

Government support measures and the current situation in the renewable energy sector of Kazakhstan



Kairat Izbassov
GETPPP, Green School, Korea University
Ministry of Energy of Republic of Kazakhstan,
Head of Division

ABSTRACT

The Republic of Kazakhstan is a geographically large but sparsely populated country, rich in natural resources, located in the center of the Eurasian continent. In recent years, it has begun to create a green economy, leading it among its neighbors in Central Asia. Therefore, the country has set a clear goal: by 2030, emissions should be reduced by 15–25% compared to the level of the 90s. As part of the country green economy strategy, in 2013 Kazakhstan adopted the “National Concept for the Transition to the Green Economy until 2050”, which sets out the principles of the green economy as a path for future development. The goal is to bring the share of renewable energy in electricity production from zero to 3% by 2020, and then increase it to 30% by 2030 and 50% by 2050. This paper looks at what Kazakhstan has done to promote renewable energy and provider perspectives. The paper also considers Kazakhstani legislation in terms of the development of renewable energy sources and provides information on incentives and preferences for the development of renewable energy sources. Thus, it will be easier for investors to evaluate the implementation of potential projects in Kazakhstan.

Introduction

Currently, Kazakhstan has significant reserves of coal, oil, gas, uranium and others in the field of energy resources. In addition, it is an exporting country. At the same time, the extraction of fossil fuel sources and their use for electricity generation pose serious environmental problems). The main consequences of using such endless sources are greenhouse gas emissions and global warming. Given that this energy consumption, due to its exhaustibility, is considered unsustainable in the long term, as well as the adoption by the world community of Paris and other environmental agreements, Kazakhstan has been implementing a policy in the field of renewable energy since 2013, which was actively developed in 2017. One of the policy instruments is creating conditions for entrepreneurship and attracting investments in renewable energy, which makes this sector attractive for business. Renewable sources can effectively help meet the growing demand for electricity and become the basis for the country's energy independence and security. For this, Kazakhstan has both a huge territory and a huge potential for using solar, wind and other types of "clean" energy.

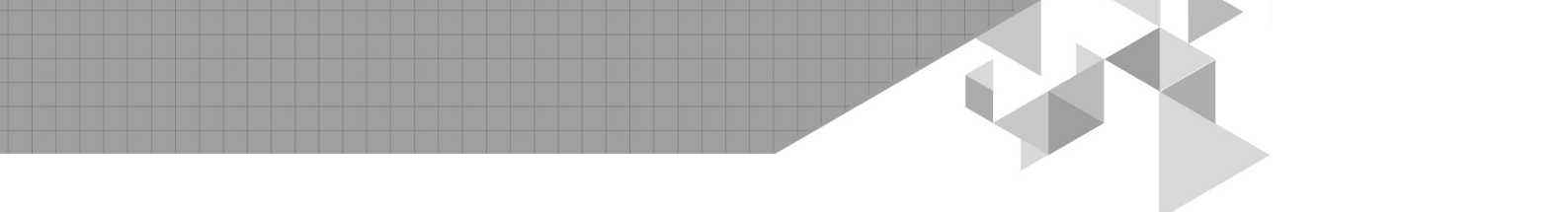
Development of the energy sector in Kazakhstan

Kazakhstan has large reserves of energy resources (oil, gas, coal, uranium).^[1] According to the Ministry of Energy of the Republic of Kazakhstan in 2017 the volume of electricity production in Kazakhstan was

103.14 billion kWh. Kazakhstan is a net exporter of electricity. In 2017, excess electricity generation gained 4.53 billion kWh. About 70% of the electricity in Kazakhstan is generated from coal, 14.6% from hydro resources, 10.6% from gas and 4.9% from oil. According to forecasts, the demand for electricity in the country will increase annually by 2.5% until 2030. Currently, the country's total installed capacity is 19.8 GW, but the available capacity is only about 15 GW, mainly due to energy obsolescence, infrastructure and a predominant lack of investment and services. To control the growing demand for electricity in Kazakhstan, it will be necessary to modernize existing capacities and build new power plants.^[2]

Environment protection

As already mentioned, more than 70% of electricity in Kazakhstan is generated by obsolete coal-fired power plants, which are a large amount of local cheap coal in the north-eastern region. Thus, 80% of the country's carbon emissions come from the energy sector, namely heat, and electricity. Therefore, there are additional problems.^[2] In Kazakhstan, as elsewhere, greenhouse gas emissions in significant quantities (about 40%) are also observed in the electricity sector. The main reasons are the use of low-quality coal and the lack of modern equipment for power plants to control. The International Energy Agency and IRENA note that to achieve global climate change indicators under the Paris Agreement (it is necessary to strive to quickly change the way energy is produced, although fossil fuels will remain the main part of the energy system, high success, the level of renewable energy use.^[3]



In 2016, data on the level of environmental pollution limited to 3.4 million tons, of which 85% was accounted for by 43 large enterprises. At the same time, the share of electricity is 87% of total greenhouse gas emissions of 214.4 million tons of CO₂ equivalents. Recall that at present in Kazakhstan up to 85% of the total electricity production as a result of burning fossil fuels, mainly local coal, to a limited extent—hydrocarbons. About 10% of atmospheric emissions from stationary sources and generation include toxic waste generated by enterprises engaged in the extraction of crude oil and associated gas. When using renewable energy sources, energy can range from 500 thousand tons to 2.5 million tons of CO₂.^[2] Also, there are, in particular, the use of renewable energy sources for the generation and supply of electricity to existing grid energy systems can be economically justified in the energy zones of Kazakhstan. Renewable energy can be the basis for the development of remote regions of the country.^[2]

Expected growth of renewable energy sources in Kazakhstan

The total installed capacity of Kazakhstan's power plants is 18,993 GW, and the estimated capacity is 14,558 GW. According to the aforementioned estimate,^[2] the total potential of wind power capacities can be 659 GW, which is 35 times higher than the installed capacity, and electricity generation consists of only 2,1735 trillion kWh/year, which is 25 in 2015, the production of electricity in Kazakhstan, which determined to 2015. 86,2 billion kWh. Kazakhstan has a huge investment capacity and attractiveness, which allows achieving sustainable development of the country for many years to come.^[2] Based on the

theory of energy consumption, for the equilibrium limit of closed energy systems, the limit of capacity allocation for them is 10% of the total installed capacity. When combining the energy systems of Europe, Central, China, and Southeast Asia, the share of renewable energy in the Euro–Asian energy systems plan can be very large. The strategic location of the prospective wind sections of Zhukimdyk in the Akmola region, Shelek and Dzhungarsky gates in the Almaty region are located close to the cities of Kazakhstan and the western provinces of China, which allows us to provide services for the mass consumption of cheap and environmentally friendly energy. It is possible to achieve large sizes only with the help of renewable energy sources for electricity and heat supply for the population, as well as for the production of hydrogen and the extraction of large underground water reserves of central Kazakhstan for agriculture.^[2]

Solar power in Kazakhstan

Development of solar power

The potential solar energy output is estimated at 2.5 billion kWh per year. Even though Kazakhstan is located in the northern latitudes, the potential of solar radiation in the republic is quite significant (amounting to 1.3–1.8 thousand kWh/m²/year, or 2500–3000 solar hours per year). At the same time, solar energy can be used not only to generate electricity, but also heat, which makes it possible to pinpoint the introduction of solar installations, including areas remote from the central electricity and heat supply.^[2] At the same time, practical

measures are being taken in Kazakhstan aimed at creating an industrial base producing silicon and photovoltaic cells necessary for the development of solar energy. The approved fixed tariffs for the supply of energy produced by renewable energy facilities are annually indexed taking into account inflation in the manner determined by the government, but this is also not enough for the payback of projects in the current economic conditions.^[4]

Since 2012, a plant for the production of photovoltaic modules based on Kazakhstani silicon has been operating in Astana – Astana Solar. The design capacity of the plant is 50 MW with the possibility of expansion in the future up to 100 MW. As for the local component, in Kazakhstan, the use of Kazakhstani equipment is not a mandatory requirement for the implementation of renewable energy projects. But to support domestic production, following the Decree of the Government of the Republic of Kazakhstan No. 644 of June 12, 2014, a fixed tariff was approved for projects of solar power plants using photovoltaic modules based on Kazakhstan silicon. The size of the fixed tariff, in this case, is 70 tenge kWh (\$0.375/kWh). These are good conditions for supporting Kazakhstan producers, as well as building an attractive market for foreign investors^[2]. The main advantages of solar energy are the accessibility and inexhaustibility of sources, complete safety for the environment. The main disadvantage is the need for large areas of land for the construction of a solar power station. However, in the case of Kazakhstan, this formula can work in the opposite direction, because semi-deserts and deserts of the country occupy 58% of the entire territory.^[4]

In 2018, a large solar power plant appeared in the

village of Burnoye, Zhambyl region. Its capacity is 100 MW. The European Bank for Reconstruction and Development, which funded the facility, received an international award for the best deal in solar energy. In 2019, near Kapshagay, the largest solar power station in the region, Nurgisa, was opened, named after the famous composer Nurgisa Tlendiev. The facility capacity is 100 MW. The power plant consists of 300 thousand panels. The total project cost amounted to 27 billion tenge. In the Karaganda region, the «Gulshat» solar power station with a capacity of 40 MW was commissioned in 2019. Construction cost \$ 46 million. The project was also funded by the European Bank for Reconstruction and Development (EBRD).^[5]

Also in 2019, a 30 MW solar power plant was launched in the East Kazakhstan region. The cost of the facility is 17 billion tenge, the investor was a Chinese company. It became known that another such facility with a capacity of 100 MW will appear near the capital. A \$ 65 million credit line for the construction of a solar power station for the Russian company Hevel. The object was named "Nura" and will be built and launched next year in the Akmola region near the village of Kabanbai Batyr. It is only 36 kilometers from Nur Sultan. The same company launched the construction of solar power plants in Kentau and Shymkent. The company was won at an auction organized by the government in 2018. In total, Kazakhstan has 27 solar power plants. This is not counting 18 wind, 35 hydro and three bioelectric power stations. In the Kyzylorda region, two more solar power plants are being commissioned. The government believes that by 2025, Kazakhstan will receive at least three thousand MW thanks to renewable energy sources.^[5]

Key stakeholders

In August 2014, the functions of the authorized body in the field of state policy in the field of the use of renewable energy sources were transferred to the Ministry of Energy^[2]. A potential investor can consult with the Ministry of Energy, the Settlement and Financial Center for Support of Renewable Energy Sources LLP and the National Company KEGOC JSC on the implementation of projects for the construction of power plants using renewable energy sources. Such projects will be priority investment projects, and after concluding an investment contract with the Ministry of Investment and Development, the investor can receive investment preferences in the form of exemption from customs duties, state in-kind grants, tax preferences, and investment subsidies. Settlement and Financial Center for Renewable Energy Support LLP centrally buys all the electricity generated by solar and wind power plants. The Ministry of Energy of Kazakhstan, in cooperation with the International Finance Corporation (a division of the World Bank) is considering promoting public-private partnerships and attracting private capital to Kazakhstan's renewable energy sources. A subsidiary of the World Bank intends to attract private capital in the field of renewable energy. A Renewable Energy Association has been created in Kazakhstan, uniting 25 companies. The Association participated in the development of rules for the use of renewable energy sources, as well as in the calculation of tariffs. Besides, work was underway to improve legislation.

The energy potential of renewable energy sources, the capacity market, and legislation can finally allow us to structure investment-attractive projects (banking projects) on the use of renewable energy

sources in Kazakhstan.^[2] Thanks to the systematic work to increase capacity, by the end of 2020, 108 facilities with a capacity of 1610 MW will operate in the system, and by the end of 2024, there will be at least 3000 MW of renewable energy in the power system.^[6] Currently, investors from 10 countries are working in the green energy sector, as well as large financial organizations such as the Eurasian Bank for Reconstruction and Development, the Asian Development Bank and the Development Bank of Kazakhstan. The Asian Infrastructure Investment Bank as the first investment project in Kazakhstan chose a renewable energy facility – a 100 MW wind farm in the Zhambyl region. According to the Minister of Energy of the Republic of Kazakhstan, a good signal is the fact that large oil companies such as Shell, Eni, Total, which receive the right to implement projects in Kazakhstan in a competitive environment, have come to green energy sector. Thus, since the beginning of the work of the Settlement and Financial Center, about 406 billion tenges (more than \$ 1 billion) has been attracted to the renewable energy sector, and about 81 billion tenges (more than \$ 208 million) will be paid for the constructed facilities. Also during the construction period, Kazakhstani engineers, builders and support staff are involved.^[6]

Government support measures in the renewable energy sector

In the framework of the Law of the Republic of Kazakhstan “On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on Electricity” adopted on July 11, 2017, amendments and

addenda were introduced to the Law of the Republic of Kazakhstan “On Supporting the Use of Renewable Energy Sources”, which provides for the transition to auction the mechanism for implementing the project on the use of renewable energy sources.^[6] Starting from 2017, the Ministry of Energy of Kazakhstan provides the right to support renewable energy sources based on competitive selection, and until 2017 the country has fixed tariffs that the investor has received for 15 years. The transition to the auction mechanism made it possible, on the one hand, to make the process of selecting projects and investors transparent and understandable, on the other hand, to bet on more efficient technologies and projects that minimize the impact on end-user tariffs, consumers at the commissioning of renewable energy, as well as clearly define the responsibility of market participants in both the generation and transmission and consumption. Auctions are held transparently on an electronic platform that will allow them to offer their electricity tariffs during a 3-hour trading session, as well as win and sign a contract for projects offering the lowest tariff. Besides, the auction mechanism allows us to choose the best projects for the construction of renewable energy sources based on market mechanisms and taking into account electric networks. The fixed tariff mechanism at the initial stage of renewable energy development allowed the country to quickly launch the renewable energy market.

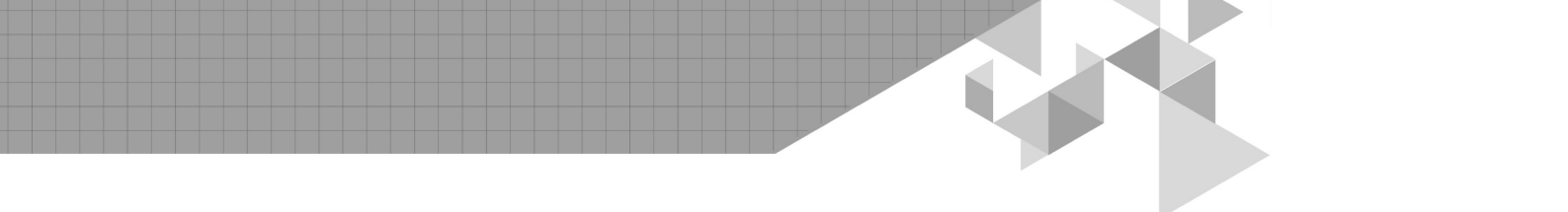
According to the Ministry of Energy, the international auction 2018 – 2019 is held in electronic format for projects with a total capacity of 1 205 MW. The auction was attended by 138 companies from 12 countries. The auction participants proposed

applications for projects with an installed capacity of about 3900 MW, which exceeded demand by 3,2 times. As a result of the auction, 30 companies signed contracts with one buyer of electricity (RFC) for a period of 15 years for a total capacity of 804 MW and 12 companies at the stage of signing contracts with RFC for a total capacity of 163 MW. It should also be noted that there was a decrease in electricity tariffs for wind power plants (wind power plants) on average at the request of bidders by 10,6%, small hydropower plants (HPPs) by 14,5%, solar power plants (SES) by 36%. At the same time, the maximum tariff reduction for individual projects amounted to 51% for SES, 23% for wind farms and hydroelectric power stations.^[6]

State support measures in the renewable energy sector include guaranteed purchase of electricity and payment at the auction price for 15 years, transparency of the project selection process through the auction mechanism, annual indexation of auction prices taking into account inflation and exchange rate changes, exemption from payment for transmission network services electricity, priority planning of electricity production using renewable energy sources, provision of investments, preferences by the legislation of the Republic of Kazakhstan, the support consumers to use renewable energy sources and other measures.^[6]

Discussion

Kazakhstan, as a country aimed at joining 30 developed countries of the world, adopted the “Kazakhstan-2050 Strategy”, where the head of state set the task of developing alternative and renewable



forms of energy, and specific target indicators for the development of the renewable energy sector were adopted. Thus, the share of renewable energy sources in the total volume of electricity production by 2020 is 3%, 2025 – 6%, 2030 – 10%, 2050. RES and alternative energy sources should account for at least half of the total energy consumption. Systemic measures of state support for renewable energy in Kazakhstan are based on a long-term policy and are implemented through the development and improvement of the regulatory framework. The process of implementing renewable energy projects arose in Kazakhstan due to the adoption in 2009 of the Law on Supporting the Use of RES and several adopted regulatory legal acts in its implementation.^[2]

To successfully develop renewable energy sources in Kazakhstan in July 2013, the Law "On Supporting the Use of Renewable Energy Sources", taking into account the best international practices and the current situation in the republic, was improved. In the framework of the Law of the Republic of Kazakhstan "On Amendments and Additions to Some Legislative Acts of the Republic of Kazakhstan on Electricity Issues" adopted on July 11, 2017, amendments and addenda were introduced to the Law of the Republic of Kazakhstan "On Supporting the Use of Renewable Energy Sources", which provides for the transition to an auction mechanism for project implementation on the use of renewable energy.^[6] The transition to the auction mechanism made it possible, on the one hand, to make the process of selecting projects and investors transparent and understandable, on the other hand, to bet on more efficient technologies and projects that minimize the impact on the tariffs of end consumers on the commissioning of renewable

energy capacities, as well as clearly define the responsibility market participants in both generation and transmission and consumption. Also, the auction mechanism allows us to select the best projects for the construction of renewable energy plants based on market mechanisms and taking into account electric networks. To implement the above law, the Ministry has carried out work on the approval of by-laws providing for the procedure for organizing and conducting auction trading, and the introduction of amendments and additions to related regulatory legal acts in the field of renewable energy.^[6]

Recommendations

For comparison, in 2014 there were 26 operating facilities with an installed capacity of 178 MW. At the end of 2019, 87 facilities with a capacity of 1,042 MW will operate in the country. At the same time, despite the measures taken by the Government of Kazakhstan, the Kazakh regulatory framework in the field of energy is more focused on the "traditional" electric power industry. And the point is not only that the issues of regulation of renewable energy sources are not sufficiently reflected in it. One of the main obstacles to the development of renewable energy in Kazakhstan is the high cost of technology. RES are forced to compete in the energy market, where the cost of electricity is determined, in fact, only by the current costs of its production. Therefore, the accelerated introduction of renewable energy sources into the existing energy system of Kazakhstan must be gradual, otherwise it will be economically inexpedient and disadvantageous. The

greatest benefit from the development of renewable energy will be obtained through the creation and production of advanced global and proprietary technologies that provide additional cost and production advantages. Besides, this will lead to the further development of related and related industries, such as construction, production of related synthetic materials, electrical equipment that are already available in Kazakhstan.^[2]

Kazakhstan has quite a huge potential in the field of renewable energy development. And if recently the idea of developing renewable energy sources in some country rich in hydrocarbons seemed unrealistic, today even large players in the oil and gas sector are investing in the development of renewable energy sources in Kazakhstan. Diversification is not only the purpose of this but also simply practical reasons – in Kazakhstan, there are regions where the use of local energy is indeed much more appropriate. To solve problems in the electric power industry and reduce emissions in the country, the policy in Kazakhstan is currently based on the promotion of a more decentralized, stable, as well as environmentally friendly energy supply system, which will contain some renewable energy sources. This shows not only the abundance of fossil fuels in the country but also very favorable conditions for the development of renewable energy sources. As the country progresses in search of a green economy, Kazakhstan's future in the field of renewable energy has a positive potential. As efforts to reduce the risks associated with renewable energy investments have intensified through financial and regulatory optimization, private investment has also increased.^[2]

Conclusion

Kazakhstan owns significant energy reserves in the form of coal, oil, gas, uranium and other minerals, and in this regard, up to 85% of Kazakhstan's total electricity production is produced by burning fossil fuels, mainly local coal, and to a lesser extent hydrocarbon raw material. The results of such irrational use of the bowels are greenhouse gas emissions and global warming. At the same time, according to forecasts, the demand for electricity in the country will increase annually by 2.5% until 2030, and with it greenhouse gas emissions will increase. To control the growing demand for electricity in Kazakhstan, it will be necessary to modernize existing capacities and build new power plants. More than 70% of electricity in Kazakhstan is generated by obsolete coal-fired power plants, the raw material for which is cheap coal. In Kazakhstan, as elsewhere, greenhouse gas emissions in significant quantities (about 40%) also come from the electricity sector. Therefore, a key factor in the use of renewable energy in Kazakhstan, as well as throughout the world, is the need to reduce the negative impact of energy on the environment. For this, Kazakhstan has both a vast territory and a huge potential for solar, wind and other types of “clean” energy. The use of renewable energy gives several environmental benefits and there are significant economic benefits. The use of renewable energy sources for the generation and supply of electricity to existing grid energy systems can be economically justified in energy-deficient regions of Kazakhstan. Moreover, it is renewable energy that can become a key factor in the development of remote regions of the country. At

the same time, practical measures are being taken in Kazakhstan aimed at creating a production base producing silicon and photovoltaic cells necessary for the development of solar energy.

To support domestic production, the Government of the Republic of Kazakhstan has approved a fixed tariff for projects of solar power plants using photovoltaic modules based on Kazakhstan silicon. These are good conditions for supporting Kazakhstani producers, as well as building an attractive market for foreign investors. Systemic measures of state support for renewable energy in Kazakhstan are based on a long-term policy and are implemented through the development and improvement of the regulatory framework. Kazakhstan adopted the "Kazakhstan-2050 Strategy", where the share of renewable energy in the total volume of electricity production is determined from 3% by 2020 to 50% by 2050 of the total energy consumption. The Ministry of Energy of Kazakhstan provides the right to support renewable energy sources based on competitive selection, fixed tariffs are set in the country, which the investor receives for 15 years. The transition to the auction mechanism made it possible, on the one hand, to make the process of selecting projects and investors transparent and understandable, on the other hand, to bet on more efficient technologies and projects that minimize the impact on the tariffs of end consumers on the commissioning of renewable energy capacities, as well as clearly define the responsibility market participants in both generation and transmission and consumption. The country is moving in search of an environmentally friendly economy, the risks associated with investments in renewable energy are reduced through financial and

regulatory optimization, private investment in renewable energy is growing.

Reference

- [1] Bridle, Richard. *Missing the 23 Per Cent Target: Roadblocks to the development of renewable energy in Indonesia*. International Institute for Sustainable Development, 2018. Retrieved from <https://www.iisd.org/sites/default/files/publications/roadblocks-indonesia-renewable-energy.pdf>.
- [2] Fund "Global monitor", "RENEWABLE ENERGY IN KAZAKHSTAN", Almaty, 2017. Retrieved from https://kazakhstan.trade.gov.pl/pl/i/download/fobject_id:415779.
- [3] Karatayev, Marat, and Mich le L. Clarke. "Current energy resources in Kazakhstan and the future potential of renewables: A review." *Energy Procedia* 59 (2014): 97-104. Retrieved from <https://www.sciencedirect.com/science/article/pii/S1876610214017214>.
- [4] Ospanova, Saule. *Assessing Kazakhstan's policy and institutional framework for a green economy*. International Institute for Environment and Development., 2014. Retrieved from <https://pubs.iied.org/pdfs/16559IIED.pdf>.
- [5] Press release of the panel to discuss the Address of the Head of State to the people of Kazakhstan dated September 2, 2019, under the chairmanship of the Minister of Energy of the Republic of Kazakhstan K.A. Bozumbaeva. Retrieved from https://www.facebook.com/minenergork/?ref=search&__tn__=%2Cd%2CP-R&eid=ARAnIMQyd5pKBpGs3h1BcPwQU_y4zxShs1Ro6SpHtb68mXzZT2XMvXtvBdAw_O98YJ17MXcr2IMEOkja.
- [6] Alexey Marchenko. *The share of the sun in Kazakhstan's energy sector has increased*. Published: 2 October 2019, «MKRU Kazakhstan» newspaper. Retrieved from <https://mk-kz.kz/science/2019/10/>

02/dolya-solnca-v-kazakhstanskoy-energetike-vozrosla.html.

- [7] Alan Isaev, *Solar Energy in Kazakhstan: Isaac Asimov's Forecast Comes True*. Published: 25 November 2019. Nur-Sultan city, «Express K» newspaper. Retrieved from https://express-k.kz/news/resursy/solnechnaya_energetika_v_kazakhstane_prognoz_ayz_eka_azimova_sbyvaetsya-150798.
- [8] The Law of the Republic of Kazakhstan dated 09.07.2004 On the Electric Power Industry.
- [9] Law of the Republic of Kazakhstan On introducing amendments and addenda to some legislative acts

of the Republic of Kazakhstan on the transition of the Republic of Kazakhstan to the “green economy” (as amended on July 26, 2016).

- [10] The Law of the Republic of Kazakhstan “On Supporting the Use of Renewable Energy Sources.
- [11] IRENA (2017) ‘Perspectives for the Energy for the Energy Transition: Investment Needs for a Low-Carbon Energy System Perspectives for the Energy Transition: Report Prepared for G20’, *International Energy Agency*, p. 204. Available at: http://www.irena.org/DocumentDownloads/Publications/Perspectives_for_the_Energy_Transition_2017.pdf.