

# The energy condition in the world: current status



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## Abstract

This study analyzes the energy agenda in the world, particularly in the United Kingdom, the United States of America, the European Union, Turkey, The Middle East, Latin America, Eurasian Economic Union countries.

The energy crisis that started at the end of 2021, aggravated by Ukrainian crisis of 2022, sanctions against Russia, as well as by the desire of Western countries to abandon Russian energy, significantly influenced the countries' energy policies. The main purpose of the study is to understand the situation on the global energy market at the end of 2022.

The authors of the study examined the low-carbon policy, processes of decarbonization, as well as the state of the traditional energy of countries and regions in new geopolitical and geo-economic conditions. Special attention is paid on world's largest economies adaptation to the changes in the energy market.

The results of the study demonstrated the following: on the one hand, the analyzed countries and regions, including Russia, despite the ongoing energy crisis, continue to pursue a decarbonization policy, which had formed before the new phase of Ukrainian conflict. Moreover, in this context for some countries the development of alternative energy sources performs as the main mechanism to overcome the current crisis. The highest results in this regard are observed in Western countries, as well as Latin America. The development of alternative energy sources is also relevant for the EAEU countries, particularly for Kazakhstan, Belarus, Kyrgyzstan and Armenia due to the tangible dependence on Russia in the energy sector.

On the other hand, the current energy crisis stimulates countries to expand the use of traditional energy sources, increase investments in this industry, as well as their production and export. In particular, exporting countries face with opportunities as they are able to replace Russian energy supplies in Europe.

At the same time, the situation in the Russian Federation differs significantly from the global one. This might be observed in other challenges and opportunities for country's energy complex due to the economic pressure exerted since February 24, 2022.

## The United Kingdom

According to the International Atomic Energy Agency, The United Kingdom is a world leader in decarbonization, the first G7 country to take responsibility for reducing all greenhouse gas emissions to zero net by 2050<sup>1</sup>. The United Kingdom set this goal in 2019 by approving the Net Zero Strategy for achieving “net zero” by 2050, in which simultaneously featured the idea of “net growth” as the basis of its industrial sector to ensure the growth of the country's economy. According to the Strategy, by 2035 the UK will switch to completely clean electricity by increasing the number of land-based, solar and other renewable energy sources; provide 5 GW of low-carbon hydrogen production capacity by 2030 while halving emissions from oil and gas; create four carbon capture, use and storage clusters; reduce traffic emissions by demanding manufacturers to sell “cleaner” cars; adopt more technologies to absorb greenhouse gases<sup>2</sup>. Moreover, in 2021 the UK government published the so-called Sixth Carbon Budget, which is designed to reduce greenhouse gas emissions by 965 million tons during 2023-2027<sup>3</sup>.

In the wake of sharp spikes in global wholesale gas prices and the increase in the marginal prices of the energy regulator for Great Britain (Ofgem) caused by the Russian-Ukrainian crisis, recently in the UK has been observed growing inconvenience about the future security, accessibility and stability of gas supplies<sup>4</sup>. In response to this, in April 2022 the UK government published an Energy Security Strategy, which aims to accelerate the country's transition to a low-carbon, energy self-sufficient future. The main focus of this Strategy is to expand domestic low-carbon sources for the UK's energy supply over the next 20 years, along with commitments to completely abandon imports of Russian oil, gas and coal by the end of 2022<sup>5</sup>. In relation to the Russian-Ukrainian conflict, since June 2022 the UK has suspended imports of Russian fuel, and since 5 December 2022 has prohibited the usage of the UK's services to transport Russian oil<sup>6</sup>. According to the data of Department for Business, Energy & Industrial Strategy (BEIS), in 2021 Russian import provided only 2.2% of the energy used in the UK<sup>7</sup>. However, disruptions in the global energy market following the Russian-Ukrainian conflict led to market uncertainty, volatility in wholesale prices and increased demand for non-Russian energy sources<sup>8</sup>. Therefore, this led to the necessity for producing

<sup>1</sup> Nuclear Energy for a Net Zero World. Official website of the International Atomic Energy Agency [Electronic resource] // URL: <https://www.iaea.org/sites/default/files/21/10/nuclear-energy-for-a-net-zero-world.pdf> (accessed: 08.11.2022).

<sup>2</sup> Net Zero Strategy: Build Back Greener. Official website GOV.UK [Electronic resource] // URL: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1033990/net-zero-strategy-beis.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf) (accessed: 08.11.2022)

<sup>3</sup> The Sixth Carbon Budget the UK's path to Net Zero. Official website of Climate Change Committee [Electronic resource] // URL: <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf> (accessed: 08.11.2022).

<sup>4</sup> Where will Britain's future energy supply come from? Official website of the UK Parliament [Electronic resource] // URL: <https://commonslibrary.parliament.uk/where-will-britains-future-energy-supply-come-from/> (accessed: 08.11.2022).

<sup>5</sup> British energy security strategy. Official website GOV.UK [Electronic resource] // URL: <https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy> (accessed: 08.11.2022)

<sup>6</sup> UK government bans services enabling the transport of Russian oil. Official website GOV.UK [Electronic resource] // URL: <https://www.gov.uk/government/news/uk-government-bans-services-enabling-the-transport-of-russian-oil> (accessed: 08.11.2022).

<sup>7</sup> Energy Trends: UK total energy. Official website GOV.UK [Electronic resource] // URL: <https://www.gov.uk/government/statistics/total-energy-section-1-energy-trends> (accessed: 08.11.2022).

<sup>8</sup> REPowerEU: Joint European action for more affordable, secure and sustainable energy. Official website of the EC [Electronic resource] // URL: [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_22\\_1511](https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511) (accessed: 08.11.2022).

significantly more green and blue hydrogen, introducing cleaner nuclear reactors, increasing the number of offshore and floating offshore wind power capacities, as well as solar photovoltaic systems<sup>9</sup>.

According to the British Finance Minister Jeremy Hunt, at the moment the country is doing an excellent job in order to completely abandon Russian fuel soon<sup>10</sup>. Still, according to Ofgem, based on current situation it is assumed that as a result of record-high energy prices and a reduction in gas supplies to Europe from 1 October 2022, the cost of electricity in the UK will increase by about 80%, which will create difficulties with obtaining heating and electricity for households<sup>11</sup>. In an attempt to end this crisis, the UK government has announced a two-year plan to reduce household electricity costs to help business owners cope with a sharp rise in energy prices<sup>12</sup>.

According to the plan of quitting the import of Russian oil and coal by the end of 2022, the UK government aims to develop the use of North Sea reserves along with conducting scientific research on shale gas production in order to increase the country's energy security<sup>13</sup>. In accordance with the North Sea Transition Deal signed in 2021 it is expected to reduce greenhouse gas emissions by 60 million tons, including 15 million tons of emissions from oil and gas production on the UK continental shelf due to the gradual decarbonization of production during the period up to 2030<sup>14</sup>.

In September 2022, the government of former British Prime Minister Liz Truss lifted the moratorium on shale gas production and supported the issuance of licenses for the development of new deposits in the North Sea<sup>15</sup>. According to some reports, these fields currently produce enough gas to meet about 40% of the country's needs<sup>16</sup>. However, according to the forecasts of the North Sea Transitional Authority (NSTA), by 2030 this figure will fall to 30%, decreasing every year due to the fact that the North Sea basin is old and a well-explored deposit, so a significant increase in gas production is unlikely<sup>17</sup>.

According to the latest BEIS energy trends statistics, in the second quarter of 2022, the UK became a net exporter of electricity for the first time since 2010, exporting 568% more in the period from April to

<sup>9</sup> UK plans to ensure energy independence by scaling up renewables while maximising North Sea production. Official website of the Offshore energy [Electronic resource] // URL: <https://www.offshore-energy.biz/uk-plans-to-ensure-energy-independence-by-scaling-up-renewables-while-maximising-north-sea-production/> (accessed: 08.11.2022)

<sup>10</sup> UK government bans services enabling the transport of Russian oil. Official website GOV.UK [Electronic resource] // URL: <https://www.gov.uk/government/news/uk-government-bans-services-enabling-the-transport-of-russian-oil> (accessed: 08.11.2022).

<sup>11</sup> Energy price cap explained. Official website of the Ofgem [Electronic resource] // URL: <https://www.ofgem.gov.uk/information-consumers/energy-advice-households/check-if-energy-price-cap-affects-you> (accessed: 08.11.2022).

<sup>12</sup> Energy Bill Relief Scheme: help for businesses and other non-domestic customers. Official website GOV.UK [Electronic resource] // URL: <https://www.gov.uk/guidance/energy-bill-relief-scheme-help-for-businesses-and-other-non-domestic-customers> (accessed: 08.11.2022).

<sup>13</sup> UK government takes next steps to boost domestic energy production. Official website GOV.UK [Electronic resource] // URL: <https://www.gov.uk/government/news/uk-government-takes-next-steps-to-boost-domestic-energy-production> (accessed: 08.11.2022).

<sup>14</sup> North Sea Transition Deal. Official website GOV.UK [Electronic resource] // URL: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1061986/north-sea-transition-deal-one-year-on.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061986/north-sea-transition-deal-one-year-on.pdf) (accessed: 08.11.2022).

<sup>15</sup> UK government takes next steps to boost domestic energy production. Official website GOV.UK [Electronic resource] // URL: <https://www.gov.uk/government/news/uk-government-takes-next-steps-to-boost-domestic-energy-production> (accessed: 08.11.2022).

<sup>16</sup> North Sea gasfield permits to be fast-tracked to boost UK production. Official website of The Financial Times [Electronic resource] // URL: <https://www.ft.com/content/8146804f-770e-42ee-8435-72469f92b4fd> (accessed: 08.11.2022).

<sup>17</sup> North Sea gasfield permits to be fast-tracked to boost UK production. Official website of The Financial Times [Electronic resource] // URL: <https://www.ft.com/content/8146804f-770e-42ee-8435-72469f92b4fd> (accessed: 08.11.2022).

June 2022 compared to the same period last year<sup>18</sup>. Presumably, the reduction in domestic electricity consumption by 15.8% is connected either to hot weather in summer or to an increase in renewable energy production in the UK<sup>19</sup>. The share of renewable energy sources accounted for 38.6% of the total energy production for the corresponding period, which is 1.3% more than for the same period in 2021, while the total capacity of renewable energy sources increased by 6.5%<sup>20</sup>. This is primarily the result of increased electricity production on land and at sea. The share of onshore production was 9.4% compared to 7.3% in 2021, and offshore – 11.3% compared to 8.5% last year<sup>21</sup>. Besides, BEIS statistics show a record high volume of gas exports from the UK. The country exported 81 TWh of gas in the second quarter, which is more than the total volume of exports in 2021. According to BEIS analytical data, the decline in gas demand in the second quarter of 2022 in the UK allowed the country to export its excess to EU countries (Belgium and the Netherlands), which helped European markets reduce dependence on Russian gas<sup>22</sup>.

According to the BEIS statistical release dated 29 September 2022, the volume of energy received from Russia decreased in comparison to the same quarter last year. Due to the lack of LNG supplies from Russia, Russia's share of gas imports to the UK fell from 7.6% last year to 0%. Russia's share in oil imports to the UK decreased from 15.1% to 3.7% in the second quarter of 2022<sup>23</sup>.

The energy issue has taken an important place in the UK political agenda and is likely to be a key topic in the next few years, based on the transformation of electricity markets around the world<sup>24</sup>. According to the Scottish and Southern Electricity Networks (SSEN), the UK has demonstrated a large-scale transition to "net zero" at the regional and local levels this year<sup>25</sup>. Based on the Future Energy Distribution Scenario published by SSEN in 2019, by 2050 The UK will achieve targets of about 2 GW of distributed large-scale solar projects in southern England and about 2 GW of new distributed onshore wind capacity in the north of Scotland. In addition, the country will be able to implement more than 4 GW of promising projects for storage of batteries of various scales, as well as install 3.3 million heat pumps, which will play an important role in reducing the impact on the climate<sup>26</sup>. In general, the existing forecasts

<sup>18</sup> Heat Pump Ready Programme. Official website GOV.UK [Electronic resource] // URL: <https://www.gov.uk/government/publications/heat-pump-ready-programme> (accessed: 08.11.2022).

<sup>19</sup> The Energy Transition | UK government announces funding to reduce reliance on fossil fuels. Official website Osborne Clarke [Electronic resource] // URL: <https://www.osborneclarke.com/insights/energy-transition-uk-government-announces-funding-reduce-reliance-fossil-fuels> (accessed: 08.11.2022).

<sup>20</sup> The Energy Transition | UK government announces funding to reduce reliance on fossil fuels. Official website of the Osborne Clarke [Electronic resource] // URL: <https://www.osborneclarke.com/insights/energy-transition-uk-government-announces-funding-reduce-reliance-fossil-fuels> (accessed: 08.11.2022).

<sup>21</sup> The Energy Transition | UK government announces funding to reduce reliance on fossil fuels. Official website of the Osborne Clarke [Electronic resource] // URL: <https://www.osborneclarke.com/insights/energy-transition-uk-government-announces-funding-reduce-reliance-fossil-fuels> (accessed: 08.11.2022).

<sup>22</sup> Heat Pump Ready Programme. Official website GOV.UK [Electronic resource] // URL: <https://www.gov.uk/government/publications/heat-pump-ready-programme> (accessed: 08.11.2022).

<sup>23</sup> Statistical Release 29 September 2022. Official website GOV.UK [Electronic resource] // URL: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1107456/Energy\\_Trends\\_September\\_2022.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1107456/Energy_Trends_September_2022.pdf) (accessed: 08.11.2022).

<sup>24</sup> The UK and the energy transition. Leading the way? Official website of the Cornwall Insight [Electronic resource] // URL: <https://www.cornwall-insight.com/wp-content/uploads/2022/05/101077.004-Energy-Transition-white-paper-S11.pdf> (accessed: 08.11.2022).

<sup>25</sup> Local forecasts of a global transition: net zero in 2050. Official website of the Regen [Electronic resource] // URL: <https://www.regen.co.uk/local-forecasts-of-a-global-transition-net-zero-in-2050/> (accessed: 08.11.2022).

<sup>26</sup> SSEN Distribution Network Future Energy Scenarios. Official website of the Regen [Electronic resource] // URL:

show transformative changes in the UK in the scale of energy generation, accelerated adoption of low-carbon technologies and significant implementation of breakthrough green technologies in the future. New global changes, provoked, among other things, by the Russian-Ukrainian conflict, have shown the UK that energy dependence is risk bearing, and consequently, its reduction is now becoming a priority of the country's policy. The events that have happened have pushed the UK to accelerate the process of switching to renewable energy sources. According to a Cornwall Insight study, the UK is currently the world leader in offshore wind power, with 14 GW of which is either already fully operational or under construction<sup>27</sup>. Moreover, the country is actively developing carbon and hydrogen capture and storage technologies, and is well positioned to play a key role in global efforts to reduce carbon dioxide emissions in the coming decades<sup>28</sup>

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<https://www.regen.co.uk/project/future-electricity-networks/> (accessed: 08.11.2022).

<sup>27</sup> The UK and the energy transition. Leading the way? Official website of the Cornwall Insight [Electronic resource] // URL: <https://www.cornwall-insight.com/wp-content/uploads/2022/05/101077.004-Energy-Transition-white-paper-S11.pdf> (accessed: 08.11.2022).

<sup>28</sup> The UK and the energy transition. Leading the way? Official website of the Cornwall Insight [Electronic resource] // URL: <https://www.cornwall-insight.com/wp-content/uploads/2022/05/101077.004-Energy-Transition-white-paper-S11.pdf> (accessed: 08.11.2022).

## The United States of America

After the US officially returned to the Paris Agreement in 2021, President Joe Biden noted the need to develop clean energy in the country, putting the goal of achieving US carbon neutrality by 2050 and emission-free electricity production by 2035 at the center of his climate policy. During the virtual climate summit of heads of state initiated by him in April 2021 the US president Joe Biden promised to reduce greenhouse gas emissions by 50-52% by 2030, as well as by 2024 to double financial support for the decarbonization policy of developing countries<sup>29</sup>.

According to BloombergNEF, US investments in energy transfer technologies in 2021 amounted to \$12 billion, which is 17% more than a year earlier, and the total US budget for energy transfer policy amounted to approximately \$28.2 billion<sup>30</sup>. These US investments were supposed to be directed to the implementation of clean energy technologies, to the development of advanced technologies for the integration and storage of clean energy, to nuclear energy, as well as to finance research in this area. In addition, in the summer of 2022 The US Senate has approved a \$430 billion package of state aid measures, known as the Inflation Reduction Act, which provides for the allocation of \$369 billion to ensure energy security and protect the country's climate<sup>31</sup>. According to the information provided in the Act, an increase in investments will allow the United States to reduce greenhouse gas emissions by 40% by 2030<sup>32</sup>.

In November 2022, the White House published the report "U.S. Innovation to Meet 2050 Climate Goals" which identifies five initial priorities that will help the United States achieve the President's goal of reducing greenhouse gas emissions by 50-52% by 2030 and achieve "net zero" emissions no later than 2050<sup>33</sup>. The Joe Biden administration attributed more efficient heating and cooling of buildings, aviation, electrification of networks and industrial products/fuel to these five priorities. In addition, the report notes such "game-changing tools", which are a combination of new technologies, improved existing technologies and their combinations. In order to stimulate innovation in these technologies, the administration also simultaneously launched the Net-Zero Game Changers Initiative, designed to help achieve "net zero" emissions no later than 2050 through the development of energy technologies.

According to the Ember analytical center, today the USA is one of the leaders in the introduction of renewable energy, ranking 2nd in the world in terms of the capacity of alternative power plants after PRC<sup>34</sup>. The total US wind power capacity for 2022 was 247 GW, of which 77 GW is accounted for by

<sup>29</sup> The Climate Crisis: Working Together for Future Generations. Official website of the U.S. Department of State [Electronic resource] // URL: <https://www.state.gov/policy-issues/climate-crisis/#leadership> (accessed: 30.10.2021)

<sup>30</sup> Energy Transition Factbook. Official website of the BloombergNEF [Electronic resource] // URL: <https://assets.bbhub.io/professional/sites/24/BloombergNEF-CEM-2022-Factbook.pdf> (accessed: 10.11.2022).

<sup>31</sup> The Inflation Reduction Act Drives Significant Emissions Reductions and Positions America to Reach Our Climate Goals. Official website ENERGY.GOV // URL: [https://www.energy.gov/sites/default/files/2022-08/8.18%20InflationReductionAct\\_Factsheet\\_Final.pdf](https://www.energy.gov/sites/default/files/2022-08/8.18%20InflationReductionAct_Factsheet_Final.pdf) (accessed: 10.11.2022)

<sup>32</sup> SUMMARY: THE INFLATION REDUCTION ACT OF 2022. Official website of the Senate Democrats [Electronic resource] // URL: [https://www.democrats.senate.gov/imo/media/doc/inflation\\_reduction\\_act\\_one\\_page\\_summary.pdf](https://www.democrats.senate.gov/imo/media/doc/inflation_reduction_act_one_page_summary.pdf) (accessed: 10.11.2022).

<sup>33</sup> U.S. innovation to meet 2050 climate goals. Official website of the White House [Electronic resource] // URL: <https://www.whitehouse.gov/wp-content/uploads/2022/11/U.S.-Innovation-to-Meet-2050-Climate-Goals.pdf> (accessed: 11.11.2022)

<sup>34</sup> Global Electricity Review 2022. Official website of the Ember [Electronic resource] // URL: <https://ember-climate.org/insights/research/global-electricity-review-2022/> (accessed: 11.11.2022).



offshore wind<sup>35</sup>. According to the National Energy Administration of China, the total installed capacity of the country's electric power industry was 707 GW; 359 GW of them is provided by solar energy, 348 GW by wind power<sup>36</sup>. More than half of the electricity production using renewable energy in the United States is provided by wind energy, the development of which is a key part of the Joe Biden administration's actions in the fight against climate change<sup>37</sup>. As a consequence, in the summer of 2022 the Joe Biden administration announced ambitious new goals aimed at positioning the United States as a leader in the development of floating wind turbines; part of this plan is the deployment of 15 GW of floating offshore wind power by 2035<sup>38</sup>. According to the National Renewable Energy Laboratory, it is assumed that the combined capacity of conventional wind farms and new floating offshore wind turbines in the future will cover the US electricity demand by about 3 times<sup>39</sup>. At the same time, Oregon Governor Keith Brown said that offshore wind will soon become an essential part of the U.S. energy transition<sup>40</sup>.

Due to the high cost of electricity in the United States and its interruptions, solar energy is becoming increasingly in demand. Nowadays, its share in the total balance of the United States is 3%, although according to the plans of the Joe Biden administration it should reach 45% by 2050<sup>41</sup>. A recently released BloombergNEF report notes that 2022 will be a record year for the number of installed solar panels in private homes<sup>42</sup>. Side by side with high electricity prices, this is also due to the adoption in August 2022 Inflation Reduction Act, contemplates the provision of various tax benefits to those who stimulate rapid growth in the production of electric vehicles, batteries and solar panels in the United States, as well as develops tools and mechanisms that contribute to a drastic reduction of environmental pollution<sup>43</sup>.

However, according to a report by the American company Clean Power, the introduction of clean energy in the third quarter of 2022 fell by 22% (to a 3-year rock bottom) and more than 60% of deferred projects are related to solar energy<sup>44</sup>. In addition, one of the problems that the United States currently faces is the lack of batteries to store clean energy, which in turn significantly slows down the pace of the

<sup>35</sup> Land-Based Wind Market Report: 2022 Edition. Official website of the U.S. Department of Energy [Electronic resource] // URL: [https://www.eriras.ru/files/2022\\_land\\_based\\_wind\\_market\\_report.pdf](https://www.eriras.ru/files/2022_land_based_wind_market_report.pdf) (accessed: 11.11.2022)

<sup>36</sup> Kitaj dobavil 52,9 GVt solnechnyh elektrostancij za pervye devyat' mesyacev 2022 goda. Official website of the RenEn [Electronic resource] // URL: <https://renen.ru/kitaj-dobavil-52-9-gvt-solnechnyh-elektrostancij-za-pervye-devyat-mesyatsev-2022-goda/> (accessed: 11.11.2022).

<sup>37</sup> Vetrovaya energetika SSHA: geografija, dinamika, regulirovanie // «Mirovye i nacional'noe hozyajstvo» - MGIMO URL: <https://mirec.mgimo.ru/2022/2022-02/us-wind-energy-geography-dynamics-regulation> (accessed: 11.11.2022).

<sup>38</sup> The Biden administration's big new plans for floating offshore wind turbines. Official website of The Verge [Electronic resource] // URL: <https://www.theverge.com/2022/9/15/23354923/biden-administration-floating-offshore-wind-turbines> (accessed: 09.11.2022).

<sup>39</sup> Offshore Wind Energy Market Assessment. National Renewable Energy Laboratory (NREL) [Electronic resource] // URL: <https://www.nrel.gov/wind/offshore-market-assessment.html> (accessed: 11.11.2022).

<sup>40</sup> The Biden administration's big new plans for floating offshore wind turbines. Official website of The Verge [Electronic resource] // URL: <https://www.theverge.com/2022/9/15/23354923/biden-administration-floating-offshore-wind-turbines> (accessed: 09.11.2022).

<sup>41</sup> Solar Energy in the United States. Official website ENERGY.GOV [Electronic resource] // URL: <https://www.energy.gov/eere/solar/solar-energy-united-states> (accessed: 11.11.2022).

<sup>42</sup> US Homes Add Rooftop Solar at a Record Clip to Cut Power Bills. Official website of Bloomberg [Electronic resource] // URL: <https://www.bloomberg.com/news/articles/2022-08-29/us-homes-add-rooftop-solar-at-a-record-clip-to-cut-power-bills> (accessed: 11.11.2022).

<sup>43</sup> BY THE NUMBERS: The Inflation Reduction Act. Official website of The White House [Electronic resource] // URL: <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/15/by-the-numbers-the-inflation-reduction-act/> (accessed: 09.11.2022).

<sup>44</sup> Clean Power Quarterly Market Report. Official website of the American Clean Power [Electronic resource] // URL: <https://cleanpower.org/resources/clean-power-quarterly-market-report-q3-2022/> (accessed: 10.11.2022).

US transition to renewable energy<sup>45</sup>. In recent months, several large-scale projects for the production of batteries have been canceled or postponed due to the rapid rise in prices for mineral raw materials<sup>46</sup>.

The reason for the delay in the implementation of projects was also a number of factors related to the Russian-Ukrainian crisis, which in turn provoked a sharp rise in world energy prices, rapidly growing demand for fossil fuels from Europe, a failure in the supply of metals needed for low-carbon solutions<sup>47</sup>.

A report published in November 2022 by the U.S. Energy Information Administration (EIA) predicts that the share of renewable energy sources in U.S. electricity generation in 2022 will increase to 22% from 20% in 2021, and in 2023 their share may reach 24%<sup>48</sup>. In turn, the IEEFA expects that the share of clean energy in the electricity production market may be 33% or more, and renewable energy sources will continue to displace fossil fuels from the U.S. electricity market<sup>49</sup>. However, at the moment, analytical and research centers cannot give an accurate medium- or long-term forecast of the energy situation in the United States due to the ongoing Russian-Ukrainian crisis.

Notwithstanding the policy of decarbonization and the creation of a green economy with the transition to renewable energy sources, the United States faces the need to invest in oil and gas production to supply the European market. According to the statement of the US Presidential Adviser on Energy Issues, Amos Hockstein, it is necessary to invest both in traditional energy sources and in the energy transition at the same time<sup>50</sup>. However, the associated emissions of methane and carbon from fossil fuel extraction can lead to the failure of the goals to reduce greenhouse gas emissions.

It must be noted that, according to some data, in the first half of 2022, the United States became the largest exporter of liquefied natural gas in the world, and in August of this year they exported a record amount of shale oil and petroleum products, since 1991 – 11 million barrels per day<sup>51</sup>. However, despite the high demand from European countries and the possibility of obtaining high profits, the pace of increasing shale oil production in the United States by American shale companies is gradually slowing down due to rising costs, problems in supply chains and unsatisfactory well performance of some companies, which in turn led to a limitation of domestic production<sup>52</sup>.

<sup>45</sup> How a battery shortage is hampering the U.S. switch to wind, solar power. Official website of CNBC [Electronic resource] // URL: <https://www.cnbc.com/2022/06/09/a-battery-shortage-is-hampering-the-us-switch-to-wind-solar-power.html> (accessed: 11.11.2022).

<sup>46</sup> How a battery shortage is hampering the U.S. switch to wind, solar power. Official website Investing.com [Electronic resource] // URL: <https://ca.investing.com/news/stock-market-news/how-a-battery-shortage-is-hampering-the-us-switch-to-wind-solar-power-2702714> (accessed: 11.11.2022).

<sup>47</sup> How a battery shortage is hampering the U.S. switch to wind, solar power. Official website Investing.com [Electronic resource] // URL: <https://ca.investing.com/news/stock-market-news/how-a-battery-shortage-is-hampering-the-us-switch-to-wind-solar-power-2702714> (accessed: 11.11.2022).

<sup>48</sup> Short-Term Energy Outlook. Official website of the U.S. Energy Information Administration [Electronic resource] // URL: [https://www.eia.gov/outlooks/steo/pdf/steo\\_full.pdf](https://www.eia.gov/outlooks/steo/pdf/steo_full.pdf) (accessed: 11.11.2022).

<sup>49</sup> U.S. 2022 Power Sector Outlook. Official website of The Renewable Energy Transition Takes Off. Institute for Energy Economics and Financial Analysis: IEEFA [Electronic resource] // <https://ieefa.org/wp-content/uploads/2022/04/2022-US-Power-Sector-Outlook-April-2022.pdf> (accessed: 10.11.2022).

<sup>50</sup> US backs Opec calls for more oil, gas investment. Official website of Argus [Electronic resource] // URL: <https://www.argusmedia.com/en> (accessed: 11.11.2022).

<sup>51</sup> US LNG exports to Europe on track to surpass Biden promise. Official website of the EURACTIVE [Electronic resource] // URL: <https://www.euractiv.com/section/energy/news/us-lng-exports-to-europe-on-track-to-surpass-biden-promise/> (accessed: 09.11.2022).

<sup>52</sup> Frackers Say Oil Production Slowing in the Shale Patch. Official website of The Wall Street Journal [Electronic resource] // URL: <https://www.wsj.com/articles/frackers-say-oil-production-slowing-in-the-shale-patch-11667743226> (accessed: 11.11.2022).

According to Bank of Nova Scotia, world prices for shale oil in the third quarter of 2022 averaged about \$ 100 per barrel, which was the reason for the increase in shale production<sup>53</sup>. However, according to The Wall Street Journal, this time companies such as Conoco Phillips Green, Pioneer Natural Resources Co. and Devon Energy Corp., instead of increasing the pace of drilling, are likely to be aimed at making a profit due to existing restrictions for growth<sup>54</sup>. According to the EIA report, it is assumed that the production of shale oil in the USA in December 2022 it will grow by only 1% to 9.191 million barrels per day (November's indicator is 9.1 million barrels per day)<sup>55</sup>. Besides, according to the EIA, oil production in 2023 should be a record for the United States and amount to 12.31 million barrels per day<sup>56</sup>.

On 3 November 2022 t a meeting of the EU-US task group on energy issues, it was decided to maintain the trend of increasing supplies of liquefied natural gas from the USA to the EU, increasing supplies by 50 billion cubic meters by 2023 compared to 2021<sup>57</sup>.

In March 2022, President Joe Biden proposed a budget of \$5.8 trillion for financial year 2023, which involves allocating \$44.9 billion for clean energy, electrification and other programs designed to help reduce greenhouse gas emissions and prepare the United States for the effects of climate change<sup>58</sup>. Joe Biden made a proposal to increase the budget of the U.S. Department of Energy by 7.1% – up to \$48.2 billion (\$45 billion was approved in fiscal year 2022<sup>59</sup>). The offer also includes \$200 million for a new program to accelerate the production of solar energy, which will help stimulate the production of solar equipment in the country<sup>60</sup>.

According to The Institute for Energy Economics and Financial Analysis of the USA, as a result of the difficult situation in the global energy market, accompanied by the ambition of Joe Biden's climate policy to achieve the country's carbon neutrality by 2050 and emission-free electricity production by 2035, the energy transition in the United States has recently shifted even more towards renewable energy sources<sup>61</sup>. In addition, it is noted that this trend will continue to displace fossil fuels from the electricity market in the near future and accelerate the already rapid growth rates of US projects in the field of solar

<sup>53</sup> Bank of Nova Scotia. Official website of The Wall Street Journal [Electronic resource] // URL: <https://www.wsj.com/market-data/quotes/BNS> (accessed: 11.11.2022).

<sup>54</sup> Frackers Say Oil Production Slowing in the Shale Patch. Official website of The Wall Street Journal [Electronic resource] // URL: <https://www.wsj.com/articles/frackers-say-oil-production-slowing-in-the-shale-patch-11667743226> (accessed: 11.11.2022).

<sup>55</sup> Drilling Productivity Report. Official website of the U.S. Energy Information Administration [Electronic resource] // URL: <https://www.eia.gov/petroleum/drilling/pdf/dpr-full.pdf> (accessed: 11.11.2022).

<sup>56</sup> Short-Term Energy Outlook. Official website of the U.S. Energy Information Administration [Electronic resource] // URL: [https://www.eia.gov/outlooks/steo/pdf/steo\\_full.pdf](https://www.eia.gov/outlooks/steo/pdf/steo_full.pdf) (accessed: 11.11.2022).

<sup>57</sup> SSHA poobeshchali ES narastit' postavki SPG na 50 mlrd kubometrov. Official website of the «Kommersant» newspaper [Electronic resource] // URL: <https://www.kommersant.ru/amp/5652257> (accessed: 09.11.2022).

<sup>58</sup> Budget of the U.S. Government. FISCAL YEAR 2023. Official website of the White House [Electronic resource] // URL: [https://www.whitehouse.gov/wp-content/uploads/2022/03/budget\\_fy2023.pdf](https://www.whitehouse.gov/wp-content/uploads/2022/03/budget_fy2023.pdf) (accessed: 11.11.2022).

<sup>59</sup> Budget of the U.S. Government. FISCAL YEAR 2023. Official website of the White House [Electronic resource] // URL: [https://www.whitehouse.gov/wp-content/uploads/2022/03/budget\\_fy2023.pdf](https://www.whitehouse.gov/wp-content/uploads/2022/03/budget_fy2023.pdf) (accessed: 11.11.2022).

<sup>60</sup> Budget of the U.S. Government. FISCAL YEAR 2023. Official website of the White House [Electronic resource] // URL: [https://www.whitehouse.gov/wp-content/uploads/2022/03/budget\\_fy2023.pdf](https://www.whitehouse.gov/wp-content/uploads/2022/03/budget_fy2023.pdf) (accessed: 11.11.2022).

<sup>61</sup> Surging energy prices accelerating pace of wind, solar and battery adoption. Official website of the Institute for Energy Economics and Financial Analysis [Electronic resource] // URL: <https://ieefa.org/articles/surging-energy-prices-accelerating-pace-wind-solar-and-battery-adoption> (accessed: 11.11.2022).

energy, wind and batteries<sup>62</sup>. However, despite the determination of Joe Biden's government to switch to renewable energy, today the United States is not ready to completely abandon the production of shale oil and gas, including hydraulic fracturing, which causes serious damage to the environment, in order to preserve its energy security.

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<sup>62</sup> Surging energy prices accelerating pace of wind, solar and battery adoption. Official website of the Institute for Energy Economics and Financial Analysis [Electronic resource] // URL: <https://ieefa.org/articles/surging-energy-prices-accelerating-pace-wind-solar-and-battery-adoption> (accessed: 11.11.2022).

## The European Union

In connection with a Special Military Operation, on 8 March 2022, the European Commission (EC) proposed a plan (RePowerEU<sup>63</sup>) aimed at gaining Europe's independence from Russian fossil fuels long before 2030<sup>64</sup>. The EU will seek to diversify gas supplies, accelerate the introduction of renewable energy sources, replace gas in heating and electricity production and intensify energy efficiency measures. This could reduce EU demand for Russian gas by two-thirds by the end of 2022<sup>65</sup>. The Plan<sup>66</sup> was presented by the European Commission<sup>67</sup> in response to difficulties and disruptions in the global energy market.

In a working paper for EC personnel<sup>68</sup> accompanying the REPowerEU plan, the Commission outlines the concept of a "hydrogen accelerator" to scale up the introduction of renewable hydrogen, which will help accelerate the EU energy transition and decarbonize the EU energy system. In such a way, one of the objectives is to produce 10 million tons and import 10 million tons of renewable hydrogen to the EU by 2030 — this is a significant increase compared to the 5.6 million tons provided for in the revised Renewable Energy Directive<sup>69</sup>, published in July 2021.

The EU Hydrogen Strategy<sup>70</sup>, adopted in 2020, plans to increase the production of hydrogen from renewable sources by electrolysis to 10 million tons of hydrogen by 2030 with an installed capacity of 40 kW of electrolyzers<sup>71</sup>. It is worth noting that the EC considers the production of hydrogen using various methods associated with a wide range of emissions, depending on the technology used and the energy source and having different consequences in terms of costs and material requirements.

There are many reasons why hydrogen is a key priority for achieving the European Green Course and Europe's transition to clean energy. It is expected that by 2050 renewable electricity will allow to decarbonize a significant part of energy consumption in the EU. The strategic vision of a climate-neutral

<sup>63</sup>The European Commission's plan to stop the consumption of Russian fossil fuels by 2030.

<sup>64</sup> REPowerEU: Joint European action for more affordable, secure and sustainable energy. Official website of the EC. [Electronic resource] // URL: [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_22\\_1511](https://ec.europa.eu/commission/presscorner/detail/en/IP_22_1511) (accessed: 11.11.2022).

<sup>65</sup> Ezhekvar'tal'nyj otchet na evropejskikh gazovyh rynkah (2022 god). Official website of the EC. [Electronic resource] // URL: [https://ec.europa.eu/info/sites/default/files/energy\\_climate\\_change\\_environment/quarterly\\_report\\_on\\_european\\_gas\\_markets\\_q1\\_2022.pdf](https://ec.europa.eu/info/sites/default/files/energy_climate_change_environment/quarterly_report_on_european_gas_markets_q1_2022.pdf) (accessed: 11.11.2022).

<sup>66</sup> REPowerEU: Plan bystrogo snizheniya zavisimosti ot rossijskogo iskopaemogo topliva i uskoreniya "zelenogo" perekhoda. Official website of the EC. [Electronic resource] // URL: [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_22\\_3131](https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131) (accessed: 11.11.2022).

<sup>67</sup> Soobshchenie Komissii Evropejskomu Parlamentu, Evropejskomu Sovetu, Evropejskomu ekonomicheskomu i social'nomu komitetu i komitetu regionov. Official website of the EC. [Электронный ресурс] // URL: [https://eur-lex.europa.eu/resource.html?uri=cellar:fc930f14-d7ae-11ec-a95f-01aa75ed71a1.0001.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:fc930f14-d7ae-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF) (accessed: 11.11.2022).

<sup>68</sup> Staff Working Document. Official website of the EC. [Electronic resource] // URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022SC0230&from=EN> (accessed: 11.11.2022)

<sup>69</sup> Renewable Energy Directive. Official website of the EC. [Electronic resource] // URL: [https://eur-lex.europa.eu/resource.html?uri=cellar:dbb7eb9c-e575-11eb-a1a5-01aa75ed71a1.0001.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:dbb7eb9c-e575-11eb-a1a5-01aa75ed71a1.0001.02/DOC_1&format=PDF) (accessed: 11.11.2022).

<sup>70</sup> A hydrogen strategy for a climate-neutral Europe. Official website of the EC. [Electronic resource] // URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0301&from=EN> (accessed: 11.11.2022).

<sup>71</sup> Vodorodnaya strategiya ES issleduet potencial vobnovlyаемого vodoroda dlya okazaniya pomoshchi v dekarbonizacii ES ekonomicheskoi effektivnym sposobom. Official website of the EC. [Electronic resource] // URL: [https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen\\_en](https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen_en) (accessed: 11.11.2022).

EU, published in November 2018<sup>72</sup>, predicts that the share of hydrogen in Europe's energy balance will grow from the current less than 2%<sup>73</sup> to 13-14% by 2050<sup>74</sup>.

Since the inception of Special Military Operation, the European Union has adopted several packages of sanctions, which have also affected the energy relations<sup>75</sup> of the EU with Russia. The import of Russian natural gas has not been sanctioned in general so far, but some of these measures have also affected the gas sector. Furthermore, on 26 September explosions occurred at the sections of the Nord Stream–1 and Nord Stream–2, which the Prosecutor General's Office of Russian Federation described as an "act of international terrorism"<sup>76</sup>. Russian representatives suggest that the perpetrators of the failure of offshore pipelines are the United States and Poland, Europe suspects Russia<sup>77</sup>. Significant gas exports were carried out via Nord Stream 1 (Russia's share in gas supplies to Europe accounted for 35% of the total volume of Russian gas imports in 2022<sup>78</sup>). Taking it into consideration, the EU is forced to look for alternative energy suppliers to Europe.

For example, Germany, Europe's largest consumer of Russian gas, can import gas from the UK, Denmark, Norway and the Netherlands via pipelines. Norway, the second largest gas supplier to Europe after Russia, is ramping up production to help the EU achieve its goal of ending dependence on Russian fossil fuels by 2027. Britain is not dependent on Russian gas and can also export it to Europe via pipelines. Southern Europe can receive Azerbaijani gas via the Trans-Adriatic Pipeline to Italy and the Trans-Anatolian Natural Gas Pipeline (TANAP) through Turkey. Imports of liquefied natural gas (LNG) to Europe from producers such as the United States and Qatar have increased. But unplanned disruptions in these countries due to production capacity, incidents and climate hazards can lead to a reduction in supplies<sup>79</sup>.

Since October, Gazprom has been looking for possible solutions to resume the operation of the previously damaged "Nord Streams"<sup>80</sup>. However, the company also admitted that it would be extremely

<sup>72</sup> A Clean Planet for All. A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, COM (2018) 773 [Electronic resource] // URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0773> (accessed: 11.11.2022)

<sup>73</sup> FCH JU (2019) Hydrogen Roadmap Europe. Official website of the EU. [Electronic resource] // URL: <https://op.europa.eu/en/publication-detail/-/publication/0817d60d-332f-11e9-8d04-01aa75ed71a1> (accessed: 11.11.2022).

<sup>74</sup> If we consider the consumption of hydrogen only for energy purposes, then its share in various scenarios varies from less than 2% to more than 23% in 2050 (Moya et al. 2019, JRC116452)

<sup>75</sup> Postanovlenie Soveta (ES) No 833/2014 ot 31 iyulya 2014 goda otnositel'no ogranichitel'nyh mer v svyazi s dejstviyami Rossii, destabiliziruyushchimi situaciyu v Ukraine. [Electronic resource] // URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02014R0833-20220316&from=EN> (accessed: 11.11.2022).

<sup>76</sup> GP Rossii iniciirovala delo o mezhdunarodnom terrorizme posle avarij na «Severnyh potokah». Official website of RT. [Electronic resource] // URL: <https://russian.rt.com/russia/news/1054694-terrorizm-rossiya-potok> (accessed: 11.11.2022).

<sup>77</sup> V Kremle prokomentirovali ubytki ot avariï na "Severnyh potokah". Official website of RIANovosti [Electronic resource] // URL: <https://ria.ru/20220928/ubytki-1820033924.html> (accessed: 11.11.2022)

<sup>78</sup> Russia cuts off gas exports to Europe via Nord Stream indefinitely. Official website of CNN. [Electronic resource] // URL: <https://amp.cnn.com/cnn/2022/09/02/energy/nord-stream-1-pipeline-turned-off/index.html> (accessed: 11.11.2022).

<sup>79</sup> Factbox: Europe's alternatives if Russia shuts off gas supply. Official website of Reuters. [Electronic resource] // URL: <https://www.reuters.com/business/energy/europes-alternatives-if-russia-shuts-off-gas-supply-2022-10-20/> (accessed: 11.11.2022).

«Gazprom» pristupil k poisku reshenij dlya vosstanovleniya raboty «Severnogo potoka». Official website of Forbes. [Electronic resource] // URL: <https://www.forbes.ru/biznes/478635-gazprom-pristupil-k-poisku-resenij-dla-vosstanovleniya-raboty-severnogo-potoka> (accessed: 11.11.2022)

difficult to restore pipelines: seawater causes corrosion at welded joints, and it is necessary to build a new station for Russian turbines to pump gas<sup>81</sup>.

Gas streams through Ukraine decreased by 41% compared to the first quarter of 2021<sup>82</sup>. According to the quarterly report, Gazprom was still "reluctant" to book additional capacities in the European gas markets for 2022, and less and less gas was supplied outside the long-term contractual volumes<sup>83</sup>.

The share of Russian pipeline gas in the EU imports decreased from 41% in 2021 to 9% in September 2022<sup>84</sup>, and LNG supplies from Russia to the EU increased by 50%. In the first nine months of 2022, the export of Russian LNG to Europe increased 1.5 times, to 15 billion cubic meters<sup>85</sup>. As a consequence, LNG is currently a key source of supplies: since the beginning of the year, the EU countries have purchased more than 100 billion cubic meters of LNG<sup>86</sup>.

Nuclear power in the EU accounts for 103 nuclear power reactors (100 GW) operating in 13 of the 27 EU member states and providing about a quarter of the electricity generated throughout the EU. More than half of the nuclear electricity in the EU is produced in only one country – France. However, years earlier, French President Emmanuel Macron stated that by 2035 the country would close 14 of the country's 58 operating nuclear reactors, of which four to six would be closed by 2030<sup>87</sup>.

56 power reactors operating in three non-EU countries (Russia, Ukraine and Switzerland) account for about 15-20% of the electricity produced in the rest of Europe. Norway and Switzerland are actually part of the EU synchronous power grid. Although nuclear power is a proven source of low-carbon electricity, today this sector faces serious problems in the EU. Some EU member states are strongly opposed to nuclear energy. It is expected that in the period up to 2030 the nuclear capacity that will be lost as a result of the closure of a number of reactors (either due to expiration or due to political interference) will outweigh the capacity received from new reactors. Therefore, a slight reduction in the EU's nuclear capacity is expected in the near future<sup>88</sup>.

At the same time, the situation in Poland and Germany is currently changeable. Poland plans to build three nuclear power plants with a total capacity of 9 GW by 2040. In accordance with the agreement

<sup>81</sup> «Gazprom» priznal, chto vosstanovit' «Severnnye potoki» budet slozhnee, chem prolozhit' zanovo. Official website of The Bell (recognized as a foreign agent) [Electronic resource] // URL: <https://thebell.io/amp/gazprom-priznal-chto-vosstanovit-severnnye-potoki-budet-slozhnee-chem-prolozhit-zanovo> (accessed: 11.11.2022).

<sup>82</sup>In the first quarter of 2022, an average of 1.7 billion cubic meters of gas of Russian origin was transported through Ukraine per month compared to 2.9 billion cubic meters. m in the first quarter of 2021. In April–May 2022, the monthly volume of transit through Ukraine in the direction of the EU was about 2 billion cubic meters.

Ezhekvartal'nyj otchet na evropejskih gazovyh rynkah (2022 god). Official website of the EC. [Electronic resource] // URL: [https://ec.europa.eu/info/sites/default/files/energy\\_climate\\_change\\_environment/quarterly\\_report\\_on\\_european\\_gas\\_markets\\_q1\\_2022.pdf](https://ec.europa.eu/info/sites/default/files/energy_climate_change_environment/quarterly_report_on_european_gas_markets_q1_2022.pdf) (accessed: 11.11.2022).

<sup>84</sup> State of the Energy Union 2022. Official website of the EC. [Electronic resource] // URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0547&from=EN> (accessed: 11.11.2022).

<sup>85</sup>Evropa берет rossijskij gaz tankerami Rossii. Official website of the “Kommersant” newspaper. [Electronic resource] // URL: <https://www.kommersant.ru/doc/5619161> (accessed: 11.11.2022)

<sup>86</sup>ES uvelichil zakupki SPG do 100 mlrd kub. m dlya zameshcheniya gaza iz Rossii. Official website of RBC. [Electronic resource] // URL: <https://www.rbc.ru/business/10/11/2022/636ba57c9a794735244180c3> (accessed: 11.11.2022).

<sup>87</sup> France to close 14 nuclear reactors by 2035: Macron. Official website Phys.org. [Electronic resource] // URL: <https://phys.org/news/2018-11-france-nuclear-reactors-macron.html> (accessed: 11.11.2022).

<sup>88</sup> Nuclear Power in the European Union. Official website of WNA. [Electronic resource] // URL: <https://world-nuclear.org/information-library/country-profiles/others/european-union.aspx> (accessed: 11.11.2022).

with the United States, Westinghouse from Pittsburgh was selected for the first project on the Baltic coast. Construction will begin in 2026, and the first reactor is expected to start operating in 2033<sup>89</sup>. Germany will postpone phasing out the use of nuclear power plants to strengthen energy security. The last two operating stations were supposed to be preserved, but they will be used as an emergency reserve until 2023<sup>90</sup>.

Despite the ongoing supply chain problems caused by the pandemic, delays in construction and record high prices for raw materials and commodities, the increase in renewable energy capacity in 2021 increased by 6% and broke another record, reaching almost 295 GWt<sup>91</sup>. Final energy consumption and primary energy consumption were 5.4% and 5.8% lower, respectively, than the targets for 2020. The share of renewable energy sources in the gross final energy consumption of the EU has reached 22.1%, which exceeds the 20% share provided for by the Renewable Energy Directive 2009. From May to August 2022 The EU produced a record 12% of electricity from solar energy and 13% from wind. Nevertheless, the production of hydroelectric power in the summer of 2022 decreased from 14% to 11% compared to previous years due to low water levels in rivers and reservoirs associated with drought. It is expected that the share of RES in the structure of electricity production will grow from 37% in 2021. up to 69% in 2030<sup>92</sup>.

For decades, coal has been a key source of energy in the EU. The European Green Deal<sup>93</sup> defined the gradual abandonment of the use of coal for energy production as an important factor in achieving climate goals for the period up to 2030 and the EU becoming climate neutral by 2050<sup>94</sup>.

In this respect, coal consumption in the EU increased by 10% in the first six months of 2022, due to the demand for coal in the electric power industry, which increased by 16%. Amid uncertainty about Russian supplies, the EU needs a gas reserve for the winter. Some EU countries (Germany, France, the Netherlands, Spain, Italy, Greece, the Czech Republic, Hungary and Austria) extend the service life of coal plants scheduled for closure, resume the operation of closed plants or increase restrictions on the duration of operation of coal plants to reduce gas consumption. IEA assumes that this will lead to an increase in coal-fired electricity generation in the second half of 2022 and to an increase in demand for thermal coal by about 33 million tons year-on-year for the whole year. The largest additional consumption will be in Germany. In July, the German government created a "gas replacement reserve"<sup>95</sup> with a total capacity of 10.6 GW. It includes 1.9 GW of brown coal power plants and 4.3 GW of coal-fired power plants

<sup>89</sup> Poland to build three nuclear power plants. Official website of Balkan Green Energy News. [Electronic resource] // URL: <https://balkangreenenergynews.com/poland-to-build-three-nuclear-power-plants/#:~:text=Poland%20plans%20to%20build%20three,to%20become%20operational%20in%202033>. (accessed: 11.11.2022)

<sup>90</sup> Germany to delay phase-out of nuclear plants to shore up energy security. Official website of The Guardian. [Electronic resource] // URL: <https://www.theguardian.com/world/2022/sep/05/germany-to-delay-phase-out-of-nuclear-plants-to-shore-up-energy-security> (accessed: 11.11.2022).

<sup>91</sup> Renewable Energy Market Update – May 2022. Official website of the IEA. [Electronic resource] // URL: <https://www.iea.org/reports/renewable-energy-market-update-may-2022/renewable-electricity> (accessed: 11.11.2022)

<sup>92</sup> State of the Energy Union 2022. Official website of the EC. [Electronic resource] // URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0547&from=EN> (accessed: 11.11.2022).

<sup>93</sup> The European Green Deal. Official website of the EC. [Electronic resource] // URL: [https://ec.europa.eu/info/sites/default/files/european-green-deal-communication\\_en.pdf](https://ec.europa.eu/info/sites/default/files/european-green-deal-communication_en.pdf) (accessed: 11.11.2022).

<sup>94</sup> Special report EU support to coal regions. [Electronic resource] // URL: [https://www.eca.europa.eu/Lists/ECADocuments/SR22\\_22/SR\\_coal\\_regions\\_EN.pdf#page40](https://www.eca.europa.eu/Lists/ECADocuments/SR22_22/SR_coal_regions_EN.pdf#page40) (accessed: 11.11.2022).

<sup>95</sup> Germany readies plans to preserve gas this summer to boost winter storage. Official website of SP Global. [Electronic resource] // URL: <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/062022-germany-readies-plans-to-preserve-gas-this-summer-to-boost-winter-storage> (accessed: 11.11.2022).



that were already in reserve, as well as 2.6 GW of coal-fired power plants that were planned to be decommissioned in 2022 and 2023. In general, coal consumption in the EU is expected to increase by 7% year-on-year to 476 million tons in 2022<sup>96</sup>.

In 2021 The EU imported 48 billion euros worth of crude oil and 23 billion euros worth of petroleum products from Russia. In June 2022 the EC adopted the sixth package of restrictive measures against Russia, containing a complete ban on the import of all Russian oil and petroleum products of marine origin, which covered 90% of the current oil imports from Russia at that time<sup>97</sup>. In October 2022, the eighth package of sanctions against Russia was adopted. The agreed package creates a regulatory framework in EU legislation for setting a price ceiling for the sea transportation of Russian oil to third countries and further restrictions on the sea transportation of crude oil and petroleum products to third countries. The combination of these measures in practice operates as follows: it is prohibited to carry out sea transportation, technical assistance, brokerage services, financing and financial assistance in the field of sea transportation of oil (starting from December 2022) and petroleum products (starting from February 2023), which are produced in Russia or exported from Russia to third countries. The price limit clause allows you to provide transportation and other specified services in cases when oil or petroleum products are purchased at a price not higher than the established limit<sup>98</sup>.

To sum up, the EU has taken serious decisions and initiatives to mitigate the abrupt transition from traditional to renewable energy sources. For example, low-carbon hydrogen can contribute to the reduction of greenhouse gas emissions by 2030, the recovery of the EU economy and is one of the key building blocks on the way to a climate-neutral and green economy in 2050, replacing fossil fuels and raw materials in difficult carbonized sectors. Meanwhile, the European states that were ahead of their time with their ideas today demonstrate their inability to completely switch to alternative energy sources, including due to the ongoing Ukrainian crisis and deteriorating relations with Russia. This forces them to resort to expanding the use of traditional energy resources.

<sup>96</sup> Coal Market Update – July 2022. Official website of the IEA. [Electronic resource] // URL: <https://www.iea.org/reports/coal-market-update-july-2022> (accessed: 11.11.2022).

<sup>97</sup> Russia's war on Ukraine: EU adopts sixth package of sanctions against Russia. Official website of the EC. [Electronic resource] // URL: [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_22\\_2802](https://ec.europa.eu/commission/presscorner/detail/en/IP_22_2802) (accessed: 11.11.2022).

<sup>98</sup>ES prinyal novyj paket sankcij protiv Rossii v svyazi s nezakonnoj anneksiej Doneckoj, Luganskoj, Zaporozhskoj i Hersonskoj oblastej Ukrainy. Official website of The European Union to the Russian Federation. [Electronic resource] // URL: [https://www.eeas.europa.eu/delegations/russia/%D0%B5%D1%81-%D0%BF%D1%80%D0%B8%D0%BD%D1%8F%D0%BB-%D0%BD%D0%BE%D0%B2%D1%8B%D0%B9-%D0%BF%D0%B0%D0%BA%D0%B5%D1%82-%D1%81%D0%B0%D0%BD%D0%BA%D1%86%D0%B8%D0%B9-%D0%BF%D1%80%D0%BE%D1%82%D0%B8%D0%B2-%D1%80%D0%BE%D1%81%D1%81%D0%B8%D0%B8-%D0%B2-%D1%81%D0%B2%D1%8F%D0%B7%D0%B8-%D1%81-%D0%BD%D0%B5%D0%B7%D0%B0%D0%BA%D0%BE%D0%BD%D0%BE%D0%B9-%D0%B0%D0%BD%D0%BD%D0%B5%D0%BA%D1%81%D0%B8%D0%B5%D0%B9\\_ru?s=177](https://www.eeas.europa.eu/delegations/russia/%D0%B5%D1%81-%D0%BF%D1%80%D0%B8%D0%BD%D1%8F%D0%BB-%D0%BD%D0%BE%D0%B2%D1%8B%D0%B9-%D0%BF%D0%B0%D0%BA%D0%B5%D1%82-%D1%81%D0%B0%D0%BD%D0%BA%D1%86%D0%B8%D0%B9-%D0%BF%D1%80%D0%BE%D1%82%D0%B8%D0%B2-%D1%80%D0%BE%D1%81%D1%81%D0%B8%D0%B8-%D0%B2-%D1%81%D0%B2%D1%8F%D0%B7%D0%B8-%D1%81-%D0%BD%D0%B5%D0%B7%D0%B0%D0%BA%D0%BE%D0%BD%D0%BE%D0%B9-%D0%B0%D0%BD%D0%BD%D0%B5%D0%BA%D1%81%D0%B8%D0%B5%D0%B9_ru?s=177) (accessed: 11.11.2022)

## The Middle East

According to the state scenario “Prospects for the energy development in the Middle East by 2030 (basic scenario)”, created by the International Energy Agency<sup>99</sup>, at the moment the states of the Middle East possess the largest amount of world oil reserves, e.g. Saudi Arabia – 303,8; Iran – 157,8; Iraq – 145; Kuwait – 101,5; The United Arab Emirates – 97,8 billion barrels<sup>100</sup>, what forms the dependence of these states’ energy sector on oil production and export<sup>101</sup>. However, recently the energy structure of the Middle Eastern states has been undergoing through changes due to geopolitical and geoeconomic crises in the world. Thus, the OPEC states claimed that there is a risk of global inflation increase, which, in its turn, will negatively affect oil demand and will contribute to investment volume decrease. In March 2022 global crude oil prices reached 13-year peak – 139\$ per barrel, since Western sanctions against Russian export have led to a shortage of the already tense oil market<sup>102</sup>. Saudi Arabia and the United Arab Emirates possess oil reserves, which are able to cover the volume of oil that is exported from Russia although it can distance states of the region from the climate objectives. It can also affect Western states oil demand in future – that is why the major Middle Eastern states are trying not to speak out on Ukrainian crisis.

According to vessel tracking data, more than 1 million barrels of oil per day reaches Europe from the Middle East; in comparison to last year the export of this crude increased by about 2 times<sup>103</sup>. Primarily, it is related to the beginning of Russian special military operation on the territory of Ukraine.

Meanwhile, until 24 February 2022 there was a tendency among some Middle Eastern states to switch from oil to gas<sup>104</sup>. It was connected with falling prices on oil export. Many oil and petroleum products importing countries rejected oil in favour of clean energy sources, that’s why demand on petroleum products was falling. As a consequence, for example since 2020 the UAE has not exported oil to Europe, but situation changed due to SMO, and export in the EU resumed<sup>105</sup>.

In long-term planning states encountered economic and energy dilemma due to worldwide reduction of oil prices and demand, as well as increasing domestic energy demand. In the scientific literature this dilemma is presented as the main driving force of energy transition<sup>106</sup>.

<sup>99</sup> BP Energy Outlook 2030. Official website of BP. January 2013 [Electronic resource] // URL: <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2013.pdf> (accessed: 11.11.2022)

<sup>100</sup> Oil Reserves by Country 2022. Official website of World Population Review [Electronic Resource] // URL: <https://worldpopulationreview.com/country-rankings/oil-reserves-by-country> (accessed: 13.11.2022)

<sup>101</sup> Vakhshouri, S., Blumenthal, D., Scissors, D.M., Goldthau, A., Mazza, M., & Slutz, J.A. (2015). The Middle East Energy Outlook. In TOO MUCH ENERGY? ASIA AT 2030 (pp. 41–50). American Enterprise Institute [Electronic Resource] // URL: <http://www.jstor.org/stable/resrep03202.7> (accessed: 06.11.2022).

<sup>102</sup> The Ukraine crisis threatens oil demand and investment, OPEC states. Official website of OFFSHORE TECHNOLOGY. March 16, 2022 [Electronic Resource] // URL: <https://www.offshore-technology.com/news/ukraine-crisis-threatens-oil-demand-opec/> (accessed: 14.11.2022).

<sup>103</sup> Saudi Arabia and Iraq Come to the Aid of Europe’s Oil Refiners. Official website of Bloomberg [Electronic Resource] // URL: <https://www.bloomberg.com/news/articles/2022-07-22/saudi-arabia-and-iraq-come-to-the-aid-of-europe-s-oil-refiners> (accessed: 19.11.2022).

<sup>104</sup> Saudi Arabia: Energy Country Profile. Official website of Our World in Data [Electronic Resource] // URL: <https://ourworldindata.org/energy/country/saudi-arabia#citation> (accessed: 07.11.2022).

OAE vperve s 2020 goda otpravili neft' v Evropu. Official website of Forbes [Electronic Resource] // URL: [https://www.google.ru/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwietqb5nbv7AhVNmYsKHbsaB10QFnoECC4QAO&url=https%3A%2F%2Fwww.forbes.ru%2Fbiznes%2F466609-oae-vperve-s-2020-goda-otpravili-neft-v-evropu&usq=AOvVaw1qtsTCFpx4vL9J\\_cGP7fZI](https://www.google.ru/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwietqb5nbv7AhVNmYsKHbsaB10QFnoECC4QAO&url=https%3A%2F%2Fwww.forbes.ru%2Fbiznes%2F466609-oae-vperve-s-2020-goda-otpravili-neft-v-evropu&usq=AOvVaw1qtsTCFpx4vL9J_cGP7fZI) (accessed: 19.11.2022).

<sup>106</sup> MohammadAl-Saidi. Energy transition in Saudi Arabia: Giant leap or necessary adjustment for a large carbon economy? [Electronic Resource] // URL: <https://www.sciencedirect.com/science/article/pii/S2352484722000154#bb10> (accessed: 06.11.2022).

As a result, the adoption and rapid entry into force of the Paris Agreement in 2015 signified an important step forward in international efforts towards fighting the global warming. This agreement was ratified by all states of The Middle East<sup>107</sup>. In order to achieve global decarbonization targets, the Middle East must give up the export of at least 40% of existing oil reserves<sup>108</sup>. For example, Qatar is committed to reduce carbon emissions of exported natural gas, as well as increase the share of renewable energy sources to 20% by 2030, completely adopt electric buses in public transport in 2022, in order that 10% of the total number of cars would be represented by electric cars by 2030; Qatar is the leading exporter of one of the cleanest types of fuel worldwide - Liquefied natural gas. The state plans to increase production to 126 million tons by 2027. After reaching the peak, state petroleum company QatarEnergy eventually plans to reduce carbon emissions of LNG by 35% by 2035, as well as greenhouse gases emissions from production by 25% through the implementation of solar energy and technologies for carbon dioxide capture and storage.

The United Arab Emirates plans to increase the share of eco-friendly energy from 25% to 50% by 2050, 25% of oil demand is planned to be replaced by hydrogen fuel demand (“green” and “blue”) by 2030. Saudi Arabia is going to reduce methane emissions by 2030, by 30% of the 2020 indicators, as well as increase the share of renewable energy sources to 50% by 2030. The company Aramco is the only company in Saudi Arabia, which applies technology for the capture and storage of greenhouse gases. 0.8 million tons of CO<sub>2</sub> per year is captured and pumped into oil reservoir. It is planned to increase the share of renewable energy sources to 40% by 2030 in Israel, full gradual withdrawal from coal power plants by 2026. At this moment, coal power plants are responsible for 24% of the total capacity<sup>109</sup>.

There is another reason for importance of energy transition in the region. The Middle East is the region most affected by the climate change. As a result, there is a growth in the share of renewable energy sources. For example, the percentage of energy received from renewable energy sources in the UAE has been growing rapidly over the past 5 years (figure 1).

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<sup>107</sup> The Paris Agreement. Official website of United Nations Treaty Collection. [Electronic Resource] // URL: [https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-7-d&chapter=27&clang=en](https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=en) (accessed: 19.11.2022).

<sup>108</sup> The Impact of Global Decarbonization Policies and Technological Improvements on Oil and Gas Producing Countries in the Middle East and North Africa. Strategic Sectors Economy & Territory. 2018 [Electronic Resource] // URL: <https://www.iemed.org/wp-content/uploads/2021/01/The-Impact-of-Global-Decarbonization-Policies-and-Technological-Improvements-on-Oil-and-Gas-Producing-Countries-in-the-Middle-East-and-North-Africa.pdf> (accessed: 07.11.2022).

<sup>109</sup> Otkryvaya novye gorizonty, ESG-povestka v Aziatsko-Tihookeanskom regione i na Blizhnem Vostoke. Official website of Kept. July 2022 [Electronic resource] // URL: <https://t.me/esgworld/967> (accessed: 08.11.2022).

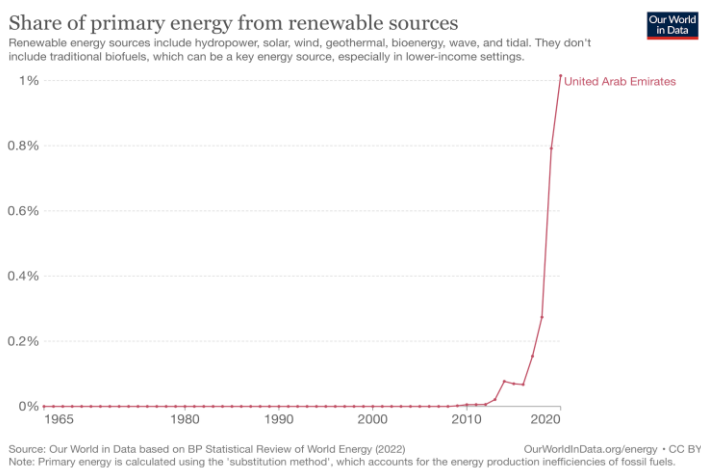


Figure 1. Share of primary energy from renewable sources

Source: Saudi Arabia: Energy Country Profile. Our World in Data [Electronic resource] // URL: <https://ourworldindata.org/energy/country/saudi-arabia#citation>

Regardless of the exponential growth of the curve, the indicator is approximately 1%, which implies a much greater use of traditional energy sources. Despite this fact, the region tries to develop in this direction and shows its interest in solving the problem of global climate change. In this respect, almost every state of the Middle East (except Yemen and Iran) possesses strategic national documents, which are based on the necessity of energy transition and an increase in the share of renewable energy sources. For example, in 2016 Saudi Arabia adopted “Saudi Vision 2030”<sup>110</sup>. Also, in 2016 Saudi Arabia adopted strategic document on the achievement of carbon neutrality by 2050<sup>111</sup>. The Ministry of Energy of Saudi Arabia put forward the concept of cyclical carbon economy at the center of the state’s strategic development plan to reduce the consequences of climate change<sup>112</sup>. This concept is based on four principles<sup>113</sup>:

1. Reduction in consumption of traditional energy sources; this includes energy efficiency improvement technologies, the implementation of renewable energy sources.
2. Reusing: capture and storage of emissions, trading of quotas for carbon dioxide emissions.
3. Recycling: natural sequestration of carbon dioxide through forests and oceans.
4. Removal: direct carbon capture and storage.

<sup>110</sup> Saudi Arabia. Vision 2030 a story of transformation, 2016–2021 [Electronic resource] // URL: <https://www.vision2030.gov.sa/a-story-of-transformation/> (accessed: 11.11.2022).

<sup>111</sup> A Sustainable Saudi Vision. Vision 2030 [Electronic resource] // URL: <https://www.vision2030.gov.sa/v2030/a-sustainable-saudi-vision/> (accessed: 11.11.2022).

<sup>112</sup> Fateh Bélaïd King Abdullah, Aisha Al-Sarihi. Energy Transition in Saudi Arabia: Key Initiatives and Challenges [Electronic resource] // URL: [https://www.researchgate.net/publication/357568996\\_Energy\\_Transition\\_in\\_Saudi\\_Arabia\\_Key\\_Initiatives\\_and\\_Challenges](https://www.researchgate.net/publication/357568996_Energy_Transition_in_Saudi_Arabia_Key_Initiatives_and_Challenges) (accessed: 08.11.2022).

<sup>113</sup> Fateh Bélaïd King Abdullah, Aisha Al-Sarihi. Energy Transition in Saudi Arabia: Key Initiatives and Challenges [Electronic resource] // URL: [https://www.researchgate.net/publication/357568996\\_Energy\\_Transition\\_in\\_Saudi\\_Arabia\\_Key\\_Initiatives\\_and\\_Challenges](https://www.researchgate.net/publication/357568996_Energy_Transition_in_Saudi_Arabia_Key_Initiatives_and_Challenges) (accessed: 08.11.2022).

Approximately the same tendencies are observed in the other states of the Middle East (table 1).

State	Национальный документ
Saudi Arabia	Saudi Vision 2030
The United Arab Emirates	The National Strategy for Innovation
Qatar	Qatar National Vision 2030 <sup>114</sup>
Kuwait	Kuwait National Development Plan <sup>115</sup>
Israel	The Structure of the Energy Sector in Israel <sup>116</sup>
Iraq	Private Sector Development Strategy <sup>117</sup>
Egypt	Egypt Vision 2030 <sup>118</sup>

*Table 1. Government strategic reports related to the energy sector*

To sum up, at this moment the energy policy of the Middle East is going through a number of changes. Until 24 February, the Middle Eastern states focused on reducing the substitution of oil with gas, but the Western states' policy of rejection of the Russian Federation's energy resources increased the demand for oil, and in this respect the Middle East was forced to increase oil shipments again. At the same time, these states have already formed national climate goals by now, what serves as a positive signal in the context of the global energy transition.

<sup>114</sup> Qatar National Vision 2030. General Secretariat for Development Planning. July 2008 [Electronic Resource] // URL: <https://www.gco.gov.qa/en/about-qatar/national-vision2030/> (accessed: 08.11.2022).

<sup>115</sup> KUWAIT NATIONAL DEVELOPMENT PLAN 2020-2025 [Electronic Resource] // URL: [https://media.gov.kw/assets/img/Ommah22\\_Awareness/PDF/NewKuwait/Revised%20KNDP%20-%20EN.pdf](https://media.gov.kw/assets/img/Ommah22_Awareness/PDF/NewKuwait/Revised%20KNDP%20-%20EN.pdf) (accessed: 08.11.2022)

<sup>116</sup> The Structure of the Energy Sector in Israel. Ministry of Energy State of Israel. March 2021 [Electronic Resource] // URL: [https://www.gov.il/BlobFolder/reports/israel\\_energy\\_sector/en/israel\\_energy\\_sector\\_en.pdf](https://www.gov.il/BlobFolder/reports/israel_energy_sector/en/israel_energy_sector_en.pdf) (accessed: 08.11.2022).

<sup>117</sup> Private Sector Development Strategy 2014-2030. Republic of Iraq Council of Ministers Prime Minister's Advisory Commission. April 2014 [Electronic Resource] // URL: <http://cabinet.iq/uploads/pdf/2015-3/2.pdf> (accessed: 08.11.2022).

<sup>118</sup> 2030 Egypt Vision [Electronic Resource] // URL: [https://arabdevelopmentportal.com/sites/default/files/publication/sds\\_egypt\\_vision\\_2030.pdf](https://arabdevelopmentportal.com/sites/default/files/publication/sds_egypt_vision_2030.pdf) (accessed: 08.11.2022).

## Turkey

Turkey's energy sector is characterized by a high dependence on imports and a lack of domestic resources, which create constant risks for the state's energy security; but at the same time, due to its favorable geopolitical position, the country claims to provide the main transit corridor in Eurasia. This is facilitated both by an increase in global demand for energy against the backdrop of the outbreak of the crisis, and the escalation of conflicts in the zones of oil and gas producing regions, including Russian-Ukrainian and Nagorno-Karabakh. As follows from the International Energy Strategy published in 2021 by the Ministry of Foreign Affairs of the Republic of Turkey, the main goals at the moment are to ensure their own security by diversifying routes and approving the role of a regional center of trade<sup>119</sup>.

Turkey's total installed generating capacity increased from 99,820 MW (December 2021) to 102,281 MW (September 2022)<sup>120</sup>. A large share in the energy balance is occupied by imported fossil fuels (oil and gas - 83%), a smaller role is assigned to geothermal, hydro and solar energy<sup>121</sup>. Despite the fact that the global oil market is undergoing a crisis, Turkey continues to successfully use its export potential thanks to its control over the Black Sea straits: the Bosphorus and the Dardanelles are among the world's busiest straits, through which about 3% of world oil passes<sup>122</sup>. Export is carried out to the USA, Germany, Great Britain, Egypt. Domestic production is relatively low (60 thousand barrels per day<sup>123</sup>), and preference is given to imports of Russian (36%), Iraqi (21%), Kazakh (7%) and Iranian (5%) oil through the Iraqi-Turkish oil pipeline and the Baku oil pipeline - Tbilisi - Ceyhan, as well as transportation by tankers<sup>124</sup>. Processing is carried out by five operating plants with a total capacity of 860 thousand barrels per day: in Izmir, Korfez, Aliaga, Kirikkale and Batman. The growth in oil consumption is mainly due to the increase in energy demand in the transport sector<sup>125</sup>.

Since the ratification of the Paris climate agreement, Turkey is committed to reducing CO<sub>2</sub> emissions to zero by 2053. Natural gas, one of the lowest carbon energy carriers and recognized by the EU Taxonomy as suitable for a gradual transition to a green economy, occupies a key place in the energy mix<sup>126</sup>. Domestic reserves are able to satisfy no more than 1% of the state's needs<sup>127</sup>, which makes Turkey

<sup>119</sup> Türkiye's International energy strategy. Ministry of Foreign Affairs [Electronic resource] // URL: <https://www.mfa.gov.tr/turkeys-energystrategy.en.mfa> (accessed: 10.11.2022).

<sup>120</sup> Monthly energy bulletin: September 2022. Official website Türkiye Sınai Kalkınma Bankası AS [Electronic resource] // URL: <https://www.tskb.com.tr/uploads/file/monthly-energy-bulletin-september-2022.pdf> (accessed: 10.11.2022).

<sup>121</sup> Turkey 2021 Energy Policy Review. Official website International Energy Agency [Electronic resource] // URL: [https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey\\_2021\\_Energy\\_Policy\\_Review.pdf](https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf) (accessed: 10.11.2022).

<sup>122</sup> *ibid.*

<sup>123</sup> Turciya uvelichila dobychu nefiti do 61 tys. barr./sutki. Official website Neftegaz.RU [Electronic resource] // URL: <https://neftegaz.ru/news/dobycha/682100-turtsiya-uvelichila-dobychu-nefti-do-61-tys-barr-sutki/> (accessed: 15.11.2022).

<sup>124</sup> Crude Oil. Ministry of energy and natural resources [Electronic resource] // URL: <https://enerji.gov.tr/info-bankenergycrude-oil> (accessed: 10.11.2022).

<sup>125</sup> Turkey 2021 Energy Policy Review. Official website International Energy Agency [Electronic resource] // URL: [https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey\\_2021\\_Energy\\_Policy\\_Review.pdf](https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf) (accessed: 10.11.2022).

<sup>126</sup> EU taxonomy: Complementary Climate Delegated Act to accelerate decarbonization. Official website European Commission [Electronic resource] // URL: [https://finance.ec.europa.eu/publications/eu-taxonomy-complementary-climate-delegated-act-accelerate-decarbonisation\\_en](https://finance.ec.europa.eu/publications/eu-taxonomy-complementary-climate-delegated-act-accelerate-decarbonisation_en) (accessed: 10.11.2022).

<sup>127</sup> *ibid.*

dependent on pipeline gas and LNG supplies from Russia (34%), Azerbaijan (21%) and Iran (17%). They are implemented through the Turkish Stream, Blue Stream, the Southern Gas Transport Corridor and the Tengiz-Ankara gas pipeline. Growth in demand for gas in Turkey exceeded demand in other European countries and amounted to 21% in 2022<sup>128</sup>.

The implementation of the strategy to reduce dependence on energy imports implies an increase in the production and consumption of domestic reserves such as lignite. An active policy of import substitution is facilitated by the state privatization of the coal mining sector, despite the high level of carbon dioxide emissions into the atmosphere and the associated environmental risks<sup>129</sup>. Coal production is currently declining: in August it fell by 7.5% (from 6940 to 6418 thousand tons) compared to last year<sup>130</sup>. However, Turkey does not plan to abandon coal mining in favor of other energy sources.

Turkey is ready to actively develop nuclear power, which is recognized as suitable for the implementation of the green energy transition, contributes to decarbonization and is cost-effective. Currently, work is underway on the construction of the Akkuyu power plant together with Rosatom<sup>131</sup> and the design of the Sinop and Igneada stations<sup>132</sup>. It is planned that nuclear energy will be able to cover more than 10% of the country's needs and reduce the burden on non-renewable sources<sup>133</sup>.

Thanks to the development of alternative energy, Turkey was able to increase consumption in 2020-2021. by 8% against the backdrop of the economic crisis and the COVID-19 pandemic; 98% of its volume comes from renewable sources, which are much cheaper compared to coal production<sup>134</sup>. The operation of only solar power plants in the first half of the year contributed to an increase in the total installed generating capacity to 102,000 MW<sup>135</sup>. In September 2022, geothermal energy (62%), hydroelectric power plants (14%) and wind farms (9%) were the leaders in energy production<sup>136</sup>. However, hydropower, which accounts for a quarter of Turkey's total energy generation, is subject to seasonal

<sup>128</sup> World Energy Issues Monitor 2022 Turkey commentary. Official website World Energy Council [Electronic resource] // URL: [https://www.worldenergy.org/assets/downloads/World\\_Energy\\_Issues\\_Monitor\\_2022\\_Turkey\\_commentary.pdf](https://www.worldenergy.org/assets/downloads/World_Energy_Issues_Monitor_2022_Turkey_commentary.pdf) (accessed: 10.11.2022).

<sup>129</sup> Turkey 2021 Energy Policy Review. Official website International Energy Agency [Electronic resource] // URL: [https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey\\_2021\\_Energy\\_Policy\\_Review.pdf](https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf) (accessed: 10.11.2022).

<sup>130</sup> Solid Fuels, August 2022. Official website Turkish Statistical Institute [Electronic resource] // URL: <https://data.tuik.gov.tr/Bulten/Index?p=Solid-Fuels-August-2022-45668> (accessed: 10.11.2022).

<sup>131</sup> Minenergo Turcii: Atomnaya energiya - znachimaya al'ternativa dlya vsego mira. Official website Anadolu Agency [Electronic resource] // URL: <https://www.aa.com.tr/ru/экономика/минэнерго-турции-атомная-энергия-значимая-альтернатива-для-всего-мира-/2642380> (accessed: 17.11.2022).

<sup>132</sup> Turciya obsudit s Rossiej vopros stroitel'stva AES v provincii Sinop. Official website Neftegaz.RU [Electronic resource] // URL: <https://neftgaz.ru/news/nuclear/752602-turtsiya-obsudit-s-rossiej-vopros-stroitelstva-aes-v-provintsii-sinop/> (accessed: 15.11.2022).

<sup>133</sup> Turkey 2021 Energy Policy Review. Official website International Energy Agency [Electronic resource] // URL: [https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey\\_2021\\_Energy\\_Policy\\_Review.pdf](https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf) (accessed: 10.11.2022).

<sup>134</sup> World Energy Issues Monitor 2022 Turkey commentary. Official website World Energy Council [Electronic resource] // URL: [https://www.worldenergy.org/assets/downloads/World\\_Energy\\_Issues\\_Monitor\\_2022\\_Turkey\\_commentary.pdf](https://www.worldenergy.org/assets/downloads/World_Energy_Issues_Monitor_2022_Turkey_commentary.pdf) (accessed: 13.11.2022).

<sup>135</sup> Monthly energy bulletin: September 2022. Official website Turkiye Sinai Kalkinma Bankasi AS [Electronic resource] // URL: <https://www.tskb.com.tr/uploads/file/monthly-energy-bulletin-september-2022.pdf> (accessed: 10.11.2022).

<sup>136</sup> *ibid.*

fluctuations, with natural gas consumption skyrocketing during dry times. Nevertheless, Turkey ranks 12th in the world in the development of renewable energy sources<sup>137</sup>.

The International Energy Agency's 2021 recommendations to move away from non-renewable sources call for attention to the transition to green energy in order to maintain competitiveness and attractiveness for foreign investment in their economy. The Republic of Turkey ranks 17th in terms of greenhouse gas emissions<sup>138</sup>, and its policies are criticized for their low degree of activity on climate change issues. The big risk is the possibility of the adoption of the Carbon Boundary Mechanism, a bill by the European Commission that would introduce a tax on carbon emissions. Turkey, being the largest exporter of fertilizers and metals to the EU (\$670 thousand in 2022<sup>139</sup>), will suffer the maximum losses<sup>140</sup>.

Turkey's closest partner in the energy sector is the Russian Federation, which is based on their interdependence: Turkey on the hydrocarbon raw materials supplied by Russia, and Russia on the Turkish energy corridor and the ability to implement projects in the field of peaceful atom. Promising is cooperation in the development of hydrogen energy<sup>141</sup>.

At the moment, Turkey's energy sector is highly dependent on imports; however, there are prospects for the creation of the largest gas and oil hub in Europe<sup>142</sup>. The energy transition is taking place at a much slower pace than the economic and resource potential allows; preference is given to traditional energy sources. The climate agenda and decarbonization are not a priority, but steps are being taken to limit CO2 emissions into the atmosphere in accordance with accepted international agreements. The flexible foreign policy of the Turkish government makes it possible, in the main, to ensure the republic's energy security. Despite the internal economic crisis and the escalation of conflicts between Turkey's main partners, the production and consumption of energy in the country is only growing.

<sup>137</sup> Turciya namerena dovesti k 2053 godu do nulya vrednye vybrosy v atmosferu. Official website МК-Турция [Electronic resource] // URL: <https://mk-turkey.ru/life/2022/10/21/t-turciya-namerena-dovesti-k-2053-godu-do-nulya-vrednye-vybrosy-v-atmosferu-erdogan.html> (accessed: 10.11.2022).

<sup>138</sup> GHG emissions of all world countries. Official website European Commission [Electronic resource] // URL: [https://edgar.jrc.ec.europa.eu/report\\_2021](https://edgar.jrc.ec.europa.eu/report_2021) (accessed: 16.11.2022).

<sup>139</sup> Foreign Trade Statistics, September 2022. Official website Turkish Statistical Institute [Electronic resource] // URL: <https://data.tuik.gov.tr/Bulten/Index?p=Foreign-Trade-Statistics-September-2022-45544> (accessed: 17.11.2022).

<sup>140</sup> Turkey 2021 Energy Policy Review. Official website International Energy Agency [Electronic resource] // URL: [https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey\\_2021\\_Energy\\_Policy\\_Review.pdf](https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf) (accessed: 10.11.2022).

<sup>141</sup> Rossiya i Turciya: sostoyanie i perspektivy energeticheskogo sotrudnichestva. Rabochaya tetrad' RSMD [Electronic resource] // URL: <https://russiancouncil.ru/papers/Russia-Turkey-Energy-WorkingPaper63.pdf> (accessed: 10.11.2022).

<sup>142</sup> Minenergo Turcii rasskazalo o planah prodavat' svoj gaz Evrope cherez novyj hab. Official website Neftegaz.RU [Electronic resource] // URL: <https://neftgaz.ru/news/shelf/759003-minenergo-turtsii-rasskazalo-o-planakh-prodat-svoj-gaz-evrope-cherez-novyy-khab/> (accessed: 17.11.2022).



## Latin America

In 2019, the United Nations Secretary-General's summit launched the Latin America and Caribbean Renewable Energy Initiative (RELAC – REnovables in Latin America and the Caribbean) to accelerate the carbon neutrality of electricity systems<sup>143</sup>. In the context of its own energy agreement, the RELAC initiative aims to achieve at least 70% of the share of renewable energy sources in the electricity mix of the region by 2030<sup>144</sup>. Each member country will contribute to the achievement of the aggregate target in accordance with its own national goals and conditions<sup>145</sup>. The leader of the initiative, Colombia, has set a goal of getting at least 4 GW from renewable energy sources by 2030, reaching 74% of RES nationwide in the electricity generation energy system<sup>146</sup>.

The need to introduce renewable energy sources is due not only to a global trend, but also to climate necessity, since the region makes a significant contribution to global greenhouse gas emissions. In 2019, emissions in the countries of Central and South America amounted to 1,107 million tons of CO<sub>2</sub>. The main contribution to GHGs emissions is made by the transport sector, emissions from which in 2019 amounted to 450 million tons of CO<sub>2</sub>. In addition, increasing the share of renewables in the generation mix is becoming increasingly important in Latin America, as the region's population is projected to grow by 18% by 2050 to over 750 million people<sup>147</sup>.

The region already generates about 25% of its energy from renewable sources, mainly hydropower and biofuels. Leading countries are Brazil, Venezuela, Argentina. Guyana, Suriname, Bolivia have the smallest percentage of RES in the energy balance<sup>148</sup>. However, according to the International Renewable Energy Agency (IRENA), there is potential to harness solar and wind resources, which accounted for only 16% of total renewable electricity generation in 2020<sup>149</sup>.

According to the Renewable Energy Country Attractiveness Index (RECAI), Brazil is ranked 9th out of 40<sup>150</sup>. This means that the country is attractive for investments in renewable energy sources and ther

<sup>143</sup> Renewable Energy in Latin America and the Caribbean Towards a Regional Energy Transition. Official website of International Energy Agency [Electronic Resource] // URL: <https://www.irena.org/events/2022/Jun/Renewable-Energy-in-Latin-America-and-the-Caribbean-Towards-a-Regional-Energy-Transition> (accessed: 10.11.2022).

<sup>144</sup> *ibid.*

<sup>145</sup> *ibid.*

<sup>146</sup> Latin America and the Caribbean's historic commitment towards renewable energy. Official website of The Global Climate Action Partnership [Electronic Resource] // URL: <https://globalclimateactionpartnership.org/about-us/> (accessed: 13.11.2022).

<sup>147</sup> Growing at a slower pace, world population is expected to reach 9.7 billion in 2050 and could peak at nearly 11 billion around 2100. Official website of UN [Electronic Resource] // URL: <https://www.un.org/development/desa/en/news/population/world-population-prospects2019.html> (accessed: 10.11.2022).

<sup>148</sup> Renewable capacity statistics 2021. Official website of International Renewable Energy Agency (IRENA) [Electronic Resource] // URL: <https://www.irena.org/Publications> (accessed: 13.11.2022).

<sup>149</sup> Renewable energy in Latin America: 5 renewable energy trends emerging from south of Rio Grande. Official website of Related Power [Electronic Resource] // URL: <https://ratedpower.com/blog/renewable-energy-latin-america/> (accessed: 13.11.2022).

<sup>150</sup> Renewable Energy Country Attractiveness Index. Official website of Ernst and Young [Electronic Resource] URL: [https://assets.ey.com/content/dam/ey-sites/ey-com/en\\_gl/topics/power-and-utilities/ey-recai-58th-edition-top-40-ranking-october-2021.pdf](https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/power-and-utilities/ey-recai-58th-edition-top-40-ranking-october-2021.pdf) (accessed: 10.11.2022).

are enough opportunities for their implementation. The country has set itself the goal of meeting about 48% of its energy needs by 2027 from wind and solar<sup>151</sup>.

Clean hydrogen is positioned as a rapidly developing clean energy in Latin America as well. The most common type of hydrogen is green. An example is Chile, which in November 2020 published a “National Green Hydrogen Strategy”<sup>152</sup>. Brazil is about to build the first hydrogen hub in Latin America for \$5.4 billion<sup>153</sup>.

At the same time, nuclear power is used only in Argentina, Brazil and Mexico. Each of these countries has two nuclear power plants in operation. In Argentina they account for 6.2% of total electricity generation, in Mexico 4.6% and in Brazil 2.8%. In general, in the region, nuclear power plants account for 2.3% of electricity generation<sup>154</sup>.

The demand for electricity in the transport sector will increase in the coming years due to the transition to electric vehicles as part of the commitment to reduce carbon emissions. Chile is the leader in public transport electrification in Latin America, with more than 800 electric buses operating on its roads<sup>155</sup>. Since 2019, Colombia, Costa Rica and Panama, as well as Chile, have launched national strategies for the introduction of electric vehicles<sup>156</sup>.

Fossil fuels continue to dominate Mexico as they account for 66% of the energy matrix, while renewables (including hydropower) account for 32% and biomass 2%<sup>157</sup>. Mexico has set a goal of generating 35% of its energy from clean sources by 2024, but last year decided to delay that goal until 2030 in line with renewed climate commitments under the Paris Agreement.

Venezuela is a member of the Organization of the Petroleum Exporting Countries (OPEC) and the region's leader in oil production. After the introduction of sanctions by the United States against the state-owned oil company PDVSA, Venezuela announced an increase in oil production. The country produces 625,000 barrels of oil daily<sup>158</sup>. According to the latest statistics released by the International Renewable Energy Agency, about 16.59 GW of renewable energy generation capacity was installed in Venezuela in 2020<sup>159</sup>. In 2020, Venezuela set a target to build 10,000 MW wind farms over the next 15 years. This is

<sup>151</sup> Renewable energy in Latin America: 5 renewable energy trends emerging from south of Rio Grande. Official website Related Power [Electronic resource] // URL: <https://ratedpower.com/blog/renewable-energy-latin-america/> (accessed: 13.11.2022).

<sup>152</sup> National Green Hydrogen Strategy. Ministry of Energy, Government of Chile. – 31 p

<sup>153</sup> V Brazílii budet postroen pervyj v Latinskoy Amerike vodorodnyj hab za 5,4 mlrd doll. Official website «Dekarbonizaciya» [Electronic resource] // URL: <http://decarbonization.ru/news/industry/v-brazilii-budet-postroen-pervyi-v-latinskoi-amerike-vodorodnyi-khabza-5-4-mlrd-doll/?ysclid=lagqjbjuf896039016> (accessed: 13.11.2022).

<sup>154</sup> Ирма Аргуэльо. Ядерная энергетика в Латинской Америке: между экономическим развитием и рисками распространения. Индекс безопасности №4 (95), Том 16. – 56 стр.

<sup>155</sup> Renewable energy in Latin America: 5 renewable energy trends emerging from south of Rio Grande. Official website Related Power [Electronic resource] // URL: <https://ratedpower.com/blog/renewable-energy-latin-america/> (accessed: 13.11.2022).

<sup>156</sup> *ibid.*

<sup>157</sup> El mercado de las energías renovables en América Latina se recupera tras la pandemia. Official website Diálogo Chino [Electronic resource] // URL: <https://dialogochino.net/es/sin-categorizar/54288-el-mercado-de-las-energias-renovables-en-america-latina-se-recupera-tras-lapandemia/> (accessed: 13.11.2022).

<sup>158</sup> Venesuela ob'yavila o roste sutochnoj dobychi nefti do maksimuma s 2019 goda. Official website Forbes [Electronic resource] // URL: <https://www.forbes.ru/biznes/451323-venesuela-ob-avila-o-roste-sutochnoj-dobychi-nefti-do-maksimuma-s-2019-goda> (accessed 14.11.2022).

<sup>159</sup> VENEZUELA RENEWABLE ENERGY MARKET – GROWTH, TRENDS, COVID-19 IMPACT, AND FORECASTS (2022–2027). Official website Mordor Intelligence [Electronic resource] // URL: <https://www.mordorintelligence.com/industry-reports/venezuelarenewable-energy-market> (accessed: 16.11.2022).

expected to increase the share of renewables in Venezuela's overall energy mix. In the near future, the countries exporting traditional resources of Latin America may replace the supply of Russian energy resources to European countries in connection with the imposition of sanctions against Russia. In particular, the Italian company Eni and the Spanish company Repsol began to buy Venezuelan oil. Cargoes of Venezuelan oil shipped to Europe helped boost the OPEC nation's oil exports by 61% in June 2022 compared to the previous month<sup>160</sup>.

Over the past few years, Latin America has invested heavily in renewable energy, with a total value of over \$16 billion, or about 6% of the world's total. Between 2010 and 2015, total investments in renewable energy generation in the region amounted to about \$120 billion, placing several countries in Latin America among the top 10 renewable energy markets in the world<sup>161</sup>. In 2019, Latin America saw a record level of foreign direct investment in renewable energy, with 97 projects completed in the first 10 months of 2019, worth \$17.8 billion<sup>162</sup>.

The use and implementation of renewable energy sources is actively developing in Latin America, in particular after the adoption of the Paris climate agreement. Countries seek to contribute to the achievement of its goals through the transition to renewable energy sources. So far, the Ukrainian crisis has not affected the energy transition in Latin America due to the remoteness of the region. However, due to the imposition of sanctions against Russia to ban oil and gas supplies to the EU, Latin American energy exporting countries may benefit in the long run in the form of increased supplies to the EU.

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<sup>160</sup> Resumption of deliveries to Europe boosts Venezuela oil exports. Official website Reuters [Electronic resource] // URL: <https://www.reuters.com/business/energy/resumption-deliveries-europe-boosts-venezuela-oil-exports-data-2022-07-05/> (accessed: 16.11.2022).

<sup>161</sup> Energías renovables, tendencias en Latinoamérica. times/inversion-en-energia-renovable-en-america-latina-alcanza-niveles-historicos-LA16071947 (accessed: 13.11.2022). Official website MAPFRE Global Risks [Electronic resource] // URL: <https://www.mapfreglobalrisks.com/gerencia-riesgos-seguros/articulos/energias-renovables-tendencias-en-latinoamerica/> (accessed: 13.11.2022).

<sup>162</sup> Inversión en energía renovable en América Latina alcanza niveles históricos. Official website Diario Libre [Electronic resource] // URL: <https://www.diariolibre.com/economia/financiamiento/inversion-en-energia-renovable-en-america-latina-alcanza-niveles-historicos-LA16071947> (accessed: 13.11.2022).

## The Russian Federation

The volume of gas production in Russia in 2021 amounted to 762.3 billion cubic meters. In January-September 2022, gas production in Russia decreased by 10.3% compared to the same period last year and amounted to 502.8 billion cubic meters<sup>163</sup>. In 2021, 204 billion cubic meters of gas were exported: two-thirds to the EU, one-third to China and Turkey. In 2021, Russia supplied 10.5 billion cubic meters of gas to China, and this year it plans to supply from 16 to 20 billion cubic meters of gas. Turkey accounted for 27-28 billion cubic meters, the CIS countries - 30 billion, Belarus - 20 billion. But most of the production - about 500 billion cubic meters - was directed to the domestic market<sup>164</sup>. According to the explanatory note to the draft budget for 2023 and for the planned period of 2024–2025, the total volume of natural gas exports from Russia may fall by 31% in 2022, to 142 billion cubic meters<sup>165</sup>.

After the onset of the global energy crisis in October 2021, which was aggravated by sanctions against Russian energy carriers, a list of instructions was developed, which include both the development of gasification, which implies an increase in domestic gas consumption in the country, and the construction of new gas pipelines from the fields of Western and Eastern Siberia, as well as also the integration of the existing gas pipelines "Power of Siberia" and Sakhalin - Khabarovsk - Vladivostok into the Unified Gas Supply System<sup>166</sup>.

The supply of Russian natural gas to the EU via pipelines in the first ten months of 2022 was halved compared to the same period in 2021, falling by 60 billion cubic meters<sup>167</sup>. This is due to a number of factors, such as Russia's requirement for counterparties to pay for gas in rubles, the cessation of the use of the Polish section of the Yamal-Europe gas pipeline, as well as sabotage on the Nord Stream 1 and Nord Stream 2 gas pipelines, which made gas supplies impossible to Europe via northern routes<sup>168</sup>. Technically, damage to these gas pipelines can be repaired, however, permits from Denmark and Sweden are required to carry out the work<sup>169</sup>. The repair itself can take more than six months<sup>170</sup>.

As for oil, in 2021 EU countries accounted for 47% of Russian deliveries in physical terms (108.1 million tons; \$50.9 billion). On May 30, the EU countries reached an agreement in principle to ban the import of Russian oil<sup>171</sup>. The United States, together with the G7 countries and the European Union,

<sup>163</sup> Dobycha gaza nezavisimyh proizvoditelej v Rossii za devyat' mesyacev vyroslo na 4%. Official website gazety «Vedomosti» [Electronic resource] // URL: <https://www.vedomosti.ru/business/articles/2022/10/10/944816-dobicha-gaza-nezavisimih-proizvoditelej> (accessed: 19.11.2022).

<sup>164</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans //Ekologiya i pravo. – 2022. – № 85. – P. 30–35.

<sup>165</sup> Eksport gaza Rossii v 2022 godu mozhet upast' do 142 mlrd kub. m. Official website TACC [Electronic resource] // URL: <https://tass.ru/ekonomika/15896975> (accessed: 19.11.2022).

<sup>166</sup> Soveshchanie o tekushchej situacii v neftegazovom sektore. Official website Administracii Prezidenta Rossii [Electronic resource] // URL: <http://kremlin.ru/events/president/news/68191> (accessed: 19.11.2022).

<sup>167</sup> V MEA prognoziryut snizhenie ob'emov postavok rossijskogo gaza v ES na 55% v 2022 godu. Official website TASS [Electronic resource] // URL: <https://tass.ru/ekonomika/16241285> (accessed: 19.11.2022).

<sup>168</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans //Ekologiya i pravo. – 2022. – № 85. – P. 30–35.

<sup>169</sup> Trubnaya sud'ba: real'no li vosstanovit' infrastrukturu «Severnyh potokov». Official website informacionnogo portala gazety «Izvestiya» [Electronic resource] // URL: <https://iz.ru/1404399/irina-kezik/trubnaia-sudba-realno-li-vosstanovit-infrastrukturu-severnykhpotokov> (accessed: 19.11.2022).

<sup>170</sup> V Gosdume zayavili, chto remont "Severnyh potokov" mozhet zanyat' minimum polgoda. Official website TACC [Electronic resource] // URL: <https://tass.ru/ekonomika/15903567> (accessed: 19.11.2022)

<sup>171</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans //Ekologiya i pravo. – 2022. – № 85. – P. 30–35.

imposed a ban on the sea transportation of Russian oil on December 5, a ban on the transportation of oil products by sea (which accounted for 65% of supplies) on February 5, 2023<sup>172</sup>.

According to the Analytical Center for the Government of the Russian Federation, 44% of oil exports from Russia are at risk<sup>173</sup>. According to the forecast of BCS Express analysts, sea supplies from Russia to the EU after the start of sanctions may be reduced by 60-70%, and 54% of the volume that was a year earlier will go through the “Druzhba” oil pipeline<sup>174</sup>.

In addition, the US Department of the Treasury has proposed to other G7 countries by the end of 2022 to introduce a price cap on oil exported by Russia. The “success” of this strategy will largely depend on the willingness of China and India to join this decision: in case of their refusal, the introduction of a ceiling on prices for Russian oil could lead to an increase in prices for supplies from other countries, which would not allow achieving the goals of sanctions and could even lead to increase the oil and gas revenues of the Russian Federation<sup>175</sup>.

Reducing the risk of reduced exports requires strengthening the diversification of supplies, including increasing the share of Asia-Pacific in the structure of sales of energy and energy products<sup>176</sup>.

Since the start of the Special Military Operation (SMO), Russian oil supplies to China have risen to 2 million barrels per day – up 55% from a year earlier – and reached a record high in May 2022<sup>177</sup>. They also exceeded Russia’s supplies to the EU in previous periods. Deliveries to India reached a record high of 975,000 barrels per day in July<sup>178</sup>. African countries such as Nigeria, Morocco, Sudan and Côte d'Ivoire are also increasing oil imports from Russia: diesel fuel exports to these countries increased from 0.8 million to 1 million tons, while imports of gasoline and naphtha countries of the region increased to 200 thousand tons<sup>179</sup>.

The active development of oil supplies to Asia is hindered by difficulties with the lack of sufficient logistics in the Asian region and the refusal of cargo insurance by European and American companies that own the market. The launch of new projects may be complicated and delayed due to the withdrawal of foreign oilfield service companies from the Russian market<sup>180</sup>.

Diversification of supplies will require the implementation of infrastructure solutions, but the return on investment in further development of capacities in the global sense is declining, so that the

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<sup>172</sup> Ibid.

<sup>173</sup> Mirovoj rynek nefii: novye pravila igry dlya Rossii. Official website analiticheskogo centra pri Pravitel'stve RF [Electronic resource] // URL: [https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo\\_%E2%84%96109.pdf](https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo_%E2%84%96109.pdf) (accessed: 15.11.2022).

<sup>174</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans // *Ekologiya i pravo*. – 2022. – № 85. – P. 30–35.

<sup>175</sup> Dekarbonizaciya v usloviyah neopredelennosti: puti i resheniya. Official website Moskovskoj shkoly upravleniya Skolkovo [Electronic resource] // URL: <https://www.skolkovo.ru/researches/dekarbonizaciya-v-usloviyah-neopredelennosti-puti-i-resheniya/> (accessed: 15.11.2022).

<sup>176</sup> Peresmotr strategii. Official website analiticheskogo centra pri Pravitel'stve RF [Electronic resource] // URL: [https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo\\_%E2%84%96\\_108.pdf](https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo_%E2%84%96_108.pdf) (accessed: 15.11.2022).

<sup>177</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans // *Ekologiya i pravo*. – 2022. – № 85. – P. 30–35.

<sup>178</sup> *ibid.*

<sup>179</sup> Strany Afriki uvelichili import nefteproduktov iz Rossii. Official website informacionno-analiticheskogo portala Neftegaz.RU [Electronic resource] // URL: <https://neftegaz.ru/news/petroleum-products/741760-strany-afriki-uvelichili-import-nefteproduktov-iz-rossii/> (accessed: 19.11.2022).

<sup>180</sup> Obzor rynka nefii. Investicii i rynki kapitala. II kv. 2022 g. Prognoz cen na nef'. Official website kompanii kept [Electronic resource] // URL: <https://kept.ru/upload/iblock/ff9/mgzt7mx0340oix0bv0z60eq66sywciw/ru-oil-market-review-2q-2022.pdf> (accessed: 15.11.2022).

requirements for the development of new sources of supply and new resources are partly irrelevant. The question is rather raised about strengthening the emphasis on solutions that allow increasing the competitiveness of Russian supplies in the face of intensifying price competition, especially in eastern markets<sup>181</sup>.

There is an opinion that the traditional suppliers of oil to Asian markets from the Gulf of Mexico countries will not give up their share to Russia, so it is not clear whether India and China will be able to “absorb” all the oil released from the EU<sup>182</sup>.

Key indicators of the Russian coal industry in March 2022 also decreased. The main difficulties in the coal sector are related to the embargo on the import of Russian coal, as well as the export of technologies for the coal industry. In the first seven months of 2022, production decreased by 0.9%. However, the fall in exports by 8.6% over the same period was largely offset by increased demand in the domestic market, which has grown by 6.8% y/y since the beginning of the year, reaching 99.5 million tons due to increased electricity consumption due to low water Siberian rivers this year<sup>183</sup>. The possibility of increasing deliveries to the Asia-Pacific countries is also being considered, but the congestion of the Eastern test site is currently a limiting factor. The increase in exports to China and Kazakhstan is complicated by the lack of free railway and port facilities<sup>184</sup>.

According to the IEA, Russia's position is weakening significantly, as it fails to find markets for all the flows that previously went to Europe. Projected oil production in Russia in 2025 will be 2 million barrels per day lower than in the WEO-2021 report, and gas production will decrease by 200 billion cubic meters. The long-term outlook is weakened by uncertainty about demand, as well as limited access to international capital and technology to develop more complex fields and LNG projects. None of the IEA's scenarios see Russia's fossil fuel exports return to 2021 levels, with its share of international oil and gas trade halved in stages by 2030<sup>185</sup>.

As for Russian nuclear power plants, which account for about 20% of all electricity produced, they increased electricity generation by 1.35% in ten months of 2022 compared to the same period in 2021. It is reported that the operation of all Russian nuclear power plants in ten months made it possible to prevent emissions of greenhouse gases into the atmosphere in the amount of more than 92 million tons of CO<sub>2</sub> equivalent<sup>186</sup>. It is important to note that no EU sanctions have been imposed on nuclear energy

<sup>181</sup> Peresmotr strategii. Official website analiticheskogo centra pri Pravitel'stve RF [Electronic resource] // URL: [https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo\\_%E2%84%96\\_108.pdf](https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo_%E2%84%96_108.pdf) (accessed: 15.11.2022).

<sup>182</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans // *Ekologiya i pravo*. – 2022. – № 85. – P. 30–35.

<sup>183</sup> Ugol'naya promyshlennost' XXI veka: zakat ili renessans. *Obshchestvenno-delovoj zhurnal «Energeticheskaya politika»* [Electronic resource] // URL: <https://energypolicy.ru/ugolnaya-promyshlennost-xxi-veka-zakat-ili-renessans/business/2022/14/10/> (accessed: 19.11.2022).

<sup>184</sup> Novaya diversifikaciya na rynkah gaza. Official website analiticheskogo centra pri Pravitel'stve RF [Electronic resource] // URL: [https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo\\_107.pdf](https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo_107.pdf) (accessed: 15.11.2022).

<sup>185</sup> World Energy Outlook 2022. Official website IEA [Electronic resource] // URL: <https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf> (accessed: 19.11.2022).

<sup>186</sup> AES Rossii na 1,35% uvelichili vyработку elektroenergii za 10 mesyacev 2022 goda. Official website Goskorporacii «Rosatom» [Electronic resource] // URL: <https://rosatom.ru/journalist/news/aes-rossii-na-1-35-uvelichili-vyработку-elektroenergii-za-10-mesyatsev-2022-goda/> (accessed: 19.11.2022).

at the moment, which is due to the high level of dependence of many countries of Eastern and Central Europe on Russian uranium fuel, as well as nuclear technologies and services<sup>187</sup>.

The cardinal change in the external economic situation has put on the agenda the issue of prompt renewal of the Energy Strategy of Russia. On the one hand, in the short term, the requirements for reducing carbon intensity and developing green energy may be somewhat relaxed, including due to the redirection of traditional energy resources to the domestic market. On the other hand, such steps should involve compensatory tightening measures in the medium and long term, since global requirements for the sustainability of the fuel and energy complex will inevitably grow<sup>188</sup>.

As part of the implementation of the Paris Agreement, the Russian Federation announces a target indicator for limiting greenhouse gas emissions, which provides for the reduction of greenhouse gas emissions by 2030 to 70% compared to 1990 levels, taking into account the maximum possible absorption capacity of forests and other ecosystems and subject to a sustainable and balanced socio-economic development of the Russian Federation<sup>189</sup>. Target, specified in the preferred scenario of Russia's Low Carbon Development Strategy assumes that it will achieve climate neutrality by 2060.

However, foreign ratings assessing the effectiveness of climate policy are critical of Russia's decarbonization strategy. The Climate Change Effectiveness Index (CCPI) assesses Russia's achievements in the field of greenhouse gas emissions prevention, renewable energy sources and climate policy as "very low"<sup>190</sup>. Since last year, Russia has fallen by 3 positions in the ranking and is now in 59th place. CCPI experts criticize the Russian government for focusing on replacing coal with natural gas instead of developing renewable energy sources, as well as ignoring the urgency of the climate crisis. In addition, they mention that the energy crisis resulting from the military operation has weakened climate action around the world<sup>191</sup>.

Representatives of the Climate Action Tracker in 2022 rated Russia's actions on the climate agenda as "critically insufficient", which means that the State's pledges reflect little or no action to meet the 1.5°C temperature rise cap under the Paris Agreement<sup>192</sup>. The government builds projections based on the assumption that by 2050 forests will absorb twice as much carbon as they currently do. At the same time, large-scale fires that occur in Siberia are not taken into account. It is reported that if all countries used an approach similar to the Russian one, the temperature could rise to the level of 3-4°<sup>193</sup>.

<sup>187</sup> Russia's multi-million euro nuclear exports untouched by EU sanctions. Official website of Investigate Europe [Electronic resource] // URL: <https://www.investigate-europe.eu/en/2022/russias-multi-million-euro-nuclear-exports-untouched-by-eusanctions/> (accessed: 19.11.2022).

<sup>188</sup> Peresmotr strategii. Official website analiticheskogo centra pri Pravitel'stve RF [Electronic resource] // URL: [https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo\\_%E2%84%96\\_108.pdf](https://ac.gov.ru/uploads/2-Publications/energo/2022/Energo_%E2%84%96_108.pdf) (accessed: 15.11.2022).

<sup>189</sup> Opredeleyaemyj na nacional'nom urovne vklad Rossijskoj Federacii v ramkah realizacii Parizhskogo soglashiya ot 12 dekabrya 2015 goda. Official website of Ministry of Economic Development of the Russian Federation [Electronic resource] // URL: <https://economy.gov.ru/material/file/37b0b56c4a347e528e5dd89ea02c32e2/NDC%20Russian%20Federation%20%28rus%29.pdf> (accessed: 15.11.2022).

<sup>190</sup> Russian Federation. Indeks effektivnosti bor'by s izmeneniem klimata [Electronic resource] // URL: <https://ccpi.org/country/rus/> (accessed: 15.11.2022).

<sup>191</sup> Russian Federation. Indeks effektivnosti bor'by s izmeneniem klimata [Electronic resource] // URL: <https://ccpi.org/country/rus/> (accessed: 15.11.2022).

<sup>192</sup> Russian Federation. Official website of Climate Action Tracker [Electronic resource] // URL: <https://climateactiontracker.org/countries/russian-federation> (accessed: 15.11.2022)

<sup>193</sup> *ibid.*

It is worth noting that some important elements of the preparations for carbon emissions regulation, which were approved before February 24, are now somewhat postponed, but not canceled. In particular, due to the need to prepare by-laws, the launch of the so-called Sakhalin Experiment, a pilot project to regulate greenhouse emissions and achieve carbon neutrality within one region, the Sakhalin Region, was postponed for six months. The project was launched on September 1, and its main goal is to achieve carbon neutrality in Sakhalin by the end of 2025. The experiment is positioned as the first model of carbon regulation in Russia and includes plans for inventorying greenhouse gas emissions and removals, as well as emission quotas for large issuers (with emissions from 50 thousand tons of CO<sub>2</sub> equivalent)<sup>194</sup>.

Some of the criticism of the Sakhalin Climate Program stems from the decision to include existing programs to improve energy efficiency and improving the environmental situation, thus "repackaging" some of the previous long-term measures already implemented by the authorities and affecting the reduction of greenhouse emissions<sup>195</sup>.

The state has also introduced a number of relaxations in the regulation of the ecological footprint in the activities of enterprises, since initiatives in this area are usually expensive for companies and require a restructuring of business processes. In the short term, some important government measures aimed at improving the quality of environmental protection have been postponed, such as: extending until the end of 2024 the deadline for applying for integrated environmental permits for 300 enterprises that have a negative impact on the environment; extension until the end of 2023 of the period of validity of the positive conclusions of the state environmental expertise expiring in 2022, etc<sup>196</sup>.

It is worth mentioning that large energy companies operating in the field of renewable energy, such as Fortum, Enel, Vestas, left the Russian market. Now only The Russia Renewable Energy Development Association (RREDA) promotes green energy. At the same time, not a single previously approved investment project for renewable energy has been canceled, the RREDA notes. But competitions for renewable energy generation projects in the wholesale and retail markets in 2022 were canceled by the government<sup>197</sup>.

Meanwhile, alternative energy in Russia is characterized by great potential. All regions of the country have one or two types of RES, the operation of which can be economically justified, and in some regions all types of RES are available (for example, in the Republic of Dagestan)<sup>198</sup>. The gross potential of RES (the amount of energy contained in this type of energy resource, subject to its full useful use) in Russia is about 3,093 billion tons of fuel equivalent. In this value, the share of solar energy is 71.3%, wind energy - 28.7%<sup>199</sup>.

<sup>194</sup> Sahalinskij eksperiment otlozhen na polgoda. Official website of «Kommersant» [Electronic resource] // URL: <https://www.kommersant.ru/doc/5217466> (accessed: 19.11.2022).

<sup>195</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans //Ekologiya i pravo. – 2022. – № 85. – P. 30–35.

<sup>196</sup> Barometr ustojchivoy transformacii biznesa. Issledovanie E+ Change i kept. Official website kompanii kept [Electronic resource] // URL: <https://kept.ru/upload/iblock/21d/gv4xbnb3hzltbx49b97o1xtapr96gv9u/ru-kept-and-eplus-barometr-of-sustainable-businessstransformation.pdf> (accessed: 15.11.2022).

<sup>197</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans //Ekologiya i pravo. – 2022. – № 85. – P. 30–35.

<sup>198</sup> Vozobnovlyaemaya energetika v Rossii i v mire. Official website REA Minenergo Rossii [Electronic resource] // URL: [https://www.rosenergo.gov.ru/vie-report/%D0%94%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4\\_%D0%92%D0%98%D0%AD.pdf](https://www.rosenergo.gov.ru/vie-report/%D0%94%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4_%D0%92%D0%98%D0%AD.pdf) (accessed: 15.11.2022).

<sup>199</sup> Vozobnovlyaemaya energetika v Rossii i v mire. Official website REA Minenergo Rossii [Electronic resource] // URL: [https://www.rosenergo.gov.ru/vie-report/%D0%94%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4\\_%D0%92%D0%98%D0%AD.pdf](https://www.rosenergo.gov.ru/vie-report/%D0%94%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4_%D0%92%D0%98%D0%AD.pdf) (accessed: 15.11.2022).



Despite the fact that Russia has huge resources of wind, geothermal, solar energy, hydropower resources, biomass energy, today the share of renewable energy in the country's energy balance is less than 1%<sup>200</sup>. According to many experts, insufficient attention to the development of RES in Russia is due to the presence of a number of objective and subjective factors, the main of which are the low economic competitiveness of RES in relation to fuel energy (prices and tariffs for electricity and heat in areas of centralized energy supply in Russia are significantly lower than in other countries). huge reserves of fuel and energy along with a large reserve capacity of interconnected energy systems (from 3 to 16 GW) with low growth rates power consumption<sup>201</sup>.

Against the backdrop of a reduction in the supply of gas, coal and oil within Russia, the question will arise: where to direct the volumes that used to be exported? At the same time, according to experts, it will not be possible to switch gas flows to Asia in the next 10 years due to the lack of infrastructure. So far, there is only a political declaration of intent to build Power of Siberia-2, but there is no agreement on investments in the project<sup>202</sup>. In addition, there is a problem with technology: Russia could switch to liquefied gas, but the technologies for its production are European or American, and they are currently not available due to sanctions<sup>203</sup>.

Thus, in the short term, due to the current geopolitical situation, in particular the impact of the sanctions, most of the measures at the level of the state and the corporate sector were aimed at solving economic and financial problems, due to which the ESG agenda was overshadowed by issues requiring priority resolution. However, the overall commitment to the ESG course remains, which is largely due to the country's long-term plans to achieve the SDGs: for example, reducing the carbon footprint, developing a green economy and green technologies.

There is an opinion that big changes in Russia's low-carbon development plans in connection with the outbreak of hostilities in Ukraine and sanctions pressure on the Russian economy should not be expected, as well as in view of the fact that the low-carb development strategy and the goals stated in it are not too ambitious and did not imply adoption some radical decisions to reduce emissions, so the new factors that appeared after February 24 cannot affect it much. Moreover, the expected slowdown in the Russian economy under the new conditions may lead to a reduction in emissions even without special measures of a low-carbon strategy<sup>204</sup>.

The Skolkovo Center for Sustainable Development considered several types of scenarios for the future of Russia's decarbonization. These scenarios are highly variable, with a 1–2 p.p. change in the four parameters of annual top-level factors influencing decarbonization. leads to diametrically opposite results in the horizon of 2050. Projected net emissions in 2050 range from 319 to 2229 million tons of CO<sub>2</sub> equivalent<sup>205</sup>.

<sup>200</sup> Vozobnovlyaemaya energetika v Rossii i v mire. Official website REA Minenergo Rossii [Electronic resource] // URL: [https://www.rosenergo.gov.ru/vie-report/%D0%94%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4\\_%D0%92%D0%98%D0%AD.pdf](https://www.rosenergo.gov.ru/vie-report/%D0%94%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4_%D0%92%D0%98%D0%AD.pdf) (accessed: 15.11.2022).

<sup>201</sup> *ibid.*

<sup>202</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans // *Ekologiya i pravo*. – 2022. – № 85. – P. 30–35.

<sup>203</sup> *ibid.*

<sup>204</sup> Vera Kuz'mina. Degazifikaciya i deneftenizaciya: vliyanie na mirovoj energobalans // *Ekologiya i pravo*. – 2022. – № 85. – P. 30–35.

<sup>205</sup> Dekarbonizaciya v usloviyah neopredelennosti: puti i resheniya. Official website Moskovskoj shkoly upravleniya Skolkovo [Electronic resource] // URL: <https://www.skolkovo.ru/researches/dekarbonizaciya-v-usloviyah-neopredelennosti-puti-i-resheniya/> (accessed: 15.11.2022).

The Russian economy is able to achieve carbon neutrality by 2060. This will require massive structural changes, but seems to be an achievable goal. At the same time, the energy transition of the world economy may lead to a situation in which the main problem for Russia will not be the reduction of GHG emissions, but the search for new sources of economic growth and budget financing against the backdrop of a reduction in the role of the Russian fuel and energy complex. In order to reach a rational strategy for the decarbonization of the Russian economy, it is necessary to stop considering low-carbon development in isolation from investment policy and the policy of developing domestic technologies. If these areas are developed separately, there is a risk that significant progress will not be achieved in any of them.

## EAEU countries (Kazakhstan, Belarus, Kyrgyzstan, Armenia)

By 2025, the EAEU countries (Russia, Belarus, Kazakhstan, Kyrgyzstan, Armenia) plan to launch a common market for gas, oil and oil products<sup>206</sup>. Concepts and programs for the formation of common markets have already been approved. In total, three stages of the program implementation are planned: from 2018 to 2021; from 2021 to 2024; the final third stage is designed for the period until January 1, 2025<sup>207</sup>. On April 5, 2022, the Protocol on Amendments to the Treaty on the EAEU dated May 29, 2014 in terms of the formation of a common electricity market came into force<sup>208</sup>. Consequently, today the foundations for the functioning of the common electricity market have been established, its participants, as well as infrastructure organizations, the principles of cross-border electricity trade, and the competences of the bodies of the integration association have been determined<sup>209</sup>.

In 2022, it was planned to sign an agreement on the formation of a common gas market<sup>210</sup>, but as of November 2022, such an agreement had not been signed (according to some estimates, the common gas market could reach over 20 billion cubic meters annually)<sup>211</sup>. The reason for this may be the presence of a number of disagreements between the member countries, which have been discussed more than once by the member countries of the EAEU<sup>212</sup>. Among others, it is worth highlighting the issue of pricing for gas transportation services on the common market, the operation of bilateral international gas agreements, as well as the supply of gas from third countries for domestic consumption<sup>213</sup>. In particular, regarding the issue of gas transportation tariffs, the EAEU member countries took different positions: for example, gas consuming countries, namely Armenia, Kyrgyzstan and Belarus, advocated the principle that

<sup>206</sup> Chem vygoden stranam EAES obshchij rynek energoresursov. Ob etom v interv'yu "Rossijskoj gazete" ministr po energetike i infrastrukture EEK Temirbek Asanbekov. Official website Evrazijskoj komissii [Electronic resource] // URL: <https://eec.eaeunion.org/news/speech/chem-vygoden-stranam-eaes-obshchij-rynek-energoresursov-ob-etom-v-intervyu-quot-rossijskoj-gazetequot-ministr-po-energetike-i-infrastrukture-EEK-temirbek-asanbekov/> (accessed: 10.11.2022).

<sup>207</sup> Obshchij neftyanoy rynek povysit konkurentosposobnost' stran EAES na mirovom urovne – direktor departamenta EEK. Official website «Evrazijskij Ekspert» [Electronic resource] // URL: <https://eurasia.expert/obshchij-nefityanoy-rynek-povysitkonkurentosposobnost-eaes-na-mirovom-urovne/> (accessed: 10.11.2022).

<sup>208</sup> Protokol o vnesenii izmenenij v Dogovor o Evrazijskom ekonomicheskom soyuze ot 29 maya 2014 goda (v chasti formirovaniya obshchego elektroenergeticheskogo rynka Evrazijskogo ekonomicheskogo soyuza) ot 29 maya 2019 goda (ratificirovan Federal'nym zakonom ot 1 iyulya 2021 g. № 235-FZ, vstupil v silu dlya Rossii 5 aprelya 2022 g.). Official website internet-portala pravovoj informacii [Electronic resource] // URL: <http://publication.pravo.gov.ru/Document/View/0001202204220001?index=0&rangeSize=1> (accessed: 10.11.2022).

<sup>209</sup> Vadim Zakrevskij: kogda zarabotayut obshchie energeticheskie rynki v EAES i kakuyu vygodu poluchat potrebiteli. Official website Evrazijskoj komissii [Electronic resource] // URL: <https://eec.eaeunion.org/news/speech/vadim-zakrevskiy-kogda-zarabotayut-obshchieenergeticheskie-rynki-v-eaes-i-kakuyu-vygodu-poluchat-potrebiteli/> (accessed: 10.11.2022).

<sup>210</sup> Formirovanie obshchego rynka gaza obsudili strany EAES. Official website Centra delovoj informacii «Kapital» [Electronic resource] // URL: <https://kapital.kz/economic/102649/formirovaniye-obshchego-rynka-gaza-obsudili-strany-yeaes.html> (accessed: 10.11.2022).

<sup>211</sup> Na soveshchanii vysokogo urovnya obsudili obshchij rynek gaza EAES. Official website Evrazijskoj komissii [Electronic resource] // URL: <https://eec.eaeunion.org/news/na-soveshchanii-vysokogo-urovnya-obsudili-obshchij-rynek-gaza> #:~:text=%D0%9E%D0%B1%D1%8A%D0%B5%D0%BC%20%D0%BE%D0%B1%D1%89%D0%B5%D0%B3%D0%BE%20%D1%80%D1%8B%D0%BD%D0%BA%D0%B0%20%D0%B3%D0%B0%D0%B7%D0%B0%20%D0%95%D0%90%D0%AD%D0%A1,%D0%B3%D0%B0%D0%B7%D0%BE%D0%BF%D0%BE%D1%82%D1%80%D0%B5%D0%B1%D0%BB%D1%8F%D1%8E%D1%89%D0%B8%D1%85%20%D1%81%D1%82%D1%80%D0%B0%D0%BD%20%D0%B5%D0%B2%D1%80%D0%B0%D0%B7%D0%B8%D0%B9%D1%81%D0%BA%D0%BE%D0%B9%20%C2%AB%D0%BF%D1%8F%D1%82%D0%B5%D1%80%D0%BA%D0%B8%C2%BB. (accessed: 10.11.2022).

<sup>212</sup> ibid.

<sup>213</sup> Vadim Zakrevskij: kogda zarabotayut obshchie energeticheskie rynki v EAES i kakuyu vygodu poluchat potrebiteli. Official website Evrazijskoj komissii [Electronic resource] // URL: <https://eec.eaeunion.org/news/speech/vadim-zakrevskiy-kogda-zarabotayut-obshchieenergeticheskie-rynki-v-eaes-i-kakuyu-vygodu-poluchat-potrebiteli/> (accessed: 10.11.2022).

tariffs for gas transportation services in the common market do not exceed the cost of pumping in the domestic market, while the countries that produce gas, Russia and Kazakhstan, advocate separate formation of tariffs for the common market and for the domestic one<sup>214</sup>. At the same time, in August 2022 it was reported that the EAEU member countries managed to resolve most of the disagreements on the creation of a single gas market; Thus, the countries agreed on the definitions of a gas buyer, free capacity, cross-border transportation and supply of gas, certain issues of regulating the common gas market and interaction between operators of gas transmission systems<sup>215</sup>. At the same time, it is planned to continue the search for solutions to unresolved issues “at a higher level”<sup>216</sup>.

Analyzing the energy agenda of the countries of the region, it should be noted that against the backdrop of the Ukrainian crisis, there is a tendency to strengthen relations in the energy sector between the countries of the region. Thus, all EAEU countries, with the exception of Kazakhstan, switched to paying for gas in rubles<sup>217</sup>. Kazakhstan insisted that when buying gas there should be an option to choose any currency, including the national one - tenge<sup>218</sup>.

At the same time, Armenia and Belarus are the most dependent on Russian supplies of energy fuel. Thus, the import of fuel from Russia to Armenia covers the production of 70% of the entire country's electricity. In particular, about 85% of gas supplies to Armenia are carried out from Russia via pipelines passing through Georgia<sup>219</sup>. In the first half of 2022, the volume of natural gas supplies to Armenia amounted to 1,411.9 million cubic meters, an increase of 22.7%. During the specified period, 1312.4 million cubic meters were supplied to consumers. m of natural gas against 1114.8 million cubic meters. m in the first half of 2021<sup>220</sup>. In 2021, Armenia purchased gas from Russia for \$414 million, oil products for \$270 million<sup>221</sup>. The peculiarity of the Armenian gas sector is that the only operator of the Armenian gas transmission network is Gazprom Armenia, a subsidiary of Gazprom, which makes the country dependent on Russia in this industry. However, according to the 2021 energy strategy, the Armenian government intends to revise all legislation in the gas sector by 2024, and as part of this, it will start developing a new gas law in 2022<sup>222</sup>.

Against the backdrop of economic sanctions against Russia and Belarus, there is an intensification of economic cooperation between the countries, including in the energy sector. Thus, the countries intend

<sup>214</sup> U edinogo gazovogo rynka EAES est' shans uspet' k 2025 godu. Official website gazety «Vedomosti» [Electronic resource] // URL: <https://www.vedomosti.ru/business/articles/2022/08/14/935948-gazovogo-rinka-eaes> (accessed: 10.11.2022).

<sup>215</sup> EAES ureguliruet raznoglasiya po obshchemu rynku gaza. Official website centra delovoj informacii «Kapital» [Electronic resource] // URL: <https://kapital.kz/economic/108084/yeaes-ureguliruyet-raznoglasiya-po-obshchemu-rynku-gaza.html> (accessed: 10.11.2022).

<sup>216</sup> ibid.

<sup>217</sup> Bol'shinstvo stran EAES pereshli na oplatu gaza v rublyah. Official website RIA Novosti [Electronic resource] // URL: <https://ria.ru/20221013/eaes-1823569386.html> (accessed: 10.11.2022).

<sup>218</sup> Kazahstan otkazalsya ot predlozheniya Rossii rasplachivat'sya za gaz tol'ko v rublyah. Official website Inbusiness [Electronic resource] // URL: <https://inbusiness.kz/ru/last/kazahstan-otkazalsya-ot-predlozheniya-rossii-rasplachivatsya-za-gaz-tolko-v-rublyah> (accessed: 10.11.2022).

<sup>219</sup> Armenia energy policy review. Official website IEA [Electronic resource] // URL: <https://iea.blob.core.windows.net/assets/8328cc7ce65e-4df1-a96f-514fdd0ac31e/Armenia2022EnergyPolicyReview.pdf> (accessed: 10.11.2022).

<sup>220</sup> Postavki prirodnogo gaza v Armeniyu uvelichilis' — Gazprom Armeniya. Official website Armeniatoday [Electronic resource] // URL: <https://armeniatoday.news/economica/503940/> (accessed: 10.11.2022).

<sup>221</sup> Armeniya provela platezhi za rossijskij gaz v rublyah. Official website Forbes.Ru [Electronic resource] // <https://www.forbes.ru/finansy/462591-armeniya-provela-platezhi-za-rossijskij-gaz-v-rublah> (accessed: 10.11.2022).

<sup>222</sup> Armenia energy policy review. Official website IEA [Electronic resource] // URL: <https://iea.blob.core.windows.net/assets/8328cc7ce65e-4df1-a96f-514fdd0ac31e/Armenia2022EnergyPolicyReview.pdf> (accessed: 10.11.2022).

to create joint production of import-substituting products in the energy sector, among which it is worth highlighting microprocessors, power and instrument transformers, gas-insulated circuit breakers and disconnectors, surge arresters, electrical insulators<sup>223</sup>. It was reported that as a result of negotiations between the countries, prices for oil and gas supplies from Russia to Belarus were reduced<sup>224</sup>, the parties abandoned formula pricing, and the price was denominated in Russian rubles<sup>225</sup>. However, there are no other details on this decision. Presumably, the country received a discount similar to those received by India and China, which is able to ensure the break-even of the oil refining industry in the domestic market<sup>226</sup>. At the same time, it is important to note that the energy sector of Belarus is highly dependent on Russian supplies: for example, Belarusian refineries operate to a greater extent on oil imported from Russia, since Belarusian oil reserves are not enough to meet domestic demand for petroleum products<sup>227,228</sup>.

The Belarusian oil refining industry, in view of the sanctions already adopted in 2021, as well as the growing difficulties amid the Ukrainian crisis in 2022, faced a number of problems related, in particular, to the export component. In the spring of 2022, refineries were reported to be operating at half capacity in preparation to serve mainly the domestic market<sup>229</sup>. Compared to January 2022, exports of petroleum products decreased by 99% in June<sup>230</sup>. The Ukrainian market (70% of Belarusian exports accounted for the supply of petroleum products)<sup>231</sup> was practically lost to Belarus due to the country's involvement in the conflict, and Russia presumably became an alternative market for Belarus<sup>232</sup>. At the same time, according to UN Comtrade, even after the start of the NWO, oil products reached Ukraine, but the volume of deliveries was rapidly decreasing: \$19 million in May 2022 compared to \$249 million in January 2022<sup>233</sup>.

Against the backdrop of the Ukrainian crisis, Kazakhstan's dependence on Russia in the context of the transportation of Kazakh oil has also become aggravated. This was manifested in the temporary

<sup>223</sup> Rossiya i Belorussiya planiruyut vmeste proizvodit' importozameshchayushchuyu produkciyu dlya energetiki. Official website Neftegaz.ru [Electronic resource] // URL: <https://neftegaz.ru/news/partnership/749000-rossiya-i-belorussiya-planiruyut-vmeste-proizvoditimportozameshchayushchuyu-produktsiyu-dlya-energe/> (accessed: 10.11.2022).

<sup>224</sup> Ekonomicheskaya integraciya s Rossiej: perspektivy uglubleniya. Official website «Ekonomicheskoy gazety» [Electronic resource] // URL: <https://neg.by/novosti/otkrytj/ekonomicheskaya-integratsiya-belarusi-i-rossii/> (accessed: 10.11.2022).

<sup>225</sup> Belorusskie NPZ rabotayut na vnutrennij rynek iz-za sankcij. Official website Reform.by [Electronic resource] // URL: <https://reform.by/309099-belorusskie-npz-rabotajut-na-vnutrennij-rynek-iz-za-sankcij> (accessed: 10.11.2022).

<sup>226</sup> Belorusskij treker peremen. Official website fonda Fridriha Eberta [Electronic resource] // URL: <https://library.fes.de/pdffiles/bueros/ukraine/19338.pdf> (accessed: 10.11.2022).

<sup>227</sup> Yurova N., Finskij N. Sovremennye tendencii razvitiya mirovogo rynka nefteproduktov: vyzovy i vozmozhnosti dlya Belarusi // Regional'naya ekonomika i upravlenie: elektronnyj nauchnyj zhurnal. – 2022. – № 3 (71). – P. 12.

<sup>228</sup> Evropejskij zelenyj kurs: vozmozhnosti i riski dlya Respubliki Belarus'. Official website centra ekonomicheskikh issledovanij BEROC [Electronic resource] // URL: [https://www.beroc.org/publications/working\\_papers/evropejskij-zelenyj-kurs-vozmozhnosti-i-riskidlya-respubliki-belarus/](https://www.beroc.org/publications/working_papers/evropejskij-zelenyj-kurs-vozmozhnosti-i-riskidlya-respubliki-belarus/) (accessed: 10.11.2022).

<sup>229</sup> Belorusskij treker peremen. Official website fonda Fridriha Eberta [Electronic resource] // URL: <https://library.fes.de/pdffiles/bueros/ukraine/19338.pdf> (accessed: 10.11.2022).

<sup>230</sup> Belorusskij treker peremen. Official website fonda Fridriha Eberta [Electronic resource] // URL: <https://library.fes.de/pdffiles/bueros/ukraine/19338.pdf> (accessed: 10.11.2022).

<sup>231</sup> Ekonomicheskaya integraciya s Rossiej: perspektivy uglubleniya. Official website «Ekonomicheskoy gazety» [Electronic resource] // URL: <https://neg.by/novosti/otkrytj/ekonomicheskaya-integratsiya-belarusi-i-rossii/> (accessed: 10.11.2022).

<sup>232</sup> Belorusskij treker peremen. Official website fonda Fridriha Eberta [Electronic resource] // URL: <https://library.fes.de/pdffiles/bueros/ukraine/19338.pdf> (accessed: 10.11.2022).

<sup>233</sup> ibid.

suspension of the activities of the Caspian Pipeline Consortium (CPC)<sup>234</sup>, through which Kazakhstan exports 82% of its oil<sup>235</sup>. The losses of the oil and gas industry of Kazakhstan due to the suspension of CPC for a month were estimated at 300 billion tenge (about \$1 billion)<sup>236</sup>. This, in turn, has become a motivating factor for the country in the development of alternative export routes, in particular the Trans-Caspian route. President of Kazakhstan K. Tokayev said that oil transportation through the Trans-Caspian route will be increased to 20 million tons per year<sup>237</sup>. Sanctions against Russia prompted Kazakhstan to introduce its own grade of oil, Kazakhstan Export Blend Crude Oil (KEBCO), in order to emphasize that the oil is of Kazakh origin<sup>238</sup>.

It is important to note that the current account of the balance of payments of Kazakhstan in the first half of 2022 was formed with a surplus of \$6.6 billion (a year earlier, the deficit was \$2.8 billion). At the same time, the growth in the export of goods by 1.6 times was formed due to an increase in the supply of oil and gas condensate by 84.7% y/y, as well as metals and products from them<sup>239</sup>. According to the EDB forecast, in 2023 oil production is expected to increase by 8.1% as a result of the Tengiz field expansion project<sup>240</sup>.

However, despite this trend, Kazakhstan is conducting preliminary negotiations with Russian Gazprom on increasing gas supplies to the country (the prospective volume may reach up to 10 billion cubic meters)<sup>241</sup>. Despite the fact that the country has significant reserves of this natural resource (ranks 22nd in the world and 3rd among the CIS countries in terms of gas reserves)<sup>242</sup>, the volume of gas exported is declining, and the expected volume for 2022 is 5 billion cubic meters<sup>243</sup>. This trend is explained by growing domestic consumption (over the past 10 years, its consumption has more than doubled - from 9

<sup>234</sup> O reshenii Primorskogo rajonnogo suda g. Novorossijska. Oficial'nyj Telegram-kanal KTK [Electronic resource] // URL: [https://t.me/caspian\\_pipeline/45](https://t.me/caspian_pipeline/45) (accessed: 10.11.2022).

<sup>235</sup> Cud polnost'yu ostanovil KTK na mesyac. Oficial'nyj Telegram-kanal of Finance.kz [Electronic resource] // URL: <https://t.me/FINANCEkaz/10598> (accessed: 10.11.2022).

<sup>236</sup> Bolee 300 milliardov tenge poteryaet RK iz-za priostanovki na mesyac KTK – ekspert. Official website Inbusiness [Electronic resource] // URL: <https://inbusiness.kz/ru/news/bolee-300-milliardov-tenge-poteryaet-rk-iz-za-priostanovki-na-mesyac-ktk-ekspert> (accessed: 10.11.2022).

<sup>237</sup> Tokaev: «Transportirovku nefi cherez TMTM dovedem do 20 millionov tonn v god». Official website Inbusiness [Electronic resource] // URL: <https://kz.kursiv.media/2022-11-07/tokaev-transportirovku-nefti-cherez-tmtm-dovedem-do-20-mln-tonn-v-god/> (accessed: 10.11.2022).

<sup>238</sup> Kazahstan pereimenuet svoyu nefi' iz-za antirossijskih sankcij. Official website Forbes.kz [Electronic resource] // URL: [https://forbes.kz/process/resources/kazahstan\\_pereimenuet\\_svoyu\\_neft\\_iz-za\\_antirossijskih\\_sanktsiy/](https://forbes.kz/process/resources/kazahstan_pereimenuet_svoyu_neft_iz-za_antirossijskih_sanktsiy/) (accessed: 10.11.2022).

<sup>239</sup> Makroekonomicheskiy prognoz sentyabr' 2022. Official website EABR [Electronic resource] // URL: [https://eabr.org/upload/iblock/600/EDB\\_2022\\_Monthly-Macroreview\\_September.pdf](https://eabr.org/upload/iblock/600/EDB_2022_Monthly-Macroreview_September.pdf) (accessed: 10.11.2022).

<sup>240</sup> Makroekonomicheskiy prognoz EABR. Ekonomiki regiona v novoj real'nosti [Electronic resource] // URL: <https://eabr.org/analytics/ceg-quarterly-reviews/makroekonomicheskiy-prognoz-ekonomiki-regiona-v-novoy-realnosti/> (accessed: 10.11.2022).

<sup>241</sup> Kazahstan vedet peregovory s "Gazpromom" ob uvelichenii zakupok gaza. Official website RIA Novosti [Electronic resource] // URL: <https://ria.ru/20221012/peregovory-1823357795.html> (accessed: 10.11.2022).

<sup>242</sup> Goluboe toplivo: kak razvivaetsya gazovaya otrasl' Kazahstana. Official website Mezhdunarodnogo Informacionnogo agentstva kazinform [Electronic resource] // URL: [https://www.inform.kz/ru/goluboe-toplivo-kak-razvivaetsya-gazovayaotraslkazahstana\\_a3960569?utm\\_source=yxnews&utm\\_medium=desktop&utm\\_referrer=https%3A%2F%2Fyandex.ru%2Fnews%2Fsearch%3Ft%3D](https://www.inform.kz/ru/goluboe-toplivo-kak-razvivaetsya-gazovayaotraslkazahstana_a3960569?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.ru%2Fnews%2Fsearch%3Ft%3D) (accessed: 10.11.2022).

<sup>243</sup> QazaqGaz: Kazahstan mozhet ostanovit' eksport gaza v 2023 godu. Novostnoj portal «Nefi' Kapital» [Electronic resource] // URL: <https://oilcapital.ru/news/export/06-06-2022/qazaqgaz-kazahstan-mozhet-ostanovit-eksport-gaza-v-2023-godu> (accessed: 10.11.2022).

billion to 19 billion cubic meters)<sup>244</sup>, which forces us to reorient export gas supplies to the domestic market. Gas shortage is predicted as early as 2023<sup>245</sup>.

Due to the problem of gasification in a number of regions of the country, coal-fired generation plays an important role in the domestic energy supply (about 70% of all energy in Kazakhstan comes from coal)<sup>246</sup>. By 2035, the forecast structure of electricity generation in Kazakhstan will change. In particular, the share of large HPPs will decrease to 7% (today it is 7.4%), but the share of renewable energy will increase to 23% (now 3.6%). At the same time, the share of coal will still remain the largest - 40% (today - 69%)<sup>247</sup>.

In Kyrgyzstan, there is also dependence on Russia in the oil and gas sector. For example, in 2020, 88% of natural gas resources were provided by imports from Russia<sup>248</sup>. In January-April 2022, natural gas imports from Russia amounted to \$25.1 million, which is 6.8% more than in the same period in 2021 (\$23.5 million)<sup>249</sup>. Gazprom Kyrgyzstan acts as the largest player in the fuel and lubricants market of Kyrgyzstan<sup>250</sup>.

In this regard, the development of alternative energy in the countries of the region is not only a natural response to climate change, but also a measure to fulfill international obligations (all EAEU countries are members of the Paris Agreement), and a tool to improve energy security.

Kazakhstan aims to achieve carbon neutrality by 2060. Armenia intends to limit greenhouse gas (GHG) emissions to 633 million tons by 2050<sup>251</sup>. By 2030, Belarus plans to reduce GHG emissions by at least 35% of the 1990 level<sup>252</sup>. Kyrgyzstan, with international support, will try to achieve carbon neutrality by 2050<sup>253</sup>.

<sup>244</sup> Deficit gaza v Kazahstane prognoziyuetsya uzhe v 2023 godu. Official website centra delovoj informacii «Kapital» [Electronic resource] // URL: <https://kapital.kz/economic/107280/defitsit-gaza-v-kazahstane-prognoziruetsya-uzhe-v-2023-godu.html> (accessed: 10.11.2022).

<sup>245</sup> Deficit gaza v Kazahstane prognoziyuetsya uzhe v sleduyushchem godu. Official website Inbusiness [Electronic resource] // URL: <https://inbusiness.kz/ru/last/deficit-gaza-v-kazahstane-prognoziruetsya-uzhe-v-sleduyushchem-godu> (accessed: 10.11.2022).

<sup>246</sup> Kazakhstan Energy Profile. Official website IEA [Electronic resource] // URL: <https://iea.blob.core.windows.net/assets/fc84229e-6014-4400-a963-bccea29e0387/Kazakhstan2022.pdf> (accessed: 10.11.2022).

<sup>247</sup> Kazahstan i k 2035 godu ne gotov otkazat'sya ot ugol'nyh elektrostancij. Official website Zakon.kz [Electronic resource] // URL: <https://www.zakon.kz/6024684-kazahstan-i-k-2035-godu-ne-gotov-otkazatsia-ot-ugolnykh-elektrostantsii.html> (accessed: 10.11.2022).

<sup>248</sup> Spros na nefteprodukty v respublike vospolnyalsya za schet ih importa. Official website Nacional'nogo statisticheskogo komiteta Kyrgyzskoj Respubliki [Electronic resource] // URL: <http://www.stat.kg/ru/news/spros-na-nefteprodukty-v-respublike-vospolnyalsya-zaschet-ih-importa> (accessed: 10.11.2022).

<sup>249</sup> Kyrgyzstan uvelichil import prirodnogo gaza iz Rossii. Official website Trend [Electronic resource] // URL: <https://www.trend.az/casia/kyrgyzstan/3619757.html> (accessed: 10.11.2022).

<sup>250</sup> Kak krizisy v Rossii vliyayut na ekonomiku Kyrgyzstana. Official website «Radio Azattyk» (recognized as a foreign agent) [Electronic resource] // URL: <https://rus.azattyk.org/a/31722556.html> (accessed: 10.11.2022).

<sup>251</sup> Strategicheskie iniciativy i perspektivy vzaimodejstviya stran EAES v sfere bor'by s klimaticeskimi izmeneniyami i ekologicheskimi vyzovami. Official website VEB RF [Electronic resource] // URL: <https://www.inveb.ru/ru/articles-menu/732-strategicheskie-initsiativy-i-perspektivy-vzaimodejstviya-stran-eaes-v-sfere-borby-s-klimaticeskimi-izmeneniyami-i-ekologicheskimi-vyzovami> (accessed: 10.11.2022).

<sup>252</sup> Belarus' planiruet snizit' k 2030 godu vybrosy parnikovyh gazov ne menee chem na 35% ot urovnya 1990-go. Official website BelTa [Electronic resource] // URL: <https://www.belta.by/society/view/belarus-planiruet-snizit-k-2030-godu-vybrosy-parnikovyh-gazov-ne-meneechem-na-35-ot-urovnja-1990-go-462329-2021/> (accessed: 10.11.2022).

<sup>253</sup> Kyrgyzstan prodolzhaet reagirovat' na posledstviya izmeneniya klimata v dolgosrochnoj perspektive. Official website UNDP [Electronic resource] // URL: <https://www.undp.org/ru/kyrgyzstan/pressreleases/%D0%BA%D1%8B%D1%80%D0%B3%D1%8B%D0%B7%D1%81%D1%82%D0%B0%D0%BD-%D0%BF%D1%80%D0%BE%D0%B4%D0%BE%D0%BB%D0%B6%D0%B0%D0%B5%D1%82-%D1%80%D0%B5%D0%B0%D0%B3%D0%B8%D1%80%D0%BE%D0%B2%D0%B0%D1%82%D1%8C-%D0%BD%D0%B0-%D0%BF%D0%BE%D1%81%D0%BB%D0%B5%D0%B4%D1%81%D1%82%D0%B2%D0%B8%D1%8F->

Among the main technologies to achieve the set goals, it is necessary to single out renewable energy sources, hydrogen energy and nuclear energy. Thus, the energy independence of Belarus from 2015 to 2019 increased from 14.2% to 16.5%, including due to the involvement of renewable energy sources in the energy balance. The share of RES in the primary energy balance from 2015–2019 increased from 5.7 to 7.1%, while the main share in RES is biomass (mainly firewood)<sup>254</sup>. However, the share of RES (solar, wind and hydro generation) in the power generation structure still does not exceed 2%<sup>255</sup>. Nuclear energy is also actively developing in the country, where there is also close interaction and dependence on Russia, since only Russian fuel is subject to processing, in accordance with the provisions of the intergovernmental agreement<sup>256</sup>.

The first stage of the implementation of the economic project has already been completed - the construction of the Ostrovets BelNPP, the first power unit put into commercial operation. This is the only foreign project of Rosatom, based on the principle "both themselves"<sup>257</sup>. The construction was carried out at the expense of a Russian loan in the amount of \$10 billion. It is assumed that the nuclear power plant will provide about 25% of the electricity needed by Belarus, and greenhouse gas emissions will be reduced by 710 million tons, or 10%<sup>258</sup>. In total, there are seven nuclear installations in Belarus today, while only the BelNPP meets the definition of Article 2 of the Convention on Nuclear Safety, the rest are nuclear installations for scientific purposes and are located at the Scientific Institution "JIPNR Sosny"<sup>259</sup>.

Over the past 10 years, the number of renewable energy facilities in Kazakhstan has grown from 23 to 111 and reached about 3% of the share in the structure of electricity generation in 2020 due to the investment incentives introduced in 2011-2013<sup>260</sup>. The share of renewable energy sources in the total volume of electricity generation is expected to increase to 10% by 2030, and up to 50% of alternative energy and renewable energy sources by 2050<sup>261</sup>. At the same time, according to IRENA forecasts, the installed capacity of renewable energy facilities should increase 10 times in order to achieve the obligations given under the Paris Agreement by 2050<sup>262</sup>.

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<sup>254</sup> Evropejskij zelenyj kurs: vozmozhnosti i riski dlya Respubliki Belarus'. Official website centra ekonomicheskikh issledovanij BEROC [Electronic resource] // URL: [https://www.beroc.org/publications/working\\_papers/evropejskiy-zelenyy-kurs-vozmozhnosti-i-riskidlya-respubliki-belarus/](https://www.beroc.org/publications/working_papers/evropejskiy-zelenyy-kurs-vozmozhnosti-i-riskidlya-respubliki-belarus/) (accessed: 10.11.2022).

<sup>255</sup> *ibid.*

<sup>256</sup> Punkt 2 st. 9 Soglasheniya mezhdru Pravitel'stvom Rossijskoj Federacii i Pravitel'stvom Respubliki Belarus' o sotrudnichestve v stroitel'stve na territorii Respubliki Belarus' atomnoj elektrostancii ot 15 marta 2011 g.

<sup>257</sup> Gromyko A.A. i dr. Soyuznoe gosudarstvo Belarusi i Rossii: rezul'taty dlya grazhdan i perspektivy. – 2021.

<sup>258</sup> *ibid.*

<sup>259</sup> Nacional'nyj doklad Respubliki Belarus' o vypolnenii konvencii o yadernoj bezopasnosti [Electronic resource] // URL: <https://gosatomnadzor.mchs.gov.by/upload/iblock/ce3/cns-belarus-national-report-2022-ru.pdf> (accessed: 10.11.2022).

<sup>260</sup> Klimaticheskaya politika. Indiya, Kitaj, Kazahstan. Official website SHkoly upravleniya Skolkovo [Electronic resource] // URL: <https://www.skolkovo.ru/researches/klimaticheskaya-politika-indiya-kitaj-kazahstan/> (accessed: 10.11.2022).

<sup>261</sup> O Konceptcii po perekhodu Respubliki Kazahstan k "zelenoj ekonomike". Kommentarij k Ukazu Prezidenta Respubliki Kazahstan ot 30 maya 2013 goda № 577 [Electronic resource] // URL: <https://adiilet.zan.kz/rus/docs/T1300000577> (accessed: 10.11.2022).

<sup>262</sup> Rynok VIE v Kazahstane: potencial, vyzovy i perspektivy. Official website The Ecolomist [Electronic resource] // URL: <https://ecolomist.kz/rynek-vije-v-kazahstane-potencial-vyzovy-i-perspektivy/> (accessed: 10.11.2022).



There are discussions in the country about the construction of a nuclear power plant, which will already be necessary for the country by 2030. It was decided to give the construction of the nuclear power plant to an international consortium, which will include companies from several countries<sup>263</sup>. Earlier it was reported that the shortlist for the construction of nuclear power plants included four companies: Russian, French, Chinese and Korean<sup>264</sup>. Indeed, Kazakhstan has significant reserves of uranium for the development of nuclear energy. The country ranks second in the world in terms of proven reserves of natural uranium. About 14% of all explored world reserves are concentrated in the depths of the country. The total explored reserves of uranium in the country are more than 700 thousand tons<sup>265</sup>.

At the same time, the country entered into a memorandum of understanding with the EU on a strategic partnership in the field of sustainable raw materials, batteries and green hydrogen value chains<sup>266</sup>. Against this background, the Swedish energy company SEG announced that it would build a \$50 billion clean hydrogen plant in Kazakhstan. It is planned that by the 2030s. Europe will be able to receive "green" hydrogen from Kazakhstan, which will help it reduce its dependence on fossil fuels<sup>267</sup>.

Kyrgyzstan, which does not have significant traditional energy resources, has a significant potential for the development of renewable energy sources (the country ranks third in terms of hydro resources in the CIS, after Russia and Tajikistan). Thus, about 90% of all electricity in the country is generated by hydropower. At the same time, the state government has repeatedly emphasized that today only more than 10% of the hydropower potential has been developed<sup>268</sup>. The presence of significant water resources also opens up opportunities for the development of hydrogen energy, namely "green" hydrogen<sup>269</sup>.

Adopted in September 2021, the Nationally Determined Contribution of Kyrgyzstan contains a strategy to combat climate change until 2030, including specific measures, and also recognizes the importance of adopting a Low-Carbon Development Strategy and a National Adaptation Plan<sup>270</sup>, and in the summer of 2022, a law "On renewable energy sources"<sup>271</sup>. At the same time, the country's strong

<sup>263</sup> Stroit' AES v Kazahstane budet gruppa stran - glava "Samruk-Kazyna". Official website Tengrinews [Electronic resource] // URL: [https://tengrinews.kz/kazakhstan\\_news/stroit-aes-kazahstane-gruppa-stran-glava-samruk-kazyina-480515/](https://tengrinews.kz/kazakhstan_news/stroit-aes-kazahstane-gruppa-stran-glava-samruk-kazyina-480515/) (accessed: 10.11.2022).

<sup>264</sup> V short-list po stroitel'stvu AES vklyuchili chetyre kompanii. Official website centra delovoj informacii «Kapital» [Electronic resource] // URL: <https://kapital.kz/economic/108970/v-short-list-po-stroitel'stvu-aes-vklyuchili-chetyre-kompanii.html> (accessed: 10.11.2022).

<sup>265</sup> Uranovaya promyshlennost'. Official website Ministerstva energetiki Respubliki Kazahstan [Electronic resource] // URL: <https://www.gov.kz/memleket/entities/energo/activities/4908?lang=ru#:~:text=%D0%9A%D0%B0%D0%B7%D0%B0%D1%85%D1%81%D1%82%D0%B0%BD%20%D0%B7%D0%B0%BD%D0%B8%D0%BC%D0%B0%D0%B5%D1%82%20%D0%B2%D1%82%D0%BE%D1%80%D0%BE%D0%B5%20%D0%BC%D0%B5%D1%81%D1%82%D0%BE%20%D0%B2,%D1%82%D0%BE%D0%BD%D0%BD%20%D1%83%D1%80%D0%B0%BD%D0%B0.> (accessed: 10.11.2022).

<sup>266</sup> Kazahstan i Evrosoyuz podpisali dokument o strategicheskom partnerstve. Official website prem'er-ministra Respubliki Kazahstan [Electronic resource] // URL: <https://primeminister.kz/ru/news/kazahstan-i-evrosoyuz-podpisali-dokument-o-strategicheskompartnerstve8105252> (accessed: 10.11.2022).

<sup>267</sup> Kazakhstan Signs Deal to Make Hydrogen at a \$50 Billion-Plant. Official website Bloomberg [Electronic resource] // URL: <https://www.bloomberg.com/news/articles/2022-10-27/kazakhstan-signs-deal-to-make-hydrogen-at-a-50-billion-plant> (accessed: 10.11.2022).

<sup>268</sup> Kyrgyzstan energy sector review 2022. Official website IEA [Electronic resource] // URL: <https://iea.blob.core.windows.net/assets/9d0cb3be-48fd-424f-8968-e543a43e8614/Kyrgyzstan2022.pdf> (accessed: 10.11.2022).

<sup>269</sup> Vodorodnaya energetika ne fantaziya dlya Kyrgyzstana — Konstantinov. Official website Sputnik Kyrgyzstan [Electronic resource] // URL: <https://ru.sputnik.kg/20220613/kyrgyzstan-vodorodnaya-ehnergetika-potencial-1065219338.html> (accessed: 10.11.2022).

<sup>270</sup> Kyrgyzstan ESG dos'e. Official website Sber Pro [Electronic resource] // URL: [https://sber.pro/digital/uploads/2022/09/ESG\\_Kyrgyzstan\\_A3\\_482aa3e05b.pdf](https://sber.pro/digital/uploads/2022/09/ESG_Kyrgyzstan_A3_482aa3e05b.pdf) (accessed: 10.11.2022).

<sup>271</sup> Podpisan Zakon KR «O vozobnovlyaemyh istochnikah energii». Official website Prezidenta Kyrgyzskoj Respubliki [Electronic resource] // URL: [https://www.president.kg/ru/sobytiya/22851\\_podpisan\\_zakon\\_kr\\_o\\_vozobnovlyaemih\\_istochnikah\\_energii#:~:text=%D0%97%D0%B0%D0%B](https://www.president.kg/ru/sobytiya/22851_podpisan_zakon_kr_o_vozobnovlyaemih_istochnikah_energii#:~:text=%D0%97%D0%B0%D0%B)

dependence on hydroelectric power plants creates some risks for energy security; in particular, seasonal fluctuations in the water level can disrupt the normal operation of the HPP. In 2021, Kyrgyzstan faced the biggest energy crisis in recent years due to falling water levels at the Toktogul hydroelectric power plant, which provides 40% of all electricity<sup>272</sup>.

Moreover, most of the HPPs in operation are worn out and in need of repair. The total depreciation of HPPs, many of which were built in the 1960s and 1970s, is estimated at 80%, while the depreciation of all power generation facilities is 70%<sup>273</sup>. To date, there are no large wind and solar power plants in the country, despite the presence of resource potential. The share of RES, namely solar and wind energy, is less than 1% of the total energy consumption<sup>274</sup>, which is also associated with a weak mechanism for economic incentives for the use of RES<sup>275</sup>. However, despite this, the country plans to increase the overall share of RES. The Ministry of Energy of the Kyrgyz Republic issued certificates to 90 companies for the construction of solar, wind power plants and small hydropower plants in 2022<sup>276</sup>. It is also reported about the intention to build a nuclear power plant in the country. The Ministry of Energy of Kyrgyzstan and Rosatom signed a memorandum of cooperation in the construction of low-power nuclear power plants<sup>277</sup>.

In Armenia, nuclear energy is one of the key types of energy to meet domestic needs. The country operates one nuclear power plant, which was commissioned during the existence of the USSR. In recent years, the station has generated up to 40% of all electricity in Armenia<sup>278</sup>. The program of the Armenian government provides for the extension of the operating life of the operating unit of the nuclear power plant until 2026, as well as the phased commissioning of new units<sup>279</sup>. At the beginning of 2022, Rosatom and the Armenian NPP signed a Memorandum of Understanding to work out possible cooperation in the construction of new nuclear power units of Russian design in the territory of the Republic of Armenia<sup>280</sup>.

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<sup>272</sup> Monitoring energeticheskikh perekhodov v Evrazii (Azerbajdzhan, Kazahstan, Kyrgyzstan i Ukraina): analiz i strategicheskie posledstviya. Official website Publish what you pay [Electronic resource] // URL: [https://www.pwyp.org/wpcontent/uploads/2022/01/RUS\\_Rep](https://www.pwyp.org/wpcontent/uploads/2022/01/RUS_Rep) (accessed: 10.11.2022).

<sup>273</sup> *ibid.*

<sup>274</sup> *ibid.*

<sup>275</sup> Strategicheskie initsiativy i perspektivy vzaimodeystviya stran EAES v sfere bor'by s klimaticheskimi izmeneniyami i ekologicheskimi vyzovami. Official website VEB RF [Electronic resource] // URL: <http://www.inveb.ru/ru/articles-menu/732-strategicheskie-initsiativy-i-perspektivy-vzaimodeystviya-stran-eaes-v-sfere-borby-s-klimaticheskimi-izmeneniyami-i-ekologicheskimi-vyzovami> (accessed: 10.11.2022).

<sup>276</sup> Minenergo Kyrgyzskoy Respubliki vydalo 90 kompaniyam razresheniya dlya stroitel'stva solnechnyh, vetryanyh elektrostancij i malyh GES – ministr energetiki. Official website energeticheskogo soveta SNG [Electronic resource] // URL: [http://energocis.ru/news/minenergo\\_kyrgyzskoy/](http://energocis.ru/news/minenergo_kyrgyzskoy/) (accessed: 10.11.2022).

<sup>277</sup> V Kyrgyzstane planiruyut postroit' AES maloj moshchnosti. Official website Gazeta.uz [Electronic resource] // URL: <https://www.gazeta.uz/ru/2022/01/21/kg-aes/> (accessed: 10.11.2022).

<sup>278</sup> Armenia 2022 energy policy review. Official website IEA [Electronic resource] // URL: <https://iea.blob.core.windows.net/assets/8328cc7c-e65e-4df1-a96f-514fdd0ac31e/Armenia2022EnergyPolicyReview.pdf> (accessed: 10.11.2022).

<sup>279</sup> Pashinyan obsudil s glavoy "Rosatoma" stroitel'stvo novoj AES v Armenii. Official website RIA Novosti [Electronic resource] // URL: <https://ria.ru/20220712/aes-1802003029.html> (accessed: 10.11.2022).

<sup>280</sup> Armyanskaya AES i Rosatom podpisali Memorandum o vzaimoponimanii po sooruzheniyu novyh atomnyh energoblokov. Official website Armpress [Electronic resource] // URL: <https://armenpress.am/rus/news/1073669.html> (accessed: 10.11.2022).

At the same time, the country is characterized by a significant potential for the development of RES. For 2015–2020 the contribution of RES to energy consumption in Armenia was about 11%, in particular due to hydroelectric power plants<sup>281</sup>. At the same time, the installed capacities of wind and solar power plants are currently small and account for no more than 1% in the overall structure of the balance<sup>282</sup>, but the country also aims to increase this indicator. Thus, it is reported that new solar and wind power stations will be built in Armenia by 2040<sup>283</sup>. For example, the Eurasian Development Bank will allocate up to \$37 million to finance the construction of 11 solar power plants with a total capacity of up to 65 MW in the Gegharkunik and Aragatsotn regions of the country. The commissioning of all facilities is planned for 2022<sup>284</sup>.

Thus, the EAEU countries are actively developing relations in the energy sector both within the integration association and on a bilateral basis. By 2025, the EAEU is expected to launch a common market for gas, oil and oil products. At the same time, the differences that arise between countries in the context of this issue can be resolved, which indicates the determination of the countries to achieve the goal. At the same time, all countries in the region are to some extent dependent on Russia, which is reflected, among other things, in Russia's dominant position in energy supplies to the countries of the region, in particular to Belarus, Armenia and Kyrgyzstan. The dependence of Belarus on Russia is currently growing due to the sanctions pressure on it after February 24, 2022 and the actual loss of the Ukrainian market. Geopolitical turbulence is also affecting Kazakhstan, the second largest energy exporter after Russia, which is motivating the country to develop alternative ways to transport its oil. The energy transition and the development of alternative energy sources, in particular RES, for countries is not only a tool for achieving national climate goals that all EAEU states have set for themselves, but also contributes to improving the energy security of the EAEU member countries. One of the tools for improving the energy security of countries is the development of nuclear energy. At the same time, it is important to note that in all countries of the region, the development of this type of energy is envisaged jointly with the Russian Rosatom.

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<sup>281</sup> Armenia 2022 energy policy review. Official website IEA [Electronic resource] // URL: <https://iea.blob.core.windows.net/assets/8328cc7c-e65e-4df1-a96f-514fdd0ac31e/Armenia2022EnergyPolicyReview.pdf> (accessed: 10.11.2022).

<sup>282</sup> Akopyan V.A. Rol' toplivno-energeticheskogo kompleksa Armenii //Innovacii i investicii. – 2022. – №. 6. – P. 212–216.

<sup>283</sup> V Armenii budut postroyeny novye solnechnye i vetryanye elektrostancii. Official website «Elektroenergeticheskij sovet SNG» [Electronic resource] // URL: [http://energo-cis.ru/news/v\\_armenii\\_budut\\_postroyeny/](http://energo-cis.ru/news/v_armenii_budut_postroyeny/) (accessed: 10.11.2022).

<sup>284</sup> EABR planiruet profinansirovat' stroitel'stvo 11 solnechnyh elektrostancij v Armenii. Official website EABR [Electronic resource] // URL: <https://eabr.org/press/releases/eabr-planiruet-profinansirovat-stroitelstvo-11-solnechnykh-elektrostansiy-v-armenii/> (accessed: 10.11.2022).