

ENERGY RESOURCE POTENTIAL OF KAZAKHSTAN, WITH PARTICULAR ATTENTION TO THE PERIOD FOLLOWING THE 2014 UKRAINIAN CRISIS

The annexation of Crimea by Russia in 2014 has been a significant geopolitical event and Kazakhstan, like many other countries, has expressed its concern and criticisms of the violation of Ukraine's territorial integrity.

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The Crimean crisis that unfolded in 2014 had a significant impact not only on the geopolitics of Central and Eastern Europe. This crisis also had significant effects on the global level, especially in terms of energy security. In this new international situation, Kazakhstan's role seems to be increasingly valued, especially in the field of the country's potential as an energy producer. The EU had to find a solution to overcome its energy dependency on Russia, and it seems that Astana will have a big role in this in the future. That is why this article reviews how Kazakhstan's foreign policy has changed in the last decade and what geopolitical challenges must be overcome in order for the country to use its energy resources as efficiently as possible in this new geopolitical environment.

Kazakh Foreign Policy after the Annexation of Crimea in 2014

The annexation of Crimea by Russia in 2014 has been a significant geopolitical event and Kazakhstan, like

many other countries, has expressed its concern and criticisms of the violation of Ukraine's territorial integrity.¹ Astana's foreign policy has generally been characterized by a commitment to maintaining good relations with its neighbors, including Russia, while also pursuing a multi-vector foreign policy² that seeks balanced relations with major global powers such as Russia, China, the United States, and European countries, as well as Türkiye.³ After the annexation of Crimea, Kazakhstan, as a member of international organizations like the United Nations (UN) and the Organization for Security and Cooperation in Europe (OSCE), expressed its support for the principles of sovereignty, territorial integrity, and non-interference in the affairs of other states. Kazakhstan did not endorse or recognize Russia's annexation of Crimea and supported the peaceful resolution of this conflict between Kyiv and Moscow.⁴ That crisis raised security concerns for Astana and other neighboring countries in the wider neighborhood. Like other Central Asian states, Kazakhstan was concerned about the potential spillover of instability from Ukraine, as well as the precedent set by Russia's actions in Crimea. For this reason, we would like to focus on two important foreign policy directions,



Kazakhstan's relations with Russia and the European Union.

The Transformation of Kazakh-Russian Relations in the Last Decade

Kazakhstan expressed concern over the violation of Ukraine's territorial integrity while trying to maintain a balanced and pragmatic relationship with Russia. This situation prompted Astana to reassess its foreign policy and security posture. It highlighted the importance of diversifying its international partnerships and reducing dependence on any single country. Kazakhstan sought to strengthen its relations with other global players, such as China, the United States, and European countries.⁵

Russia is a major trading partner for Astana. Energy resources, particularly oil and gas, play a significant role in their economic relationship. Kazakhstan, as world's largest landlocked country, uses Russia's infrastructure to export its oil at a time of Western-imposed price caps and a ban on sea-borne Russian oil purchases over its actions in Ukraine. Moscow has been a destination for Kazakh oil exports, and there have been discussions about expanding energy infrastructure and cooperation. The two countries have cooperated on regional security issues, including efforts to combat terrorism and extremism in

Central Asia.⁶ Astana also benefits from the transit of its goods through the Russian territory. It should also be underlined that the two countries participate in joint military exercises and security dialogues.

Kazakhstan and Russia, in general, have maintained positive political relations, with high-level meetings and diplomatic engagements. However, there have been occasional differences of opinion on various international issues. The annexation of Crimea by Russia in 2014 and the ongoing conflict in eastern Ukraine strained relations between Astana and Moscow to some extent.⁷ Astana, as a supporter of the principles of territorial integrity and non-interference, expressed concern over these developments while also trying to maintain a balanced stance given its close ties with Moscow.⁸ Kazakhstan, as an energy producer, carefully observed how the Ukrainian crisis affected regional energy dynamics. It considered the potential impact on energy transit routes and export options, particularly as it sought to expand its energy exports to global markets.

As a non-permanent member of the United Nations Security Council (UNSC) during the crisis, Astana supported diplomatic efforts to find a peaceful resolution to the conflict in Ukraine.⁹ It participated in international negotiations and discussions aimed at ending the conflict. The Ukrainian crisis underscored the importance of re-

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gional security cooperation in Central Asia. Kazakhstan, along with other Central Asian states, sought to enhance its security measures and engage in regional dialogues to address common security challenges.¹⁰ Astana aimed to protect its sovereignty and security while maintaining its strategic interests and partnerships in the region. The crisis also prompted the country to play a more active role in regional and international diplomacy to address security challenges. Kassym-Jomart Tokayev, the second president of Kazakhstan, has been in power since March 2019. After coming to power, the president had to deal with numerous domestic political and ethnic crises. Russia's invasion of Ukraine came as an additional shock for Kazakhstan, which had already experienced serious domestic unrest in January 2022.¹¹ Astana has consistently distanced itself from Moscow's aggression and diversified its relationships with various countries, while preserving its bilateral relationship with Moscow. The EU has shown interest in engaging more with Kazakhstan. It can help the country to overcome this critical juncture by encouraging and supporting its genuine domestic transformation. In a public discussion with Vladimir Putin at the St. Petersburg International Economic Forum in June 2022, Tokayev made it very clear that his country remained committed to the principle of territorial integrity and therefore would not recognize the 'quasi-states' of Donetsk and Luhansk.¹²

So it seems that the relationship between Moscow and Astana is still important and strong, but it has changed significantly since the Crimean crisis. Kazakhstan is striving to develop a foreign policy that is much more independent and less dependent on Russia, the biggest asset of which lies in the country's energy reserves. That is why it is important to look at how the country's foreign relations with the EU developed during this period.

The Relationship between Kazakhstan and the EU after 2014

Astana has maintained a significant relationship with the European Union (EU), particularly in the context of energy policy. There are some key points regarding the relationship between Astana and the EU in terms of energy policy after 2014, because the aim of the new EU strategy on Central Asia is to build stronger, modern, and broad partnerships with CA countries. In December 2015,

Kazakhstan and the EU signed the Enhanced Partnership and Cooperation Agreement (EPCA).¹³ The agreement replaced the previous Cooperation and Partnership Agreement, which had regulated bilateral relations since 1999. Kazakhstan and the EU have been building close and mutually beneficial relations for decades.¹⁴ The EU and Astana have had a long-standing energy partnership that includes cooperation in the areas of energy security, energy efficiency, and the promotion of sustainable energy sources. The EU seeks to diversify its energy sources and reduce its dependency on Russian energy, and Kazakhstan's energy resources play a role in achieving these goals.¹⁵

The European Union has been interested in securing stable energy supplies from Kazakhstan to reduce its reliance on traditional suppliers like Russia. The EU has been supportive of the idea of constructing a Trans-Caspian Pipeline to transport natural gas from Kazakhstan (and potentially Turkmenistan) to Europe via the Caspian Sea and the Southern Gas Corridor. This project has faced various geopolitical and legal challenges, including disputes with Russia and Iran over the Caspian Sea's legal status. Nevertheless, the EU has expressed its interest in facilitating such a project to enhance its energy security.¹⁶

The EU has supported Astana's efforts to improve energy efficiency and promote renewable energy sources. This includes technical assistance, investments, and collaboration on projects aimed at reducing energy consumption and increasing the share of renewables in Kazakhstan's energy mix.¹⁷ Astana has undertaken legislative and regulatory reforms in the energy sector to align its practices with EU standards. These reforms are intended to enhance transparency, competitiveness, and sustainability in the energy sector, making it more attractive to European investors and partners.¹⁸

After reviewing the two defining foreign policy directions, we must examine the most important factors and changes in the Kazakh energy sector, which can be important keys for building future relations and can determine Astana's future ideas. It will become apparent that the Kazakh economy does not rely solely on oil and natural gas reserves, but that important developments are taking place in other areas of the energy sector as well.

Kazakh Economy: The Past and the Future Goals

Every natural resource that we are discussing in the following is going to be examined through the eyeglasses of energy (electricity) production.

After the collapse of the Soviet Union Kazakhstan's economy – as the other post-soviet countries – suffered for years. Kazakhstan was one favorable country among

foreign investors, and due to these investments, the country's economy started to grow. In the past decades, Astana tried to improve itself by adopting international standards for the production, financial, and administrative sectors. Despite all of the efforts from the government, the Kazakh economy remained highly dependent on the coal and the oil sector.¹⁹

The Kazakh government also recognized the challenges that the 21st century sets up for countries all around the globe. In 2013 Astana drew up its plan to reach the 'green goals.' Based on this in 2013 the *"Concept for Transition to the Green Economy in Kazakhstan"* was adopted. The concept behind the document is to help the economy move from the hydrocarbon resource-based model to a more sustainable and environmentally friendly one. The following are some cornerstones from the document:

- diversification of the economy (reduce oil, coal, and gas revenue dependence);
- improve energy efficiency and the renewable energy sector;
- encourage and improve eco-friendly infrastructure and sustainable transportation system;
- sustainable agriculture (better water management, reduction of chemicals);
- green finance and investments (attracting investments in "green projects").²⁰

Overall this Green Economy Concept drew a picture of the future Kazakh economy till 2050²¹ to prepare Kazakhstan to comply with the Paris Agreement and the Kyoto Protocol. Astana aimed to achieve reduce the GHG emission to 15% below the 1991 level by 2030 and to make the Country carbon neutral by 2060.²²

Power Generation, Green Goals, and Energy Flexibility

Most of the power generations are based on rotation, which means by burning coal, gas or using nuclear power, usually steam is generated which spins the turbines and these turbines by spinning in an electromagnetic field will generate electricity. Regarding hydropower plants, the water spins the turbine, and at wind power, the wind spins it. Solar power differs from this logic.

Kazakhstan's total energy production in 2021 was 111 TWh.²³ In the country the coal-fired power plants (2022) gave ca. 60,1% of the electricity production, gas-fired 28,5%, and renewable sources 11,3% (mainly hydropower plants with 8,1% and the rest are solar, wind, and biogas).²⁴

Kazakhstan's goal is to reduce its carbon footprint and create a sustainable and greener power generation system. In order to reach this goal, 50% of the energy production must come from alternative and renewable energy sources, for example from solar, wind, hydro, and nuclear plants.²⁵ In the short term Astana expects that regarding power generation the renewable electricity supply will reach 15% by 2030 and coal will decrease to 40% while gas will increase to 38%.²⁶

In order to reach these goals the Kazakh government needs to take a few points into account. Renewable energy resources such as sun, wind, and hydro do not constantly supply power source due to the volatility of the weather. Besides the weather, the actual season also has an impact on energy production. In order to ensure the stability of the power supply few main steps must be realized to create a flexible system that can adapt more or less to the circumstances. For instance:

- Nuclear power plants are essential for commercial power generation. These power plants with the proper technology can ensure a clean and reliable power source instead of coal. Nuclear plants' GHG emissions and the caused mortality are significantly lower than coal- or gas-fired plants.²⁷ These power plants are mainly to supply power for the baseload so they are very little flexible, but much "greener" than the coal-fired power plants, which aren't flexible as well.
- More gas-fired power plants are needed. In general, the coal-fired or nuclear power plants supply power to ensure the baseload. They need several hours or days till they can start generating electricity. Unlike these power plants, gas turbines are more flexible, since the modern ones can be ready to produce electricity within 30 minutes.²⁸ Therefore due to the flexibility of the gas-fired plants, they are useful for managing and balancing the oscillation of the ratio of power production and power consumption.
- Thirdly the Kazakh power grid system must be developed and the interconnection within the co-

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2. Map Kazakhstan's oil field and supply routes (European Parliament, *Kazakhstan: Selected trade and economic issues*, 14)³⁷

untry with different regions and with other countries must be built out or improved. This will ensure that in case of power overproduction or underproduction, the regions among each other or Kazakhstan with other countries will be able to import or export electricity. Not to mention the inefficiency of the Kazakh grid system and the huge losses in the network.²⁹

- Fourthly the potential in hydro, solar, and wind should be exploited properly in a bigger volume. This topic will be introduced later on.

Kazakhstan's Energy Potential

Coal

Kazakhstan has one of the biggest coal reserves in the world. Based on his resources, the country generates 60% of its electricity from coal-fired power plants. This is still a living trend even in highly developed Western countries, but the Kazakh power plants are more inefficient and obsolete. The coal-fired power plants are playing an outstanding role in the country's carbon footprint since their CO₂ and SO₂ emissions are highly considerable. The government's goal is to improve technology and shrink the share of the coal-burning power plants' role in power generation to reduce GHG emissions.³⁰

Although the Kazakh coal reserves are the 10th largest in the world (33,7 billion tonnes, 2,4% of the world reserves),³¹ the quality is not the best; because of high ash, sulfur, and moisture content, heating value of the Kazakh

coal is relatively low.³² Despite this, coal mining is still ongoing in high volume, and 20% of the produced coal is exported, mainly to Russia (86%) and the rest mostly to the former Soviet Union States (12%) and to China (1%).³³

According to estimates, coal is going to remain the main energy source in the country in the long run. Currently, its share in energy production is 60,1%, but this is expected to decline to 40% by 2030. Kazakhstan is expecting to increase coal export, but this hides challenges because other countries – as Kazakhstan does – try to reduce their carbon footprint by using environmental-friendly technology instead of the “old type of power plants”.³⁴

Oil and Natural Gas

Kazakhstan's oil reserves are globally at the 12th place and its gas is the 20th place in the world.³⁵ The main oil export route for Kazakhstan is the CPC (Caspian Pipeline Consortium), which transits to Russia, but the Kazakhstan-China Pipeline and Kenkiyak-Atyrau Pipeline also need to be mentioned, although their volume is significantly lower than the CPC's.³⁶ Besides these pipelines the Kazakh oil can reach the BTC (Baku-Tbilisi-Ceyhan) pipeline via sea, where it can be transferred to Türkiye and towards the EU.

The country is among the 20 countries with the most natural gas reserves, which Kazakhstan reached ca. 3,8 trillion cubic meters.³⁸ Although Kazakhstan's natural gas

production is quite big on a global scale, most of the natural gas production is the byproduct of oil exploitation. In 2020 gas production reached 55.1 bcm (billion cubic meters), but ca. 31% of this was reinjected into the ground in order to help further oil production. 14% of the gas was used on-site by the producer companies for power generation and the rest (51%) was sent for processing. The government expects an increase in gas production, it counts yearly with 87,1 bcm by 2030.³⁹

Because of the current international energy market situation and the increasing domestic gas consumption in Kazakhstan, it became urgent for the country to incentivize commercial gas production and supply.

Uranium and Nuclear Power

Kazakhstan possesses the biggest uranium resource (37% of the global resource) and it is also the main uranium producer in the world. In 2020, its output was 19.500 tons, which gave the 2/5 of the world's production.⁴⁰ Despite Kazakhstan's huge uranium output and reserves and furthermore its experience in nuclear power research, the country does not operate any commercial nuclear power plant. One main background regarding this oddity is the public sentiment towards nuclear power. This remains from the soviet era when several nuclear weapons were tested in the Kazakh area of Semey. At that time and also nowadays several million people were exposed to radiation, not to mention the contaminated soil and water.⁴¹

Kazakhstan has research reactors in operation and the country also has its Institute of Nuclear Physics (INP). The Kazakh institutes are in close cooperation with the Atomic Energy Agency of Japan and with institutes from France and Russia. Also, there are five universities in the

According to the Kazakh Ministry of Energy, in 2022 there were 130 renewable energy facilities in Kazakhstan, and their total capacity reached 2400 MW.

country where nuclear physics or nuclear power engineering can be studied.⁴²

The main step regarding a possible nuclear power plant was when the president, Tokayev declared on 03.09.2021 that it is high time to give Kazakhstan a nuclear power plant.⁴³ The two planned nuclear reactors' capacity is going to be between 1000-1200 MW in order to support the baseload. According to Mr. Timur Zhan- tikin, the CEO of KNPP, if the supplier is selected in 2023 then the feasibility study is going to be finished in 2025. After the government's examination, the construction can be started.⁴⁴

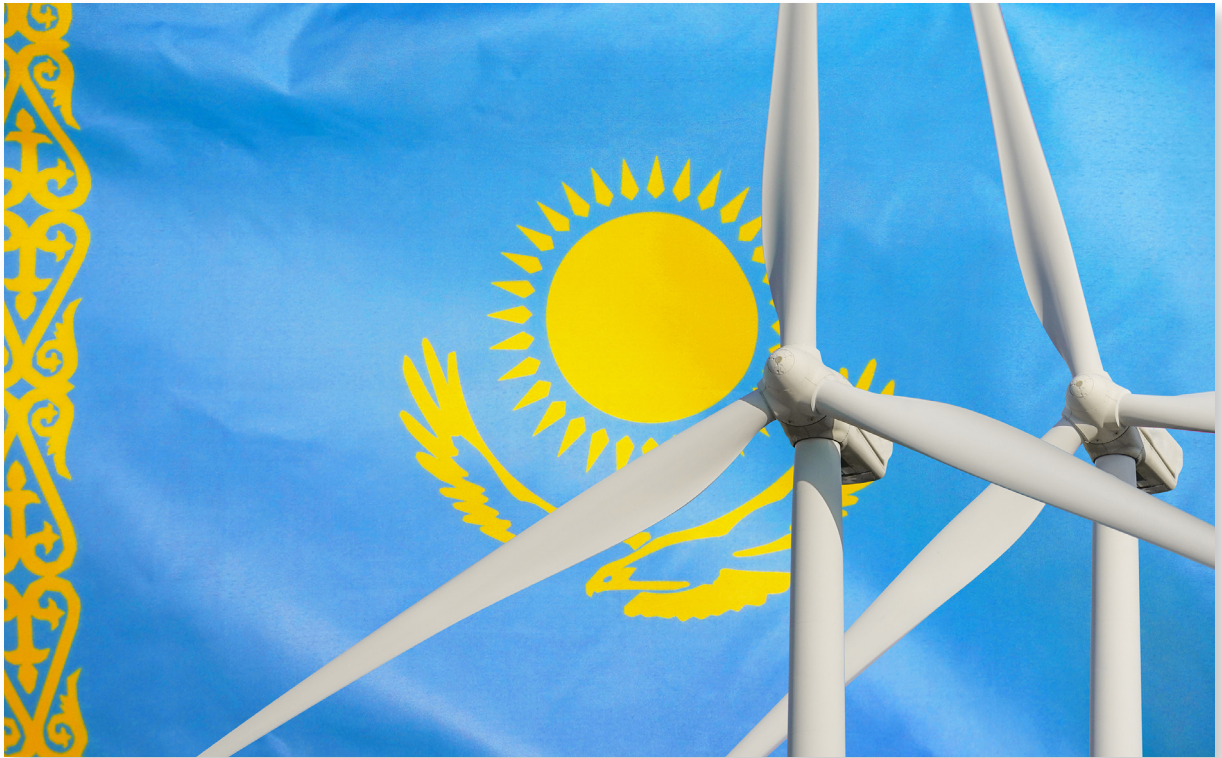
Renewable Sources

Kazakhstan's total renewable energy was around 12,2 TWh (11%). The main source is hydropower plants. Although the country currently has a small renewable energy capacity it has considerable potential.

The technically feasible wind energy potential is around 920 TWh/year. The best areas are near the Caspian Sea and in the northern and southern parts of the country.⁴⁵

The estimated hydropower capacity is around 170 TWh/year, but only 62 TWh/year is technically feasible and only 30 TWh/year is economically feasible. The ave-





average age of hydropower plants is 36.5 years. Between 2020-2030 the country plans to expand its hydropower plant capacity by 3300 MW.⁴⁶

The solar energy potential is around 2,5 TWh. Kazakhstan's annual sunshine is around 2200-3000 hours. The received sunshine differs in each region. In the northern region, the land receives around 2000 hours of sunshine, but in the southern areas, this number increases to around 2900 hours yearly. The electricity which could be generated by this would be enough to provide enough electricity to supply the southern part of the country. Although 50% of the country's territory is suitable for solar power plant installation, solar energy production is still very little compared to other renewable energy sources.⁴⁷

According to the Kazakh Ministry of Energy, in 2022 there were 130 renewable energy facilities in Kazakhstan, and their total capacity reached 2400 MW. This potential contains 46 wind farms, 44 solar plants 37 hydro power plants, and 3 biomass power plants. In 2023 Kazakhstan is going to start further 15 facilities with a capacity of 276 MW.⁴⁸

Although the resources are given, the country suffers from the lack of modern technology and know-how.

For renewable energy, Astana needed to find investors. In 2018 the auctions system was introduced. In this competitive bidding system, renewable energy investors submit proposals to win contracts for supplying electricity to the power grid. In this process each developer or investor can bid a price for 1 kWh of green energy production and the lowest offer will win each auction.⁴⁹ With this process, the government tries to decentralize renewable energy production.

Kazakhstan's Future Energy Relationship with the EU

Kazakhstan already has a strong relationship with the post-soviet countries, therefore now we will concentrate on its relations and opportunities with the European Union.

The EU and Kazakhstan had already established diplomatic relations at the beginning of the 1990s. In 1995 the two sides had signed the "Partnership and Cooperation Agreement." This partnership was improved in 2015 when they signed the "*Enhanced Partnership and Cooperation Agreement (EPCA)*" which regulates the trading and economic relations between them. With this agreement, the EU became the main trading partner of the country. In numbers, this means that 40% of the Kazakh export's goes to the EU but in return, the European states became the main investors in Kazakhstan.⁵⁰

Oil is the main resource that Kazakhstan exports to the EU. Between 2000 and 2022 the main export from the country to EU was the crude oil. Between 2011 and 2014, it hit its peak (it was ca. 28-30 billion USD), but after the Russian invasion of Ukraine the volume of oil trading started increasing and in 2022 it reached 25,3 billion USD.⁵¹

In May 2022 EU and Kazakhstan signed a Memorandum of Understanding. This document strengthens the strategic partnership between the two parties. On one side this agreement tries to ensure the EU's access to raw and refined materials in the view of sustainability. On the other side, the EU offers Kazakhstan further EU investment and cooperation in geological exploration, and research and innovation. The agreement's goal is also to develop renewable hydrogen production and create battery value chains. These are essential not only for the EU's energy security, but also for Kazakhstan and the EU's green and digital transformation and decarbonization. The agreement is based on the previous EPCA.⁵²

The raw materials are important for the EU. These are inevitable materials in wind turbine production, battery (lithium, cobalt), and semiconductor production (polysilicon). Batteries are crucial for energy transition, energy storage, and green transport. Green hydrogen is one of the main fundamentals of decarbonization.⁵³

Conclusion

In the beginning of the 1990s, Kazakhstan had to deal with many difficulties and challenges. But at the end of this period perhaps the most important decade in the history of Kazakhstan's independence began. Due to the country's geopolitical features, it has to deal with many difficulties and challenges. At the end, Astana can be a huge winner in the reorganization taking place in the world.

Kazakhstan needs to battle with huge challenges to reach its green goals. Anyhow the country recognized in time the difficulties and the unsustainability of its current economic system. Kazakhstan has enormous natural resources and with that, it could be able to speed up the required changes. The country's resources are considerable and offer everything that is needed to base the country on new, sustainable, and environment-friendly soil.

Although the resources are given, the country suffers from the lack of modern technology and know-how. The European Union stepped up in the previous decades as one of the main trading partners and investors, offering the know-how and technology for the country and it asks for raw materials and raw resources. So far, a good example in complementarity for the two partners.

Endnotes

- 1 "Kazakhstan Responds to Ukraine Crisis," Refworld. Accessed September 8, 2023. Retrieved from: <https://www.refworld.org/docid/5332b98b4.html>
- 2 Rico Isaacs. "Russia-Kazakhstan Relations and the Tokayev-Nazarbayev Tandem," *Russian Analytical Digest*. 2020; No. 248, 6 March. p. 3.
- 3 Nargis Kassenova. "Between Scylla and Charybdis: Kazakhstan Foreign Policy in Pursuit of a New Equilibrium," *Central Asia-Caucasus Institute & Silk Road Studies Program, Joint Center*. 2022. p. 1.
- 4 Shaun Walker. "Annexation of Crimea has magnified divisions inside Kazakhstan," *The Guardian*. Accessed September 8, 2023. Retrieved from: <https://www.theguardian.com/world/2015/may/03/annexation-of-crimea-magnified-divisions-inside-kazakhstan>
- 5 Nikola Mikovic. "Russia's ally Kazakhstan turns eyes to the West," *The Interpreter*. Accessed September 8, 2023. Retrieved from: <https://www.lowyinstitute.org/the-interpreter/russia-s-ally-kazakhstan-turns-eyes-west>
- 6 Mariya Omelicheva. "Kazakhstan-Russia Relations in the Wake of the January Unrest," *Russian Analytical Digest*. 2022, No. 278. pp. 10-11.
- 7 Kaan Diyarbakırılıoğlu - Süreyya Yiğit. "Kazakh Multi Vector Foreign Policy in Action.," *Alternatives: Turkish Journal of International Relations*. 2014, Vol. 13, No.4, Winter. p. 72.
- 8 "Blinken Starts Asia Trip With Promise Of New Aid To Central Asia," *Radio Free Europe/Radio Liberty*. Accessed September 8, 2023. Retrieved from: <https://www.rferl.org/a/kazakhstan-us-blinken-meeting/32291409.html>
- 9 "Speech by the President of Kazakhstan Kassym-Jomart Tokayev at the General Debate of the 77th session of the UN General Assembly," *The Republic of Kazakhstan*. Accessed September 8, 2023. Retrieved from: <https://www.akorda.kz/en/speech-by-the-president-of-kazakhstan-kassym-jomart-tokayev-at-the-general-debate-of-the-77th-session-of-the-un-general-assembly-2082327>
- 10 Marie Dumoulin. "Steppe change: How Russia's war on Ukraine is reshaping Kazakhstan," *European Council on Foreign Relations*. April, 2023. p. 9.
- 11 Svante E. Cornell. "Learning from Kazakhstan's January Crisis," *Central Asia-Caucasus Institute & Silk Road Studies Program, Joint Center*. Accessed October 2, 2023. Retrieved from: <https://www.cacianalyst.org/resources/pdf/220418-FT-Kazakhstan.pdf>
- 12 "Putin Gets Unexpected Pushback From Ally Over War in Ukraine," *Bloomberg News*. Accessed September 8, 2023. Retrieved from: <https://www.bloomberg.com/news/articles/2022-06-17/putin-says-russia-can-survive-sanctions-crows-west-suffers-more#xj4y7vzkg>
- 13 "Council Decision (EU) 2016/123 of 26 October 2015," *Official Journal of the European Union*. 2016, Volume 59, 4 February.
- 14 Yesdauletov, Aitmukhanbet et al. "A new stage of relations between the European union and Kazakhstan: Europeanization process," *Astra Salvensis*. 5(10), 2017. p.1.

- 15 Carole Nakhle. "Kazakhstan and the EU: Common interest in energy security." Geopolitical Intelligence Services. Accessed September 8, 2023. Retrieved from: <https://www.gisreportsonline.com/t/eu-energy-security/>
- 16 Carole Nakhle. "Kazakhstan and the EU: Common interest in energy security." Geopolitical Intelligence Services. Accessed September 8, 2023. Retrieved from: <https://www.gisreportsonline.com/t/eu-energy-security/>
- 17 "Renewable energy sources to account for 15% of Kazakhstan energy balance by 2030 — Alikhan Smailov," *The Press Service of the Government of the Republic of Kazakhstan*. Accessed September 8, 2023. Retrieved from: <https://primeminister.kz/en/news/renewable-energy-sources-to-account-for-15-of-kazakhstan-energy-balance-by-2030-alikhan-smailov-24599>
- 18 "EU-Kazakhstan strategic partnership becomes operational," European Commission. Accessed September 8, 2023. Retrieved from: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2815
- 19 Pier Paolo Raimondi. "Central Asia Oil and Gas Industry – The External Powers" Energy Interests in Kazakhstan, Turkmenistan and Uzbekistan," *Working Paper* 006.2019, Fodanzione Eni Enrico Mattei, 2019, p 26.
- 20 Concept for Transition to the Republic of Kazakhstan to Green Economy, *Decree of the President of the Republic of Kazakhstan*, May 30, 2013. Accessed August 22, 2023. Retrieved from <https://policy.asiapacificenergy.org/sites/default/files/Concept%20on%20Transition%20towards%20Green%20Economy%20until%202050%20%28EN%29.pdf>
- 21 Kazakhstan 2022 Energy Sector Review, *International Energy Agency*, 2022, p 11.
- 22 Kazakhstan 2022 Energy Sector Review, *International Energy Agency*, 2022, pp. 15-16.
- 23 Kazakhstan 2022 Energy Sector Review, *International Energy Agency*, 2022, p 71.
- 24 "Distribution of electricity generation in Kazakhstan in 2022," Statista.com. Accessed August 26, 2023. Retrieved from <https://www.statista.com/statistics/1236339/kazakhstan-distribution-of-electricity-production-by-source/>
- 25 Concept for Transition to the Republic of Kazakhstan to Green Economy, Decree of the President of the Republic of Kazakhstan, May 30, 2013. p 36
- 26 Kazakhstan 2022 Energy Sector Review, *International Energy Agency*, 2022, pp. 73-74.
- 27 Pushker, A. Kharecha and James E. Hanse. "Prevented Mortality and Greenhouse Gas Emissions from Historical and Projected Nuclear Power" *Environmental Science&Technology*, 2013, p 4891-4893. Accessed August 26, 2023. Retrieved from: https://pubs.giss.nasa.gov/docs/2013/2013_Kharecha_kh05000e.pdf
- 28 Flexibility in conventional power plants. *Innovation Landscape Brief*, *International Renewable Energy Agency* 2019, p. 9.
- 29 The National Energy Report 2021, *Kazenergy*, 2021, p. 168.
- 30 Kazakhstan 2022 Energy Sector Review, *International Energy Agency*, 2022, p. 13.
- 31 The National Energy Report 2021, *Kazenergy*, 2021, p. 148.
- 32 Kazakhstan 2022 Energy Sector Review, *International Energy Agency*, 2022, p. 59.
- 33 The National Energy Report 2021, *Kazenergy*, 2021, p. 152.
- 34 The National Energy Report 2021, *Kazenergy*, 2021, p. 148.
- 35 Kazakhstan 2022 Energy Sector Review, *International Energy Agency*, 2022, p. 32.
- 36 The National Energy Report 2021, *Kazenergy*, 2021, p. 91.
- 37 Robert Bendini. "Kazakhstan: Selected trade and economic issues," *European Parliament, Policy Department*, September 25, 2013. Accessed August 23, 2023. Retrieved from https://www.europarl.europa.eu/RegData/etudes/briefing_note/join/2013/522303/EXPO-INTA_SP%282013%29522303_EN.pdf
- 38 The National Energy Report 2021, *Kazenergy*, 2021, p. 118.
- 39 Kazakhstan 2022 Energy Sector Review, *International Energy Agency*, 2022, pp. 35-36.
- 40 The National Energy Report 2021, *Kazenergy*, 2021, p. 204.
- 41 The National Energy Report 2021, *Kazenergy*, 2021, p. 214.
- 42 The National Energy Report 2021, *Kazenergy*, 2021, p. 83.
- 43 Vusala Abbasova. "President Tokayev Says Kazakhstan Needs Nuclear Power Plant", *Caspian News*, September 5, 2021. Accessed: August 29, 2023. Retrieved from: <https://caspiannews.com/news-detail/president-tokayev-says-kazakhstan-needs-nuclear-power-plant-2021-9-5-0/>
- 44 Assel Satubaldina. "Nuclear Power Plant in Kazakhstan: What's Next", *The Astana Times*, August 13, 2023. Accessed: August 29, 2023. Retrieved from: <https://astanatimes.com/2023/08/nuclear-power-plant-in-kazakhstan-whats-next/>
- 45 Kazakhstan 2022 Energy Sector Review, *International Energy Agency*, 2022, pp. 89-91.
- 46 Saniya Perzadayeva and Nurmolda Ospangali. "Obstacles For Hydropower Station Projects In Kazakhstan", *Energy Central News*, April 18, 2022, Accessed: August 29, 2023, Retrieved from: <https://energycentral.com/news/obstacles-hydropower-station-projects-kazakhstan>
- 47 Saule Akhmetkaliyeva. "A Promising Green Energy Resource in Kazakhstan: Solar Power", *Eurasian Research Institute*, 2020. Accessed: August 29, 2023, Retrieved from: <https://www.eurasian-research.org/publication/a-promising-green-energy-resource-in-kazakhstan-solar-power/>
- 48 Assel Satubaldina. "Kazakhstan Powers Ahead, Unleashing Potential of Renewable Energy Under Critical Challenges", *The Astana Times*, June 2, 2023. Accessed: August 29, 2023. Retrieved from: <https://astanatimes.com/2023/06/kazakhstan-powers-ahead-unleashing-potential-of-renewable-energy-under-critical-challenges/>
- 49 Assel Satubaldina. "Kazakhstan Powers Ahead, Unleashing Potential of Renewable Energy Under Critical Challenges", *The Astana Times*. Accessed: August 29, 2023. Retrieved from: <https://astanatimes.com/2023/06/kazakhstan-powers-ahead-unleashing-potential-of-renewable-energy-under-critical-challenges/>
- 50 Pier Paolo Raimondi. "Central Asia Oil and Gas Industry – The External Powers" Energy Interests in Kazakhstan, Turkmenistan and Uzbekistan," p. 43.
- 51 "European Union Imports of mineral fuels, oils, distillation products from Kazakhstan", *Trade Economics*. Accessed: August 29, 2023. Retrieved from: <https://tradingeconomics.com/european-union/imports/kazakhstan/mineral-fuels-oils-distillation-products>
- 52 "COP27: Strategic partnership with Kazakhstan", *European Commission*, November 7, 2022. Accessed: August 29, 2023. Retrieved from: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6585
- 53 "Commission announces actions on Critical Raw Materials", *European Commission*, September 2, 2020. Accessed: August 29, 2023. Retrieved from: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1542