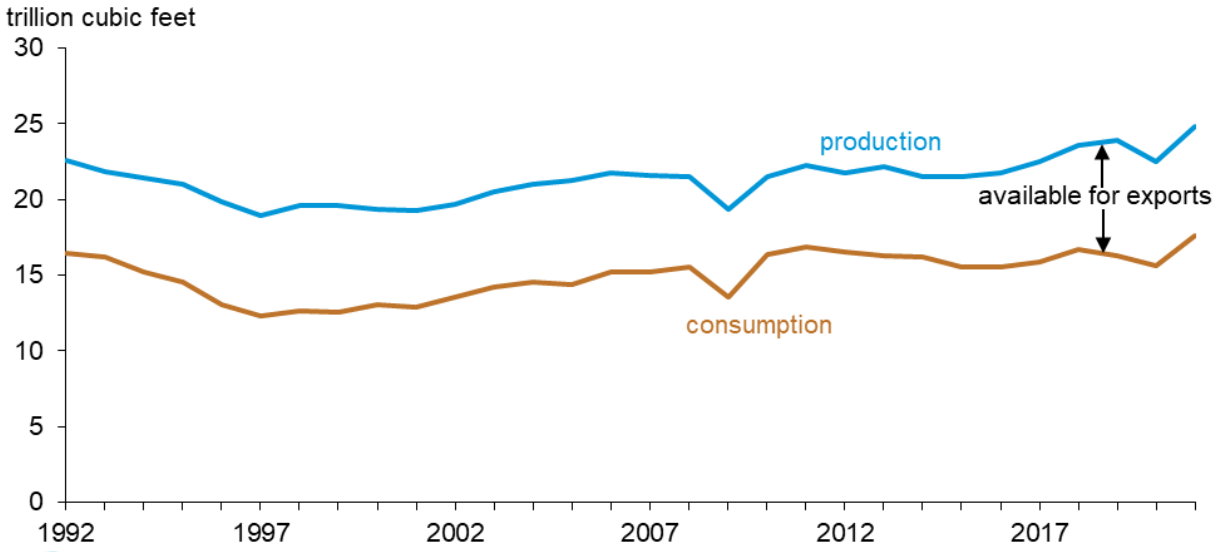


- The Caspian Pipeline Consortium's (CPC) de-bottlenecking program is nearly complete. Beginning in 2023, the upgraded pipeline, which transports crude oil produced in Kazakhstan and Russia to the Russian Black Sea port of Novorossiysk, will be able to transport nearly 1.5 million b/d of oil from Kazakhstan. Pipeline capacity will rise to 1.7 million b/d as it passes through Russia.[13]
- Russia may delay the launch of new hydrocarbon gas liquid (HGL) facilities following the full-scale invasion of Ukraine. Sibur's Amur Gas Chemical Complex (with a planned production capacity of 2.7 million tons per year), is a joint venture with China's Sinopec, and is co-located with Gazprom's Amur Gas Processing Plant in Svobodny and was originally scheduled to start production in 2024. The facility will produce polyethylene and polypropylene and consume ethane as well as smaller quantities of propane as feedstock. Irkutsk Oil's Ust-Kut polymer plant (with a planned production capacity of 650 thousand tons per year), located in East Siberia, will produce ethylene and polyethylene and consume approximately 45,000 b/d of ethane feedstock, and was also scheduled to launch in 2024.[14] Revised launch schedules for either facilities have not been published.

Natural Gas

- Russia held the world's largest natural gas reserves, at 1,688 trillion cubic feet (Tcf), as of January 1, 2023.[15]
- Natural gas discoveries in Russia's Arctic region, particularly in the Yamal Peninsula and Ob Bay, could facilitate Russia's plans to increase liquefied natural gas (LNG) exports to approximately 4.5 Tcf–4.9 Tcf per year by 2024 and to about 8.3 Tcf–9.6 Tcf per year by 2035, according to industry publications.[16,17,18,19]
- In 2021, Russia flared more than 897 million cubic feet of natural gas, accounting for the largest share of the 5.1 Tcf flared globally.[20]
- In 2021, 71% of Russia's natural gas was consumed domestically (Figure 2).

Figure 2. Russia dry natural gas production and consumption, 1992–2021



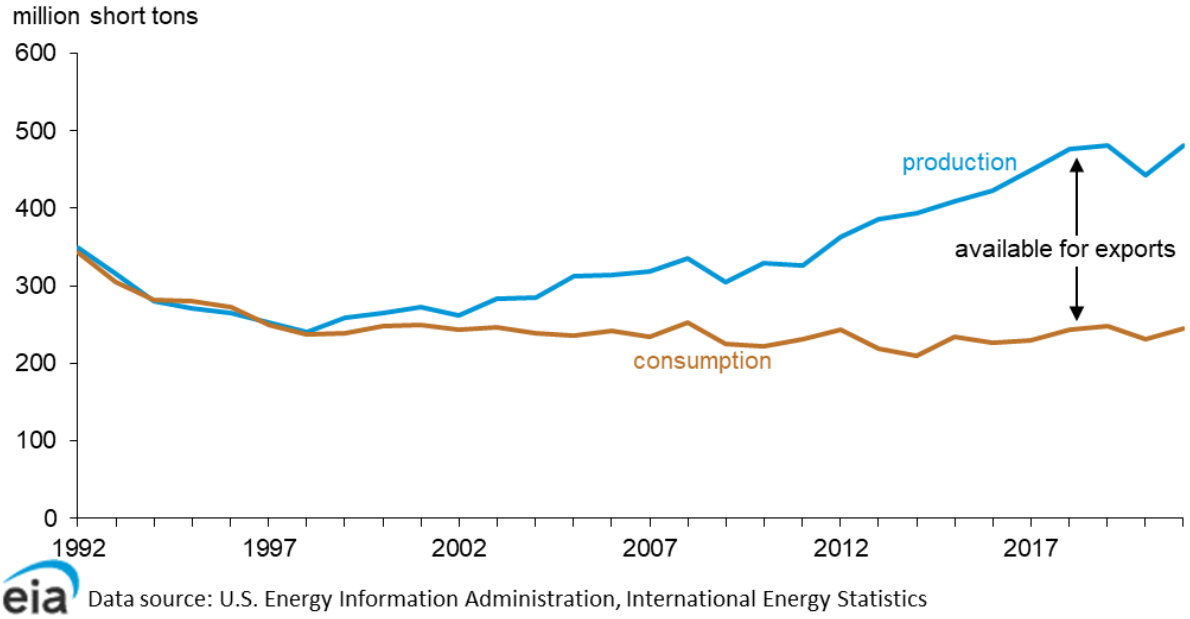
Data source: U.S. Energy Information Administration, International Energy Statistics

- Russia continues to increase its LNG export capacity. The first train of Gazprom's Baltic LNG at Ust-Luga port, a two-train LNG export facility with a total capacity of 624 billion cubic feet (Bcf) per year, is scheduled to begin commercial operations in 2023. The second train will come on stream in 2024.[21] Novatek's Arctic LNG-2 project on the Gydan Peninsula, a three-train liquefaction export facility with a total capacity of 951 Bcf per year, is scheduled to export its first LNG cargo in 2023. Arctic LNG-2's second and third trains will begin operation in 2024 and 2026, respectively.[22] However, these dates were announced by operating companies prior to Russia's full-scale invasion of Ukraine and have not been revised since then.

Coal

- Russia's coal reserves were approximately 179 billion short tons at the end of 2021, making it the second-largest holder of recoverable coal reserves in the world after the United States.
- Russia is ranked the sixth-largest coal producer in the world behind China, India, Indonesia, the United States, and Australia. The Kuznetsk Basin, located equidistant to the main Baltic and Black Sea ports in the west and the Far East ports on the Pacific, accounts for over half the coal produced in Russia.[23] Other key basins include the long-mined Donetsk Basin, the Yakutia Basin, and the Pechora Basin, which is close to the north coast.
- Bituminous coal, used for thermal generation, and metallurgical coal, an important input for iron and steel production, cumulatively accounted for nearly two-thirds of the 481 million short tons of coal produced in 2021.
- In 2021, 51% of Russia's coal production was consumed domestically (Figure 3).

Figure 3. Russia coal production and consumption, 1992–2021



Data source: U.S. Energy Information Administration, International Energy Statistics

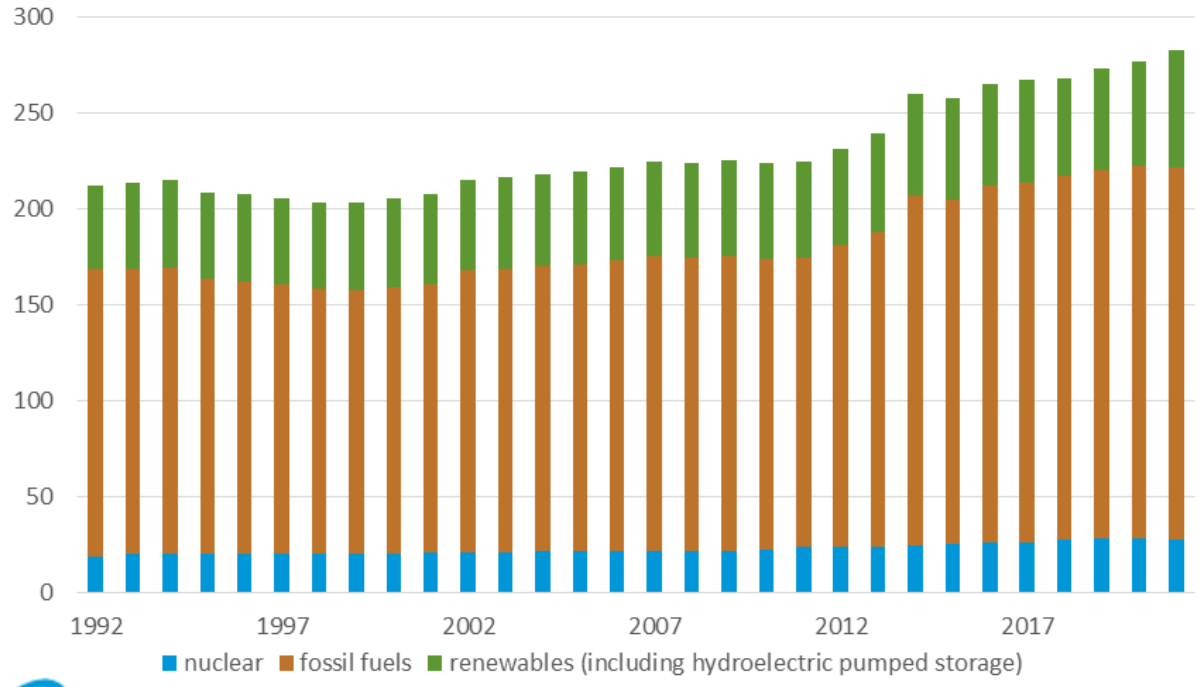
- Russia is investing in its coal infrastructure. In June 2020, Russia adopted a long-term program for developing its coal industry by 2035. With the 2035 Coal Program, Russia plans to expand the eastern ends of the Baikal-Amur Mainline (BAM) and Trans-Siberian railways, removing a bottleneck for coal flows to its eastern seaports; create new coal extraction hubs; and implement high global standards on efficiencies and capacities for domestic coal producers.[24,25]

Electricity

- Russia's installed electricity generation capacity increased to 283 gigawatts (GW) at the end of 2021. Although the country added 7 GW of renewable (hydro, solar, and wind) capacity last year, renewable capacity, as a share of total capacity, has averaged 21% since 1992 (Figure 4).

Figure 4. Russia electricity capacity share by source, 1992–2021

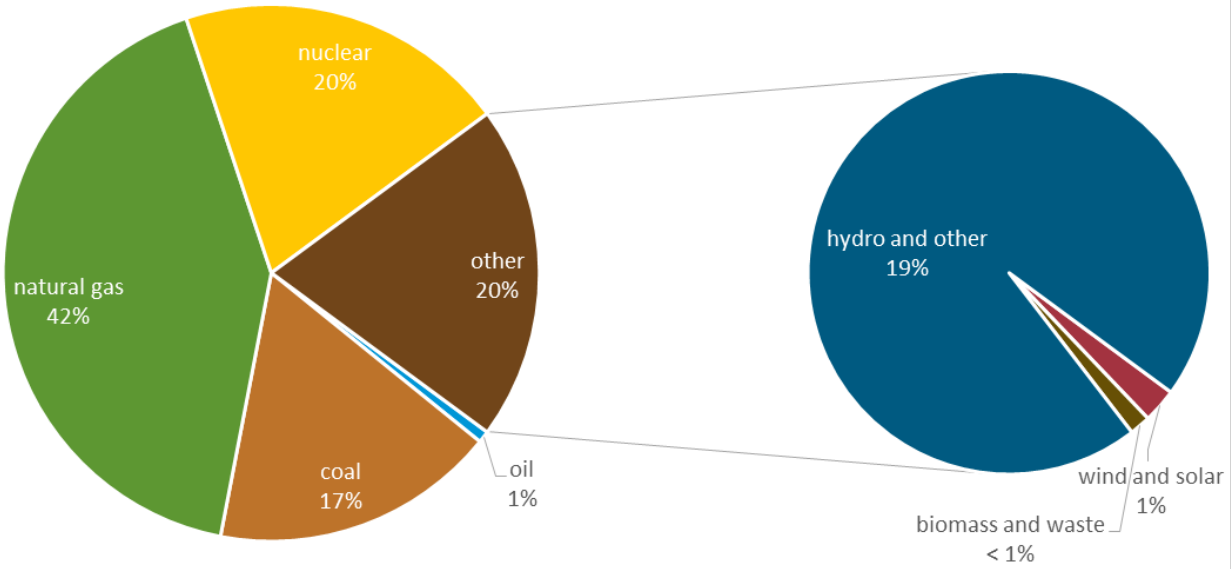
million kilowatts



Data source: U.S. Energy Information Administration, International Energy Statistics

- Russia's electric power generation was 1,110 billion kilowatthours (kWh) in 2021. About 60% of Russia's electric power generation came from fossil fuel-derived sources, and the remainder came mostly from nuclear and hydroelectric sources (Figure 5).

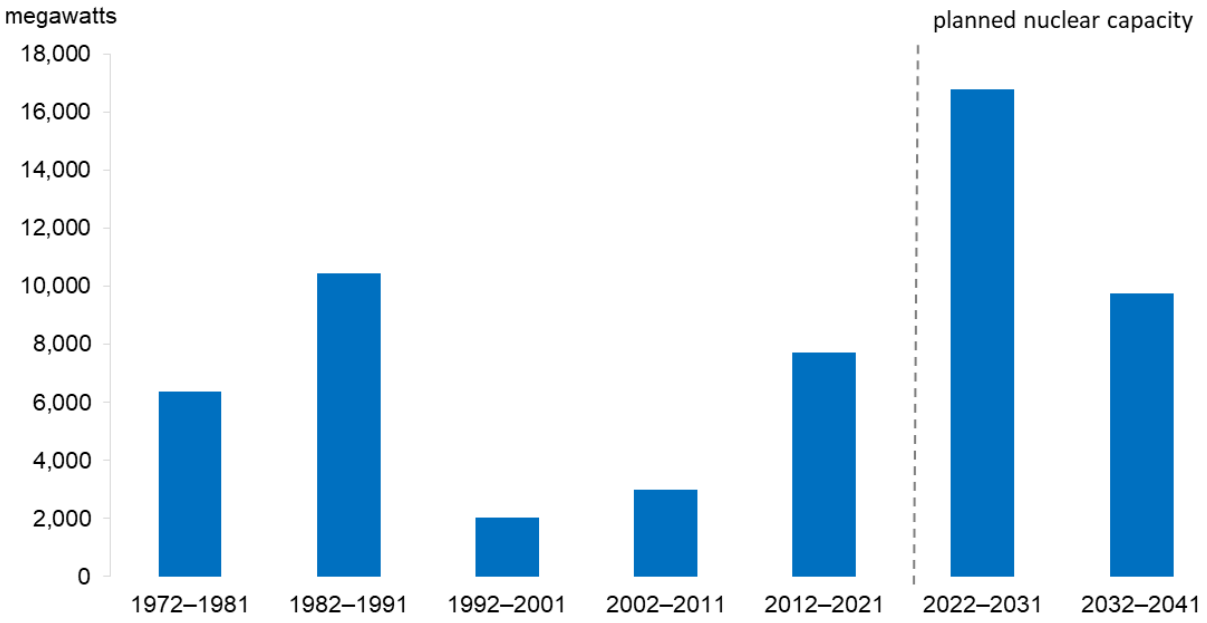
Figure 5. Russia electricity generation by source, 2021



Data source: U.S. Energy Information Administration, International Energy Statistics, and BP, Statistical Review of World Energy 2022

- Russia is planning to expand the role of nuclear energy. Based on the most recent information available, three nuclear power reactors (Kursk II-1, Kursk II-2, and BREST-OD-300), with a total gross generation capacity of 2.8 GW, are under construction.[26] In addition, Rosenergoatom, Russia's sole utility company operating the country's nuclear plants, anticipates building 26 additional nuclear reactors that would potentially provide approximately 24 GW of additional capacity over the next 15 years (Figure 6).[27]

Figure 6. Operating and planned nuclear capacity in Russia, as of December 2022



Data source: International Atomic Energy Association, Power Reactor Information System
Note: According to the World Nuclear Association (WNA), construction of Baltic I was suspended in July 2013, and the reactor pressure vessel (RPV) made for Baltic I was sent to be used in Ostrovets 2 in Belarus. The unit was removed from the WNA's database in November 2020 and is not part of the data for the graph above.

- Russia has the world's first floating cogeneration nuclear power plant, the *Academician Lomonosov*. Located at the Artic port of Pevek, 600 miles from the Bering Strait, the Academician Lomonosov is based on technology used for nuclear icebreaker ships and consists of two 35 megawatts reactors that provide heat and power to the town.

Energy Trade

Petroleum and other liquids

- In 2022, four ports (Primorsk, Nakhodka, Novorossiysk, and Ust-Luga) accounted for 82% of Russia's crude oil and condensate exports (Table 4). Similarly, three ports (Ust Luga, Novorossiysk, and Primorsk) accounted for more than half of Russia's refined petroleum product exports (Table 5).

Table 4. Russia's seaborne crude oil and condensate exports by port terminal, 2022

thousand barrels per day

Port terminal	Crude oil and condensate exports
Primorsk	826
Nakhodka	795
Novorossiysk	640
Ust-Luga	554
Murmansk	314
Sokol Sakhalin	99
Varandey	101
Others	114

Data source: Kpler

Note: Novorossiysk includes CPC loadings where the seller is Lukoil, excludes all other CPC loadings. Murmansk includes volumes that are originally loaded in Arctic ports, and transshipped through Murmansk, in order to optimize shipping.

Table 5. Russia's seaborne refined petroleum product exports by port terminal, 2022

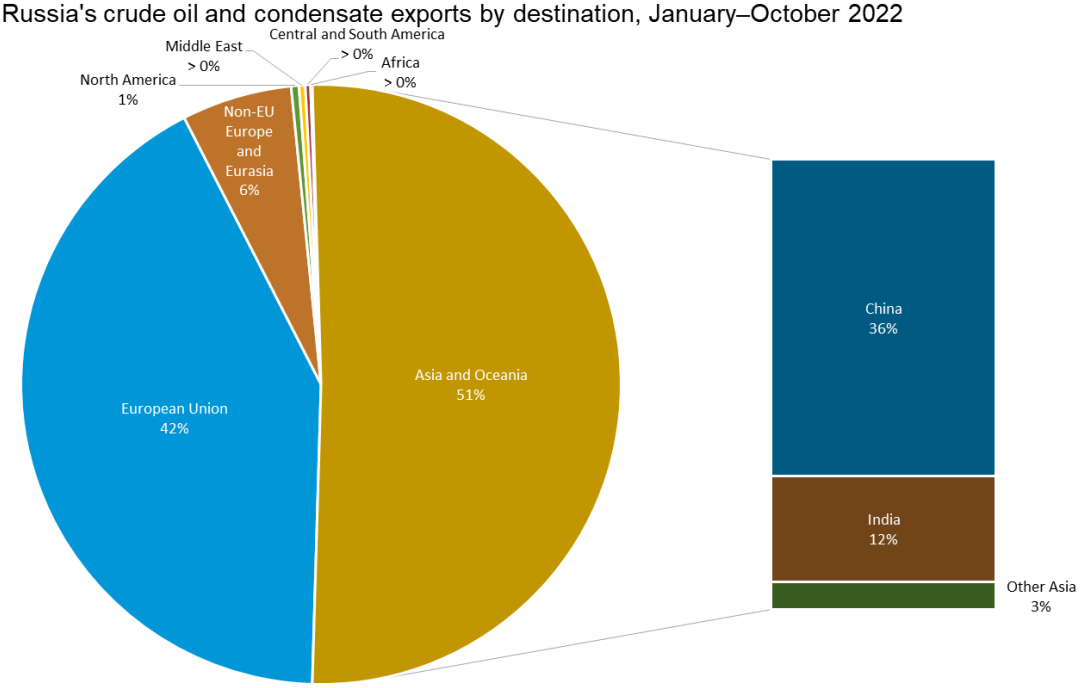
thousand barrels per day

Port terminal	Refined petroleum product exports
Ust Luga	701
Novorossiysk	372
Primorsk	350
Tuapse	251
Vysotsk	239
St Petersburg	192
Taman	139
Others	362

Data source: Kpler

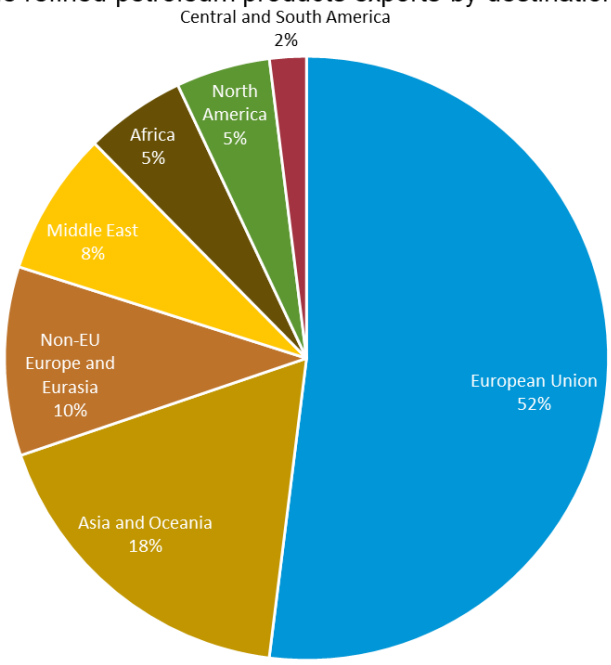
- Russia exports crude oil and condensates to Europe via the Druzhba pipeline system, which was briefly interrupted in mid-November 2022.[28] Russia exports crude oil and condensates to China via the ESPO and the Kazakhstan-China (KC) pipelines. The KC pipeline is under a swap arrangement between Russia and Kazakhstan. A small portion of the Caspian Pipeline Consortium (CPC) pipeline, which primarily carries Kazakh crude oil, is also used to export crude oil and condensates.
- Between January and October 2022, Russia's seaborne and piped exports of crude oil and condensate totaled about 5 million barrels per day (b/d) (Figure 7). China received the largest share, at 36%, of Russia's total crude oil and condensate exports. During the first 10 months of 2022, seaborne deliveries of refined petroleum products were 2.5 million b/d, and EU markets received 52% of these deliveries (Figure 8). Diesel, fuel oil, and naphtha, cumulatively, accounted for 86% of total seaborne refined petroleum products exports. Data are limited for other methods of transportation.[29]

Figure 7. Russia's crude oil and condensate exports by destination, January–October 2022



Data source: Kpler and International Energy Agency, *Oil Market Report*

Figure 8. Russia's seaborne refined petroleum products exports by destination, January–October 2022



Data source: Kpler

Natural gas

- Six major pipelines connect Russia's natural gas infrastructure to European markets, and two pipelines transport Russia's natural gas to Asian markets (Table 6). Russia's western pipelines have also been affected by Russia's full-scale invasion of Ukraine last year. For example, the German government suspended certification of the Nord Stream 2 following the full-scale invasion of Ukraine.[30] In May 2022, Ukraine suspended operations at the Sokhranivka measuring station and the Novopskov compressor station, which are part of the Soyuz and Brotherhood pipeline system, because of interference by Russian forces.[31] In early-September 2022, Nord Stream was shut down following explosions that damaged the pipeline.[32] Russia plans to increase deliveries of natural gas to China via Mongolia with the proposed Power of Siberia 2 pipeline, which would expand its export options beyond Europe.

Table 2. Russia's major natural gas export pipelines

Pipeline	Annual capacity (trillion cubic feet)	Total length (miles)	Supply regions	Markets
Western pipelines				
Yamal-Europe	1.2	2,552	West Siberian fields including Urengoy area	Poland, Germany, and northern Europe via Belarus
Blue Stream	0.6	754	West Siberian fields including Urengoy area	Turkey via the Black Sea
Nord Stream	1.9	761	West Siberian fields including Urengoy area	Germany and northern Europe via the Baltic Sea
Nord Stream 2	1.9	761	West Siberian fields including Urengoy area	Germany and northern Europe via the Baltic Sea
Soyuz and Brotherhood (Urengoy-Pomary-Uzhhorod)	1.1	2,800	West Siberian fields including Urengoy area, Russian Urals fields, and Central Asia	Western Russia and Europe via Ukraine
TurkStream	1.1	580	West Siberian fields including Urengoy area	Turkey and southeastern Europe via the Black Sea
Eastern pipelines				
Sakhalin-Khabarovsk-Vladivostok	0.2	1,118	Sakhalin fields (offshore northern Sakhalin)	Eastern Russia with potential exports to Asia via Vladivostok LNG or new pipelines
Power of Siberia	Mainline: 2.2 China spur: -1.3	5,040	East Siberian fields including Chayadinskoye in Yakutia region and Kovytka in Irkutsk region	Northeast China with a connection to the Sakhalin-Khabarovsk-Vladivostok pipeline

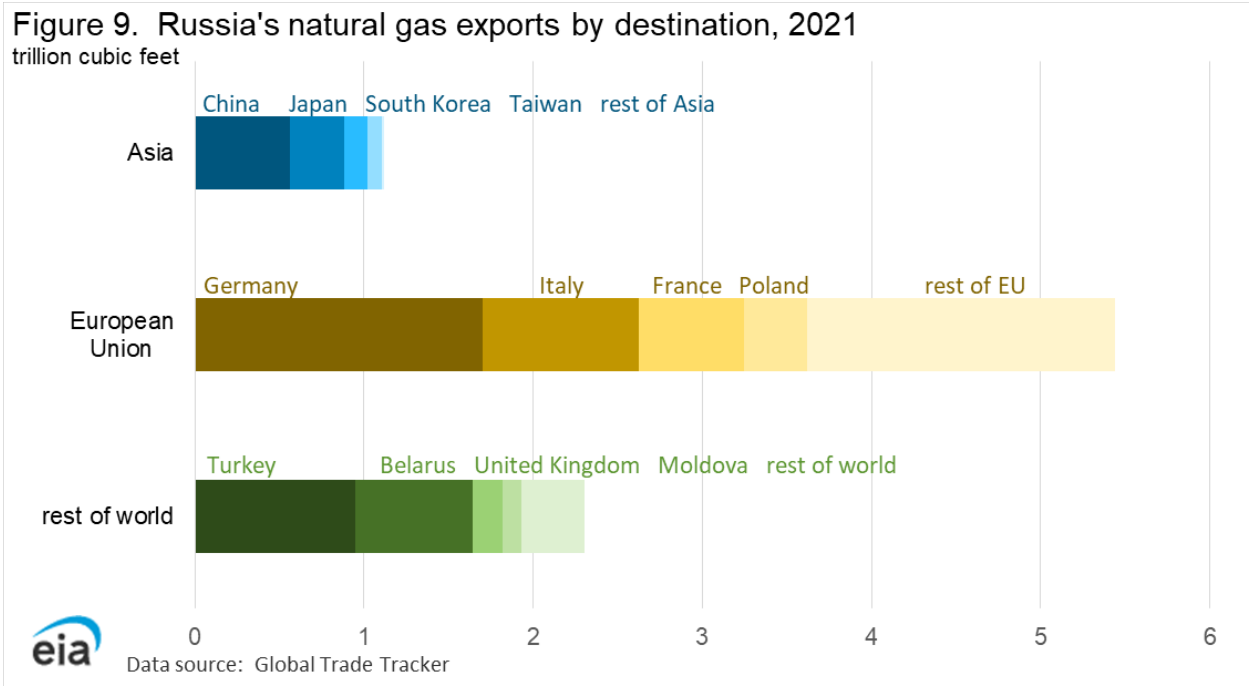
Data source: Enerdata, Reuters, British Petroleum, Gazprom, Sakhalin Energy, TurkStream, World Gas Intelligence, Nefte Compass, and Argus FSU

- Between January and October 2022, Russia delivered 1.4 trillion cubic feet (Tcf) of natural gas via various pipelines to Europe, a large decrease compared with the 2.9 Tcf delivered during the same period in 2021. However, Russia increased natural gas exports to China via the Power of Siberia pipeline between January and October 2022.[33] During the first 10 months of 2022, Russia also exported 2.1 Bcf of liquefied natural gas (LNG).[34] Japan, China,

and France were the top three destinations for Russia's LNG exports. Data are limited for other methods of transportation.

- In 2021, Russia exported 8.9 Tcf of liquefied and piped natural gas. Nearly 85% of Russia's exported natural gas arrived at its destination country via pipeline, and the rest was shipped as LNG. The EU received more than 60% of Russia's natural gas exports (Figure 9). Within the EU, Germany was the largest importer of Russia's natural gas exports, receiving 1.7 Tcf.

Figure 9. Russia's natural gas exports by destination, 2021



Coal

- Historically, Russia's coal exports accounted for most of the European coal import market because of Russia's proximity to Europe. Now, they compete with Indonesia to supply coal to the Asian and Far Eastern markets. Russia is increasing coal sales in new markets by offering price discounts.
- Following the EU ban on importing coal from Russia, Russia began marketing its coal to buyers in Asia. Between January and October 2022, Russia's seaborne coal exports were nearly 200 million short tons (MMst), a slight decrease compared with the 218 MMst during the same period in 2021.[35,36] Despite rising rail costs and railway bottlenecks domestically, Russia continued to deliver both thermal and metallurgical coal to China and India, the primary benefactors of Russia's price discounts. Together, seaborne coal exports to China and India, which previously accounted for 27% of Russia's total seaborne coal exports in 2021, grew to over 40% from January through October 2022. Data are limited for other methods of transportation.
- In 2021, Russia exported 262 million short tons (MMst), or more than half of the coal the country produced. Thermal coal exports, often used for power generation, accounted for 86% of Russia's coal exports. The EU received 24% of all Russia's thermal coal exports and 11% of all Russia's metallurgical coal exports (Figures 10 and 11).

Figure 10. Russia's thermal coal exports by destination, 2021

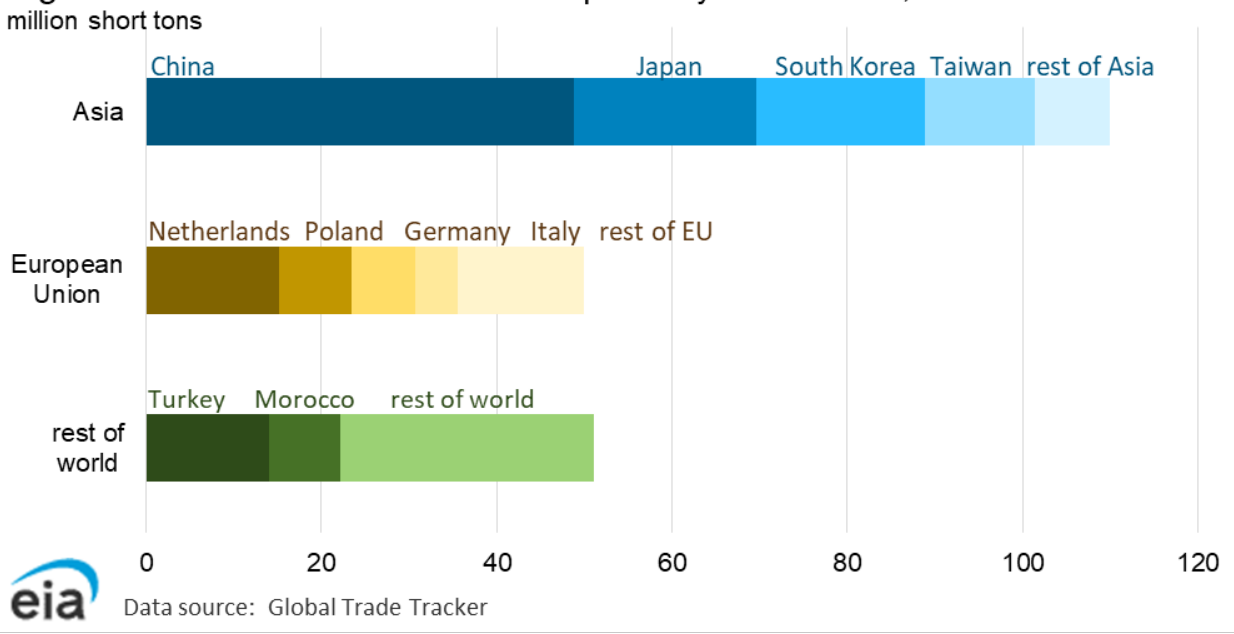
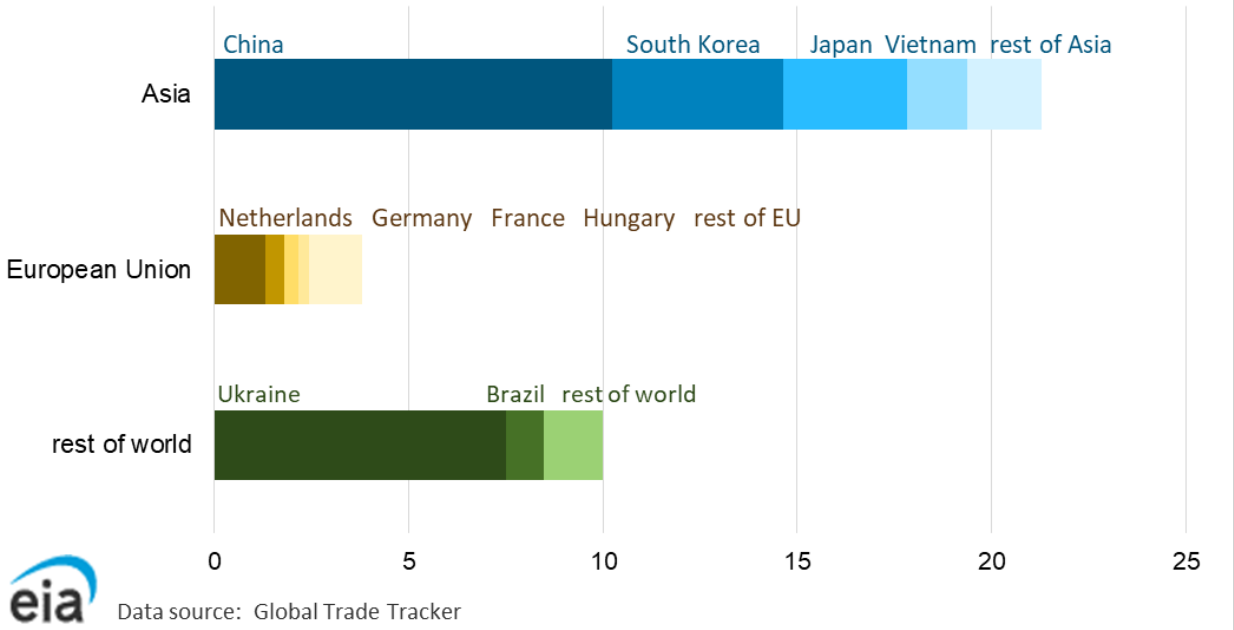


Figure 11. Russia's metallurgical coal exports by destination, 2021



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