

GET

GREEN
ECONOMY
TRANSITION

CASE STUDY

RENEWABLE ENERGY IN KAZAKHSTAN



European Bank
for Reconstruction and Development



CLIMATE
INVESTMENT
FUNDS



Background Towards a green economy

Kazakhstan is a vast but sparsely populated country rich in natural resources, located in the centre of the Eurasian landmass. In recent years, it has embarked on building a green economy, taking the lead among its Central Asian neighbours. The country has set itself a clear target: by 2030, emissions are supposed to be reduced by between 15 and 25 per cent, compared with the 1990 level.

In 2013, Kazakhstan adopted the “National Concept for Transition to a Green Economy up to 2050” outlining the principles of the Green Economy as a future development path. The objective is to bring the share of new renewable energy in electricity generation from zero to 3 per cent by 2020, and then to raise it further to 30 per cent by 2030 and 50 per cent by 2050.

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

Kazakhstan's strained electricity sector

More than 70 per cent of Kazakhstan's electricity is produced in ageing coal-fired plants, served by the large volumes of cheap local coal in the north-east of the country. Consequently the energy sector, in particular power and heat generation, accounts for 80 per cent of the country's carbon emissions. The sector is facing additional challenges:

70%

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

MEETING RISING DEMAND FOR ELECTRICITY

Rapid economic growth over the past decade – per capita GDP increased from US\$ 8,500 in the late 1990s to US\$ 23,000 in 2014 – brought a sharp upswing in electricity consumption. Particularly in winter, electricity supply is now sometimes unable to meet demand, leading to electricity shortages and adverse effects on regional economic development. The country's electricity demand is projected to increase by 2.5 per cent annually between now and 2030. Currently, the country's total installed capacity is 19.8 GW, but the available capacity only stands at around 15 GW, mainly due to ageing power infrastructure and a widespread lack of maintenance and investment. To meet the growing electricity demand Kazakhstan will have to modernise existing power facilities and construct new power generation 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 energy 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 transmission networks that are highly inefficient. Losses of electricity produced during transmission and distribution were over 7 TWh in 2012, equivalent to the total electricity consumption of Latvia.

By providing additional generating capacity in the south, the system would become more balanced, and losses would be reduced, providing a double-dividend to 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 energy supply system, which will include a range of renewable resources. This recognises not only the country’s abundant fossil fuel sources, but the highly favourable landscape for renewable energy development.

Hydropower

Hydropower’s major contribution to electric power generation in Kazakhstan dates back to the Soviet era, when it played a major part in efforts to increase the Soviet Union’s energy potential. Today, the 15 large hydropower stations (>50 MW) with a total capacity of 2.25 GW account for up to 13 per cent of the country’s total generating capacity, a relatively small contribution compared with neighbouring countries, but reflective of Kazakhstan’s geography. They generate around 8 TWh per year, equivalent to about 8 per cent of power generation. More recently, a few small- and medium-scale hydropower plants have been developed. These are attractive in terms of cost, speed of construction, reliability and reduced environmental impact.

Solar power

Kazakhstan’s solar power potential is estimated at 3.9 to 5.4 TWh, or around 5 per cent of annual power consumption. There is high solar irradiance in most regions of the country, but as Kazakhstan is located in the northern hemisphere, the general trend is to develop the solar sources in the south, such as in the Burnoye area near Shymkent, which addresses imbalances in the energy network.

Although the current installed solar power capacity in the country is insignificant, the number of fully permitted and ready-to-build projects is predicted to rapidly increase from 2015. According to the Ministry of Energy’s Plan of Activities for Alternative and Renewable Energy, about 28 solar energy projects are scheduled for operations by the end of 2020, with a total installed capacity of 713.5 MW.

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 region, as well as the Caspian Sea region.

Nevertheless, in order to access these abundant resources, fundamental work in understanding the potential, and outlining the policy challenges was required. 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, landlocked and with weak internal transport links. Transporting large-scale items such as wind towers and blades to their final destination along with subsequent installation is a major challenge. Furthermore, manufacturers will have to be prepared to guarantee equipment performance at temperature ranges of +50 to -50 degrees Celsius. This increases the cost of wind power in Kazakhstan, compared with countries that are closer to the manufacturing sites of wind equipment, and where a more temperate climate exists.

The government responded to this challenge by seeking external support in developing this industry from an early stage.

Creating the grounds for renewable energy

Initiated in the early 2000s by the United Nations Development Programme (UNDP) and the government of Kazakhstan, and financed by the Global Environment Facility (GEF), the Wind Power Market Development Initiative was one of the first projects in Kazakhstan that aimed to reduce the country's greenhouse gas emissions by facilitating the sustainable development of the wind market. It made the first attempt to address the development of regulations and policy instruments to reduce the risk of renewable investments and support the adoption of a national target for wind power in Kazakhstan.

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

While the project initially envisaged the installation of a 5 MW wind energy demonstration project it soon became clear that the combination of a broad range of market barriers prevented the investment from happening. The barriers fell into three categories:

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

Further policy work was required to address these.

WIND ATLAS OF KAZAKHSTAN

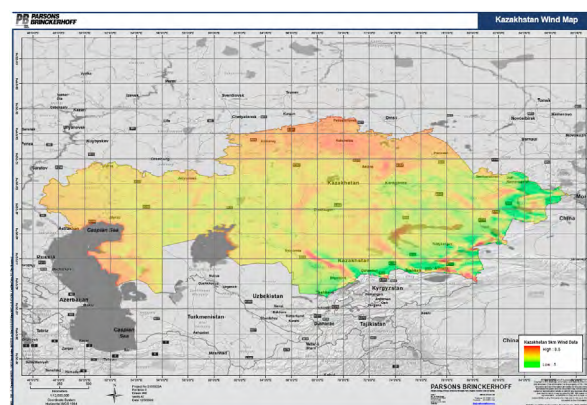


Figure 3. Map of the Republic of Kazakhstan with distribution of wind speed value at height of 80 m above ground level and a resolution of 9 km

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
Mugojar mountains	West	10	0.01
Mount Ulatau	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_628917f72699f098639e307a76d867d0), 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 of Kazakhstan and the EBRD signed a Sustainable Energy Action Plan (SEAP). This document outlined a range of joint actions, comprising both investments and technical assistance. Among the proposed investments, renewable energy projects were identified as priority investments. Similarly, the proposed technical assistance activities focused on regulatory support in the area of renewable energy, and this assistance was put in place from autumn 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's Shareholder Special Fund (SSF), the EBRD carried out an in-depth review, which identified areas for improvement in the draft law. Specifically, references were made to the proposed tariff allocation to projects, the cost recovery from network operators and the connection regulations for new renewable generators.

Improvements in these areas promised to make the law more transparent and accessible to a broader range of investments. Based on this input, the government of Kazakhstan passed the renewable energy law in 2009.

The law was indeed a first step in creating a favourable environment for a renewable energy sector to emerge. However, it was not sufficient to stimulate investments. It particularly lacked a regulatory component, and this meant that the absence of clear rules and thus high uncertainty and risks for developers entering the market prevented investments from coming forward. The law also did not provide a best-practice cost-allocation system. Rather than offering a universal, currency-indexed feed-in tariff (FIT) system, it was based on project-based tariffs that required each project to be negotiated with the regulators. This created a particularly high barrier for international investors.



KAZAKHSTAN'S SUSTAINABLE ENERGY ACTION PLAN

The EBRD signs Sustainable Energy Action Plans (SEAP) with some of the governments of its countries of operations to outline the priorities of the involved governments and the EBRD. SEAPs define the scope of joint actions between the Bank and the respective country, and they typically include a combination of investments and technical assistance. Throughout the implementation phase, the EBRD maintains close dialogue with the government of the respective country.

Kazakhstan's Sustainable Energy Action Plan was designed to foster the country's sustainable growth and economic diversification and to address regional imbalances. The set of joint actions outlined include:

- the review and implementation of draft laws, including the Law on the Use of Renewable Sources of Energy
- to ensure an adequately resourced agency to implement energy efficiency strategies. This body would ensure national energy efficiency through actions including: campaigns against energy waste, 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 – support companies' investment commitment. In addition, introduce metering and the improvement of energy bill payment collections
- finance investments that deliver the greatest return, financially, economically and in terms of energy saved. Priority investments should include efficiency improvements in power generation, renewable energy investments, efficiency improvements in transmission and distribution networks, municipal infrastructure investments and investments through the EBRD's Sustainable Energy Financing Facilities.



2009 Teaming up with the Clean Technology Fund (CTF)

Owing to its cooperation with the government over the renewable energy law, in June 2009 the EBRD led a joint mission of multilateral development banks to Kazakhstan to help the government develop its Clean Technology Fund Investment Plan. This provided the opportunity to highlight the power sector's challenges and the potential of using renewable energy sources on a wide scale. Recognising the domestic political will to increase renewable energy production, the CTF decided to provide support and approved 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 support the creation of a renewable energy market, by funding investments and technical assistance. As a result, CTF-funded technical assistance began in 2010.

The first technical assistance 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 technical assistance offered by the EBRD with support from the Clean Technology Fund provided inputs 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 developing standards for power-purchase agreements and national standards regarding the technical conditions of connecting renewable energy projects to the grid.

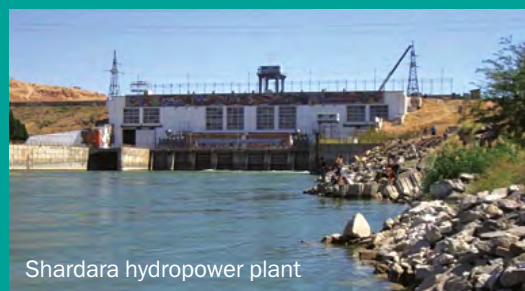
The majority of the recommendations were incorporated into the new primary law. In addition, the government adopted a national target of increasing the share of electricity generated from new renewable sources within total electricity demand to 3 per cent by 2020. The government continued to engage in 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 aimed at replacing old equipment and improving the efficiency of the hydropower plant.

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

This project is estimated to result in increased output of at least 30 per cent to more than 650,000 MWh per year, substituting part of the thermal power imports from coal power plants in the north. The savings are estimated to be around 875,000 tonnes of CO₂ per year, excluding the avoided transmission losses.



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 EBRD's and the Kazakh government's work on creating a favourable environment for renewable energy by analysing existing barriers, identifying incentive mechanisms and drafting primary and secondary legislation.

A new renewable energy law with significant improvements was passed in 2013, and this secured 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 in revising the methodology, as well as modelling regional feed-in tariffs. The EBRD also supported the government in amending a range of legal and financial infrastructure, such as the design of the Power Purchasing Agreement (PPA).

Another major development was the creation of the Cost Clearing and Settlement Centre. It was established in June 2013 to serve as the single buyer for renewable power, and thereby to integrate renewables costs 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 still showed some shortfalls related to the lack of long-term creditworthiness and short-term liquidity constraints of the Cost Clearing and Settlement Centre. In 2014, the Kazakh government requested additional support from the EBRD to further improve the 2013 renewable energy law.

As of April 2016, a number of further improvements in the regulations related to renewable energy were due to be signed into law shortly. These improvements relate to the creation of a reserve fund for payments of the feed-in tariffs, the development of a standard agreement for the connection to the grid and the possible indexation of the feed-in tariffs to hard currency.

€1 million

TOTAL SUPPORT FROM THE CTF
BETWEEN 2010 AND 2015

IMPROVING THE RENEWABLE ENERGY LAW

The revised renewable energy law that was launched in 2013 introduced a range of new elements, which contributed significantly to encouraging initial investments:

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

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

Technical support	Year	Donor	Description
Assistance to the government of Kazakhstan for drafting of secondary legislation implementing the renewable energy law	2009	SSF	The assignment comprised reviewing, re-drafting and finalising the 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 of Kazakhstan on developing feed-in tariffs for renewable energy sources	2010	SSF	The assignment provided a methodology to develop feed-in-tariff levels. It recommended the adoption of a uniform feed-in tariff structure, providing identical tariff levels for projects based on technology, in order to increase transparency, investor certainty and ease of project approval.
Advice to the government of Kazakhstan on improving renewable energy primary legislation	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 purchase of electricity from qualified energy producers, licensing, and supporting the Ministry of Industry and New Technology (MINT) in preparing draft amendments of the main law.
Modelling regional renewable energy feed-in-tariffs within 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 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 of Kazakhstan on a renewable energy sources (RES) allocation agreement	2013	CTF	The objective of this assignment was to improve the legal framework of the renewable energy law by introducing clear and transparent rules for investors. This involved (i) the introduction of fixed (feed-in) tariffs; (ii) the development of the Cost Clearing and Settlement Centre that would purchase renewable energy generation from eligible generators; (iii) calculating the average cost per MWh of generation purchased and selling this energy to suppliers and other load-serving entities; and (iv) drafting secondary regulations and model power purchase agreements.
Modelling the social impact of renewable energy feed-in tariffs in Kazakhstan	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 Green Economy Law. Monitoring work was carried out, focused on the status of renewable energy projects and the perceptions of developers. This highlighted weaknesses of the current renewable energy support framework.

Investing in Kazakhstan's renewable energy production

The aim of the technical assistance was to create an enabling environment that would lead to substantial investments being made. In this regard, following over half a decade of work, the cooperation between the government of Kazakhstan and the EBRD was successful.



€59.2 million

LOAN PROVIDED BY THE EBRD
TO WIND POWER YEREYMENTAU

The attractiveness of wind energy: Yereymentau wind farm

In 2014, the EBRD signed the first large-scale wind power project in Kazakhstan. The Bank provided a KZT 14 billion (€59.2 million) loan to Wind Power Yereymentau, a special-purpose vehicle. The CTF contributed €18 million of concessional finance. The loan was guaranteed by JSC Samruk-Energo – Kazakhstan's national energy company and ultimate owner of the special-purpose vehicle – which intended to diversify its portfolio of thermal power plants by adding renewable capacity.

The funds will be used to finance the construction, the connection to the power transmission grid, commissioning and the launch of a greenfield 50 MW wind power plant, located in Yereymentau, approximately 130 km north-east of Astana in central Kazakhstan.

As the new renewable energy law came into force in 2013, the project became a beneficiary of the new feed-in tariff system that set tariffs for each type of renewable energy. For wind power, the tariff was set at KZT 22.68/kWh (€0.10/kWh) for 15 years, annually adjusted to inflation. All generated electricity from renewable energy sources will be purchased by the newly created Cost Clearing and Settlement Centre.

Once the Yereymentau wind power plant commences operations, it will generate electricity in excess of 130 GWh per year and reduce Kazakhstan's carbon emissions by over 120,000 tonnes of CO₂e per year. In 2015, the Yereymentau Wind Farm project received the prestigious American Chamber of Commerce Environmental & Safety Award.

Investing in bankable solar power: Burnoye solar farm

In June 2015, the EBRD's second renewable energy project was signed in Kazakhstan. A €80 million solar power plant project in Kazakhstan, it was also co-financed with CTF funds of US\$ 15 million. The project is jointly owned by both public and private entities, as the financing extends to a company founded by Kazakh-UK joint venture – Samruk-Kazyna Invest, an investment arm of Kazakhstan's sovereign wealth fund and United Green, a UK developer.

The 50 MW greenfield Burnoye solar power plant is the first large-scale (above 5 MW) solar plant in Kazakhstan, and is expected to generate over 67 GWh per year, offsetting carbon emissions of about 60,000 tonnes of CO₂ annually. The plant is located in the south of the country, in the region of Zhambyl, where power supply is lacking.

Throughout the project development period, the EBRD was actively engaged with the government,

including the Ministry of Energy, the Prime Minister and Samruk-Kazyna Invest, to enable the bankability of limited-recourse project finance structures appropriate for Burnoye and other renewable projects. The project therefore became the first renewable energy project in the country to adopt a limited-recourse project finance structure.

Burnoye solar farm



Kazakhstan's renewable energy outlook

As the country progresses in its pursuit of the green economy, the future of Kazakhstan's renewable energy sector is promising. With increasing efforts to reduce the risks of renewable energy investment through regulatory and financial optimisation, private investment has also grown.

For example, in April 2015 the German company Promondis began the construction of Kazakhstan's largest solar power plant with a total capacity of 75 MW in southern Kazakhstan. This project is estimated to mobilise foreign investment of a total of US\$ 250 million. During the ceremony, the Governor of the South Kazakhstan oblast, Saparbek Tuyabayev, revealed that at least six renewable energy projects with total capacity of 290 MW were planned for installation in 2015 and 2016 in the southern Kazakhstan region. These plants will cover the region's current electricity deficit of 280 MW by 2017.

The EBRD continues to support Kazakhstan's renewable energy sector growth. It has a number of private and public renewable energy projects in Kazakhstan intended for investment; some are expected to be signed in the near future. At the same time, the EBRD will continue to work closely with the government on improving the existing renewable energy framework. In particular, it plans to assist the country to enhance the bankability of renewable energy projects through improvement in regulations, such as strengthening the role of offtake agreements, which allow renewable energy buyers to purchase or sell part of a producer's output in future.



European Bank
for Reconstruction and Development

**European Bank for Reconstruction
and Development**

One Exchange Square
London EC2A 2JN
United Kingdom
Tel: +44 20 7338 6000
Fax: +44 20 7338 6100
Website: www.ebrd.com

© European Bank for Reconstruction and Development

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, including photocopying and recording, without the written permission of the copyright holder. Such written permission must also be obtained before any part of this publication is stored in a retrieval system of any nature. Applications for such permission should be addressed to permissions@ebrd.com.

Images: EBRD and image libraries