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Paint It Green:
Russia and the Energy Transformation

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Russia's decision to ratify the Paris Agreement shouldn't be seen as a major shift in its approach to climate policy and green energy. The Kremlin's main concern is not climate change but potentially lower demand for fossil fuels as a result of more restrictive climate policies pursued around the world and the economic fallout of the COVID-19 pandemic. Therefore, instead of genuine efforts to transform its energy sector, Russia will promote it as helpful in Europe's energy transformation. Such tactics will be exploited to seek closer cooperation with Europe and to maintain Russia's position as a gas exporter.

Russia and Greenhouse Gas Emissions

Russia's energy sector was inherited from the USSR, which had developed strong fossil-based energy resources as well as nuclear and hydro energy. During the Soviet era and after the USSR's collapse little attention was paid to environmental issues. Russia entered the 1990s as one of the world's top polluters after the U.S. and China. However, between the collapse of the Soviet Union in 1991 and the 2015 adoption of the Paris Agreement, greenhouse gas (GHG) emissions by Russia decreased by 31%. This stemmed from a 20% decrease in primary energy consumption—with a huge slump in the 1990s as a result of the state's economic collapse—and changes in the energy mix. The consumption of the most polluting fuels, coal and oil, decreased by 45% and 41%, respectively, and the share of hydropower and nuclear energy increased. Despite that, Russia remains the fourth-largest polluter in the world.

Table 1. Russia's Fuel/Energy Consumption and GHG Emissions

	1990	1991	1995	2000	2005	2010	2015
Coal (mln tonnes)	182.3	167.1	119.4	105.8	94.6	90.5	92.1
Oil (mln tonnes)	251.7	245.3	150.6	123.2	125.0	133.3	144.3
Natural gas (bcm)	414.2	425.0	372.4	366.2	400.4	423.9	408.7
Nuclear (mln toe)	26.8	27.1	22.5	29.6	33.8	38.6	44.2
Hydro (mln toe)	37.8	38	39.9	37.1	39.1	37.7	38
Total primary energy (mln toe)	859.6	847.7	655.6	613.4	640.3	669.3	675.4
GHG mln tonnes of CO2 equivalent*	3 186.8	3 24.3	2 084.8	1 900.8	1 994	2 057.6	2 093.6

* Total emissions excluding Land use, land-use change, and forestry (LULUCF).

Source: *BP Statistical Review of World Energy June 2019 (All data 1965-2018)*, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html; OECD; https://unfccc.int/files/ghg_emissions_data/application/pdf/rus_ghg_profile.pdf; https://stats.oecd.org/Index.aspx?DataSetCode=AIR_GHG.

Natural gas dominates the power generation mix with 47% of energy consumption. Despite the lower demand, coal still has a significant share (16%), and solar and wind energy are virtually non-existent.

Table 2. Russia's Power Generation Mix

	1990	1991	1995	2000	2005	2010	2015	2018
Coal	14%	14%	19%	20%	17%	16%	16%	16%
Oil	11.8%	12%	8%	4%	2%	1%	1%	1%
Natural gas	47%	47%	41%	42%	46%	50%	50%	47%
Nuclear	10.9%	11%	12%	15%	16%	16%	18%	18%
Hydro	15.4%	16%	20%	19%	18%	16%	16%	17%
Total (TWh)	1082.2	1068.2	860.0	877.8	954.1	1038.0	1067.5	1110.8

Source: *BP Statistical Review of World Energy June 2019 (All data 1965–2018)*, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html.

Most of Russia's thermal power plants (which use mainly natural gas) require modernisation. Since the country's energy intensity (energy consumption per unit of GDP) is 1.2-2 times higher than the world

average, together with the wider effort to improve energy efficiency this could potentially reduce Russia's GHG emissions.[1]

According to a BP forecast, Russia's energy production and consumption will increase by 21% and 7%, respectively, in 2017-2040. The consumption of coal will decline by 36% while nuclear energy will increase (by 35%), as well as hydro (12%), and gas (9%). The share of renewable energy sources (RES)[2] in primary energy consumption will rise from less than 1% in 2017 to 2% in the period.[3]

Russia aims to decrease GHG emissions by 25–30% to 2030 compared with 1990 levels. In fact, this target was achieved in 2015.

Russia, though, has set unambitious GHG emissions-reduction targets. Its Intended Nationally Determined Contribution (INDC) submitted in 2015 under the United Nations Framework Convention on Climate Change aims to decrease GHG emissions by 25–30% to 2030 compared with 1990 levels. In fact, this target was achieved in 2015 (see Table 1). In addition, in its INDC Russia suggests considering its forests' GHG-absorption potential (known as LULUCF, or Land Use, Land-Use Change and Forestry), which is emphasized also in the Paris Agreement. It remains a fact that Russian forests have big GHG-reduction potential: Russia is the biggest country in the world, with about a half of it covered by forests. However, in this case, including LULUCF in the calculations can justify Russia increasing GHGs in the coming decades.

Maintaining the Status Quo: Russia's Energy Strategy

The focus on traditional fuels is also reflected in Russia's strategic documents. Its energy strategy for the period to 2035, approved in April 2020, gives some insight into its goals in the energy sector (although it does not assess the impact of the COVID-19 pandemic, apart from mentioning it as one of the factors impacting oil prices). The strategy confirms its unambitious climate policy. In it, Russia sets the above-mentioned target of 25–30% GHG reductions compared to 1990 levels and also suggests including LULUCF absorption when calculating reductions, as discussed above.[4] This approach could serve as an excuse not to pursue an ambitious climate policy.

[1] Энергетическая стратегия Российской Федерации на период до 2035 года, Министерства энергетики Российской Федерации April 2020, p. 26, https://minenergo.gov.ru/node/1920.

[2] Regarding renewables, this paper discusses mainly wind and solar energy: the most rapidly developing RES sources. In 2018, global electricity generation from wind and solar power increased by 12.6% and 29%, respectively, compared to 7% growth of other RES sources. Furthermore, some features of wind and solar energy make them exceptional, such as the use of rare-earth minerals, the need to balance their supply/demand, depending on weather conditions, and coupling them with hydrogen production and electric vehicles in EVs. All of these challenges shape the energy transformation and impact the development of modern technologies.

[3] "BP Energy Outlook—2019. Russia," BP, www.bp.com.

[4] The strategy states that Russian emissions (including LULUCF) in 2017 were at 50.7% of the 1990 level. The table with projections includes this figure for 2017 and sets the goal for 2035 at 70–75% of 1990 emissions. This suggests that Russia wants to include LULUCF, making its commitment even weaker. See: Энергетическая стратегия Российской Федерации на период до 2035 года, Министерства энергетики Российской Федерации April 2020, pp. 27, 59, 79, www.minenergo.gov.ru.

The strategy declares that Russia will create a national GHG monitoring system. According to the strategy, one of the aims of the development of the Russian energy sector is to "strengthen and maintain" its position on the global energy market. This aim should be achieved by supporting a "positive image" of Russian energy (i.e., its natural gas and nuclear sectors) internationally. Russian energy is said to be clean and one of the most eco-friendliest, since a large share of it comes from nuclear, hydro, and natural gas. However, the production of fossil fuels and their consumption will generally remain at the current level or increase.

A large share of Russian energy comes from nuclear, hydro, and natural gas. That is why it branded as "clean" by the Russian leaders.

Russia also plans to support domestic RES development and aims to export these technologies. However, the strategy indicates that RES will not play significant role in Russia—it mentions that RES are not price-competitive. One measure to protect the environment is to use the Best Available Technology[5] principle, but since Russia considers its traditional energy sectors as the most eco-friendly, this would rather petrify the *status quo.*

Table 3. Russia's Fuel Production and Consumption Forecast

	2018		2024		2035	
	Production	**Consumption**	**Production**	**Consumption**	**Production**	**Consumption**
Coal (mln tonnes)	439	205	448-530	195-213	485-668	184-211
Oil (mln tonnes)	555	-	556-560	-	490-555	-
Natural gas (bcm)	678	460	740-764	462-475	801-923	470-484

Source: *Энергетическая стратегия Российской Федерации на период до 2035 года*, Министерства энергетики Российской Федерации, p. 81-82, https://minenergo.gov.ru. The values for natural gas were converted from Russian GOST, as per Gaz-System's conversion factor: https://en.gaz-system.pl/strefa-klienta/sgt-gazociag-jamalski/parametry-charakteryzujace-jakosc-przesylanego-gazu. The strategy does not include the future oil consumption, focusing only on fuels, like diesel.

The strategy does not include figures on the future share of wind and solar in the energy mix, so the implication is that these will not be significant[6] (RES might be developed to some extent in some isolated areas). What is more, the strategy aims to stimulate demand for power from RES but, as emphasized, it will be "voluntary demand", which suggests no strong commitments will be made. Russia also aims to improve the efficiency of its hydropower plants.

The strategy also acknowledges that hydrogen can become an important source of energy; Russia has production potential and should become one of the world leaders in hydrogen production and export.

[5] It means the technologies that are best for limiting GHG emissions, see: "Best available techniques: environmental permits," www.gov.uk.

[6] This can be concluded from two earlier drafts of the strategy. The draft from 2017 forecasted that 2-3% of electricity will be generated from RES in 2035. The 2017 draft states that RES could be developed in isolated regions since RES are not competitive to power sources integrated with Russia's central grid, while a later draft (from 2019) forecasts that in 2035 more than 97% of power will be supplied from the centralised power grid (thermal/nuclear/hydro power plants).

Domestic demand should be stimulated and export is projected to reach 0.2 million tonnes in 2024 and 2 million in 2035. Russia aims to develop production technologies (see "hydrogen" below).

Russia's Energy Security Doctrine (approved in 2019) is consistent with these goals. It emphasizes the significance of hydrocarbons and nuclear energy[7] and lists the development of green energy and climate policy as challenges. According to the doctrine, Russia supports climate policy but when it supports Russian national interests; it also emphasizes the need to develop domestic RES technologies.

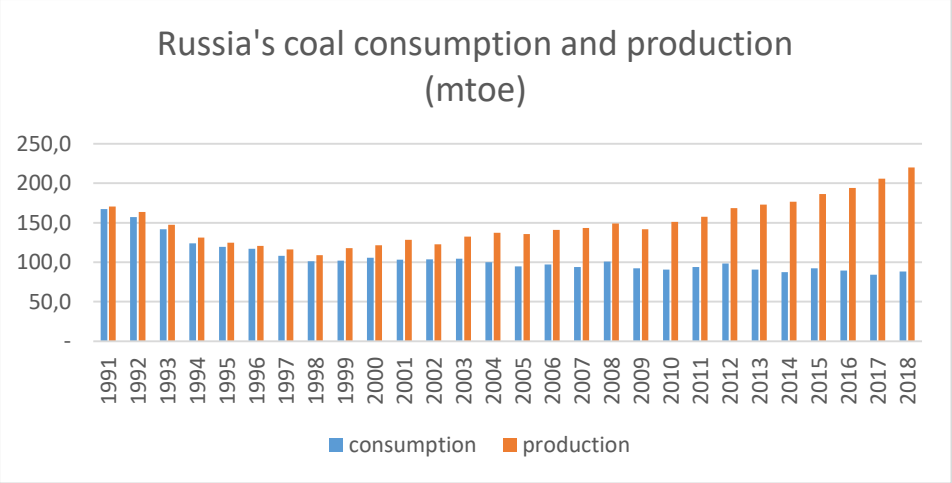
These documents give a better understanding of Russia's approach to climate-related issues and the Paris Agreement. President Vladimir Putin revealed himself as sceptical of both anthropogenic global warming and RES, stating on one occasion that he's against an Earth with "rows of wind-powered generators and covered by several layers of solar panels." Putin's message is in fact consistent with the strategic documents quoted above. This view can be summarized as Russia wants to follow its own path and the green transformation should include a role for Russian natural gas and nuclear power.

Coal and Oil: Development and the Future of "Dirty" Fuels

Russia has no plans to phase out coal or oil. Even if domestic consumption of these does not change significantly, Russia wants to increase exports.

Between 1991 and 2018, Russia's coal production increased from 170.6 to 220 million tonnes of oil equivalent (mtoe),[8] and oil from 9.264 to 11.438 million barrels per day (mbpd). Simultaneously, domestic consumption decreased from 167 to 88 mtoe and from 4.9 to 3.2 mbpd,[9] which allowed Russia to maintain its position as the top coal and oil exporter. In 2018, Russia recorded record high exports of 136.2 mtoe of coal, making it the world's third-biggest exporter, and it was the top oil exporter with 9.1 mbpd.

Figure 1. Russia's Coal Consumption and Production (1991–2018)



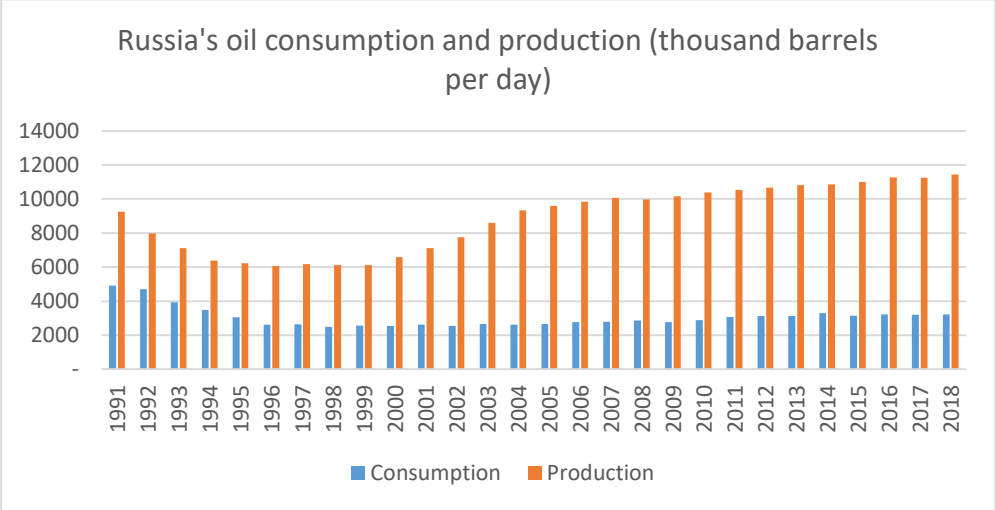
Source: *BP Statistical Review of World Energy June 2019 (All data 1965–2018)*, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

[7] "Указ «Об утверждении Доктрины энергетической безопасности Российской Федерации»," Президент России, 13 May 2019, p. 3, www.kremlin.ru.

[8] Million tonnes of oil equivalent, an energy unit that allows comparisons of different types of fuel.

[9] "BP Statistical Review of World Energy June 2019 (All data 1965-2018)," BP, June 2019, www.bp.com.

Figure 2. Russia's Oil Consumption and Production (1991–2018)



Source: *BP Statistical Review of World Energy June 2019 (All data 1965-2018)*, BP, June 2019, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

While the EU views coal as the "dirtiest" fuel and plans to phase it out (and there is little Russia can do about it), the Russian government supports its domestic coal industry and sees future export opportunities, mainly to the markets in the Asia-Pacific region. Similarly, Russian companies' aim (at least before the COVID-19 pandemic) to at a minimum maintain oil production and develop Arctic oil reserves, which are to become a crucial resource base in the long run. The government offers tax preferences for the largest oil producers like Rosneft.

According to BP estimates and the Russian energy strategy, Russia's growth of oil production will be higher than consumption while coal production will increase insignificantly and its consumption will decrease. This means exports of both resources should increase. There is also a noteworthy difference between Russian companies and some Western oil companies. While some of the Russian companies emphasize "sustainable development," it is not yet as important an issue as with Western corporations. The latter not only diversify their portfolios and invest in RES but even change their names to rebrand to a "cleaner" image not associated with the "dirty" fuels, e.g., Statoil (Norway) rebranded as Equinor.

Painting Russian Energy Green

The fossil fuel and nuclear energy provide energy for domestic needs and create jobs. They are also important foreign policy tools.

The pressure to reduce emissions comes mainly from abroad,[10] for example, from concerns about the EU's plans to introduce a carbon border tax. So far, Russian decision-makers have not been addressing these challenges, although some advisers and liberal politicians are aware of them. For instance, the Ministry of Economic Development abandoned its plans to set GHG targets for companies. This was at least partly due to the lobbying of the Russian Union

[10] P. Kiryushin, "'Green Economy': Opportunities and Constraints for Russian Companies," IFRI, August 2014, p. 13, www.ifri.org.

of Industrialists and Entrepreneurs, which argued that such targets would result in an increase in energy prices affecting ordinary people.[11] Russian energy companies instead promote natural gas and nuclear energy as supporting the energy transformation, rather than follow the path of the Western companies.

Natural Gas

Russia, one of the world's top natural gas producers, has 20% of global reserves, and with current output, these will be sufficient for the next 58 years. Gas contracts and supplies are used as a foreign policy tool and the sector plays an important role in social policy.

Natural gas is less-polluting than coal, diesel fuel, or gasoline and is promoted abroad by the Russian stakeholders as a more ecological fuel. This is particularly important since the EU, where Russia exported more than 75% of its pipelined gas in 2018, pursues an ambitious climate policy. Therefore, companies such as Novatek or Gazprom present natural gas as an important means for achieving climate goals and supporting RES development. President Putin himself defends natural gas as a clean fuel, but at the same time criticizes fracking technology (which has helped the U.S. to increase gas production to a level it can compete with Russia on some markets) and even called it "barbaric."

That natural gas can substitute coal as a low-emission fuel is raised on numerous occasions to justify such controversial projects like the Nord Stream 2 (NS2) pipeline. The companies involved emphasize that natural gas is an effective backup for RES because gas-fired power plants are more flexible than coal-fired ones. Nord Stream 2 AG (the pipeline's owner) has also ordered a report proving that supplies of natural gas via NS2 would produce significantly less GHGs than non-Russian liquefied natural gas (LNG) import alternatives such as those from the U.S.[12] (LNG can be transported by ships and the U.S. recently shipped gas to Europe) and lobbies within the EU, emphasizing the role of natural gas in the EU energy transition.

In the EU, the decarbonisation of road transport is gaining prominence as part of climate policy and electric vehicles are becoming more popular. Russia's objective in this area is the development of natural gas as motor fuel and to increase its domestic use. Gazprom promotes natural gas for transport, also in cooperation with foreign companies, and develops gas filling stations domestically and abroad.

The global use of natural gas as a maritime fuel seems to be promising from the Russian perspective. The International Maritime Organization introduced global caps on emissions from maritime transport (with several areas with stricter limits, including the Baltic and Northern seas). The EU also aims to pursue an ambitious policy reducing GHG emissions from shipping. It tips LNG as a maritime fuel, predicting demand is to increase in the coming years.[13] Within the EU, this will be enabled by the development of LNG filling stations at the ports of the TEN-T core network, and others.

In 2018, Russia exported 25 bcm of LNG and is expanding its capacities. Russian companies will benefit also from direct LNG sales, as they are present in this segment. Abroad, Gazprom subsidiaries cooperate with, among others, the port of Rostock (Germany), where they started LNG bunkering.

[11] A. Grigoryan, "Russia: Government Introduces Bill to Regulate Greenhouse Gas Emissions and Absorption," Library of Congress, 7 May 2019, www.loc.gov; N. Doff, "Russia Scraps Plans to Set Climate-Change Goals for Businesses," *Bloomberg*, 7 November 2019, www.bloomberg.com; It is worth mentioning that in most regions of the world RES are becoming more competitive, see: "Renewable Power Generation Costs in 2018," IRENA, May 2019, www.irena.org.

[12] "Comparison of Additional Natural Gas Imports to Europe by Nord Stream 2 Pipeline and LNG Import Alternatives," Thinkstep, 24 March 2017, www.globallnghub.com.

[13] These figures are based on operational and under-construction LNG-powered vessels as of June 2018. See: "LNG as a Maritime Fuel: Prospects and Policy," Congressional Research Service, 5 February 2019, p. 18, www.fas.org.

Novatek, on the other hand, created a joint venture with Belgian company Fluxys to construct an LNG transhipment terminal at Rostock, which will receive cargo from Vysotsk. Novatek also aims to boost its bunkering business in cooperation with Japanese firm Saibu. Russia also wants to promote LNG as a fuel on the Northern Sea Route, so its companies are constructing and using LNG-fuelled tankers.

Nuclear

With 36 nuclear reactors and total capacity of 29 GW, Russia is the fourth-largest nuclear power generating country in the world and also is investing in nuclear energy in the EU (e.g., in Finland and Hungary). Rosatom, the company responsible for Russia's nuclear industry, is the top global company in terms of uranium enrichment (36% of the global market) and holds the second-largest uranium reserves. It is of strategic importance to Russia's economy, energy security, and nuclear forces. The nuclear sector also helps brand Russian energy overall as clean—the 2035 Strategy mentions that, thanks to nuclear energy, among others, the Russian energy sector is environmentally friendly. Russia also aims to construct small nuclear reactors for remote or isolated areas, where RES normally fits best.

According to Rosatom, nuclear power is one of the "key components" of green energy. The CEO of Rosatom is positive on the Paris Agreement and the corporation supports the UN's 2015 Sustainable Development Goals, stressing Rosatom's commitment to delivering "affordable and clean energy" (the company also invests into clean energy, which will be discussed below).

Russia and Clean Energy

Hydrogen

The EU is discussing replacing natural gas[14] with zero-emission hydrogen, so the aim is to produce it in a non-polluting way.[15] The electrolysis method seems to fit the climate goals best: in this process, electricity is applied to water to separate the hydrogen. Using clean power sources (e.g., wind farms) allows for the production of hydrogen without releasing CO/CO_2 and the conversion of surplus RES energy into a clean resource that can be stored. Most of the new hydrogen production projects in the EU, Norway, and Switzerland[16] use (or will use) electrolysis.

The wider use of hydrogen instead of natural gas might be a challenge for Russia, so it is paying more attention to this fuel. The 2035 Strategy seems to prefer hydrogen production from natural gas, also mentioning the use of nuclear energy and RES (in this case, hydropower), as well as ambitions to develop highly efficient water electrolysers. The Ministry of Energy also supports cooperation between state-owned companies in hydrogen development.

Gazprom is developing a process in which its natural gas reserves can be used as feedstock for hydrogen production, which would help maintain its position on the European market. In this process,

[14] There are also plans for wider use of biogas produced on farms but it probably will remain local. See: F. Simon, "The future of biogas in Europe: it's a local affair," *EurActiv*, 30 September 2019, www.euractive.com.

[15] There are several different technologies for producing hydrogen. Depending on the method, hydrogen is called "grey" (a big amount of CO_2 is released as a by-product), "blue" (CO_2 emissions are limited thanks to carbon-capture-and-storage technology) and "green" (carbon-free). See: "Innovation Insights Brief 2019," World Energy Council, 2019, www.worldenergy.org.

[16] Out of 26 hydrogen production projects in the EU with a start date of 2019 or later, 21 are designed with electrolysis. Of the 26, 12 are designed for the chemical/industry sectors, while the majority will be used for power generation, transport, heating, etc. There are also four projects with a start date of 2019 or later in Norway and Switzerland, all using electrolysis. IEA data includes projects "(…) for the production of hydrogen for energy or climate change mitigation purpose." See: "IEA Hydrogen projects database," IEA https://iea.blob.core.windows.net/assets/a02a0c80-77b2-462e-a9d5-1099e0e572ce/IEA-Hydrogen-Project-Database.xlsx.

called pyrolysis or "cracking," natural gas is heated to high temperatures.[17] As a result, hydrogen and concrete coal is created. However, this technology is still not commercially available. Gazprom also promotes its "three stage approach" for the EU economy's decarbonisation. According to it, natural gas should replace more polluting fuels and then hydrogen will be gradually mixed into the gas grid with the final goal the full transition to hydrogen.[18] This strategy in the short and middle terms can be used to justify the expansion of Russian pipeline infrastructure to the EU and boosting exports of gas (purportedly contributing to the future hydrogen use).[19] According to Gazprom's assessments, gas pipelines like Nord Stream can carry a mixture of natural gas and hydrogen.

Rosatom also shows interest in hydrogen production with the use of its nuclear capacities. The company has some experience in electrolysis as well as significant power-generation capacities. Hydrogen also can be produced in high-temperature gas-cooled reactors and last year, Rosatom has patented a new method of hydrogen production from natural gas. The company is working on a strategy for the hydrogen sector in Russia and abroad. Rosatom with its partners started a pilot project in the Sakhalin region to develop hydrogen-fuelled trains. Rosatom also views Japan as a promising export market. The company signed an agreement with Japan's Agency for Natural Resources and Energy for a feasibility study on a project that will produce hydrogen using electrolysis for Japan. Gazprom, for its part, has held talks with Uniper (its partner in the NS2 project) on hydrogen production. Another Russian company, RusHydro (which owns most of Russia's hydropower capacities) is developing a hydropower plant in the Far East (Ust-Srednekanskaya) to produce hydrogen for export to Japan.[20]

> Russia wants the EU to include natural gas and nuclear energy in its decarbonization effort.

Wind and Solar Energy

In the last several decades, the production of electricity from wind and solar energy has been insignificant in Russia and capacities have increased only in recent years. They went up from 10 MW (wind) and 7 MW (solar) in 2014 to 106 MW and 546 MW, respectively, in 2018. Such growth is impressive only in terms of percentage change, as the base was very low.

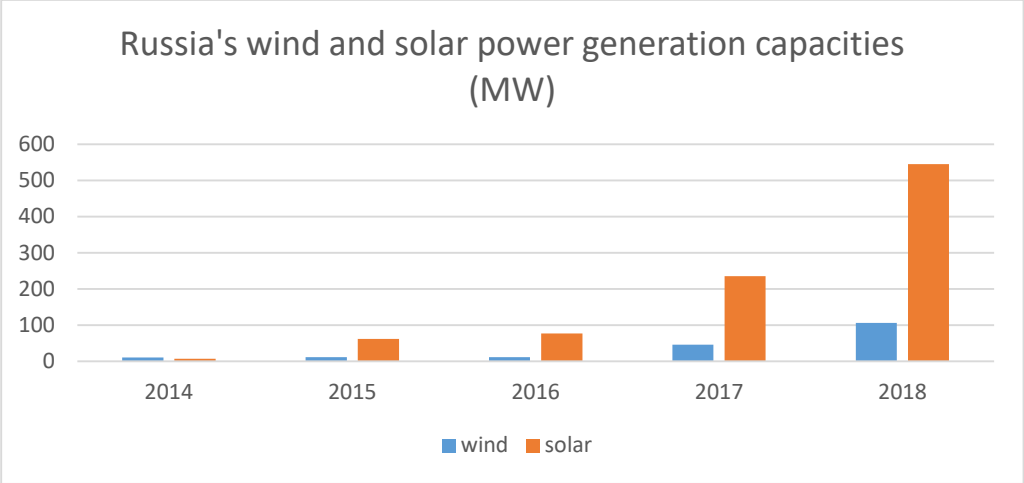
[17] Y. Melnikov, "Hydrogen in Russia: Current State and New Opportunities," *Skolkovo*, 24 September 2019, www.unece.org; H. Lohmann, "Gazprom Könnte Langfristig Wasserstoff Anbieten," *Energate*, 19 September 2018, https://www.energate-messenger.de/news/186177/gazprom-koennte-langfristig-wasserstoff-anbieten.

[18] "Blue Fuel, Gazprom Export Global Newsletter," *Gazprom Export*, 2018/Issue 49, p. 4-9, http://www.gazpromexport.ru/files/BLUE_FUEL_49325.pdf.

[19] A. Konoplyanik, "On prospective role of Russian natural gas in EU decarbonisation," Energy Transition Forum, June 2019, p. 7, http://www.konoplyanik.ru/speeches/190606-IENE-Vienna-Konoplyanik-final%20no%20back%20ups.pdf.

[20] "Russia's hydrogen bet sets up contest with Australia for Japanese market," *Platts*, 24 March 2020, https://blogs.platts.com/2020/03/24/russia-hydrogen-fuel-australia-japan/.

Figure 3. Russia's Wind and Solar Power Generation Capacities (2014-2018)



Source: *BP Statistical Review of World Energy June 2019 (All data 1965-2018)*, BP, June 2019, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

In 2023, Russia should have 3.2 GW of wind power capacity[21] and 2.7 GW of solar capacity[22]. These will most likely remain low. To put it in perspective, in 2018 the EU had around 180 GW of wind capacity (a 10 GW year-on year increase) and 115 GW of solar capacity (an 8 GW increase).

The supporting mechanism established by the government in 2013 for RES electricity capacities will not change significantly. Selected projects will receive subsidies for 15 years to maintain capacities so electricity can be generated on demand.[23] Despite some positive signals of more ambitious support, in 2019 the Russian Energy Ministry announced that in 2025-2035, only 5,000 MW of RES capacity will be added (also, the programme costs are much higher than expected[24]). This comes even though Russia has the biggest wind energy potential in the world (its northern regions) and high solar energy potential (southern ones). Still, RES profitability *vis-à-vis* traditional sources is an issue and the support for large oil and gas companies and modernisation of fossil fuel plants takes priority.

On the other hand, Russia is determined to develop localisation (local content)[25] of RES: the above-mentioned capacity mechanism introduces requirements for local content for supported projects. In 2016–2020, this is set at 65% for wind farms and 70% for solar PVs. Its aim is to develop domestic know-how, but such a high localisation obligation is seen as a barrier for companies aiming to enter the RES sector.[26] What is more, the Russian Ministry of Industry and Trade even considers limiting the

[21] "Wind Energy in Europe: Outlook to 2023," *Wind Europe*, October 2019.

[22] "Global Market Outlook For Solar Power /2019-2023," *Solar Power Europe*, https://www.solarpowereurope.org/.

[23] Each project's capacity must be at least 5 MW (for hydropower it cannot exceed 25 MW). See: "Decree No. 449 on the Mechanism for the Promotion of Renewable Energy on the Wholesale Electricity and Market," International Energy Agency, 23 July 2015, https://www.iea.org/policies/5510-decree-no-449-on-the-mechanism-for-the-promotion-of-renewable-energy-on-the-wholesale-electricity-and-market.

[24] Т. Дятел, "Зеленой энергетике урезали ожидания," *Kommersant*, 27 April 2019, https://www.kommersant.ru/doc/4073199; Е. Вавина, "Потребители энергии просят изменить механизмы поддержки зеленой генерации," *Vedomosti*, 2 September 2019, https://www.vedomosti.ru/business/articles/2019/09/02/810278-mehanizmi-zelenoi-generatsii.

[25] Localisation means that a specific share of the equipment will have to be produced by Russian contractors (therefore, it will be "local content").

[26] "Decree No. 449 on the Mechanism for the Promotion of Renewable Energy on the Wholesale Electricity and Market," International Energy Agency, 23 July 2015, https://www.iea.org/policies/5510-decree-no-449-on-the-mechanism-for-the-

role of foreign companies in RES projects' design and installation although most wind and solar projects are developed mainly by them (in Europe, they are mainly German, Italian, and Finnish firms).[27] Rosatom and other state companies cooperate with foreign stakeholders on technology localisation (e.g., wind turbines). Its wind power subsidiary, NovaWind, has started building the Kochubeyevskaya Wind Farm in Stavropol Krai (Caucasus) with a capacity of 210 MW. Rosatom's strategy seems to be the most ambitious since it goes beyond simply securing its position as nuclear champion. The company is diversifying its portfolio to include RES technologies: wind turbines and photovoltaic and lithium-ion batteries. One of the company's goals is to become Russia's wind-turbine market leader.

When it comes to exports, these go mainly to the Eurasian Economic Union. The Russian deputy energy minister revealed that the country had started exporting solar panels to Europe (however, as he admitted, in small quantities) and supposedly there are talks with Saudi Arabia on exports of panels. Despite that, it is very unlikely that Russia will become an RES-exporting powerhouse. Competing with the current exporters seems to be difficult and Russia would need more ambitious domestic RES development to build export potential.[28]

Hydropower

Russia also has some of the greatest hydropower potential in the world, and a significant share of electricity is generated by it (see: Table 2). The energy strategy doesn't focus much on it, but mentions, for example, the need to improve efficiency and the support mechanism from 2013 offers support for small hydropower projects. Some of the new capacity will be used to produce hydrogen (see "hydrogen" above). However, hydropower's share in power generation will probably remain at roughly the same level.[29] Moreover, most of Russia's huge hydropower potential is located in areas where there is no power demand.[30]

Raw Materials

Russia is focused on securing its share of raw resources used in RES technologies. Among these are rare-earth minerals, cobalt, lithium, nickel, and others, which are used in electric vehicle batteries and wind turbines, among others.

Russia has 3.5% of the world's cobalt reserves and 4% of its production,[31] 8.5% of nickel reserves and more than 9% of production (second-largest producer). There are plans to boost the production of nickel and cobalt. When it comes to lithium, in 2016 Russia accounted for around 4% of global production and has some potential for increasing its resource base. Still, lithium production will

promotion-of-renewable-energy-on-the-wholesale-electricity-and-market; A. Khokhlov, Y. Melnikov, "Market liberalization and decarbonization of the Russian electricity industry: perpetuum pendulum," The Oxford Institute for Energy Studies, May 2018, p. 4, https://www.oxfordenergy.org/wpcms/wp-content/uploads/2018/05/Market-liberalization-and-decarbonization-of-the-Russian-electricity-industry-perpetuum-pendulum-Comment.pdf.

[27] "Russia Considers Banning Foreign Companies from Renewable Energy Projects," *The Moscow Times*, 16 October 2019, https://www.themoscowtimes.com/2019/10/16/russia-considers-banning-foreign-companies-from-renewable-energy-projects-a67755.

[28] E. Bellini, "Renewables & geopolitics: Russia," *PV Magazine*, 11 April 2019, https://www.pv-magazine.com/2019/04/11/renewables-geopolitics-russia; Е. Вавина, "Потребителиэнергиипросят…", *op. cit.*

[29] The draft version of the energy strategy from 2017 forecasted that power generation from hydropower plants will be 201-230 TWh (in 2018 it was 190). It means a 13.6-16.6% share of power generation (see also: Table 2).

[30] "REmap 2030 Renewable Energy Prospects for Russian Federation," Working paper, IRENA, 2017, Abu Dhabi, p. 14, www.irena.org.

[31] "Mineral Commodity Summaries," United States Geological Survey, February 2019, https://www.usgs.gov/centers/nmic/mineral-commodity-summaries.

probably not increase significantly in the coming years. Instead, Russia seeks to secure lithium assets abroad, from Bolivia and Chile, which hold more than 57% of the world's reserves and account for around 19% of production. Rosatom is interested in the Chilean lithium assets and created a Swiss subsidiary to trade this resource.

Russian reserves hold more than 14.5% of the world's rare-earth elements, but produces a mere 1.6%; there are some investments to boost production in the coming years (and, as Russian leaders emphasize, this is important for national defence), but this will not translate into monopolisation, rather it can be viewed as diversification of the China-dominated supply. This could be particularly important in Russia's policy toward the EU, as the raw materials used in green technologies are becoming more important for the Union (e.g., in 2011 the EC released a list of critical raw materials, updated at least every three years).

Conclusions

Russia's policy toward climate change is different than the EU's. Despite some reactive measures or even more ambitious strategies (like Rosatom's), there is no genuine push for an energy transformation. The fossil fuel and nuclear energy sectors are at the core of Russia's policy. They are the traditional pillars of the domestic energy sector (and jobs), and for years have been an important source of "easy" revenue and foreign policy tools—in the Russian elite's view, RES do not offer such advantages. Therefore, Russia wants to "strengthen and maintain" its position on the global energy market via its traditional energy sectors. Arctic melting gives Russia access to new fossil fuel reserves. In this regard, Russia will try to convince its partners that its nuclear energy and natural gas can contribute to limiting GHG emissions (this rhetoric might also be used to shield NS2 and other projects from criticism). However, Russia's weak GHG emissions reduction targets and unambitious RES plans demonstrate that the country only wants to join global climate effort on its own terms. The COVID19 pandemic and the economic crisis will affect the Russian energy sector but probably will not lead to an ambitious energy transformation. Lower global demand for oil and gas and their subsequent low prices will force Russia to reduce production. However, the need to support the economy from the state budget after the pandemic eases means greater support for green technologies is even less likely.

On the other hand, Russia's push to restore relations with the EU and U.S. might be even stronger as a result of the crisis. The Kremlin could use "green rhetoric" to achieve its goals of securing the position of Russian companies, lifting the sanctions imposed after Russia's annexation of Crimea in 2014, and in seeking closer relations with EU and NATO member states. Russia may still try to persuade some European countries, that, notwithstanding the tensions with EU/NATO, it can be a constructive partner in "non-political" areas, such as climate policy, which is mentioned, for example, in the EU's "selective engagement" policy.

Russia may also try to propose cooperation on hydrogen production (e.g., the German economy minister emphasized the need to cooperate with Russia in this regard) or claim it is a key partner in diversifying rare-earth mineral supplies vis-à-vis China's dominance. This, together with the threat of a "pivot to China", might help to advance the Kremlin's goal to be recognized as a strategic partner by the EU or at least some of its members.