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TRANSITION

CASE STUDY

RENEWABLE ENERGY IN KAZAKHSTAN



European Bank
for Reconstruction and Development



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Background Towards a green economy

Kazakhstan is a vast but sparsely populated country, rich in natural resources. In recent years, it has embarked on building a green economy, taking the lead among its neighbours. The country has set itself a clear target under the Paris Climate Agreement: by 2030, it aims to have reduced greenhouse gas emissions by 15 per cent compared with the 1990 levels.

In 2013, Kazakhstan adopted the “Concept for the Transition of the Republic of Kazakhstan to a Green Economy up to 2050”, outlining the principles of the green economy as a development path for the future. One of the objectives defined in the Concept is an increase in renewable energy as a percentage of total electricity generation, from just over 1 per cent in 2013 to 3 per cent by 2020, 30 per cent by 2030 and 50 per cent by 2050.

Kazakhstan’s plans are ambitious, considering the unique circumstances of the country. Globally, it is the 14th-largest emitter of greenhouse gases and, until recently, its use of renewable energy was limited to a few hydropower plants constructed during the Soviet era. The country experiences climatic extremes, with summer temperatures in the capital, Astana, exceeding 40° C, and winter temperatures falling below -40° C. Coping with this range requires the substantial use of energy for cooling and heating.

Kazakhstan’s strained electricity sector

More than 70 per cent of Kazakhstan’s electricity is produced in ageing coal-fired plants, served by large volumes of cheap local coal in the north-east of the country. Consequently, the energy sector – power and heat generation in particular – accounts for 80 per cent of Kazakhstan’s carbon emissions. And the sector faces additional challenges, some of which are detailed below.

70%

OF KAZAKHSTAN’S ELECTRICITY IS PRODUCED IN COAL-FIRED PLANTS

MEETING RISING DEMAND FOR ELECTRICITY

Rapid economic growth over the past two decades – per-capita GDP increased from US\$ 8,500 in the late 1990s to US\$ 26,000 in 2017 – brought a sharp upswing in electricity consumption, particularly in winter, when electricity supply is sometimes unable to meet demand. The resulting shortages adversely affect regional economic development. Meanwhile, the country’s electricity demand is projected to increase by an average of 2.5 per cent per year between now and 2030. Currently, Kazakhstan’s total installed capacity is 21.3 GW, but available capacity stands at only around 17.5 GW, mainly due to an ageing power infrastructure and to a widespread lack of maintenance and investment. In order to meet the growing demand, Kazakhstan will have to modernise its power facilities and construct new power plants.



BALANCING REGIONAL DISCREPANCIES

Around 80 per cent of electricity is produced in the country’s north, where the coal mines are located. Southern Kazakhstan is less rich in fossil fuel resources and therefore relies on electricity imports from neighbouring countries and the supply of electricity generated in the north. This leads to high losses, as electricity is delivered to the south of the country by highly inefficient transmission networks. Losses of electricity during transmission and distribution exceeded 7 TWh in 2012, equivalent to the total electricity consumption of Latvia that year.

The provision of additional generating capacity in the south would help to balance the system, and reduce losses, providing a double dividend on the investment.

Renewable energy – tackling Kazakhstan’s electricity challenge

In order to overcome its electricity challenges, and reduce the country’s emissions, Kazakhstan’s policy is now based on promoting a more decentralised, balanced and environmentally friendly system of energy supply that will include a range of renewable resources. This approach recognises not only the country’s abundant fossil fuel sources, but also the fact that its landscape is highly favourable for renewable energy development.

Hydropower

Hydropower’s major contribution to power generation in Kazakhstan dates back to the Soviet era, when it played a significant part in efforts to increase the Soviet Union’s energy potential. Today, the six largest hydropower stations, with a total capacity of 2.5 GW, account for up to 9 per cent of the country’s total electricity generation, a relatively small contribution compared with that of neighbouring countries, but reflecting Kazakhstan’s geography. More recently, 27 small and medium-scale hydropower plants, with a total capacity of 200 MW, have been put into operation. These are attractive in terms of their cost, speed of construction, reliability and reduced environmental impact.

Solar power

Kazakhstan’s solar power potential is estimated to be 3.9 to 5.4 TWh, or approximately 5 per cent of annual power consumption. There are high levels of solar irradiance in most regions of the country. But as Kazakhstan is in the northern hemisphere, the general trend is to develop solar sources in the south, such as in the Burnoye area near Shymkent. This helps to address imbalances in the energy network. However, the country’s current total of installed solar power capacity is relatively insignificant, at 209 MW, with a large number of projects scheduled to start operations by 2020.

Wind power

Kazakhstan’s steppe geography makes it suitable for the development of wind energy. Roughly 50 per cent of the country’s territory has average wind speeds of 4 to 6 metres per second, suitable for energy generation. The most promising areas include the northern and central regions, as well as locations around the Caspian Sea.

Nevertheless, access to these abundant resources requires fundamental work in understanding the market potential and outlining the policy challenges. For example, there are severe technological and logistical challenges to overcome in the development of wind power. Kazakhstan is about the size of western Europe, but it is landlocked and has weak transport links internally.

The transportation of large-scale items such as wind towers and blades to their final destination, and their subsequent installation, are major challenges.

Furthermore, manufacturers must be prepared to guarantee equipment performance at temperatures ranging from -50 °C to +50 °C. This increases the cost of wind power in Kazakhstan, compared with countries that have more temperate climates and are closer to the manufacturing sites of windpower equipment.

The government has responded to this challenge by seeking external support to develop the windpower industry from an early stage.

Creating the grounds for renewable energy

Initiated in the early 2000s by the United Nations Development Programme and the government of Kazakhstan, and financed by the Global Environment Facility, the Wind Power Market Development Initiative was among the first projects that aimed to reduce the country’s greenhouse gas emissions by facilitating the sustainable development of the wind market. The Initiative made the first attempt to develop regulations and policy instruments that would reduce the risk of investing in renewables and support the adoption of a national target for wind power in Kazakhstan.

The Wind Atlas of Kazakhstan, which served as a basis for later investments, was a direct outcome of this initiative, along with an initial assessment of the development potential of each region.

While at first the project envisaged the installation of a 5 MW wind-energy demonstration project, it soon became clear that a range of market barriers prevented the investment from going ahead. The barriers fell into three broad categories:

- awareness, information and capacity barriers
- financial barriers and low electricity prices
- policy and institutional barriers.

Further policy work was required to address these issues.

WIND ATLAS OF KAZAKHSTAN

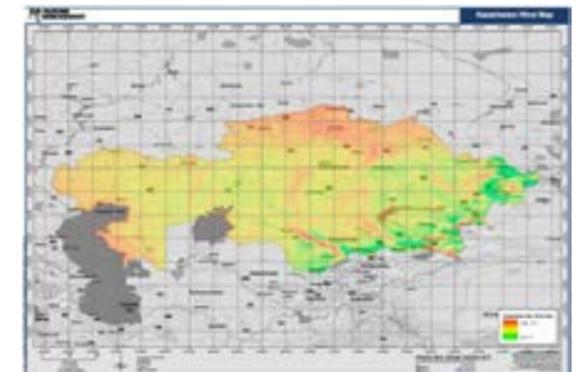


Figure 3. Map of the Republic of Kazakhstan with distribution of wind speed value at height of 80 m above ground level and a resolution of 9 km

Source: www.windenergy.kz/files/1260181884_file.pdf

Table 1: Prospective regions for wind power development in Kazakhstan¹

Location of potential wind farms	Region	Projected installed capacity (MW)	Annual production (TWh)
Mangystau mountains	West	210	0.4
Mugojary mountains	West	10	0.01
Mount Ulutau	Central	90	0.13
Yereymentau mountains	Central	50	0.01
Karatau peak	South	190	0.23
Chu-Ili mountains	South	180	0.27
Djungar Gates	South	200	0.66
Total		930	1.71

¹ Source: Marat Karatayev, Michele L. Clarke, “Current energy resources in Kazakhstan and the future potential of renewables: A review”, (http://ac.els-cdn.com/S1876610214017214/1-s2.0-S1876610214017214-main.pdf?_tid=64e7f018-8c82-11e5-bcd9-00000aacb35e&acdnat=1447692917_628917f2699f098639e307a76d867d0), 2014.

2008

Kazakhstan teams up with the EBRD – the Sustainable Energy Action Plan

The EBRD's involvement in Kazakhstan's renewable energy market began in 2008, when the government and the EBRD signed a Sustainable Energy Action Plan (SEAP). This document outlined a range of joint actions, comprising investment and technical assistance. Among the proposed investments, renewable energy projects were identified as priorities. Similarly, the proposed technical assistance activities focused on regulatory support in the area of renewable energy, and these were put in place from late 2008 onwards.

Following the signing of the SEAP, the government of Kazakhstan approached the EBRD asking for comments on a proposed renewable energy law. With support from the EBRD Shareholder Special Fund (SSF), the Bank carried out an in-depth review, identifying areas for improvement in the draft law. Specific references were made to the proposed tariff allocation for projects, the recovery of costs from network operators and the connection regulations for new generators of renewables.

Improvements in these areas promised to make the law more transparent and applicable to a broader range of investments. Based on the EBRD's input, in 2009 the government passed the Law on Supporting the Use of Renewable Energy Sources.

This Law was indeed a first step in creating a favourable environment for a renewable energy sector to emerge. However, it was not enough to stimulate investment. In particular, it lacked a regulatory component. Consequently, the absence of clear rules, and the high levels of uncertainty and risk facing developers who were entering the market, prevented investments from materialising. In addition, the Law did not provide a best-practice cost-allocation system. Instead of offering a universal, currency-indexed feed-in tariff, the system was built on project-based tariffs that required the tariff for each project to be negotiated with the regulators. This created a particularly high barrier for international investors.

Kazakhstan's Sustainable Energy Action Plan was designed to foster the country's sustainable growth and economic diversification and to address regional imbalances. Under this plan, the joint actions include:

- the review and implementation of draft laws, including the Law on Supporting the Use of Renewable Energy Sources
- the creation of an adequately resourced agency to implement energy efficiency strategies (this body would ensure national energy efficiency through actions such as campaigns against energy waste, through training and awareness-raising, and implementation of appliance and equipment labelling)
- the improvement of tariff levels to cover operating and maintenance costs and – in the medium term – to support companies' investment commitments, introduce metering and improve the collection of energy bill payments
- finance for investments that deliver the greatest financial, economic and energy-saving returns, with priority investments to include efficiency improvements in power generation, renewable energy, efficiency improvements in transmission and distribution networks, municipal infrastructure and investments through the EBRD's Green Economy Financing Facilities.

KAZAKHSTAN'S SUSTAINABLE ENERGY ACTION PLAN

In some of the economies where it invests, the EBRD signs Sustainable Energy Action Plans with governments. SEAPs aim to outline the priorities of the relevant government and of the EBRD, defining the scope of joint actions between the Bank and the country. These plans typically include a combination of investment and technical assistance. Throughout the implementation phase of the plans, the EBRD maintains close dialogue with the government.



2009

Teaming up with the Clean Technology Fund

Owing to its cooperation with the government on the renewable energy law, in June 2009 the EBRD led a joint mission of multilateral development banks to help Kazakhstan develop its Clean Technology Fund (CTF) Investment Plan. This was an opportunity to highlight the power sector's challenges and the potential for wide-scale use of renewable energy sources. Recognising the domestic political will to increase renewable energy production, the CTF decided to provide support, approving the government's request to nominate renewable energy as a priority investment area for the fund's activities in Kazakhstan. The CTF allocated US\$ 116 million to back the creation of a renewable energy market by funding investment and technical assistance. As a result, CTF-funded technical assistance began in 2010.

The first task was to support the government in developing implementation regulations for the renewable energy law in order to stimulate higher levels of investment. Officials also asked for support in improving the law. The EBRD's technical assistance, with support from the Clean Technology Fund, provided input on: the introduction of a cost-allocation system; draft provisions for feed-in tariff support for renewable energy projects; procedures on the award of concessions; and the development of standards for power-purchase agreements and national standards for the technical conditions of connecting renewable energy projects to the grid.

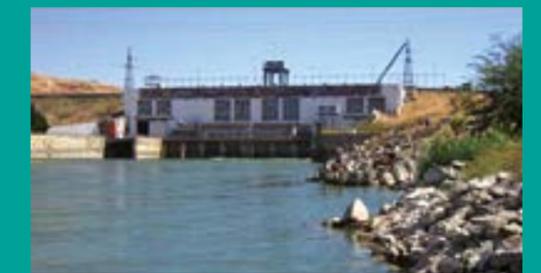
The majority of these recommendations were incorporated into the new primary law. In addition, the government adopted a national target of increasing the use of electricity generated from new renewable sources to 3 per cent of total electricity demand by 2020. The government has continued to engage in close dialogue with the EBRD, aiming to further optimise the law.

THE EBRD'S FIRST RENEWABLE INVESTMENT IN KAZAKHSTAN

In 2012, the EBRD signed its first investment in renewable energy in the country, a loan agreement for the Shardara hydropower plant rehabilitation project, which aimed to replace old equipment and improve the efficiency of the plant.

The EBRD provided a loan in Kazakh tenge, equivalent to US\$ 60.6 million, to Samruk- Energo Company, the owner of the 100 MW Shardara hydropower plant in southern Kazakhstan. The loan was designed to finance the modernisation of the plant, including full replacement of the power generation units and auxiliary equipment, resulting in greater efficiency and security of supply from renewable energy for power-deficient southern Kazakhstan. Shardara became the first hydropower plant in the country to be modernised since the Soviet era.

This project is estimated to have increased output by at least 30 per cent, to more than 650,000 MWh per year, replacing some thermal power imports from coal plants in the north. The savings are calculated to be around 875,000 tonnes of CO₂ per year, excluding any transmission losses that have been avoided.



Shardara hydropower plant

2010-15 CTF-funded technical assistance to improve the renewable energy law

Between 2010 and 2015, the CTF provided a total of €1 million to support the work of the EBRD and the government in creating a favourable environment for renewable energy: analysing barriers, identifying incentive mechanisms and drafting primary and secondary legislation.

In 2013, a new renewable energy law with significant improvements was passed, securing a renewable energy development framework that attracted national and international investors alike. It introduced a feed-in tariff mechanism, for which the EBRD provided assistance to revise the methodology and to model regional feed-in tariffs. The Bank also supported the government in amending the legal and financial infrastructure, such as the design of the Power Purchasing Agreement.

Another major development was the creation of the Cost Clearing and Settlement Centre, established in June 2013 to serve as the sole buyer of renewable power, thus integrating the cost of renewables into the price caps for conditional customers. The Centre's main function is to purchase renewable generation from eligible generators, calculate the average cost per MWh of generation purchased and sell the energy to suppliers and other load-serving entities (for example, self-suppliers).

While the 2013 renewable energy law was a milestone in developing a sustainable energy market in Kazakhstan, it had shortfalls related to the Centre's lack of long-term creditworthiness and short-term liquidity constraints. In 2014, the government requested additional support from the EBRD to further improve the law.

The legislative framework for renewable energy was introduced to recognise the environmental challenges of coal-fired generation and acknowledge the need to diversify Kazakhstan's economy. Within this framework, the government set an indicative target for renewable energy power production to account for 3 per cent of total electricity generation by 2020. Aligned with this strategic direction and goal, the EBRD contributed to the setting-up of the renewables sector in Kazakhstan and paved the way for similar sustainable energy projects in the country.

€1 million

TOTAL SUPPORT FROM THE CTF BETWEEN 2010 AND 2015

IMPROVING THE RENEWABLE ENERGY LAW

The revised renewable energy law of 2013 introduced a range of elements that contributed significantly to encouraging initial investments. These elements include:

- a land-plot allocation for the construction of renewable energy-using facilities
- the introduction of fixed tariffs
- the purchase of the full volume of renewable energy at a fixed tariff guaranteed for 15 years
- the exemption of energy producers from payment for the transportation of electricity produced from renewable energy sources
- the creation of the Cost Clearing and Settlement Centre responsible for
 - a) the centralised purchase and sale of energy generated by renewable energy facilities
 - b) the financial settlement of imbalances in electricity production from renewable energy sources.

Table 2: Technical assistance provided to the Kazakh government on renewable energy regulations and policy in the country

Technical support	Year	Donor	Description
Assistance to the government of Kazakhstan for the drafting of secondary legislation to implement the renewable energy law	2009	SSF	The assignment comprised reviewing, redrafting and finalising secondary legislation related to the renewable energy law. It focused on introducing a feed-in-tariff system and transparent procedures for investor selection, in accordance with international best practices.
Advice to the government on developing feed-in tariffs for renewable energy sources	2010	SSF	The assignment provided a methodology for developing feed-in-tariff levels. It recommended the adoption of a uniform feed-in tariff structure, providing identical tariff levels for projects based on their use of technology, in order to increase transparency and investor certainty and to ease project approval.
Advice to the government on improving primary legislation on renewable energy	2011	SSF	The assignment developed a set of rules and norms for the primary law on renewable energy to make the legal framework operational. The assignment focused on the possibility of introducing a cost-allocation system, procedures for the purchase of electricity from qualified energy producers, licensing, and support for the Ministry of Industry and New Technology in preparing draft amendments to the main law.
Modelling regional renewable energy feed-in tariffs in Kazakhstan	2011	SSF	The assignment developed a methodology for the adoption of regional feed-in tariff schemes for wind and small-scale hydropower generation. The assignment's outcome was the implementation of this methodology.
Kazakhstan renewable energy development framework and regulatory support	2012	CTF	The assignment supported the government with amending the primary legislation and developing the secondary legislation, as well as supporting the Cost Clearing and Settlement Centre.
Advice to the government on a renewable energy sources allocation agreement	2013	CTF	This assignment aimed to improve the legal framework of the renewable energy law by introducing clear and transparent rules for investors. The work involved (i) the introduction of fixed (feed-in) tariffs; (ii) the further development of the Cost Clearing and Settlement Centre that would purchase renewable energy generation from eligible generators; (iii) the calculation of the average cost per MWh of generation purchased and the sales of this energy to suppliers and other load-serving entities; and (iv) the drafting of secondary regulations and model power-purchase agreements.
Modelling the social impact of renewable energy feed-in tariffs	2013	CTF	The assignment consisted of calculating the gross impact of feed-in-tariffs on electricity end-use tariffs, estimating the impact of the new CO ₂ emissions law, and proposing mitigating measures to restrict price rises. One of the key conclusions of the assignment was that Kazakhstan should continue to fully index feed-in tariffs against inflation, as the least costly method of supporting renewable energy while promoting private investment.
Assisting the Ministry of Environmental Protection in the final stage of developing renewable energy legislation	2014	CTF	The assignment aimed to establish a legal and regulatory framework for the development and operation of bankable renewable energy projects in Kazakhstan, which fed into the development of the country's green economy law. Monitoring work was carried out, focusing on the status of renewable energy projects and the perceptions of developers. This highlighted weaknesses in the renewable energy support framework.
Assisting the Ministry of Energy on a technical workshop with the International Energy Agency on integration of the renewable energy grid	2015	CTF	The assignment consisted of organising an exclusive workshop addressing the integration of renewable energy into Kazakhstan's electricity network. The event outlined the challenges and solutions associated with integrating renewable energy into electricity networks in Kazakhstan.
Cooperation with national authorities on a strategic environmental review of Kazakhstan's renewable energy financing facilities	2015	CTF	The assignment consisted of a strategic environmental review of specific renewable technologies, including small-scale hydropower, wind, solar, geothermal and biogas technologies. As such, it was a basis for the subsequent development and appraisal of specific investment projects in these sectors.
Framework for technical, environmental and legal due diligence of renewable energy projects	2015-17	CTF	The assignment focused on undertaking technical, environmental and legal due diligence on renewable energy projects that were under consideration for EBRD financing.

2015-2018 Investing in Kazakhstan's renewable energy sector

Investments in the sector commenced in earnest in 2015, supported by regulatory improvements and the ongoing commitment of the government. Furthermore, the EBRD continued its support in improving the regulatory framework for renewables, providing suggestions on how to improve the feed-in tariff scheme and participating in a working group on renewables, headed by the Ministry of Energy.



The attractiveness of solar energy: Burnoye solar power plant

In 2015 and 2017, the EBRD and CTF provided funding for construction of the first and second stages (50 MW each) of the Burnoye solar power plant (SPP). Burnoye is located in the Zhambyl region of southern Kazakhstan, where the local supply of power is insufficient. The plant is expected to generate more than 144 GWh of electricity per year, offsetting about 135,000 tonnes of CO₂.

Burnoye is the first commercial SPP in the country. The EBRD provided local currency debt financing of around €104 million, with an additional US\$ 25 million in concessional debt financing from the CTF.

Throughout the project development phase, the EBRD engaged with the government (including the Prime Minister and the Ministry of Energy) to ensure the bankability of limited-recourse project finance structures appropriate for Burnoye and other renewable energy projects. Burnoye thus became the first renewable energy project in Kazakhstan to adopt a limited-recourse project structure of this kind.

€100 million +

PROVIDED BY THE EBRD FOR THE CONSTRUCTION OF THE BURNOYE SOLAR POWER PLANT

The EBRD's Renewables Framework

Following the financing of the first phase of the Burnoye SPP, the EBRD reconfirmed its commitment to supporting the renewable energy sector in Kazakhstan through the approval in 2016 of the €200 million Kazakhstan Renewables Framework. Under the Framework, the EBRD will support the construction of renewable energy projects (wind, solar, small-scale hydropower and biogas) with a total capacity of up to 300 MW. In addition, the Framework will finance the modernisation of electricity grids to support the integration of these renewable energy projects into the national transmission system.

The Framework is supported by a contribution from the Green Climate Fund of US\$ 110 million (US\$ 106 million in concessional loan finance and US\$ 4 million for technical assistance).

2018: A breakthrough year for renewables

In 2018, the EBRD supported four foreign investors in Kazakhstan's renewable energy sector. The Bank provided a loan in local currency equivalent to US\$ 8.8 million, to the French company Urbasolar, for the construction of the 14 MW Zadarya SPP. In addition, the CTF co-financed the project with a US\$ 3.9 million concessional loan. Elsewhere, the EBRD arranged a financial package to support China's Risen Energy in the construction of a new 40 MW SPP in the Karaganda region. This financing package includes a local currency loan equivalent to US\$ 22 million, a loan of up to US\$ 5.8 million from the CTF and up to US\$ 4.2 million from the GCF. This is the first facility provided jointly by the EBRD and GCF to finance a solar project in Kazakhstan as part of the government's framework agreement, signed earlier in 2018, to co-finance renewable energy.

During the year, the EBRD also partnered with the CTF and the Asian Development Bank to fund the construction of a 50 MW SPP in Baikonur in central Kazakhstan.

Beyond the provision of finance, the EBRD assisted the Ministry of Energy in developing and implementing an auction scheme for renewables, which was launched in 2018.

Table 3: EBRD portfolio of renewable energy projects in Kazakhstan

Project and capacity	Projected installed capacity	Location
Burnoye SPP (100 MW)	United Green (Kazakhstan/UK)	Zhambyl region
Zadarya SPP (14 MW)	Urbasolar (France)	South Kazakhstan region
Baikonur SPP (50 MW)	United Green (Kazakhstan/UK)	Kyzylorda region
Risen Solar SPP (40 MW)	Risen Energy (China)	Karaganda region
Nomad SPP (37 MW)	Total EREN (France), Access Infra Central Asia (UAE)	Kyzylorda region
Saran SPP (100 MW)	Joachim Goldbeck Holding (Germany)	Karaganda region



Kazakhstan's renewable energy outlook

As the country progresses towards a greener economy, the future of Kazakhstan's renewable energy sector looks promising.

With increasing efforts to reduce project risk through regulatory improvements, private investment (including from abroad) has grown. And other providers of finance, such as the Asian Development Bank, have entered the market.

The EBRD will continue to support further development of the renewables sector in Kazakhstan. This support will consist of providing finance (such as investments in the grid that are necessary to support an increased percentage of renewable energy) and further improvement to the regulatory framework. In addition, under the GCF programme the EBRD has committed itself to addressing gender issues in the renewable energy sector. The Bank also aims to support further development of the Kazakhstan Emissions Trading Scheme – for example, through the development of domestic offsetting projects based on renewable energy projects that the EBRD supports.



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