

QazaqGreen

INFORMATION AND ANALYTICAL MAGAZINE

qazaqgreen.com

www.kas.de



KONRAD
ADENAUER
STIFTUNG

2023

№ 5 (09) May

ENERGY SUSTAINABILITY
OF KAZAKHSTAN:
ENERGY TRANSITION

QAZAQ
GREEN
FEST

II INTERNATIONAL
BUSINESS FESTIVAL
ON RENEWABLE ENERGY
SOURCES



CONTENTS

SUSTAINABLE DEVELOPMENT



12

MARIO CUCINELLA:

SUSTAINABILITY IS NOT ABOUT NUMBERS, KILOWATTS, OR CO EMISSIONS. IT IS ABOUT BEAUTY

38

"GREEN" DEVELOPMENT OF THE FUTURE: THEMATIC BUSINESS VISIT TO BELGIUM ON "GREEN" ECONOMY FOR CENTRAL ASIAN COUNTRIES

QAZAQ GREEN FEST



08

QAZAQ GREEN FEST 2023

WHY IS IT IMPORTANT TO DISCUSS THE FUTURE OF RENEWABLE ENERGY IN KAZAKHSTAN?

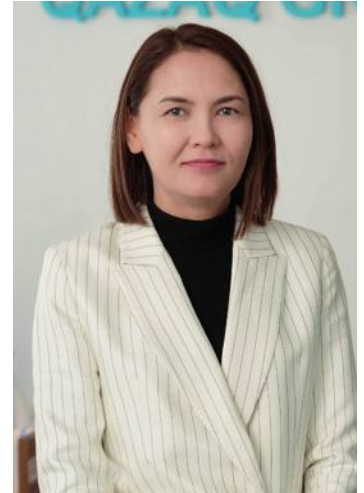
OVER THE PAST YEAR, KAZAKHSTAN'S POWER GENERATION FROM RES HAS INCREASED BY MORE THAN HALF

44

BAKHROM JALOLOV:

ALTYNALMAS IS INTERESTED IN THE RATIONAL USE OF NATURAL RESOURCES

RES SCHOOL



30

THE QAZAQ GREEN RENEWABLE ENERGY SCHOOL WILL IMPROVE THE COMPETENCE OF CIVIL SERVANTS AND POWER ENGINEERS

26

WHO KNOWS ABOUT RES IN KAZAKHSTAN

QazaqGreen

No. 5 (09) 2023

Information and analytical magazine

FOUNDER:

"Qazaq Green" Renewable Energy Association

EDITORIAL COUNCIL:

J.D. Rey
N.N. Kapenov
A.M. Sospanova

T.M. Shalabayev
A.Ye. Akhmetov

CHIEF EDITOR

N.N. Kapenov

ISSUING EDITOR

N.V. Shayakhmetova

PUBLICATION:

"NV-Media" IE

Editorial Address:

010000, Republic of Kazakhstan
Astana, Chubary microdistrict,
A. Knayginina Str., 11
Tel.: +7 (7172) 24-12-81
qazaqgreen.kz

MAGAZINE REGISTERED:

Committee of Information of the Ministry of Information and Social Development of the Republic of Kazakhstan. Certificate # KZ19VPY00042949 dated November 19, 2021.

HYBRID RES SOLUTIONS



86

AUTONOMOUS ENERGY SOLUTIONS: HYBRID SOLAR POWER PLANTS ARE BECOMING POPULAR IN CENTRAL ASIA

EDUCATION FOR RES



90

TRAINING RES SECTOR
 IN THE XXI CENTURY, ENERGY SECURITY HAS BECOME ONE OF THE MAIN GLOBAL PROBLEMS

EXPERT OPINION



54

BEM – PANACEA FOR ENERGY TROUBLE OR VERDICT FOR RENEWABLE ENERGY SECTOR?

48

30 YEARS OF POWERING PROGRESS TOGETHER: SHELL CELEBRATES MILESTONE ANNIVERSARY IN KAZAKHSTAN

72

DECARBONIZATION OF EXTRACTIVE INDUSTRIES OF THE REPUBLIC OF KAZAKHSTAN

64

LAUNCH OF GCIP- KAZAKHSTAN ACCELERATING INNOVATION AND ENTREPRENEURSHIP IN THE FIELD OF CLEAN TECHNOLOGIES

82

IMPROVING THE QUALITY OF LIFE THROUGH "GREEN" TECHNOLOGIES

Initial registration:
 November 20, 2019, KZ60VPY00017379.

Magazine coverage:
 Republic of Kazakhstan,
 Countries of Near and Far Abroad

Total circulation:
 1,500 copies

Printed:
 Print House Gerona LTD.

Any reproduction of materials or their fragments is possible only with the written permission of the publisher. The editors are not responsible for the content of advertising materials. Editorial opinion does not necessarily coincide with the opinion of the authors.

The magazine is published with the support of the Konrad Adenauer Foundation





QAZAQ GREEN

UNITED PLATFORM

for Kazakhstan and international players
in the field of renewable energy sources

AIM – SECTOR CONSOLIDATION

to bring together actors in the field of renewable energy sources
in order to create favorable conditions for development of the sector

MISSION:

formation of a holistic position of association members to
obtain attractive conditions for investing in the projects
of renewable energy sources



Astana,
Chubary microdistrict, A. Knyaginina Str., 11

qazaqgreen.kz



**THE WELCOME SPEECH OF ALMASSADAM SATKALIYEV
MINISTER OF ENERGY OF THE REPUBLIC OF KAZAKHSTAN**

**ҚАЗАҚСТАН
РЕСПУБЛИКАСЫНЫҢ
ЭНЕРГЕТИКА
МИНИСТРЛІГІ**



**МИНИСТЕРСТВО
ЭНЕРГЕТИКИ
РЕСПУБЛИКИ
КАЗАХСТАН**

The Ministry of Energy of the Republic of Kazakhstan fully supports the initiative to host the II International Business Festival on Renewable Energy Sources "Qazaq Green Fest 2023": "Energy sustainability of Kazakhstan: energy transition" in Kazakhstan. This event, organized by the Qazaq Green RES Association of Kazakhstan, is one of the most significant events in the country promoting renewable energy sources (RES).

The Qazaq Green RES Association has undertaken a mission to form a comprehensive policy and provide attractive conditions for investment and the successful development of RES in the Republic of Kazakhstan. Such achievements and step-by-step actions would not be possible without active participation from a large number of stakeholders, and constant exchange of opinions and experience between Kazakhstani and international experts.

We are confident that the new business event of the festival will become an effective multilateral dialogue platform that will allow us to consolidate advanced knowledge and experience in the field of RES. It will provide an opportunity to exchange professional opinions on the most topical issues in the industry and create a significant international industry networking. As a result, favorable opportunities and conditions for the development of RES in the Republic of Kazakhstan will emerge.

We extend our invitation to Kazakhstan and international companies to take an active part in the festival. The Ministry is ready to provide support for this event, and we look forward to a fruitful and productive partnership.

Almassadam Satkaliyev

A handwritten signature in blue ink, appearing to be 'AS' or similar initials, written in a cursive style.

Minister of Energy of the Republic of Kazakhstan



THE WELCOME SPEECH OF NURLAN KAPENOV THE CHAIRMAN OF THE BOARD OF DIRECTORS QAZAQ GREEN RENEWABLE ENERGY ASSOCIATION

DEAR READERS! DEAR FRIENDS!

In 2019, Qazaq Green hosted the first International Business Festival on Renewable Energy Sources, Solar Fest Qazaqstan in the heart of the Burabai State National Natural Park – Rixos Hotel Borovoe – which brought together more than 300 representatives of solar and renewable energy market of Kazakhstan: representatives of government agencies, Financial Settlement Center of RE, the organizer of renewable energy auctions, domestic and foreign investors, international experts and recognized world industry leaders, international organizations and financial institutions, associations and universities of Kazakhstan.

The participants had the opportunity to discuss topical issues on development of renewable energy in Kazakhstan – the problems and difficulties of implementing renewable energy projects in Kazakhstan, prospects for further development of renewable energy sources, challenges that concern key market players.

Such discussions resulted in Charter – an appeal of business community of the renewable energy industry to the Government of the Republic of Kazakhstan for further development of renewable energy in Kazakhstan. This Charter raises topical issues of sector development, which have already been resolved or have received support from the Government of the Republic of Kazakhstan:

- stimulating the implementation of small-scale renewable energy projects (the Majilis of the Parliament of the Republic of Kazakhstan is currently considering a bill aimed at improving the conditions for implementation of such projects);
- risks of solvency of conditional consumers (since 2021, a through rate for renewable energy for conditional consumers has been in effect);
- financial stability of Financial Settlement Center of RE (Regulation on provision of financial support from Government to Financial Settlement Center of RE in case it fails to fulfill its obligations on payments to RES projects is in effect from 2021);
- training of personnel potential for RES (educational programs have been launched on the basis of a
- number of Kazakhstani universities);
- inclusion of RES projects in the List of priority activities for implementation of investment projects (in 2020 RES are included in the list of priority activities).

We believe that this is a practical result of joint work of industry community led by the Ministry of Energy of the Republic of Kazakhstan, and our event became the platform that accumulated the opinion of business and the vision of government agencies.

Qazaq Green still receives positive feedback from both domestic and foreign participants, despite the fact that the event took place almost four years ago. All this gives grounds to conclude that our event is a key platform for renewable energy in the country.

This year Qazaq Green is organizing the II International Renewable Energy Festival Qazaq Green Fest. It will be held on May 25-26, 2023 in the already traditional location – Rixos Hotel Borovoe. There are no less pressing issues for our sector on the agenda of the festival:

- energy transition through the development of renewable energy sources;
- state policy and strategic vision of development of the electric power industry and RES, the introduction of a new "Single Buyer" market model and the operation of RES facilities in the balancing electricity market;
- availability of long-term financing for renewable energy projects;
- implementation of ESG policies at the corporate level, taking into account gender aspects;
- development of voluntary carbon market in Kazakhstan;
- actual business problems in implementation of renewable energy projects.

All these issues are of concern to the business community of the renewable energy sector, which today needs clear guidelines, stable legislation and predictability for planning investments in the industry.

Huawei and its certified partner Photomate are the general partner of the event. Taking this opportunity, Qazaq Green expresses gratitude for support of the event.

We also express our gratitude to our sponsors and all the organizations that supported Qazaq Green Fest: LONGi, TotalEnergies, Sany, ENI, Jusan Bank, Zhanatas Wind-Power Station, Jinko Solar, Bureau Veritas, Unicase Law Firm, KAZENERGY, Hevel, Alageum Electric, Profland and the Eurasian Development Bank. Special thanks to our partners who have made a great contribution to the development of renewable energy in our country and supported us: the UN Development Program and the Global Environment Facility.

On behalf of Qazaq Green, we welcome all participants of Qazaq Green Fest 2023 and wish them success, fruitful work and new achievements in development of renewable energy in the Republic of Kazakhstan.



Nurlan Kapenov
Chairman of the Board of Directors
QAZAQ GREEN RES Association

QazaqGreenFest 2023

WHY IS IT IMPORTANT TO DISCUSS THE FUTURE OF RENEWABLE ENERGY IN KAZAKHSTAN?

IN THE PAST YEAR ALONE, ENERGY PRODUCTION FROM RENEWABLE SOURCES
IN KAZAKHSTAN HAS INCREASED BY MORE THAN HALF.



The second International Business Festival on Renewable Energy Sources Qazaq Green Fest 2023 will be held in Burabai National Park on May 25-26 this year. The organizers, represented by Qazaq Green Renewable Energy Association, are preparing a large program for a dialogue platform, which should become the central event in this area in our country. We tell you why this is important.

THE SECTOR SHOWS GROWTH

The renewable energy sector in Kazakhstan has been actively developing for more than ten years and is becoming more noticeable in the country's energy system.

In general, the country has ambitious plans in this direction. For example, the Concept for transition to "green" economy states that by 2030 RES should occupy 15% of total electricity production, and by 2050 - up to half of the total electricity production (together with nuclear).

WHAT HAS BEEN ACHIEVED SO FAR? ACCORDING TO THE MINISTRY OF ENERGY OF THE REPUBLIC, IN THE FIRST QUARTER OF THIS YEAR, RENEWABLE ENERGY FACILITIES GENERATED 4.8% OF ALL ELECTRICITY. AT THE SAME TIME, IF COMPARED WITH THE FIRST QUARTER OF 2022, THE INDICATOR IMMEDIATELY INCREASED BY 58%.

For example: by the end of 2021, renewable energy power plants generated 3.6% of all electricity in Kazakhstan. This means that this sector has grown significantly in volume over the year and has become a good support for the energy system of our country, which is already experiencing a shortage of electricity.

The installed capacity of renewable energy facilities has exceeded 2.5 gigawatts, and it is based on solar power plants with a total capacity of almost 1.15 gigawatts. Wind power plants with a capacity of just over 1.1 gigawatts are slightly behind, followed by small hydroelectric power plants with 267.4 megawatts and bioelectric power plants with 1.77 MW.

It is clear that this market needs to develop further, especially against the background of the shortage of electricity in the country and the general trend towards the "greening" of energy.

This becomes especially important given the introduction of carbon tax, for example, in the European Union, Kazakhstan's main trading partner. Without the production of goods on "clean" energy, our products may simply become uncompetitive abroad.

But where is the renewable energy sector moving now and what awaits it in the future? These pressing issues need to be discussed, and this is what will be discussed at the upcoming Qazaq Green Fest 2023.





DIALOGUE PLATFORM FOR EVERYONE

The upcoming event will be an ideological continuation of Solar Fest Qazaqstan Renewable Energy Festival, which took place in the summer of 2019 and brought together more than 300 representatives of the renewable energy market of Kazakhstan – representatives of government agencies, domestic and foreign investors, experts and world industry leaders, international organizations and financial institutions, associations and universities of our country.

"SOLAR FEST QAZAQSTAN WAS NOT JUST A BUSINESS EVENT THAT BROUGHT TOGETHER INDUSTRY REPRESENTATIVES. FIRST OF ALL, IT BECAME A DIALOGUE PLATFORM WHERE PARTICIPANTS HAD THE OPPORTUNITY TO DISCUSS TOPICAL ISSUES ON DEVELOPMENT OF RENEWABLE ENERGY IN KAZAKHSTAN," - SAYS NURLAN KAPENOV, CHAIRMAN OF THE BOARD OF DIRECTORS OF QAZAQ GREEN RENEWABLE ENERGY ASSOCIATION.

It is this association, which promotes the interests of the industry, that has become the main organizer of the upcoming festival. According to Nurlan Kapenov, such events are not just a forum for discussion. It is a platform for achieving concrete results. For example, the Solar Fest Qazaqstan resulted in Charter – an appeal to the Government of Kazakhstan from the business community of the renewable energy industry for further development of this industry.

To date, such issues as stimulation of small-scale projects, the risks of solvency of conditional consumers, the financial stability of Financial Settlement Center of RE, personnel training and inclusion of RES projects in the List of priority activities for implementation of investment projects have been resolved or almost resolved.

"WE BELIEVE THAT THIS IS A PRACTICAL RESULT OF JOINT WORK OF THE INDUSTRY COMMUNITY, AND SOLAR FEST QAZAQSTAN HAS BECOME THE PLATFORM THAT WAS ABLE TO ACCUMULATE THE OPINION OF BUSINESS AND VISION OF GOVERNMENT AGENCIES," - QAZAQ GREEN ASSOCIATION NOTES.

Nevertheless, there are still many questions about the development of renewable energy. And Kazakhstan's renewable energy community is ready to promote and defend its interests. A new dialogue platform for industry will be Qazaq Green Fest, which will retain the main goal – to discuss the current state and prospects of renewable energy in Kazakhstan.



THE FOCUS IS ON THE "GREENING" OF THE ECONOMY

The range of topics discussed is wide: from the global energy transition and energy security issues to "green" financing and ESG policy.

And there really is something to talk about. In this February, President of Kazakhstan Kassym-Jomart Tokayev signed a Strategy for achieving carbon neutrality by 2060. One of its main goals is to reduce emissions of harmful substances into the atmosphere, where the energy sector remains one of the main pollutants.

By the end of the first quarter of this year, RES had generated almost 5% of all electricity in Kazakhstan. However there is still a lot of work ahead. About 70% of all electricity is still produced using coal.

At the same time, there is a shortage of electricity production in our country, the

obsolescence of power plants, increase in emergency equipment shutdowns, shortage of maneuverable capacities and increasing dependence on electricity imports from neighboring countries. For example, the volume of electricity flow from Russia amounted to more than 1.5 gigawatts with an allowable flow of 150 megawatts.

It is the development of the renewable energy sector that can become a solution for Kazakhstan's energy sector. Moreover, our country has large wind and solar resources, which allows us to implement large-scale projects. Players of this market advocate the use of these resources, and the state can help in this, not just pretend to support.



To discuss these issues, Qazaq Green Fest 2023 will bring together guests of the highest level, including, for example, the ambassadors of Great Britain and Italy to Kazakhstan, heads of ministries and state companies, investors and players of the energy market.

At the same time, the organizers note, the festival is not limited only to the business program. Thus, within the framework of Qazaq Green Fest, the organizers will hold a charity event – competition for children from orphanages of the Akmola region.

In addition, the results of the competition among media representatives for the best materials on

the development of renewable energy sources in Kazakhstan will be summed up. The jury will announce the authors of the best publications on the topics of state policy, green energy projects, use of renewable energy by the population and business, as well as successful cases in this area.

In addition, guests and participants of the festival will be able to get acquainted with the technologies of industry leaders at a separate exhibition and attend an outdoor Gala.





INTERVIEW



MARIO CUCINELLA

was born in Palermo in 1960 and graduated in Architecture at the University of Genoa in 1986. In 1992, in Paris, he founded MCA – Mario Cucinella Architects, an architecture and design firm that has now headquarters in Bologna and Milan, and of which he is also the creative director.

Mario Cucinella:

SUSTAINABILITY IS NOT ABOUT NUMBERS, KILOWATTS, OR CO₂ EMISSIONS. IT IS ABOUT BEAUTY



Sustainable architecture is architecture that seeks to minimize the negative environmental impact of buildings through improved efficiency and moderation in the use of materials, energy, development space and the ecosystem at large.



Italian architect Mario Cucinella presented his design philosophy at the Imagine a Sustainable World exhibition, which opened at the Nur Alem Museum of Future Energy in Astana on February 24. The exhibition, initiated by the Italian Embassy in Kazakhstan with the support of QazExpoCongress company and ICE Agency, is part of initiatives related to the Italian Design Day.

The exhibition, curated by architect Dario Curatolo, aims to highlight Italian achievements in the field of regenerating space. At its opening, the Italian Ambassador to Kazakhstan, Marco Alberti, noted the special role of culture as a driving factor of peace, development and reconstruction.

Qazaq Green magazine took an interview with the Ambassador of Italy to Kazakhstan Marco Alberti and the exhibition's author, famous architect Mario Cucinella.



Q: You know that the President of Kazakhstan approved at the beginning of February the strategy for achieving carbon neutrality, which is the first step. So do you think that it's possible for Kazakhstan to make a great transformation strategy from the energy sector, which 70% depends on coal, and which has to diversify all of the economy?

M.A.: I think it's possible. The challenge is transforming the targets, objectives and commitment into action. That's the point. Climate, as I declared in the previous Qazaq Green interview, does not react to what the government, the organisation or the people say. It reacts to what they do. So the first step is to have a framework, have a new strategy. The second more important step is to implement the strategy and to have a serious transformation. In renewable energy, you need to act on the entire value chain. When you go green, you go electric. When you go electric, you go digital. So the structure is fundamental. The new concept and the new design on the demand side are necessary to educate the consumer to move from aspiration to execution of projects. That's very important too. Kazakhstan and Kazakh governments took the first step.



Now, it's a question of cooperation, because I think that as long as sustainability is not rewarding, economically speaking, the transition will be difficult. So the transition is a question of the government, but also companies. And companies move when they believe in something, but also when they know that it can be profitable.

Q: We know that Italian companies are very proactive in Kazakhstan in the energy sector, especially in renewable energy as well. So, I think currently, Kazakhstan is a very good leader in making strategies and making those good steps. What practical steps, in your opinion, can Kazakhstan take within the framework of the strategies it has developed?

M.A.: If you assume that for the rational and effective transition, you need to consider the power sector, I would say that the weak point, not only for Kazakhstan but for the entire world, is not adding the renewables, but preparing the entire system for the transition. For example: what about the distribution of transportation, and distribution of infrastructure quality? Or how digitised the infrastructures are?

MARIO CUCINELLA ARCHITECTS

is an architectural and design firm. With an international team of one hundred professionals including architects, engineers, designers, model makers and visual artists, the firm was established in Paris in 1992 and has offices in Bologna (from 1999) and in Milan (from 2018). With projects around the world, the firm has received several national and international awards over the years, especially for its focus on environmental issues. MCA has extensive experience in architectural design that combines environmental and energy efficiency strategies and relies on an R&D (Research & Development) department that carries out research on sustainability with a holistic approach.

The design with BIM (Building Information Modeling) methodology is developed internally thanks to a process management team composed of BIM Manager and BIM Coordinator. The studio can also boast a product, interior & industrial design department. All projects have in common a focus on technological integration with environmental and climate strategies to build buildings that can reduce their environmental impact in view of the 2030 European objectives.

How much is ready to absorb the additional quantity of renewables? I have noticed that when people talk about energy transition, 95% of people talk about renewables. They are very important. Last year, the world record investment in renewables was 495 billion. But renewables alone don't solve the problem. What I think is important is not to focus on all the investment, all the commitment, on the generation, but to consider the entire value chain, which also includes new services for people who are educated within and prepared for the transition risk, sacrifices and costs. The question that I ask myself, the question I ask my kids, the question I ask my government and the question I ask the Italian companies is "How much are you ready to invest or sacrifice, or have you something better for transition?"

Q: Good. Today is a very nice exhibition opening. Can you tell me what kind of other initiatives of the Italian embassy in Kazakhstan we have on the green agenda?

M.A.: Yes. Who would like me to have some initiatives to emphasise the commitment to it? Today we are talking about something that is not generational with energy, something that includes and supports the transition. Then we will participate in some workshop in Kazakhstan dedicated to renewable energy. And last

but not least, at the end of the year, I would like to bring to Kazakhstan some companies in the sectors of our nation, particularly in transportation and distribution of energy. Because I strongly believe that that's the key point in enabler. For the transition on one side and the other side, we have tons of top-notch technology from Italian companies that can partner in Kazakhstan in order to accelerate and expedite the transition, to reach carbon neutrality by 2060.

Architect Mario Cucinella emphasises that his mission is to design buildings to make people's lives better.

Q: So the first question. Why is sustainability the main topic of the exhibition?

M.K.: Because there are no options. Because I think the agenda of the next 30 years is all about using better energy and reducing the impact of CO2 in the world. I think that is the topic of this study. I think this exhibition sends a positive message: we can make a better world, we can make better buildings, and focus on one fundamental thing – we design buildings for people design buildings for others, we design schools, towers, offices, and residential buildings. Architects build buildings and don't destroy buildings and don't destroy cities. Our aim is to build a better world. We can make beautiful sustainable buildings





Architect Mario Cucinella emphasises that his mission is to design buildings to make people's lives better.

QC: Yes, many philosophers and culturologists say that there is a gap between human and nature, especially in the 20th century, because of the industrial revolution, because of the wars and many outer states. What kind of model of relationship should be between human and nature? And how architecture could help to build these relationships?

M.K.: The relationship between human and nature is a long story. I think in the last century we lost because we believe more in technology than nature. But then what's happened then with technology? We cannot save the world, but that's the point. I think within the last 10 years, especially young generations realised, that we cannot save nature. There's no money, there's no technology that can save this. So I think these are kinds of questions now that come more, more strong. There's no way to have a broken electronic nature. We believed that for too many years, we can live without nature. But then nature is presenting the bill. Besides, we can, although expensive,

we can do it. So I think we need to rebuild this kind of friendship. And see, then we are not the only ones in the class. We are not the biggest. Maybe the most intelligent. But in terms of numbers, we are not the big numbers. The animals, the plants, they're much more than us. In the last century, it was the human being in the center of the universe. We understand we are not the center. We are only a part of it. Be kind. We need time to change this kind of philosophy. Sustainability is not about numbers, kilowatts, or CO₂ emissions. It is about beauty. I consider myself deeply Italian by combining technology with beauty. I am very confident that the new generation will become more and more aware. You need maybe 20-30 years to change the generation. That is the process. There are no options.

QC: The topic of your exhibition is **Imagine the Sustainable World. How do you imagine it?**

M.A.: The exhibition called "The Imagine a Sustainable World" is a wish, because the best thing we can do is not imagine, but do it. The point is we cannot imagine too long. I think we need to make it. We need to do a change. If you don't make something of a very good change, you don't deserve the change. That's all we need to do there is no option on the table.

INFORMATION ON ELECTRICITY PRODUCTION BY RES FACILITIES AT THE END OF 2022

INSTALLED POWER INCLUDING:

2 388 MW



WIND FARMS

958 MW

2 411 mln. kWh

SOLAR POWER PLANTS

1 148 MW

1 763 mln. kWh



POWER GENERATION INCLUDING:

5 110 mln.kWh



SMALL HYDROPOWER PLANTS

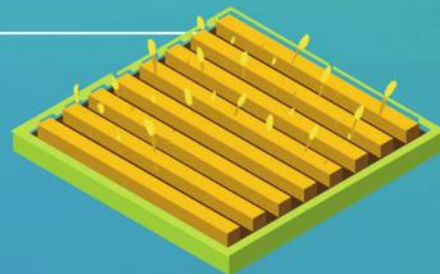
280 MW

934 mln. kWh

BIO POWER PLANTS

1,77 MW

1,98 mln. kWh



Share of renewable electricity generation in total electricity generation is **4,53%**

The increase of electricity generation by RES facilities in 2022 made **27%** compared to 2021



QAZAQ GREEN

QAZAQ GREEN.
LONGi has awarded the Qazaq Green RES Association as the best partner in Kazakhstan.

Asset Ongarbayev, Regional Director - Kazakhstan of LONGi MEA & CA Region, presented the award to Nurlan Kapenov, Chairman of the Board of Directors of the Qazaq Green RES Association, and Ainur Sospanova, Chairperson of the Association.



LONGI

AWARDS QAZAQ GREEN AS BEST PARTNER IN KAZAKHSTAN



With a view to promote energy transition in the world, especially in Central Asia, LONGi joined the Qazaq Green Renewable Energy Association in October 2022.

Founded in 2000, LONGi is committed to being the world's leading solar technology company, focusing on customer-driven value creation for full scenario energy transformation.

Under its mission of 'Utilizing Solar Energy, Building a Green World' and brand philosophy of 'Steadfast and Reliable Technology Leadership', LONGi has dedicated itself to technology innovation and established five business sectors, covering mono silicon wafers, cells and modules, commercial & industrial distributed solar solutions, green energy solutions and hydrogen equipment. The company has honed its capabilities to provide green energy and has, more

recently, also embraced green hydrogen products and solutions to support global zero carbon development.

THE **QAZAQ GREEN RES ASSOCIATION** WAS FOUNDED IN 2018 TO SUPPORT THE DEVELOPMENT OF THE RENEWABLE ENERGY SECTOR IN KAZAKHSTAN AND BRINGS TOGETHER INVESTORS, DEVELOPERS AND EQUIPMENT MANUFACTURERS, AS WELL AS INTERNATIONAL FINANCIAL INSTITUTIONS, RESEARCH AND DESIGN INSTITUTIONS. THE ASSOCIATION IS ACCREDITED WITH THE MINISTRY OF ENERGY OF THE REPUBLIC OF KAZAKHSTAN, THE MINISTRY OF ECOLOGY, GEOLOGY AND NATURAL RESOURCES OF THE REPUBLIC OF KAZAKHSTAN AND THE NATIONAL CHAMBER OF ENTREPRENEURS OF THE REPUBLIC OF KAZAKHSTAN "ATAMEKEN" AND IS CURRENTLY ONE OF THE KEY EXPERT CENTERS FOR THE DEVELOPMENT OF RENEWABLE ENERGY IN KAZAKHSTAN FOR BOTH GOVERNMENT AGENCIES AND BUSINESS COMMUNITIES.

DIALOGUE:

EUROPEAN UNION – CENTRAL ASIA



Chairman of the Board of Directors of Qazaq Green took part in the 7th European Union - Central Asia High-level Conference, which took place on February 23-24 in Rome, Italy.



R

epresentatives of the Governments of Central Asian countries,

the European Union and EU Member States responsible for environmental, climate change and water policy, international, regional and non-governmental organizations met at the 7th EU-Central Asia High-level Conference on February 23-24 this year in Rome. The conference was organized within the framework of EU-Central Asia Platform on Environment and Water Cooperation and was held at the Italian Ministry of Foreign Affairs.



Three main goals of the conference were announced:

- to present the results of the activities of the EU–CA Platform on Environment and Water Cooperation and its Working Group on Environment and Climate Change (WGECC) since January 2019;
- To Identify priority areas for EU–CA Platform for 2023-2025;
- To discuss and agree on practical steps to enhance policy dialogue and capacity development in the field of environment, climate change and water resources in Central Asia.

NURLAN KAPENOV SPOKE AT THE SESSION "NGOS / REPRESENTATIVES OF CIVIL SOCIETY ORGANIZATIONS: OPINION OF CIVIL SOCIETY" WITH A REPORT ON: "RES DEVELOPMENT IN KAZAKHSTAN: ACHIEVEMENTS, PROBLEMS AND POTENTIAL". THE SESSION WAS ALSO ATTENDED BY REPRESENTATIVES FROM KYRGYZSTAN, TURKMENISTAN, TAJIKISTAN AND UZBEKISTAN. THE MAIN DISCUSSION AT THE SESSION WAS DEVOTED TO THE MAIN CHALLENGES AND OPPORTUNITIES FOR THE CENTRAL ASIAN REGION TO ACCELERATE THE "GREEN" TRANSITION AND ACHIEVE SUSTAINABLE DEVELOPMENT GOALS FROM THE POINT OF VIEW OF CIVIL SOCIETY.

The conference was organized within the framework of WECOOP project "European Union – Central Asia: Cooperation in the field of water resources, environment and climate change (WECOOP)", which was resumed by the European Union in October 2019. The project continues to strengthen the dialogue on sustainable development between the Central Asian countries and promotes the expansion of their cooperation with the EU in the field of environmental protection and climate change. In particular, the project's activities are aimed at improving and rationalizing political strategies and strengthening the capacity of national ministries and

government departments working in relevant fields.

The WECOOP project aims to improve environmental, climate change and water policy in Central Asia through its convergence with EU standards, as well as to stimulate "green" investments in relevant sectors of the economy in order to help achieve considerable reduction in pollution caused by human activities, including carbon dioxide (CO₂) emissions.

The project activities will include support for the EU–Central Asia Platform on Environment and Water Cooperation (Platform) and EU–Central Asia Working Group on Environment and Climate Change (WGEC). The latter include representatives of the European Commission's Directorate General for Environment and Climate. 



Expected results of the project:

- raising environmental awareness among decision makers in industry and civil society;
- improving environmental policy in Central Asia, including on water resources and climate change;
- identification, development and submission of investment opportunities in environmentally sound infrastructure that contribute to a measurable reduction of anthropogenic pollution to international financial institutions.



CARBON NEUTRALITY

By the Decree of the President of the Republic of Kazakhstan dated February 23, 2023, the Strategy for Achieving Carbon Neutrality of the Republic of Kazakhstan until 2060 was approved. In December 2020, at the summit of climate ambitions, Kazakhstan announced a new goal – achieving carbon neutrality by 2060, confirming its commitments under the Paris Agreement on preventing global temperature growth by more than 1.5–2°C. Thus, the work on documents was carried out for several years, taking into account that the Government of the Republic of Kazakhstan had previously worked on Concept of Low-Carbon Development of Kazakhstan until 2050. We will try to reflect the key aspects in terms of the development of electric grid and RES, which were covered by the Strategy.

Strategy for achieving carbon neutrality of the Republic of Kazakhstan until 2060 has been developed taking into account global climate trends and in compliance with relevant international commitments. The Strategy defines national approaches, the strategic course of state policy for consistent transformation of economy to ensure well-being, sustainable economic growth and equitable social progress and is adopted to ensure the coherence and coordination of state policies.

Kazakhstan signed the Paris Agreement on August 2, 2016 and ratified it on December 6, 2016. Before the official signing of the Paris Agreement in September 2015, Kazakhstan demonstrated its commitment to its goal by presenting its NDC within the framework of UN Framework Convention on Climate Change, which assumes the achievement of the following goals:

- unconditional reduction of GHG emissions by 15% by December 2030 compared to 1990;
- conditional reduction of GHG emissions by 25% by December 2030 compared to 1990, subject to additional international investments, access to a mechanism for transfer of low-carbon technologies, funds from Green Climate Fund and flexible mechanism for countries with economies in transition.

The structure of national GHG emissions is dominated by three GHGs with a total share of more than 99.5%:

- **81.6% of national GHG emissions are represented by carbon dioxide (CO₂), which is mainly released during the combustion of organic fuels**, as well as in arable farming;
 - 12.4% - methane (CH₄), released mainly in the processes of extraction, transportation, transshipment/storage of fuel, biodegradation of organic waste and animal rearing for production of meat, milk, wool and hides;
 - 5.6% - nitrous oxide (N₂O).

The remaining types of GHGs enter the atmosphere as a result of industrial processes.

The largest share of GHG emissions in Kazakhstan is accounted for by the Energy sector (77.6% of national net emissions), followed by the importance of the contribution to national emissions by the Agriculture sector with a share of 11.6% and further descending: "Industrial processes and use of products" (IPUS) (6.3%), "Land use, land-use change and forestry" (LULUCF) (2.4%) and "Waste" (2.1%)



Strategy notes that greenhouse gas emissions from primary energy production (extraction sector) account for 16.6% of all GHG emissions (58.3 million tons of CO₂ equivalent). Of these, 8.1 percentage points are volatile emissions, and 6.7 percentage points are covered by volatile emissions from coal mining (23.7 million tons of CO₂ equivalent in 2020).

The final demand for energy consists of direct combustion of fuel in industry, transport, agriculture, as well as residential and non-residential buildings; use of electric and thermal energy. In the structure of fuel and energy resources used in the country (150.7 million tons of oil equivalent), oil and petroleum products account for 41%, coal and coal products - 29.4%, natural gas, including compressed (motor fuel) - 7.6%, electricity - 16.2%, heat - 5.8%.

Despite the fact that in the structure of used fuel and energy resources, coal and coal refining products account for 29.4% (in comparable energy units of measurement), the contribution of coal to national net emissions exceeds 55.7%. Therefore, the gradual withdrawal of Kazakhstan's economy from coal

Therefore, the gradual withdrawal of Kazakhstan's economy from coal dependence is important for low-carbon development and achieving carbon neutrality by 2060.

dependence is important for low-carbon development and achieving carbon neutrality by 2060.

In 2020, the country's power plants and thermal power plants (boilers) generated 108.1 billion kWh of electric and 91.2 million Gcal of thermal energy. The sector's contribution to national net GHG emissions amounted to 31.6% or 110.9 million tons of CO₂ equivalent.

In 2020, 68.9% of electricity and 99% of heat were produced on the basis of coal combustion. 20% of electricity was generated on natural gas, 0.05% on fuel oil. Hydroelectric power plants generated 8.8% of electricity. Wind power plants, solar power plants and biogas plants produced 2.2% of the generated electricity (taking into account small hydroelectric power plants, the share was 3.0%).

Most power plants operate using outdated technologies that exceeded the design life. In 2020, there were 179 power plants in Kazakhstan: 68 thermal power plants (thermal power plants) (28 coal, 38 gas, 2 fuel oil), of which 41 are CHP plants (CHP); 51 HPPs (45 of them are small HPPs with a capacity of up to 35 MW), 28 wind farms, 31 SPP and 1 Biogas plant. The average age of coal-fired power plants was 55 years, gas - 40 years, hydroelectric power plants - 56 years. About 39% of installed generating capacity is over 40 years old and 64% is over 30 years old.

The distribution systems of both electricity and heat are also worn out, which lead to high losses in energy distribution (up to 35% of total electricity losses in some regions) and are one of the factors that increase GHG emissions from the sector.

Therefore, low-carbon development and the achievement of carbon neutrality in Kazakhstan by 2060 will require a deep transformation of the energy system and will consist of three main elements:

- 1) decarbonization of primary energy supplies;
- 2) decarbonization of electric and thermal energy production;
- 3) decarbonization and highly efficient end-use of energy in buildings, transport and industry.

The greatest reduction in GHG

emissions in the energy sector will be achieved through a shift towards more sustainable energy sources: by gradually reducing the volume of fossil fuels, switching to the use of electricity and heat instead of direct burning of fossil fuels. Decarbonization of the energy sector requires the use of natural gas as an intermediate fuel and for this purpose geological exploration will be carried out to identify new gas fields. Alternative and renewable energy sources will be actively developed in the process of decarbonization.

Improving energy efficiency and switching to low-carbon technologies in all sectors of the economy will cause significant changes in the supply of primary energy.

LOW-CARBON DEVELOPMENT AND CARBON-NEUTRAL SYSTEM OF 2060 INVOLVE THE FOLLOWING TRANSFORMATIONS:

1

gradual replacement of coal with alternative and renewable energy sources;

2

displacement of burning of fossil fuels in the structure of final consumption to the lowest possible level through the electrification of energy consumption in all sectors of the economy;

3

transition to the use of hydrogen, biofuels and synthetic low-carbon fuels in processes that will be difficult or impossible to electrify;

4

application of carbon capture and storage technologies.

For low-carbon development and achieving carbon neutrality, a gradual, planned reduction in the share of coal generation with an increase in the share of renewable energy and alternative energy, as well as the use of natural gas as an intermediate fuel, will be carried out until 2060. The capacity structure will include nuclear power plants as a stable source of energy, so a long-term vision for development of nuclear energy will be developed.

Due to the growing share of electricity generation from renewable energy sources and alternative sources, additional input of maneuverable generation sources is needed. In this regard, a long-term vision for development of solar and wind generation will be developed.

In the medium and long term, there is uncertainty about the availability of sufficient water resources, so a long-term vision for development of hydropower will be formed.

In the medium and long term, carbon capture and storage technology is expected to be used for GHG capture. In this connection, a vision will be developed for decommissioning coal-fired facilities with current operational life of more than 30 years and the introduction of carbon capture and storage technology for those units that will continue to operate after 2035. At the same time, the coal capacities being withdrawn will be given priority right to implement "green" projects in the field of energy.

At the same time, gasification of existing coal facilities can also contribute to reducing emissions.

The production of centralized thermal energy will be decarbonized due to the transition from coal to natural gas, use of renewable energy in the form of geothermal energy (heat pumps) and biofuels. Decentralized (individual) autonomous heat supply systems will become the main goal of technological changes. In the medium and long term, the use of geothermal energy and hot water supply due to solar energy will be actively developed, therefore, a vision for their development will be developed.



In addition, development of small-scale renewable energy sources, development of "smart" electric power industry will be stimulated, as well as other approaches to decarbonize the electricity and heat generation sector will be used.

At present, coal-fired generation retains a dominant position in the production of electricity and heat, but for low-carbon development and achieving carbon neutrality, a phased, planned reduction in the share of coal generation will be provided until 2060.

The development of renewable energy sources will be a key condition for successful decarbonization. Thus, wind, given its quality and availability in the country, will become the main resource for development at earlier stages, while solar energy will become a key technology at a later stage, when the cost of investments in SPP will noticeably decrease.

In the long term, the use of RES will be accompanied by energy conservation systems, which will allow regulating the supply of electricity and better integrating RES into the energy system.

The strategy of achieving carbon neutrality of the Republic of Kazakhstan until 2060, being a strategy for economic diversification and its technological breakthrough, should become a new long-term strategic document during the renewal of socio-economic policy of the country.





RES IMBALANCES IN 2022

Analytical data for 2022 showed that the total imbalances from renewable energy facilities, both positive and negative, amounted to 1 867.8 million kWh with an actual generation of 4 561.6 million kWh! A big problem in the issue of forecasting the production of electric energy by renewable energy facilities is the lack of financial instruments to stimulate their compliance. In total imbalances indicators, the SPP accounted for about 527 million kWh or 28%, WPP – 1257 million kWh or 67%, HPP – 84 million kWh or less than 1%.

The peak of imbalances in the energy system from renewable energy sources was noted in March and amounted to 93 million kWh of under-generation, 89 million kWh of electricity over-generation for all types of renewable energy sources.

THE HOURLY AVERAGE DEVIATION BY TYPES OF RENEWABLE ENERGY SOURCES FOR 2022:

SPP – 42,08%; WPP – 60,39%; HPP – 23,41%;

THE LARGEST AVERAGE DEVIATION BY MONTHS OF THE SPECIFIED PERIOD FOR ALL TYPES OF RES WAS NOTED IN JANUARY: SPP – 61.79%, WPP - 70.28%, HPP - 27.30%. THIS WAS DUE TO DIFFICULTIES OF SEASONAL NATURE TO FORECAST PRODUCTION FOR SPP AND HPP.

At the same time, the number of hours for deviations from a certain range was:



Deviation range	SPP*	WPP	HPP			
x<10%	1174	13%	1014	12%	4226	48%
10%<x<20%	671	8%	635	7%	1492	17%
20%<x<30%	474	5%	653	7%	889	10%
30%<x<40%	382	4%	590	7%	447	5%
40%<x<50%	335	4%	610	7%	302	3%
50%<x<60%	297	3%	624	7%	209	2%
60%<x<70%	290	3%	585	7%	143	2%
70%<x<80%	278	3%	622	7%	152	2%
80%<x<90%	266	3%	647	7%	313	4%
x>90%	682	8%	2781	32%	587	7%

**taking into account the hours of sunshine for the period under review*



SIGNIFICANT IMBALANCES OF ELECTRIC ENERGY THAT WILL ARISE DURING THE OPERATION OF BALANCING ELECTRICITY MARKET IN REAL TIME, AN INCREASE IN DEPENDENCE ON THE ENERGY SYSTEM OF THE REPUBLIC OF KAZAKHSTAN WILL LEAD TO FINANCIAL RISKS ON THE SIDE OF RES BALANCE PROVIDER. IN THIS REGARD, IT IS NECESSARY TO WORK OUT THE ISSUE OF INTRODUCING OF ACCURATE FORECASTING SYSTEMS BY RES FACILITIES IN THE SHORTEST POSSIBLE TIME.

Source: Financial Settlement Center of RE LLP

WHO KNOWS ABOUT RES IN KAZAKHSTAN



Within the framework of the project "Reducing the risks of Investing in RES", UNDP in Kazakhstan, in partnership with the Ministry of Energy of the Republic of Kazakhstan, with the financial support of the Global Environment Facility (GEF), conducted the study of public awareness of RES introduction.

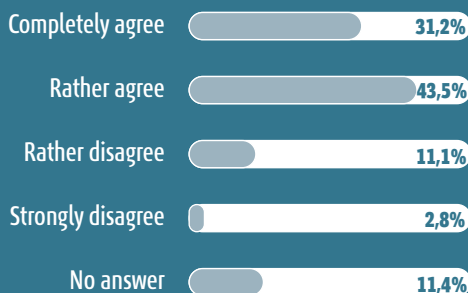


Perception of RES

The study involved 2546 people from all regions of Kazakhstan, including representatives of business, academic structures, business associations, experts in the field of renewable energy.

Renewable energy sources are part of a popular environmental narrative

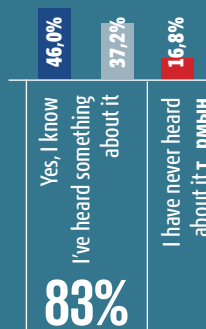
75% of respondents support the idea that humanity needs to create a world that would be fully supplied with renewable energy.



However, not everyone has an understanding of what it is

83% of respondents know something about renewable energy

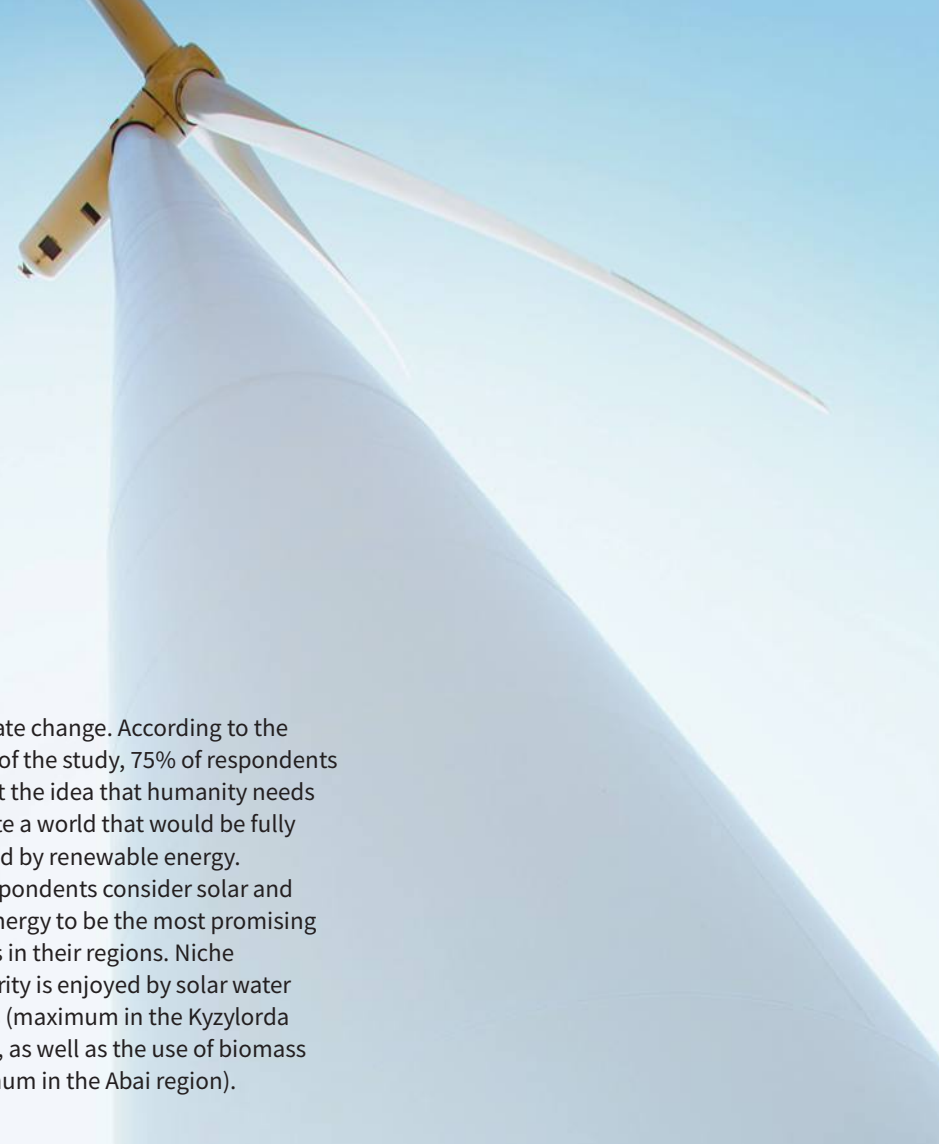
Do you know what renewable energy is?



Do you know the differences between renewable and non-renewable energy sources?



21% of respondents don't know what exactly RES is but want to follow the fashion



The results of the study showed that education plays a key role in raising awareness about renewable energy. Experts suggest the need to make changes to educational programs both at the level of the school curriculum and additional education in the field of renewable energy. For example, to develop training programs for workers, engineers, managers, young designers and other categories.

In addition, it turned out that there were significant differences in awareness among men and women. Women are significantly less involved in the implementation of "green" agenda, although the renewable energy sector is more attractive to women because of its interdisciplinarity. It should also be noted that women in Kazakhstan make up less than 30% of workers in the field of renewable energy. Their representation at the decision-making level is several times less.

Thus, 83% of Kazakhstanis know about renewable energy and are deeply immersed in the environmental agenda, and 76% of respondents agree that human activity is the main cause

of climate change. According to the results of the study, 75% of respondents support the idea that humanity needs to create a world that would be fully supplied by renewable energy.

Respondents consider solar and wind energy to be the most promising sources in their regions. Niche popularity is enjoyed by solar water heaters (maximum in the Kyzylorda region), as well as the use of biomass (maximum in the Abai region).

Direction of movement

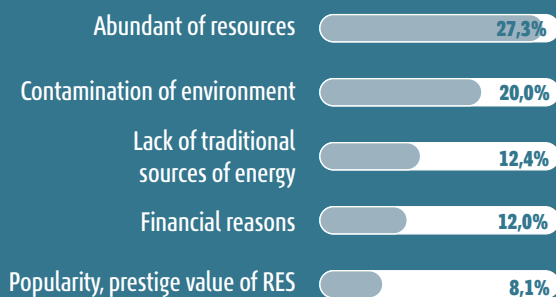
Three reasons for switching to renewable energy:

- old resources are running out
- there are new renewable resources available in the country
- the transition to them will lead to an improvement in the environmental situation, it is prestigious and it is financially supported by the state

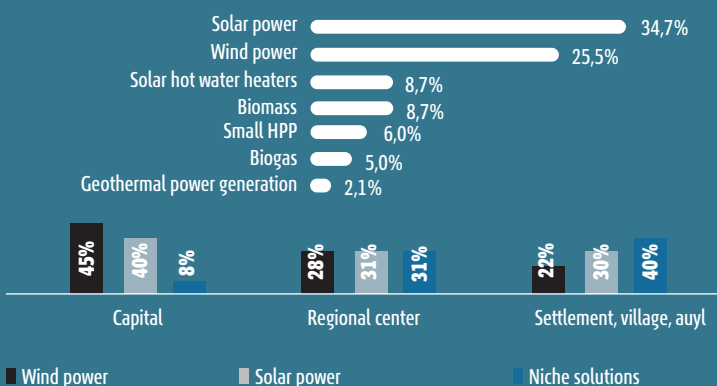
Direction of the path
The respondents consider solar power generation and wind power to be the most promising. Other sources enjoy niche popularity

Consideration of local peculiarities
In order to avoid social risks, the transition should be carried out taking into account regional and other differences

Reasons for switching to RES



What kind of renewable energy sources do you consider the most promising in your region?



12% of Kazakhstanis already use some renewable energy sources at home for a number of reasons.

The largest number of respondents indicated a desire to protect nature and save on utility bills, while some were forced to use renewable energy due to the lack of other sources.

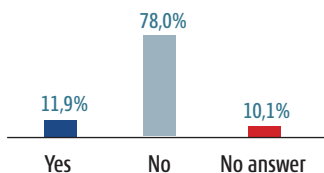
Change of motivation

12% of respondents say they use renewable energy sources at home

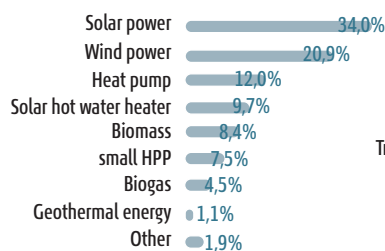
➤ The most used technologies in households

➤ The main motives: social, economic and forced

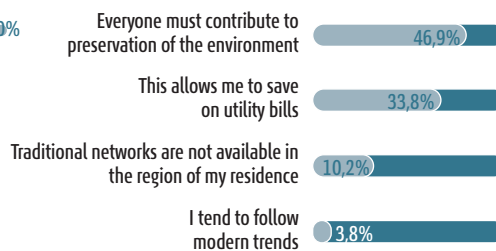
Do you use renewable energy at home?



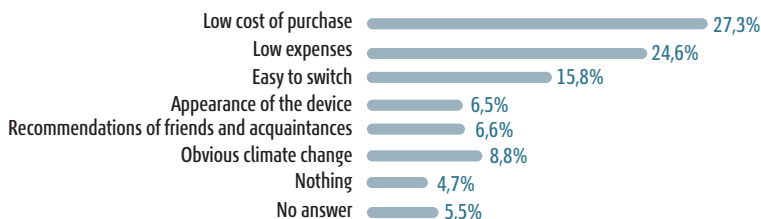
Which renewable energy technologies do you use at home?



Why did you decide to use renewable energy?



Which of the following can influence your decision to switch to renewable energy sources?



The social factor was of great importance at the first stage, then for the further development of renewable energy, it is necessary to develop an economic offer to the population (more details below).

The results of the study showed that the population supports gradual energy evolution in a country where renewable energy is a strategic goal, and gas is considered as an intermediate solution.

One of the already adopted documents – the "Concept for development of electric power industry of the Republic of

Kazakhstan until 2035" – provides an increase in the capacity of renewable energy facilities to 7 GW by 2030 among the list of goals. At the same time, the share of renewable energy in total electricity generation should reach 15% by 2030 and 50% by 2050, the share of "green" energy will increase from the current 4.5% in 2022.





Attitude to the state policy for transition to RES

“Perception ladder” of governmental initiatives:

91% of respondents expect efficient government actions for RES development

47% heard something about initiatives

21% can specify concrete initiatives

It is expected that these measures will be stimulating, not directive

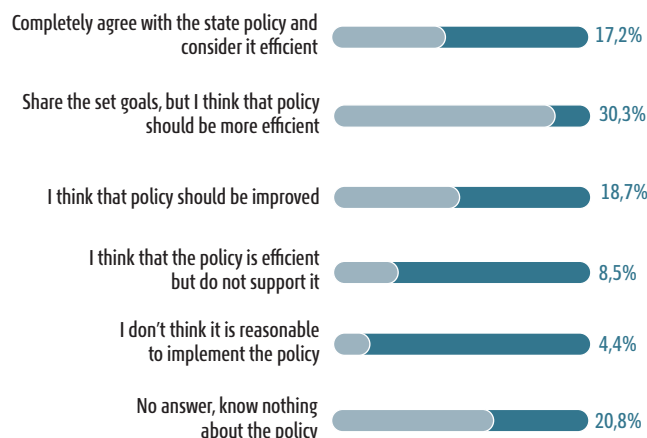
34% of respondents say about only stimulus measures

26% of respondents indicate possible combination of stimulus and directive measures

20% of respondents indicate use of directive measures in limited scale

There is a risk that the state policy for RES development may lead to an increase in the polarization of opinions in society

What is your assessment of state policy for distribution of use of RES in Kazakhstan?



91% of respondents support the participation of the state in development of renewable energy. 47% of respondents have heard something about the actions of the authorities on development of renewable energy. However, 21% of respondents were able to recall specific initiatives. According to experts, this is a high indicator for such a new industry.

It should also be noted that there are certain costs for business and society when expanding the use of renewable energy in the energy sector. They include high cost of energy generated using renewable energy in comparison with the cost of energy from traditional sources; transition to "clean" energy, which will require a large-scale restructuring of the entire energy infrastructure; dependence of energy production volumes on weather conditions and, as a

consequence, the need to create a system of reserve and storage capacities.

According to experts, the costs of switching to renewable energy, increase in energy costs and the potential increase in the number of unplanned outages during the restructuring of the energy infrastructure are likely to be critically perceived by society. In turn, the majority of respondents talk about the need to stimulate producers and consumers and soft directive influence, without hard promotion.

It should be noted that the majority of Kazakhstanis indicated the Internet as the main source of obtaining information about renewable energy sources. However, traditional media are still of great importance in regions and small settlements.



THE QAZAQ GREEN RENEWABLE ENERGY

School will improve the competence of civil servants and power engineers



Taking into account modern trends – the decarbonization of the country's economy and the growing demand for "clean" energy, the need for training and informing various target groups becomes urgent. We talked about the prospects of studying at short-term courses with Ainur Sospanova, CEO of Renewable Energy Association "Qazaq Green".

– Ainur Saparbekovna, why is short-term education becoming relevant at the current stage?

– Recently, the growing demand for renewable energy has become noticeable, its potential is becoming more significant. In this regard, it can be argued that in the next 20 years, short-term training courses on this topic will become critically important for the industry. Even those graduates who have recently graduated from universities and colleges will have to replenish their knowledge in the workplace. Therefore, they will need to complete continuous professional training courses.

With this need in mind, our Association has opened Qazaq Green Renewable Energy School.

The course is designed taking into account the principle of flexibility. This means that the course can be adapted both for beginners in the field of renewable energy, and for experienced professionals who want to replenish their knowledge.



The course is designed taking into account the principle of flexibility. This means that the course can be adapted both for beginners in the field of renewable energy, and for experienced professionals who want to replenish their knowledge.



We must be ready for the fact that the public, the population, and the corporate sector will actively participate in the processes of energy transition in Kazakhstan. This transition to "clean" energy sources should take place pragmatically, according to a smoother, softer scenario, since it all concerns both attracting investment and influencing tariffs, the energy system and, in general, the Earth's climate. The lack of competence and information about renewable energy is one of the main challenges of these processes. It is important that people obtain new knowledge, basics, skills of working with "green" technologies in the energy sector, so we decided that Renewable Energy School in RES Association "Qazaq Green" will be a logical continuation of the work that we have been doing over the past years.

We believe that knowledge related to renewable energy should be transferred not by theorists, but by people who have practical experience. We, the experts who worked on development of legislation to support renewable energy, implemented and built renewable energy projects in Kazakhstan, attracted investments, have something to pass on to those who need it, and we believe that our School will be able to do it.

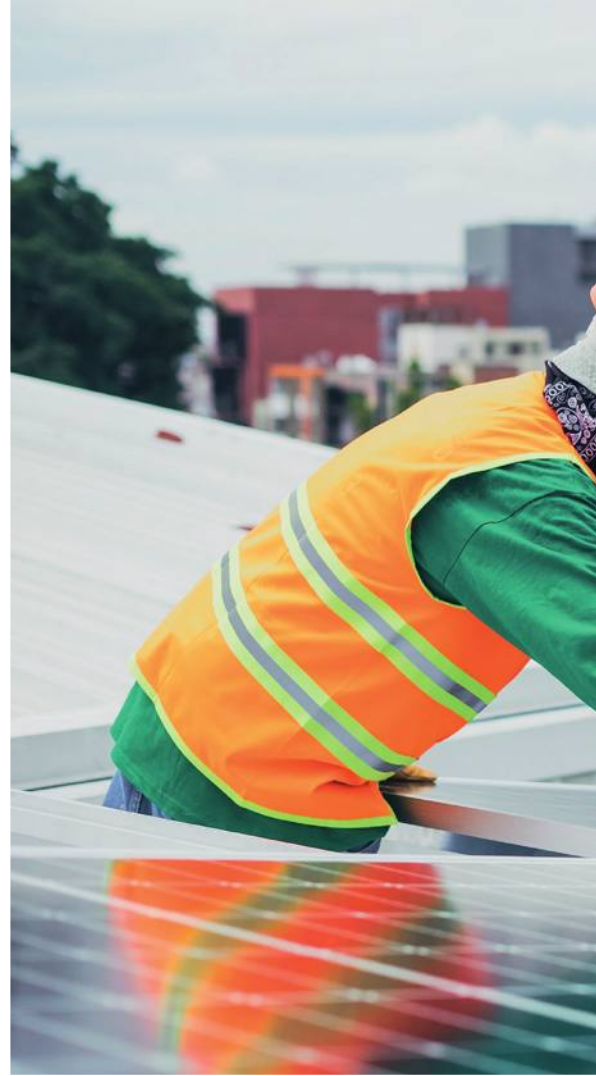
– Are there similar courses on the market? Please tell us about the goals and objectives of the Qazaq Green Renewable Energy School.

– There are, of course, similar short-term courses at universities. But our courses are different in that we have practical experience in implementing renewable energy projects. There is a second important point. We plan to organize a renewable energy landfill on the territory of our Association's office, where students will be able to get acquainted with various renewable energy technologies in practice, visually, work with ready-

We must be ready for the fact that the public, the population, and the corporate sector will actively participate in the processes of energy transition in Kazakhstan.

– How did the idea of creating the Qazaq Green Renewable Energy School come about?

– In the course of working with market participants, decision makers, companies and the corporate sector, we came to the conclusion that a lot of people lack knowledge, understanding of what renewable energy sources are, what are the advantages of using them, how to implement projects.



made renewable energy installations or on a mock-up, get information from the stands about the principles of operation of these energy sources. And this is very important, especially for those who would like to have a renewable energy installation in their home or use it in a farm.

For example, it is useful for farmers to see how the installation works, how to maintain it, what are the nuances associated with the technological solution. The most important thing is how to support this installation, because there are a lot of myths that installations do not work correctly, that it is impossible to support them without the participation of experts. In fact, these installations are quite simple to maintain. It is at these courses that we want to debunk such "legends".

– Who is the target audience of your School? Will this course be useful for young people?



– I think our target audience is very broad. If we structure it, first of all, I would recommend that representatives of state and local executive bodies responsible for development and implementation of policies related to renewable energy and climate change, take these courses. For example, akimats, within the framework of their functions, are obliged to allocate a land plot for investors who would like to implement renewable energy projects. Here absolutely simple questions arise: what should be the size of the land plot, what should be taken into account when allocating this land plot, how to calculate the potential of the land plot where investors want to build this facility. Akimat employees should at least know the basics of how renewable energy sources work, understand how to implement such projects, and generally understand the principles of state policy in this area.

The second category is representatives of the corporate sector. We have a lot of companies – oil, oil and gas, mining and metallurgical. These are large consumers of electricity who are now asking the question of how to reduce greenhouse gas emissions, reduce the carbon footprint of manufactured products. And here one of the most effective ways to reduce CO₂ emissions is implementation of renewable energy projects instead of "dirty" coal generation.

These companies can replace RES with old energy sources and thus reduce the carbon footprint of their finished products. The corporate sector, before thinking about the company's strategy to reduce emissions, should understand the basics of renewable energy.

The third category is, of course, young people who are standing in

the way of choosing a profession today. From this point of view, it will probably be interesting for them to study at these courses. Thanks to the knowledge gained, young people will be able to choose a profession related to renewable energy.

There are a lot of professions related to renewable energy around the green energy sector – lawyers, financiers who work with renewable energy projects, design institutes, consulting companies. It is important that young people understand that very many professions will disappear in the next 10-30 years, and specialties related to energy transition, with "clean" energy, on the contrary, will develop.

Kazakhstan has committed itself to achieving carbon neutrality by 2060. Accordingly, those sectors that will allow us to carry out this strategic course will develop. It is through

training courses related to the basics of renewable energy that young people will change their thinking and strive to work in the sectors of the "green" economy.

Thus, our Qazaq Green Renewable Energy School will contribute to achieving carbon neutrality in Kazakhstan.

– Thank you for the informative conversation. We wish Qazaq Green Renewable Energy School success! 🌱





STRATEGY OF DECARBONIZATION AND ACHIEVEMENT OF CARBON NEUTRALITY OF NAC "Kazatomprom" JSC until 2060

Recent global events have led to increased attention to energy security and diversification of energy generation sources, which has allowed nuclear power to come to the fore as an indispensable basic alternative to fossil fuels. Against the background of a global discussion of the challenges associated with climate change and the benefits of ESG policy development, we are witnessing a growing interest of the world community in the nuclear industry.



Telman Shuriyev,
Chief Expert of Production
Department of "NAC "Kazatomprom"
JSC

TODAY, DECARBONIZATION IS NOT ONLY A MEANS TO SOLVE ENVIRONMENTAL AND CLIMATIC PROBLEMS, BUT ALSO A WAY TO ENSURE THE DIFFERENTIATION OF ITS PRODUCTS AND ITS COMPETITIVENESS ON A GLOBAL SCALE.

According to International Energy Agency (IEA) report, nuclear power accounted for about 10% of global electricity production in 2020. Nuclear power is still the second largest source of electricity with low greenhouse gas emissions after hydropower.

Without nuclear power plants, total emissions from electricity production would be almost 20% higher.

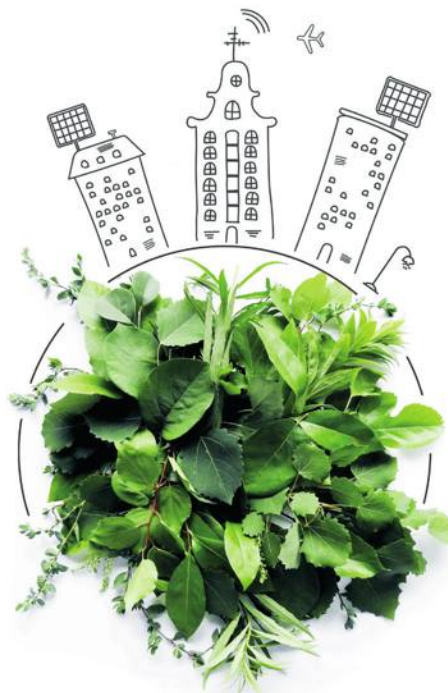
By 2040, 85% of the world's electricity will be produced from clean sources, compared to 36% today.

In this regard, Kazatomprom plans to play a significant role in implementation of energy transition efforts, while remaining committed to its strategy of creating long-term value, while observing high production standards and environmental safety.

Taking into account the trends and commitments of the country described above, the Company understands that it can make a significant contribution to achieving the goals and objectives of the country.

In this regard, in October 2022, Kazatomprom developed and approved a Strategy for decarbonization and achieving carbon neutrality, defining the Company's climate ambitions, systematizing the main approaches and understanding the current level of greenhouse gas emissions, as well as defining measures to reduce the carbon footprint.

According to the approved strategy, the Company has decided to reduce greenhouse gas emissions by 2030 to 10% compared to 2021 (Coverage 1.2), and by 2060 it is planned to achieve full carbon neutrality.



For information, the total carbon footprint of direct and indirect CO₂ emissions of Samruk-Kazyna Fund Group is estimated at the level of 57.8 million tons by the end of 2021.

Greenhouse gas emissions from direct and indirect emissions for 2021 amount to 949.4 thousand tons, where the share of direct emissions is 106.9 thousand tons or 11% of all greenhouse emissions, and the share of indirect emissions is 842.5 thousand tons or 89%, respectively.

Indirect emissions from Coverage 2 are predominant, and this is directly related to the purchase of energy resources, mainly by coal-fired power plants.

The structure of greenhouse gas emissions from Coverage 1 consists of boiler plants, mobile compressor stations with a diesel engine and motor vehicles.

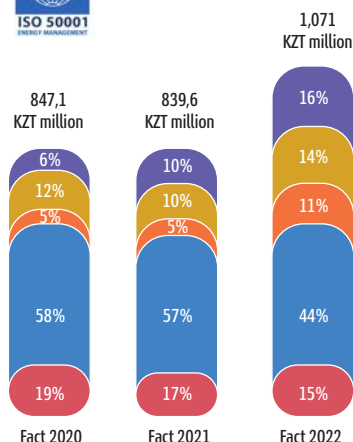
The proportion of direct greenhouse gas emissions in the structure of the Company's line of business: 59% – mining enterprises, 34% – auxiliary activities, 6% – nuclear fuel cycle.

Thus, the share of direct and indirect greenhouse gas emissions of Kazatomprom in the structure of all enterprises of the Fund by the end of 2021 is only 1.63%.

Despite these indicators, in order to achieve full carbon neutrality, Kazatomprom implements 3 types of decarbonization development scenarios until 2060 – pessimistic, realistic and optimistic, where realistic goals until 2030 – 10%, and optimistic – 15%.

The main tool for reducing direct greenhouse gas emissions is implementation of a project to optimize fuel consumption in motor vehicles, boiler houses and compressor units, as well as a partial transition to gas consumption.

Reduction of indirect emissions will be achieved by implementing a comprehensive energy efficiency and



- Decrease in consumption of FER due to modernization of production equipment and improvement of RRA
- Decrease in energy consumption of production processes
- Modernization of power equipment
- Savings from use of RES
- Savings from the use of renewable energy sources

In 2020-2022, economic effect from energy saving events is more than **KZT 2.75 billion**

energy saving program, increasing electricity consumption from renewable and alternative sources, implementing digital solutions aimed at optimizing electricity consumption, and purchasing carbon offset units.

Implementation of the approved decarbonization indicators directly depends on implementation of the energy saving and energy efficiency



program, which in turn solves not only environmental issues, but also brings economic benefits to the company.

Thus, in 2020–2021, economic benefits amounted to 840 million tenge or electricity savings of 38–40 million kWh. At the same time, the indicators for 2022 amount to 1.071 billion tenge.

The main energy saving and energy efficiency measures are: reducing the

The proportion of direct greenhouse gas emissions in the structure of the Company's line of business: 59% – mining enterprises, 34% – auxiliary activities, 6% – nuclear fuel cycle.



energy intensity of technological processes, reducing the consumption of fuel and energy resources, saving from the use of renewable energy and much more.

The total economic benefits for 2020-2022 amount to 2.75 billion tenge or 130 million kWh, diesel fuel consumption has also been reduced by 1100 tons, which had a positive effect on reducing direct greenhouse emissions.

The structure of electricity consumption by our enterprises shows that 76.17% is electricity consumption by our mining enterprises, and 23.83% is accounted for by UMP enterprises and service enterprises.

It follows from this that, according to the Pareto principle, we need to focus on the mining sector.

The structure of electricity consumption in the mining sector: 67.7% is accounted for by wellfield, where the main source of consumption is operation of submersible pumps and centrifugal pumping stations, 19.75% – the workshop for processing pregnant solutions (operation of large pumping stations and stationary compressor equipment), and 12.55% – auxiliary complexes and Refining shop.

To date, according to preliminary calculations, the indicators of greenhouse gas emissions by the end of 2022 have not been exceeded and have remained at the same level compared to 2021.

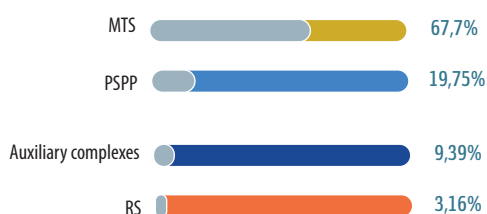
Last year, the production department carried out a lot of work on in-depth analysis of greenhouse gas emissions and modeling of possible scenarios for development of decarbonization, including mechanisms and tools for implementing the Decarbonization Strategy.

It can already be stated that direct and indirect greenhouse gas emissions will be significantly less than in previous years, due to a reduction in electricity consumption from coal-fired power plants and an increase in consumption from renewable energy sources, as well as use of a number of energy-efficient and energy-saving measures.

Percentage ratio of consumption of electric energy of Mining and Service subsidiary and affiliates



Consumption of electric energy by facilities of subsidiaries and affiliates for 2021 (%)



"GREEN" DEVELOPMENT OF THE FUTURE:

thematic business visit to Belgium on "green" economy for Central Asian countries

A

izhan Mussakanova, Trade & Investment Counsellor of Belgium in Kazakhstan, Head of the Representative Office of The Walloon Export-Investment Agency (AWEX Almaty)¹:

"I am glad to inform our compatriots about the successful holding of a thematic business visit to the Belgian region of Wallonia, which took place on November 21-25, 2022. This is the first specialized visit of such a delegation, which brought together experts and professionals in the field of renewable energy from three Central Asian countries: the Kazakhstan Renewable Energy Association "Qazaq Green", the Kazakhstan Waste Management Association "KazWaste", the Renewable Energy Association of Tajikistan and the Renewable Energy Association of Kyrgyzstan.

This event was of particular importance due to the fact that the Belgian Government announced during the 27th Conference of the Parties to the UN Framework Convention on Climate Change (COP27) about its strategy of promoting Belgian experience and expertise in the field of "green" technologies in developing countries. But this direction is also



Aizhan Mussakanova,
Trade & Investment Counsellor of
Belgium in Kazakhstan



¹ *Walloon Export & Investment Agency (AWEX) is a state organization established in 1998 that represents the foreign trade interests of the Wallonia region. AWEX is responsible for promoting and supporting the export of Walloon companies, as well as attracting foreign investment to Wallonia. The Agency operates on the principle of "one window" for interested foreign investors. The Kazakh representative office is also authorized to represent the foreign trade interests of the Flemish and Brussels regions.*

included in the plan of priority measures provided by the Walloon Export and Investment Agency to enhance the export of expertise and technological solutions of Walloon companies.

In this connection, the main purpose of this event was to study the best practices of using "green" technologies in the field of waste management (MSW and water resources, in particular, the use and management of small hydroelectric power plants) and further strengthen the development of "green" economy mechanisms in Kazakhstan, Kyrgyzstan and Tajikistan. I sincerely hope and believe that the "green" technologies developed and applied in Belgium will firmly settle in our country. After all, experienced professionals and true patriots of Kazakhstan are working on this, such as Nurlan Kapenov, Chairman of the Board of Directors of the Renewable Energy Association "Qazaq Green", Ainur Sospanova, CEO of the Renewable Energy Association "Qazaq Green", and Chairman of the Board of the Kazakhstan Association for Waste Management "KazWaste" Shynbolat Baikulov. I really want our children and their descendants to inherit a clean land, a careful attitude to nature and its resources, which are not infinite. To do this, we, all citizens of our country, must work together. I hope that the thematic business visit organized by AWEX Almaty and the high mission of the delegates will be a big step and a reliable foundation on the way to building a "green" economy in Kazakhstan.



THE THEMATIC BUSINESS VISIT BEGAN WITH AN INTRODUCTORY SEMINAR ON "GREENTECH: WALLONIA EXPERTISE", WHICH WAS ATTENDED BY REPRESENTATIVES OF THE BELGIAN GREENWIN CLUSTERS – ENRIQUE GONZALEZ, MECATECH – RAFAEL JAMES CONTRERAS AND VALBIOM – AURELIEN BARDELLIN. REPRESENTATIVES OF CLUSTERS PRESENTED THE ACTIVITIES OF THEIR ORGANIZATIONS, ONGOING PROJECTS, DEVELOPMENT PROSPECTS AND TRENDS OF THEIR INDUSTRIES.





During the seminar, Milena Gvozden and Hubert Siemes, representatives of the head office of the Wallonia Export and Investment Agency (AWEX Brussels), presented the European TAIEX INTPA program and financial support tools for various projects in the field of "green" energy.

TAIEX INTPA – is a tool of the Technical assistance and Information Exchange Program (TAIEX), within the framework of which experts from the public sector of the member states of the European Union provide short-term technical support at the request of public institutions of the partner countries. The program aims to strengthen the mechanisms of national development policy and promote the achievement of sustainable development goals in accordance with the EU commitments under the UN Agenda for the period up to 2030 and can cover any areas of knowledge and best practices of EU member states - from EU norms and laws in the field of border control and consumer protection to digitalization.

Within the framework of this program, the Ministry of Ecology and Natural Resources of the Republic Kazakhstan, with the support of the Kazakhstan Waste Management Association "KazWaste", is preparing an application for an expert

examination by holding a specialized seminar on the topic of EPS, an expert mission in Kazakhstan, and is also organizing a study trip for representatives of the ministry in order to receive detailed advice on

various issues related to the field of waste management and EPS.

The topic of medical waste disposal has always been relevant for humanity, but in the covid and post-covid period, against the background of the global epidemic and mass vaccination, the amount of medical waste, including in Kazakhstan, has increased many times, and this issue has become particularly acute. The company AMB Ecosteryl, located in the city of Mons (50 kilometers southwest of Brussels), is the author of a safe technological solution for the disinfection and processing of biomedical waste. This development is a 100% environmentally friendly innovation that has become a key institutional implementation in solving the global health crisis. Based on the results of thematic business visit, AMB Ecosteryl is currently negotiating with Kazakh partners on further implementation and use of its technology in the local market.

Construction waste in most developed countries today accounts for almost a third of all waste. In such a situation, the recycling process becomes a top priority. One of the objectives of the thematic



GREENWIN (www.greenwin.be) – is a competitiveness cluster engaged in innovations in the field of "green" chemistry and sustainable materials (including their use in buildings with low energy consumption).

Three strategic directions of GreenWin's activity:

- Development of new products based on the use of secondary or renewable raw materials (bio-sources)
- Development of new products and energy management systems
- Development of new technologies for processing and disposal of products at the end of their life cycle, as well as for use of waste as a new source of raw materials.

MECATECH (www.polemecatech.be) – is a cluster related to the field of engineering mechanics. The projects of this cluster have four main directions:

- materials of the future
- formation of global technologies
- microtechnologies and mechatronics
- maintenance.

VALBIOM (www.valbiom.be) covers the sectors of biomass energy and renewable raw materials (biomass chemistry). Valbiom is actively working on topics such as:

- Resources: flaxseed, rapeseed, cereals, chicory, beets, potatoes, hemp, by-products of the woodworking and agro-industrial industry
- Processes: combustion, anaerobic digestion, cogeneration, gasification, plant chemistry, etc.
- At the product level: solvents, surfactants, biopolymers, bio-lubricants, biomaterials, heat, "green" electricity, biofuels.

The cluster works with representatives of the agricultural sector and government departments. It includes communities, associations, scientific institutions and other structures.

business visit was also to study the experience of Belgium in the management of construction waste by visiting the production facilities of companies such as Tradecowall (Recyliege) and Replic.

Tradecowall (Recyliege) has been specializing in waste management of construction and demolition of buildings in Wallonia since 1991 and includes a network of companies working with inert waste recycling centers in the region. The company helps to make the construction industry more circular, thereby reducing its impact on the environment.

While Replic's pilot industrial facility for the processing and disposal of plaster, located in the autonomous port of Pecq, represents a unique innovative partnership between partners such as Ipalle², SUEZ³ and Cogetrina⁴. This initiative makes a significant contribution to the WAPI 2040 territorial project⁵, which fully corresponds to the closed-loop economy from both an economic and environmental point of view. It is worth noting that plaster has an infinite recycling cycle and therefore can be used as a final product in cement plants or plaster products.

In the field of waste management, one of the relevant topics was also the study of the Belgian experience in the management of solid household waste (MSW) and waste of alkaline batteries. The delegation members visited two waste recycling plants in Wallonia. They are supervised by the municipal associations TIBI and Intradel, which provide a solid waste management system in the cities of Charleroi and Liege in the west and east of Belgium. The main activity of the associations established back in the 80s is to provide the communes with a full range of services for the collection, sorting,



disposal of waste in accordance with the legislation of the European Union, Belgium and the Wallonia region.

During the visit of TIBI, the delegation also had the opportunity to visit one of its divisions – the Valtris sorting center, whose production line allows dividing into 14 fractions the contents of blue bags collected from almost two million residents containing various types of packaging. This is a very important step towards the introduction of the circular economy of packaging, which is being implemented in partnership with the operator of the Fost Plus EPS.

Another interesting point of the visit program was a visit to the Revatech plant. This is the first company in Europe that has been using a patented process for recycling and recycling alkaline batteries called REVABAT® since 1996. Revatech processes about 4,000 tons of batteries per year, collected from all over Belgium, as well as in other European countries.

Effective management of the variability of water resources and

² Intermunicipal Environmental Management for the western part of the Wallonia province of Hainaut.

³ A French multinational water and waste management company.

⁴ A Belgian company providing complete and sustainable waste management. The company's policy is aimed at environmental collection systems, such as semi-underground (buried) containers.

⁵ The project, focused around six priority areas and 25 strategic goals, is the focus of a whole series of actions that will contribute to the establishment of the identity of the territory and ensure its development for the benefit of the greatest number of people.



ecosystem changes in a rapidly changing climate undoubtedly plays a central role in creating a climate-resilient and reliable "green" economy. In this regard, Wallonia is a good example: the main aquifers are located there, providing 55% of the national demand for water. There are many organizations involved in water supply and sanitation in the Wallonia region, the most important of which, SWDE⁶, organized a group meeting for delegates. Located in the province of Liège, SWDE is the main state organization responsible for water supply in the Wallonia region. It serves about 200 municipalities, providing about 70% of the population with water (more than 2.4 million people).

It should be noted that one of the most effective directions for the development of renewable energy sources and an important component of the energy balance, at the same time environmentally friendly, economical, quickly implemented and reliable, are small hydroelectric power plants (SHPP). Today, only about 20% of the world's total hydropower potential is involved. In this regard, taking into account the areas in which Wallonia has unique expertise and know-how, the participants of the visit were able to visit and get acquainted with the activities of such Belgian companies as JLA Hydro and Rutten Electromécanique SA, specializing in the design and production of hydraulic turbines.

Today, the Belgian company JLA Hydro has more than 100 SHPP installations on four continents with a total capacity of more than 4,000 kW. The company specializes in the development, engineering, production and installation of hydraulic turbines. As for Rutten Electromécanique, based in the city of Herstal (province of Liège), it puts innovative solutions at the forefront

⁶ *Société wallonne des eaux means "Wallonia Water Company".*

of its development, in particular in the field of hydropower in Belgium and around the world.

For more than 30 years of its existence, the company has developed the concept of a high-performance hydroelectric turbine suitable for low pressure from 1.6 to 4 m. The lack of civil engineering component is the main goal that the company aspired to. Therefore, Ruten turbines are designed to adapt to existing stationary dams (automatic locks, stone dams, needle dams, etc.).

The final and one of the important events of the thematic visit was a collective meeting at the John Cockerill

company in the city of Seraing. It is a large multinational company with more than 200 years of history. Its representatives presented various solutions and projects covering five main areas: energy, environment, "green" hydrogen, defense and industry.

A particularly important topic of discussion was the prospects for development of projects in the field of "green" hydrogen. The field of hydrogen energy development is becoming increasingly important for Kazakhstan, given its commitment to decarbonizing the economy and achieving carbon neutrality by 2060. 



THIS THEMATIC BUSINESS VISIT ALLOWED THE DELEGATES OF THE THREE COUNTRIES TO PLUNGE HEADLONG INTO THE WORLD OF "GREEN" TECHNOLOGIES, GET ACQUAINTED WITH THE RICH EXPERIENCE OF OUR BELGIAN COLLEAGUES, SEE THE RESULT OF THEIR APPLICATION AND PROSPECTS FOR IMPLEMENTATION AT HOME.



Bakhrom Jalolov:

ALTYNALMAS

IS INTERESTED IN THE RATIONAL USE OF NATURAL RESOURCES

Altyntalmas gold mining company has joined as an accredited observer of Qazaq Green Renewable Energy Association this year. Thus, the company demonstrates its commitment to high standards of sustainable development and the desire to develop "green" energy. In an interview with Qazaq Green, Bakhrom Jalolov, Chief Executive Officer for Sustainable Development of JSC AC Altyntalmas said about how the company, being the largest gold producers in Kazakhstan, implements ESG standards (environmental and social responsibility, corporate governance) especially in terms of "green" projects.



–Bahrom Burkhonovich, you are in charge of an important direction in the company, which has become a megatrend in recent years – ESG and the principles of sustainable development. How does Altynalmas implement the agenda of social, environmental responsibility and effective corporate governance?

– Altynalmas Group is currently working on the implementation of the principles of sustainable development at all levels of the corporate governance system. We understand that the integration of aspects of social and environmental responsibility into business processes is a prerequisite for development of the Company in the long term. The key areas of development of our ESG practice are occupational safety and environmental protection, achieving the best indicators in the field of corporate social responsibility, increasing environmental contribution in the regions of presence, improving relationships with stakeholders, improving the corporate governance system, as well as the development of corporate culture and anti-corruption.

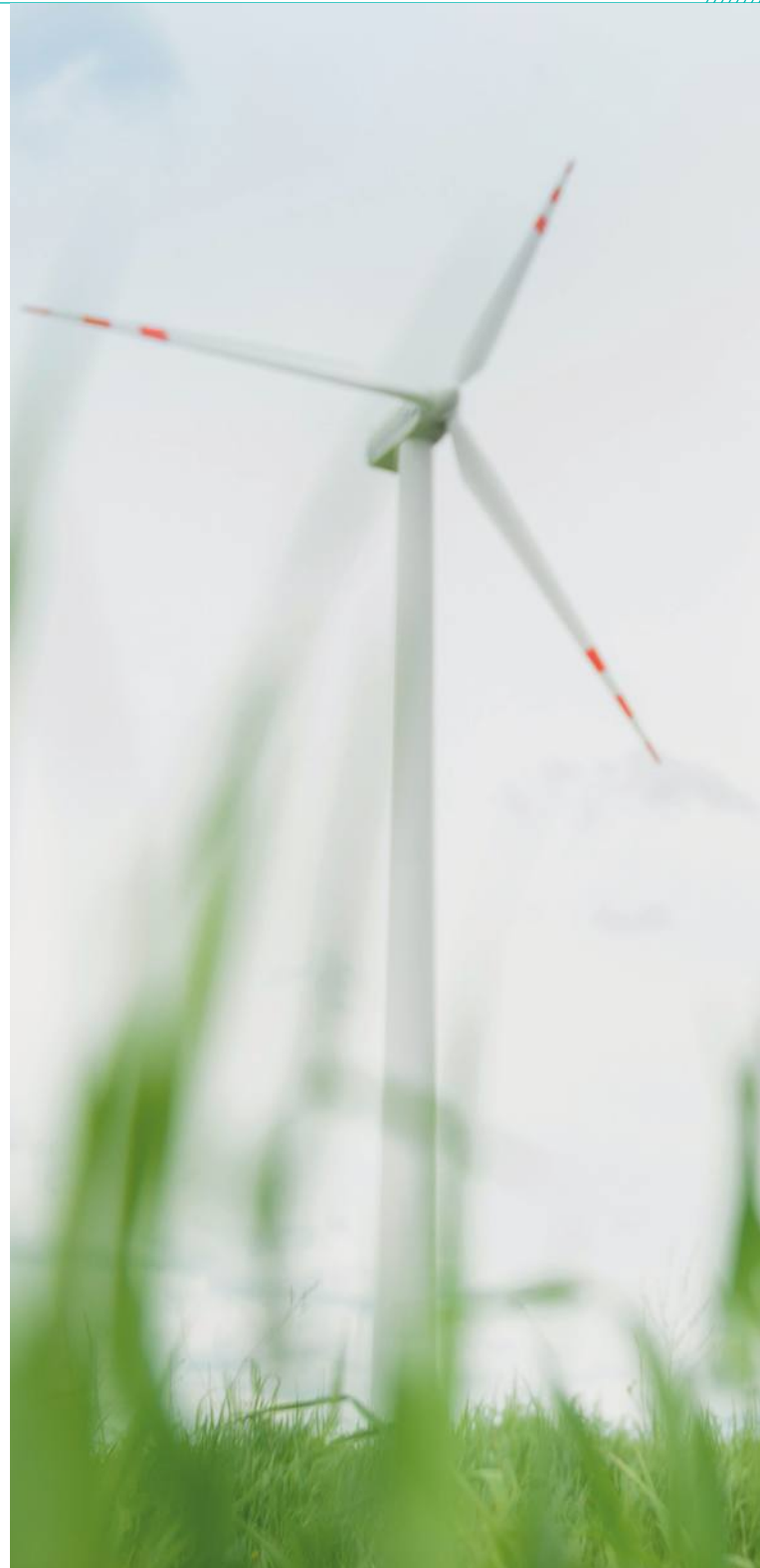
More than 10.5 thousand people work in the Altynalmas Group today. The company carries out extensive work on development of personnel management system aimed at ensuring decent working conditions. The company has a representative body of employees to protect the rights and legitimate interests of employees and ensure interaction with the employer in solving problematic situations, a collective agreement has been signed that takes into account the interests of all interested parties. This is the basis for further development, fruitful and mutually beneficial cooperation.

Altynalmas is active in several regions of Kazakhstan – Abai, Zhambyl, Karaganda and Akmola regions. Representatives of the Company regularly take part in public hearings and other events to build a dialogue with residents of the regions. Social contributions are being made for education, socio-economic development, and important events are being held aimed at building a mutually beneficial and trusting partnership with the local community. The Group holds a number of charity and sponsorship events. The company also strives to support residents of the region in emergency situations.

In our daily activities, we try to adhere to the high standards and principles of ESG.

– Last year, AK Altynalmas JSC entered the top 10 in the rating of sustainable development reporting. Experts of the PwC consulting company rated highly social component of ESG agenda. How do you manage to find a balance of interests – not to harm the environment and to conduct active production activities?

– Indeed, Altynalmas has entered the top 10 best Kazakhstani companies in terms of completeness and quality of disclosed information on compliance with ESG principles, having issued the first report on sustainable development in accordance with GRI standards. The rating was conducted among 40 companies in the oil and gas, banking, energy and mining industries. The study assessed the quality and accessibility of ESG information in annual reports and reports on the sustainable development of Kazakhstani companies published in 2021.



MORE THAN 10.5 THOUSAND PEOPLE WORK IN THE ALTYNALMAS GROUP TODAY. THE COMPANY CARRIES OUT EXTENSIVE WORK ON DEVELOPMENT OF PERSONNEL MANAGEMENT SYSTEM AIMED AT ENSURING DECENT WORKING CONDITIONS.

5 eco-projects of Altynalmas in 2022



It is worth noting that our company has shown significant growth. Thus, in 2019, Altynalmas was on the 32nd place in the ESG rating, and in 2020 - on the 30th line, while earlier ESG data were evaluated based on the results of the annual report. This time, the experts highlighted the company's contribution for disclosing information on "S" position (employees, local communities, Occupational Health and Safety). I would like to add that the company received the second place for best ESG strategy at the forum "Astana Mining & Metallurgy Congress" (AMM).

As a large gold mining company, we understand that we have a significant impact on the economy, society and the environment, especially in the regions where we operate. Therefore, in our work we strive to find a balance of interests of all stakeholders, including employees of the company and residents of the regions of presence. The basis for long-term sustainable development of the company is the growth of operational and financial indicators with further progress in the social and environmental spheres.

– If we focus on ecology, what projects has the company initiated to take care of responsible attitude to the environment?

It is worth starting with the fact that Altynalmas has joined the UN Global Compact, thereby strengthening its commitment to sustainable development. We have

decided on 11 goals for ourselves, among which the main role is played by the environmental agenda.

For example, the UN goal is "Clean water and sanitation".

Ore extraction and processing is classified as water-intensive industries and provision of process water is an essential issue in the implementation of projects. The sources of industrial and household water supply are own artesian wells. A closed cycle of water consumption and sanitation has been introduced at all the company's enterprises. The Pustynnoye, Akbakai and Aksu-2 projects use modular biological wastewater treatment plants which send purified domestic wastewater to production needs.

"The goal of responsible consumption and production.

Our company is interested in the rational use of natural resources. When planning and designing, the environmental impact of each project is assessed with special care, detailed action plans are developed and technologies are introduced to reduce the negative impact.

One of the global goals relevant to the whole world and any industry is the combating climate change.

Altynalmas regularly carries out production environmental monitoring (PEM), within the framework of which special accredited laboratories carry out measurements of the main environmental indicators. To date, chemical analyses of air samples, analysis of state of surface, technological and underground waters, the level of noise and background radiation do not exceed the established norms. The important projects of 2022 include solar-powered lighting of the road between the Pustynnoye and Dolinnoye fields in Karaganda region, which significantly reduced the carbon footprint, as well as the Green Office project, launched jointly with ECO Network organization and allowed 272 kilograms of waste to be sent for processing in just one quarter of the office's work, 180 kilograms of which is waste paper, 27 - glass and more than 65 - plastic, thus we reduced carbon dioxide emissions into the atmosphere by more than 2,000 kilograms, saved 12 trees, saved 24 tons of water and almost 2 000 kilowatts of electricity.

Another important goal of the UN is "Conservation of terrestrial ecosystems".


The divisions of Altynalmas regularly carry out work on landscaping the territories, increasing the area of green spaces. These activities are carried out within the framework of the company's programs for protection of flora and fauna. For example, by the end of 2022, Altynalmas employees planted 5 500 trees in all regions of their presence. I would especially like to mention the project on phytocapture of dust, implemented jointly with Narkhoz University at the Aksu tailings dump in Akmola

region, where 1 400 trees were planted using a 3D computer modeling program. There is already a good intermediate result in survival rate, which amounted to 93.2%.

In addition, this year, such environmental projects were implemented in the company as phytocapture of dust using computer technologies at a tailings dump in the Akmola region, the use of chemical reagents for dust suppression, and other important environmental projects that meet high ESG standards.

We believe that Altynalmas Group of Companies can make the greatest contribution in these areas. In the future

a program of specific measures for each priority goal will be developed.

I would like to add that our participation in Qazaq Green Renewable Energy Association is due to the desire to implement renewable energy projects, which are an effective decarbonization tool. We believe that the integration of aspects of social and environmental responsibility into business processes is a prerequisite for the sustainable development of our company. 





30 YEARS OF
POWERING PROGRESS
TOGETHER: **SHELL**
CELEBRATES MILESTONE
ANNIVERSARY IN
KAZAKHSTAN

In the early 1990s, as Kazakhstan just gained its independence and opened its doors to foreign investors, one name stood out: Shell. The multinational oil and gas giant saw great potential in the country's energy sector and embarked on a journey that would transform the industry, boost the local economy and contribute to the development of local communities. Today, three decades later, Shell's investment in Kazakhstan has helped the country become a major player in the global energy market, and its presence in the region continues to shape the country's energy landscape. With an investment of over \$18 billion, Shell is one of the largest foreign direct investors in Kazakhstan, having interests in such projects like the North Caspian Sea Production Sharing Agreement, Karachaganak Final Production Sharing Agreement and Caspian Pipeline Consortium.

GREEN PROGRESS

In recent years, the energy industry has witnessed a significant shift towards renewable energy sources as governments and corporations worldwide seek to tackle climate change. Shell is one of the companies at the forefront of this energy transition, that adopted an ambitious green strategy in response to increasing demand for cleaner energy. As a roadmap for the energy transition, the company launched its Powering Progress strategy, that outlines commitment to reducing its carbon emissions. In Kazakhstan, where Shell has a significant



30 

Z H Y L SHELL QAZAQSTAN
1993-2023

Today, three decades later, Shell's investment in Kazakhstan has helped the country become a major player in the global energy market, and its presence in the region continues to shape the country's energy landscape.

presence, the company has been taking steps to reduce its carbon footprint and support the country's transition towards a low-carbon economy.

One example of Shell's efforts to implement its Powering Progress strategy in Kazakhstan is the energy assessments, that had been initiated at the company's joint ventures in Kazakhstan, the North Caspian Operating Company and Karachaganak Petroleum Operating, to identify possible abatement opportunities to reduce greenhouse gas (GHG) emissions. This allowed NCOG to adopt and start implementing the GHG Emissions and Energy Efficiency Management Strategy, which sets out specific objectives and plans for achieving 15-25% GHG emissions reduction by 2030. A similar strategy has been developed by KPO, with both companies envisioning key activities on energy efficiency improvement, waste heat recovery, renewable energy generation, gas flaring minimization, as well as carbon capture, utilization, and storage (CCUS).



As part of Shell Kazakhstan's social investment strategy, the company has been implementing its 'Solar for Schools' initiative for the past five years. Shell Kazakhstan has successfully commissioned solar stations in schools in Astana, Uralsk, Aktau, and Atyrau, with launching of another solar energy system in Turkestan school this year. The primary goal is to encourage young people's interest in sciences, technology, engineering, and mathematics (STEM) and raise awareness of the benefits and opportunities of renewable energy.

Shell Kazakhstan is also actively contributing to shaping the renewable energy policy regime in the country, which has been a major issue holding back developers and investors. In partnership with other international oil companies and leading institutions, Shell has been addressing a number of issues to improve the investment climate, including the bankability of Power Purchase Agreements (PPA), extension of the PPA duration, long-term financial stability of the off-taker of renewable energy, inclusion of renewable energy projects into the national list of priority investment opportunities, annual inflation indexation of auction prices, and changes in the exchange rate, providing investment preferences.

Shell Kazakhstan is also contributing to the development of CCUS technology in the country. In 2021, Shell Kazakhstan and "KazMunayGas" signed a Memorandum of Cooperation on CCUS. The Memorandum provided for joint exploration of potential opportunities for implementation of the CCUS Pilot Project seeking to identify and develop the main criteria for carbon capture and utilization. As part of the Memorandum signed, Shell's technical experts shared their international experience in implementing similar CCUS projects worldwide.

SOLAR FOR SCHOOLS

As part of Shell Kazakhstan's social investment strategy, the company has been implementing its 'Solar for Schools' initiative for the past five years. Shell Kazakhstan has successfully commissioned solar stations in schools in Astana, Uralsk, Aktau, and Atyrau, with launching of another solar energy system in Turkestan school this year. The primary goal is to encourage young people's interest in sciences, technology, engineering, and mathematics (STEM) and raise awareness of the benefits and opportunities of renewable energy. The project serves as a unique platform to develop small scale distributed green energy systems in 5 cities across the country. This initiative also focuses on attracting local companies to design, procure, and build specialized systems equipped with solar photovoltaic panels for each school. As part of the project, the company organizes a special educational program, "Shell NXplorers," for students


and teachers to motivate Kazakh teenagers to study energy transition issues and help them develop energy-efficient thinking.

The photovoltaic panel systems were specifically designed to meet the needs of these schools and are capable of generating 100 kW of energy for each school. These systems can cover in average 30% of the schools' annual energy consumption, reduce expenses of utilities cost, and redirect excess electricity generated into city

electrical grid, thereby providing significant energy savings.

30 YEARS OF IMPACTFUL COLLABORATION FOR SUSTAINABLE FUTURE

Shell Kazakhstan is also involved in advocacy work via the Foreign Investors Council and Kazenergy associations, with a current focus on improving the regulatory framework in relation to Emission Trading System, Cross-Border Adjustment

Mechanism, and CCUS. With these initiatives, Shell Kazakhstan is making significant strides towards a sustainable energy future in Kazakhstan, and its efforts are contributing to the country's progress towards a low-carbon economy. Overall, Shell's Powering Progress strategy is a global effort, and its implementation in Kazakhstan is just one example of the company's commitment to reducing its carbon footprint and contributing to a more sustainable future. 



GERMANY'S NEW HYDROGEN DIPLOMACY OFFICE IN ASTANA:

supporting the Exchange between Kazakhstan and Germany in the World of green Hydrogen



The Hydrogen Diplomacy Office in Astana forms part of the German Foreign Office's Global Hydrogen Diplomacy (H₂ Diplo) Program. This initiative is one of several activities conducted by GIZ in Kazakhstan since the early 1990s. The GIZ portfolio in Kazakhstan is focused on long-term economic development and good governance, education and vocational training, environment and climate.



Manuel Andresh,
Global Hydrogen Diplomacy (H₂-Diplo)

During her visit in October 2022, the German Federal Foreign Minister Annalena Baerbock announced that Germany would soon open a Hydrogen Diplomacy Office (HDO) in Astana in order to institutionalize the interaction between both governments and experts around the topic of green hydrogen. Just three months later, many stakeholders in Astana and Almaty were already visited during an inaugural visit. With the presentation of the HDO, first ideas and suggestions for cooperation were already discussed. Since the beginning of March, the work of the office has officially started.

With Kazakhstan's objective of carbon neutrality by 2060, its important role on the global energy market, as well as its strategic partnership on sustainable raw materials, batteries and renewable hydrogen with the European Union, the topic of green hydrogen is becoming increasingly important in Kazakhstan. At the same time, the announcement of several green hydrogen projects has strongly increased Kazakhstan's visibility in the green hydrogen sphere.

Due to the expected high global demand for green hydrogen and Kazakhstan's potential and plans to

produce it, Kazakhstan will keep playing an important role on the international energy market. Furthermore, there are also many possibilities to use green hydrogen domestically. Among others, the production of green steel, green ammonia (as a key ingredient for fertilizer production) and synthetic fuels for sea and air transport are just three options for which green hydrogen can play a role either within the country's markets for its own carbon neutrality goals or on international markets by exporting the value-added goods. An economic diversification is required to address the expected decrease in demand for fossil oil and gas, increasing Kazakhstan's competitiveness in the long run. The HDO is working with Kazakhstan to discuss and analyze its many options and to find the best solutions for the country, transforming its industry and diversifying its energy exports. The HDO offers an exchange platform for these topics, domestically within the country as well as with international stakeholders, providing insights and inputs for strategies and partnerships. As a first step, a study on the export options and their cost implications will be conducted. This study will include the technological possibilities and cost implications for the export of green hydrogen (and derivatives).



Management Agency and Ansole conducted a workshop on prospects of potential green hydrogen export opportunities in Kazakhstan.

It will be necessary to train people around the topic of green hydrogen. Several professions and specializations will be required, of which some can be transferred from the fossil fuel industry, while others will demand new educational programs. The HDO is actively supporting the development of such programs, for example the creation of the Mangystau School of Sustainable Engineering, which will be developed on the basis of the Yessenov University, in cooperation with the Kazakh-German University, Svevind and several German universities.



WHILE GREEN HYDROGEN IS AN IMPORTANT PART OF GLOBAL DECARBONIZATION AND DEFOSSILIZATION, IT IS NOT SUSTAINABLE BY DEFAULT. WITH HIS BACKGROUND IN SUSTAINABILITY RESEARCH ON GREEN HYDROGEN PRODUCTION, THE HEAD OF HDO, MR. MANUEL ANDRESH, IS DEDICATING HIS WORK ALSO TO SUSTAINABILITY ASPECTS.

There are many social and environmental sustainability aspects that have to be addressed with the production of green hydrogen. At the same time, geopolitical elements. Historically, the potential for energy exports has depended on fossil resources and the ability to extract them. With green hydrogen, this dependence on fossil resources becomes obsolete, enabling many countries around the world to participate in the market. Both topics require international discussions, agreements and cooperation on a global level. The international exchange on these topics will be supported by the HDO for this international exchange.

There has been active exchange between Kazakhstan and Germany around the topic of green hydrogen already. The HDO is collaborating with the German Energy Agency (dena) and the Delegation of German Economy in Central Asia (AHK), both being already active in the country. Just recently, the Reiner Lemoine Institute, DLR Project

THE MAIN FOCUS IS SET ON GEOPOLITICAL, MACROECONOMIC AND EDUCATIONAL ASPECTS. THESE ASPECTS WILL BE ADDRESSED WITH SEVERAL ACTIVITIES, SUCH AS:

1. Studies, that address local topics as well as international aspects, will be conducted.
2. Symposia and dialogue events with public and private actors will be held.
3. Trainings and study visits for international exchange and knowledge transfer will be organized.
4. Direct advisory and support for strategies, roadmaps and other projects will be discussed and offered within the country and network. While the work has already started, the HDO will formally be launched with a first symposium within the upcoming months.



BEM –

PANACEA FOR ENERGY
TROUBLE OR VERDICT
FOR RENEWABLE
ENERGY SECTOR?



Yedil Saryyev,
Expert in renewable energy

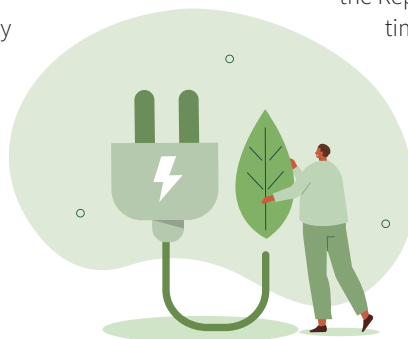
Over the past few years, significant changes have been observed in electric power industry in switching the electric energy generation from traditional sources to renewable energy facilities (RES). Such transformations pose serious challenges to specialists in ensuring the stability of the entire electric power system and search for effective methods of forecasting energy production from renewable energy facilities.

For a comprehensive solution to the existing problem, it is necessary to consider two main directions:

1. Increasing the efficiency and flexibility of the power system through the construction of maneuverable generation.
2. Improving the quality of

forecasting electricity generation by renewable energy facilities.

KEGOC JSC, the operator of the National Grid is currently carrying out the actual balancing of production/consumption of electric energy. Taking into account the shortage of maneuverable sources of electric energy in the territory of the Republic of Kazakhstan, the resulting imbalances are covered mainly by flows from the National Grid of Russian Federation and the Kyrgyz Republic. Therefore there is a need to build own maneuverable capacities in the territory of the Republic of Kazakhstan. At the same time, the growth of renewable energy facilities can be considered only as one of the reasons for the need to increase the volume of maneuverable capacities. The main reason is the need to increase the reliability of the entire power system of



the Republic of Kazakhstan, including in the event of technological disruptions at stations, as well as ensuring the possibility of purchasing balancing electricity at power plants in Kazakhstan, and not outside it.

AS FOR IMPROVING THE QUALITY OF FORECASTS FOR GENERATION OF ELECTRIC ENERGY BY RENEWABLE ENERGY FACILITIES. FORECASTING OF THE ENERGY GENERATED BY RENEWABLE ENERGY FACILITIES SHOWS THE EXPECTED AMOUNT OF ENERGY GENERATION AT A CERTAIN POINT IN TIME (ANNUAL, MONTHLY, DAILY, HOURLY).

In particular, the availability of wind energy is significantly affected by fluctuations in meteorological conditions, including seasonal changes. That is why forecasting energy generation

by renewable energy facilities, unlike traditional power plants, is an extremely complex process, often characterized by multiple uncertainty factors.

The generation of electricity by renewable energy facilities is variable, so the amount of electricity generated by wind power plant directly depends on quality of forecast of meteorological data at WPP site, which is often unpredictable, given the climatic conditions of the region. The graph below (Fig. 1) reflects the operation of WPP on a daily basis during the year, during which generation increases to the level of installed capacity and decreases to 0 MW.

As an example of forecasting the generation of electric energy, it is proposed to consider the operation of classic wind power plant with a capacity of 100 MW located in the Northern zone of the Republic of Kazakhstan (WPP).

The forecast for generation of electric energy of wind power plant is carried out by various methods: independently by the station staff, using data on projected wind speed from open sources, in cooperation with wind turbine manufacturer, as well as with the world's leading companies in the field of forecasting for generation of electric energy (Fig.2).

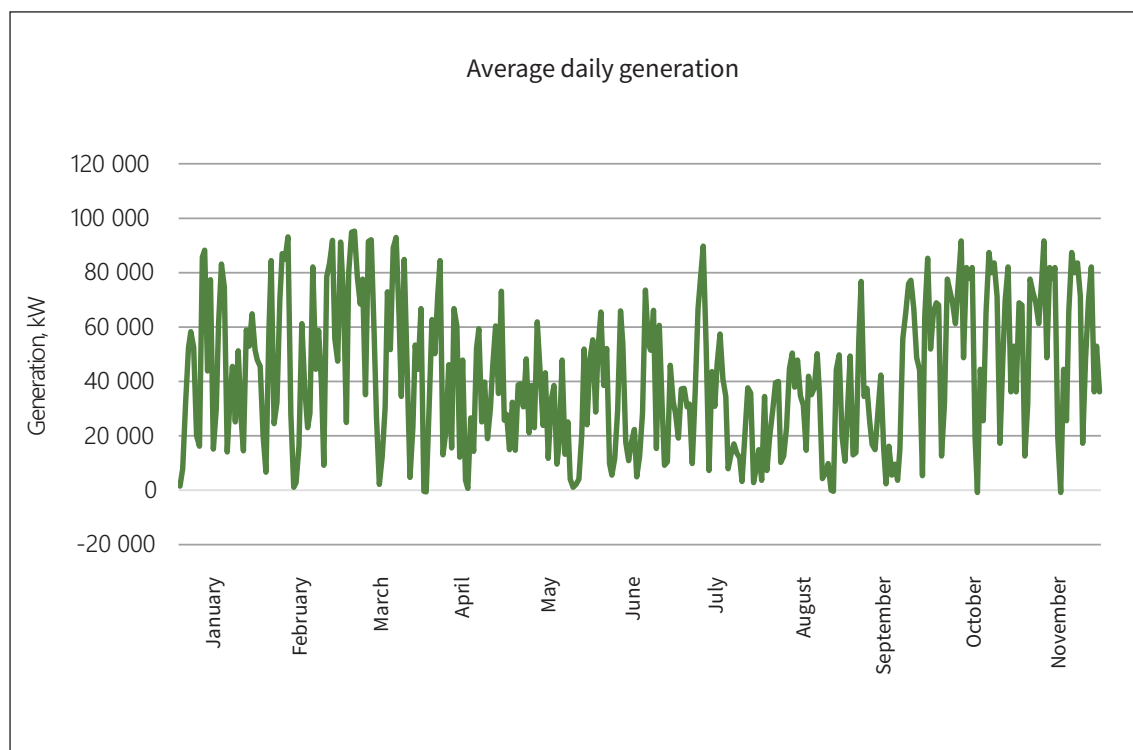


Figure 1

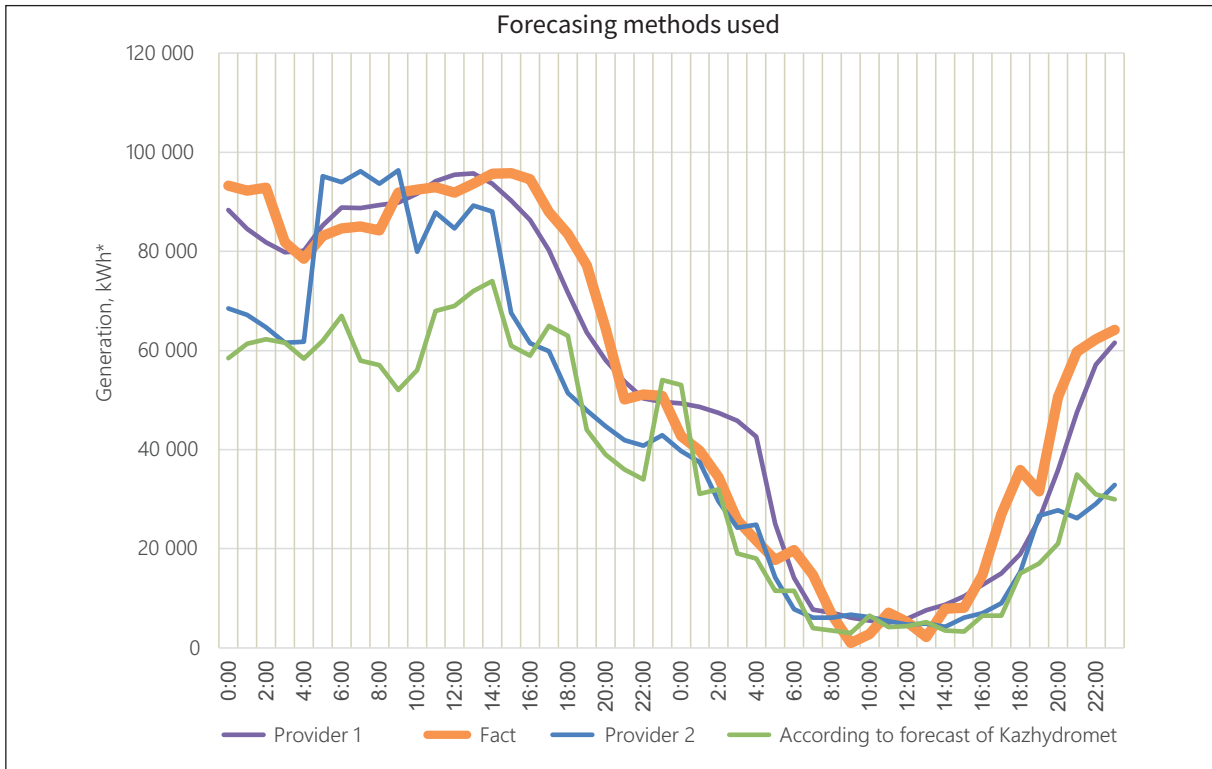


Figure 2

The forecast data provided by the verification companies for similar periods of time also have significant discrepancies.

The quality of efficiency of forecasts of electricity generation for longer periods of time is an order of

magnitude higher than short-term (hourly) ones. For example, forecasts for a year, a month, and even a day are achieved with minimal deviations. The graph below shows data on forecast and actual data on electricity generation in monthly/annual terms.

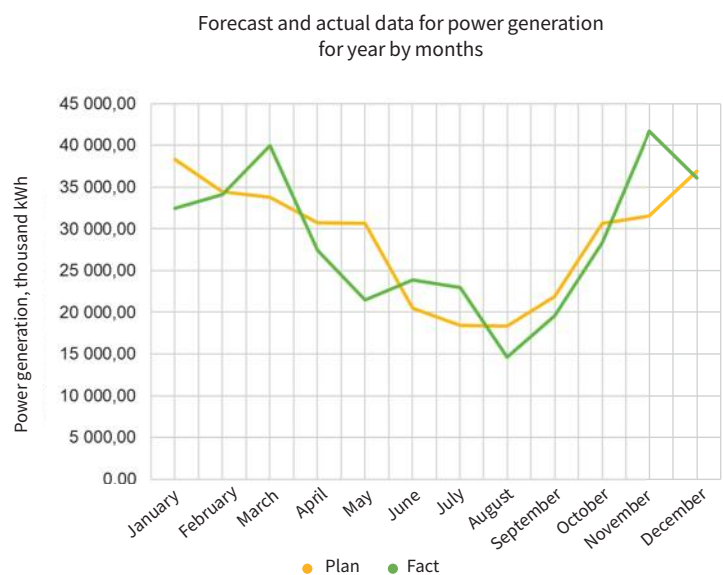
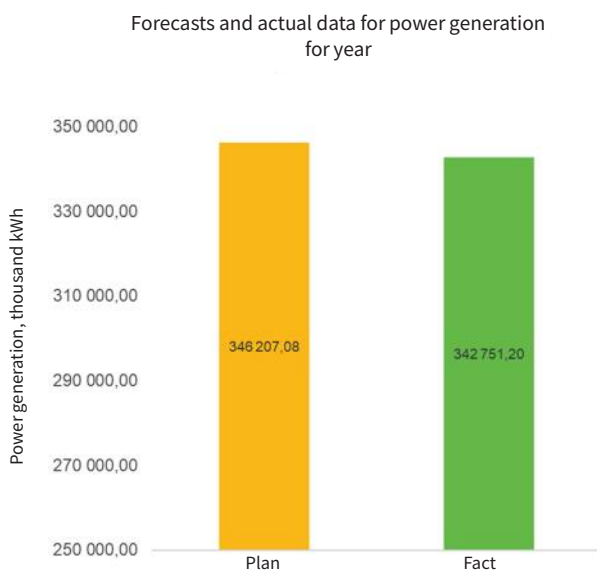


Figure 3

At the same time, considering forecasting in hourly terms, periods with a deviation close to 0% are observed during the period of operation (Fig. 4), and deviations reaching 1000% or more (Fig. 5).

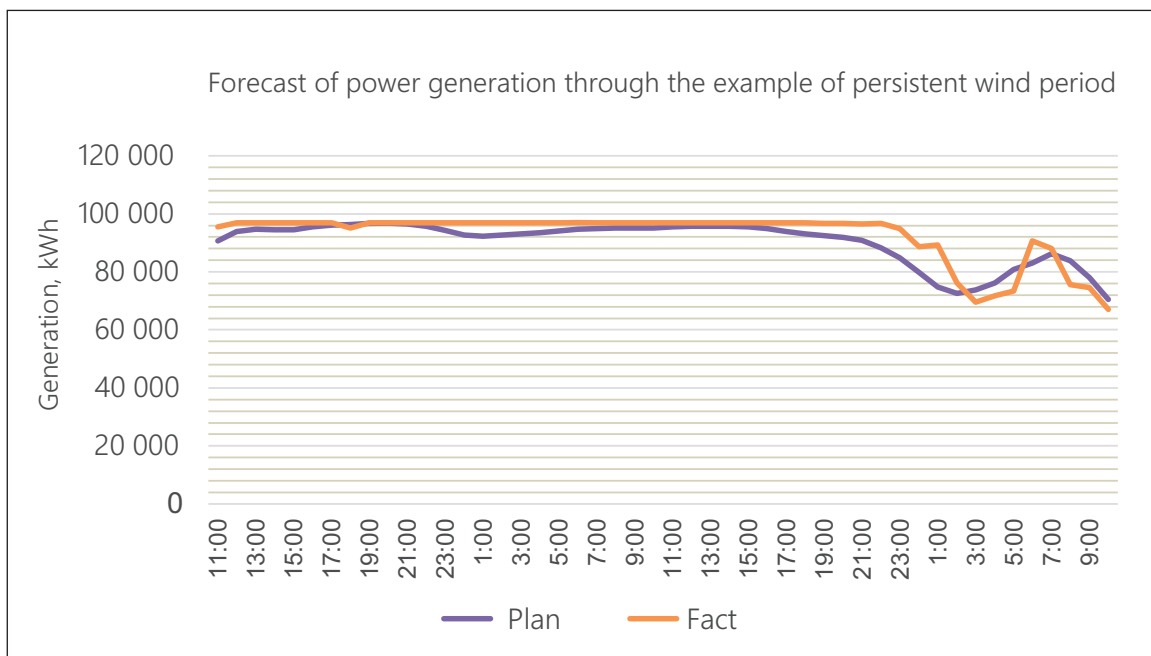


Figure 4

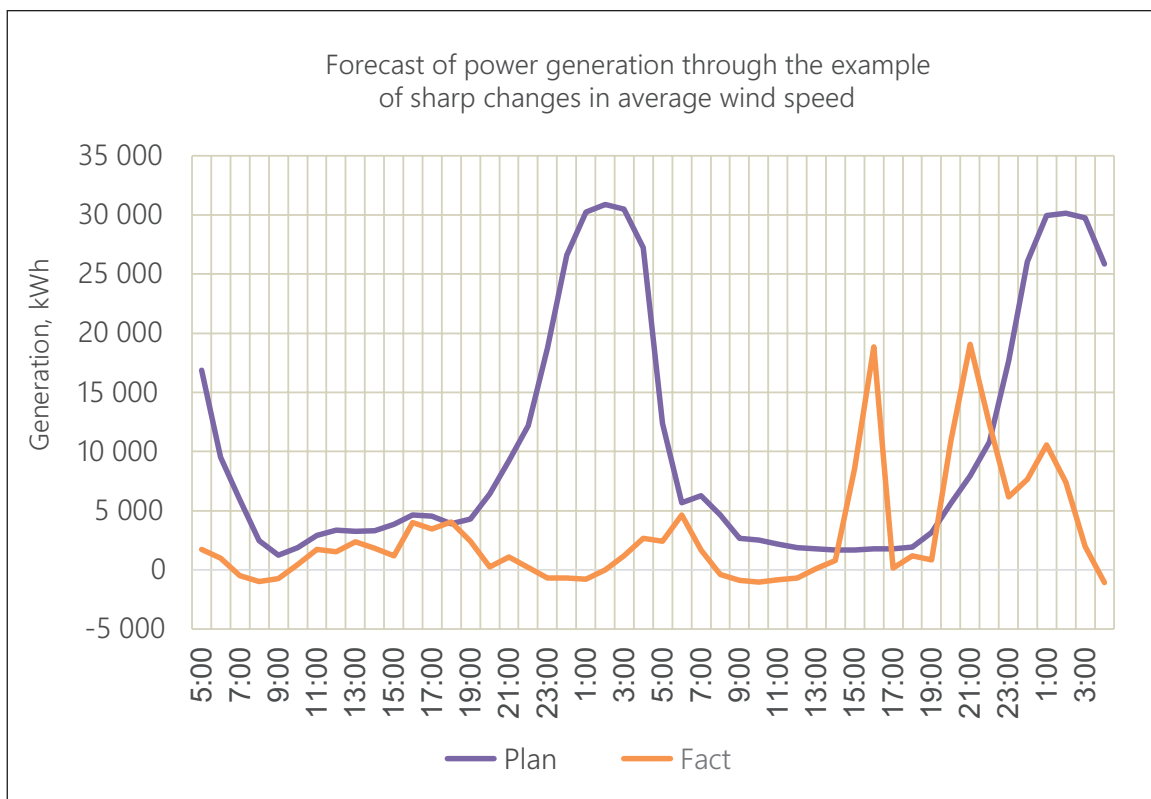


Figure 5

WHAT FACTORS CONTRIBUTE TO THESE CIRCUMSTANCES?

Wind turbines enter the nominal operating mode at a certain wind speed, usually at 11-12 m/s, respectively, the quality of forecast data will be improved during a steady windy period of time, in particular for a sharply continental climate in the winter and autumn-spring phases.

The main difficulty of forecasting electric energy on the territory of the Republic of Kazakhstan, in comparison, for example, with Europe, "dotted" with numerous meteorological masts united in a single network, is a sharply continental climate with characteristic significant amplitudes of daily and seasonal air temperatures and insufficient development of hardware and technical complex of system for monitoring and forecasting meteorological conditions. For example, in the spring and autumn periods, on the territory of the wind power plant, the differences in wind speed between wind power plants can reach 6 m/s or more. At the same time, the greatest distance between the turbines does not exceed 10 km. These factors contribute to huge differences between actual and forecast data in hourly terms.

In general, given the rather serious problems in the field of forecasting electricity generation by renewable energy facilities, a sharp transition to a balancing electricity market is expected to be very sensitive.

FOR EXAMPLE: THE RENEWABLE ENERGY PLAYERS OF EUROPEAN COUNTRIES, INCLUDING SPAIN¹, DENMARK², GREAT BRITAIN AND GERMANY³, SEVERAL YEARS AGO SWITCHED TO THE MODEL OF THE BALANCING ELECTRICITY MARKET PROPOSED (FROM JULY 1 THIS YEAR IN KAZAKHSTAN) BY THE AUTHORIZED BODY AND THE SYSTEM OPERATOR. HOWEVER, UNLIKE OUR COUNTRY, IN EUROPE THIS TRANSITION WAS PROVIDED IN STAGES, BASED ON THE TEST PERIOD AND WITH SIGNIFICANT DIFFERENCES.

Thus, during the evening and morning peak, the tariff level from renewable energy facilities reaches 0.35 euro cents/kWh, in addition, renewable energy facilities are provided with tax and investment preferences, along with the sale of quotas CO from 2 at tariffs of 60 euros/ton in the current period, with an increase to 170 euros/ton by 2035⁴. In addition, the maximum possible deviations from the forecast data have been established.

Based on the above, it can be concluded that the planned transition of renewable energy facilities to a balancing electricity market will entail a number of significant problems, due to the lack of opportunities to achieve high accuracy in predicting the generation of electricity by renewable energy facilities. These factors will directly affect the decline in pace of renewable energy development, will lead to a loss of investment attractiveness in the renewable energy sector,

since, by extending the BEM to renewable energy projects with existing contracts with FSC, the Ministry of Energy allows for a "Change in the rules of the game" in its course. In addition, this situation as a whole will deal a huge blow to the country's reputation as a reliable and stable place for investment.

The introduction of balancing market in real time proposed by the authorized body and the system operator is largely caused by the lack of sufficient maneuverable capacity, technological disruptions at traditional generation facilities and in the networks of energy transmission organizations. Accordingly, it is assumed that the solution of a number of long-overdue and existing problems in the country's energy system, through the introduction of a balancing electricity market, is shifted to the "shoulders" of renewable energy facilities.

At the same time, the creation of completely objective forecasts is currently impossible due to the uncertainty of future state of the atmosphere. Therefore, as part of transition of the Republic of Kazakhstan to a balancing market, for renewable energy facilities it is necessary to indicate the probability of issued forecasts in terms and assumptions that should be taken into account by the system operator when drawing up load schedules.

To solve this problem, as well as taking into account the experience of leading European countries, it is proposed to set maximum daily (not hourly) deviations for renewable energy facilities between planned and actual values of electric power generation in the permissible range. In addition, such permissible range should be established only based on the results of pilot-test transition period (taking into account the assessment of success of forecasts and intensity/repeatability of synoptic cycles every three to five years) to provide renewable energy facilities with the necessary technical, information and computing complexes.

Based on the above, it can be summed up that in Kazakhstan it is necessary to create favorable conditions with clear and fair rules of the game for the development of maneuverable capacities. Regarding the renewable energy sector, firstly, it is necessary to provide maximum permissible deviations of actual from forecast data, determined by the results of the test period for new projects, and balancing costs should be taken into account when forming auction prices for electric energy. Secondly, the balancing electricity market should not apply to existing renewable energy facilities, as it significantly worsens their situation compared to the conditions specified in the contracts previously concluded with FSC.



¹ <https://www.omie.es/en/spot-hoy>

² <https://en.energinet.dk/>

³ <https://www.eex.com/en/>

⁴ <https://sustainability.crugroup.com/>

HOW VOLUNTARY AND REGULATED CARBON MARKETS CAN AFFECT THE ACHIEVEMENT OF COMPANIES' CLIMATE GOALS



Aida Maksut,
Director of SSDC LLP

The climate agenda is extremely relevant in today's world. Many countries and organizations recognize the need to reduce greenhouse gas emissions and limit global warming to $< 1.5^{\circ}\text{C}$ compared to preliminary industrial levels.

In recent years, we have observed an increase in the frequency and scale of disasters related to climate change, such as severe floods, droughts, fires, hurricanes, etc. These events resulted not only in the death of people, but also to economic losses and damage to ecosystems.

In addition, climate change can lead to a deterioration in the quality of life of the population, leading to a shortage of food and water resources, population migrations, diseases and other negative consequences.

In this regard, more and more companies and governments recognize the need to take measures to combat climate change. Many companies set goals to reduce greenhouse gas emissions, introduce energy-saving technologies and switch to renewable energy sources. At the same time,



governments are developing and implementing strategies to reduce emissions, including carbon taxes, emissions trading systems and other market mechanisms.

THUS, THE CLIMATE AGENDA IS EXTREMELY RELEVANT AND REQUIRES FURTHER EFFORTS ON THE PART OF ALL STAKEHOLDERS, INCLUDING GOVERNMENTS, COMPANIES AND CITIZENS.

The Government of the Republic of Kazakhstan also recognizes the need to take measures to combat climate change and is actively working in this direction. Under the Paris Agreement, Kazakhstan has committed to reduce its greenhouse gas emissions by 15% by 2030 compared to 1990.

Carbon markets are one of the tools for achieving climate goals at both the country and company levels.

Carbon markets provide economic incentives to reduce greenhouse gas emissions and promote green technologies through the use of greenhouse gas emissions trading mechanisms and opportunity to earn money from reducing emissions.

Carbon markets also encourage investment in green technologies, as companies that reduce their greenhouse gas emissions can sell their carbon units on the market, which can lead to increased revenue and investment in green technologies.

One of the key advantages of carbon markets is that they create financial incentives to reduce greenhouse gas emissions, which leads to a reduction in overall emissions in a shorter time. It can also help companies and states achieve their climate goals set out in the Paris Agreement.

Today there are 2 types of carbon markets: voluntary carbon markets and regulated carbon markets.

REGULATED CARBON MARKETS

Regulated carbon markets are an instrument of state regulation of greenhouse gas emissions. Kazakhstan already has a system of trading quotas for greenhouse gas emissions, which sets limits on the total amount of emissions in various sectors of the economy.

Kazakhstan's Greenhouse Gas Emissions Trading System (ETS) was introduced in 2013 and is the first and only one of its kind in Central Asia. The principle of the system is that the Government of Kazakhstan sets greenhouse gas emission targets for companies which have emissions exceeding 20,000 tons of CO₂ per year, and then allows companies that exceed their targets to purchase emission quotas from companies that, on the contrary, reduce their emissions below the established targets.



The system also provides for completion of its emission obligations through the purchase of carbon offsets that have been registered under the ETS. Any project aimed at reducing GHG emissions can be registered under the carbon offset. Such projects may include renewable energy projects, energy efficiency improvement projects, forest projects, carbon capture and storage projects, and others. To date, there are the following restrictions on the trade of offset units within the framework of the Kazakhstan EST:

1. Offset units can be traded only within the framework of the Kazakhstan ETS, and cannot be transferred to the registry of another country.
2. Trading on ETS is limited to project applicants and companies that are regulated by ETS. Thus, companies that are not regulated by ETS, but at the same time focus on achieving their climate goals, cannot purchase offset units on ETS.

These restrictions and excessive distribution of free units to emitters affect the economic efficiency of ETS of the RK and low prices per carbon unit (1-1.3 dollars per unit). Low prices make it difficult to invest in environmentally friendly technologies and the development of environmentally friendly infrastructure, and thus do not provide an incentive to reduce greenhouse gas emissions of regulated companies.

VOLUNTARY MARKETS

Добровольные углеродные рынки – это Voluntary carbon markets are mechanisms in which companies, states, or other organizations can buy or sell carbon units that are not necessarily established by government or regulatory authorities.

One of the most common voluntary carbon market systems is the Verified Carbon Standard (VCS), which is designed to set standards and certifications for greenhouse gas emission reduction projects that are not subject to mandatory government schemes. This means that VCS provides carbon units to reduce greenhouse gas emissions that can be sold on the market.

To date, prices for voluntary units vary from \$ 1.5 to \$ 50, depending on the type of project, year of release.

Another example of a voluntary carbon market system is Gold Standard, which also provides carbon units to reduce greenhouse gas emissions, but unlike VCS, Gold Standard also focuses on social and environmental benefits for local communities. Today, in addition to VCS and Gold Standard, more than 10 different voluntary systems exist and are being developed, which is an indicator of the need for development of such markets.

One of the key advantages of voluntary carbon markets is that they can promote innovative and environmentally sustainable projects that do not fall under mandatory government schemes. They can also provide an additional source of funding for such projects, as well as raise the profile of the organization regarding its environmental responsibility. Unlike a regulated system (such as ETS), voluntary markets have a wider range of participants and projects, since they are not limited by the geography of project implementation, and by participants who can participate in trade. Companies can use voluntary units to achieve their voluntary climate goals (which are not regulated by the legislation of the country), thereby compensating for their GHG emissions. With voluntary carbon units, companies can offset emissions from both direct sources (Scope 1) and indirect sources (Scope 2 and 3).

To date, prices for voluntary units vary from \$ 1.5 to \$ 50, depending on the type of project, year of release. According to Bloomberg, prices for voluntary units in 2050 may range from \$22- \$88 per ton of CO₂, while global demand may grow to 5.4 Gt of CO₂ in 2050, compared with demand of 0.181 Gt of CO₂ in 2023. Bloomberg

attributes this growth in demand primarily to the trends of many companies to achieve carbon neutrality.

INTERACTIONS BETWEEN VOLUNTARY AND REGULATED CARBON MARKETS

Voluntary and regulated carbon markets can interact in Kazakhstan, providing businesses and citizens with flexible tools to reduce greenhouse gas emissions and ensure compliance with government requirements for climate policy. At the same time, it should be taken into

account that regulated carbon markets are more formalized and state-controlled, while voluntary markets usually have a wider range of participants and projects.

In order to avoid a conflict between voluntary carbon markets and Kazakhstan's emissions trading system, it is necessary to establish clear rules and mechanisms of interaction between them. To do this, it is possible to ensure transparency and openness of interaction between voluntary carbon markets and the ETS of Kazakhstan and create

reporting and monitoring mechanisms that will allow the state to monitor and assess the impact of voluntary carbon markets on reducing greenhouse gas emissions in Kazakhstan.

Development of voluntary market on the territory of Kazakhstan will increase the volume of investments in "green" projects, while Kazakhstan's greenhouse gas emissions will be reduced, which will allow achieving the goals of the Paris Agreement economically faster and more efficiently.





LAUNCH OF GCIP-KAZAKHSTAN



Saule Bishimbayeva,
National technical expert
and project coordinator
GCIP-Kazakhstan
NJSC "IGTIC", PhD in economics

Accelerating
innovation and
entrepreneurship
in the field of clean
technologies



The "Global Program for Promoting Innovations in the Field of Clean technologies and entrepreneurship in SMEs to create green jobs in Kazakhstan" (hereinafter GCIP - Kazakhstan) is being launched in Kazakhstan.

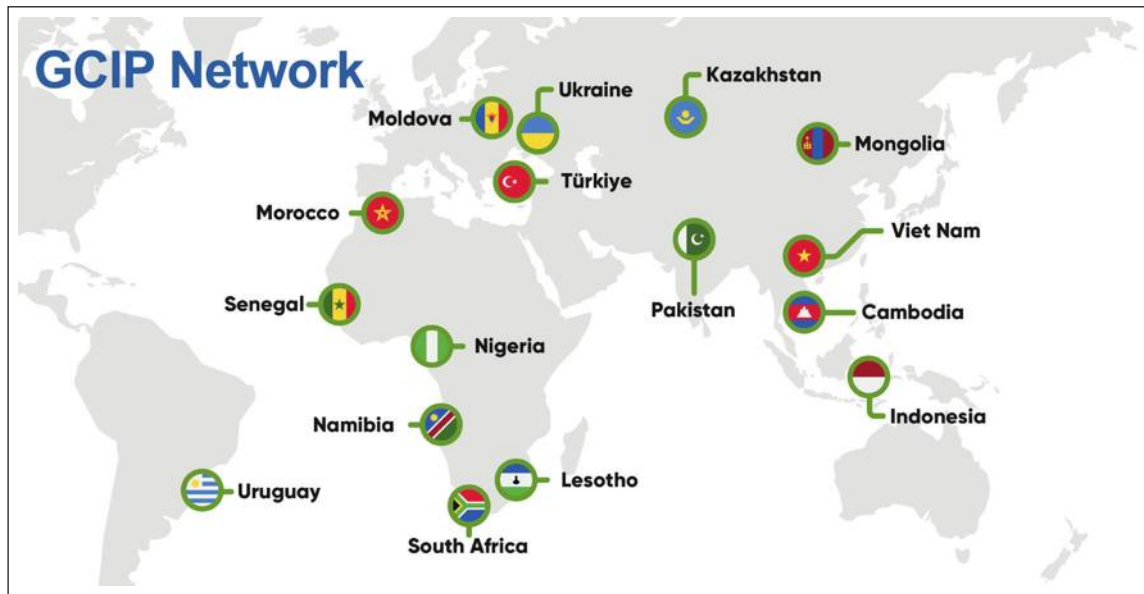


Figure 1 Countries of the Global GCIP Platform

The grant was allocated to Kazakhstan by Global Environment Facility (the GEF), with the assistance of the United Nations Industrial Development Organization (hereinafter - UNIDO), which has a unique mandate to support inclusive and sustainable industrial development to solve the most pressing global environmental problems of our time.

The national executor of the project is NJSC "International Green Technologies and Investments Center".

RELEVANCE AND PURPOSE OF THE PROJECT:

THE AIM OF THE PROJECT IS TO PROMOTE INNOVATIONS IN THE FIELD OF CLEAN TECHNOLOGIES THROUGH AN INTERSECTORAL AND MULTI-LEVEL APPROACH TO REDUCE GREENHOUSE GAS EMISSIONS AND CREATE SUSTAINABLE INNOVATIVE ECOSYSTEMS FOR SMALL AND MEDIUM-SIZED ENTERPRISES AND STARTUPS.

Achieving the Paris Agreement's goal of limiting global warming to 1.5°C requires Kazakhstan to significantly reduce greenhouse gas emissions by 2030 and achieve zero emissions by 2060.

This requires the rapid development, deployment and implementation of domestic innovative environmentally friendly

technologies with low carbon emissions at a scale and pace that will lead to transformational changes.

It should be noted that the GCIP Program is one of the unique and flagship projects of the GEF and UNIDO. The 10-year experience of GCIP has clearly shown that an effective way to achieve the goals of sustainable development, energy transition and solving climate change problems lies through the introduction of innovations by small and medium-sized enterprises.

The project has its roots in 2011, when the Government of South Africa, with the support of the GEF and UNIDO, successfully implemented a project to hold the first clean technology competition among representatives of small and medium-sized businesses (SMEs) who had innovative ideas and solutions in the field of energy efficiency, renewable energy and eco-friendly construction.

The South Africa Cleantech project, implemented in 2011 in South Africa, proved to be so successful that it gave impetus to its expansion into the Global GCIP Program and spread to new developing countries.

The project is unique in that the countries become part of a large Global GCIP Platform covering 16 developing countries: Moldova, Ukraine, Turkey, Kazakhstan, Cambodia, Indonesia, Mongolia, Morocco, Namibia, Nigeria, Uruguay, Pakistan, South Africa, Senegal, Vietnam, Lesotho (Figure 1).

For Kazakhstan, being the first Central Asian country to join GCIP, this is a unique opportunity to build an effective innovation ecosystem for the development and support of clean technologies and their adaptation to climate change. In addition, a very attractive investment climate has been created in Kazakhstan to attract investment. Thus, according to UNCTAD, 46% of all investments and declared "greenfiled" projects in the Central Asian region are accounted for by Kazakhstan.

GCIP creates key opportunities for all countries and stakeholders so that they can effectively integrate support for small and medium-sized enterprises in the field of clean technologies into policies and business processes.

This will eliminate market and policy shortcomings that hinder the emergence, deployment and adoption of environmentally friendly technologies in the long term, which will help low- and middle-income countries to make the leap to a greener economy.

The effect of more than 1,100 GCIP startups that have been accelerated over the period 2017-2020 has shown impressive results. Thus, a projection of 14 startups

Effects of GCIP (2017-2020): Projection of 14 selected startups supported by GCIP

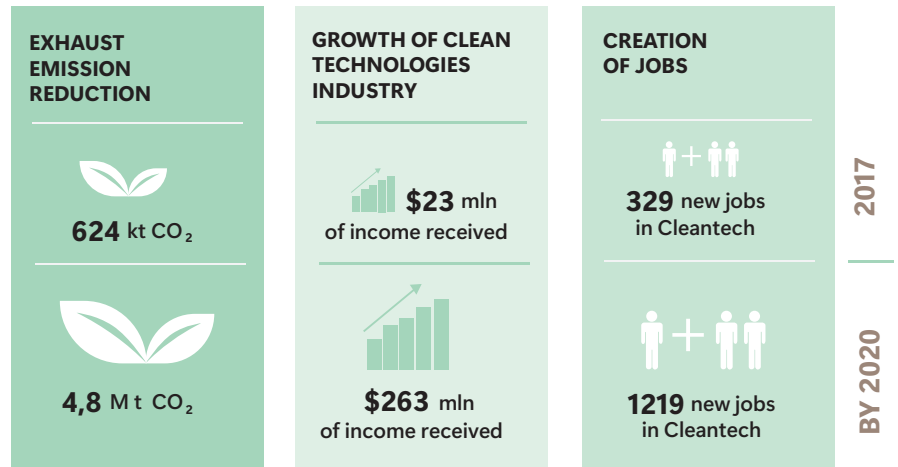


Figure 2

that passed the GCIP Acceleration Program reduced greenhouse gas emissions by 4.8 million tons of CO₂, attracted US\$ 263 million and created 1,219 new jobs in the field of clean technologies.

As in the whole world, SMEs in Kazakhstan can become the main generator of new ideas, supplier of innovations and play a decisive role in

Gender issue IGTIC

In GCIP Kazakhstan, preference will be given to women entrepreneurs, trainers, coaches (at least 35 %)



Figure 3

achieving carbon neutrality. Thus, the share of small and medium-sized enterprises in Kazakhstan's GDP in 2021 amounted to 34.7%.

It should be noted that over the years of the Program's implementation, progress has also been made in the GCIP countries to eliminate the problems of gender inequality. For example, the share of female-headed enterprises in GCIP-Pakistan in 2017 was 32%, and the percentage of female-headed GCIP enterprises at the GCIP Global Forum 2018 was 53%.

In the GCIP - Kazakhstan competition, preference will also be given to women entrepreneurs, coaches, mentors (at least 35%). In this regard, Kazakhstan also has a good foundation for the development of women's entrepreneurship. Thus, there are 1.7 million small and medium-sized enterprises, of which 44% are headed by women.

GCIP - Kazakhstan is aimed at implementing transformational changes through the implementation of three components:

1) support for new SMEs offering innovative solutions in the field of clean technologies.

As a result of the National Competition and selection of the best projects, support will be provided to Kazakhstani clean technology enterprises (SMEs and startups) in the form of acceleration programs, development, scaling and implementation of their solutions. In addition, the project will help attract local investment, create jobs and develop the clean technology market.

2) development and strengthening of the ecosystem of innovation and entrepreneurship in the field of clean technologies.

GCIP-Kazakhstan will assist the government in improving national policies and regulations that promote innovation and commercialization of clean technologies.

The project will focus on strengthening institutional, market potential to support a favorable ecosystem of start-ups in the field of environmentally friendly technologies and strengthening policy frameworks and

mechanisms for technological innovation in SMEs.

GCIP's ecosystem approach is based on the belief that to bring about the changes the world needs, a partnership between private and public actors, as well as between thematic and sectoral disparate structures, is required.

By stimulating enabling innovation ecosystems, the GEF and UNIDO aim to promote affordable and scalable solutions enabling countries to make the leap to climate and clean energy technologies within the GCIP framework.

3) The activities under the 3rd component are aimed at ensuring that the achievements of GCIP-Kazakhstan are recorded and brought to the attention of the whole world, as well as that the projects of all GCIP countries are implemented in a coordinated manner.

In this regard, the Center will cooperate with global organizations implementing the project from the USA, such as NGIN (Network for Global Innovation) and GCG (Global Cleantech Group), and will also contribute to the collection of information and knowledge exchange.

TERMS OF THE GCIP- KAZAKHSTAN COMPETITION

Using an intersectoral approach to creating a sustainable favorable business environment for innovation and entrepreneurship, GCIP uses a competition-based approach (accelerator) to identify a pool of promising Kazakhstani entrepreneurs and support them through constant mentoring, training and networking events to transform their innovative ideas and concepts into full-fledged products and services ready to enter the national market and global markets.

The national competition will be held to identify the most promising innovative entrepreneurs and startups across the country for their subsequent support, risk reduction and linking them with potential investors, clients and partners

Projects will be able to participate in GCIP-Kazakhstan only at an early stage of readiness, when all scientific research has already been completed and evidence of a clearly defined product or service with properties and benefits that can be evaluated and tested by commercial clients were presented.



Figure 4

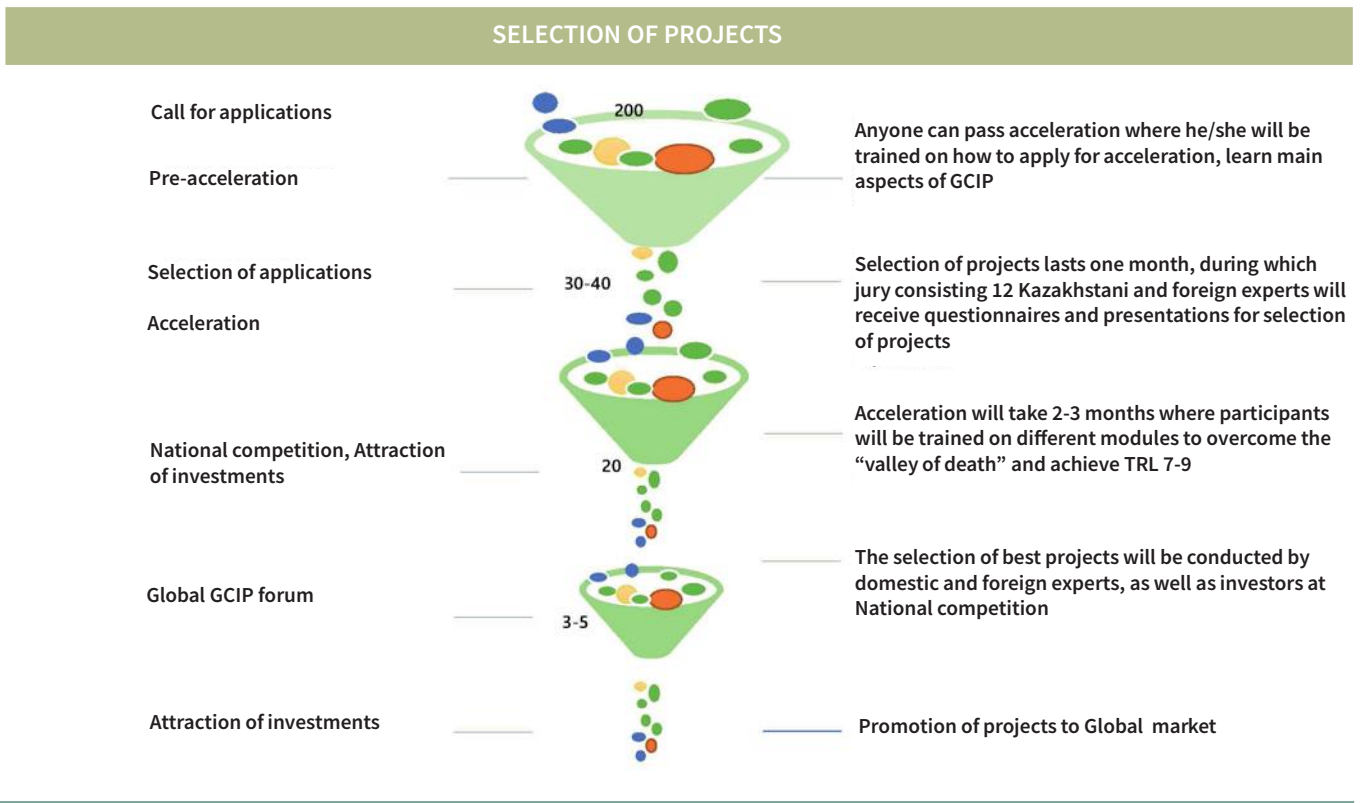


Figure 5

The competition will be held in the following 7 areas:

- waste management
- renewable energy sources
- energy efficiency
- efficient use of water
- transport
- green construction
- modern materials and chemicals

The competition is expected to collect applications from 150-200 applicants, 30-40 startups will be selected for acceleration, and approximately 5-7 startups will be selected to participate in the Cleantech Global Forum, which usually takes place in the Silicon Valley of the USA, in San Francisco and in Los Angeles or Europe (Fig. 6).



Figure 6

Who can apply for acceleration?

- Manufacturing companies with technologies that can change the industry;
- Companies that produce goods or provide services with an innovative business model that can give them a sustainable competitive advantage;
- Promising teams: at least two people whose authority can attract other talented people to help them enter a certain market.

ONE OF THE INNOVATIONS OF GCIP-KAZAKHSTAN IS TO CONDUCT PRE-ACCELERATION BEFORE THE START OF THE MAIN ACCELERATION OF STARTUPS.

Pre-acceleration aims to help entrepreneurs prepare for GCIP acceleration by focusing on the formation of a business concept, a minimally viable product (MVP) and a team. It usually lasts 2-3 weeks.

Acceleration is a program lasting from 3 to 6 months, in which a group of

entrepreneurs is trained. These programs usually take the form of business contests with multiple presentations and prizes for the winners.

For companies in the field of clean/green technologies, acceleration is especially important, since they relate to product innovations and differ from typical companies in that business is most often built on physical components (batteries, machines, solar panels, sensors, components of micro-networks, etc.). Therefore, commercialization and introduction of environmentally friendly technologies is a more complex process and companies have a longer "valley of death".

It takes time for companies to get stronger, a higher level of financial support, as well as the availability of a variety of skills and abilities to achieve success: accelerated development of prototypes, intellectual property protection, creation and subsequently scaling of production, a market entry strategy. Therefore, the GCIP program, consistently building a bridge of various support tools, helps new companies overcome various barriers and avoid the notorious "valley of death".(see Figure 7).

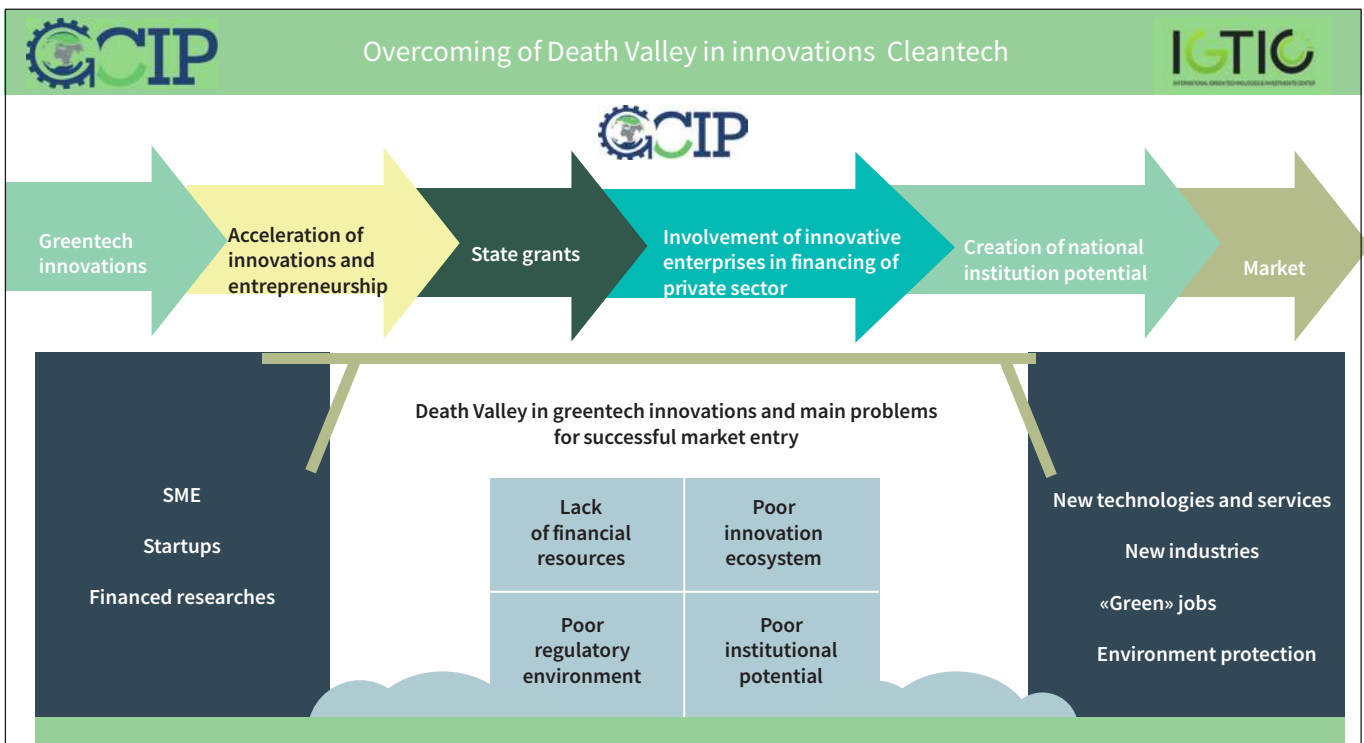
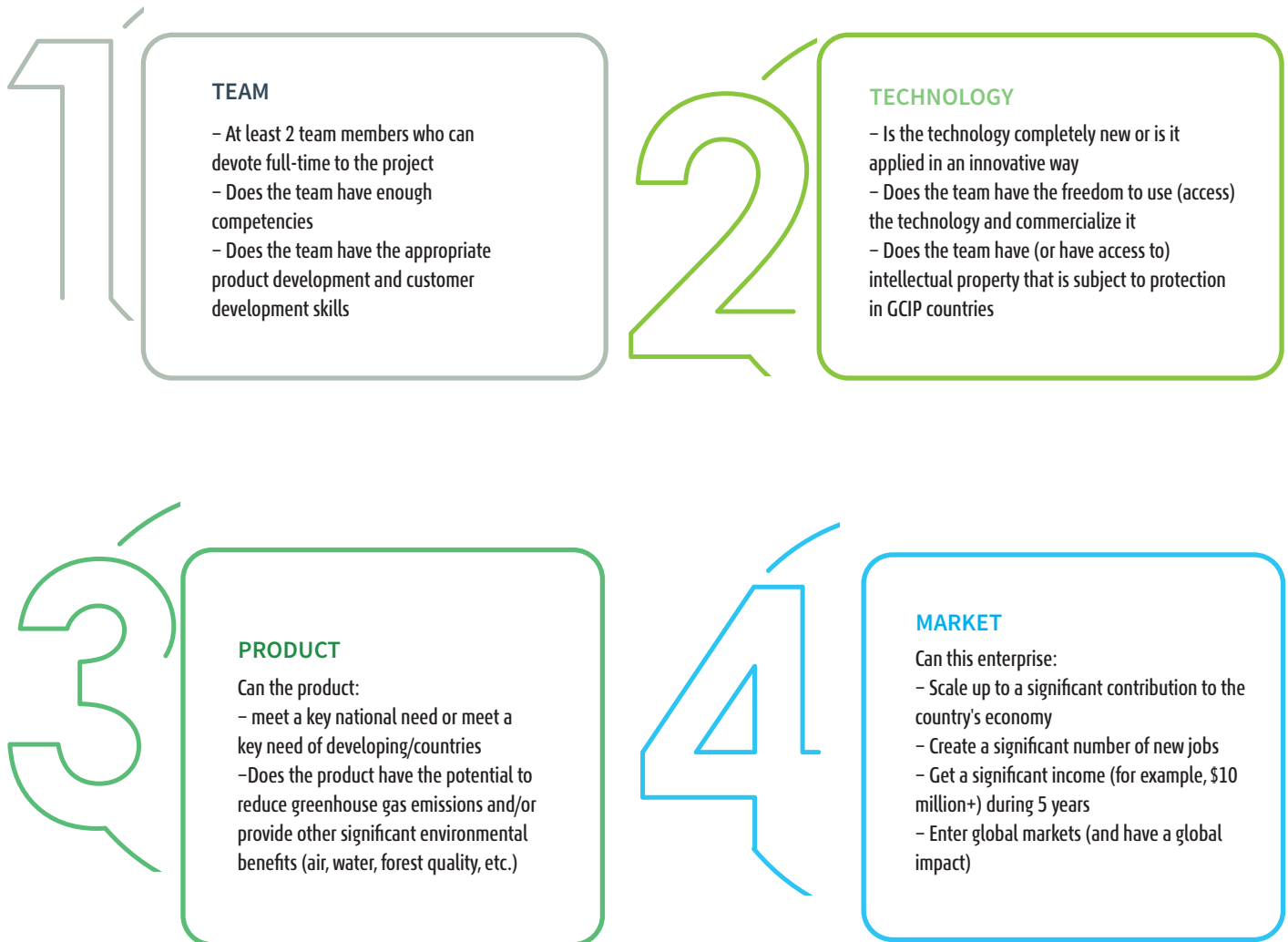


Figure 7

The preliminary selection of projects for acceleration will be conducted by evaluating the following 4 criteria:



At the same time, GCIP does not immediately require, at the initial stage of selection, a comprehensive strategy for entering the market, the correct determination of who will buy their product and why, an excellent financial forecast or a deep understanding of the financing strategy. These are exactly the areas in which GCIP is designed to help.

In addition, within the framework of GCIP-Kazakhstan, the GEF and UNIDO provide an opportunity to demonstrate projects to domestic and foreign investors, including the PFAN private finance network.

Methodological support of the Startup Acceleration Program will consist of 6 modules:

1. Guide for Entrepreneurs: Innovation and approval of business models;
2. Handbook for entrepreneurs:

- creating a successful presentation for investors;
- 3. Handbook for entrepreneurs: marketing communications;
- 4. Guide for Entrepreneurs: Regional and global expansion;
- 5. Venture financing: business

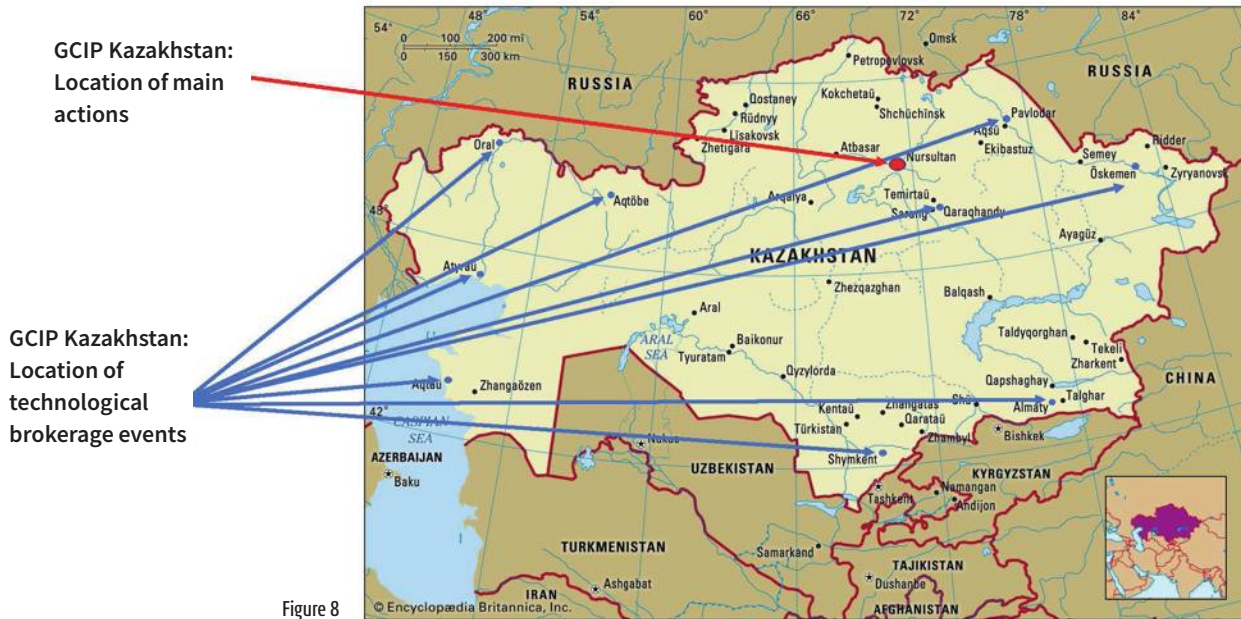


Figure 8

angels and venture capital (global venture capital environment, technological trends and opportunities). Crowdfunding (features of work in Kazakhstan); 6. Sustainability (environmental and social), impact tracking and monetization ("Green investors", impact funds, CO₂ emissions tracking, etc.).

ONE OF THE MAIN MECHANISMS FOR PROMOTING TECHNOLOGIES FOR FURTHER IMPLEMENTATION IN REGIONS AND CITIES WILL BE TECHNOLOGY BROKERAGE EVENTS IN THE REGIONS OF THE REPUBLIC OF KAZAKHSTAN, WHERE INVESTORS, DEVELOPERS OF PROJECTS/TECHNOLOGIES, ENTERPRISES MEET TO SOLVE TECHNOLOGICAL PROBLEMS OF THE REGIONS.

The regions of Kazakhstan with the largest emissions and polluted atmospheric air were selected for technological brokerage events.

Expected results:

Currently, GCIP supports more than 1,250 SMEs in fifteen countries, of which 35-40% are headed by women.

As a result, over the next 10 years, GCIP is expected to collectively reduce direct GHG emissions by at least 2,225,000 eq. CO₂ and indirect emissions by at least 11,275,000 eq. CO₂.

In addition, GCIP aims to achieve other related environmental, social and economic benefits, including job creation, poverty reduction and women's empowerment.

It is planned that after implementation of the GCIP-Kazakhstan program, the following results will be achieved:

- Reduction of CO₂eq emissions (tons) by at least 135,000 (directly) and at least 675,000 (indirectly);
- At least 80 companies that have passed acceleration;
- Attracted investments in the amount of a minimum of 1 million US dollars;
- 1,000 additional jobs created or retained (at least 35% are headed by women);
- 5-10 enterprises with an increase in exports brought to the global market (at least 35% are headed by women);
- 30 mentors trained;
- 10 commercialized green patents;

- 7-9 technological brokerage events in the regions of Kazakhstan.

In the end, GCIP improves the basic conditions for all relevant stakeholders, including entrepreneurs, financial and technology consultants, policy makers and investors, which subsequently allows them to act independently of GCIP in the long term.

The implementation of GCIP-Kazakhstan will provide new technological businesses and solutions to various environmental problems of the country, the creation of new green jobs and SMEs, which will bring Kazakhstan closer to the low-carbon economy of the country.

GCIP-Kazakhstan will attract local and foreign investments to support domestic technologies, which will subsequently increase the environmental innovation activity of the country.

All this combined will certainly give Kazakhstan more opportunities to get closer to the goals of the Paris Agreement and achieve zero emissions by 2060.



Decarbonization of extractive industries of the Republic of Kazakhstan





Bakhyt Yessekina,

Member of the Green Economy Council under the President of the Republic of Kazakhstan, Director of SREC "Green Academy", Doctor of Economics, Professor



The problem of global energy transition based on principles of decarbonization, technological modernization and integration of ESG principles into corporate governance processes is core of modernization of long-term economic development strategies of both developed and developing countries.

As is commonly known, the Decree of the President of the Republic of Kazakhstan K.K. Tokayev dated 2.02.2023 (N120) approved the Strategy for Achieving Carbon Neutrality of the Republic of Kazakhstan by 2060. In this regard, the multi-authored monograph* of well-known Kazakhstani scientists and experts devoted to development and substantiation of theoretical and methodological provisions and practical recommendations to the Government on achieving carbon neutrality at the national level is very timely and relevant and represents a pioneering study not only in Kazakhstan, but also for the Asia-Pacific countries.

The authors begin their research by substantiating the conceptual

provisions of decarbonization based on generalization of international experience of the energy transition. It is established that at present, a kind of "carbon revolution" is taking place in the world economy, associated with new economic priorities, changes in the structure of the economy,

Based on the analysis of global carbon markets, it is determined that in the coming decades, low carbon, based on reducing the negative impact on the climate and increasing energy efficiency, will become a key characteristic of advanced economies, since many economies of the world will have a new innovative and technological basis.

The authors propose to consider low-carbon development as an important part of the concept of sustainable development aimed at preventing the catastrophic consequences of global climate change. Reducing the consumption/ burning of carbon-containing fossil fuels plays the major role in formation of low-carbon economy in most countries. In this regard, countries that have ratified the UN Framework Convention on Climate Change

¹ Decarbonization of extractive industries of the Republic of Kazakhstan: monograph, edited by Doctor of Geological Mineralogical Sciences S.J.Daukey, Bi-print, 2021, 295p.

...to assess the potential of decarbonization and possibility of using low-carbon technologies, as well as to identify existing barriers and challenges that need to be overcome in solving the task of reducing emissions at the national and regional levels.

(UNFCCC), including the Republic of Kazakhstan, in order to increase its competitiveness, it is necessary to assess the potential of decarbonization and possibility of using low-carbon technologies, as well as to identify existing barriers and challenges that need to be overcome in solving the task of reducing emissions at the national and regional levels.

An unconditional contribution to development of theory of decarbonization is justification of following principles of transition to low-carbon development:

1. In order to limit the average global temperature to 1.5 °C from pre-industrial level, as stipulated by the Paris Agreement, it is necessary to reduce greenhouse gas emissions by at least 25% from the 1990 level by 2030.

2. The decarbonization policy of the country should be based on technological modernization based on use of alternative and digital technologies in basic industries;

3. Payment for greenhouse gas emissions should not be considered as a way to replenish the budget, but only as a way to redistribute funds in order to transfer the economy to a low-carbon path of development. It is advisable to consider the possibility of reducing the rates (up to zero) for some taxes or the possibility of their complete abolition.

4. The emission control system should provide for a wide range of measures to support and stimulate investment in low-carbon projects and sectors with tax exemption, subsidizing interest rates and co-financing of relevant projects from budgets or from special funds for low-carbon development.

5. Decarbonization should not be just a business matter, it should become the goal of entire state economic policy, which should be reflected in the Implementation Plan of the Strategy to achieve Carbon Neutrality and, accordingly, in the system of strategic planning and budgeting.

In the course of critical understanding of the international experience of technological modernization in ensuring the energy transition (studies by IEA, UNFCCC, IPCC, UNIDO, etc.), it was determined that the most effective technological solutions that ensure

economic growth and at the same time reduce emissions include:

- transition to low-carbon or carbon-free fuels;
- decarbonization of electricity production;
- electrification of economy and its individual branches;
- improving the efficiency of energy production and consumption;
- application of carbon capture and storage technologies;
- use of geothermal energy and other renewable energy sources;
- preservation and increase of potential of CO absorption, including in forestry and land use.

As an important decarbonization potential of the national economy, the authors of monograph define the development of integrated geothermal heat supply systems* that can provide heating and hot water supply to civil, industrial buildings and technological needs of production (car washes, laundries, etc.), as well as heating greenhouses, schools and other social objects with simultaneous achievement of ecological and economic effect.

It is established that three main types of energy systems based on thermal waters are used in the world:

- direct use from district heating system operating in dry steam deposits;
- geothermal power plants (with steam generator) operating on hot water deposits under pressure;
- geothermal heat pumps with a binary cycle, in which geothermal heat is transferred to a secondary fluid (for example, saline solutions, freon or isobutane) and classical Rankine cycle occurs.

Currently, exploration and exploitation of geothermal steam fields is conducted in more than 80 countries of the world, and their industrial use has been mastered in 60 countries. In 2000, geothermal thermal power plants operated in 59 countries with a total installed capacity of 15.2 thousand tons . MW and an annual output of 193 thousand TJ, which allowed saving 9.2 million tons.

During the study, the natural reserves of hydrogeothermal resources of Kazakhstan

Figure 1. Use of geothermal energy in the world



* A.A. Absametov, *Decarbonization of extractive industries of the Republic of Kazakhstan, Bi-print, 2021, pp.56-71, pp.137-156*
 * Satova R.K. *Decarbonization of extractive industries of the Republic of Kazakhstan, Bi-print, 2021, pp.71-88, pp.207-221*

Source: <https://www.geothermal-energy.org/explore/our-databases/geothermal-power-database/>

with temperatures from 40°C to more than 100°C were estimated at 10275 billion m3 of water and 680 billion Gcal of heat, which is equivalent to 97 billion tons of conventional fuel or 2.8 billion TJ, and is comparable to the resources of traditional fuel sources of heat. Geothermal sources are mainly located in Western Kazakhstan - 75.9%, in Southern Kazakhstan - 15.6% and in Central Kazakhstan - 5.3%.

An important practical contribution of the study was clarification of criteria and definition of promising areas for practical use of geothermal energy of the subsoil of Kazakhstan. At the same time, the factors constraining the development of this type of energy were substantiated, among which: the location of geothermal sources in sparsely populated areas and significant distance from large potential consumers of thermal energy of the subsoil, etc. The following are the most promising for extraction of thermal-energy groundwater with a mineralization of up to 3 g/dm3 with a temperature of up to 70-100 °C: artesian basins of Southern and South-Eastern Kazakhstan: Arys, Almaty and Zharkent. In these areas, underground thermal waters have low mineralization, mainly 0.5-3 g / dm3, and the temperature at self-discharge ranges from 50 - 60 ° C to 90-100 ° C.

As an important direction for decarbonization, the authors of monograph consider the potential

and prospects for use of hydrogen and hydrogen technologies*. It is determined that hydrogen is used mainly in oil refining and fertilizer production. However, the range of applications of hydrogen can be much wider. In the conditions of energy transition, it is necessary to use hydrogen in such sectors as transport, buildings, and electricity generation.

At the same time, the production of hydrogen by steam conversion of light hydrocarbons (most often methane) or coal (mainly in China), as well as water electrolysis, despite its relatively wide application in various fields of industry,

has limitations due to the lack of necessary infrastructure and competition from cheaper, affordable and easy-to-use energy sources. In this regard, transition to use of hydrogen, which causes a reduction in greenhouse gas emissions from the energy sector, requires comprehensive incentive measures, creation of appropriate infrastructure both at the national and corporate levels, possibly as part of development of Hydrogen Strategy.

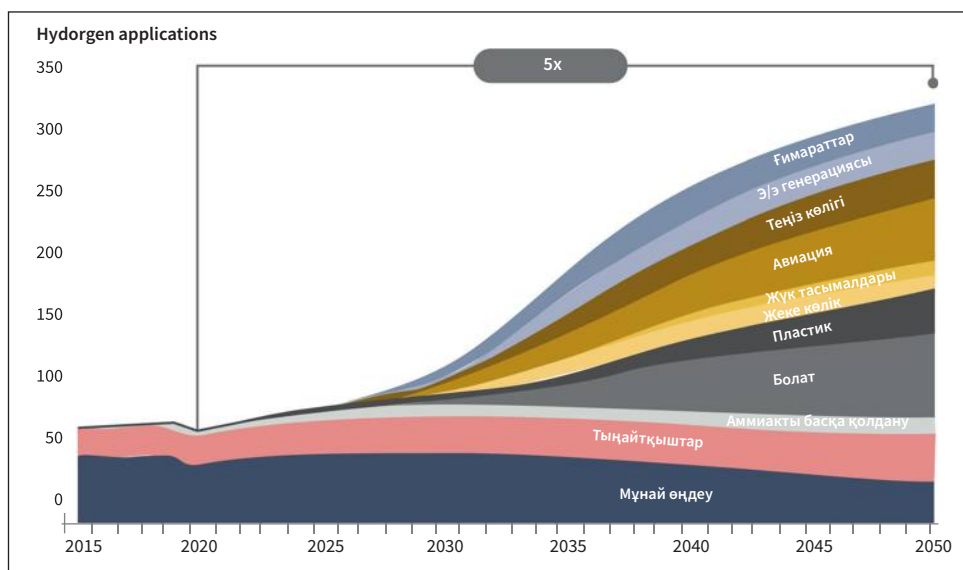
The monograph comprehensively explores absorption technologies that allow for more complete use of heat generated in the electricity production

Table 1. Distribution of geothermal waters in artesian basins of Kazakhstan

Artesian basins (potential usable geothermal waters, thous.t. reference fuel)	Number of identified displays of geothermal waters				
	Total	Including with temperature on well head, °C			
		20-50	50-75	75-100	>100
Ily (1438.7)	47	35	6	5	1
Syrdarya (6247.7)	81	55	24	2	-
Shu- Sarysu (n.s)	30	28	2	-	-
Mangystau- Ustyurt (2885.6)	11	3	2	3	3
Total for RK (10572)	169	121	34	10	4

Source: M.K Absametov. *Decarbonization of extractive industries of economy of the Republic of Kazakhstan Bi-print, 2021, C.140*

Figure 2. Global demand for hydrogen, in mln. tons per year



Source- Analysis of RystadEnergyHydrogenCude (beta version)

cycle. These technologies make it possible to utilize low-potential thermal resources in two ways: by means of absorption bromistolithium refrigerating machines (ABRM) or absorption bromistolithium heat pumps.

Currently, up to 80% of ABRM is used in industry, since energy-intensive enterprises always have excess thermal energy that needs to be disposed of: hot water, steam, waste (flue) gases. This is especially true for basic industries

- energy, petrochemistry, ferrous and non-ferrous metallurgy, where there is a significant amount of excess heat in the form of industrial effluents or recycling cycles.

A study to assess the decarbonization potential of basic industries begins with consideration of fuel and energy complex (FEC)*, which is one of the most energy-intensive sectors of the country's economy and represents a complex system consisting of production,

extraction of fuel and energy resources, their transportation, distribution and consumption of both primary and converted types of energy carriers, which includes: electric power, coal industry, gas and oil industry.

It is determined that emissions of pollutants from electric power facilities account for 43-45% of the total emissions of all stationary sources, one third of which are ash emissions. Emissions from thermal power plants account for up to

Table 2. Hydrogen application in modern economy

Hydrogen applications					Other sectors of industry
As fuel	For heat	As raw materials			Metallurgy Food industry Steel making Glass production
Transport	Power industry	Industry	Housing and Utilities	Chemistry and Petrochemicals	
Motor transport Sea transport Aviation Synthetic fuel	Generation of power at peak ratings	Steel making Cement production paper production Food production Aluminum smelting	Heating of buildings	Fertilizer Fuel preparation	

Source: Bloomberg NEF

Figure 3. Use of Absorption refrigerating system (ABRS) for air-cooling system

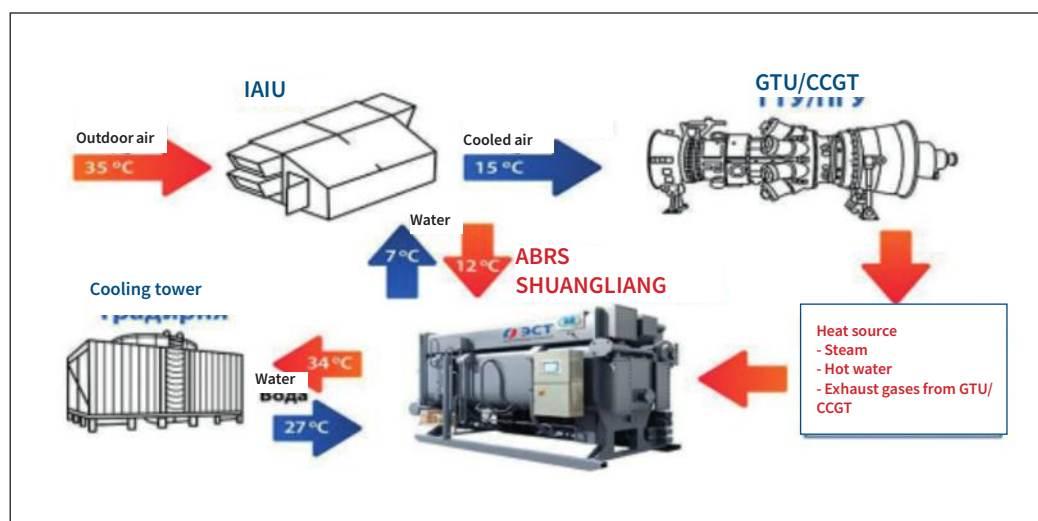


Table 3. Ecological efficiency of operation of system for use of low-grade heat of circulating water based on heat pumps HT-3000

No.	KPI	Unit of Measurement	1 stage	2 stage	3 stage
1	Heat generation	thous. GCal/year	98,857	219,58	304,641
2	Saving of primary fuel	t.r.f./year	17812	39568	54896
		tn/year	28050	62312	86450
3	Reduction of number of railcars for transportation of coal pcs/year	pcs/year	467	1038	1441
4	Reduction of harmful emissions into atmosphere including				
4.1	CO	tn/year	1,336	2,97	4,117
4.2	SO ₂	tn/year	213,7	474,8	658,7
4.3	NO _x	tn/year	128,2	284,9	395,2
4.4	Ash	tn/year	71,2	158,3	219,6
5	Reduction of wastes in the form of ash directed to ash yard	tn/year	3710	8241	11434
6	Reduction of payments to budget for ecological emissions	mln KZT/year	2,83	6,28	8,71

70% of the total emissions of electric power facilities. Most thermal power plants use coal with high ash content, ranging from 30% (Karaganda coal) to 45% (Ekibastuz coal). The amount of fly ash, sulfur oxides and nitrogen formed in boilers depends on the type and quality of the fuel burned. In comparison with the indicators of 1990, the volume of

emissions of pollutants (sulfur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, VHF) in 2020 decreased by an average of two times. This was facilitated by a decrease in level of production and installation of cleaning equipment at the fuel and energy complex enterprises. At the same time, stationary sources of decentralized heat

supply, which are autonomous boiler houses and heating furnaces, make a significant contribution to pollution of air basin. The established standards for emissions of solid particles in the fuel and energy complex are 14 times higher than EU standards (RK - 700 mg/m³, EU - 50 mg/m³), while the process of achieving EU emission indicators complicates

* Alimgazin A.A. Decarbonization of extractive industries of the Republic of Kazakhstan, Bi-print, 2021, pp.88-105, pp.221-238

* S.S. Sagintayeva, A.S. Bigembetova Decarbonization of extractive industries of the Republic of Kazakhstan, Bi-print, 2021, pp.105-124, C194-207

deterioration of power equipment (up to 50% and above) at CHP, TPP and GRES. Methane emissions and leaks in the oil and gas sector are up to 45% of all emissions and, accordingly, occupy a significant share in composition of greenhouse gases.

The authors believe that it is possible to achieve a significant reduction in emissions in order to achieve European standards and reduce greenhouse gas emissions, provided that significant investments are made in upgrading the technological equipment of thermal power plants and switching to more environmentally friendly fuel. To reduce the carbon intensity and increase the energy efficiency of coal-fired thermal power plants, modernization is required, including:

- 1) installation of efficient flue gas cleaning systems;
- 2) improving fuel efficiency, reducing emissions of nitrogen oxides, sulfur, carbon dioxide and suspended particles;
- 3) switching to ultra-supercritical steam parameters, which allows reducing carbon dioxide emissions by 19% (all other things being equal), and further increasing the parameters to advanced ultra-supercritical (advanced USC, A-USC) to reduce emissions of CO₂ by 30%;
- 4) introduction of cogeneration regime that allows coal-fired thermal power plants to significantly increase the efficiency index and reduce carbon dioxide emissions;
- 5) co-combustion of coal and biomass as a way to increase the energy efficiency of coal-fired thermal power plants;
- 6) introduction of CO₂ capture technologies.

To implement the climate agenda of the oil and gas sector, it is required:

- 1) to assess the carbon footprint, including an analysis of projected emissions and an annual greenhouse gas report;
- 2) to develop decarbonization strategy for each oil and gas company focused on reducing methane and carbon dioxide emissions;
- 3) to implement energy-efficient measures, introduction of energy-saving technologies, energy-efficient equipment with a high energy saving index, including the use of renewable energy sources;

Figure 4. Experimental trigeneration installation with system of integration of additional energy sources based on RES



4) to reduce hydrocarbon leaks and their costs for own needs of oil and gas companies;

5) to increase useful life and utilization of associated petroleum gas (APG) as a way to reduce greenhouse gas emissions.

The country's resource potential by types of renewable energy is determined * by: wind power - 920 billion kWh/year; hydropower - 62 billion kWh/year; solar energy - 2.5 billion kWh/year; thermal potential of geothermal waters - 4.3 GW.

The most significant of all RES is the potential of wind energy. In about 50% of the territory of Kazakhstan, the wind speed at an altitude of 30m is 4-5 m/s. The highest wind potential is available in the area of Caspian Sea - Atyrau and Mangistau regions, as well as in Northern

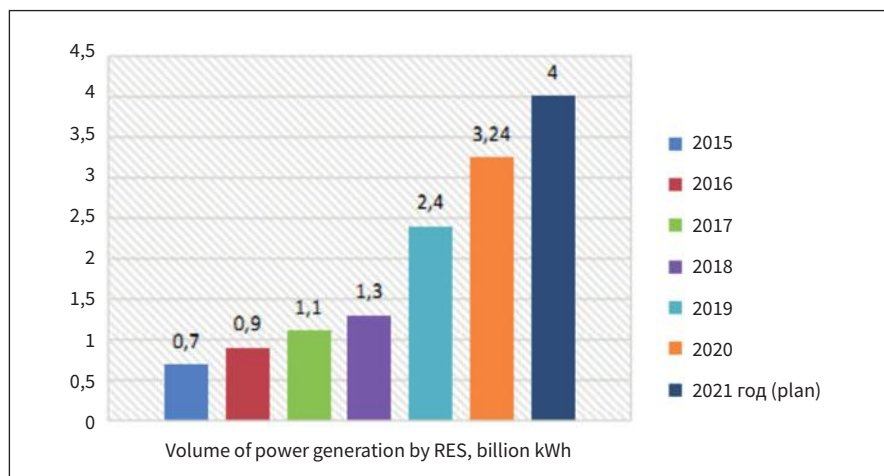
and Southern Kazakhstan.

Hydropower is the second largest source of electricity generation in Kazakhstan, accounting for about 10.9% of the country's total generating capacity. According to absolute indicators of potential hydro resources, Kazakhstan ranks third among the CIS countries. The authors substantiate promising directions for use of various renewable energy technologies by households, including:

- 1) solar collectors – for purposes of hot water supply and heating, especially in areas that do not have central heating networks;
- 2) use of renewable energy by small and medium-sized businesses and peasant farms.

Investigating the mining and

Figure 5. Dynamics of power generation by RES in 2015-2021 in RK.



Source: data from the website of the Ministry of Energy of the Republic of Kazakhstan

metallurgical complex (MMC) of Kazakhstan, the authors found that the complex has a potential of 10-15% in the field of reducing the carbon intensity of production, which can be realized through the use of digital approaches associated with the introduction of operational monitoring and optimization of the main technological processes. One of the measures of decarbonization of the MMC may also be inclusion of measures for technological modernization aimed at energy efficiency and reducing carbon

intensity in public-private partnership in the list of projects of the Industrialization Map of Kazakhstan.

In conclusion of monograph, the authors* developed specific proposals to the Government of the Republic of Kazakhstan on decarbonization of basic industries, taking into account green financing mechanisms, including development of a green taxonomy and launch of greenbonds market*. In general, the research results presented in this monograph served as a theoretical and

methodological basis for development of Strategy to achieve carbon neutrality of the Republic of Kazakhstan by 2060. Individual developments of the authors of the monograph, in particular, on development of hydrogen, geothermal power generation, use of absorption technologies and use of green and climate finance mechanisms are used in the work of line ministries, departments, as well as in development of corporate decarbonization strategies for individual enterprises.

Table 4. Range of tools of climate policy supplementing carbon pricing

Type of tool	Examples
Tools providing direct financing from budget (at national and sub-national levels)	
Target investment incentives	Green rates (extra and fixed), PPA agreements and other incentives for RES, Capital grants, Tax reliefs (tax discounts, amortization)
(or policy for technology support)	Concessional lending, direct investments, subsidies, guarantees, insurance Other tools to improve business solvency Tools facilitating attraction of additional private funds (for example, through green bonds)
Mixed financing (participation of financial institutes of development for reduction of risks and long-term financing)	Technological standards (for example, requirements for composition of biofuel) Standards of efficiency and productivity (for example average level of CO ₂ emissions by car fleet, energy efficiency standards) Permits and standards of quality of environment within the framework of state programs (for example, green procurements)
Standards and legal regulation	Requirements for marking and rating assignment scheme (marking scheme, requiring information about energy consumption and carbon print of products) Outreach campaigns Policies affecting the conduct of business (voluntary and mandatory disclosure of information and reporting, obligatory energy audits)
Information approaches	Introduction of practices of banking green lending, environmental risks management systems in policies of financial organizations
Role of financial regulators in greening of financial system	Increase in share of contributions by sovereign welfare funds, pension funds to share capital and debt investments in low-carbon projects.
Green mandates of institutional investors	

* A.S. Sospanova/ *Decarbonization of extractive industries of the Republic of Kazakhstan, Bi-print, 2021, 124-137p.*

* A.K. Kazybayev, *monograph/Decarbonization of extractive industries of the Republic of Kazakhstan, Bi-print, 2021, 255-274p/*

LONGi

offers green solutions for Kazakhstan's growing industry



LONGi is anticipating significant growth in Kazakhstan's large industrial and commercial sectors thanks to its multi-pronged foreign policy and the favourable investment climate in the country.



W

ith active development, oil refining, mining, metallurgy, cement production, and other industries will need to increase their energy supply, and solar power plants are the most obvious and quickest solution to future power shortages in Kazakhstan's fast-growing economy. To bridge the gap as quickly as possible and help the Kazakh government achieve its carbon neutrality goals, LONGi Company is prepared to offer its most advanced photovoltaic

technology for projects in Kazakhstan. Since entering the Kazakhstan market in 2019, LONGi has earned widespread recognition from customers for its efficient and reliable solar modules.

In collaboration with its partners in Kazakhstan, LONGi has made significant contributions to the country's efforts to promote clean energy through its latest advancements in solar technology.

50 MW BALKHASH POWER PLANT

One of the largest projects supported by LONGi in the Republic of Kazakhstan is the first phase of the 50 MW Balkhash power plant built in cooperation with Technogroupservice.


Technogroupservice completed the first phase of the Balkhash SPP with a capacity of 50 MW using LONGi's Class A solar panels by mid-summer. The LONGi Hi-MO 5 modules are the preferred model, given the harsh weather conditions in the area. The two-sided version of the panel captures sunlight reflected from the snow, providing additional performance improvements. Therefore, the two-side panel from LONGi helps compensate for more carbon dioxide emissions. The average daytime temperature in Kazakhstan in winter is as low as -20°C , which significantly impacts the power generation performance of the power station. In this regard, LONGi's Hi-MO 5 modules ensure the stable and efficient operation of the power station through leading module conversion efficiency and continuously optimized cell technology (high-resistance dense grid, laser SE, etc.).

In the construction of the power plant, load-bearing steel structures made in Kazakhstan were used. Design engineers at Technogroupservice performed engineering calculations, and the company adheres to the principle of maximizing domestic content. During the six-month maintenance period of

In this regard, LONGi's Hi-MO 5 modules ensure the stable and efficient operation of the power station through leading module conversion efficiency and continuously optimized cell technology (high-resistance dense grid, laser SE, etc.).

the station by the Technogroupservice team, the power generation of the Balkhash station exceeded the planned target by 5.2%, saving about 35,000 tons of air pollutants in the form of CO_2 .

NEW MONO MODULES

Last year, LONGi launched the brand new Hi-MO 6 Mono modules, which include four series: Explorer, Scientist, Guardian, and Artist. All of them are in the standard M10 size (182mm) and are available in 72C, 66C, 60C, and 54C types. The module complements a wide variety of application scenarios, with upgraded comprehensive power generation performance, stability, safety, reliability, and high-quality assurance. 

LONGi, founded in 2000, is committed to being the world's leading solar technology company, with a focus on customer-driven value creation for full-scenario energy transformation. Its mission of "making the best of solar energy to build a green world" and brand positioning as "the most trusted and reliable solar company that blazes the trail for green technology" have led the company to dedicate itself to technological innovation and establish five business sectors covering mono-silicon wafers, cells, and modules, commercial and industrial distributed solar solutions, green energy solutions, and hydrogen equipment. The company has honed its capabilities to provide green energy and has recently embraced green hydrogen products and solutions to support global zero-carbon development.

LONGi also became the first Chinese enterprise to join the RE100, EP100, and EV100 global initiatives and carbon targets (SBTI), contributing directly to the global energy revolution. The LONGi team in Central Asia is actively working together to use the most advanced technologies and products to provide maximum support for projects in the region.



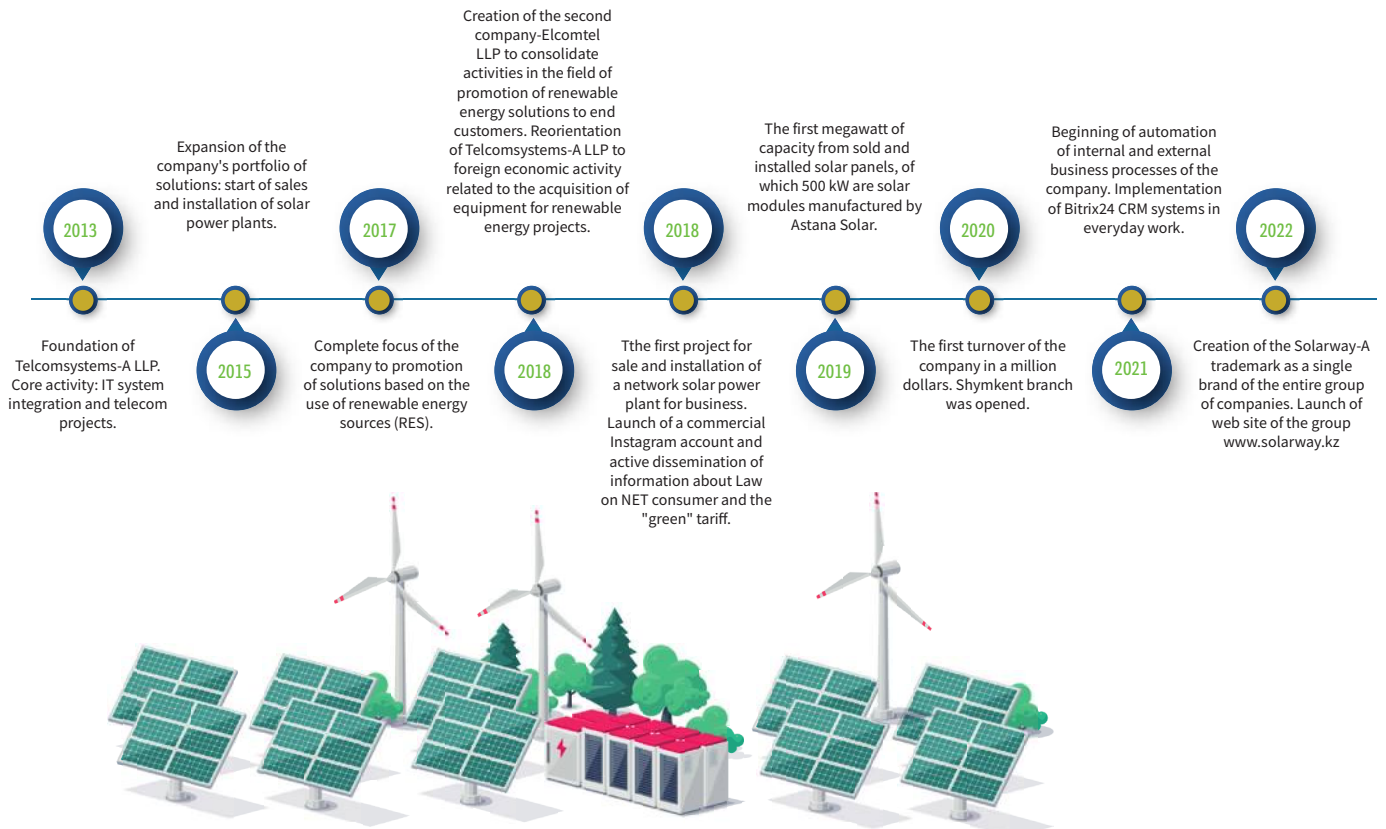


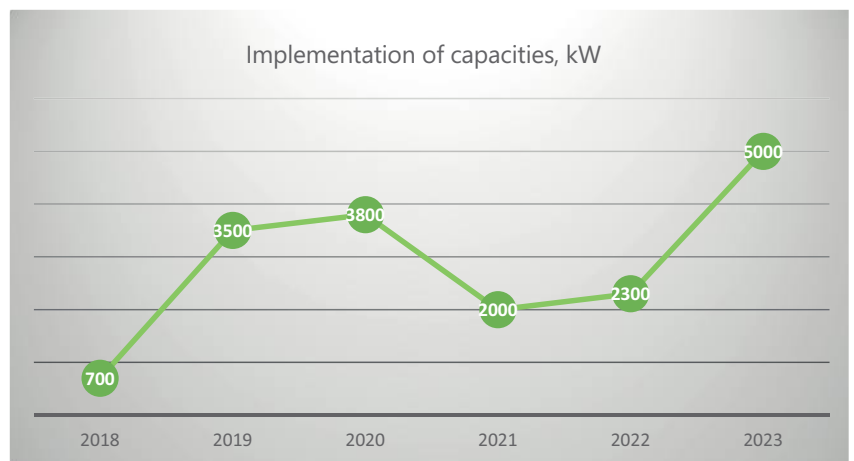
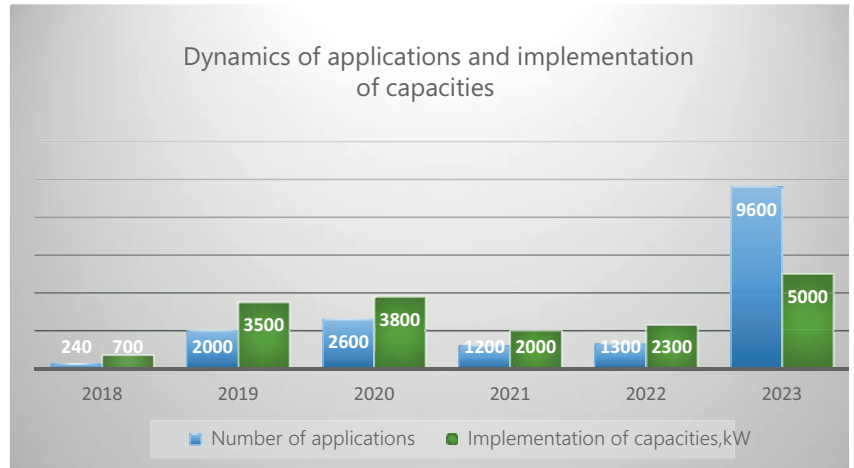
Improving the quality of life through "green" technologies



HOW IT ALL BEGAN

Elcomtel LLP was founded in 2018. It has been operating in the field of renewable energy since its existence. In particular, its main direction is photovoltaic power systems of autonomous and grid types, with the provision of a wide range of solutions for energy generation, distribution and storage, as well as integration with other energy sources.





The company and the team have come a long way, from sale of solar modules and equipment for small farms to serious and technologically advanced distributed generation projects for enterprises and businesses.

The main target market is SME sector and private customers, as well as sectors of medium and large enterprises.

In 2022, a rebranding took place with the creation of trade name Solarway-A, with the subsequent expansion of the range of services, quality in the field of solar energy, with the improvement of processes both within organizational structures and in external interactions with customers, contractors and suppliers.

During the period from 2022 to 2023, the conjuncture of the markets of Central Asia in the field of solar energy, the strategy of access to these regions were analyzed, negotiations were conducted. This work resulted in opening of a branch under the name of "Solarway-T" LLC in the Republic

of Uzbekistan in 2023. The company also plans to enter the markets of other neighboring countries.

The competence of the company in this area is demonstrated by the fact that it began to be approached on implementation and support of large projects with a capacity from 20 MW to 500 MW.

In general, it can be said that there is a positive trend in the markets of small and medium generation in the industry. This is evidenced by indirect indicators on applications and implementation of capacities. In 2021 and 2022, they were affected by the pandemic and instability of the national exchange rate.

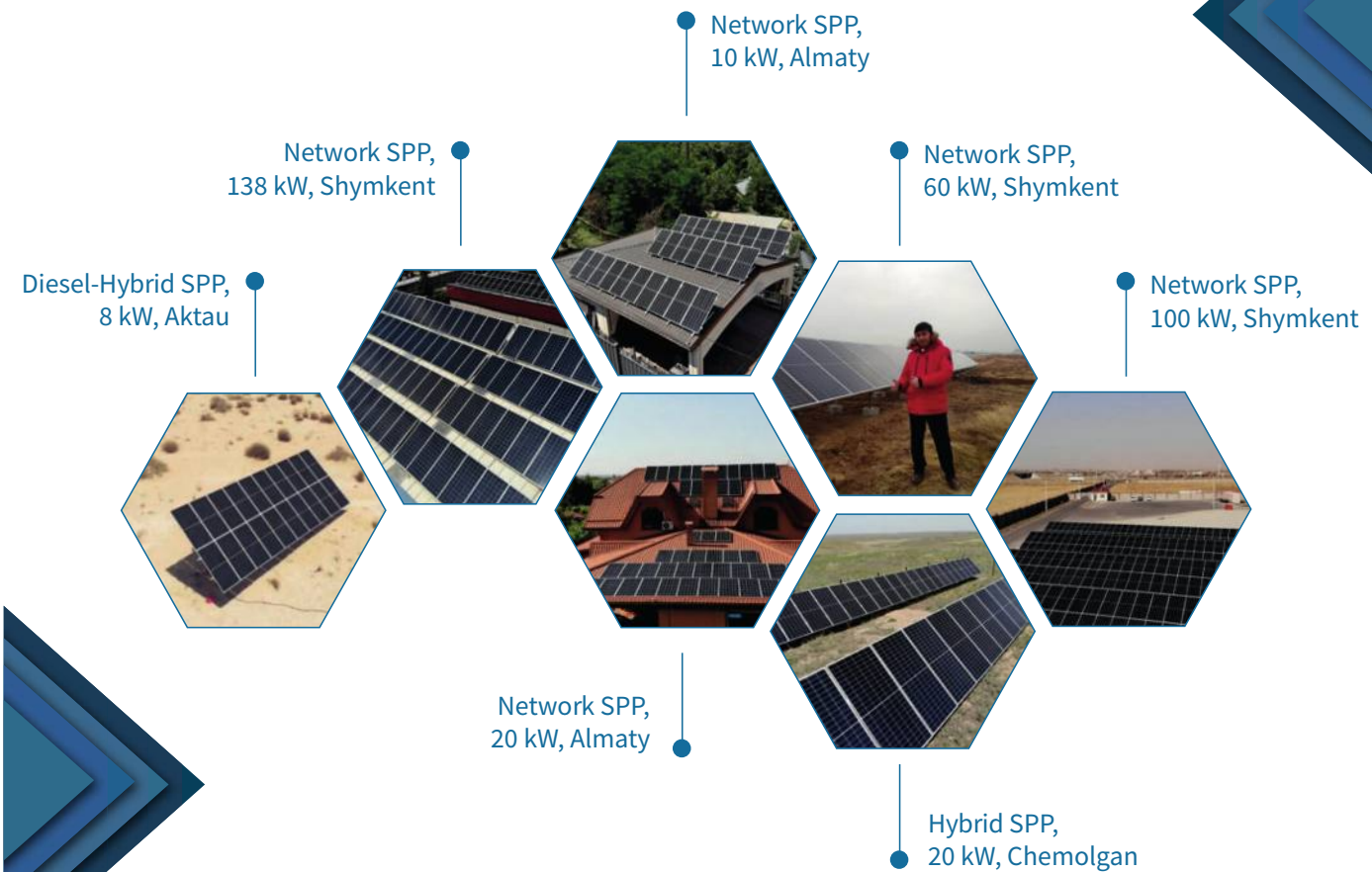
THE ENERGY TRANSITION STARTS LOW

Today, trends in energy transition from fossil fuels to renewable are apparent, and we are all witnesses of this event. Kazakhstan has also actively stated its ambitions to switch to renewable energy by 2060.

Since the company is at the forefront of promoting distributed generation to the masses, it intends to continue to introduce advanced technologies available in the field of solar generation,

storage systems, process automation, to increase the efficiency and availability of these technologies in various areas of the national economy, from industry to individual housing.

The company has installed over 1.5 thousand small-generation facilities, which is more than 8 MW of installed capacity, with a huge geography and completely different equipment solutions that are designed individually for the needs of different categories of customers.

**EXAMPLES OF IMPLEMENTED PROJECTS:**

When working with projects, the technical aspects of the project is provided, as well as:

- project support;
- financial model of the project for customer's decision-making in terms of certain credit conditions and programs;

Loan repayment schedule

Period	Month 0	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
Principal repayment of loan with subsidy	-1 027 002 651	- 15 041 787	- 15 242 344	- 15 445 576	- 15 651 517	- 15 860 204	- 11 813 564	- 11 971 078
Remaining principal amount of loan with subsidy		1 354 295 081	1 339 052 736	1 323 607 161	1 307 955 644	949 761 223	937 947 660	925 976 582
Interest payment of loan with subsidy	-485 732 976	- 18 257 825	- 18 057 268	- 17 854 036	- 17 648 095	- 17 439 409	- 12 663 483	- 12 505 969
Subsidy of part of principal amount						342 334 217		
TOTAL								
Loan principal	-1 369 336 868,00	-15 041 787	-15 242 344	-15 445 576	-15 651 517	-15 860 204	-16 071 673	-16 285 962
Principal balance of the loan without subsidy		1 354 295 081	1 339 052 736	1 323 607 161	1 307 955 644	1 292 095 440	1 276 023 767	1 259 737 805
% of the loan	-628 639 862,05	-18 257 825	-18 057 268	-17 854 036	-17 648 095	-17 439 409	-17 227 939	-17 013 650
		-33 299 612	-33 299 612	-33 299 612	-33 299 612	-33 299 612	-33 299 612	-33 299 612
Savings/revenues								
Partial early repayment	-1 997 976 730	-33 299 612	-33 299 612	-33 299 612	-33 299 612	-33 299 612	-33 299 612	-33 299 612

Over 25 years

year	Solar power plant capacity kW	Solar power output per square metre (PVGs) kWh / m2	PV modules efficiency %	Power generation without losses kWh	System losses %	PV module output 1 year (Degradation) %	Power generation including losses kWh
2023						100,00%	5 324 580,18
2024					97,30%	97,30%	5 169 795,88
2025					97,01%	97,01%	5 139 182,98
2026					96,31%	96,31%	5 108 570,08
2027					96,02%	96,02%	5 077 957,18
2028					95,53%	95,53%	5 047 344,28
2029					95,04%	95,04%	5 016 731,38
2030					94,33%	94,33%	4 986 118,50
2031					94,04%	94,04%	4 955 505,60
2032					93,54%	93,54%	4 924 892,70
2033					93,05%	93,05%	4 894 279,81
2034					92,20%	92,20%	4 860 222,26
2035					91,35%	91,35%	4 826 174,71
2036					91,40%	91,40%	4 792 127,17
2037					91,40%	91,40%	4 758 079,63
2038					91,40%	91,40%	4 724 032,09
2039					91,40%	91,40%	4 690 000,00
2040					91,40%	91,40%	4 656 000,00
2041					91,40%	91,40%	4 622 000,00
2042					91,40%	91,40%	4 588 000,00
2043					91,40%	91,40%	4 554 000,00
2044					91,40%	91,40%	4 520 000,00
2045					91,40%	91,40%	4 486 000,00
2046					91,40%	91,40%	4 452 000,00
2047					91,40%	91,40%	4 418 000,00
2048					91,40%	91,40%	4 384 000,00
2049					91,40%	91,40%	4 350 000,00
2050					91,40%	91,40%	4 316 000,00
2051					91,40%	91,40%	4 282 000,00
2052					91,40%	91,40%	4 248 000,00
2053					91,40%	91,40%	4 214 000,00
2054					91,40%	91,40%	4 180 000,00
2055					91,40%	91,40%	4 146 000,00
2056					91,40%	91,40%	4 112 000,00
2057					91,40%	91,40%	4 078 000,00
2058					91,40%	91,40%	4 044 000,00
2059					91,40%	91,40%	4 010 000,00
2060					91,40%	91,40%	3 976 000,00
2061					91,40%	91,40%	3 942 000,00
2062					91,40%	91,40%	3 908 000,00
2063					91,40%	91,40%	3 874 000,00
2064					91,40%	91,40%	3 840 000,00
2065					91,40%	91,40%	3 806 000,00
2066					91,40%	91,40%	3 772 000,00
2067					91,40%	91,40%	3 738 000,00
2068					91,40%	91,40%	3 704 000,00
2069					91,40%	91,40%	3 670 000,00
2070					91,40%	91,40%	3 636 000,00
2071					91,40%	91,40%	3 602 000,00
2072					91,40%	91,40%	3 568 000,00
2073					91,40%	91,40%	3 534 000,00
2074					91,40%	91,40%	3 500 000,00
2075					91,40%	91,40%	3 466 000,00
2076					91,40%	91,40%	3 432 000,00
2077					91,40%	91,40%	3 398 000,00
2078					91,40%	91,40%	3 364 000,00
2079					91,40%	91,40%	3 330 000,00
2080					91,40%	91,40%	3 296 000,00
2081					91,40%	91,40%	3 262 000,00
2082					91,40%	91,40%	3 228 000,00
2083					91,40%	91,40%	3 194 000,00
2084					91,40%	91,40%	3 160 000,00
2085					91,40%	91,40%	3 126 000,00
2086					91,40%	91,40%	3 092 000,00
2087					91,40%	91,40%	3 058 000,00
2088					91,40%	91,40%	3 024 000,00
2089					91,40%	91,40%	2 990 000,00
2090					91,40%	91,40%	2 956 000,00
2091					91,40%	91,40%	2 922 000,00
2092					91,40%	91,40%	2 888 000,00
2093					91,40%	91,40%	2 854 000,00
2094					91,40%	91,40%	2 820 000,00
2095					91,40%	91,40%	2 786 000,00
2096					91,40%	91,40%	2 752 000,00
2097					91,40%	91,40%	2 718 000,00
2098					91,40%	91,40%	2 684 000,00
2099					91,40%	91,40%	2 650 000,00
2100					91,40%	91,40%	2 616 000,00
2101					91,40%	91,40%	2 582 000,00
2102					91,40%	91,40%	2 548 000,00
2103					91,40%	91,40%	2 514 000,00
2104					91,40%	91,40%	2 480 000,00
2105					91,40%	91,40%	2 446 000,00
2106					91,40%	91,40%	2 412 000,00
2107					91,40%	91,40%	2 378 000,00
2108					91,40%	91,40%	2 344 000,00
2109					91,40%	91,40%	2 310 000,00
2110					91,40%	91,40%	2 276 000,00
2111					91,40%	91,40%	2 242 000,00
2112					91,40%	91,40%	2 208 000,00
2113					91,40%	91,40%	2 174 000,00
2114					91,40%	91,40%	2 140 000,00
2115					91,40%	91,40%	2 106 000,00
2116					91,40%	91,40%	2 072 000,00
2117					91,40%	91,40%	2 038 000,00
2118					91,40%	91,40%	2 004 000,00
2119					91,40%	91,40%	1 970 000,00
2120					91,40%	91,40%	1 936 000,00
2121					91,40%	91,40%	1 902 000,00
2122					91,40%	91,40%	1 868 000,00
2123					91,40%	91,40%	1 834 000,00
2124					91,40%	91,40%	1 800 000,00
2125					91,40%	91,40%	1 766 000,00
2126					91,40%	91,40%	1 732 000,00
2127					91,40%	91,40%	1 698 000,00
2128					91,40%	91,40%	1 664 000,00
2129					91,40%	91,40%	1 630 000,00
2130					91,40%	91,40%	1 596 000,00
2131					91,40%	91,40%	1 562 000,00
2132					91,40%	91,40%	1 528 000,00
2133					91,40%	91,40%	1 494 000,00
2134					91,40%	91,40%	1 460 000,00
2135					91,40%	91,40%	1 426 000,00
2136					91,40%	91,40%	1 392 000,00
2137					91,40%	91,40%	1 358 000,00
2138					91,40%	91,40%	1 324 000,00
2139					91,40%	91,40%	1 290 000,00
2140					91,40%	91,40%	1 256 000,00
2141					91,40%	91,40%	1 222 000,00
2142					91,40%	91,40%	1 188 000,00
2143					91,40%	91,40%	1 154 000,00
2144					91,40%	91,40%	1 120 000,00
2145					91,40%	91,40%	1 086 000,00
2146					91,40%	91,40%	1 052 000,00
2147					91,40%	91,40%	1 018 000,00
2148					91,40%	91,40%	984 000,00
2149					91,40%	91,40%	950 000,00
2150					91,40%	91,40%	916 000,00
2151					91,40%	91,40%	882 000,00
2152					91,40%	91,40%	848 000,00
2153					91,40%	91,40%	814 000,00
2154					91,40%	91,40%	780 000,00
2155					91,40%	91,40%	746 000,00
2156					91,40%	91,40%	712 000,00
2157					91,40%	91,40%	678 000,00
2158					91,40%	91,40%	644 000,00
2159					91,40%	91,40%	610 000,00
2160					91,40%	91,40%	576 000,00

AUTONOMOUS ENERGY SOLUTIONS:

hybrid solar power plants are becoming popular in Central Asia



We have received requests from all over Central Asia to develop an autonomous power plant with the possibility of working with the city grid using batteries or a diesel generator.

There are several types of solar plants varying depending on the purpose of use. If the cost of electricity is high, network solar stations are installed, which replace part of the external energy of the grid. If the external grid is unstable, then standard uninterruptible power supplies are installed, for example, they include rechargeable LFP batteries manufactured by Jinko Solar, SolaX Power and GROWATT.

SOVENTUS KAZAKHSTAN is the official distributor of products and service company of these international equipment manufacturers. Autonomous power plants with the ability to work with town mains using



batteries or a diesel generator are in special demand today – applications have begun to arrive to the company from all regions of Central Asia.

Since SOVENTUS KAZAKHSTAN operates in Kazakhstan, Kyrgyzstan, Uzbekistan and Turkmenistan, the company is trying to find an approach specifically to the local market, in particular, due to the cost of electricity, fuel, the number and duration of power outages.

For example, in Kazakhstan, the cost of electricity in the Turkestan region is quite high for the end user, and network stations are currently popular there, but due to frequent power outages associated with



accidents due to increased load or due to accidents on main transmission lines, the demand for hybrid stations has increased.

SOVENTUS KAZAKHSTAN has been working with such equipment for more than three years. LFP batteries have a guaranteed number of cycles equal to 5000-6000 (14-15 years of guaranteed operation), a defect warranty of up to 10 years, as well as a deep discharge of up to 0%.

A key component of a hybrid photo power station is a hybrid inverter, which performs the following functions:

- synchronization with the home network and providing it with power



LFP BATTERIES HAVE A GUARANTEED NUMBER OF CYCLES EQUAL TO 5000-6000 (14-15 YEARS OF GUARANTEED OPERATION), A DEFECT WARRANTY OF UP TO 10 YEARS, AS WELL AS A DEEP DISCHARGE OF UP TO 0%.

generated by solar panels for partial or complete replacement of energy consumption from the external grid;

- charge and discharge of batteries;
- switching in automatic mode between the battery, solar panels and the town mains.

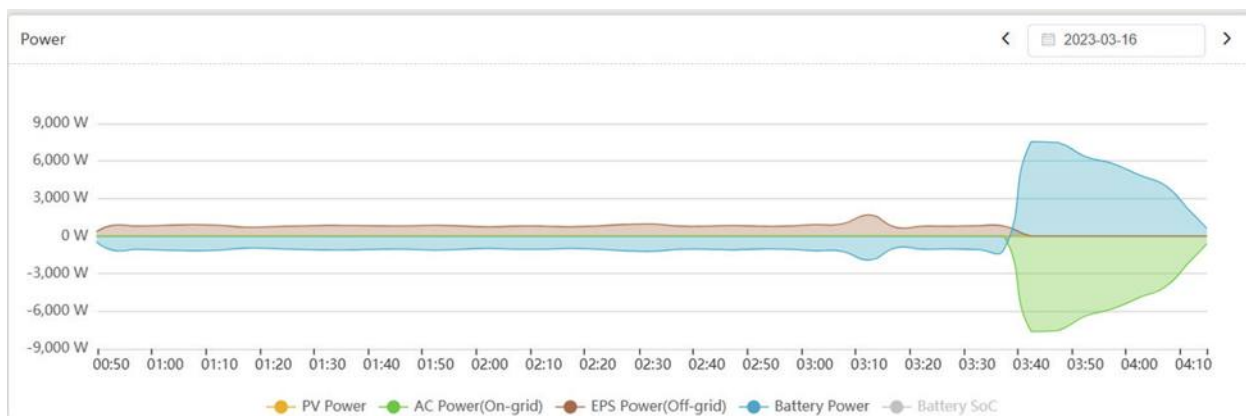
Such stations are more popular in regions where the cost of fuel is quite high, for example, in Uzbekistan.

In Kazakhstan, Kyrgyzstan and Turkmenistan, it is more efficient to use hybrid-diesel stations that can work in parallel through a special controller, where solar energy can be used as much as possible during the daytime, and a diesel generator – as a supporting generation and at night.



General information board of SolaXPower inverters

SolaXPower, Growatt and JinkoSolar have online monitoring from anywhere in the world via an app or browser.



Time interval 16.03 at the hybrid power plant in Almaty

Time interval 16.03 at the hybrid power plant in Almaty

In this example, you can see that the batteries are automatically switched on during a power outage via the AVR. The switching time is 10 ms (without blinking the home light).

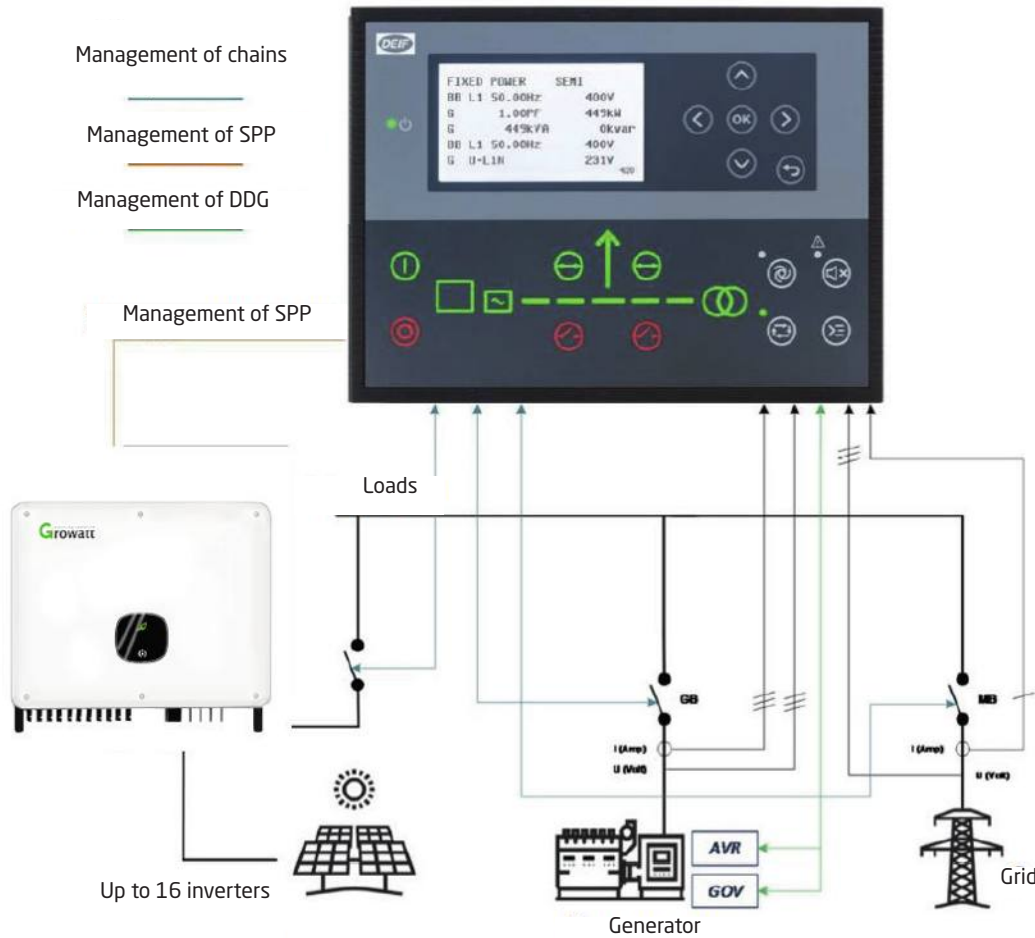
Also, this hybrid SPP has the ability to deliver energy to the grid during high generation from a solar power plant. In Kazakhstan, since July 2016, the order of the Minister of Energy "On approval of the Rules for the purchase and sale of electricity from net consumers" has been in effect, which allows owners of private SPP to sell surplus generated energy to the general electric grid at market prices. Indeed, this function will make the installation of a hybrid SPP even more profitable.

If there is no network, autonomous solar power plants are used, which feed the load due to batteries of accumulators charged from solar panels.

A hybrid solar power plant is a universal solution that combines the advantages of grid and autonomous stations. Hybrid solar photo power plants are a type of power plants where electrical energy is generated by converting solar energy into electrical energy, which can then be given either directly to the grid or used to recharge batteries. The load is powered directly from the solar station during the day, or, depending on the mode, from LFP batteries, or from the mains.

A hybrid solar-diesel power plant can operate in three main modes:

- 1) Island mode: SPP + generator



- 2) SPP synchronously with the grid
- 3) Parallel operation of sources (grid + SPP + generator).

In conclusion, it should be noted that the use of alternative energy sources is one of the most promising areas in modern energy. Hybrid solar power plants are a prime example of "green"

technologies that surpass well-known analogues in energy efficiency and reliability, but are inferior in initial capital investments. The reliability of the plant depends not only on high-quality equipment, warranty obligations, but also on quality of installation and fastening structures, as well as on timely service throughout the entire life cycle of the plant.



ABOUT THE COMPANY

SOVENTUS – is a group of companies consisting of SOVENTUS QAZAQSTAN (Kazakhstan), SOVENTUS ENERGY (Uzbekistan) and SOVENTUS KYRGYZSTAN (Kyrgyzstan), focused on implementation of turnkey solar plants. From the development of the planning design, the working design of the plant, selection, purchase and supply of equipment, installation of fasteners and electrical wiring to connection of the inverter, commissioning of the plant, its maintenance based on long-term contracts. The team consists of experienced specialists and engineers to solve any technical problems. Long-term partnership with equipment suppliers gives confidence in efficient operation of the plant and high-quality service (including troubleshooting).

IN THE XXI CENTURY, ENERGY SECURITY HAS BECOME ONE OF THE MAIN GLOBAL PROBLEMS. THE GROWING DEMAND FOR ENERGY, DECREASE IN OIL RESERVES, CLIMATE CHANGE AND A NUMBER OF OTHER FACTORS HAVE LED TO SEARCH FOR NEW ENERGY SOURCES. ONE OF THE SOLUTIONS TO THESE PROBLEMS IS TRANSITION TO RENEWABLE ENERGY SOURCES (RES), SUCH AS SOLAR, WIND AND HYDROPOWER.



TRAINING RES SECTOR



Energy security education plays an important role in achieving these goals. It helps to raise awareness about the possibilities of using renewable energy and reduce dependence on oil and gas. In addition, training on renewable energy can help improve energy efficiency and reduce energy consumption.





Danara Mukasheva,
LLP Hay Consulting
Project manager of the RES School
Qazaq Green

In Kazakhstan, the topic of energy crisis is especially relevant, since the country is facing problems of electricity shortage, obsolescence of generating capacities of traditional stations and growth of emergency repairs, shortage of balancing capacities and dependence on flows from neighboring states.

Many countries around the world have begun to pay more attention to renewable energy. Instead of traditional courses on design of energy systems, many educational institutions began to develop specialized courses on renewable energy. Such courses include various aspects of use of solar, wind, and hydropower. They teach students how to plan, design and build appropriate renewable energy systems.

Australia has long been aware of the importance of using renewable energy for sustainable development of the country and the fight against climate change. For example, Murdoch University offers a master's degree to those who are interested in pursuing a career in the renewable energy and sustainable energy sector. The Master of Renewable and Sustainable Energy program covers a wide range of topics, including renewable energy technologies, energy efficiency, sustainable development and policy. Students gain a deep understanding of technical, economic and social aspects of renewable energy, as well as practical skills necessary for design, implementation and management of renewable energy projects¹.

¹ <https://www.murdoch.edu.au/course/postgraduate/m1268>

In addition, Murdoch University has access to an open test site where students study renewable energy technologies in practice. The university's electrical engineering and renewable energy program includes employment, where the students can get 300 hours of real work experience. This experience allows them to apply the knowledge and skills gained in the classroom in real situations².

In turn, the Australian National University provides students with a two-year Master of Engineering in Renewable Energy program. The program is based on interdisciplinary engineering orientation of the university and research experience to develop students' skill of solving complex interdisciplinary problems, while simultaneously provide advanced technical knowledge in the field of renewable energy³.

The program includes a mandatory set of courses that provide advanced training for engineers, and specialized knowledge in the field of energy resources (including renewable and non-renewable) and renewable energy integration. In addition, students need to take at least two courses on renewable technologies, including the generation of energy from solar and wind resources.

At the Technical University of Denmark, students can study for a Master of Science in Sustainable Energy (MSc). The program covers a wide range of topics, including energy management, energy policy, energy markets, renewable energy technologies, energy efficiency and sustainable development. Students also have the opportunity to specialize in areas such as wind energy, solar energy, energy storage or smart grids⁴.

The program includes both coursework and research project that allows students to apply their knowledge in practice, solving problems in the field of sustainable energy. Graduates of the program are well prepared to embark on a career in the sustainable energy sector, working in areas such as energy planning, energy consulting, project management, and research and development.

The program includes a mandatory set of courses that provide advanced training for engineers, and specialized knowledge in the field of energy resources (including renewable and non-renewable) and renewable energy integration.

It should be noted that education in the field of renewable energy is a relatively new branch. In Kazakhstan, to this day, this direction occupies an insignificant part of the traditional courses of electric power, energy, and engineering. Today there are only four programs that focus on renewable energy.

In Central Asia, the first specialized master's program in the field of renewable energy was the program of Kazakh-German University Strategic Management of Renewable Energy and Energy Efficiency, which was developed in cooperation with leading universities in Germany and is supported by the German Ministry of Foreign Affairs and the USAID regional program "Energy of Central Asia"⁵.

Students of this program receive theoretical and practical knowledge and skills in the creation and management of renewable energy facilities, as well as in the management of entire range of issues related to the development of "green" energy, including energy conservation and energy efficiency.

Al-Farabi Kazakh National University (KazNU) offers master's degree that includes lectures on the development of solar energy⁶. After completing this program, graduates will be able to describe the main characteristics of photovoltaic cells, solar thermal power plants and the physical principles of conversion and storage of electrical energy. They will also be able to carry out modeling and calculations of efficiency of solar heat supply systems, energy storage and transmission systems in order to optimize their parameters and operating modes.

Graduates will also be able to apply a scientific and systematic approach to the calculation and design of electronic control units, power electronic units, energy storage devices, solar tracking systems, solar concentrators and power plant components, as well as predict the output power of photovoltaic power plants.

²

³ <https://programsandcourses.anu.edu.au/program/NENRE>

⁴ <https://www.dtu.dk/english/education/graduate/msc-programmes/sustainable-energy>

⁵ <https://dku.kz/ru/content/programm-view/?id=69>

⁶ https://welcome.kaznu.kz/ru/education_programs/magistracy/speciality/1925#info

G. Daukeyev Almaty University of Energy and Communications (AUEC) is among the leaders in the field of personnel training in the energy sector in Kazakhstan. One of the programs available to students is a bachelor's degree in modern and innovative renewable energy technologies. This program offers students the knowledge and skills necessary for design of renewable energy facilities, organization of their operation and maintenance. The educational process of the program is supported by a high-quality material and technical base. Within the framework of the program, students have access to the educational and research laboratory "RES and Energy Saving", which is equipped with modern laboratory stands for wind power plants operating in grid and offline mode, solar photovoltaic systems⁷.

In addition, AUEC students study at the Bachelor's degree in Hydropower engineering. Graduates of this program are engaged in development of projects in the field of hydropower, hydroelectric power plants, relay protection and automation of electric power systems, power supply of enterprises. They also carry out technical, economic and environmental analysis of hydroelectric power plants and are engaged in installation, commissioning, operation and repair of technological equipment of hydroelectric power plants. Future specialists solve modern problems in the field of energy, water management and hydropower related to operation and design of parameters and modes of hydropower plants⁸.

The renewable energy sector continues to develop rapidly, and it is already beginning to occupy a significant share in the global energy sector. This growth will inevitably lead to the emergence of new jobs and change in the requirements for existing ones. The Atlas of new Professions and Competencies of Kazakhstan has a number of future professions related to the field of renewable energy, which may become in demand in the near future.

ONE OF THESE PROFESSIONS IS A METEOROLOGICAL POWER ENGINEER.

Meteorological power engineer is a specialist who will provide solutions to new tasks, such as determining the need for balancing energy capacities due to weather



changes, maintaining an ecological balance when installing generating power plants.

The main difference between alternative energy and traditional energy is the uneven generation of alternative energy and decentralization of energy generation points. Energy production from non-traditional sources depends on the time of day, weather conditions and other factors. In order to comply with the global energy balance, it is necessary to quickly enter balancing generation capacities. The amount of balancing energy to be injected is determined by the weather forecast and climatic factors: wind strength and direction, temperature, and more. Therefore, the meteorological power industry will play an important role in the field of renewable energy⁹.

⁷ <https://aues.edu.kz/ru/bachelor/edu-program-one?id=28>

⁸ <https://aues.edu.kz/ru/bachelor/edu-program-one?id=35>

⁹ <https://enbek.kz/atlas/ru/profession/162>



Another promising profession is biomass specialist. Biomass is an organic material that can be used for energy production. It is produced from a variety of sources, including animal and plant waste, as well as some types of vegetation. Use of biomass as an energy source is becoming increasingly popular in light of the problems of climate change and the need to switch to renewable energy¹⁰.

The profession related to obtaining biomass for energy production is new for Kazakhstan. This profession will require specialists to have knowledge in the field of creating technologies for obtaining energy from biomass, determining the sources of biomass production, adapting biomass technology to new conditions and selecting power plants that are optimal for obtaining energy from the biomass used.

In addition, within the framework of grant funding for 2022-2024, the Ministry of Science and Higher Education of the Republic of Kazakhstan is financing 18 projects in the field of energy, eight of which are related to renewable energy. Astana IT University is implementing a project to develop a roadmap for development of renewable energy for Kazakhstan with high spatial, temporal and technical disaggregation using hybrid modeling of the energy system.

Academician Ye. Buketov Karaganda University is implementing two projects aimed at developing new designs of wind power plants. The first project is related to the numerical study of a new design of the blades of a wind power plant with a horizontal axis of rotation. The second is aimed at creating an energy-efficient combined vertical-axial wind power plant using a gearless low-speed electric generator.

¹⁰ <https://enbek.kz/atlas/ru/profession/174>



On the other hand, K.Satpayev Kazakh National Research University (KazNITU) is implementing a project within the framework of which a new design of a modular wind power plant with a fixed vertical axis is being developed.

KazNU is developing an innovative water electrolyte for high-energy metal-ion batteries. ENU is developing a technology for producing composite ceramics based on oxides and nitrides for alternative energy and new classes of structural materials.

The Academy of Logistics and Transport is developing an experimental energy complex based on a modernized boiler plant using biofuels.

Nazarbayev University is engaged in development and research of technology for obtaining and improving oxide-dispersion hardened steel for use in nuclear power.

Within the framework of program-targeted financing for 2021-2023, the National Nuclear Center of the Republic of Kazakhstan is implementing a program in the field of energy aimed at developing technologies for production and storage of hydrogen for development of alternative energy.

In addition, ENU is developing new types of structural materials for nuclear power and protection from ionizing radiation. This work is extremely important because radiation protection plays a key role in the safety of nuclear power plants.

IN CONCLUSION, IT CAN BE EMPHASIZED THAT THE TRAINING OF QUALIFIED PERSONNEL FOR THE RENEWABLE ENERGY SECTOR IS OF GREAT IMPORTANCE. THIS IS ONE OF CONDITIONS FOR DEVELOPMENT OF AN ENVIRONMENTALLY SUSTAINABLE ECONOMY AND REDUCING THE NEGATIVE IMPACT ON THE ENVIRONMENT.I.

In Kazakhstan, there are a number of study programs at universities, including DKU (Strategic Management of Renewable Energy and Energy Efficiency), KazNU ("solar energy"), AUEC ("modern and innovative renewable energy technologies", "hydropower").

Considering the scale of global problems, such as the energy crisis, climate change and environmental

protection, vocational education in the field of renewable energy is becoming more relevant and in demand. The Atlas of New Professions and Competencies of Kazakhstan highlights promising professions related to renewable energy that may become in demand in the near future, for example, a meteorological power engineer and a biomass specialist.

Based on the information provided by the Ministry of Higher Education and Science of the Republic of Kazakhstan, 18 programs are currently being funded in the field of energy and energy conservation, eight of these projects are aimed at developing renewable energy.

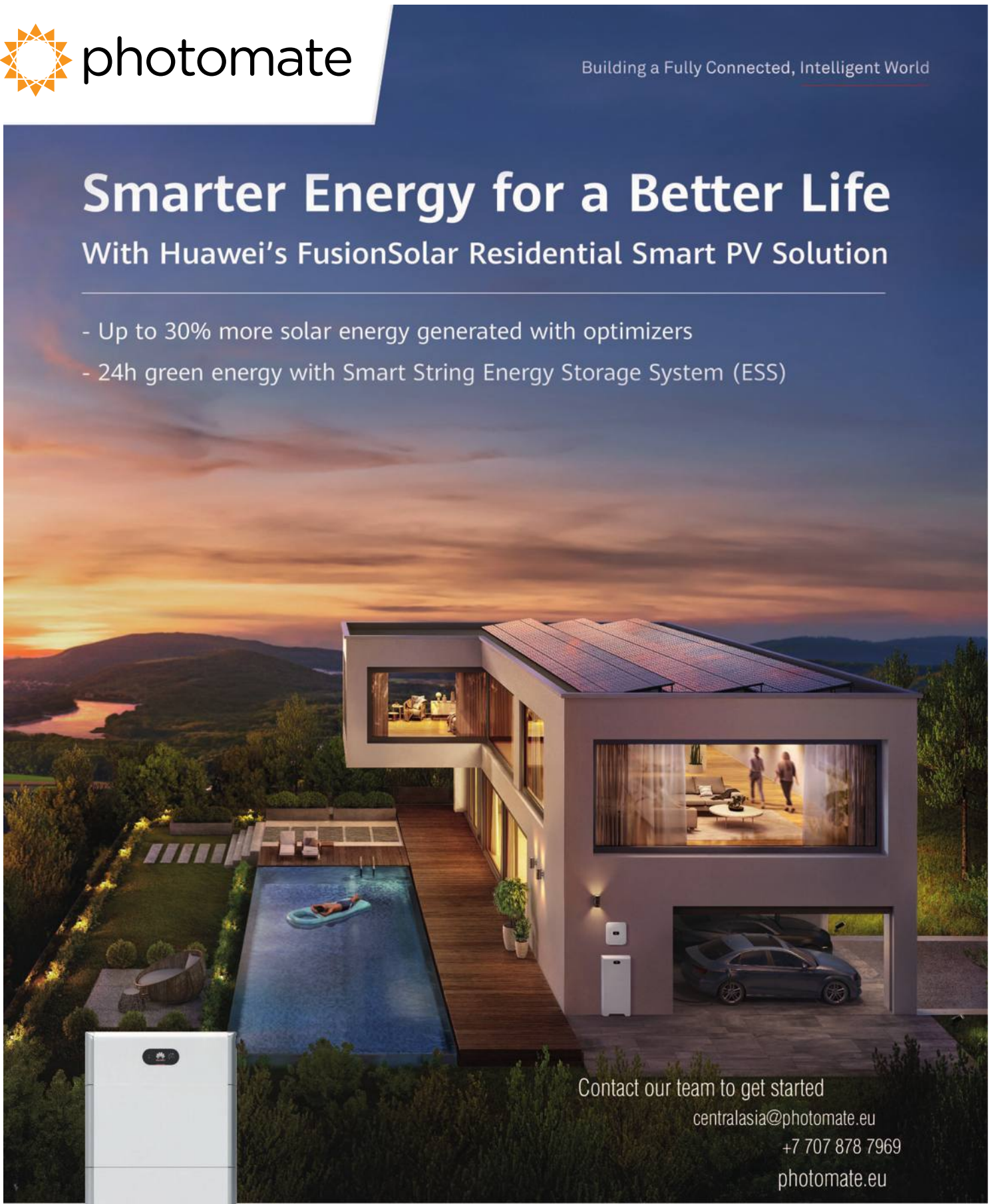
Thus, thanks to the training of qualified specialists who can work in the renewable energy sector, Kazakhstan can continue to develop renewable energy and contribute to the achievement of global goals in the field of combating climate change and environmental protection.



Smarter Energy for a Better Life

With Huawei's FusionSolar Residential Smart PV Solution

- Up to 30% more solar energy generated with optimizers
- 24h green energy with Smart String Energy Storage System (ESS)



Contact our team to get started

centralasia@photomate.eu

+7 707 878 7969

photomate.eu



FusionSolar for a Sustainable Business

Optimal Electricity Cost | Active Safety | Smart O&M

Contact our team to get started:

centralasia@photomate.eu

+7 707 878 7969

photomate.eu





**BUREAU
VERITAS**

Shaping a World of Trust

BUREAU VERITAS VERITAS IS A GLOBAL LEADER IN QUALITY, ENVIRONMENTAL, SAFETY, AND SOCIAL RESPONSIBILITY TESTING, INSPECTION, AND CERTIFICATION SERVICES.

AS A WORLD LEADER IN AUDIT AND CERTIFICATION SERVICES, WE SUPPORT OUR 400,000 CLIENTS TO BE MORE EFFICIENT, MORE METHODOICAL AND MORE TRUSTWORTHY IN THEIR JOURNEY TOWARDS MORE SUSTAINABLE BUSINESS AND A MORE SUSTAINABLE WORLD.



At Bureau Veritas as a part of the Global network, we understand that environmental, social responsibility, and corporate governance (ESG) issues are becoming increasingly important for investors, customers, employees, external stakeholders, and regulators. Therefore, we offer a wide range of ESG services, helping companies collect and analyze data, identify areas for improvement, and determine how ESG will be integrated into their overall strategy.

Our ESG solutions enable companies to use their data to take action and gain various benefits. With our help, companies can identify areas and strategies for improving ESG

performance, increase capital-raising opportunities by using ESG successes, meet criteria for green bonds and green financing opportunities, maximize investor trust in long-term sustainability management, support the development of a more sustainable supply chain, and enhance the company's reputation by

demonstrating its ESG commitments.

We work closely with our clients to develop individual ESG solutions that meet their specific needs and goals. Our experienced team of experts uses the latest technologies and tools to provide high-quality ESG services, including assessment, audit, and verification of ESG.

By partnering with Bureau Veritas Kazakhstan, companies can demonstrate their commitment to ESG performance and benefit from our experience and support. Together, we can help create a more sustainable future for Kazakhstan and beyond.

Residential

Residential ESS (1kWh-50kWh)



Multiple product lines to comply with diversified demands



Cell-level fireproof design, more reliable for home use



Automatically switch between grid-connected and off-grid, compatible with existing PV Power Station



Intelligent management platform realize remote monitoring

Residential ESS Product

Cell type: Lithium iron phosphate

Cycle life: 6000 cycles

Capacity: 5.12-20.48kWh, support parallel connection

Warranty: 10 years

Protection class: IP66(Inverter) , IP65(Pack)





Residential ESS (1kWh-50kWh)



Standardization / Customization Modes Available



Cell-level fireproof design, more reliable for home use



Automatically switch between grid-connected and off-grid, compatible with existing PV Power Station



Intelligent management platform realize remote monitoring

C&I ESS Product

Battery Type: Lithium Iron Phosphate (LFP)

Battery Life Cycle: 8000 Cycles, 0.5C @25°C

Nominal Capacity: 50-1000kWh (Customized)

Voltage Range: 500-1500V

IP Rating: IP54

Cooling: Air cooled / Liquid cooled

Certification: IEC 62619, UN 38.3, CE, UL 1973



Utility



Utility Energy Storage System



Effective Liquid coolingable



Early Detection



Higher Efficiency



Real Time Monitoring

Liquid Cooling Energy Storage System

Higher Energy Density 3.44MWh / 20ft

Lower Auxiliary power consumption 20%

Less Power Consumption

Longer Service Life temperature difference $\leq 2.5^{\circ}\text{C}$





ADVERTISEMENT LOCATIONS

PREMIUM CLASS

Advertising operator of key facilities of the Republic of Kazakhstan with the highest passenger flow and effective target audience





Nursultan Nazarbayev
International airport JSC



Almaty International
Airport JSC



Shymkent International
Airport JSC



Turkestan International
Airport JSC



Aktau International
Airport JSC



Aktobe International
Airport JSC



Kokshetau International
Airport JSC



Railway station/Nurly
Zhol/Nur-Sultan 1,
Almaty 1/Almaty 2



Atyrau International
Airport JSC



+7 776 444 6444
@info.myd.kz
myd.kz
Astana
31 Zhekebatyr St.



PLATFORM FOR NATIONAL AND INTERNATIONAL PLAYERS IN RENEWABLE ENERGY SOURCES



NURLAN KAPENOV
Chairman of the Board of Directors



ISLAMBEK SALZHANOV
Chairman of the Supervisory Board



AINUR SOSPANOVA
Chairperson – Member of the Board of Directors



ORAZ JANDOSOV
Member of the Board



ALEX STILLAVATO
Member of the Board



ANATOLIY SHKARUPA
Independent Director



VALERIY TYUGAY
Member of the Board



MIKHAIL KADYMOV
Member of the Board



ARSENIY KATERUSHA
Independent Director

ASSOCIATION AS INFORMATIONAL RESOURCE

The Association is a resource that will allow members of the Association to receive information about changes in legislation immediately.

Association is a resource that creates public opinion, and also contributes to the promotion of renewable energy. It will allow you to form a positive image around an event in the activities of both a member of the Association and the Association itself.



ZHOMART MOMINBAYEV
Member of the Board



ARTYOM SLESARENKO
Independent Director



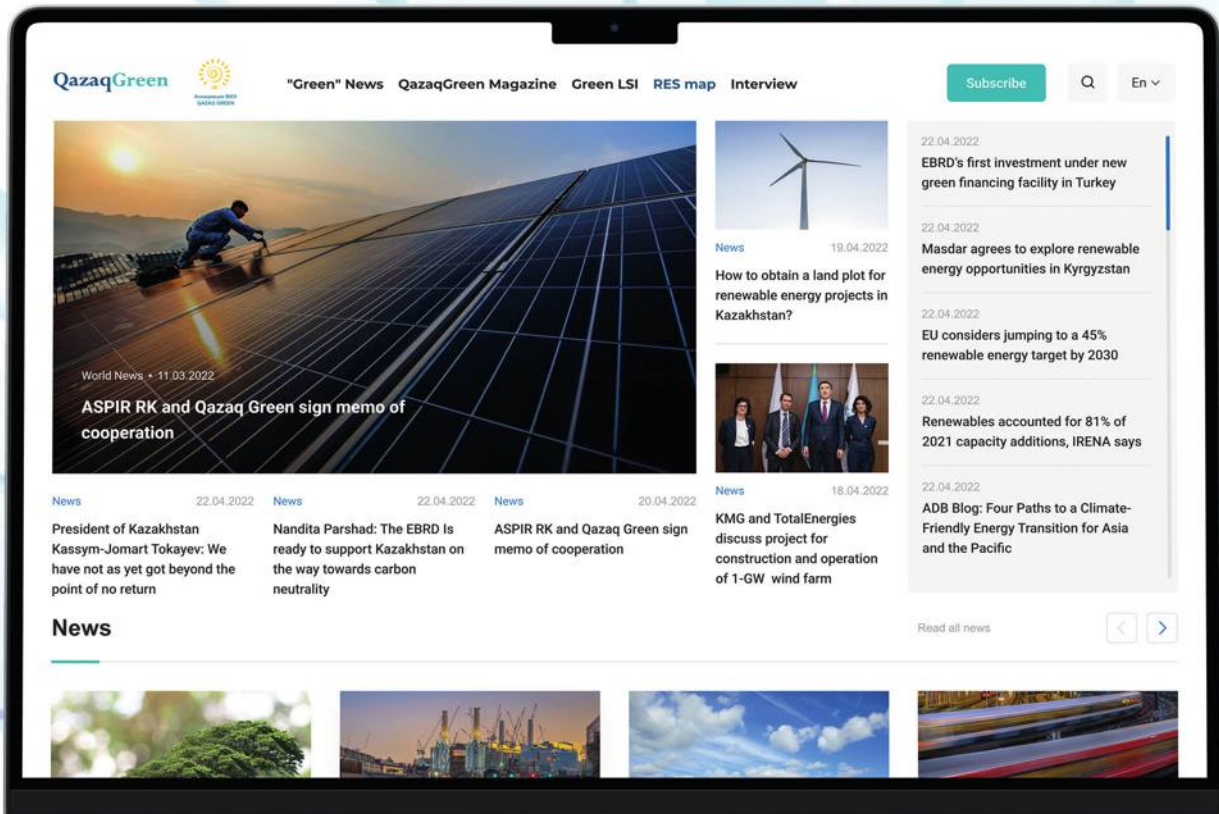
AIDA MAKSUT
Independent Director



TIMUR SHALABAYEV
Executive Director



ZHANAR KUANYSHBEK
Manager



Qazaq Green has launched information portal on "green" economy of Kazakhstan



www.qazaqgreen.com

information portal will present latest news from Central Asia, Kazakhstan and all over the world, as well as articles of QazaqGreen magazine.



The Konrad Adenauer Foundation is a political foundation of the Federal Republic of Germany. With its programmes and projects, the Foundation actively and effectively promotes international cooperation and mutual understanding.

The Representative Office of the Foundation in Kazakhstan began its work in 2007 at the invitation of the Government of the Republic of Kazakhstan. The Foundation works in partnership with government agencies, the Parliament of the Republic of Kazakhstan, civil society organizations, universities, political parties and enterprises.

The main purpose of the Foundation's activities in the Republic of Kazakhstan is to strengthen mutual understanding and partnership between the Federal Republic of Germany and the Republic of Kazakhstan through cooperation in the field of political, educational, social, cultural and economic development, thus contributing to the further development and prosperity of Kazakhstan.

The Konrad Adenauer Foundation has the following priorities in the Republic of Kazakhstan:

-
- Policy and Party Counselling
 - Interparliamentary Dialogue
 - Energy and Climate
 - Local Self-Governance
 - Political Education
 - Media
 - Sur-Place Scholarships



Address:
Konrad-Adenauer-Stiftung e.V.
Representative Office
Kabanbay batyr Str. 6/3 - 82
010001 Astana Kazakhstan



Contacts:
Info.Kasachstan@kas.de
+7 7172 92 50 13
+7 7172 92 50 31

<https://www.kas.de/ru/web/kasachstan/>

