

Renewable Energy Market in Kazakhstan: Potential, Challenges, and Prospects

First edition

May 2021



Important Note

PwC Kazakhstan presents the results of a study “The Renewable Energy Sources Market (RES) in Kazakhstan: Potential, Challenges, and Prospects” as of 31 December 2020. The study contains an analysis of data for each RES facility in Kazakhstan, including the location, capacity, and net capacity factor, as well as results of a survey featuring the largest participants of the RES market in Kazakhstan: RES producers, development banks, the regulator, scientists, analysts, and consultants directly involved in the creation of RES facilities in Kazakhstan, and other respondents who wished to maintain confidentiality.

The study consists of:

- An overview of the RES market as of 31 December 2020: RES facilities by type, location, capacity, net capacity factor, and other indicators
- A summary of participants' opinions on important issues pertaining to the future of the RES market in Kazakhstan
- A comparative analysis of Kazakhstan and other countries (peers and global leaders)

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Introduction

The climate agenda is one of the most important challenges for the energy industry around the world and high in the consciousness of much of the world's population. Ambitious targets for decarbonization and carbon neutrality, stricter regulations and measures to limit CO2 emissions, and investors' desire to "green" their portfolios in favour of sustainable development will have a significant impact on the fuel and power sector in many countries. As a result, energy from renewable sources is becoming an attractive alternative to a conventional energy sources, especially given the growing trend towards lower costs of building renewable energy production facilities, continuing technology developments, increasing investor demand and economies of scale. This provides significant impetus for the development of RES. However, the share of RES in electricity generation still remains relatively small and does not meet the emission reduction targets of the Paris Agreement.

Kazakhstan is not standing apart from these trends. It set its carbon neutral targets, which in turn ensured the importance of green energy development in the country.

The study shows that the investment incentive mechanisms introduced in 2011-2013 have proven effective: the capacity of renewable energy plants increased from 94 MW (2011) to more than 1800 MW (2020), resulting in a 3% share of renewable energy in power generation production.

However, there are a number of fundamental issues impeding further development of RES and requiring systemic solutions: 1) creating a balancing capacities market, 2) attracting investments to maintain reserve capacities, 3) establishing market tariffs, 4) modernizing the existing power plants or constructing new ones. Additionally, current growth rates might not be sufficient to meet carbon neutrality goals by the deadlines. So, the country is on the verge of major changes in the energy sector, and the success of the transformation will depend on the Government's decisions to provide the necessary impetus for the sector development.



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Overview, Objectives, and Key Takeaways of the Study

The study analysed open source statistics for each RES facility, including capacity, location, year of commissioning, majority shareholders and construction costs, for facilities commissioned between 2011 and 2020. We also conducted a survey of market participants to get a more complete and balanced picture of the current situation. Our respondents included the Ministry of Energy, the Solar Energy Association of Kazakhstan, Development Banks (EBRD, IFC), renewable energy producers, experts, analysts, scientists. A summary of the results is presented in this report.

As part of our survey, respondents were asked to share their views on the potential of RES in Kazakhstan, market prospects, trends, challenges and barriers.

The survey was conducted between February and April 2021.

Since the beginning of 2011, the number of renewable energy facilities in Kazakhstan has grown from 23 to 111. The main growth drivers include regulatory changes, an introduction of a "green" tariff, guarantees for electricity purchase, and strategic objectives set under the Concept for the Transition to a Green Economy:

- 3% share of renewable energy sources in total electricity production by 2020;
- 10% share of renewable energy sources in total electricity production by 2030;
- 50% share of alternative and renewable energy sources in the total electricity production by 2050.

The study presents opinions of the participants on various topics pertaining to the RES market in an aggregated form. Some comments, with permission of the respondents, are presented verbatim.



Approach to Analyzing Data and Survey Results (1/4)

We would like to clarify at the outset what the RES category includes in our study.

According to the Law of Kazakhstan on support of RES, RES are energy sources continuously renewable through naturally occurring natural processes, including the following types: solar energy, wind energy, hydrodynamic energy of water; geothermal energy (heat of soil, groundwater, rivers, reservoirs); and man-made/anthropogenic sources of primary energy resources (biomass, biogas and other fuel from organic waste used to produce electricity and (or) heat energy).

Additionally, the following terms were used in our study:

Balancing electricity represents electrical energy used to eliminate the imbalances arising from deviations of electricity production and consumption from the hourly schedule approved by the system operator.

Balancing electricity market (BEM) is a trading platform where surplus or deficit electricity, the amount of which has arisen due to the difference in actual and scheduled consumption during the day, is sold or purchased on an hourly basis.

BRICS stands for Brazil, Russia, India, China, South Africa.

Rolling shutdown is cyclical disconnection of consumers from the power grid in order to limit the amount of energy consumed. This can occur due to accidents or for economic reasons (non-payment of debts, problems with energy supply, insufficient capacity of power plants or transmission lines).

Electricity imbalance is the deviation of the actual electricity generation-consumption value from the value approved by the system operator in the hourly daily schedule of electricity generation-consumption.



Approach to Analyzing Data and Survey Results (2/4)

EBRD stands for European Bank for Reconstruction and Development.

NCF stands for net capacity factor.

Flexible capacity characterizes a generating unit with an adjustable electrical power.

IFC stands for International Finance Corporation.

A **microgeneration facility** is an electricity generating facility that operates, inter alia, on the basis of renewable energy sources including solar, wind, and water energy with a maximum capacity of up to 15 kW.

RES Operator is the Financial Settlement Center for RES Support.

Distributed (decentralized) production is the production of energy at the level of a distribution network or on the side of consumers connected to the network.

Reserve power is the difference between the operating power of a generating electrical unit and the power generated at a given moment.

System Operator (KEGOC) a national company that performs centralised operational dispatch management, ensures parallel operation with the energy systems of other states, maintains the balance in the energy system, provides system services and purchases ancillary services from wholesale electricity market entities, as well as transmits electricity through the national electricity grid, maintains and maintains it in operational readiness.

Daily production-consumption schedule is a document approved by the system operator that regulates hourly amounts of production and consumption of electrical energy for each calendar day.



Approach to Analyzing Data and Survey Results (3/4)

Centralized production is electricity generation by large power facilities such as thermal power plants, district-level electrical systems, state district power plants, and large hydroelectric power plants.

CAGR stands for compound annual growth rate.

IRENA stands for International Renewable Energy Agency.

PPA-contract (Power Purchase Agreement) / Offtake-contract is an agreement for a guaranteed purchase of electricity with a specified period and at a fixed rate.

Data Sources

For the study, data were collected from public sources. The following sources were used in different sections:

Kazakhstan energy sector overview:

- “Analysis of the Electricity and Coal Markets in Kazakhstan” reports for the period from 2016 to 2020 published by Samruk-Energy.

- Reports on energy generation and plant capacity by RES type for the period from 2016 to 2020 available on the Ministry of Energy website.
- Data on population and GRP structure for the period from 2016 to 2020 from the Bureau of National Statistics at the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

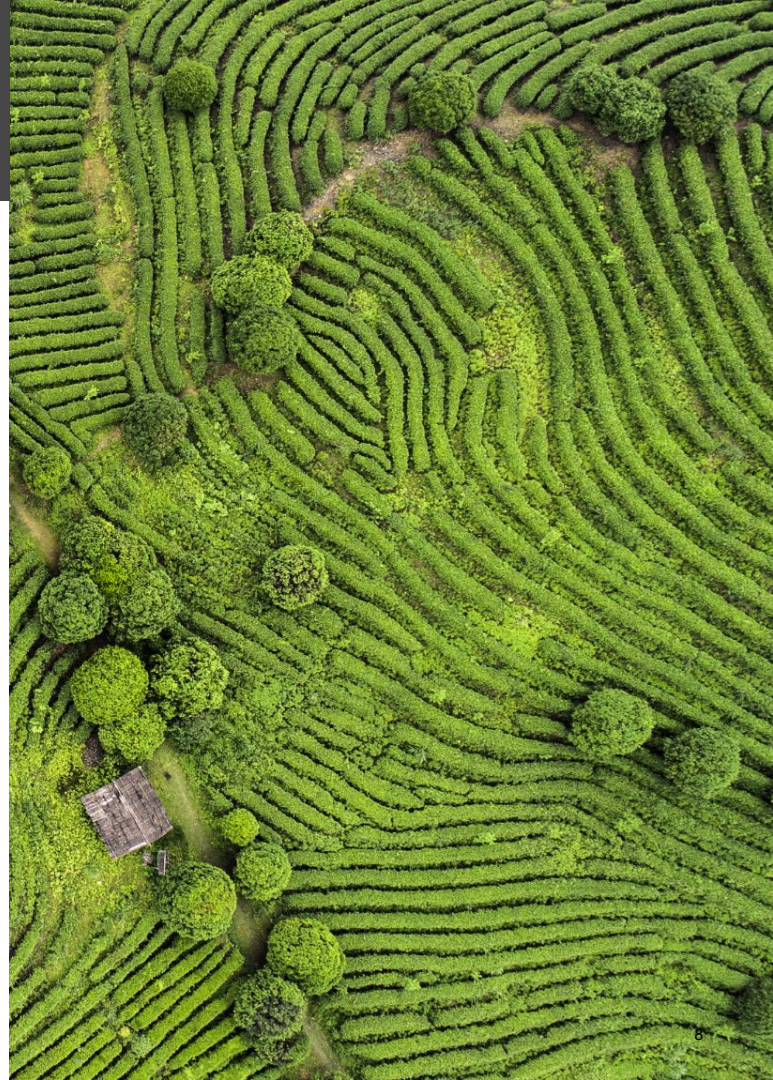
Overview of facilities and development of the RES market in Kazakhstan:

- Data on the installed capacity and average annual RES-based generation from the following sources: RES Operator, Samruk-Green Energy.
- Data on loans and the cost of facilities from the following sources: EBRD website, Eurasian Development Bank website.

For the study, energy production facilities were classified based on data from open sources:

Renewable and alternative energy sources:

- Wind power plants - WPP
- Solar power plants - SPP
- Small hydroelectric power plants - Small HPP
- Biogas power plants - BPP



Approach to Analyzing Data and Survey Results (4/4)

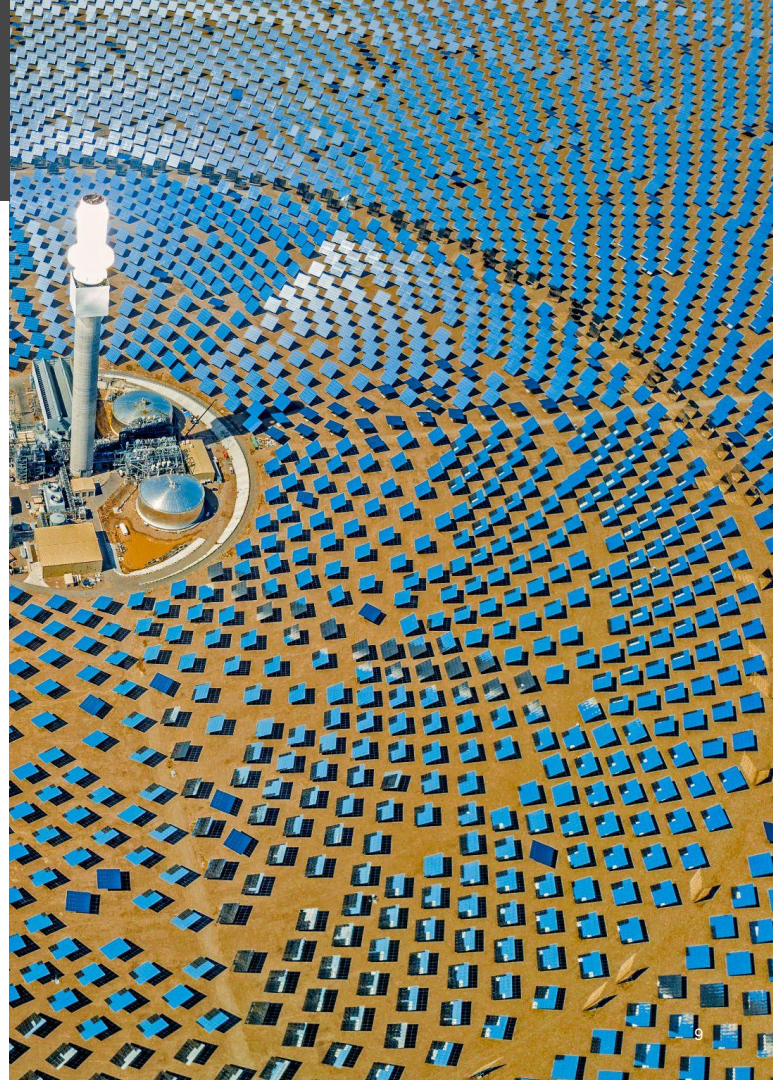
Traditional energy sources:

- Combined Heat and Power Plant - TPP, including:
 - Condensing power plants - SDPP
 - Large hydroelectric power plants - Large HPP.

Survey results:

The results of the respondents' survey were also analysed and presented in an aggregated form. Individual comments by respondents have been disclosed in our research with the respondents' permission. It should be noted, however, that respondents' opinions may reflect their own position on certain issues rather than the position of the company/department where respondents work. Moreover, at the time this research was published, information on the place of work and position of our respondents may not be accurate to the difference in the date of the interview and the date of release of the research.

We express our gratitude to all our participants for their time, interest and expert opinion. We hope that this research will be useful to all readers and interested parties.



1 The Global RES Trend and the Development of the Green Energy Market in Kazakhstan



The Global RES Trend

“

Despite the commitments made by the Governments to keep the global average temperature rise in check, current investments in construction and development of green technologies may not be enough to achieve the stated goals.”

Global investments in RES
between 2010 and 2019
made up

\$2.7T

*According to Global
Trends Report*

In 2019, approximately

78%

*of the deployed generating
capacities were RES-based*

In 2019, the growth of newly
deployed RES capacities
reached an all-time high of

12%

*At the same time, the USD value
of RES investments remained at
the level of 2018 (+1%) due to a
lower construction costs*

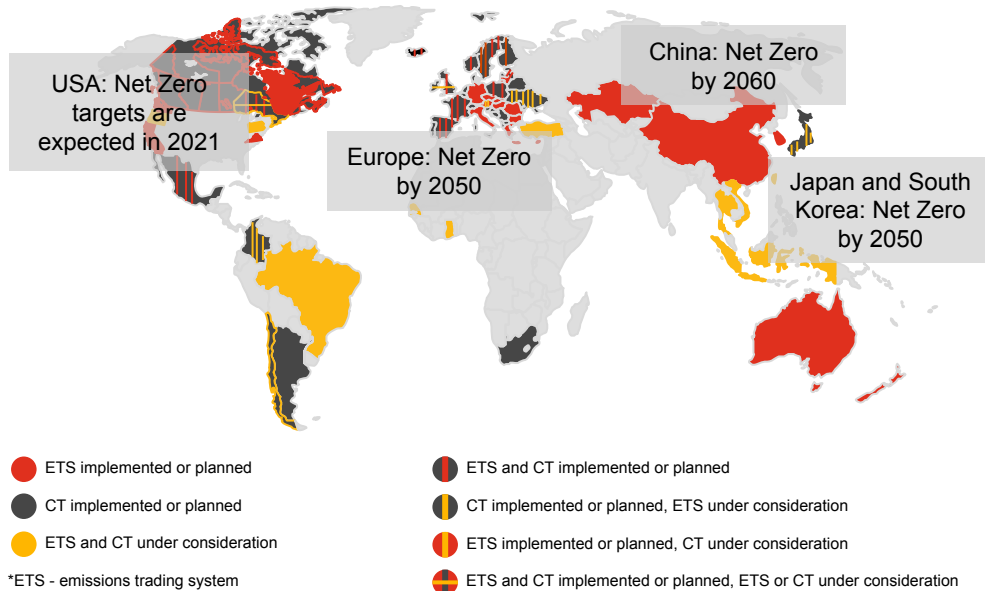
Based on IRENA forecasts, the
installed capacity of RES
facilities needs to increase

x10

*to achieve the goals of the Paris
Agreement by 2050*

Globally, the public and private sectors are trying to achieve net zero emissions (**Net Zero**)

Implemented, Planned, and Pending CO2 Charge Initiatives (as of November 2020, World Bank)



Sources: World Bank, IEA, Energy & Climate Intelligence Unit, UN

To meet the Paris Agreement (2015) targets of keeping the global average temperature rise below 1.5C, in 202, various measures have been taken within the EU and by countries outside the EU:

- emissions reductions, subsidies, carbon taxes, tariffs, mandatory disclosure of environmental impacts and other regulations. The main instrument for **achieving net zero emissions has been the establishment of CO2 payments in 45 countries** (World Bank, November 2020).
- the EU is considering introduction of a **carbon border levy** that would require exporters of goods to 27 EU countries to pay a levy on the carbon dioxide emissions associated with the production of their products.
- **Greenhouse gas emissions trading system** in Europe was introduced in 2005 and currently covers 45% of EU emissions, with a focus on the energy, industry and aviation sectors.
- **Net Zero targets:** 2 countries - Suriname and Bhutan - have already achieved net zero emissions; 6 countries have set goals to achieve Net Zero by 2050 at the legislative level; in 6 more countries, such a bill is pending (Energy & Climate Intelligence Unit).

Investments in renewable energy sources increase companies' profitability and market capitalization

AUM of companies upholding the United Nations' Principles for Responsible Investment (PRI)

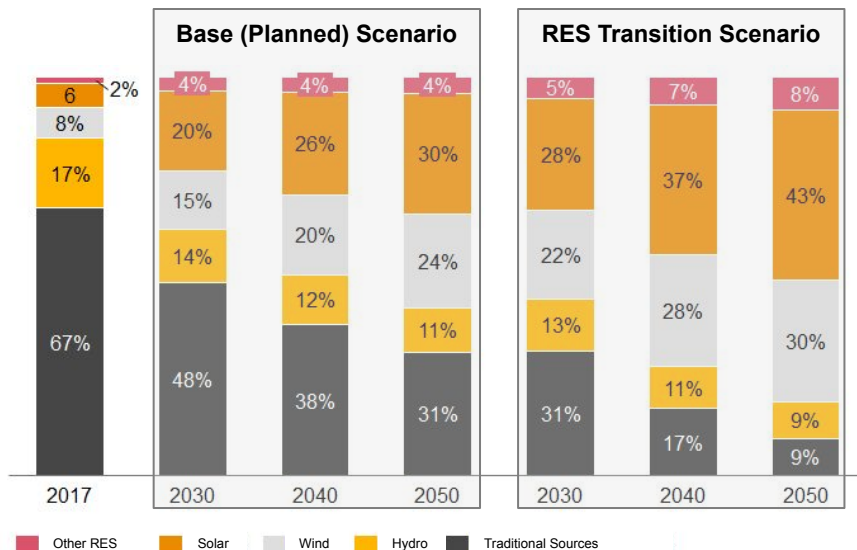


Sources: IEA, Center for Climate Finance & Investment, PRI, IRENA, S&P Global, public sources

- Investors and financial institutions are increasingly seeking to **"decarbonise" portfolios** by allocating investments in support of green energy. Banks are scrutinising new projects to comply with the green economy.
- The "Climate Action 100+" initiative includes more than 570 investors and has more than \$54T. The initiative encourages companies to make significant improvements in **climate governance and disclosure**.
- In April 2021, the Glasgow Net Zero Emissions Finance Alliance (GFANZ) was launched by industry representatives together with the UN, bringing together more than 160 companies (over \$70 trillion under management) **to accelerate the achievement of Net Zero goals by 2050**.
- Significant growth in assets under management of organisations that have **committed to responsible investing**, including the PRI and Climate Action 100+, indicates a rise in green investments, including in RES, which also has a positive effect on RES market capitalisation. According to S&P Global, shares of the top 10 companies in the utilities sector rose by an average of 49% in 2019, led by companies that have focused on RES.

Renewable energy investments are particularly relevant in the oil-gas and energy sectors, to ensure compliance with legal requirements on greenhouse gas emissions (and to avoid paying penalties) as well as sustain the company's market value (1/2)

Projection of the share of energy sources in total installed capacity according to IRENA under two scenarios: baseline planning scenario and scenario on conversion to RES



Sources: IRENA, public sources

Renewable Energy Market in Kazakhstan: Potential, Challenges, and Prospects

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- According to the IRENA study, in the next 30 years, **10 times the current renewable energy capacity would need to be introduced**. The share of renewables in the total energy mix would then be more than 90% under a transition scenario that achieves the Paris Agreement's target of keeping global warming rise below 1.5 degrees. However, Bloomberg New Energy Finance estimates that an additional \$11 trillion would be needed to the level of investment projected today. **This will require a further \$11 trillion over the next 30 years.**
- According to S&P Global, all of the eight largest international oil and gas companies are implementing different strategies to facilitate the transition to green energy. More extensive measures have been taken by European companies, which have stricter legislation. Nevertheless, according to the IEA, **investments in renewables by oil and gas companies still account for less than 1% of total capital expenditures.**
- The Orsted example (Danish multinational power company) demonstrates that developing a business towards renewables can increase shareholder value. The company has seen impressive results in strengthening its position in the stock market after moving away from fossil fuel production. **Orsted now has the largest capitalisation among renewables players - \$67 billion.**

Renewable energy investments are particularly relevant in the oil-gas and energy sectors to ensure compliance with legal requirements on greenhouse gas emissions (and to avoid paying penalties) as well as sustain the company's market value (1/2)

According to a joint study by the International Energy Agency (IEA) and the Centre for Climate Finance and Investment 2020, renewables can also deliver sustainability and returns that exceed fossil fuel investments. In addition, green stocks have proven to be less volatile, especially in the face of a pandemic and collapsing oil and gas prices

178%

the 5-year return on investment in renewable energy, versus (-20.7%) for fossil fuels, in France and Germany.

In the UK, over the same period, investments in green energy yielded 75% returns, versus 8.8% for fossil fuels.

75%

200%

the return on investment in green energy in the US, versus 97.2% for fossil fuels, analyzed over a 5-year period.

- The growth in demand for renewable energy is driven by both the need for electricity and concerns about climate change. The compound annual growth rate of the installed RES capacity in the world from 2011 to 2020 amounted to 8%, and the share of RES in the installed capacity of the entire global energy industry increased from 25% to 37% over 10 years. According to an IRENA study, in order to achieve the goals of the Paris Agreement, state support for RES, including subsidies, may increase from \$166B in 2017 to \$192B in 2030 and to \$209B in 2050.
- In some EU countries, in accordance with regulatory requirements, the largest energy companies are gradually decommissioning nuclear power plants. Germany's plans include a phased decommissioning of nuclear plants by 2022 and of coal plants by 2035. In France, where the energy sector has historically depended on nuclear power, a nuclear reform, which will determine the future of the country's main energy supplier, EDF, is expected this year.
- In the EU, many government measures are aimed at increasing competition in the energy sector. For example, in the United Kingdom, the term "Big Six", symbolizing the historical oligopolistic structure of the energy market, is gradually losing its relevance due to the emergence of a large number of new companies offering better tariffs and/or cleaner energy solutions.

Kazakhstan is introducing measures to limit greenhouse gas emissions to facilitate the transition to a green economy

Kazakhstan's Carbon Neutrality Goals

2013

In 2013, Kazakhstan adopted a plan for transitioning to a green economy. According to this plan, the share of renewable energy sources in total electricity production should be 3% by 2020, 10% by 2030, and 50% by 2050.

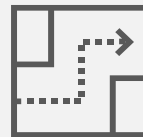
2016

In 2016, Kazakhstan signed the Paris Agreement on Climate Change, making a commitment to reduce greenhouse gas emissions by 15% by 2030 relative to the level of 1990.

2020

A low-carbon strategy until 2050 is currently being developed. It is expected to be completed in June 2021. Additionally, at the December 2020 summit on climate actions, Kazakhstan pledged to achieve carbon neutrality by 2060.

Measures for Achieving Carbon Neutrality



- Regulating greenhouse gas emissions by making those who utilize natural resources **restore** the environment
- Making significant investments to implement the **best available technologies** (BAT)
- Requiring presence of an **integrated environmental permit** from the beginning of 2025.



- Introducing cleaner technologies with a **more rational** use of resources and **minimal** economically justifiable emissions
- Carrying out a **comprehensive technological audit** of 50 enterprises that are major pollutants
- Fully implementing BAT **by 2025**

Although the law on RES support was introduced in 2009, significant changes in the development of RES in Kazakhstan occurred more recently, following law amendments between 2013 and 2017 (1/2)

2013-2014

The Financial Settlement Center (FSC) is created in order to support the development of RES as a centralized buyer of RES electricity supplied to the system operator's network.

FSC signs offtake contracts with investors and takes the obligation to buy back the entire volume of produced electricity for a guaranteed fixed tariff during a 15-year period.

The system operator is obliged to connect RES facilities to the grid (as well as to perform grid maintenance) and to prioritize RES in dispatching electricity.

2016

Renewable energy projects are included in the list of investment projects. An approved contract will provide the following privileges:

- Exemption from customs duties
- Import VAT exemption
- State in-kind grants

2017

Auctions begin, making the project selection process much more competitive and transparent.

Indexation for the dollar exchange rate (70% of the tariff) and inflation (30% of the tariff) is introduced.

2020

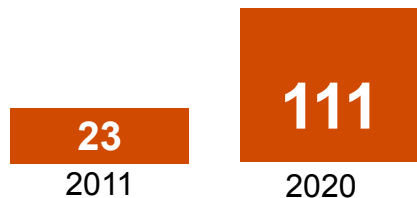
Renewable energy projects are included in the list of priority investment projects. In addition to the earlier ones, the following investment privileges were offered:

- Property tax exemption
- Land tax exemption
- CIT exemption

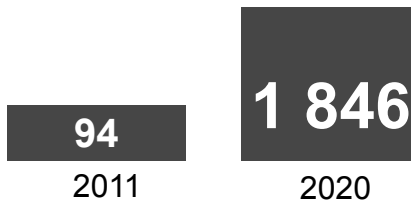
The term of contracts for a guaranteed purchase of electricity by the RES Operator is extended to 20 years.

Although the law on RES support was introduced in 2009, significant changes in the development of RES in Kazakhstan occurred more recently, following law amendments between 2013 and 2017 (2/2)

Number of RE facilities

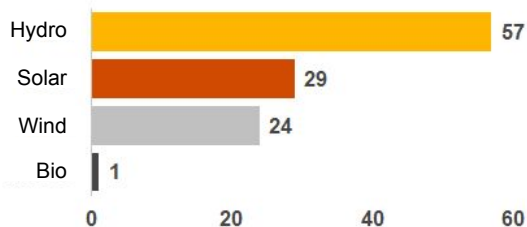


Total capacity of RE facilities, MW

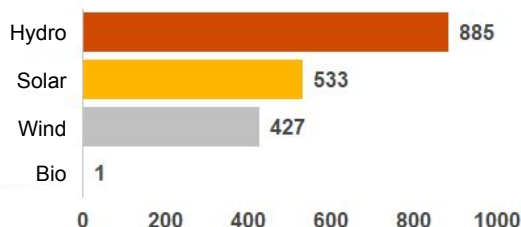


State support measures have proven effective. Since the establishment of the FSC, about 90 new renewable energy projects have been initiated, leading to a CAGR of 24%. Additionally, according to data on auctions conducted, 70 new renewable energy facilities are expected to be launched in the coming years.

Total number of operating RE plants, 2020



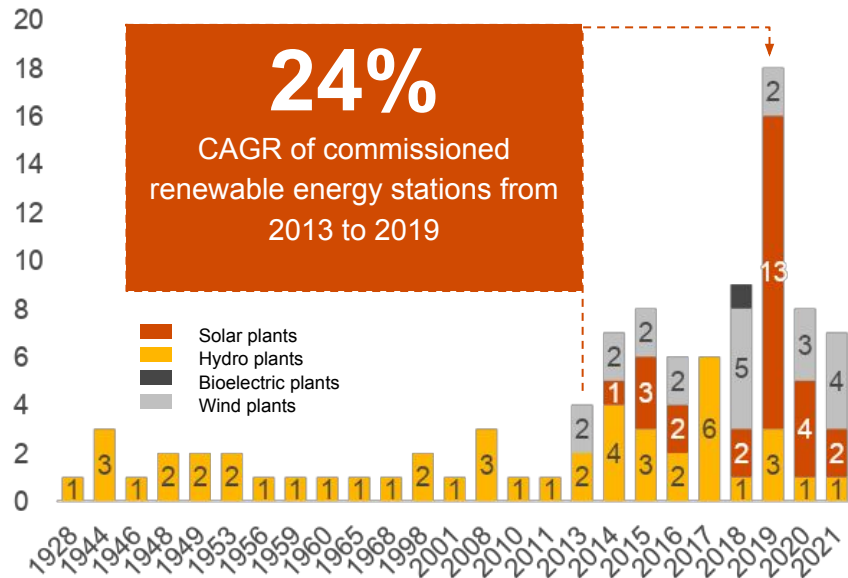
Total capacity of operating RE systems, 2020, MW



Source: PwC analysis, Media analysis, Open sources

Since the introduction of the law on RES support, facility construction expenses have totalled at least 628.5B tenge

The number of RE stations introduced annually

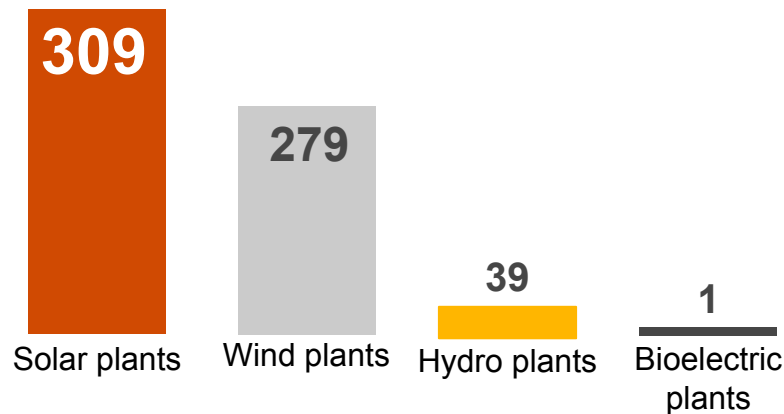


*the analysis includes only publicly available data

Source: PwC analysis, media analysis, open sources

We estimate that at least 628.5B tenge has been spent on constructing renewable energy facilities since 2011.

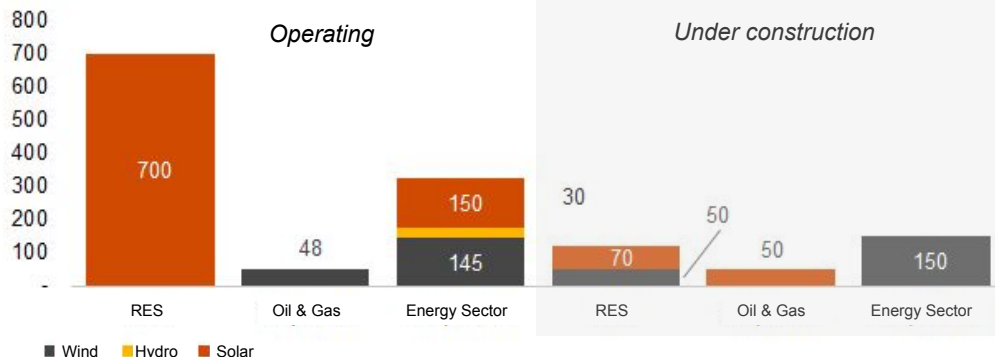
Construction costs by type of power plant in billion tenge, 2011-2020*



RES investors in Kazakhstan are generally from the energy sector

According to open source data analysis, investors in RES in Kazakhstan are mainly from the energy sector (including the renewable energy sector), and the oil and gas sector. Investors in the RES sector mainly include subsidiaries of energy companies specialising in RES, as well as manufacturers of RES equipment

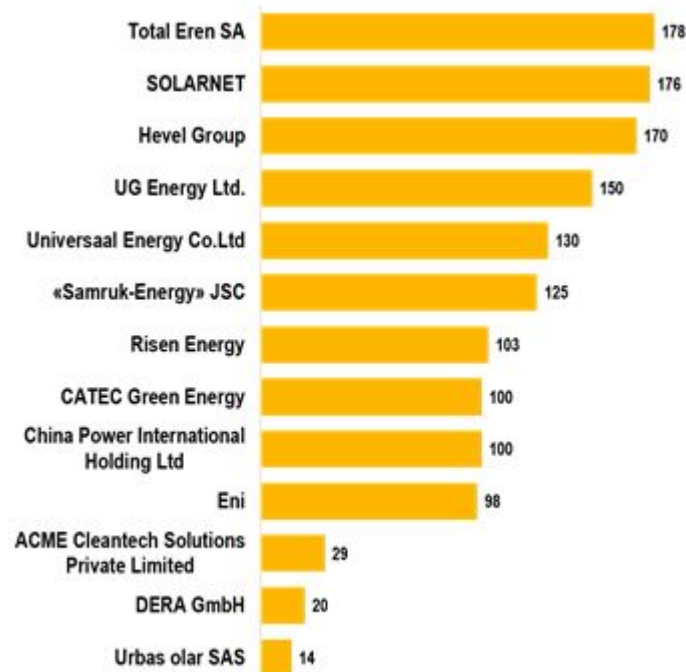
Operating and developing large and medium-sized solar and wind plants in Kazakhstan by industry and energy types, in MW*



*the analysis includes only publicly available data and only majority shareholders

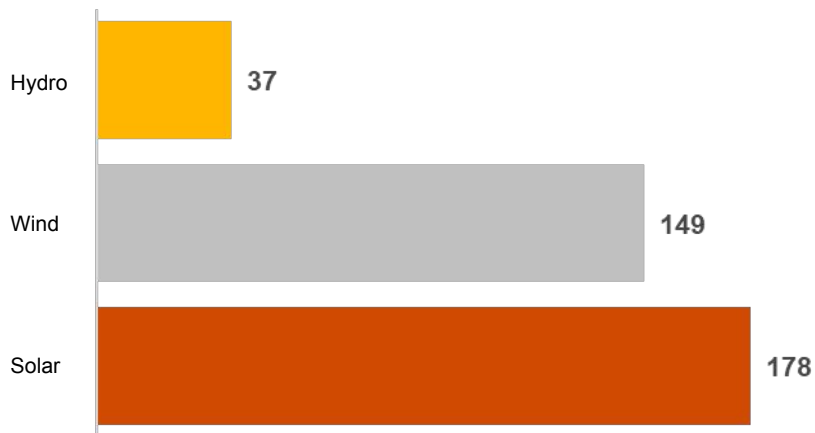
Source: PwC, media reports, public sources

Investors in large and medium-sized operating RES (solar and wind farms) in Kazakhstan, MW*



Financing of RES projects in Kazakhstan is most often provided by Development Banks

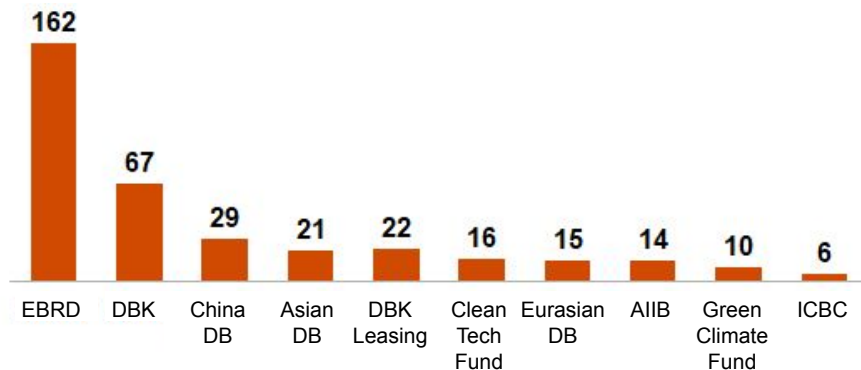
Debt financing by type of renewable energy sources in billion tenge, 2011-2020*



* the analysis includes only publicly available data

Source: PwC, media reports, public sources

Debt financing volumes by Development banks in billion tenge, 2011-2020*

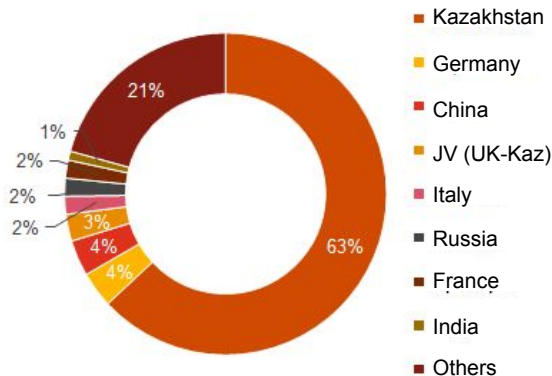


Sources: PwC, media reports, public sources

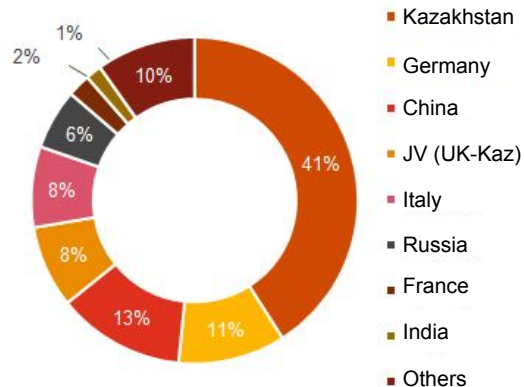
Analysis of individual projects shows that the most common capital structure is 70% debt, 30% equity.

The number of RES projects with local investors was 63%. The capacity of these projects was only 41%

Number of RES facilities by origin of investors, 2011-2020



Share of investors in the total installed renewable energy capacity, 2011-2020



63% of all RES facilities were started by local investors, including small capacity projects (up to 10 MW). However, when considering projects within the total installed capacity, the share of local investment in RES falls by more than 20%. The share of capital participation from China, Germany, Italy, and joint projects between Kazakhstan and Britain increases from 13% (of the number of financed plants) to 40% (of the total installed capacity of RES projects). Thus, foreign investors are more interested in implementing large projects in Kazakhstan.

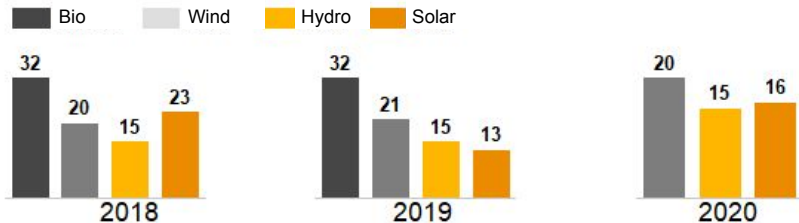
Sources: PwC, public sources

The tariff continues to fall year by year reflecting the trend towards cheaper RES construction costs

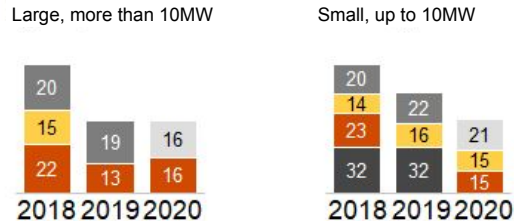
Number of companies winning the auction



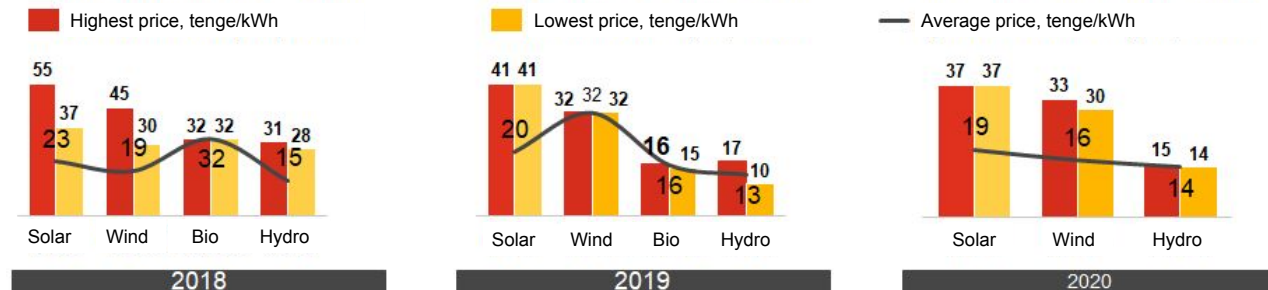
Average auction price for renewable energy facilities, tenge/kWh



Average auction price by type of RES facilities, tenge/kWh



Analysis of the maximum, minimum, and average auction prices for RES facilities in different years, tenge/kWh

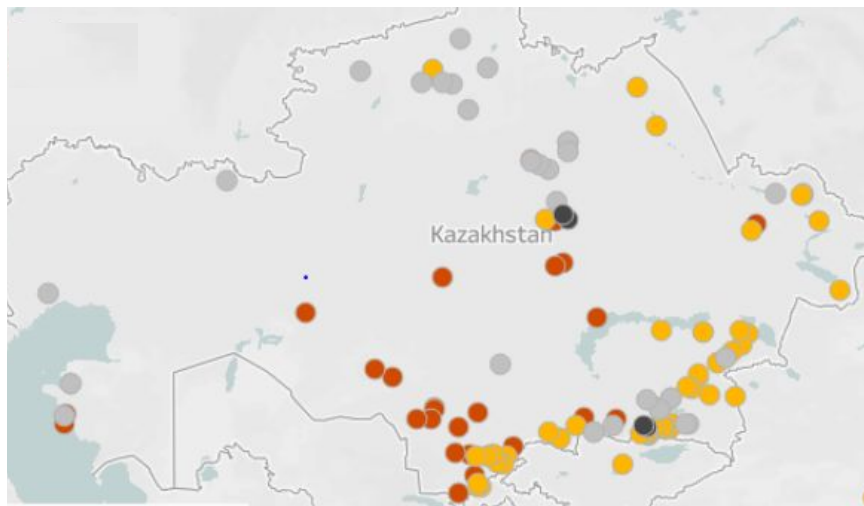


The auction price is the price for the purchase by the Settlement and Financial Centre of electricity produced by the renewable energy facility, determined by auction bidding and not exceeding the level of the relevant ceiling auction price.

Source: PwC, website of the FSC for RES Support

Concentration of solar generation in the south of the country is due to favourable climate conditions and high electricity demand (1/2)

Distribution of RES facilities by regions, 2020



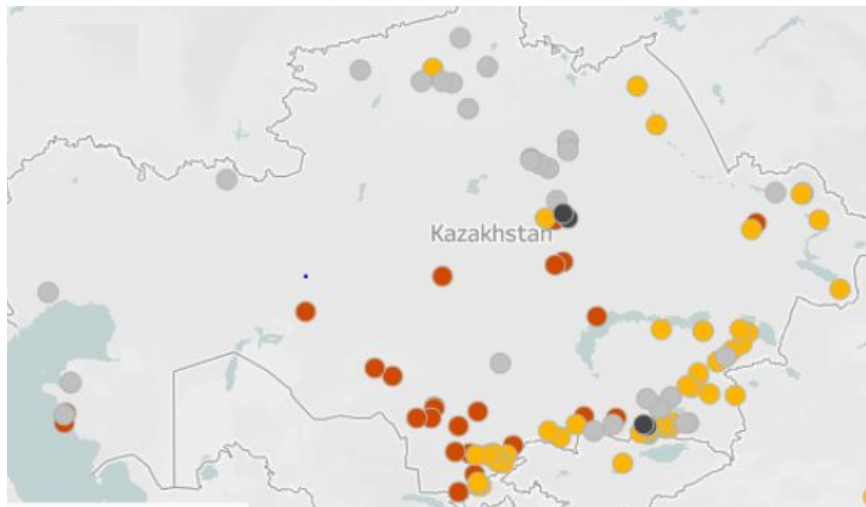
Source: PwC analysis, public sources

The distribution/location of RES facilities in Kazakhstan shows a direct dependence on the natural potential of the region. But it is worth noting that high wind potential is characteristic of almost all regions:

- The country's hydro-potential is greatest in areas with major rivers - East Kazakhstan, Almaty region, Zhambyl and South Kazakhstan regions
- The southern region also has a high solar potential, with more sunny days per year compared to statistics for the rest of the country.
- The West of Kazakhstan is characterised by high wind potential, but the locked-in energy system of the West does not allow the development of RES in this region. Accordingly, the concept of RES development by a single operator, in which all the energy from RES is distributed to the grid throughout the country, does not work in this case.

Concentration of solar generation in the south of the country is due to favourable climate conditions and high electricity demand (2/2)

Distribution of RES facilities by regions, 2020



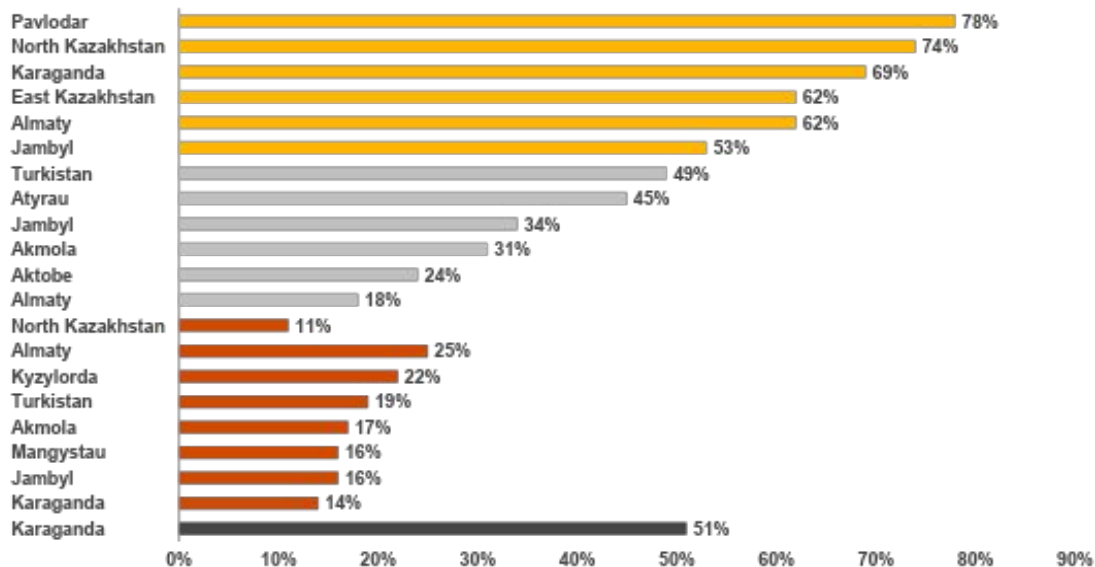
Source: PwC analysis, public sources

Trends in RES development in Kazakhstan indicate that the construction of solar plants prevails over other energy sources. The reasons for this trend include:

- Relative ease of construction and the resulting shorter lead time from contract to commissioning
- Logistics costs are significantly lower compared to wind turbine shipping costs, as the panels are predominantly shipped from China and the equipment is much smaller in size
- High electricity demand in the densely populated south and favourable climate conditions in the same region (more sunny days in the south)
- Lower maintenance and repair costs for solar plants compared to wind farms

The installed capacity utilisation factor by region shows the climate potential of the region. The highest NCF is in the Atyrau region for wind power and in the Almaty region for solar power

Average NCF by region, 2020

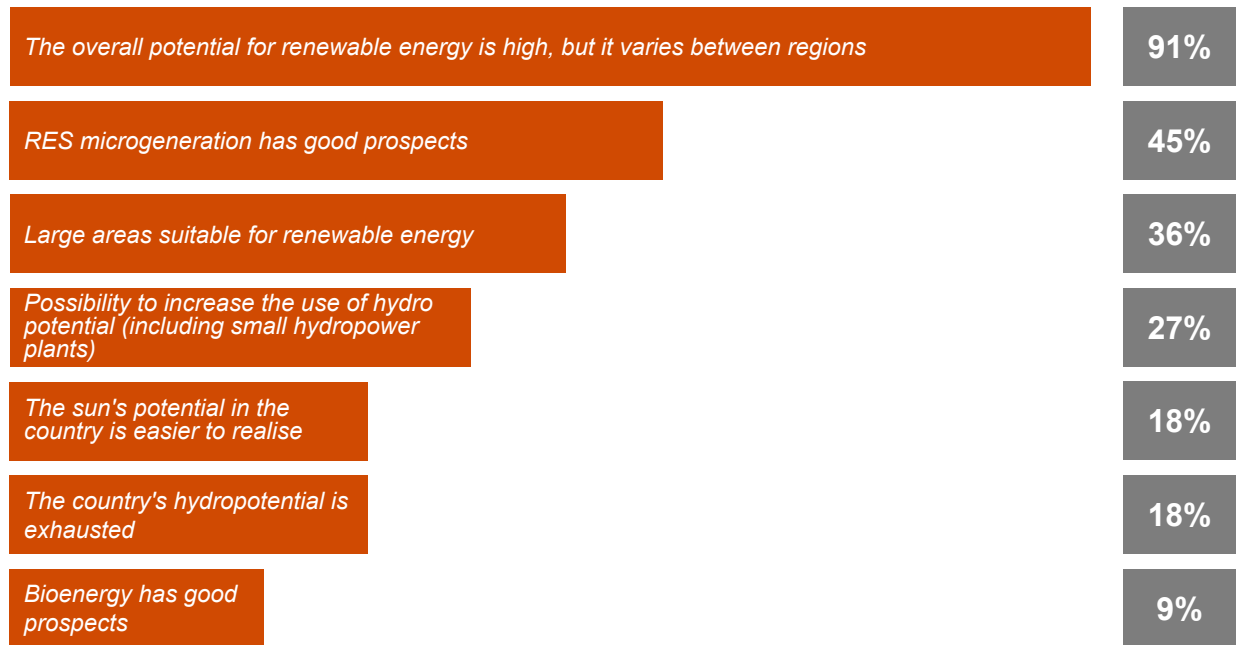


Source: PwC, public sources

The regional NCF was calculated as the ratio of the actual output of each power plant to its maximum output.

Hydropower plants and biogas power plants historically have the highest ratio (national averages NCF of 59% and 51%, respectively), while solar power has the lowest ratio (national averages NCF of 16%). The national average NCF for wind farms was 24%.

91% of respondents believe that the preconditions for RES development in Kazakhstan are good, but the natural potential may differ from region to region



“

We have many areas with excellent wind potential (average speed of 8-9 m/s) and solar potential (for example, in areas south of Balkhash). As we know, wind farms and solar farms require large amounts of land, which Kazakhstan has in large numbers. Since the country is prone to desertification, these areas could be used for renewable energy purposes.”

Ainur Sospanova,
Ex-Director of the RES Department
at the Ministry of Energy
Interview date: March 11, 2021

Although 27% of respondents believe that there is opportunity for further increase in the use of hydropower, 18% believe that Kazakhstan's hydropotential has been exhausted

“

I think that every type of renewable energy is quite well represented in Kazakhstan, but there are a number of obstacles when it comes to construction of wind farms, biogas plants, and hydroelectric power plants such as high logistical costs, a low tariff, and a longer project implementation period. Typically, it takes 1-2 years to build a wind farm and up to 2 years to build a hydroelectric plant, while a solar farm can be built in just 6 months.”

Edil Saryyev,
Director of “CATEC Green Energy” LLP

“

Given the vast distances and the length of our networks, it is worth bearing in mind that the advantage of RES and the potential for Kazakhstan in this area is that generation occurs where it is consumed. In our country, the south is mostly densely populated, so the location of the workforce implies the location of industrial plants, which is why renewable energy is now developing there.”

Ainur Sospanova,
Ex-Director of the RES Department at the Ministry of Energy
Interview date: March 11, 2021

2 Industry Challenges



Renewable energy challenges

This section analyses the answers of respondents on key challenges facing the renewable energy industry identified in our analysis. Respondents commented that despite the rapid development of the RES market in Kazakhstan, including with strong legislative support, there are still many challenges facing RES that limit the growth of the industry. The following questions were covered during the interviews:

- Legislation and RES
- Investment risks
- Reserve power issues
- Uncompetitive tariffs
- Lack of support for microgeneration projects
- Issues with the integration of RES into the country's energy system

According to the respondents, this is a comprehensive list of crucial industry challenges.



... The cost of RES tariffs is decreasing rapidly with each auction, the tariffs of existing thermal generation are increasing, the existing thermal capacity is largely used up and electricity consumption is increasing and requires new capacity. This creates good preconditions for RES, provided that the problem of flexible generation shortage is solved. Of course, the development of the energy system will require investment, which may affect end-user tariffs, but sooner or later the question of developing new generation, new power plants will arise. ...Therefore, it is important to strike a balance and keep moving smoothly, laying the foundation for future development and decarbonisation of the sector, while ensuring the stability of the system."

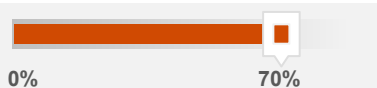
Petr Konstantinov,
Principal Banker, EBRD

Legislation and RES (1/4)

While respondents acknowledged the contribution of legislation to RES development and the timeliness of the measures applied to attract investment in the sector, most felt that there is a need to further improve the legislative framework for RES.

Industry representatives - producers of RES - noted aspects such as the need for legislative improvements and the lack of incentives for the balancing market for electricity and micro-generation. While current legislation is attractive to investors, including private investors and international financial institutions, the further development of RES and the possibility of making a significant contribution to the energy system of Kazakhstan requires improvement of legislation appropriate to the stage of industry development.

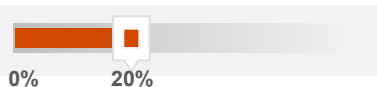
The legislation related to laws and bylaws on regulation of BEM requires improvements



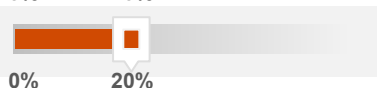
Legislation requires improvements to stimulate microgeneration and heat production



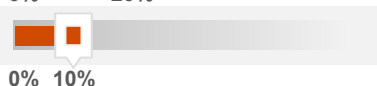
Legislation is well developed and allows the sector to operate



It is necessary to develop a strategy for the development of the energy sector



Legislation is not developed to allow investors to invest in the industry



“

“In terms of regulation, the system, which has been in operation since 2013-2014, has proven to be a working mechanism, as it has allowed more than 1.5 gigawatts of renewable energy to be commissioned during that time. It is certainly not perfect and could continue to be improved indefinitely, but the facts, in this case, speak for themselves. Therefore, on the whole, I see very good prospects for RES development.”

Petr Konstantinov,
Principal Banker, EBRD

“Despite a lack of active involvement in the development of renewable energy projects to date, the IFC remains interested and supportive of financing renewable energy generation in Kazakhstan. Kazakhstan's commitment to renewable energy is evidenced by the continuous improvement in legislation to support further deployment of renewable energy in the country, including legislation passed in December 2020.”

Ekaterina Benjamin,
Head of the IFC Representative Office in Kazakhstan

Legislation and RES (2/4)

“

The most important problem is the lack of balancing capacity. Whereas 5 years ago we actively supported green energy, now we understand that Kazakhstan's energy system is not sufficiently developed for this, hence a hasty implementation could lead to an unstable system. This issue has been discussed for more than 10 years, but during this time no measures have been taken to address the problem.”

Nurlan Kapenov,

Founder and Chairman of the Board of Directors of Solar Power Association of Kazakhstan

“

The existing mechanism of legal regulation of heat production by RES facilities, as well as electricity production by micro-generation facilities, is unworkable and does not allow for the development of this generation segment.”

Edil Saryyev,

Director of “CATEC Green Energy” LLP

Revising the regulatory framework relating to the balancing electricity market (BEM) and microgeneration is crucial for developing RES in Kazakhstan.

Legislation and RES (3/4)

“

At the moment, there is neither a short-term nor long-term strategy for developing the energy sector in Kazakhstan. The development has been in stagnation, most of the stations have depreciated, and just above 50% of equipment has worn out which may lead to frequent accidents. Therefore, the President gave a specific mandate to prepare a National Plan for Developing the Energy Sector until 2025.”

Nurlan Kapenov,

Founder and Chairman of the Board of Directors of Solar Power Association of Kazakhstan

“

Currently, the Ministry of Energy has many initiatives, but there is no fundamental document - a Development Plan of the Energy Sector - that would highlight the importance of green energy. [...] Such a plan would provide a clearer picture of the market for one to rely on and make one's predictions.”

Anonymous

Respondents noted the importance of developing and having an energy sector strategy (Development Plan), within which a legislative framework could be formed that would provide a clear understanding of the development of the entire energy sector and the role of RES in Kazakhstan.

Legislation and RES (4/4)

Respondents also suggested measures to further improve the mechanism for selecting RES projects. For example, the introduction of auctions for high-capacity RES projects would allow for economies of scale. Also, introducing the concept of technology-neutral auctions, where RES producers, individual energy storage plants and conventional energy producers could participate, would contribute to the development of the sector.

“

[...] One option for improving the selection mechanism for RES projects is conducting “technologically neutral auctions” with all available technological solutions, both green and traditional. One of the main criteria for such auctions is price. However, currently, it is impossible implement such mechanism with the current tariff system, since the system being largely administrative.”

Anonymous

“

“The main constraint is the lack of supply of RES in large volumes, including individual large projects of 500 megawatts, which would allow for economies of scale. I believe that if the government were to offer auctions for large volumes, there would also be demand.”

Petr Konstantinov,
Principal Banker, EBRD

Investment risks (1/4)

The respondents identified several risks that limit the growth of investments in the RES market, the most important being the risk of tenge devaluation.



Despite state support measures provided to the RES sector, including the provision of guaranteed tariffs and buyout of the entire volume of energy produced by the RES Operator (RFC), respondents noted that there are investment risks inherent in the RES market in Kazakhstan.

Like any infrastructure projects, RES projects require large capital outlays at the start of the project. Most RES projects are financed by loans from international institutions in USD. Consequently there is a currency risk to the investor that can significantly increase the cost of the project in tenge.

Respondents also noted shortcomings in off-take contracts, in particular the lack of specific wording in the event of a default by either party (the operator or the RES producer). These risks significantly limit the development of the industry.

Investment risks (2/4)

The respondents said that significant investment risks were **(1)** tenge devaluation, **(2)** financing the construction of a project in foreign currency with limited ability to defer payments based on electricity production, **(3)** long payback periods, **(4)** delays in tariff indexation (indexation starts **one year** after the start of operations)



We have to understand that investors first need to invest in the construction of a project, and that will take about 2-3 years. Often financing is done in a foreign currency, therefore, investors should consider those risks and how to mitigate them.”

Ainur Sospanova,

Ex-Director of the RES Department at the Ministry of Energy

Interview date: March 11, 2021



[...] Over the construction period, investors bear currency risks. If equipment is purchased in a foreign currency and investors do not pay for it right after the auction, there might be unfavorable changes in the exchange rates significantly altering the amount to be paid.

[...] This risk is intrinsic to the system and deters many investors. In theory, this risk can be hedged, but it can be quite expensive. Basically, one has to keep the amount that can cover the entire cost of the project during the whole period converted into currency and use it as needed. This means that one needs to pay interest from day one, and that significantly increases the cost of debt. I would note that this is a weakness of the current system in Kazakhstan since it significantly reduces the number of potential investors.”

Petr Konstantinov,
Principal Banker, EBRD

Investment risks (3/4)

The respondents also noted the role of the state in reducing investment risks. In order to make RES projects more attractive for private investors and financial institutions in Kazakhstan, the Government should ensure solvency of RES producers and amend offtake agreements to match international standards.

“

[...] In order to implement a project and obtain financing, it is important to guarantee loan repayment by offering collateral to the lender. This condition restricts many investors in the RES sector since they do not have enough resources for that.”

Edil Saryyev,
Director of “CATEC Green Energy”
LLP

Investment risks (4/4)

“

Currently, nobody knows how the market will work after power purchase agreements (PPA) expire. The first project is expected to expire only at the end of the 2020s or the beginning of the 2030s. Now, it is quite difficult to say how long the commitment to buy out electricity produced from RES will last. However, I believe that after PPAs expire, the RES tariff (incorporating the cost of transportation) will be at the level of the active tariff for the end user.”

Edil Saryyev,

Director of “CATEC Green Energy” LLP

“

“[...] First, the Ministry of Energy announces an auction, but then the system operator does not provide the connection to the general power grid system, explaining this by a shortage of balancing capacities in the power system. At the same time, the participation in the auction implies that one should already get a permission from the System Operator to connect to the network.”

“[...] It is mandatory to fulfil the requirements for balancing solar and wind power [...] with the help of individual electric energy storage installations. At the same time, marginal tariffs for RES remain unchanged, but installing these storage devices entails significant capital expenditures and operating expenses. At the end of the day, legislation is needed to specify the rules of the game, or initially make the presence of such restrictions clear. There should be common rules of the game applicable to everyone, individual approaches should not be allowed - this leads to opacity and stagnation of the market.”

Valeriy Tyugay,

Director of “Energy Systems Research” LLP

Although the state provides support measures for the RES market, there are still some challenges such as the uncertainty around the tariff after the expiration of PPAs. Additionally, RES producers noted difficulties in access to the network and priority dispatching of the generated electricity. Lack of balancing power affects the RES market. Moreover, the expenses associated with the requirements for balancing by RES facilities can make RES projects even more expensive.

Limited balancing capacities (1/5)

Limited availability of balancing capacities is another challenge for RES and the energy sector as a whole. All respondents emphasized the importance of having a BEM for the development of the energy industry and particularly RES.

40%

It is necessary to build new
flexible facilities:
gas and hydro power plants

40%

The lack of
balancing
capacities can be
solved through
storing RES energy

10%

It is necessary to
solve the problem by
stimulating conscious
consumption

30%

It is necessary to
determine the existing
potential of balancing
capacities, a BEM will
show what the capacity
reserve of existing
power plants is

20%

We need to focus on hydropower
as the balancing power

“

Looking at energy consumption and production in Kazakhstan, one sees a capacity surplus of about 3,600 MW. However, this estimate does not incorporate planned and emergency repairs of production facilities, exported electricity obligations, and downtimes due to lack of fuel. Considering these factors, we will have around 350 MW of capacity to balance the system which is not enough for Kazakhstan. Furthermore, 55% of the existing generating equipment has been utilized for more than 30 years [...]

Nurlan Kapenov,
Founder and Chairman of the Board of Directors of Solar
Power Association of Kazakhstan

Limited balancing capacities (2/5)

“

In Kazakhstan, it is essential to develop flexible capacities because coal-based energy generation is not flexible. Flexible sources include stations operating on gas, hydro power, or accumulators. The lack of such capacities is one of the technical constraints impeding the growth of renewable energy sources. When we started to develop this sector 10 years ago, the share was negligible - less than 1%, and it did not greatly affect the network and tariffs for consumers. Today, when renewables account for 3% of the total electricity generation, the impact on the energy system and tariffs for consumers is becoming tangible. As you know, the electricity generation on renewable energy facilities is unstable. Therefore, the main industry challenge at the moment is to create sufficient reserve capacities to stabilize the system.

Currently, it is difficult to talk about positive effects of renewable energy on the environment, since, in my opinion, the share should be more significant in order for us to see that clean renewable energy has really substituted dirty coal-based generation. However, the President has stated that Kazakhstan will be carbon-neutral by 2060. Accordingly, clean energy technologies in Kazakhstan will have to continue to develop, and this includes renewable energy, possibly nuclear generation, and other low-carbon sources - this question remains open. It is clear that gas generation will have to exist as a reserve in 2060, but coal generation will have to either cease to exist or become “clean” with the Carbon Capture technology. “In the long term this must be addressed although right now it is seen as unfeasible. However we have already gone through this when 10 years ago the goal of reaching a 3% share of renewable energy looked unrealistic.”

Ainur Sospanova,
Ex-Director of the RES Department at the Ministry of Energy
Interview date: March 11, 2021

Limited balancing capacities (3/5)

The main advantage of gas and hydroelectric power plants is their quick launch which makes them the main source of flexible power. However, in Kazakhstan, major sources of gas are located in the West, whereas regions with energy deficit are in the South. Additionally, due to the general gas shortage, constructing gas power plants will require a guaranteed tariff to attract investors according to experts.

“

[...] it is getting more difficult to integrate renewable energy sources into the country's energy system every year, because the volume of renewable energy production is growing, but the production itself remains unstable. This problem can be solved either by creating additional flexible capacities, or by introducing renewable energy accumulating devices. Both of these solutions require significant investments, increasing the projects' payback period.”

Anonymous

“

[...] you need to understand that there is a shortage of gas in Kazakhstan, demand exceeds supply. If we talk about the construction of a gas power plant, then it is crucial to offer favorable conditions for investors, such as a guaranteed gas supply, a fixed tariff, and other privileges.”

Nurlan Kapenov,
Founder and Chairman of the Board of Directors of
the Kazakhstan Solar Energy Association

Limited balancing capacities (4/5)

Storing RES-based energy necessitates purchasing and installing battery stations for storing and balancing energy. Currently, due to high costs, purchasing such equipment significantly increases construction costs and negatively affects project profitability. Renewable energy producers are ready to install this equipment if electricity tariffs rise significantly. According to the respondents, solving the issue of balancing capacities with the help of energy storage will be the best option in the future, provided that the costs of such stations go down.

“

The system operator (KEGOC - PwC's remark) needs to complete its research on balancing capacities and publish the results. This will provide an opportunity to start developing a legislative framework, in particular, a law regarding special auctions for hybrid projects. The concept of hybrid projects includes both renewable energy generation and energy storage. Such a solution allows balancing the power system, but projects like this entail slightly different tariff levels.”

Anonymous

“

[...] I believe that the most promising trend is accumulating energy. When affordable means of energy storage are invented - inexpensive, durable, with less losses, then a revolution in the RES sector will take place. Basically, energy will be accumulated when natural conditions allow it, and used during those hours when consumers need it. Today, accumulation technologies, although they are gradually becoming cheaper, are still quite expensive. ”

Nurlan Kapenov,

Founder and Chairman of the Board of Directors of the Kazakhstan Solar Energy Association

Limited balancing capacities (5/5)

The respondents believe that introducing a balancing electricity market (BEM) will help determine the potential of the existing reserve capacities and will allow a more efficient storage.

There is a strong need to launch a balancing market in real time. Currently, there are no market signals for power plants and consumers in the electricity market that would encourage them to participate in regulating the power system. However, BEM mechanisms will enable full regulation of the existing power plants and electricity consumers, which will reduce the need for constructing new flexible power plants in future. In other words, this will, firstly, to some extent reduce the cost of creating additional flexible capacities, and secondly, optimize the daily load schedule.”

Talgat Abilgazy and Anuar Koshkarbayev,
Independent experts

The respondents noted the high potential of flexible capacities in hydroelectric power plants.

[...] developing hydropower seems more attractive because such generation causes almost no harm to the environment in the form of emissions. However, I don't see any major projects right now. I believe that it is essential for the Ministry of Energy and the Ministry of Ecology to work together to understand the potential in terms of location, availability of lines, as well as the environmental component (potential harm to the river fauna).”

Edil Saryyev,
Director of “CATEC Green Energy” LLP

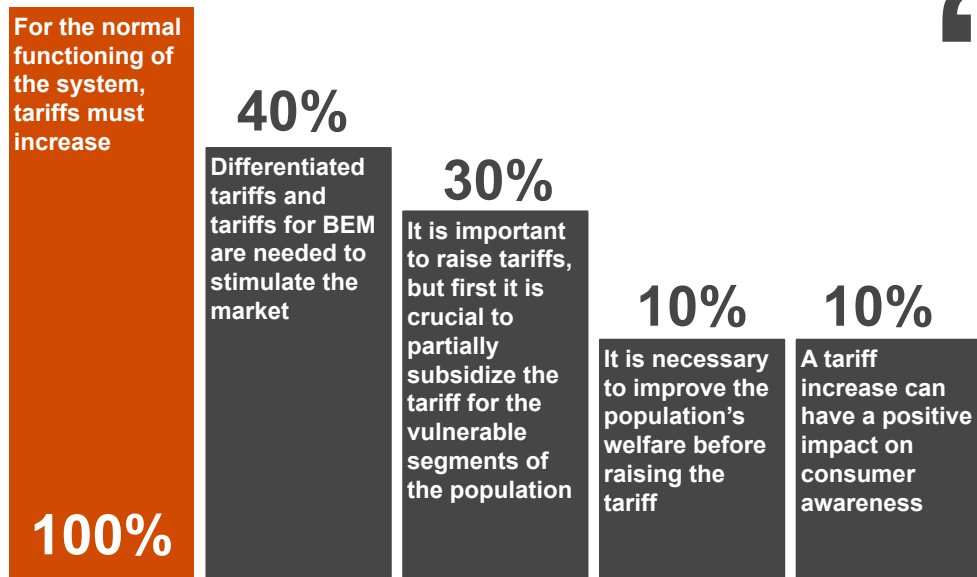
Some respondents suggested solving the problem by encouraging conscious consumption.

This approach (price-dependent consumption - PwC's remark) is definitely cheaper than building flexible stations. And most importantly, this approach will involve the consumer in the process and increase their energy awareness, allowing them to participate in the market of system services (services of balancing - PwC's remark).”

Valeriy Tyugay,
Director of “Energy Systems Research” LLP

Uncompetitive tariffs (1/3)

In comparison with tariffs for traditional electricity, the current high RES tariffs make RES uncompetitive without government support. However, according to the respondents, the real tariff for traditional energy, ensuring the long-term functioning of the energy system, should be higher. With appropriate market tariffs, transitioning RES to a competitive environment is feasible. All survey participants agreed that increasing electricity tariffs is essential, but some of them proposed different implementation options, including subsidizing tariffs for a part of the population.



“

One of the impediments to industry growth is the low tariff. In our case, renewable energy is still expensive if we compare it with tariffs for the basic, coal or gas, electricity, and these low tariffs, in turn, are associated with the fact that we have old power plants. If we calculate the cost of new gas or coal generation, it will be quite comparable with auction tariffs for RES. Therefore, it is not correct to compare tariffs for new renewable energy projects with tariffs for the existing basic generation which depreciated long ago.”

Ainur Sospanova,
 Ex-Director of the RES Department at the Ministry of Energy
 Interview date: March 11, 2021

Uncompetitive tariffs (2/3)

“

I believe that tariffs should be economically justified because they have to take into account investments aimed at maintaining and modernizing equipment. Therefore, when the tariff increases, firstly, the stakeholders' interests must be in balance, and secondly, it is necessary to control the fulfillment of investment obligations. Increases in tariffs did not always lead to high-quality equipment renovation, an increase in available capacity, or a decrease in the gap between downtime and production.

If a decision is made to increase electricity tariffs, I highly recommend ensuring supervision and control to adequately allocate capital expenditures for equipment support. This approach will allow updating fixed assets and building new generating capacities which will be essential in the near future.”

Valeriy Tyugay

Director of “Energy Systems Research” LLP

Of course, developing the energy system will require investments which may affect the tariffs for end users, but sooner or later, the question of developing new generation, new power plants will arise. Therefore, sooner or later, the tariff will have to be raised. However, it is important to strike a balance and continue to move smoothly, laying the foundation for future development and decarbonization of the sector, while ensuring stability of the system. ”

Petr Konstantinov,

Principal Banker, EBRD

“

The economy of Kazakhstan developed on cheap electricity. For example, some mining companies appeared because of cheap electricity in Kazakhstan. However, the current tariffs are too low and do not cover the costs of upgrading the stations. It should be clear that investments in modernization are necessary. Otherwise, the risks for the energy system are too high. Therefore, the approach to raising tariffs must be deliberate. We need to remember the lessons of the 90s, when the power system was failing and there was a rolling blackout throughout the country.”

Ainur Sospanova,

Ex-Director of the RES Department at
the Ministry of Energy

Interview date: March 11, 2021

Uncompetitive tariffs (3/3)



Tariffs are expected to increase in the future to cover the system's needs for:

- ***construction of flexible power plants;***
- ***construction of new facilities to replace the old ones;***
- ***introduction of new RES facilities with changes in the RES cost allocation scheme.***

In the latter case, the costs of RES capacity, since they are already becoming significant, will shift to the end consumer in the form of a surcharge to the marginal electricity tariff of traditional energy producers. Moreover, within the framework of the BEM mechanism, an introduction of an RES liability for imbalances is under consideration. Currently, as you know, all the energy produced by renewable energy facilities is redeemed in the volume in which it is produced, and the responsibility for imbalances is shifted to other market entities.”

Talgat Abilgazy and Anuar Koshkarbayev,
Independent experts

No stimulation of microgeneration (1/2)

Most of the respondents support the development of microgeneration. However, the enabling environment for implementing this should be considered along with the implementation of energy-efficient solutions.

Microgeneration is a very promising area that needs to be developed

78%

Microgeneration is a good alternative to flexible capacities

22%

Microgeneration must be considered in conjunction with energy efficiency of the buildings where the equipment is installed

22%

Microgeneration should be developed along with large renewable energy plants, and not replace them

11%

“

At this stage, the whole world is changing the paradigm of centralized energy wherein electricity is generated at large power plants with a capacity of several thousand megawatts, transmitted over ultra-long distances to consumers with losses in distribution networks.

In particular, this situation is typical for Kazakhstan. For example, the only region with energy surplus is Pavlodar, where electricity is produced by large coal-fired power plants with a capacity of 1,000 megawatts and more. Then, the electricity is transferred to the energy-deficient southern region. If we trace the supply chain from generation to consumers in this example, and imagine that it is 1,000-1,500 km of lines of different voltage classes, then the question of system reliability arises.

As a result, the concept of a decentralized system becomes attractive, as private houses and households can produce energy for their own needs and immediately consume it, without losses in the networks, while the surplus can be transferred to the network and offered in the electricity market. Despite the fact that the unit cost, due to the small size of the project increases, the load on the networks decreases, losses during transportation become smaller, making the system more reliable. Therefore, I believe that low-capacity distributed generation should develop.”

Anonymous

No stimulation of microgeneration (2/2)

“

The Ministry of Energy has developed an approach for stimulating microgeneration with a 50% compensation for implementing low-capacity projects, but with the caveat that the equipment must be produced in Kazakhstan. KazPV was indeed created on the basis of NAC Kazatomprom JSC, but, unfortunately, it did not work - the costs were quite high. I think it is essential to remove the condition that the equipment must be local, or to create favorable conditions for local equipment producers, or to localize the production of power installations.”

Edil Saryyev,
Director of “CATEC Green Energy” LLP

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I believe that the issue of microgeneration and its potential should not be considered separately from other important aspects such as improving the energy efficiency of buildings. Initially, at the stage of construction of such individual residential buildings, technologies for generating electric and thermal energy should be added. Also, issues of energy conservation, processing sewage treatment facilities, etc. should be resolved. If you implement projects with this combination, the system will be viable and useful.

[...] Undoubtedly, one needs to revise the legislation on this issue, because at the moment, there is no certainty regarding the connection of such facilities to the network as well as the requirements and standards for such equipment and houses. However, the idea should primarily be commercial, investors should believe in it. Only then will it give the necessary impetus to the development of small renewable energy plants.”

Ainur Sospanova,
Ex-Director of the RES Department at the Ministry of
Energy
Interview date: March 11, 2021

Problems of integrating RES into the country's energy system

During our interviews, a common theme regarding industry challenges was that the infrastructure of the energy system in Kazakhstan was not ready for the full integration of RES.

In addition to the already mentioned lack of reserve capacities and microgeneration, the respondents noted the deterioration, low throughput rate, and geographic limitations of energy grids, the impossibility of integrating RES with thermal energy, and the "isolation" of the western region of the country (where, despite the region's high natural potential, developing RES will lead to a significant increase in energy costs for end users).

Additionally, although the system operator (KEGOC) supports the development of RES, experiences of other countries have shown problems associated with the surplus of energy from traditional and other alternative sources.



[...] In order for renewable energy to develop effectively in Kazakhstan, an established infrastructure is needed - this entails networks of high capacities and flexible stations.

Ainur Sospanova,
Ex-Director of the RES Department at the Ministry of Energy
Interview date: March 11, 2021



[...] Infrastructural constraints include the underdevelopment of the electric power network and the lack of free land plots for promising hydroelectric power generation facilities. Since these sites are located in hard-to-reach places, building a network there is quite laborious and expensive. If the networks were developed with the support of the state and there were a mechanism for reserving land plots for renewable energy facilities, then hydropower would develop well.

Edil Saryyev,
Director of "CATEC Green Energy" LLP



[...] Nowadays, the unified energy system of Ukraine is facing difficulties due to the large amount of installed solar plants. Since, there is a priority dispatching the electricity generated by RES as set by the regulations, the system is unable to dispatch energy coming from nuclear stations when there is an excess supply...

Boris Basok,
Scientist, Corresponding Member of National Academy of Science of Ukraine, Head of the Scientific Department of Thermophysical Foundations of Energy-Saving Technologies,
Institute of Technical Thermophysics of the National Academy of Sciences of Ukraine, Kyiv

3 RES Prospects: Is It Possible to Compete with Traditional Sources?

RES market prospects: can RES compete with traditional sources?

According to many of our respondents, conducting research in the field of energy storage should be the top priority. However, participants share opposing points of view whether RES can compete with traditional energy sources until an effective and inexpensive solution is invented.

60%

There are significant problems with energy storage, but as soon as they are resolved, people will abandon traditional sources

40%

In developed countries the situation is such that the RES plants are already competing with traditional plants

40%

Renewable energy should not compete with other sources - renewable energy should always remain a priority

20%

RES cannot replace traditional sources, as the latter are needed for reliability of the system

10%

RES can replace traditional energy sources

RES market prospects: can RES compete with traditional sources?

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Nowadays, renewable energy is the top priority in the energy sector, it has become a global practice. The system operator prioritizes renewable energy in its purchases, and this is reasonable [...] since there is energy that is better to store and there is energy that is better to be used like wind energy.

I think it is strange to abandon this concept, what benefits would that yield? Therefore, prioritizing renewable energy sources is reasonable.”

Petr Konstantinov,
Principal Banker, EBRD

“

At some point, RES will be able to compete with other sources of energy without guaranteed tariffs and volumes. It is an international practice. For example, some states in the USA do not support RES with special measures. In Colorado, for instance, there are auctions with gas, coal, wind, and solar power plants. Lately, wind farms have been winning auctions because the use of renewable energy can reduce taxable emissions. Moreover, tariffs are also becoming competitive because there are no environmental charges. Therefore, as soon as tariffs in Kazakhstan (for both RES and TES) reflect the fair cost of raw materials, environmental charges, capital expenditures, and transportation expenses, then it will be possible to say that RES can compete freely.”

Ainur Sospanova,
Ex-Director of the RES Department at the Ministry
of Energy
Interview date: March 11, 2021

RES market prospects: can RES compete with traditional sources?

“

[...] When the problem of storing the energy is resolved (either through accumulation at private stations or through the system operator's accumulation mechanism) and when a fair price for all energy sources on the electricity market is established, then RES will be able to compete with traditional sources. Nowadays, this trend can be observed around the world because RES is not only environmentally friendly but also economically profitable.”

Ainur Sospanova,
Ex-Director of the RES Department at the Ministry of
Energy
Interview date: March 11, 2021

“

Why is it impossible for Kazakhstan to completely abandon traditional sources? This is a matter of security. In Kazakhstan, the renewable energy capacity needs 100% back-up or reservation, i.e. there should be flexible capacity available to the same extent to cover imbalances in energy supply and demand. We cannot get the needed capacities from the outside.

In the Scandinavian countries (for example, in Denmark), renewable energy is developing rapidly, and RES are replacing traditional sources. There are several reasons for this, including high tariffs (about 150 tenge/kWh), high standards of living, and consumer awareness. However, the main reason is that the reservation of Denmark's RES energy is almost entirely carried out at the expense of the flexible capacities of neighbouring countries such as Sweden, Norway, France, Germany, etc, and not at the expense of the country's domestic sources. For these purposes, the EU countries have strong interstate ties. This mechanism of supranational interaction is stipulated in mandatory EU directives, ensuring energy security of countries such as Denmark. In such conditions, Denmark can, for example, fully rely on the supply of energy volumes that can cover 100% of its maximum load from neighbouring European countries. Of course, that is not the case here.”

Anuar Koshkarbayev,
Independent expert

Key Conclusions



The active expansion of measures to support and regulate renewable energy sources both in Kazakhstan and globally contributed to rapid development of the sector in the last decade. According to Global Trends Report, global investments in RES between 2010 and 2019 were \$2.7T. However, according to Bloomberg New Energy Finance, to achieve the goals set under the Paris Agreement (2015), investments of \$11T will be needed in addition to the amount currently planned (to be allocated towards RES) over the next 30 years.

Taking into account the growth and stable capitalization levels associated with investments in renewable energy sources, the private sector can play an important role in this transformation. Note, however, that regulatory measures adopted by countries to alleviate global warming are also transforming countries' fuel and power sector as well as mining sectors.

Currently in Kazakhstan, the main sponsors of renewable energy projects (in terms of capacity) are development banks and foreign investors. The country's immense natural potential provides the necessary prerequisites for the further development of the sector.

In our survey, we asked respondents to comment on key challenges impeding the growth of the renewable energy industry in Kazakhstan. The study participants noted the need to further improve the legal framework to align with the current stage of RES development, investment risks (including currency risks), limited balancing capacities, uncompetitive tariffs, lack of stimuli for microgeneration, and problems associated with integrating RES into the country's energy system.

The respondents' opinions regarding the competitiveness of RES in the absence of effective and affordable solutions for energy storage were divided. For example, according to some survey participants, RES can already compete with traditional sources in a number of countries, but traditional energy is essential for keeping the power system stable and reliable.

Special Thanks

We express our gratitude to each participant of our study for taking the time to share their opinion and offering invaluable help in creating this report.

We hope that the results of our joint efforts will contribute to a deeper understanding of current trends in the development of the renewable energy sector in Kazakhstan.



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Notes

Thank You!

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