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RENEWABLE ENERGY IN KAZAKHSTAN AND RUSSIA: COMPARATIVE LEGISLATIVE FRAMEWORK REVIEW

D. Shalina

Kazakh-German University

Almaty, Kazakhstan

Abstract

Historically dependent on traditional energy sources and motivated by global decarbonisation trends as well as given a rising attention to unconventional energy sources, Kazakhstan and Russia have had diversified energy portfolios. This article presents a comparative review of renewable energy legislation in Kazakhstan and Russia focusing on legislative frameworks that formed the integration and scale-up of renewable energy sources in the two resource-rich countries. The study tracks the evolution of renewable energy agenda in both countries and highlights key energy legislative acts and strategic goals. The analysis reveals that Kazakhstan has achieved significant growth in solar and wind energy capacity and generation and demonstrated policy consistency and commitment whereas Russia's progress has been incremental. Supported with renewable energy potential, capacity and generation dynamics by type, the comparative analysis offers insights into legislative and policy measures and serves as an introduction to the renewable energy context of respective countries.

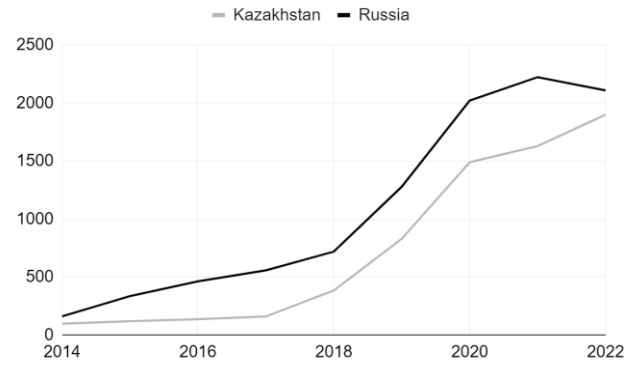
Keywords: renewable energy, renewable energy legislation, energy policy, Kazakhstan, Russia

Introduction

The Republic of Kazakhstan and the Russian Federation (hereinafter referred to as Kazakhstan and Russia) share a number of historical, political, economic, and cultural commonalities, and have both relatively recently embarked on renewable energy integration journeys. Abundant in fossil fuel resources, both states have recognized the need for diversifying their energy mixes aiming at ensuring energy security and mitigating negative environmental impacts. The countries' renewable energy capacities installed and generation volumes have been particularly sizable since 2014

and have been demonstrating growth ever since, as seen in *Graphs 1* and *2* below, *Appendix*.

Graph 1.
Solar electricity generation in Kazakhstan and Russia, 2014-2022, 0-2500 gigawatt-hours (GWh), IEA data



Graph 2.
Wind electricity generation in Kazakhstan and Russia, 2014-2022, 0-6000 gigawatt-hours (GWh), IEA data

This review provides a comparative analysis of key renewable energy legislation in Kazakhstan and Russia, comparing and contrasting their policies on renewable energy. The review contributes to a generalised understanding of how legislative framework influences the development and integration of renewable energy sources in countries with similar geopolitical and economic contexts. The analysis regards policy successes and challenges faced by Kazakhstan and Russia in their energy transition efforts and serves as a soft simplified introduction to the renewable energy context of the countries for those beginning to explore the issue.

The report is motivated by the recent worldwide energy transition trend. Although not discussed in the current paper, there is a discussion yet to be had on the implications energy policies of Kazakhstan and Russia, significant players to the global energy market, have for regional and international energy dynamics. Analysing and comparing these two nations' legislative approaches to an emerging renewable energy sector, this review offers insights for enhancing renewable energy adoption in other fossil fuel-rich countries.

The article is organised as follows: *Section 1* discusses the study goals and methodology, *Sections 2* and *3* deepdive into the renewable energy legislative framework in Kazakhstan and Russia, respectively, listing and discussing key laws, strategies, and touching upon market mechanisms driving renewable energy development, *Sections 4* and *5* explore similarities and differences between the

legislative approaches of Kazakhstan and Russia, respectively. Finally, *Section 5* concludes the article with a discussion of the findings and advises on future exploration of renewable energy policy journeys of Kazakhstan and Russia for more nuanced policy insights.

1. Goals and methodology

The primary goal of the study is to conduct a comparative analysis of renewable energy legislation in Kazakhstan and Russia. The study reviews publicly available legislative documents, strategic plans, and policy reports as well as credible media resources from both nations. A qualitative analysis of legislative frameworks is aimed at providing a nuanced understanding of the legislative and policy environments shaping renewable energy integration in Kazakhstan and Russia. Brief notes on overall solar and wind energy profiles in respective countries are provided for enhancing the overall renewable context understanding.

2. Renewable energy legislation in Kazakhstan: legislative framework

Kazakhstan’s southern and central regions boast solar potential. [1] Average sunshine levels are 2,200-3,000 hours annually nationwide, [2] with a decent north-to-south decrease. According to the *International Renewable Energy Agency* (IRENA), more than 10% of land area in Kazakhstan generates below 1.2 megawatt-hours (MWh), about 60% - 1.2-1.4 MWh, and about 30% - 1.4-1.6 MWh for every kilowatt-peak (kWp) of installed solar capacity. [3] High potential for solar energy makes the resource exploitation advantageous and feasible given the presence of large open land plots. As for wind, areas in close proximity to the Caspian sea are mainly resource rich. [4] More about 20% of land area has a wind power density of below 260 watts per square metre (W/m2) at 100 metres (m) height, more than 60% - 260-420, and about 20% - 420-560 W/m2. [3]

Kazakhstan's renewable energy integration path is associated with a number of legislative acts with the key ones including:

1. The Law on supporting the use of renewable energy sources (2009); [5]
2. Kazakhstan 2050 strategy (2012); [6]
3. Concept for the transition to a green economy (2013); [7]
4. Auction system introduction (2017); [8, 5]
5. Presidential decree No.611 on Kazakhstan national development plan until 2029. [9]

Kazakhstan's renewable energy policy includes the following key mechanisms:

1. Feed-in tariffs (2009-2017);
2. Auction system (2017-onwards);
3. Green tariffs.

Kazakhstan has made significant strides in increasing its renewable energy capacity, *Appendix*. Renewable energy capacity installed amounted to 5,663 MW as of 2023 [10] (in 2023, solar and wind energy capacities installed reached 2,746 MW, *Appendix*, or about 48% of all renewables), with renewable energy constituting 5.8% of total energy generation. The key renewable energy projects include the 100 MW Saran solar power plant (Karagandy, commissioned in 2019), and the Zhanatas Wind Farm (Zhambyl, South Kazakhstan, commissioned in 2021) with a capacity of 100 MW. Kazakhstan has been demonstrating a significant year-on-year growth in solar and wind energy generation circa post-2018 (*Graphs 1, 2*).

A number of legislative acts and strategic initiatives have been enacted in order for Kazakhstan to practice sustainable energy. It all began with the Law *On Supporting Usage of Renewable Energy Sources* in 2009. The law pioneered to define renewable energy sources as follows: *renewable energy sources are energy sources that are continuously renewable due to naturally occurring natural processes, including solar radiation energy, wind energy, hydrodynamic water energy; geothermal energy: heat from soil, groundwater, rivers, reservoirs; as well as anthropogenic sources of primary energy resources: consumer waste, biomass, biogas and other fuels from consumer waste used for the production of electrical and (or) thermal energy*. [5]

This foundational law served as the legal basis for the development of renewable energy in Kazakhstan; its amendments in 2014, 2016, 2017, and 2020 introduced feed-in tariffs and tax exemptions, made renewable energy projects investment aligned and eligible for various fiscal incentives and government support mechanisms, introduced an auctioning system, and further promoted renewable energy projects to priority investment projects with an expanded list of incentives including exemptions from property and business taxes. [5] Ensuring financial stability legally with the feed-in tariffs produced impetus for financial institutions to invest in renewables; investments to the sector were secured.

The *2050 Strategy* adopted by Kazakhstan in 2012 set a long-run strategic vision for the country's economic and energy sector transformation. The most ambitious target of the *Strategy* set for the transition to a green economy is having 50% of the nation's energy originating from renewable sources by 2050. Preceding targets were identified

as 3% by 2020 (achieved), 6% by 2025 (with 5.8% achieved as of 2024), 10 and 15% by 2030, respectively. [11] The *2050 Strategy* gives equal attention to the issues of energy mix diversification, reduction in greenhouse gas emissions, and energy security. The *Strategy* served a guideline for the development of renewable energy, directing consequent energy policy and investment choices in the years ahead.

Following the *2050 Strategy*, the government developed the 2013 *Green Economy Concept*. The chosen strategies mainly brought up the issues of renewable energy, energy efficiency, and the environment, among others. The multifaceted concept precisely defined policy measures with both legislative and financial incentives such as subsidising renewable energy projects and creating training programmes necessary to aid the transition to the green economy (the establishment of specialised educational programs in green technologies and environmental protection). [7] The *Concept for the Transition to a Green Economy* strengthened Kazakhstan's early commitment to renewable energy deployment and sustainable development.

Adoption of an auction system in 2017 which replaced the feed-in tariff mechanism further enhanced competition and cost reduction in the renewable energy sector. Competitive bidding brought about efficiency in projects. Circa post-2017, the country has seen significant increases in renewable energy generation, particularly solar and wind sectors (*Graphs 1, 2, Appendix*). Besides the auction system, Kazakhstan also resorted to the use of green tariffs - increased rates for electricity produced from renewable power plants. It might be argued that these finance-based stimuli created further impetus to scale up renewable energy projects in the country. The success of the auction system clearly underlines the role market-based instruments play in renewable energy development.

Most recently, the decree *On Kazakhstan national development plan until 2029* reinforces the development of renewables via goals within the broader energy sector, such as increasing manoeuvre capacities, enhancing auction mechanisms, and the development of a retraining programme to prepare the workforce for green energy sectors, among others. [9]

Kazakhstan has been dynamic in its development of renewable energy. Counting about 2,700 MW of total renewable capacity installed in 2014, a decade after the country has grown the capacity to about 5,700 MW, [10] showing a more than 100% increase. Increase in solar and wind capacities between 2014 and 2023 has been from 5 to 1306 MW and from 53 to 1440 MW, respectively, *Appendix*.

3. Renewable energy legislation in the Russia: legislative framework

Russia's northern, western, and coastal areas are most abundant in wind resource. [4] According to IRENA, more than 60% of land area in Russia generates less than 260 W/m2 at 100 m height, slightly more than 20% - 260-420, and below 10% - 420-560 W/m2. [12] As for solar potential, more than 80% of land area generates less than 1.2 MWh and about 20% - 1.2-1.4 MWh for every kWp of installed solar capacity. [12]

Russia's energy legislation focus has primarily been on energy efficiency. Nevertheless, attention has been increasingly given to developing renewable energy sources. Key legislative acts include:

1. Federal law on the electric power industry (2003); [13]
2. Policy guidelines for promoting renewable energy to 2020 (2009); [14]
3. Energy strategy of Russia to 2030 (2009); [15]
4. Decree No. 449 on the mechanism for the promotion of renewable energy on the wholesale electricity market (2013); [16]
5. Energy Strategy of the Russia for the period up to 2035 (2020); [17]
6. Strategy of socio-economic development of Russia with a low level of greenhouse gas emissions until 2050 (2021). [18]

Russia's renewable energy policy includes the following key mechanisms:

1. Capacity-based support mechanism;
2. Competitive bidding;
3. Renewable energy quotas.

Russia's renewable energy sector has undergone gradual development over time, with total renewable energy capacity installed amounting to 56,708 MW as of 2023, sourced mainly from exploiting hydropower potential [10] (in 2023, solar and wind energy capacities installed reached 4,688 MW only, *Appendix*, or about 8% of all renewables.) Key renewable energy projects include *Kochubeevsk 210 MW Wind Farm* (Stavropol, commissioned in 2020) and *Arshan 115.6 MW Solar Power Plant* (Kalmykia, commissioned in 2022.) Although Russia's renewable energy generation has been growing, it grows slowly and remains a small, insignificant fraction of the total energy mix; as of July 2023, renewables in Russia make up 2.5% of the total electrical energy capacity installed. [19]

The 2003 law *On electric power industry* first defined renewable energy sources as follows: "*renewable energy sources are solar, wind, water (including wastewater)*

energy with the exception of cases of use of such energy at pumped storage power stations, tidal, wave energy of water bodies including reservoirs, rivers, seas, oceans, geothermal energy using natural underground coolants, low-potential thermal energy of earth, air, water using special coolants, biomass which includes plants specially grown for energy including trees, as well as production and consumption waste with the exception of waste obtained in the process of using hydrocarbon raw materials and fuel, biogas, gas released by production and consumption waste in landfills of such waste, and gas generated in coal mining." [13]

Russia has had three key energy strategies (dated 2003, 2009, and 2019 by 2020, 2030, and 2035, respectively), and the fourth one is currently being drafted. Russia's historic reliance on fossil fuels and large reserves of natural gas and oil have always fueled scepticism towards renewable energy. So, the 2003 *Russia Energy Strategy to 2020* gives minimal mention of renewable or alternative energy, focusing mainly on expanding oil and gas production and export geography. [20] Nevertheless, the 2009 *Russian Energy Policy to 2030* emphasised the development and integration of renewable energy sources. The 2009 *Energy Strategy 2030* focused on stabilising the share of renewable energy in the structure of electrical energy production. [15] Important measures stipulate the master plans for allocation of renewable energy generation facilities, state backing of the manufacturing industry and research institutes, fostering investments in projects of renewable energy. It also values the consensus in the development of the electric energy industry and promotes the creation of small enterprises in the field of renewable energy resources. The 2009 *Russian Energy Strategy to 2030* aimed to consequently increase the share of renewables in the overall energy generation so as to have 1.5% by 2010, 2.5% by 2015 and 4.5% by 2020 [14]. The 2014 State Programme on Energy Efficiency and Energy Development lowered the 2020 target to 2.5%, reflecting the challenges Russia had faced in scaling up renewables.

As compared to the previous Strategy, the 2020 *Russian Energy Strategy 2035* [17] is evolutionary, with a difference in approaching renewable energy. The earlier *2020 Strategy* primarily focused on establishing the foundations for renewable energy development: it outlined state support measures such as incentives for renewable energy production, infrastructure development, and fostering research and development within the sector. In stark contrast, the *2035 Strategy* shifts towards a more multifaceted and detailed framework for integrating renewables into Russia's energy mix and foresees a cumulative wind and solar energy generation of 46-52 billion GWh hours by 2035. [21] Expansion of renewable energy capacities, diversification of

renewable energy (to include wind, solar, and biomass) are mentioned. The strategy pinpoints more ambitious targets for renewable energy production and includes comprehensive plans for enhancing grid infrastructure to bear a potentially increased share of renewables. Notably, the *2035 Strategy* gives attention to technological innovation and private sector involvement, aiming to attract more investment and promote the localization of renewable energy technologies. Improving energy efficiency, expanding energy export, and increasing hydroelectric capacity have permeated all the three *Strategy* versions.

Despite the strategic approach to renewable energy scale-up, renewable energy generation in the overall energy generation was 1.7% in 2020 and 2.5% as of July 2023. [19] Consequently, Russia failed to achieve its target of having 4.5% of renewables by 2024. In 2024, deputy energy minister P. Sorokin announced that renewables were not key in Russia's decarbonisation efforts, and they would most likely remain below 10% by 2050. [22] A share of renewables in installed electricity generation in Russia is being forecasted to not exceed 6.2% by 2035. [19]

Retrospectively, another milestone in Russia's renewable policy was enacting *Decree No. 449 on the Promotion of Renewable Energy* in 2013 which introduced a mechanism for supporting renewable capacity that provides payments for an installed capacity rather than energy delivered. Developed to encourage the construction of large-capacity renewable energy installations, the mechanism offered measures of financial stability and predictability to the investors. The approach, therefore, was to attract investment in the renewable energy sector and facilitate deployment of renewable capacity for renewable energy. In 2015, Russia introduced *Decree No. 47 On Amendments to Decree No.449,* thus following up on the framework brought about by *Decree No. 449* and formalising the procedure of selecting projects of such sources of energy through competitive bidding. Competitive bidding was ensured through an auctioning system. Ensuring transparency, increasing market efficiency and competition, competitive bidding was a significant step forward. Complementing these mechanisms, Russia's adoption of renewable energy quotas aimed to secure a minimum share of renewables within the energy mix, providing a regulatory framework for increasing renewable energy capacity over time. Therefore, *Decree No. 47* can indeed be considered as a valuable addition to *Decree No. 449* rather than amendment.

In 2017, amendments to the Law *On Electric Power Industry* aimed at enhancing the regulatory framework for renewable energy development, providing clearer procedures and stronger incentives for large- and small-scale renewable energy projects.

Counting about 5,600 MW of renewable capacity installed in 2014, in 2023 Russia possessed installed capacity of about 56,700 MW, [10] showing an about 10% increase over a decade. Increase in solar and wind capacities between 2014 and 2023 has been from 5 to 2170 MW and from 10 to 2518 MW, respectively, *Appendix*.

Overall, renewable energy capacity for Russia has been developing on an incremental basis, with the recent slow-down in growth rates. While hydropower remains the most exploited source of renewable energy in the country, visible progress in the development of wind and solar projects, especially after the 2019 *Strategy* impetus, has been made. Continued fossil fuel dependence and challenges in moving to greater energy mix diversity persist. Nevertheless, the capacity-based support mechanism and the competitive bidding process have played a crucial role in facilitating the development of renewable energy projects in Russia.

4. Comparative analysis: similarities

A key commonality of renewable energy legislative courses in Kazakhstan and Russia is gradual development resulting in increasing renewable energy generation dynamics. Both Kazakhstan and Russia defined renewable energy sources as encompassing a broad range of renewable energy forms including solar, wind, hydro, geothermal, and biomass. In 2009, both countries introduced foundational laws that set the stage for renewable energy development (Kazakhstan's Law *On Supporting the Use of Renewable Energy Sources* and Russia's *Policy Guidelines for Promoting Renewable Energy to 2020*.) Strategic approach to renewable energy is proven by the states committed to energy strategy development and regular updates (Kazakhstan's *2050 Strategy*, the *Concept for the Transition to a Green Economy* and Russia's *Energy Strategy to 2030*, *Energy Strategy to 2050* being currently in development) with ambitious energy mix targets.)

The two states have a similar record of employing energy market-based mechanisms: both implemented feed-in tariffs to encourage investments in renewable energy. Kazakhstan used this mechanism from 2009 to 2017, whereas Russia introduced a similar capacity-based support mechanism with *Decree No. 449* in 2013. Both countries shifted to competitive bidding: Kazakhstan introduced an auction system in 2017, and Russia - in 2015 with *Decree No. 47*.

Both nations have financial incentives in place to stimulate the development of renewable energy projects: green tariffs in Kazakhstan and the capacity-based support mechanism in Russia are both supposed to ensure financial stability and attract investment. Financial support to renewable energy developers through tax exemptions and subsidies was present in both countries. Both Kazakhstan and Russia have amended foundational laws and strategies multiple times, thus reflecting evolving market conditions and goals (Kazakhstan amended its 2009 law in 2014 and 2018, whereas Russia updated its *Energy Strategy to 2030* in 2009 and *Energy Strategy to 2035* in 2019.)

5. Comparative analysis: differences

While Kazakhstan and Russia share some similarities in terms of renewable energy legislation, there are definitions, speed and renewable energy development trajectory differences. In 2009, Kazakhstan came to define renewable energy sources as those continuously replenished by natural processes, including solar radiation, wind, hydrodynamic water energy, geothermal energy, and biomass, including anthropogenic sources such as consumer waste. The broad definition might indicate Kazakhstan's comprehensive approach to renewable energy. Russia's 2003 definition is more detailed. However, the Russian definition excludes certain types of waste and emphasises the use of renewable energy in specific contexts (such as excluding waste from hydrocarbon raw materials.) This generally demonstrates a more cautious approach with a specific focus on certain types of renewable sources.

Being as comparably abundant in fossil fuels as Russia, Kazakhstan has been more proactive and ambitious towards renewable energy policy and adoption. Arguably, the auction-based system introduced in 2017 has been successful in bringing down costs and attracting investment from a wide range of investors, mainly development banks. Such efforts have resulted in renewable energy capacity reaching 5,663 MW in Kazakhstan, predominantly sourced from wind and solar projects.

In turn, the renewable energy sector in Russia has seen slow growth and has once failed to achieve an energy generation target. Slower renewable energy development correlates with a mostly conservative reliance on fossil fuels.

Kazakhstan devises renewable energy policies with broader considerations for environmental and sustainability goals (the 2013 Green Economy Concept), bolstering these with a call for educational programs and training in green technologies. Russia's

legislative approach to renewables has been less holistic and committed. Most of its laws, decrees, and strategies focus primarily on energy efficiency, maintaining energy security and scaling hydroelectric capacity.

Kazakhstan’s renewable energy capacity growth has been rapid, doubling 2,700 MW in 2014 to approximately 5,700 MW in 2023, around a two-fold increase. In turn, Russia's renewable energy capacity increased by about 10% from 2014 to 2023, reaching 56,700 MW, and still constitutes an insignificant fraction of the overall energy mix.

6. Conclusion

While Kazakhstan and Russia share similarities in legislative approaches to the development of renewable energy as evident from foundational laws, policy mechanisms, and incentives, the countries do differ in strategic ambition, market integration, and overall progress in renewable energy development. Kazakhstan is distinguished by more ambitious targets and market-based reforms that have led to faster growth, whereas Russia's piecemeal approach and the lack of commitment to utilising unconventional energy sources produced continued reliance on fossil fuels and hydroelectric power as a renewable option.

The strategic approach of Kazakhstan to the development of renewable energy has indeed helped progress with renewables. Success from the auction-based system indicated that market-based mechanisms encouraged renewable energy development. More importantly, increase in renewable capacity installed and wind and solar energy generation signifies the operational success of projects awarded through the auctions and an efficient translation of capacities awarded into actual generation.

In Russia, gradual and cautious development of renewables comes down to the country's dependence on traditional energy sources and substantial reserves of natural gas and oil, which constrains the country’s potential in decarbonising the economy. Capacity-based support and competitive bidding mechanisms have generally proven functional in scaling up renewable energy projects, but overall renewable energy sector growth is slow, and the progress remains insubstantial. Current barriers to achieving Russia's renewable energy targets with a precedent of failing to achieve one include continued reliance on fossil fuels and high costs associated with renewable energy technologies, especially given current geopolitical uncertainties. Nevertheless, having renewable energy market-based mechanisms in place is a positive move toward increased renewable capacity issuance and energy supply security.

Despite a number of historical, political, economic, and cultural commonalities that link Kazakhstan with Russia, the two economies have been following different trajectories in their renewable energy journeys, with some commonalities. Renewable energy policy practised by Kazakhstan has been proactive and more ambitious than that of Russia, thereby providing impetus to renewable energy capacity and generation, making the country benefit considerably from a number of socioeconomic benefits attributed to escalating solar and wind energy deployment.

To conclude, the current comparative analysis of renewable energy legislation in Kazakhstan and Russia demonstrates the role strategic vision, market mechanisms, financial incentives, and overall commitment and policy consistency play in promoting renewable energy development. There are a number of lessons emanating from both Kazakhstan and Russia's experiences with renewables that might be delved into further by researchers, policymakers, and stakeholders affected for producing more nuanced insights into energy transition paths in respective countries.

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Appendix

Selected renewable energy source generation and installed capacity dynamics, Kazakhstan and Russia, 2014-2022. IEA data.

		Generation, GWh				**Capacity installed, MW**			
country	**year**	**solar**	**wind**	**hydro**	**bio**	**solar**	**wind**	**hydro**	**bio**
Kazakhstan	2014	97	13	8262	1	5	53	2675	0
Kazakhstan	2015	118	131	9269	2	57	72	2678	0
Kazakhstan	2016	136	274	11620	4	57	98	2696	0
Kazakhstan	2017	159	339	11210	2	59	112	2726	1
Kazakhstan	2018	384	460	10395	1	209	121	2756	1
Kazakhstan	2019	830	707	9993	3	542	284	2778	2
Kazakhstan	2020	1490	1028	9660	7	912	486	2785	8
Kazakhstan	2021	1629	1747	9208	2	1038	684	2807	8
Kazakhstan	2022	*no update*				1146	1108	2807	8
Kazakhstan	2023					1306	1440	2903	14
Russia	2014	160	96	177141	32	5	10	50116	1370
Russia	2015	335	148	169914	30	61	11	50259	1370
Russia	2016	462	148	186640	32	76	11	50250	1370
Russia	2017	557	140	187131	84	225	11	50486	1373
Russia	2018	719	231	193027	72	535	52	50579	1373
Russia	2019	1279	330	196510	0	1276	102	51079	1373
Russia	2020	2022	1240	214388		1428	945	51398	1373
Russia	2021	2224	3311	216392	72	1661	1955	51398	1373
Russia	2022	*no update*				1816	2218	51398	1373

Energy

Russia 2023 2170 2518 50571 1373

Note: *Hydro electricity generation is reported by IEA within its Renewable Energy by country and type of source rubric. Hydro capacity refers to renewable hydropower capacity (including mixed plants) as reported by IRENA (2024), Renewable capacity statistics 2024, International Renewable Energy Agency, Abu Dhabi.*

РЕЗЮМЕ

ВОЗОБНОВЛЯЕМАЯ ЭНЕРГЕТИКА В КАЗАХСТАНЕ И РОССИИ: СРАВНИТЕЛЬНЫЙ АНАЛИЗ ЗАКОНОДАТЕЛЬНОЙ БАЗЫ

Д. Шалина
Казахстанско-немецкий университет
Алматы, Казахстан

Исторически зависимые от традиционных источников энергии Казахстан и Россия вкупе с глобальными тенденциями декарбонизации и растущим вниманием к нетрадиционным источникам энергии имеют диверсифицированные энергетические портфели. В этой статье представлен сравнительный обзор законодательства в сфере возобновляемых источников энергии в Казахстане и России с упором на законодательную базу, которая сформировала интеграцию и масштабирование возобновляемых источников энергии в двух богатых ресурсами странах. В рамках исследования отслеживается эволюция повестки возобновляемой энергетики в обеих странах и освещаются ключевые энергетические законодательные акты и стратегические цели. Анализ показывает, что Казахстан добился значительного роста установленных мощностей и производства энергии солнца и ветра, продемонстрировав политическую последовательность и волю, тогда как прогресс России был постепенным. Сравнительный анализ, подкрепленный динамикой потенциала, установленных мощностей и производства возобновляемых источников энергии по типам формирует представление о законодательных и политических мерах в секторе и служит введением в контекст возобновляемой энергетики в соответствующих странах.

Түйіндеме

ҚАЗАҚСТАН МЕН РЕСЕЙДЕГІ ЖАҢАРТЫЛАТЫН ЭНЕРГИЯ: ЗАҢ ШЫҒАРУ НЕГІЗІНЕ САЛЫСТЫРМАЛЫ ТАЛДАУ

Д. Шалина
Қазақ-неміс университеті

Алматы, Қазақстан

Дәстүрлі энергия көздеріне тарихи тәуелді Қазақстан мен Ресей жаһандық декарбонизация тенденцияларымен және дәстүрлі емес энергия көздеріне өсіп келе жатқан назармен бірге энергия қоржындары әртараптандырылған. Бұл мақала ресурсқа бай екі елде жаңартылатын энергияның интеграциясы мен масштабын қалыптастырған заңнамалық базаға назар аудара отырып, Қазақстан мен Ресейдің жаңартылатын энергия туралы заңнамасына салыстырмалы шолу жасайды. Зерттеу екі елдегі жаңартылатын энергия күн тәртібінің эволюциясын бақылайды және негізгі энергетикалық заңнама мен стратегиялық мақсаттарды көрсетеді. Талдау көрсеткендей, Қазақстан белгіленген қуат пен күн және жел энергиясын өндіруде айтарлықтай өсімге қол жеткізіп, саяси тұрақтылық пен ерік-жігер таныта отырып, Ресейдің алға жылжуы бірте-бірте болды. Жаңғыртылатын энергия көздерінің түрлері бойынша әлеует, орнатылған қуат және өндіріс динамикасымен расталған салыстырмалы талдау сектордағы заңнамалық және саясаттық шараларды түсінуді қамтамасыз етеді және тиісті елдердегі жаңартылатын энергия контекстіне кіріспе ретінде қызмет етеді.

Түйін сөздер: жаңартылатын энергия көздері, қалпына келтірілген энергия туралы заңнама, полиция энергиясы, Қазақстан, Ресей