

QazaqGreen

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QAZAQ GREEN FEST 2024

III INTERNATIONAL BUSINESS
FESTIVAL ON RENEWABLE
ENERGY SOURCES



**ACCEPTING THE CHALLENGES
OF THE PRESENT – TOGETHER TOWARDS
A SUSTAINABLE FUTURE**

PROGRAM QAZAQGREENFEST 2024



QAZAQ GREEN
RES ASSOCIATION

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

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Members and partners of the Association



KGEC

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KAZGREEN
ENERGY



goldbeck solar



6–8 **THE WELCOME SPEECH OF NURLAN KAPENOV THE CHAIRMAN OF THE BOARD OF DIRECTORS QAZAQ GREEN RENEWABLE ENERGY ASSOCIATION**

7 **THE WELCOME SPEECH OF ALMASSADAM SATKALIYEV THE MINISTER OF ENERGY OF THE RK**

NEWS OF THE INDUSTRY

10–11 **GIZ AND RES SCHOOL: TRAINING SPECIALISTS FOR THE ENERGY TRANSITION IN KARAGANDA**

12–14 **AINUR SOSSPANOVA: CLEAR RULES ARE NEEDED FOR FUNCTIONING OF BILATERAL CONTRACTS MARKET**

18–19 **THE ROAD AHEAD FOR KAZAKHSTAN'S POWER SECTOR: MODERNISING THROUGH RENEWABLES**



20–25 **RES AUCTION SCHEDULE IN 2024**

26–29 **NABI AITZHANOV**
THE VISION OF TRANSMISSION SYSTEM OPERATOR OF THE IEPS (INTEGRATED ELECTRIC POWER SYSTEM) OF KAZAKHSTAN ON THE DEVELOPMENT OF ENERGY STORAGE TECHNOLOGIES

30–35 **TALGAT TEMIRKHANOV**
WITHOUT RENEWABLE SOURCES OF ENERGY, THE PRESENCE OF TRADITIONAL ENERGY IN THE COUNTRY'S GENERATION STRUCTURE IS HIGHLY QUESTIONABLE

36–39 **THE ROLE OF ENGINEERING IN THE CONSTRUCTION OF RES**

40–45 **TOP 5 FACTS EXPLAINED FROM COP28**



46–49 **THE SINGLE PURCHASER MODEL: WHAT HAS CHANGED IN THE REGULATION OF RENEWABLE ENERGY FACILITIES**

50–53 **OVERCOMING OBSTACLES: WHY ARE THE LEADERS OF THE MINING INDUSTRY IN NO HURRY TO SWITCH TO RENEWABLE ENERGY?**

54–55 **INTEGRATION OF AGRICULTURE WITH SOLAR ENERGY IN SOUTH KAZAKHSTAN**

56–61 **THE STATE OF SOIL CARBON SEQUESTRATION IN KAZAKHSTAN**

62–65 **ENVIRONMENTAL CHALLENGES OF AGRICULTURE IN KAZAKHSTAN: MANAGEMENT OF PESTICIDES AND PERSISTENT ORGANIC POLLUTANTS**



66–77 **DEVELOPMENT OF LOCAL CONTENT FOR RES PROJECTS: INTERNATIONAL EXPERIENCE**

78–79 **REGULATION OF WASTE IN KAZAKHSTAN: BASIC PERMITS**

80–83 **DEVELOPMENT OF RENEWABLE ENERGY SOURCES AS A KEY INSTRUMENT FOR DECARBONIZATION OF INDUSTRY IN KAZAKHSTAN**

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“Quote of the edition”

Ensuring the smooth operation of all life support systems of settlements is one of the basic functions of the Government and akimats.

However, each heating season reveals the same problems.

State bodies do not learn lessons from the systemic errors and omissions that have brought the industry to its current state.

The construction of combined cycle gas plant at the Almaty CHPP-2 is being delayed.

For more than ten years (since 2012), we have not been able to restore the power unit at Ekibastuz GRES-1.

There are questions about the timely implementation of Ekibastuz GRES-2 expansion and reconstruction project.

Government must complete the modernization of 19 heat sources in the red risk zone as a matter of priority this year.

It is also necessary to ensure the commissioning of more than 700 megawatts of additional generation.

Postponements are no longer acceptable.

In general, it has to be stated that the country is experiencing a shortage of capacities for the production and transmission of electricity, heat, and water.

This was the result of a number of errors – large and small – the refusal to complete the construction of the Balkhash TPP, the lack of transparency in the work of natural monopolies, as well as artificial tariff containment.

An in-depth reform of the industry is needed, including several systemic elements.

First of all, tariffs should be long-term, allowing paying back investments in a reasonable time and maintain the proper condition of infrastructure facilities.

Subjects of natural monopolies should be allowed to include a certain rate of profit in the tariff.

Effective control is of fundamental importance, which can be ensured only through the complete digitalization of all processes in this area.

It is necessary to implement an online resource accounting and data transfer system.

Tariff increases should be accompanied by targeted subsidies to consumers.

This process should be simplified and automated as much as possible.

Government should develop a detailed set of measures to restore and develop the country's utility and energy infrastructure.

Akims should also actively engage in urban development and combat pollution. It is necessary to build, first of all in large cities, plants for processing of solid household waste, attracting investors for this, as well as to engage in urban landscaping. This work is being carried out unsatisfactorily.

Electricity, heating, water, efficient public utilities are basic benefits, the availability of which directly affects the quality of life of citizens.

This is a serious, comprehensive reform that will gradually eliminate all the accumulated problems in this area.

Speech of President Kassym-Jomart Tokayev
at the extended meeting of the Government, February 7, 2024.

INFORMATION ON PRODUCTION OF ELECTRIC ENERGY BY RENEWABLE ENERGY FACILITIES OF 2023

Installed capacity including: **2 868,6 MW**



WIND POWER
PLANTS

1 394,6 MW



SMALL HPP

269,605 MW



SOLAR POWER
PLANTS

1 202,61 MW



BIOELECTRIC POWER PLANTS

1,77 MW

Power generation including: **6 675,5 million kWh**



WIND POWER
PLANTS

3824,99 million kWh



SMALL HPPS

993,87 million kWh



SOLAR POWER
PLANTS

1 853,95 million kWh



BIOELECTRIC POWER PLANTS

2,71 million kWh

**The share of renewable energy generated in the total
volume of electric energy production**

5,92%

**The increase in the electricity generation by renewable
energy facilities in 2023, as compared to 2022, comprises**

30%



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

DEAR READERS! DEAR FRIENDS!

It is with great pleasure and enthusiasm that I address you today on behalf of the Qazaq Green RES Association. Last year, in the heart of the serene landscape of Burabay National Park at the Rixos Hotel Borovoe, we hosted the II International Business Festival on Renewable Energy Sources 'Qazaq Green Fest'. This significant event brought together over 300 representatives of the renewable energy market of Kazakhstan: government representatives, financial institutions, renewable energy auction organizers, domestic and foreign investors, international experts, industry leaders, international organizations, financial institutions, associations, and universities of Kazakhstan.

Participants had the opportunity to discuss pressing issues related to the development of renewable energy sources (RES) in Kazakhstan. These included the problems and difficulties encountered in implementing RES projects, prospects for further development, and significant challenges that concern key market players.

These discussions culminated in the drafting of a Charter, a collective appeal from the renewable energy industry to the Government of the Republic of Kazakhstan, advocating for further development of renewable energy in the country. The Charter outlined crucial issues for the sector's growth, many of which have already been addressed or gained support from the Government of Kazakhstan:

- Sustainable policies and investment climate for renewable energy development
- Impact of the new "Single Buyer" market model and real-time balancing electricity market on renewable energy facilities
- Accessible long-term financing in national currency from financial institutions is a critical factor for the development of the renewable energy sector and financial sustainability of projects in Kazakhstan
- Development of the renewable energy bilateral contracts market

- Development of small-scale renewable energy for the population and small and medium-sized businesses
- Slow pace of development of the most reliable and predictable renewable energy source - small hydropower plants
- Development of energy storage systems
- Development of local content
- Development of the domestic market for voluntary carbon standards
- Establishment of a professional holiday - "Renewable Energy Worker Day"

We believe that this is a practical result of the collaborative efforts led by the Ministry of Energy of the Republic of Kazakhstan, and Qazaq Green Fest has successfully become a main platform that accumulates the opinion of business and the vision of government agencies in our industry.

This year, Qazaq Green will host the III International Festival on Renewable Energy Sources 'Qazaq Green Fest' on May 30-31, 2024, at the traditional venue – the Rixos Hotel Borovoe. Recognizing that the future development of renewable energy sources is closely tied to the transformation and growth of the electric power industry, we have partnered with the Kazakhstan Electricity Association, which will act as the strategic partner of the event.

Therefore, extremely topical issues for our industry are on the agenda of the Festival:

- Implementation of large-scale 'gigawatt' renewable energy projects in Kazakhstan: the pros and cons
- Energy transition in Kazakhstan: strategic vision and challenges
- Single Buyer - operation of power and renewable energy facilities in the new market model and balancing electricity market
- Prospects for the development of renewable energy bilateral contracts and balancing issues
- Gender policy and workforce development issues in a just transition

- Development of small-scale projects and distributed renewable energy generation: new legislation and initiatives for further development of the sector

- Current business challenges in the power and renewable energy sector.

These pressing concerns resonate with the renewable energy business community, which seeks clear guidelines, stable legislation, and predictability for planning industry investments.

In conclusion, I would like to express my gratitude to everyone who supported the organization of Qazaq Green Fest, especially the general partner of the Festival – Huawei and its certified partner Photomate, and our strategic partner – the Kazakhstan Electricity Association.

We also express our gratitude to our sponsors and all the organizations that supported Qazaq Green

Fest. Our thanks go to our official partners: The United Nations Development Programme, ACWA Power, TotalEnergies, Sany Renewable Energy, and the German Society for International Cooperation (GIZ). We also appreciate the support from Jinko Solar, UNICASE, and Goldbeck Solar.

On behalf of the entire Qazaq Green team, I extend a warm welcome to all participants of Qazaq Green Fest 2024. We wish everyone a productive and successful event, fostering further advancements in renewable energy development across the Republic of Kazakhstan.



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

**ҚАЗАҚСТАН
РЕСПУБЛИКАСЫНЫҢ
ЭНЕРГЕТИКА
МИНИСТРЛІГІ**



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№ _____

**Welcoming Address
by Almassadam Satkaliyev, Minister of Energy of the Republic
of Kazakhstan, to the participants of the III International Business
Festival on RES Qazaq Green Fest**

Dear participants of Qazaq Green Fest

I am delighted to welcome you to the III International Business Festival on Renewable Energy Sources 'Qazaq Green Fest'!

In our country, the transition to a green economy is a key priority of our new economic policy. Fostering renewable energy sources is the most effective way to attain our carbon neutrality goals. President of Kazakhstan has set a goal to increase the share of RES generation to 15% by 2030. The Government of the Republic of Kazakhstan has been given specific instructions to create a favorable investment climate in the sector, support the use of RES technologies by households and businesses, develop domestic science, and train personnel.

According to the Action Plan for the development of the electric power industry until 2035, a massive 11.7 GW of renewable energy capacity is slated for development, with 6,720 MW secured through RES auctions and 5,000 MW stemming from large-scale projects involving foreign investors. Consequently, the share of renewable energy (excluding hydropower) in the power generation mix is projected to hit 24.4% by 2035.

In light of these developments, I firmly believe that the Qazaq Green Fest 2024, dedicated to fostering dialogue on the implementation of large-scale renewable energy projects, stands as a crucial and timely contribution to charting the course for the continued advancement of the electricity and renewable energy sectors. The event's significance is further amplified by its joint organization by two pivotal industry associations - the Qazaq Green Renewable Energy Sources Association and the Kazakhstan Electric Power Association, which collectively represent nearly the entire business community within the nation's electricity landscape. This undoubtedly elevates the status of the event, placing it as the premier platform for discourse on "green" energy in the country. Consequently, I am confident that the outcomes of Qazaq Green Fest will be met with the utmost attention and consideration by the Ministry of Energy of the Republic of Kazakhstan.

I would like to take this opportunity to express my gratitude to the Qazaq Green RES Association for its numerous initiatives to develop renewable energy in our country.

I wish all participants fruitful discussions and success in the development of the sector!

Almassadam Satkaliyev

GIZ and RES School: training specialists for the energy transition in Karaganda

QAZAQ GREEN. Karaganda hosted short-term training courses of the Renewable Energy Sources School (RES), established in May of last year on the basis of the Qazaq Green Association. The goal of the courses is to transfer new skills and competencies necessary for work in the field of renewable energy to the participants.



The German Society for International Cooperation (GIZ) in Kazakhstan plays an important role in the implementation of this initiative. Within the framework of its project "Capacity Development for Climate Policy in South-East and Eastern Europe, the South Caucasus and Central Asia" (CDCP III), GIZ supports Kazakhstan in preparing for the energy transition. The Republic is gradually increasing the

share of electricity generated by renewable energy sources, setting a target of 15% by 2030. In this regard, the demand for renewable energy has become noticeable lately, and its potential is becoming increasingly significant.

In the next 20 years, short-term training courses on this subject will become critically important for the industry. Therefore, even those graduates who recently

graduated from universities and colleges will need to update their knowledge in the workplace. And for this, they will need continuous professional development courses.

Moreover, these short-term courses can cater to both newcomers and seasoned professionals in the renewable energy field seeking to enhance their expertise. For instance, attendees at the Karaganda training included educators from educational institutions, as well as representatives from energy and other corporate entities.

GlZ emphasized that the project aligns with Kazakhstan's commitments to transition to a low-carbon economy and achieve climate neutrality by 2060.

"The global trend towards decarbonizing the world economy is already evident. Kazakhstan has the potential to emerge as a significant player in the global market for clean energy and low-carbon products. Understanding which business models will enable the Kazakh industry to adapt to new global requirements and derive benefits from them is essential. This transition will necessitate substantial investments, including in specialist training. In the long run, the Kazakh economy stands to gain from the energy transition and the associated modernization. The GlZ project aims to facilitate dialogue on decarbonization among various stakeholders and facilitate the transfer of knowledge and international experience," stated GlZ.

Among those who attended the training was Aigul Orazbayeva, Head of the Department of Energy Disciplines at the Karaganda Higher Polytechnic College. During the training, the teachers told the participants about the prospects for the development of renewable energy.

Aigul Orazbayeva noted the importance of obtaining comprehensive information on renewable energy for teachers who graduate specialists in renewable energy sources.

"We have a specialty "technicians-power engineers of renewable energy" and this specialty was opened in 2021. Next year will be the first graduation. The guys who came in the first set are already in their third year. For all of us, as a college, department and teachers, it is very important to understand how the development is going on now, where we can send the guys for practice and how much we can help them get a job later. Therefore, in this sense, the course was very useful, because for us, as teachers, some things, like financing, were for the first time. Of course, everything was very useful," she said.

In 2021, the Karaganda Higher Polytechnic College admitted the first two groups of students in the specialty "technicians-power engineers" in the field of renewable energy with training in the Kazakh and Russian languages. In 2025, these 35 students will graduate. In 2022 and 2023, the college conducted two more student admissions for this specialty.

"Right now we are already finding practice bases for them, since the QazaqGreen association includes all the players who participate in green energy in Kazakhstan. These are investors, those who build, those who deliver these panels,

and everyone, everyone, everyone. For us, this networking is very important to conclude some contracts, to help our guys get a job in the future. For teachers, of course, all the information on the development of renewable energy in Kazakhstan was useful," Orazbayeva noted.

During the training, the participants studied both the Kazakh and international experience of renewable energy development. The head of the college department and her colleagues also received extensive information, so that they could then use it in teaching methods, conveying the knowledge gained to their students.

The first year of college for students is general education. In the second year, students become familiar with the operation of electrical equipment, stations, substations, and enterprises. Later, students begin to intern at renewable energy companies, where they learn about energy generation technology. They are taught by masters who have studied renewable energy projects.

The Karaganda Higher Polytechnic College is a member of the QazaqGreen Association. Last year, during networking in Borovoye, the college's teachers met with many entrepreneurs who are developing renewable energy in Kazakhstan. Interestingly, one student, before graduating from college, started working at one of the renewable energy companies and took part in the commissioning of a solar power plant in the Aktobe region.

Artem Slesarenko, the founder of Profland, a partner of renewable energy companies, believes that the training provides the latest up-to-date information on the development of the sector.

"WHAT IS USEFUL IN THE RENEWABLE ENERGY SCHOOL FOR STUDENTS? THE LATEST INFORMATION, MAXIMALLY CONCENTRATED AND MAXIMALLY CAPACIOUS. FOR EXAMPLE, WE SENT A TEAM OF FOUR PEOPLE BECAUSE THE TRAINING COVERED INFORMATION ABOUT THE MARKET. ALSO, OUR TECHNICAL SPECIALISTS ALSO LOOKED AT VARIOUS OTHER SECTORS, I.E. THEY LOOKED AT SOLAR AND WIND ENERGY. THE RENEWABLE ENERGY MARKET IN KAZAKHSTAN IS CONSIDERED FROM DIFFERENT SIDES: FROM THE TECHNICAL AND ECONOMIC SIDES," HE SAID.

According to him, the training instructors showed the participants a high level of expertise, providing interesting and necessary information for a comprehensive understanding of the renewable energy market. In addition, Slesarenko believes that since the training was off-site, in the future it would be possible to demonstrate operating renewable energy installations to the participants. Thus, they would be able to see on-site the operation of renewable energy in detail in real time.



Ainur Sospanova:

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



Clear rules are needed for functioning of bilateral contracts market

QAZAQ GREEN. The system of bilateral PPA contracts in Kazakhstan could become an alternative to auctions for the selection of renewable energy projects. Clear legislative rules need to be developed for the full functioning of the new mechanism.

implementing projects through the Single Purchaser. The current climate agenda is encouraging large consumers to buy clean energy. Plus, companies are thinking that without complying with ESG policies, their competitiveness will fall. Today, the scheme of bilateral contracts is not denied, but



Corporate bilateral PPA contracts are one of the tools of the renewable energy market that is widely used around the world. Despite the lack of legislative specifics for market participants, businesses are showing high interest in concluding corporate contracts.

"The potential for developing bilateral contracts in Kazakhstan is even higher than the potential for

not supported either. We need clear rules for the functioning of the bilateral contracts market, which would regulate the issues of interaction between a large consumer and a renewable energy facility that implements the project for the needs of the buyer," - noted the Chairperson of the Board of the Renewable Energy Association "Qazaq Green" Ainur Sospanova during a round table organized within the



We see that the structure of the energy balance is changing. A new type of energy – renewable energy is entering the market.

framework of the GIZ project "Developing climate policy potential in South-Eastern and Eastern Europe, the South Caucasus and Central Asia (CDCP)".

The practice of concluding bilateral contracts is widely used around the world. As the Head of the Energy Department of Global Factor Consulting, Craig Menzies, said, thanks to the new mechanism, over the past eight years, the volume of renewable energy capacity introduced in Europe has grown from 5 to 46 gigawatts. There is a clear trend of increasing bilateral contracts in the EU.

"The system of bilateral contracts is very popular in the EU, for example, in Finland, about 85% of all energy supplies are PPA contracts. Since 2022-2023, there has been a high demand for the new mechanism in Europe from large companies. With the change in the geopolitical situation,

many of them began to think about taking the conclusion of contracts into their own hands. Technology companies, data centers Amazon, Meta, Google sign large contracts for the purchase of energy directly from the supplier. Among oil and gas and chemical companies, clean electricity is also in high demand," Craig Menzies shared the latest data.

The EU Green Course is also relevant for Kazakhstan. Between our countries there is an Enhanced Partnership and Cooperation Agreement, which covers a wide range of areas and joint initiatives. In this regard, the implementation of bilateral contracts can become an effective tool for fulfilling decarbonization obligations of our economy.

According to the Director of the Department for the Development of the National Electric Network of JSC KEGOC Zhenis Dyussenov, Kazakhstan is observing a fairly high rate of introduction of alternative energy sources. In 2023, the share of renewable energy sources in the total energy balance increased by 30%. He also announced the completion of a major study of the Kazakhstani electricity market, which took into account initiatives to develop the generation of traditional and renewable energy sources.

"We see that the structure of the energy balance is changing. A new type of energy – renewable energy is entering the market. Plans for the development of the national electricity network and generation in general are

aimed at ensuring the balance stability of the power system. We are in favor of the power system remaining balanced when integrating any technology of the renewable energy type. This requires measures to increase maneuverable generation, equip renewable energy facilities with control systems," the representative of the system operator believes.

At the same time, he drew attention to the need for high-quality forecasting of energy production. He also said that his department is ready to participate in the joint development of by-laws with the Qazaq Green RES Association.

During the round table, representatives of industrial enterprises raised the issue of the functioning of renewable energy sources after 2029, when the period of validity of contracts with the Single Energy Purchaser - the Financial Settlement Center for Renewable Energy Sources - will end. It was assumed that enterprises would be able to enter the free market. Another question that interested the business is the possibility of concluding bilateral contracts if the previous PPA contract was terminated at the initiative of the consumer.

"When the first PPA contracts began to be concluded in 2014, it was assumed that they would work on the free market after 2029. Today there is no free market, no free single buyer either. Will enterprises be able to work on bilateral contracts, like renewable energy sources? In theory, yes, the law does not prohibit it. In general, we need to start discussing this issue with the Ministry of Energy now. 5-6

years will pass and it will become acute," Ainur Sospanova summed up.

According to Nurlan Kapenov, Chairman of the Board of Directors of the Qazaq Green RES Association, the future of Kazakhstan's energy sector lies in corporate bilateral contracts.

"Now tariffs are reaching a fair level, understanding this, businesses are beginning to correctly structure the process of generating energy from the technical side on their own. When a fair tariff appears, companies themselves enter the balancing market, they will be ready to pay a fair price. If necessary, the business itself will buy balancing capacities, install an energy storage device or apply some other tools. In any case, together with the system operator, it will find a win-win solution that will be beneficial for both KEGOC, and the buyer of electricity, and the Settlement and Financial Center for Renewable Energy Support, KOREM and other stakeholders," Nurlan Kapenov believes.

In addition, bilateral contracts will stimulate the development of related businesses, when energy storage technologies become more affordable and have a longer life cycle.

PPA is a long-term contract for the supply of electricity between a producer and a consumer of electricity. The contract is usually concluded for 10-15 years with a fixed contract price for a certain volume of production.



INDUSTRY NEWS

JINKOSOLAR LICENSES TOPCON PATENTS TO ONE OF THE WORLD'S TOP FIVE SOLAR CELL COMPANIES



SHANGRAO, China, February 6 2024 – JinkoSolar, one of the largest and most innovative solar module manufacturers in the world, today announced its affiliated company has recently signed a TOPCon patent license agreement with one of the world's top five solar cell companies ("Licensee"), granting rights to certain of its N-type TOPCon related patents to Licensee for a fee, allowing Licensee to use certain JinkoSolar's patented TOPCon technologies in its relevant TOPCon products. This agreement follows the agreement signed with one of the world's top ten solar module companies as announced on January 5, 2024.



With one of the largest number of granted N-type TOPCon patents, JinkoSolar is a leader in N-type TOPCon technology. The company is fully focused on sustaining its technical leadership based on its extensive intellectual property rights.

Dr. Hao Jin, CTO of JinkoSolar, commented: "We are pleased to see that a tier 1 solar cell company in the PV industry has recognized JinkoSolar's TOPCon technology leadership. As one of the largest and most innovative solar module manufacturers in the world, we have long been investing substantial resources in R&D and innovation and enhancing our sustainable competitiveness in the industry through an ever-improving patent protection system. This patent licensing agreement is another concrete example of our commitment to helping other industry players identify opportunities for developing new technologies and products, and to bring more efficient and reliable products to the global market. At the same time, we also call for our entire industry to respect and fully protect technology, a necessary step for China's PV industry to fully mature."



EXPERTS DISCUSSED BARRIERS TO RENEWABLE ENERGY PROJECTS IN KAZAKHSTAN

QAZAQ GREEN. On March 4 of the current year, a meeting was held in Astana with representatives of the renewable energy sector, organized by the Renewable Energy Association "Qazaq Green" with the support of the global project GIZ "Capacity Development for Climate Policy in South-Eastern Europe, Southern Caucasus and Central Asia" (CDCP).



The discussion involved representatives of state bodies, industrial enterprises of Kazakhstan, and investors in the renewable energy sector.

"Today's roundtable is being held with the support of the GIZ project in the field of renewable energy and the development of a strategy for achieving carbon neutrality by Kazakhstan. We are grateful to the German Agency for International Cooperation (GIZ) for the close attention paid to our renewable energy sector. Together with the "Qazaq Green" Association, this is the second event dedicated to the problems of manufacturers, both domestic and global brands. This is because Kazakhstan is a member of the World Trade Organization, where market relations are valued and a non-discriminatory approach to all manufacturers is welcomed, regardless of their origin," said Nurlan Kapenov, Chairman of the Board of Directors of the Renewable Energy Association "Qazaq Green."

The event showcased the achievements and new technical solutions of renewable energy sector suppliers, with companies such as Photomate, LONGi Solar, "Maiami Solar" LLP, Umai R&D, "Profland-RT" LLP, and others participating.

In addition to the local content in renewable energy projects, roundtable participants discussed the existing problems and barriers for suppliers participating in renewable energy projects implementation in Kazakhstan.

JINKOSOLAR UNVEILS ITS FIRST NEO GREEN PANELS PRODUCED WITH RENEWABLE ENERGY



JinkoSolar, one of the largest and most innovative solar module manufacturers in the world, unveiled Neo Green panels today. These N-type TOPCon Tiger Neo panels are produced in factories that were awarded the "Zero Carbon Factory" certification by TÜV Rheinland for their compliance with the criteria and requirements of such certification. JinkoSolar is also the first company in the industry to be awarded with the "Zero Carbon Factory" certification by TÜV Rheinland for Silicon Ingot Manufacturing, Silicon Wafer Cutting, Solar Cell Manufacturing, and Solar Module Manufacturing. This milestone marks a major step in the company's journey toward its goal to promote sustainability, innovation, and environmental responsibility.



The initial 5GW capacity of Neo Green is the result of years of significant research and development work, as well as, maximizing the adoption of an environmentally conscious approach across its vertically integrated supply chain, including the use of solar, hydro and wind generated electricity in its wafer, cell and module factories in Leshan, Chuxiong and Shangrao. As part of its broader environmental efforts, in addition to its objective of reaching 100% of electricity produced from renewable sources for manufacturing and production, JinkoSolar will continue to expand the use of recycled materials and increase the use of electric trucks and LNG-powered ships. Additionally, JinkoSolar is also targeting to gradually reduce the use of plastic in its packaging.

Ms. Dany Qian, JinkoSolar Vice-President, "We are extremely proud to release our first Neo Green Panels produced in factories that use electricity from renewable sources, a strong expression of our efforts to fulfill our commitment to sustainability. Our biggest impact on the environment will always come from providing customers with sustainable products and solutions that accelerate a greener future, reflecting the shared values of our customers, partners and investors."



Tatiana Lanshina,
Project Manager Power System
Transformation,
Agora Energiewende

THE ROAD AHEAD FOR KAZAKHSTAN'S POWER SECTOR: MODERNISING THROUGH RENEWABLES

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Kazakhstan can quadruple the share of variable renewable energy in its power mix to 20 percent by 2030 while minimising power system costs, a new study by Agora Energiewende finds. Accelerating the deployment of wind and solar would help the country to phase down coal and create sustainable opportunities for electrification across the heating, transport and industry sectors.

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With its potential for the development of cheap wind and solar energy, Kazakhstan is well placed to increase the share of variable renewable power generation from five percent today to 20 percent by 2030, helping it to get on track to meet its 2060 carbon neutrality target.

This ramp-up of renewable energy deployment is feasible while minimising power system costs, ensuring security of supply, and phasing down coal-fired generation, according to a new study by Agora Energiewende.

The study models four different scenarios for 2030: one for business-as-usual centred on the government's current target of increasing the share of renewables to 15 percent, and three that are more ambitious, assuming higher shares of variable renewables (up to 20 percent). In Tatiana's sentence, make sure to use 'percent' and not %.

According to the results of the study, Kazakhstan can minimise the overall costs of its power system while reducing the share of coal from the current level of 67% to 45% by 2030.

The model assumes that a decline in coal power generation will be offset by the rise in renewables – specifically solar change to 'solar photovoltaics' and wind, where the levelised cost is estimated to be about half of that for new-build coal-fired generation. All scenarios envision a significant increase in electricity production and consumption by 2030, due to demographic growth and a continued expansion of energy-intensive industries.

Key measures to successfully transform Kazakhstan's energy system identified by the Agora study are expanding and reinforcing the grid, increasing energy efficiency, and developing a plan to move away from coal. The ramp-up of the

share of renewables in the power mix is also critical to sustainably electrify heat, industrial applications, and transport. In some hard-to-abate sectors such as aviation, shipping, and cement, Kazakhstan will need to transition towards renewable hydrogen and other power-to-X fuels.

SIGNIFICANT POTENTIAL FOR TRANSFORMATION DESPITE CHALLENGES

Kazakhstan's economy is one of the least energy-efficient in the world; the energy intensity of its GDP is about 50 percent higher than the global average. The country is planning to build over 4 GW of new coal power plants, and oil is one of the main sectors of the economy. Its energy infrastructure is also in need of modernisation.

At the same time, over the past 30 years, Kazakhstan's power market has evolved from a vertically integrated monopoly to a partially liberalised, multi-market system. Over the last decade, the last decade, the country has seen increasing penetration of renewables. Thus, Kazakhstan has the potential to set a positive example for other countries in the region.

Concerted and immediate efforts to expand and reinforce the grid as well as increase energy efficiency would allow the country to not only select the most cost-effective generation sources but also to fulfil its 2030 climate target set to reduce emissions by 15 percent below 1990 levels, an important milestone on its path to net zero.

The study shows a feasible transition pathway from coal to renewables that would allow Kazakhstan to create opportunities for electrification and energy efficiency gains across sectors like heating, transport, and industry, thus reaping the benefits for the wider economy of a clean energy transition.

The study "Modernising Kazakhstan's coal-dependent power sector through renewables: challenges, solutions and scenarios up to 2030 and beyond" was produced by Agora Energiewende in collaboration with OET, ECOJER and Qazaq Green. The 59-page study models four analytical scenarios for the renewables landscape in Kazakhstan in the lead-up to 2030.

Source: <https://www.agora-energiewende.org/news-events/the-road-ahead-for-kazakhstans-power-sector-modernising-through-renewables>



RES AUCTION SCHEDULE IN 2024

The Ministry of Energy of the Republic of Kazakhstan invites all stakeholders to participate in auctions for selection of projects for construction of renewable generation facilities in 2024.

In accordance with the Order of the Minister of Energy of the Republic of Kazakhstan dated March 7, 2024 No. 105 "On approval of the auction schedule for 2024", the following schedule was approved:



№	Type of RES	Installed capacity, MW		UES zone	Information on reserved land plots for planned construction of renewable energy facilities	Information about the possibilities of connecting to points of electric networks of energy transmission organizations, indicating restrictions on power input and the number of new connections	Auction Date
		Small	Large				
1	HPP	20		All zones except for Tentek River			June 10, 2024
2	HPP	20		All zones except for Tentek River			June 11, 2024
3	HPP	10		All zones except for Tentek River			June 12, 2024
4	WPP		100	Northern zone	Region: Aktobe Area: Mugalzhar Settlement: Zhem Land area, ha: 250 Land category: 48.754823 58.108441 (the area around this land plot)	Energy transmission organization: KEGOC JSC Region: Aktobe Power line (name, coordinates): Ulke Substation (buses): 220 kV Restriction on power input: 100 MW Restrictions on number of new connections: 1	June 13, 2024
5	WPP		200	Northern zone	Region: Kostanay Area: Kostanay Settlement: Zhdanov r/d Land area, ha: 2237 Land category: 12-183-105-184	Energy transmission organization: KEGOC JSC Region: Kostanay Power line (name, coordinates): Kostanay 1150 Substation (buses): 220 kV Restriction on power input: 200 MW Restrictions on number of new connections: 1	June 14, 2024



6	WPP	100	Northern zone	Region: Abay Area: Zhanasemey Settlement: Prirechniy r/d Land area, ha: 500 Land category: 50.098340 80.407734 Settlement: Semey, Semey – Ust-Kamenogorsk highway Land area, ha: 237 Land category: 50°20 21" 80° 19'12" 50°20 11" 80° 20'20" 50° 19 48" 80° 217" 50°19 17" 80° 20'29" 50°19 57" 80° 19' 13"	Energy transmission organization: KEGOC JSC Region: Abay Power line (name, coordinates): Semey Substation (buses): 220 kV Restriction on power input: 100 MW Restrictions on number of new connections: 2	June 17, 2024
7	SPP	100	Southern zone	Region: Almaty Area: Ili Settlement: Konayev c. Land area, ha: 200 Land category: 77.09274472660809 43.916188968964576 77.09274472660809 43.916188968964576 77.08255209214212 43.913164466252596 77.07338928343717 43.912422583620355 77.06657658993413 43.91413460650941 77.06092575113826 43.91780577842917 77.06311743160649 43.91942254396258 77.06670861887824 43.91921331795629 77.07198977663359 43.91793892548594 77.07756139806463 43.92604413141493 77.08115258533644 43.92491921816966 77.07888168750355 43.922732021102405 77.08004354220856 43.922161434729844 77.08310661370604 43.92398729185987 77.08799168462917 43.921134365467395 77.09080023456274 43.91807207224477	Energy transmission organization: Alatau Zharyk Companiyasy JSC Region: Almaty Power line (name, coordinates): Ili Substation (Bus): ПСА-143А Robot Restriction on power input: 100 MW Restrictions on number of new connections: 1	September 23, 2024

8	SPP	20	Southern zone	Region: Zhetysu Area: Panfilov Settlement: Zharkent c. Land area, ha: 150 Land category: 44.280.39N 80.04229 E 44.28018N 80.06101E 44.27042N 80.04310E 44.270.32N 80.05828E	Energy transmission organization: TATEK JSC Region: Zhetysu Power line (name, coordinates): 175 Substation (buses): 134,133 Restriction on power input: 20 MW Restrictions on number of new connections: 1	September 24, 2024
9	SPP	20	Southern zone	Region: Almaty Area: Zhambyl Settlement: Kazybek bek settlement Land area, ha: 40 Land category: 43037'36.88"C 76022'59.47"B 43038'19.55"C 76023,29.56"B 43038' 17.82"C 76024' 15.80"B 43037'34.83"C 76024'20.36"B	Energy transmission organization: Alatau Zharyk Companiyasy JSC Region: Almaty Power line (name, coordinates): Substation (buses): ПС 115А Kazybek bek Restriction on power input: 20 MW Restrictions on number of new connections: 1	September 25, 2024
10	SPP	20	Southern zone	Region: Kyzylorda Area: Shiyeli Settlement: Yenbekshy r/d Land area, ha: 200 Land category: 66°52'43.416""B 44° 18' 15,817""C 66°52'42,073""B 44°18'53,079""C 66°54'28.747""B 44°18'54,662"MC 66°53'42,989""B 44°18'22,191""C 66°53'43,173""B 44° 18' 17,052""C	Energy transmission organization: KREK JSC Region: Kyzylorda Power line (name, coordinates): Substation (buses): 35 kV Restriction on power input: 20 MW Restrictions on number of new connections: 1	September 26, 2024

11	HPP	200	All zones except for Tentek River			November 11, 2024
12	HPP	100	All zones except for Tentek WPP			November 12, 2024
13	HPP	30	All zones except for Tentek WPP			November 13, 2024
14	HPP	20	All zones except for Tentek WPP			November 14, 2024
15	WPP	100	Northern zone	Region: Kostanay Area: Kostanay Settlement: Zhdanov r/d Land area, ha: 400 Land category: 12-183-105-036	Energy transmission organization: KEGOC JSC Region: Kostanay Power line (name, coordinates): Sokol Substation (buses): 220 kV Restriction on power input: 100 MW Restrictions on number of new connections: 1	November 15, 2024
16	WPP	100	Northern zone	Region: Kostanay Area: Kostanay Settlement: Zhdanov r/d Land area, ha: 341,2 Land category: 12-183-105-031	Energy transmission organization: KEGOC JSC Region: Kostanay Power line (name, coordinates): Sokol Substation (buses): 220 kV Restriction on power input: 100 MW Restrictions on number of new connections: 1	November 18, 2024

17	WPP	100	Southern zone	Region: Turkestan Area: Sauran Settlement: Zhana Ikan r/d Land area, ha: 400 Land category: 43°18'54.1 "bl 68°38'38.9"E 43C19'05.4"bl 68°38'59.7"E 43C19'50.7"K1 68°39'41.0"E 43°20'15.8 "bl 68°37'52.5"E 43°19'47.6"H 68°37'31.9"E	Energy transmission organization: KEGOC JSC Region: Turkestan Power line (name, coordinates): Ortalyk Substation (buses): 220 kV Restriction on power input: 100 MW Restrictions on number of new connections: 1	November 19, 2024
18	BioPP	10	All zones			November 10, 2024

Source: Ministry of Energy of the Republic of Kazakhstan

The total auctioned installed capacity in 2024 - 1,270 MW, broken down by type of power plants:

- solar power plants (SPP) – 160 MW;
- wind power plants (WPP) – 700 MW;
- hydroelectric power plants (HPP) – 400 MW;
- biogas power plants (BioPP) – 10 MW.





Nabi Aitzhanov
Chairman of the Management Board
of KEGOC JSC

THE VISION OF TRANSMISSION SYSTEM OPERATOR OF THE IEPS (INTEGRATED ELECTRIC POWER SYSTEM) OF KAZAKHSTAN ON THE DEVELOPMENT OF ENERGY STORAGE TECHNOLOGIES

Currently, energy systems around the world are facing challenges in ensuring their own stability, efficiency and sustainability. The large-scale integration of renewable energy sources (hereinafter referred to as RES) requires effective management of the variability of electric energy production by this type of generation.

The Concept of Kazakhstan's transition to the "green economy" has set the task to increase the share of renewable energy in the energy balance to 15% by 2030 and to 50% by 2050 (with due account for other alternative energy sources). Currently, about 80% of electricity generation in the IEPS of Kazakhstan falls for traditional power plants. The share of flexible generation is several times less than in similar energy systems of neighboring states. These factors significantly complicate the integration of RES.

In conditions of a shortage of flexible generation in the IEPS of Kazakhstan, the development of renewable energy generation requires a balanced approach to the introduction of wind farms, solar power plant and at the same time accelerated the development of HPP (hydroelectric power plant) technologies, flexible generation, as well as the establishment of requirements for RES to minimize the negative impact on the stability of the energy system.

One of the solutions to this problem is the introduction of electrical energy storage systems (hereinafter referred to as ESS). ESS are advanced technologies that provide new opportunities for the development of the electric power industry. It provides the opportunity to store electricity and shift the time of its consumption, so that the production and consumption processes do not need to be

ESS are advanced technologies that provide new opportunities for the development of the electric power industry.

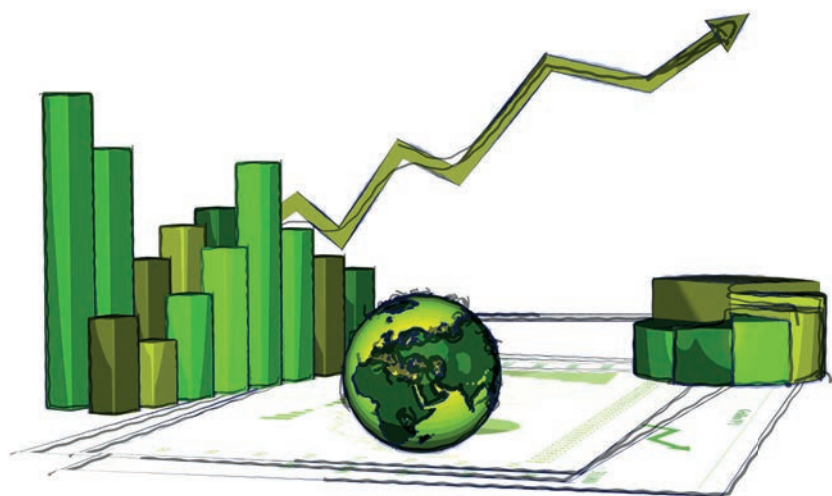
strictly simultaneous. Thanks to these technologies, it is possible to ensure continuous power supply even in cases of emergency conditions.

The use of ESS will ensure compensation for fluctuations in renewable energy generation, as well as the participation of solar power plants in the power balance during the evening maximum load. Besides, ESS can be used in solving other issues, specifically:

1. Load leveling: ESS can be used to reduce consumption during peak hours, as well as to supply reserved amounts of electricity to the power grid to cover imbalances, thereby reducing by-hour electricity imports and imbalances at the borders of adjacent power systems.
2. Frequency and voltage regulation: ESS are technologically capable of maintaining the frequency and voltage in the power system within acceptable limits, including within the framework of primary and secondary frequency regulation.
3. Redundancy: in situations of limited power supply from the power grid, ESS are able to function temporarily as a backup energy source.
4. Emergency management: in case of emergency shutdowns of power transmission lines or generation lines, ESS is used to unload controlled sections and maintain the stability of the power system with minimal restriction of consumers.
5. Electrical power regulation: the use of ESS as a tool for the tasks of a centralized system of automatic frequency control and power overflows.

These functional aspects are becoming especially relevant in the context of the growing pace of RES implementation. This opens up new prospects for improving and optimizing energy efficiency technologies in order to effectively use renewable resources and ensure a future with sustainable energy.

To date, Kazakhstan has launched the large-scale projects for the construction of wind farms with a total capacity of 5.7 GW under agreements with





Total Energies (France), Masdar (UAE), ACWA Power (Saudi Arabia), China Power International Holding (China), Power China (China). Whereof 4 wind farms projects involve the use of EES.

However, at the moment there are no legislative standards in Kazakhstan regulating the use and implementation of electricity storage technologies. In order to determine an effective mechanism for the implementation and functioning of the ESS in Kazakhstan in the near future, it is necessary to form a regulatory framework considering international experience. Note that in 2021, the Asian Development Bank prepared an analytical report on the prospects for the use of ESS in Kazakhstan, which reflected legal, technical and economic obstacles, as well as the recommendations on updating legislation for the implementation of ESS in the IEPS of Kazakhstan.

KEGOC JSC, as a transmission system operator, is a major asset in the implementation of the ESS scheme in the IEPS of Kazakhstan, and is already taking the necessary measures in this direction.

On December 4, 2023, as part of a visit to Beijing (China), KEGOC JSC, China Power International Development Limited, China Power International Holding Limited and the Association of Renewable

Energy of Kazakhstan have signed an agreement on the implementation of a Pilot project for the introduction of ESS in the IEPS of Kazakhstan. The purpose of this Pilot project is to examine the impact of ESS on the regulation of the energy system during the integration of renewable energy sources into the IEPS of Kazakhstan.

Following the results of the Pilot Project, with the support of the Association of Renewable Energy of Kazakhstan, recommendations are expected to be developed on amendments to the regulatory legal acts of the Republic of Kazakhstan and the development of regulatory and technical documentation on the implementation of ESS of Kazakhstan, the mechanism of ESS operation in the wholesale electricity market.

The implementation of the Pilot project will stimulate the development of ESS technologies in Kazakhstan, which, therefore, will provide an opportunity to increase the share of RES in the energy balance.

Thus, the use of ESS will have a comprehensive positive effect on the functioning of the energy system and the activities of various categories of participants of the wholesale electricity market:

1. Energy-producing organizations based on renewable energy sources will have the opportunity to neutralize the natural unevenness of their own electricity generation by using ESS to reserve over-planned generation volumes.
2. Wholesale consumers will be able to reduce the volume of electricity imbalances in the balancing market by covering unplanned loads using their own ESS, as well as use the ESS as a backup energy source in cases of limited power supply. In addition, the use of ESS power reserves in emergency management will allow replacing some consumers with forced power restrictions and reduce the time to restore power supply to disconnected consumers.
3. ESS operators, as a new category of participants of the wholesale electricity market, will provide services to other subjects and receive appropriate competitive income. The provision of service to a transmission system operator for secondary regulation of electric power with the connection to a centralized system of automatic frequency control and power overflows, participating in the balancing electricity market, is also being considered.

As a result of the implementation of ESS in the IEPS of Kazakhstan, the transmission system operator will have additional tools for regulating imbalances and frequencies in the energy system, expand the opportunities for ensuring the stability of the energy system by increasing emergency management resources. The operator will have an increased potential for integrating RES into the national electric network as well.





INTERVIEW



Talgat Temirkhanov:

WITHOUT RENEWABLE SOURCES OF ENERGY, THE PRESENCE OF TRADITIONAL ENERGY IN THE COUNTRY'S GENERATION STRUCTURE IS HIGHLY QUESTIONABLE

“

Kazakhstan's energy sector has been facing a large number of challenges in recent years. Today, the enterprises of the industry are implementing large-scale tasks to modernize their capacities and are on the path of 'green' transformation. Talgat. Temirkhanov, Chairman of the Kazakhstan Electric Power Association (KEA), presented his vision of the prospects for the development of the energy industry and possible risks in the interview with QazaqGreen.

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– Talgat Kenesovich, you have repeatedly stated that the electric power industry needs a strategic document that will in the long term shape the policy of development of the country's electric power industry. In 2022, the Ministry of Energy elaborated a Concept for the development of the industry until 2035. What is wrong with this document?

– In recent years, Kazakhstan's energy industry has faced many challenges related to the further development of the sector against the background of a changed global climate agenda. At the same time, there are a large number of unresolved issues within the industry that need to be tackled as soon as possible. There are significant depreciation of equipment and networks, loss-making companies, limited opportunities to change tariffs as well as new obligations to decarbonize the economy. Contrary to the expectations of the sector, the Concept for the development of the electric power industry, approved by the supervising ministry in 2022, did not answer most of the pressing questions. It is difficult to call it a strategic document. And we partly understand why this happened. Today, the energy sector in Kazakhstan is regulated by several

government agencies at once. The Ministry of Energy supervises in general the development of the industry, including the issues related to providing industry and consumers with electricity and heat. The Ministry of Ecology and Natural Resources performs the tasks to improve the environmental situation without going into such specific details as tariffs, energy plans and so on. The third player on the pitch is the Ministry of National Economy, which directly influences tariff policy and carries out work on inflation containment. There is also the Ministry of Industry and Construction, its area of responsibility extends to utility networks, the department is responsible for their reconstruction, and also deals with energy efficiency issues. Each body has its own tasks, and they all participate in the development of industry documents, which sometimes contradict each other.

Our country has adopted a low-carbon development strategy, which clearly outlines he need to reduce emissions of pollutants, including greenhouse gases. The main emitter of CO₂ is coal-fired generation. At the same time, we have a clear task to increase electric power and thermal capacities since we need to

develop industry. On behalf of the Head of State, we need, we need to double GDP by 2008, this will require the construction of manufacturing plants, large factories, engineering facilities, and for this we need large amounts of electricity.

Finally, it is critically important for us to reduce network wear. This requires investments, and you can't do without raising the tariff here. We simply do not have any other sources of financing. And here we are facing a tariff policy that absolutely does not encourage enterprises to modernize their capacities, since it is aimed at keeping inflation and not raising the cost of energy.

It turns out that, on the one hand, the electric powers sector faces large-scale tasks, there are instructions from the Head of State. On the other hand, we are limited by specific environmental obligations and the existing tariff policy. How should the industry develop in this context? The Concept of the country's electric power industry does not say anything about this. Therefore, the Kazakhstan Electric Power Association has taken the initiative to elaborate a strategy for the development of the sector, which will combine all previously adopted disparate documents and answer the basic question: how to ensure the country's energy security and further effective development of the industry in the context of the global climate agenda.

– What are the key points of the strategy developed by the Association?

– The document, as expected, provides for several scenarios for the development of the energy sector: optimistic, pessimistic and realistic. Together with a group of international experts, we applied economic and technical modelling tools to draw a clear picture of the industry functioning in the future. We want to show the government agencies how much our obligations in the tariff will weigh, how this will affect the overall structure of energy generation, and so on. The strategy is designed until 2030 with a further expansion of the planning horizon until 2060. After all, energy plans are being developed for a long time, since the construction of a single station can take up to seven years. And, of course, when writing the document, we proceeded from plans for the development of energy, decarbonization of industry, considered energy efficiency issues, as well as the need for the development of hydropower, maneuverable energy and renewable sources of energy.

– There are forecasts that Kazakhstan will face a shortage of electricity and capacity in the future.



In your opinion, are alternative sources of energy capable of dramatically affecting the situation? And role will they play in the future?

– The renewable energy sector in Kazakhstan is actively developing. Renewable energy sources are one of the important components of generation. We propose different scenarios in the strategy, but it is too early to talk about them, since we must first discuss all options with authorized government agencies. In general, taking into account Kazakhstan's commitments to achieve carbon neutrality, renewable

sources of energy occupy one of the main roles in the structure of the country's future energy market. Currently, a large volume of renewable energy generation is planned at the level of intergovernmental agreements. These are projects by Arab Masdar, French TotalEnergies, ACWA Power from Saudi Arabia, providing for the construction of wind farms with a total capacity of three gigawatts in the regions of Kazakhstan. It is still unclear how the flow of such large amounts of energy will affect the stability of generation, it needs to be correctly modeled and predicted. There are certain risks for the energy system as a whole. I think we need to discuss this issue at the upcoming international forum under the auspices of the Qazaq Green Renewable Energy Association, and together with experts from the sector, representatives of the government agencies and businesses, try to find the answer or at least get closer to solving it.

Another objective difficulty limiting the use of renewable sources of energy is related to the instability of natural sources. In general, it can be solved by introducing energy storage systems that could store excess electricity and supply it to the grid during peak hours. Today, the traditional energy sector interacts very closely with renewable sources of energy. We understand that without renewable energy, our presence in the country's generation structure is in great doubt. Therefore, we are moving in close cooperation and coordinating our actions. In my opinion, the development of renewable energy should now receive a new impulse.

– So, we will be able to avoid the problem of shortage of capacity and generation, won't we?

– I think so. In this case it is necessary to understand correctly with which generation we will enter the market after 2030. Currently, the country is considering the construction of three coal-fired power plants and nuclear generation. Unfortunately, small and large hydroelectric power plants are not actively developing. There are several hydroelectric power plants built in Soviet times, and that's it. This is partly due to strict requirements in the fields of specially protected areas and rivers. To install a hydroelectric power station or carry out construction work on the river, it is necessary to go through a difficult and continued path of preparatory work and approvals. Despite all the difficulties, hydropower must definitely be developed. We can start at least with small hydroelectric power plants. Their advantage is high maneuverability, during peak hours hydroelectric power plants allow to quickly start the required amount of generation. And then it is the

'green' energy and stability. Returning to the question of what the structure of generation and what the structure of the country's energy will look like after 2030, I want to say one thing: the foundation needs to be laid now. All these issues are considered by the Kazakhstan Electrical Power Association in the strategy for the development of the electric power industry. Consequently, it will be necessary to develop a Roadmap with specific measures, it may be necessary to amend legislation but these are inevitable things.

– In European countries, they declare that they have almost completely abandoned coal generation and have reached 90% in the scale for 'greening' the economy. Kazakhstan's industrial sector faces an ambitious goal to achieve carbon neutrality by 2060. What challenges and opportunities may the energy sector face in this regard in the future?

– The production of environmentally friendly energy in Kazakhstan will definitely increase annually. At the same time, the amount of greenhouse gas emissions will potentially decrease. For our country, which now exports significant amounts of metals to Europe, it is very important to fulfill the conditions of the border carbon tax. Currently, a transition period is in effect for industrial enterprises until the end of 2024, two years later, will industrial sectors will be affected by the increased environmental payments for emissions. This is the production of ferrous metals and aluminum, cement, fertilizers, hydrogen and electricity. According to the estimates of exporters, the payment of a new cross-border duty may cost some companies in the range of \$ 300 million, which is completely unacceptable for the domestic economy.

Currently, a large volume of renewable energy generation is planned at the level of intergovernmental agreements. These are projects by Arab Masdar, French TotalEnergies, ACWA Power from Saudi Arabia, providing for the construction of wind farms with a total capacity of three gigawatts in the regions of Kazakhstan.

Speaking about the decarbonization of the industrial sector, we understand that the main challenge for us will be the large-scale modernization of the energy enterprises, where coal generation should be replaced. By gas and renewable sources of energy. This is a very ambitious task for Kazakhstan, as the share of coal generation in our country now stands at about 65%.

We cannot simultaneously abandon the cheap and stable energy generated by traditional power plants. This will immediately increase the cost of electricity for both exporters and individuals. There are technologies that make coal-fired generation more environmentally friendly. These are mostly Chinese or Russian

AS THE SHARE
OF COAL
GENERATION IN
OUR COUNTRY
NOW STANDS AT
ABOUT

technologies, they cost a lot of money. Nevertheless, enterprises are ready to invest in stations to maintain the volume of basic generation. This requires changes in the tariff policy.

Talking about European countries, not all of them have abandoned the use of coal raw material. How can we apply their experience at home? The main tool that European companies use in matters of energy transition to cleaner energy sources is the absence of a restraining tariff setting mechanism. They have the cost of raw materials and all costs for the development of renewable sources of energy, including the closure of coal-fired generation facilities, included in the final tariff. Our tariffs are low and do not encourage





the population to save. The executive authorities are interested in ensuring that utility bills do not shock consumers, and the state's efforts are mainly aimed at curbing the growth of tariffs. When we restrain tariffs, energy-producing companies have to reduce some of their costs, mainly for reconstruction and repairs. To prevent this, the tariff, must cover all the costs that arise during the operation of the station. As an association, we advocate for improving the mechanism of targeted social assistance. To reduce the burden on socially vulnerable categories of the population, we propose to introduce differentiated tariffs. The method of paying for electricity can be similar to a progressive tax scale, in which citizens who are able to pay, will pay at a fair tariff. This practice is used in many countries, in particular, in the OECD countries. I think we need to try to implement international experience, which as a result will help the state and have a positive impact on the development of the industry.

– Similar to electric power industry, modernization is required for the heat and power industry of Kazakhstan itself as well as for the concept of its development. What points are primarily necessary to be paid attention to?

–Heat supply is the main service sector, which covers a wide range of enterprises and citizens. Its condition determines the well-being of society and the competitiveness of the country's economy. Historically, the population believes that heat in our country should always be cheap. This is fundamentally wrong because there is a cost estimate that includes an

increase in the cost of coal, wages, and transportation costs. Here, as in the case of electricity, there must be fairness in tariff setting. Over the past 20 years, there has been a problem of network deterioration in the country and it has not disappeared anywhere. According to the Ministry of Industry and Construction, the average wear of heating systems is 53%. This situation was the result of a tariff containment policy. Everyone understands that it is hardly possible to carry out a large-scale modernization quickly in the next year or two. A long-term industry programme is needed to restore fixed assets within five to six years, according to which outdated heating systems and equipment will be replaced throughout the country. Maintaining the infrastructure in working order requires significant investments. To our satisfaction, the Head of State hears the aspirations of power engineers. The second wave of the 'Tariff-for-Investment' programme, announced by the Government, is aimed at implementing its direct instructions to reduce the number of outdated networks by 15% over five years. We saw the first positive results of this programme last year, when we were given the opportunity to adjust the tariff for an increase in employee's wages.

Now the electricity tariff has been raised quite well. In response to this, the companies have undertaken serious obligations to carry out repairs at the stations. This year, we may already be able to see positive results in the heat power engineering.

– When do you plan to start discussing the document with the Strategic Planning Agency?

– In the near future (by the end of May), we plan to organize several high-level meetings in the Ministries of Energy and National Economy. After all the discussions, we will take this. Document to the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

– Thank you for the informative conversation! 

THE ROLE OF ENGINEERING IN THE CONSTRUCTION OF RES

These days, when attention to environmental issues and sustainable development is becoming increasingly desired, the construction of renewable energy facilities has taken a special place in the construction industry. Such facilities represent a significant technological and managerial challenge that requires the use of innovative solutions and the most effective monitoring of all stages of implementation. In turn, the Government of our country has attached special importance to this issue in recent years, as such projects are crucial for reducing carbon dioxide emissions into the atmosphere.

The banking sector is also very active. In Kazakhstan, financing of "green" projects is carried out mainly by development banks. The largest creditor is the European Bank for Reconstruction and Development (EBRD), which has already provided loans in the amount of 162 billion tenge. The Development Bank of Kazakhstan takes the second



Akhmet Bissenov,
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Murat Baimanov,
Development Director,
KazBuildExpert LLP

place with 67 billion tenge, and the Development Bank of China takes the third place with 29 billion tenge. The most commonly used financing scheme is 70% of the project cost is covered by borrowed funds. In terms of the number of projects, about two thirds have been implemented by Kazakhstani investors, and in terms of installed capacity, 59% of all renewable energy facilities are financed by foreign investors who prefer large projects.

Of course, innovative construction projects cannot be implemented without relevant engineering activities. In addition to the usual standard engineering services, such as technical and designer supervision, the project management service, undeservedly neglected before, comes to the fore. Indeed, project management is an outlook at a project, at construction activities from above, it is the involvement of all participants in the generation of results, it is attention to detail, processes, focus on importance, validity and effectiveness.



Project management helps to prevent a lot of problems, to avoid an increase in the implementation time and cost of the project, because one of the main tasks of this approach is to neutralize the impact of potential risks and change management, since it is these poorly executed processes that lead to cost increases and deadlines.

To highlight how the lack of competent project management and strict quality control critically affect the success of renewable energy initiatives, here are some examples from our experience:

Technical supervision remarks. At one of the projects for construction of wind power plants, the contractor, ignoring the comments of technical supervision regarding the quality of the concrete mix, continued construction and installation work on reinforcement and pouring foundations under the masts of the wind turbine. In turn, the client pursued the goal of completing the project as soon as possible, did not attach importance to the comments, did not respond to the order issued to the contractor and the written notification received. The study of the provided concrete mix designs revealed falsification and non-compliance of the documents with the actual quality of the concrete mix with the design requirements. The engineering company sent a letter to the client's higher-level organization directly to the head office located in the People's Republic of China, which led to an audit by the client's founders. The inspection showed that five foundations did not meet the technical specifications and could not be used as bases for wind power plants. As a result, the foundations with a total volume of about 3,000 cubic meters were declared unsuitable, which significantly affected the timing and cost of the project. Thus, ignoring the comments of technical supervision led to significant financial losses.

Receipt inspection of materials. At the WPP construction project, the contractor did not have the necessary receipt inspection of materials. This has led to the fact that the anchor cages intended for foundations have not been properly checked. After installing the next turbine, the installers failed to tighten the bolts to the required parameters. There was a need to conduct many studies that showed that the quality of anchor nuts did not meet the design requirements. To eliminate the problem, it was decided to dig into 11 foundations, dismantle the concrete and replace all nuts on the anchor cages one-by-one. Such problems caused significant additional costs in both monetary and time terms, significantly affecting the overall cost and timing of the project.

Selection of supplier. During construction of the wind power plant, the contractor did not include requirements for technical characteristics of materials at the stage of selecting suppliers of inert materials, samples of sand and gravel were not requested, field visits to quarries were not carried out. As a result, the contractor, based on unverified information, concluded contracts with quarries for the purchase of large volume of materials. However, during the production of control concrete samples, it turned out that the strength of concrete is not ensured due to the fact that the density of crushed stone is almost two times less than required (800 kg/m³ instead of 1400 kg/m³). Also, the supplied sand turned out to be too dusty, which required the use of special equipment for cleaning it. What additional costs have arisen? Firstly, it was time, as it was urgently necessary to change the supplier of inert materials.



Project management helps to prevent a lot of problems, to avoid an increase in the implementation time and cost of the project, because one of the main tasks of this approach is to neutralize the impact of potential risks and change management, since it is these poorly executed processes that lead to cost increases and deadlines.



Secondly, about 40% of the materials paid for under the previous agreement were non-refundable under the terms of the agreement. Thirdly, the quarry of the new supplier was located at a considerable distance from the place of work (500 km), which increased the cost of transportation. Fourth, the cost of equipment for cleaning sand from dust is about 15-20 million tenge. All these costs were not taken into account and included in the initial budget of the project only because the contractor was negligent in choosing a supplier, limited himself to paperwork and phone calls instead of going to the site for actual research, taking samples and making control cubes of concrete mix.

These cases demonstrate the lack of competent, complete and integrated management. The need for detailed and step-by-step project management has been proven not only for the implementation stage, but also at earlier stages, at the design stage.

The lack of management of the design process can also lead to financial and temporary losses, which will certainly affect the quality of project development in general and calculations of the exact amount of materials, in particular. Here are a couple more examples:

Initial data. When developing the estimated documentation for construction of a solar power plant, the design team did not take into account the aggressiveness of the soils to the metal racks of the trackers. This was discovered after the approval of tracker deliveries and the placement of orders. The revealed high aggressiveness of

the soils to galvanized metal required additional protection measures, including concreting the bases of the racks. Thus, the initially planned work on the clogging of tracker installations was changed to drilling holes, installing racks and additional concreting, which led to an increase in the cost and timing of work. In this case, the planning did not take into account the physical, technical and chemical properties of the soils, both in terms of bearing capacity and their aggressiveness.

Volumes of materials. At one of the WPP projects, the design and estimate documentation contained specifications of materials with incorrect volume data. During the construction and installation work, it turned out that there was a shortage of fittings associated with the overlap. Such an error cost the client 200 thousand US dollars, since the overlap had to be made in 25 working diameters.

These examples show that in order to achieve the success of projects in the renewable energy sector, it is necessary to have a deep understanding of all the nuances of the construction of RES facilities. The most important elements include careful preparation of design estimates, strict technical control over the execution of work, as well as effective management of resources and contractual activities. Neglecting any of these aspects can lead to significant financial losses, an increase in the duration of the project and deterioration in the quality of the work performed.

Given the dynamism of technological progress in the field of RES construction, it is important to be ready for prompt changes to the design documentation, adapting to new technological solutions and changes in regulatory requirements. This requires project management teams to be flexible and dynamic, as well as an established communication system with customers, contractors, regulatory authorities and other project participants.

In the practice of project management, one of the important processes is stakeholder management, which is often ignored, which leads to unjustified problems during the implementation of the project.

The interests of the implicit participants. For example, one of the projects for construction of wind power plant did not take into account the possibility of residents of a nearby village to influence the progress of construction. During the public hearings, promises were made to the population, the fulfillment of which was subsequently delayed. Without waiting for fulfillment of promises, residents blocked access to the concrete pump during the concreting of the foundation, which caused a delay in concreting for 4-6 hours. The supplied concrete began to lose its characteristics, the already poured concrete began to set. As a result, cold joints formed and the "stagnant" concrete did not gain the necessary strength. As a result, the poured foundation was declared unsuitable, losses amounted to more than 100 million tenge.

Errors in the project documentation, ignoring the comments of technical supervision, ill-considered logistics and inefficient management of resources and stakeholders of the project are the reasons for future failures to meet deadlines and increased cost of projects.

To avoid this, special attention should be paid to a detailed analysis of the construction conditions, including geological, climatic features and potential risks. It is important to ensure strict control over the compliance of the materials and technologies used with the design solutions. These and other important processes for construction of energy facilities, accompanied by engineering project management services, are becoming much more efficient, predictable and more effective.

It is project management in the field of construction of renewable energy facilities that provides an integrated approach, including not only technical and technological aspects, but also deep knowledge and understanding of management processes, including risk and contract management processes.

The experience and professionalism of the project teams, as well as the use of modern methodologies and tools, are the key to the successful implementation of such projects. In this context, it is important not only to strive for innovation, but also to realize the need for continuous training and improvement of management skills to adapt to the constantly changing trends of the construction industry and renewable energy technologies.

The examples given here have a very expensive price of experience, the repetition of which can be eliminated by

involving project management engineering companies with experience in the construction of solar and wind energy generation parks.

■ OUR COMPANY KAZBUILDEXPERT PROVIDES ALL TYPES OF ENGINEERING SERVICES AND OVER 12 YEARS OF INTENSE ACTIVITY HAS ESTABLISHED ITSELF AS AN INNOVATOR, HAS ACHIEVED SUSTAINABLE LEADERSHIP IN THE FIELD OF RES, HAVING GAINED INVALUABLE EXPERIENCE, WHICH INCLUDES A LOT OF EXAMPLES OF PROBLEM PREVENTION, HAS IN ITS ARSENAL A LIBRARY OF STRATEGIES AND SOLUTIONS AIMED AT MINIMIZING POSSIBLE RISKS. HAVING IMPLEMENTED PROJECTS WITH A TOTAL CAPACITY OF MORE THAN 300 MEGAWATTS IN SOLAR ENERGY AND EXCEEDING 750 MEGAWATTS IN WIND ENERGY, WE HAVE ESTABLISHED OURSELVES IN THE NATIONAL MARKET AS A RELIABLE EXPERT.

Catching trends and being at the forefront, we actively promote our expertise to the international market. We have opened the Kbexpert Limited company in the city of Future - Masdar in the United Arab Emirates and have received approval of a license for project management in construction and engineering in the field of energy conservation. We also joined a consortium with a Belarusian and Uzbek company for CIS projects.

The success of any project, as well as of a company, is based on a continuous commitment to innovation and the highest quality of service provision and intolerance to corruption. We are proud that our team includes more than 45 specialists in the field of quality control in construction, each member of the team brings his/her own unique contribution to the success of our projects. The advantage of our team is confirmed not only by numbers, but also by real results — our projects become a symbol of environmental responsibility, an effective marketing tool for international customers, attracting attention and respect from both business and society as a whole.





TOP 5 FACTS EXPLAINED



Saniya Perzadayeva,
UNICASE Managing Partner



Alexandra Mussina,
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unicase

On November 28 through December 13, 2023, Dubai (United Arab Emirates) fostered an annual Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). Amidst the hottest year on the observation record, this year, the COP28 was marked as a major event in terms of active involvement of civil society and hot debates on previously unresolved issues, such as adaptation policies, so-called Loss and Damage Funds for developing countries suffering from the consequences and disasters of the rapidly changing climate. The discussions lasted longer than expected, and the final conference statement was released only on December 13, after a long night of debates between the delegates. It was nicknamed “the beginning of the end” of the fossil-fuel era, although some activists remain unsatisfied with vague expressions to react to a climate emergency.

We recommend you read the full paper released by the UNFCCC, but if you do not have time to do that, UNICASE will shortly explain developments of the COP28 in this brief.



FROM COP28



FOSSIL FUELS: PHASE OUT, PHASE DOWN OR TRANSITION AWAY FROM?

The Dubai meeting was the first-ever COP in history that mentioned fossil fuels as the linking cause, which has to be neglected to mitigate the effects of human-induced climate change. Although the Intergovernmental Panel on Climate Change (IPCC) reports (which serve as a scientific basis for the UNFCCC policy-making) mentioned that the use of fossil fuels is the major reason for the greenhouse effect causing human-induced climate change, legally, there has not yet been such clarification in the sources of international climate change law. Even though at a certain point, it seemed that the agreement on the need to move away from fossil-fuel dependence would not happen as the delegates to the Conference could not find common ground for the correct expression, COP28 remarkably achieved the consensus. A significant conflict of interests was surrounding the political debate between the “phase-out” (meaning a radical elimination of fossil fuels) or “phase down” (meaning a more steady decline of the use of fossil fuels), with arguments from different stakeholders of various backgrounds. It took three drafts to finalise the statement.

As a result, the final statement defined the need to “transition away from fossil fuels in energy systems, adopting a just, orderly, and equitable approach and expediting action throughout this crucial decade. The objective is to achieve net-zero emissions by 2050, aligning with scientific recommendations.”

The text finalised in Dubai acknowledges the imperative for significant, swift, and continual reductions in greenhouse gas emissions aligned with the 1.5 °C target. Still, it does not aim all measures to fulfil it. It urges Parties to contribute to global initiatives actively, considering the Paris Agreement and their unique national circumstances, pathways, and approaches. COP experts are scrutinising terminology, noting the nuanced shift from “calls on” to “transitioning away,” deviating from the initial preference for a stronger “phase-out” option, along with the proposed time frame; moreover, some wording creates loopholes and scapegoats for greenwashing solutions, such as the carbon capture and storage technologies which are not favoured by the climate activists community since they only offer a temporary limited solution, rather than solve the direct cause of climate change.



RENEWABLE ENERGY

In the same section as the “fossil fuel” clause, the global stocktake proposes to increase the capacities of the renewable energy globally by 3 times and to double “the global average annual rate of energy efficiency improvements by 2030.” The clause is taking the lead since it clarifies a specific quantified target for the parties by a certain deadline with renewable energy ambitions.





LOSS AND DAMAGE FUND

COP28 established the awaited Loss and Damage Fund, with an overall 700 million USD contribution pledged by the developed states to address climate-related losses and damages in favour of Global South. Article 9.1 of the Paris Agreement mentioned that “Developed country Parties shall provide financial resources to assist developing country Parties to both mitigation and adaptation in continuation of their existing obligations under the Convention [UNFCCC]”.

Moreover, article 8 amplified the necessity of addressing the loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage, amplifying the UNFCCC mechanisms.

Therefore, an urge to create the Loss and Damage Fund was expected since the adoption of the Paris Agreement; the issue elaborating on Article 8 of the Paris Agreement was noted during last year's COP27, but wasn't completed until now.

Although it is clearly a positive step in terms of climate justice, some concerns arise over the adequacy of addressing the escalating financial needs associated with climate-related loss and damage, as well as the distribution of compensation or possible grants. It has been suggested that the pledged amount falls significantly short of the estimated 400 billion USD needed annually by developing countries to tackle loss and damage associated with extreme climate events, which is especially terrible for the small island states losing their territories due to rising sea levels. Developing



countries are disproportionately challenged by the effects of climate change and the need to mitigate their carbon input, which often results in the inability to comply with a climate burden due to a simple lack of finances. Therefore, the Global South asserts a requirement of at least 400 billion USD annually, considering the economic costs of extreme events in 2022 alone surpassed 100 billion USD. The declared amount falls significantly short, representing less than 1% of developing

countries' expectations and only 0.2% of actual needs - and the collection of that still needs to be guaranteed.

Overall, the urgency of the climate condition in terms of global power dynamics demands wealthier and polluting nations to bear a financial burden and redirect existing subsidies toward climate action. This leads us to conclude that the job regarding Loss and Damage after COP28 still needs to be completed. Still, there is room for improvement and, therefore, hope.



GLOBAL GOAL ON ADAPTATION

Climate action is usually divided into two main features: the mitigation of the threats of climate change (meaning adopting the policies to reduce the anthropogenic greenhouse effect by regulating the emissions, air pollution or limiting other factors which contribute to climate change to prolong temperature rise) and adaptation to the impacts of climate change (meaning increasing the resilience of the countries capacities and reduced vulnerabilities of risks related to climate change). Although the Paris Agreement establishes a goal to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change, the need of the Parties to make efforts to adapt to the threats of climate change adequately, the adaptation targets were slightly overlooked during the previous meetings; adaptation

targets were sometimes neglected in the first statements submitted by the states in relation to Nationally Determined Contributions on the Climate Change (NDC's) under the Paris Agreement (for example, Kazakhstan first NDC statement had only mitigation targets).

Therefore, negotiators had yet to define a framework for understanding this Global Goal of Adaptation, including clear targets or how they would be measured. At COP28 at COP28, negotiators have finally agreed to global time-bound targets for specific themes and sectors (such as water and health) and the adaptation policy process. At this point, the targets lack financial and other support for developing countries; they also need to be quantified, which will need extra consideration in the upcoming sessions to be successfully implemented.





REVIEWING THE NDC'S

Ahead of the COP28, all 193 Parties to the Paris Agreement have submitted at least their first NDC; 151 among them amended or updated NDC in a due manner. But quality and ambition vary for many reasons, including a lack of adequate finance, capacity and, in some cases, insufficient political commitment. (Many NDCs to date only cover carbon dioxide emissions and selected parts of the economy and do not set emissions reduction targets.)

The COP28 position statement invites countries to submit their new NDCs ahead of COP30 in 2025. NDCs are submitted every five years to the UNFCCC secretariat in accordance with the Paris Agreement; In order to enhance the ambition over time the Paris Agreement provides that successive NDCs will represent a progression compared to the previous NDC and reflect its highest possible ambition. Under the common



timeframes decision adopted in 2021 in Glasgow, each NDC will last ten years but will be updated every five years. In the upcoming phase, nations are anticipated to revise their 2030 goals and introduce new targets for 2035. The decision reached at COP28 emphasises the necessity for these new NDCs to be more ambitious. This aligns with the Intergovernmental Panel on

Climate Change (IPCC) findings, which highlight that limiting global warming to 1.5 degrees Celsius requires a 60% reduction in global greenhouse gas emissions below 2019 levels by 2035.

In addition to adjusting emissions targets for 2030, the outcome of COP28 underscores that the next set of NDCs should go beyond existing efforts to curb emissions. They should also encompass strategies and priorities for adaptation, initiatives supporting a just transition, and addressing loss and damage. The decision further specifies that these contributions should reflect transformative actions spanning various sectors, including but not limited to clean energy, nature conservation, road transport, and more.

Governments will start to prepare their next round of NDCs in 2024. COP28 calls for the UN to host global and regional workshops and capacity-building sessions to help them.

IN CONCLUSION:

Although the Paris Agreement is celebrating its 8th anniversary and notable progress is being made in climate commitments, experts notice that the targets set still need to be achieved and demand urgent treaty-consistent action based on scientific evidence. The next conference has been announced for November 2024 in Azerbaijan - and we believe it will exceed expectations and fulfil its mission.

“The people in power don’t need conferences, treaties or agreements to start taking real climate action. They can start today. When enough people come together then change will come and we can achieve almost anything. So instead of looking for hope - start creating it.”

Greta Thunberg, climate activist, 2021

THE SINGLE PURCHASER MODEL: WHAT HAS CHANGED IN THE REGULATION OF RENEWABLE ENERGY FACILITIES



On July 1, 2023, a single electricity buyer model was introduced in Kazakhstan, and the balancing electricity market began to operate in real time.



Karina Ilyusizova,
Advisor, Egen Gregory LLP

These innovations have raised many questions in the renewable energy sector, in particular issues related to the effective planning (forecasting) of electric energy production and the financial responsibility of renewable energy facilities for imbalances between planned and actual values of electric energy generation. This review examines these issues in order to attract the attention of participants in the renewable energy market, including regulatory authorities, to finalize relevant regulatory legal acts aimed at creating an investment-attractive renewable energy market in the Republic of Kazakhstan..

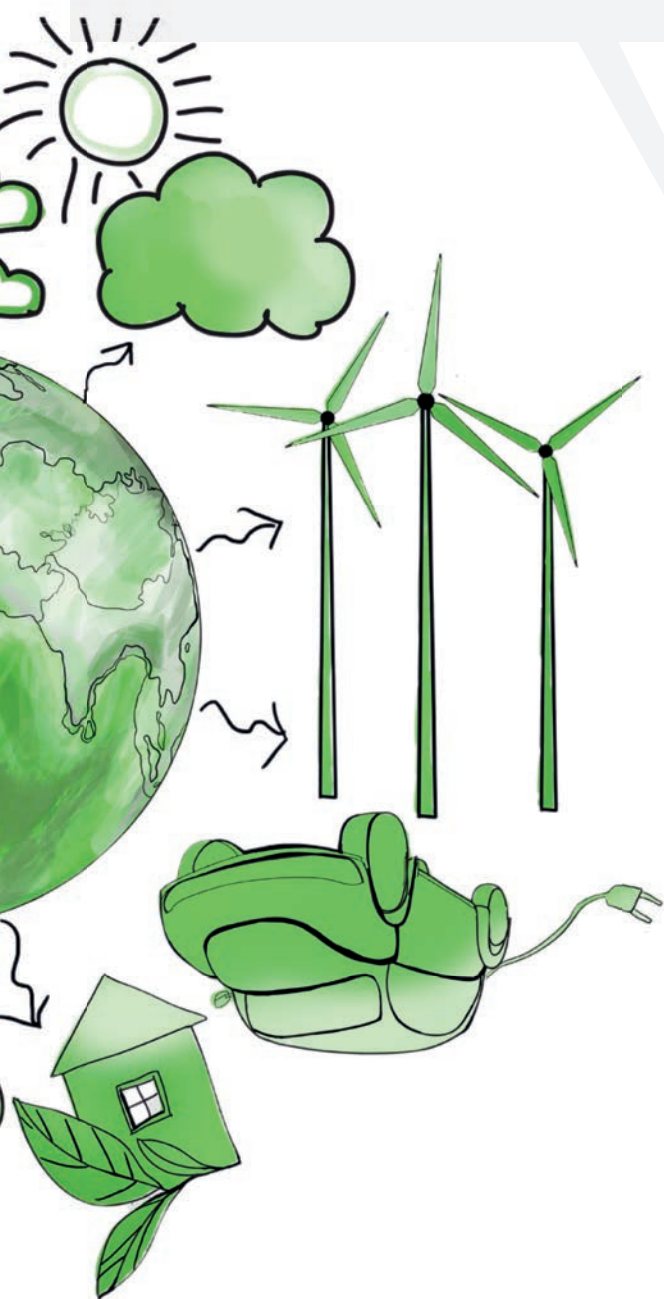
THE SINGLE PURCHASER MODEL

The Single Purchaser is LLP "Settlement and Financial Center for Support of Renewable Energy Sources". The Settlement and Financial Centre, as a Single Purchaser, buys electricity from energy-producing organizations (including renewable energy facilities) for its sale to energy supply, energy transmission organizations, consumers and other market entities.

From July 1, 2023, the Single Purchaser purchases planned, and not the actual volume (electric energy



The Single Purchaser pays only for the planned amount of electric energy approved by the System Operator in the daily schedule.



produced by renewable energy facilities and supplied to the power grid of the Republic of Kazakhstan) of electric energy from renewable energy facilities that have concluded a long-term electric energy purchase agreement with the Single Purchaser, as it was before.

This change is aimed at stimulating renewable energy facilities to carry out effective forecasting of electricity generation and imposes an obligation on renewable energy facilities to provide planned volumes of electricity generation for inclusion in the daily schedules of production and consumption of electric energy approved by KEGOC JSC.

Renewable energy facilities with electricity purchase agreement must submit a sales application in the system of balancing electricity market on the operational day before 8:00 a.m. in order to include it in the daily schedule of electric energy production approved by the System Operator. The daily schedule regulates the hourly values of production and consumption of electric energy for each calendar day.

At the same time, renewable energy facilities can make adjustments to increase the daily schedule no later than 2 hours before the hour of actual production of electric energy, provided that the production-consumption balance is maintained in the specified daily schedule.

It should be noted that electricity supplies from renewable energy facilities have priority in the formation of daily schedules (except for renewable energy facilities that participate in the capacity market or do not have the electricity purchase agreement). Priority generation is important for renewable energy facilities, because if the hourly volumes of the daily consumption schedule are exceeded, the System Operator can reduce the hourly volumes of applications for the sale of facilities not included in the priority generation schedule.

The daily schedule is the final document for settlements with the Single Purchaser. The Single Purchaser pays only for the planned amount of electric energy approved by the System Operator in the daily schedule. Payments to renewable energy facilities that have concluded the electricity purchase agreement after July 1, 2023, must be made daily (no later than 12:00 p.m. of the operating day), but renewable energy facilities receive part of the payment within 45 calendar days of the month following the billing month.

However, taking into account that the generation of electric energy by renewable energy facilities is subject to changes, providing objective and accurate forecasts by renewable energy facilities is a difficult task, and the actual data of electric energy production may differ significantly from the planned volumes. Such deviations from planned volumes (imbalances) are subject to regulation at the balancing electricity market.

IMBALANCES OF RENEWABLE ENERGY FACILITIES

The balancing electricity market has been operating in real time since July 1, 2023, which involves the physical and financial settlement of hourly electrical energy imbalances that occur on an operational day.

The imbalance is the difference between the planned and actual balance of generation-consumption of electric energy in kWh. Accordingly, two goods are bought and sold at the balancing electricity market:

- balancing electricity to cover positive imbalances (an imbalance whose value is greater than zero (not negative), in kWh); and
- negative imbalances (for an imbalance whose value is less than zero (negative), in kWh).

If the specified planned volume of a renewable energy facility exceeds the actually generated volume of electric energy, then a positive imbalance appears; conversely, if the specified planned volume of a renewable energy facility is lower than the actually generated volume, then a negative imbalance appears.

The financial settlement of imbalances from renewable energy facilities is carried out by the Single Purchaser. This means that renewable energy facilities will be financially responsible for deviations from the planned daily schedule of production and consumption of electric energy by:

- to cover positive imbalances by purchasing balancing electricity from the Single Purchaser; and
- sales of negative imbalances to the Single Purchaser.

For this purpose, renewable energy facilities that have concluded the electricity purchase agreement and are included in the list of subjects of the wholesale electricity market must conclude a liability transfer agreement with the Single Purchaser.

The price of a positive imbalance is the price for the sale of electric energy indicated in the electricity




It is important to note that the Single Purchaser, within the framework of contracts on the transfer of responsibility with renewable energy facilities that concluded the electricity purchase agreement before July 1, 2023, does not carry out transactions for the purchase and sale of balancing electricity and negative imbalances.

purchase agreement multiplied by an increasing coefficient, and the price of a negative imbalance is the price for the sale of electric energy multiplied by a decreasing coefficient.

It is important to note that the Single Purchaser, within the framework of contracts on the transfer of responsibility with renewable energy facilities that concluded the electricity purchase agreement before July 1, 2023, does not carry out transactions for the purchase and sale of balancing electricity and negative imbalances. For such renewable energy facilities, a coefficient of one is applied for the entire period of validity of the electricity purchase agreement. This means that these renewable energy facilities do not bear additional financial burden for their imbalances.

However, the question of the financial responsibility of renewable energy facilities concluding the electricity purchase agreement with the Single Purchaser after July 1, 2023 remains open. Thus, it is currently envisaged that for such facilities an acceptable deviation from the planned value of the supply of electric energy to the grid, included in the daily schedule, will be determined, if not exceeded, these facilities should not be financially responsible for their imbalances (permissible deviation). That is, the increasing and decreasing coefficients will be equated to one for the corresponding hour of the operating day. At the same time, the size of such an acceptable deviation has not yet been established, so it is currently unknown what financial burden new renewable energy facilities will bear in connection with participation at the balancing electricity market.

Thus, the implementation of the Single Purchaser model and the participation of renewable energy facilities at the balancing electricity market suggest that renewable energy facilities should have effective methods and technical solutions for forecasting electricity production. In the absence of such methods, renewable energy facilities that conclude the electricity purchase agreement after July 1, 2023, may be financially responsible for their imbalances. However, the size of the permissible deviations and the corresponding coefficients for renewable energy facilities currently amount to an uncertain amount, which makes it difficult to assess the investment attractiveness of projects in the renewable energy sector, develop a financial model, and determine the conditions for financing renewable energy projects. 

OVERCOMING OBSTACLES: WHY ARE THE LEADERS OF THE MINING INDUSTRY IN NO HURRY TO SWITCH TO RENEWABLE ENERGY?



Sergey Vassilyev,
Director of PF Environmental
Development Fund of Almaty

Despite the dynamic development of renewable energy in Kazakhstan over the past 10 years, mining companies are still in no hurry to invest in the construction of RES facilities. In the mining industry, there are only isolated cases of projects implemented by large companies. Thus, in 2019, a subsidiary of Kazakhmys put into operation the Kengir solar station (Ulytau region) with a capacity of 10 MW, and in 2023 – the Balkhash station with a capacity of 50 MW, which is planned to be expanded to 100 MW by the end of 2025. The remaining projects are still at the design or construction stage – the Khromtau-1 wind power plant (155 MW) in the Donskoy OMPP (ERG) area, the expansion of existing cascades of small hydroelectric power plants to 106 MW with the participation of KAZ Minerals.

In order to understand why Kazakhstani mining giants are not actively investing in RES facilities, it is necessary to analyze in more detail the situation of the four largest mining groups (Kazakhmys/KAZ Minerals, KazZinc, Eurasian Resources Group, Karmet), which are the flagships and main beneficiaries of enterprises in the industry of extraction and processing of non-ferrous and ferrous metals. Based on the results of such an analysis, it can be stated that these companies face a number of insurmountable obstacles on the way to decarbonizing their energy consumption.

Firstly, despite the constant decline in the cost of renewable energy, it still cannot compete with coal and hydro plants owned by mining giants. The four above-mentioned groups control almost 20% of all installed capacities of Kazakhstan's power plants, and excluding RES facilities, their control reaches almost 25%. At the same time, the existing mechanism of Single Group of persons allows companies to purchase electricity directly from their generating capacities without participation in the system of a Single Buyer.

As can be seen from the table, among all RES facilities, only wind power plants can be more or less competitive in terms of electricity costs. However, their use also rests on the problem





Table 1. Generating capacities of mining companies and their tariffs

Group	Source	Installed capacity (estimate), MW	Approved cap rates for 2023 KZT/kWh
Kazakhmys / KAZ Minerals	GRES Topar LLP	743	11,65
	Kazakhmys-Energy LLP*	263	16,37
KazZinc LLP	Bukhtarma HPP**	675	1,46
Eurasian Resources Group (ERG)	Aluminum of Kazakhstan LLP	350	6,05
	Eurasian Energy Corporation LLP	2 475	7,40
Karmet (Arcelor Mittal Temirtau)	Karaganda CHP-2	435	6,77
Total / Weighted average		4 941	7,55
For comparison, the minimum tariffs for sources obtained at auctions for RES in 2023:			
Wind power plants		10,38	
Solar power plants		13,89	
Hydroelectric power plants (up to 10 MW)		17,50	
Hydroelectric power plants (over 10 MW)		34,80	

*including Balkhash and Zhezkazgan CHPs.

**it is a part of KazZinc under the terms of a long-term lease agreement with Samruk-Energo JSC.

of the need for round-the-clock operation of critical mining and processing equipment, which is the basis for both productivity and safety in mining and processing processes. In our opinion, this is the second and most significant obstacle to the transition of mining companies to renewable energy sources.

Significant part of the mining equipment, including single-stall systems, ventilation systems, pumps, as well as ore processing plants, must operate continuously to maintain the working process. Sudden stops of equipment lead not only to a decrease in productivity,

but also create serious safety risks, potentially blocking miners in mines, or causing the collapse of structures. The same interruptions in ventilation systems can lead to dangerous accumulations of gases, endangering the lives of miners.

¹According to KEGOK JSC, the total installed capacity of Kazakhstan's power plants is 24.5 GW (20.8 GW excluding RES facilities).

Table 2. Assessment of the debt burden of the largest mining enterprises

Company	Current debt burden (estimate) ²
Kazakhmys / KAZ Minerals	>\$6,900 million
KazZinc LLP	\$355 million
Eurasian Resources Group (ERG)	~\$5,022 million
Karmet (former Arcelor Mittal Temirtau)	\$805 million
Total	>\$13'082 million

In terms of ore processing and concentrate production, the complexity of equipment systems such as flotation cells, ball mills and thickeners requires continuous operation to avoid damage, loss of valuable minerals or inefficient restarts during unplanned shutdowns. Even submersible pumps or fire-fighting equipment, if the continuity of their operation is disrupted, can lead to unreliability of their use during emergencies.

The importance of uninterrupted power supply for these critical systems cannot be overemphasized. That is why the intermittent nature of renewable energy sources, especially wind power plants, represents a significant obstacle for mining companies on their way to using clean energy. The use of RES storage devices could be one of the optimal solutions, however, this significantly increases both the initial level of capital investments during the construction of the station and the cost of its maintenance. As a result, even WPP become uncompetitive compared to coal and hydro stations of mining corporations.

The third major obstacle is the high debt burden of mining companies. The high financial obligations and debts of most operating mining companies (including small players) limit their ability to make significant investments outside their industry. As a result, from the point of view of attracting debt financing, it is more profitable for companies to invest in expanding existing energy assets, bringing available capacity to

the installed capacity, than to implement RES projects from scratch.

Thus, mining companies in Kazakhstan have serious obstacles in the transition to renewable energy. High tariffs and instability of energy supply from RES facilities, as well as the high debt burden of the companies, lead to the fact that the integration of renewable energy into the mining sector seems difficult and financially unrealistic. Moreover, in the hierarchy of environmental problems, decarbonization is currently not the leading one among enterprises in the mining industry, yielding the palm to the issues of environmental protection and occupational safety. The closure of Cobre Panama copper mine, owned by Canada's First Quantum³, or the withdrawal of Arcelor Mittal Corporation from Kazakhstan are vivid examples of the risks that mining companies may face with insufficient attention to the impact of industrial waste on the natural landscape and occupational safety.

Meanwhile, the gradual transition to RES is a global trend and in the long term, Kazakhstani enterprises will have to switch to clean energy. Therefore, it is already necessary to develop a comprehensive approach to stimulating mining companies. Such an approach can include both innovative financing mechanisms and tax exemptions in exchange for investments in renewable energy sources, as well as joint efforts in research and development to improve the efficiency of renewable energy storage and the stability of the energy system.

²Sources and assumptions:

Kazakhmys: \$1,208 million – according to the financial statements as of 31/10/2023 published on KASE, as well as \$5,700 million provided by VTB for the de-listing of KAZ Minerals and refinancing of the company's loans in 2021. (<https://en.vtb-bank.kz/news/3744/>).

KazZinc LLP: financial statements of the company as of 31/12/2022.

ERG: according to the financial statements of Shubarkol Komir JSC, Sokolovsko-Sarbaykoye Mining and Processing Production Association JSC, TNC Kazchrome JSC, Aluminum of Kazakhstan JSC as of 31/12/2022. Debts of Eurasian Energy Corporation LLP are not included.

Karmet: \$355 million raised as loans by the buyer's structures, as well as \$450 million – Karmet's debt to the previous owner (Arcelor Mittal Group).

³The Canadian company First Quantum was forced to close Panama's largest copper mine after unprecedented protests by the Panamanian population against its operation, which, according to experts, negatively affected about 5,900 hectares of tropical forests. From 2013 to 2023, the company invested more than \$10 billion in the project. The first ore was processed in the second half of 2019; at the end of 2023, Cobre Panama was suspended. As of today, work is beginning on the complete closure of the deposit.

Cooperation between government agencies, financial institutions and industry participants plays a key role in creating an enabling environment that supports and encourages the transition to renewable energy for mining companies. Only collective action

and innovative solutions can turn these challenges into opportunities, contributing to a sustainable and green future for Kazakhstan's mining industry.



Meanwhile, the gradual transition to RES is a global trend and in the long term, Kazakhstani enterprises will have to switch to clean energy. Therefore, it is already necessary to develop a comprehensive approach to stimulating mining companies.



INTEGRATION OF AGRICULTURE WITH SOLAR ENERGY IN SOUTH KAZAKHSTAN

Agrivoltaics, also known as photovoltaic energy, is the practice of combining agriculture with solar energy production by installing solar panels above or next to crops. The choice of crops for agrivoltaics depends on several factors, including climate, soil type, exposure to sunlight, and the economic viability of crops. Here are some crops that are considered well suited for agrivoltaic systems:

BERRY CROPS: Berry crops such as strawberries, raspberries and blueberries are often grown in areas with strong sunlight, which makes them good candidates for agrivoltaic systems. In addition, they tend to be low-growing and can be easily harvested.

LEAFY GREENS. Leafy greens such as lettuce and spinach can be grown in shaded areas under solar panels, where reduced sunlight can help prevent shoots from plants and prolong the growing season.

SPECIAL CROPS: Special crops such as herbs and medicinal plants can be grown in shaded areas under solar panels. These crops usually require less sunlight than traditional crops and can be more profitable per square meter.

LOW-GROWING CROPS: Low-growing crops such as peas and beans can be grown in shaded areas under solar panels. These crops often grow well at lower temperatures and can be planted early in the season.

Cultures with high economic value. Finally, crops with high economic value, such as vineyards and orchards, can also be grown in agrivoltaic systems. Although these crops usually require more space and sunlight than other crops, the economic benefits may outweigh the additional costs of solar panels.

The best crops for agrivoltaic systems are those that are well suited to the local climate, soil type and sunlight exposure. In addition, crops with high economic value and those that can grow in shaded areas are often good candidates for agrivoltaic systems.

In Turkestan region, one of the first in the republic, an agro-photovoltaic project is being implemented on an area of more than one hectare, where more than 200 kWp solar modules of HBC technology from Longi and low-power inverters from SolaXPower will be installed. The integrator of this photovoltaic system is the leader in the general contract of roof and ground stations in the commercial sector, Soventus Energy, which is based in Shymkent and Tashkent. The company has embarked on the implementation of agro-photovoltaic projects in the Central Asian region and has the necessary technologies for their successful implementation.

Cabbage with high yield will be grown on this site. Despite the fact that this site has the required water supply, solar panels will help reduce evaporation, and will also help preserve



Syrymbet Idrissov,
Director of Soventus Qazaqstan





Photo 2. Planned type of construction



Photo 1. The site for the implementation of the first of its kind agro-photovoltaic project in Central Asia

the dark green color of cabbage, which is more in demand among buyers.

The expected annual generation of the photovoltaic plant is 220,000 kWh of environmentally friendly energy. Taking into account the current legislation and the ability to sell excess electricity up to 100 kW, and in August 2024 there will be 200 kW at maximum capacity, this project with a tariff of more than 40 tenge has

a tremendous economic effect and payback in three years, and the remaining 27 years the station will be profitable.

This system is a win-win and cost-effective for the implementation of PVS projects in agriculture. For detailed calculations, please contact us by phone +7 702 888 3771 or by email info@soventus-energy.com.





STUART BOWLIN

A private pilot, UAV pilot, and cofounder of rTek, Stuart is passionate about using remote sensing and AI to address environmental challenges. He is particularly interested in using these technologies to monitor and protect wildlife, track deforestation, and predict natural disasters. Stuart is committed to using his skills to make a positive impact on the world.

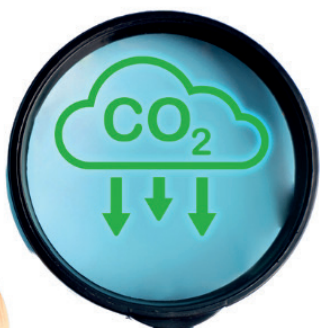
THE STATE OF SOIL CARBON SEQUESTRATION IN KAZAKHSTAN

Carbon Sequestration has immense potential in Kazakhstan, but more research is needed to reduce risk for project developers.

The lack of information hampers the agricultural industry's ability to make informed decisions regarding land value and potential for development throughout the nation.

The Strategy to Achieve Carbon Neutrality of the Republic of Kazakhstan until 2060 (1) states: "Improper handling of soils in agriculture (failure to observe crop rotation, insufficient and untimely fertilization, and so on) has led to a decrease in the level of humus in soils, which continues to decline from year to year; accordingly, the ability of soils to capture carbon dioxide from the atmosphere and deposit it is also decreasing."

In 2023, Kazakhstan and UNDP produced the Eighth National Communication and Fifth Biennial Report of the Republic of Kazakhstan to the UN Framework Convention on Climate Change (2), clearly outlining the importance of soil management—"In cases where the use of a land plot or its part has led either to a significant deterioration of the fertility of agricultural land or to environmental damage, the owner of the land plot or the land user shall be obliged to eliminate the



damage in accordance with the legislation of the Republic of Kazakhstan.”

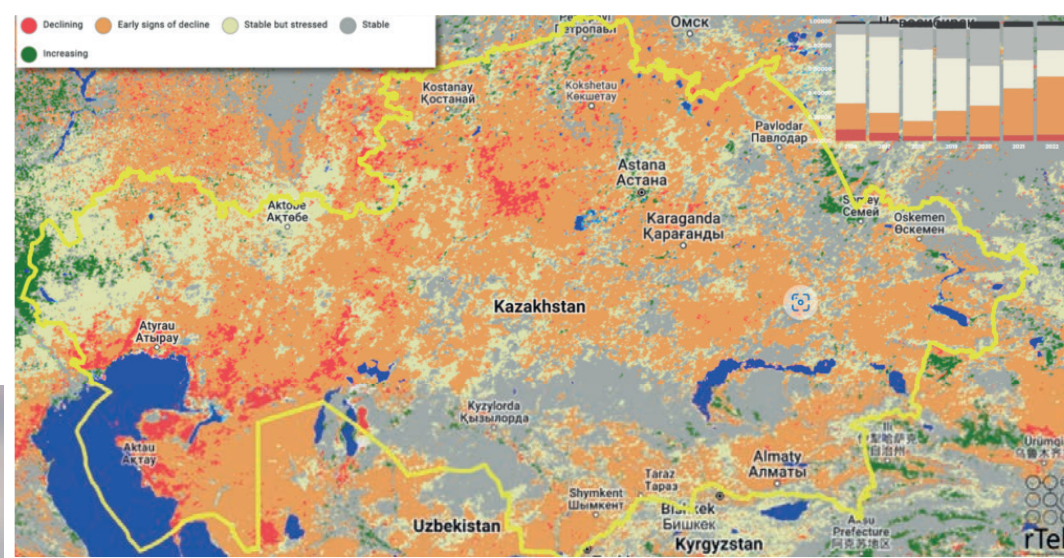
According to paragraph 3 of Article 228 of the Ecological Code (3), “lands are subject to protection from soil degradation, depletion, damage, and deterioration (wind erosion, desertification, etc.)”

Article 238 of the Ecological Code states that “individuals and legal entities shall preclude degradation and depletion of soils in their land use activities”.

Of Kazakhstan’s total countrywide emissions of 401.6 MTCO₂e (2), the LULUCF sector accounted for 40.7 MT/year of emissions, with two-thirds from livestock and one-third from arable pastures.

FAO GSOCSeq, a country-wide ROTHG model, estimated in 2023 that under an ideal sustainable soil management scenario (SSM3), soils can sequester 45.2MT per year, a reversal from the current rate of loss of 32 MT per year, resulting in overall mitigation of 77.2 MT per year.

Kazakhstan Land Productivity Dynamics - 2022. NASA MODIS



The percentage of stable soils has declined from 57% in 2016 to just 22% in 2022. Soils in “early signs of decline” have increased from 22% to over 48%. The most decline is occurring in areas with the highest current agricultural production, in North Kazakhstan, South-East, and Aktope region.

SOIL SEQUESTRATION POTENTIAL IS CONCENTRATED MOSTLY IN FOUR OBLASTS:

- Akmola – 15.2 MT/yr,
- North Kazakhstan – 10.5 MT/yr,
- East Kazakhstan – 11.3 MT/yr,
- Almaty – 10.9 MT/yr

CAPACITY FOR MEASURING SOIL BASELINES

Many countries measure soil baselines at a much higher level of detail than Kazakhstan. 160 countries, to be precise. But Kazakhstan has the capacity.

Most national laboratories in Kazakhstan have state of the art NDIR soil spectrometers capable of measuring elemental carbon and nitrogen in soil samples to a high level of accuracy, complete with fully automated sampling equipment to pull cores from the soil.

CURRENT STATUS OF SOIL DATA IN KAZAKHSTAN:

Our primary sources of soil data are research institutions, government reports, and international databases, each with its limitations.

Among the international open databases, the International Soil Reference and Information Centre (ISRIC) is the only one that avails its data to international scientists, however, the current scope of coverage renders it unfit for its intended use.

Kazakhstan is ranked 160th in the density of carbon samples (hectares per sample), behind Russia by 5 times, Uzbekistan by 20%, and practically all other countries that have ongoing LUCLUCF sector projects.

Industrial and scientific users, (like Boomitra, a carbon credits issuer based in San Francisco), still rely on this database to make investment decisions, posing a severe risk to the development of Kazakhstan’s agricultural industry.

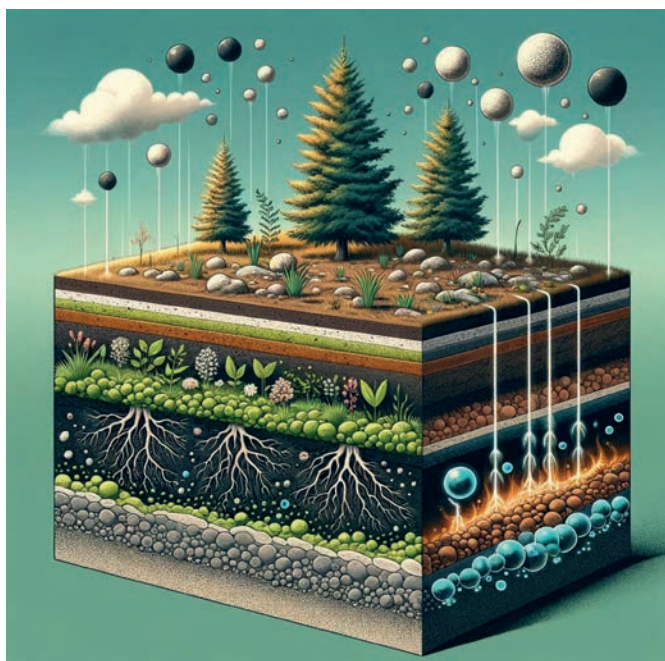
ISRIC currently hosts only 52 soil samples from Kazakhstan, graciously provided by a project by Nazarbayev University in 2017-18¹. This number is far from sufficient for constructing reliable, high-resolution soil property maps at a country-wide level, considering Kazakhstan’s vast land area.

Another study was performed from 2001-2005 in Shortandy (7915 ha), a collaboration between Baraev Institute and researchers at Kyoto University². They found a sequestration rate above the baseline of up to 1 MgC/ha/yr, based on barley and wheat crop rotation.

Influence of crop rotation system on the spatial and temporal variation of the soil organic carbon budget in northern Kazakhstan

And in 2021, based on the ISRIC available dataset, FAO and the Kazakhstan Ministry of Agriculture provided a national submission to the GSOCSeq (Global Soil Organic Carbon Sequestration) map. Although a positive step, this model disagrees with the Tanaka 2008 study by over 300%, underestimating carbon sequestration potential.

Using the FAO GSOCSeq data, average potential SSM3* sequestration rates are calculated per region. The predicted sequestration rates are very low, around 0.07 t/ha/yr of carbon sequestration. In North Dakota, for example, (in



WHO IS ISRIC?

ISRIC (International Soil Reference and Information Centre) is an independent, nonprofit organization that was established in 1966 by the Food and Agriculture Organization (FAO) and the International Soil Science Society (ISSS), funded by the Government of Netherlands.

Its mission is to serve the international community with information about soils, land resources, and their sustainable management. ISRIC is recognized as the world's leading center for soil information, with a focus on the development and dissemination of global and regional soil databases, such as the popular SoilGrids.org geoportal. The organization provides access to soil data to scientists and policymakers worldwide and supports research and capacity building in soil science.

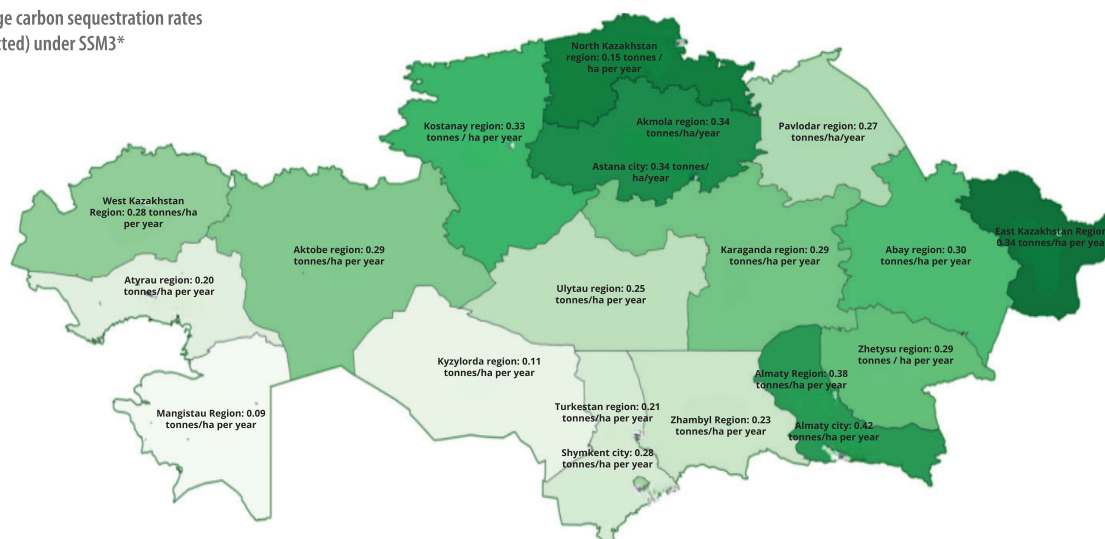
similar climates) observed sequestration rates are closer to 0.3 t/ha/yr.

Given this low sequestration forecast, with the conversion rate of 3.6663 tCO₂e/tC, we see that each hectare can sequester around 0.25 tCO₂e/year, with the highest areas in east Kazakhstan.

SSM3 (Sustainable Soil Management Scenario 3)

This map represents the projected soil organic carbon stocks (in t C ha⁻¹) in 2040, after 20 years of implementation of sustainable soil management (SSM) practices that generate a 20 percent increase in carbon inputs (Scenario 3), at a soil depth of 0-30 centimeters.

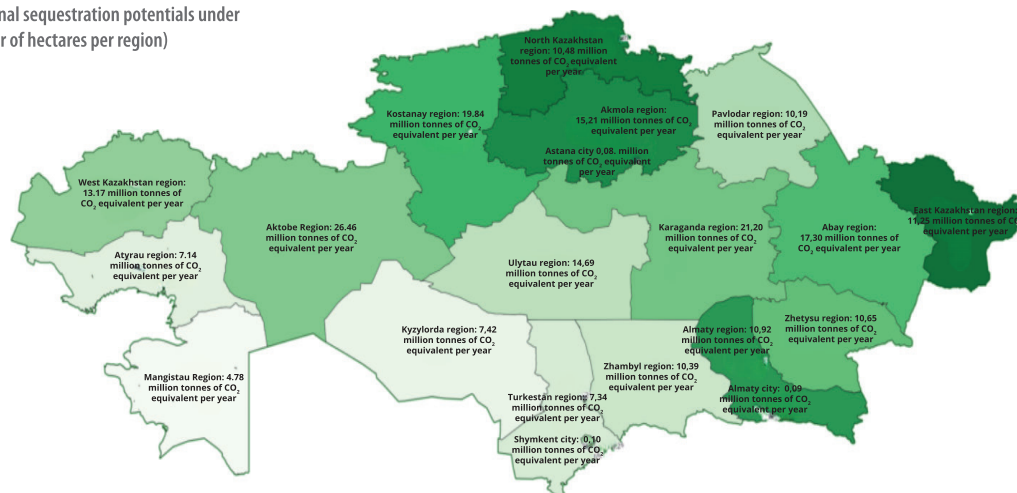
FAO GSOCSeq average carbon sequestration rates per oblast (uncorrected) under SSM3*



2.9X CORRECTION FACTOR

The Takata 2008 study observed significantly higher soil carbon sequestration rates, and we can directly compare the sequestration rates observed in the soil to the predicted rates by GSOCSeq.

2.9x corrected overall regional sequestration potentials under SSM3 (tCO₂e/ha/yr x number of hectares per region)



PROJECTING OPTIMISTICALLY

Projecting this to other sites in the region (above), a prediction between ~0.8 - 1.2 tCO₂e/ha/yr is possible, which is within the empirically expected range in this climate and soil type.

*Top Soil Physical and Chemical Properties in Kazakhstan across a North-South Gradient, Nazarbayev University, Nature, 2018

*Influence of crop rotation system on the spatial and temporal variation of the soil organic carbon budget in northern Kazakhstan, Tanaka et. al, Kyoto University, Baraev Institute, 2008

ISSUES WITH DIFFERING BASELINE MEASUREMENTS AND ASSUMPTIONS

(See FAO Technical Report for specific deep-dives into these points below)

1. Soil (BAU) carbon levels are dynamic, not static. The transport pathways between atmosphere GHGs, and surface/ subsoil water are very large and can be increased even more by anaerobic conditions and methanotrophic organisms.
2. Climate-based SOC losses (due to drying, salinization, and decrease of biodiversity due to extreme weather events) may significantly exceed any sequestration even in the best-case scenarios (at least on the 100-year time scale) making SSM practices more like REDD+ in that they are preventing loss, rather than necessarily gaining carbon. Verra's VM0042 does appear to account for this, as a declining baseline-declining SSM would still yield carbon credits.
3. In increasing SOC systems, labile sinks require constant "feeding pressure" with organic matter to activate conversion to longer-term SOC storage sinks (like mineralization and aggregate adsorption). These sinks can theoretically become saturated, slowing the SOC sequestration rates over time and requiring higher and higher feeding pressures. On the balancing side, increasing biodiversity has an accelerating effect on sequestration rates. Due to the complexity of these interactions, it is almost impossible to predict which scenario will apply to a given site until empirical trials begin.
4. Comparing previous experiments to plans is very difficult because baseline measurement practices differ from experiment to experiment. The worst-case scenario for generating carbon credits is also quite likely due to traditional grazing practices (B). Because the BAU (Business as Usual) baseline is approaching a sequestration limit, the annual increase in the difference between SSM and baseline trends towards zero, meaning that carbon credits could not be produced from the same land at the same rate in perpetuity, but only temporarily, although SSM practices would need to continue for a very long time to facilitate the transfer from short to long term storage.

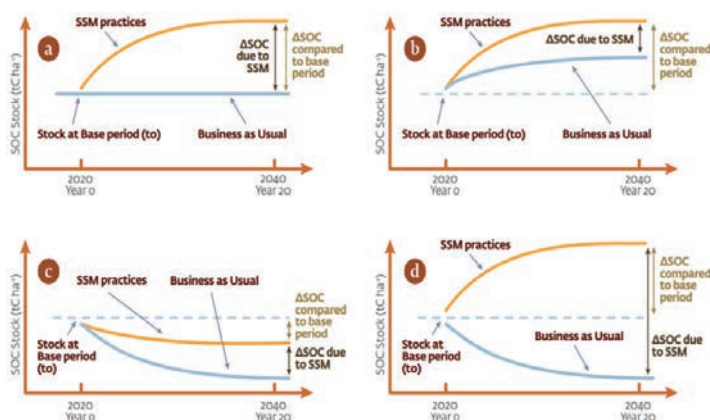
Some current crediting mechanisms (BCarbon, Gold Standard) don't account for baseline scenarios C or D, which, similar to REDD+, utilize SSM to counteract or slow losses under BAU.

RISKS OF CURRENT AI-DRIVEN INTERPOLATION METHODS:

The scarcity of soil data has forced scientists and policymakers to rely on artificial intelligence (AI)-driven interpolation methods for estimating soil properties across larger geographic regions.

WHAT IS RANDOM FOREST INTERPOLATION?

Random forest interpolation is a machine learning technique used to estimate unknown soil properties across larger geographic regions by training on a subset



Additional Baseline Types, FAO GSOCSeq Technical Report

of available data. The algorithm creates a decision tree for each subset of the data and combines them to make a prediction. This method is commonly used when working with sparse soil data.

Limitations of Random Forest Interpolation

While random forest interpolation can provide some valuable insights, it is not effective when working with sparsely sampled data, especially when the samples are not well distributed and attempting to represent a large area. This is because the model struggles to account for the variations in soil properties across different regions.

When there are many thousands of kilometers between samples, the model may make incorrect assumptions and overgeneralize the data, leading to inaccurate predictions.

In the case of Kazakhstan, the limited soil data available is sparsely distributed across the country. As a result, a random forest interpolation model would not be effective in estimating soil properties at a country-wide level, with accuracies in the low 60% range or worse, similar to a coin toss.

The model would likely produce unreliable or misguided predictions, leading to poor decision-making and potentially disastrous consequences for the agricultural industry and environmental conservation efforts.

Given these limitations, it is essential to prioritize the development of a comprehensive national soil database for Kazakhstan, which would provide accurate and reliable data for scientific research, policymaking, and sustainable agricultural practices.

While current AI-driven methods can provide some valuable insights, there are significant limitations and potential risks, especially when calibrating based on a small number of samples, as is the case with Kazakhstan.

Low Accuracy: With only 52 samples, the AI models may not accurately represent the complex variations in soil properties across different regions of Kazakhstan. This could result in misleading conclusions about soil health and composition.



Increased Uncertainty: Sparse sampling increases the uncertainty of the interpolated maps, leading to potentially unreliable or misguided decision-making, which could adversely impact land use planning, agricultural productivity, and environmental conservation efforts.

Generalization Errors: The AI models might make incorrect assumptions based on limited data, leading to significant generalization errors. Given Kazakhstan's geographical diversity, these errors could be substantial.

Illustrative Cases for the Application of a Soil Database:

To further highlight the potential benefits of a comprehensive soil database, let's consider these practical applications:

Optimized Agricultural Practices: With an extensive soil database, AI models can create precise soil property maps.

Farmers can use these to understand their land better, enabling them to choose suitable crops, determine optimal planting times, and apply fertilizers more effectively, thus increasing agricultural productivity while minimizing environmental impacts.

Informed Agricultural Investments: With a comprehensive soil database, agricultural investors can make informed decisions about land acquisition and assess the potential for growing new crops.

This information can also help reduce risks and barriers to entry for industry investors by identifying areas with soil properties that could pose challenges to certain crops.

Sustainable Land Use Planning: Policymakers can use high-resolution soil maps to inform land use policies, helping to conserve environmentally sensitive areas, plan infrastructure projects, and mitigate the impacts of climate change.

Environmental Protection: Conservationists can utilize soil data to monitor soil degradation and biodiversity loss, thereby guiding effective strategies for environmental protection.

The Importance of a National Soil Database:

Given these considerations, it's clear that a national soil database for Kazakhstan is a necessity. It would provide numerous benefits:

1. Consolidated Information: It would gather all soil data into one accessible source, removing unnecessary access barriers for the industry.
2. Standardized Data Collection: It would ensure the use of standardized, rigorous methodologies for soil data collection across the country.
3. Informed Decision-Making: It would significantly enhance the quality of information available to policymakers, farmers, and scientists.
4. Improved Soil Mapping: It would allow for the creation of more accurate and detailed soil property maps, with high-detail AI models, reducing the risk of generalization and uncertainty that current AI models pose.

IN CONCLUSION, the development of a comprehensive national time series soil database for Kazakhstan is an urgent need, offering significant potential benefits. It will contribute substantially to sustainable agricultural practices, informed policymaking, and scientific research, while mitigating the risks of current practices, and contributing significantly to the development of the Agriculture sector.



Source: <https://rtek.kz/beyond-the-canopy/soil-carbon-sequestration-kazakhstan/>

Environmental challenges of agriculture in Kazakhstan: Management of Pesticides and Persistent Organic Pollutants



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Director of the Waste and Chemical safety
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PF «The Center «Cooperation for
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THE MANAGEMENT OF PESTICIDES, INCLUDING THOSE CONTAINING PERSISTENT ORGANIC POLLUTANTS, REMAINS ONE OF THE SERIOUS ENVIRONMENTAL PROBLEMS IN KAZAKHSTAN. OBSOLETE PESTICIDES REMAINED FROM THE SOVIET UNION ARE USUALLY STORED IN INAPPROPRIATE CONDITIONS IN WAREHOUSES NEAR FARMS, IN THE OPEN AIR.

IN ADDITION, THE NUMBER OF OBSOLETE PESTICIDES ARE REGULARLY REPLENISHED WITH PESTICIDES CURRENTLY IN USE, AS A RESULT OF THEIR EXPIRATION DATE, AS WELL AS VIOLATIONS OF THE REQUIREMENTS FOR THEIR HANDLING. AT THE SAME TIME, OBSOLETE PESTICIDES AND THEIR IMPACT ON THE ENVIRONMENT CAN CREATE SERIOUS PROBLEMS IN AGRICULTURE AND REQUIRE THE IMPLEMENTATION OF RISK MANAGEMENT STRATEGIES AND COMPLIANCE WITH ENVIRONMENTAL NORMS AND STANDARDS.

WHAT ARE PESTICIDES?

Pesticides are toxic chemicals that are used in agriculture to control pests and plant diseases, as well as various parasites and carriers of it "dan gerous" or "dangerous", seemed like an extra space animal diseases. Pesticides are divided into several main groups. The most common ones include: herbicides – for destruction of weeds, insecticides – to destroy insect pests, fungicides - to

combat pathogenic fungi, zoocides - against rodents.

Obsolete pesticides mean pesticides that have lost their effectiveness or safety due to expiration date, improper storage, improper use or prohibition of use in accordance with legal regulations.

Some types of pesticides belong to persistent organic pollutants (hereinafter - POPs), a group of chemicals that move everywhere in the environment and remain

harmful to the environment and the health of living beings for a long time. POPs are regulated by the Stockholm Convention, which aims to protect health and the environment from the negative effects of POPs. Currently, the Convention includes 30 POPs that are prohibited for sale and use. However, the list is regularly updated and supplemented. Of these, 19 chemicals are pesticides.

WHAT IMPACT DO PESTICIDES AND POPs HAVE ON HUMAN HEALTH AND THE ENVIRONMENT?

The impact of pesticides, especially those containing POPs, on ecosystems and biodiversity is extremely negative. Accumulating in soil, water and air, they cause pollution of natural environments and destruction of ecosystems. Toxic components can poison plants, animals and microorganisms, disrupting their vital functions and leading to a reduction in biodiversity. Moreover, these substances can pass from one organism to another through food chains, which entails cascading effects and threatens the stability of ecosystems.

production processes that consume large amounts of energy and as a result cause greenhouse gas emissions, including CO₂.

IS THERE A RELATIONSHIP BETWEEN THE USE OF PESTICIDES IN AGRICULTURE AND CO₂ EMISSIONS?

The use of pesticides, including those containing persistent organic pollutants, in agriculture can lead to adverse consequences, one of which is an increase in CO₂ emissions into the environment. If pesticides are used in large quantities, they can be leached into the soil and enter water resources. This leads to contamination of soil and water, as well as deterioration of its quality. As a result of decomposition processes of pollutants in the soil, additional amounts of CO₂ can be released.

In addition, under the influence of improper use of pesticides, the soil may lose its fertile properties due to the destruction of its microbiological composition or loss of organic matter. This leads to a decrease in the soil's ability to retain carbon, and contributes to an increase in CO₂ emissions into the atmosphere.

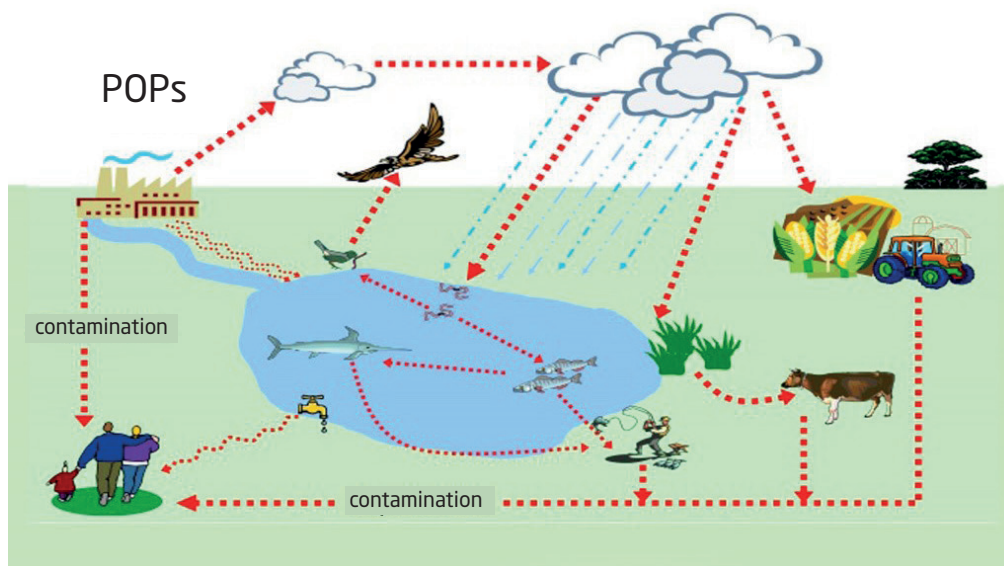


Figure 1. – The impact of POPs on the ecosystem

Even in small doses, POPs can disrupt normal biological functions, pass on to subsequent generations and pose a real threat to human health and the environment. Toxic substances cause a variety of diseases and pathologies in humans. The effects of POPs and pesticides on human health are devastating and highlight the need to take measures to protect society from their negative impacts. One of the important aspects of the negative impact of pesticides on the environment is increase in carbon dioxide (CO₂) emissions in agriculture. The use of pesticides often occurs using agricultural machinery and

WHAT IS THE SITUATION WITH OBSOLETE PESTICIDES AND POPs IN THE REPUBLIC OF KAZAKHSTAN?

According to the National Plan for Fulfilling the Obligations of the Republic of Kazakhstan under the Stockholm Convention on Persistent Organic Pollutants for 2017-2028, as a result of the preliminary inventory of pesticides in 2003, 727 warehouses and 15 burial grounds were discovered throughout the country. 105 tons of obsolete pesticides and toxic chemicals, including POPs-containing pesticides, were found in these warehouses and burial grounds:

- 24 tons of DDT at Antiplague Station in Atyrau region;
- 15 tons of toxaphene in Akkai area of North Kazakhstan region;
- 0.5 tons of DDT near Zhangiz-Tube settlements in the East Kazakhstan Region.

In 2014, the total stocks of obsolete pesticides were estimated at 1 617.63 tons and more than 169 660 containers of pesticides. The largest number of obsolete pesticides was concentrated in Akmola, Kostanay, and East Kazakhstan Regions. In Aktobe, Almaty, Zhambyl, West Kazakhstan, Karaganda, Atyrau, Kyzylorda, Mangystau, North Kazakhstan regions, according to the 2014 inventory, obsolete pesticides were not found.

Currently, with the support of FAO (Food and Agriculture Organization of the United Nations), a national inventory of obsolete pesticides and an environmental assessment of contaminated areas is being conducted in Kazakhstan within the framework of FAO/GEF project should be “Lifecycle Management of Pesticides and Disposal of POPs Pesticides in Central Asian countries and Türkiye”. The updated data of the national inventory will be submitted to the state authorities after completion of all stages of research.

HOW IS THE HANDLING OF PESTICIDES, INCLUDING THOSE CONTAINING POPs, REGULATED IN THE NATIONAL LEGISLATION OF THE REPUBLIC OF KAZAKHSTAN?

The legislation of the Republic of Kazakhstan regulates the management of POPs and pesticides at various stages of their life cycle, including production, import, export, storage, transportation, use and disposal. The main regulatory documents regulating the handling of pesticides and POPs are:

- Environmental Code No. 400-VI LRK dated January 2, 2021;
- Law "On Plant Protection" dated July 3, 2002 No. 331;
- Rules for management of POPs and waste containing them dated November 24, 2022 No. 717;
- Technical Regulation on safety of plant protection products (pesticides) dated June 27, 2023 No. 249;
- Rules for neutralization of pesticides, as well as conditions for maintenance of special storages (burial grounds) in proper condition (Order of the Minister of Agriculture of the Republic of Kazakhstan dated September 29, 2015 No. 15-05/864).

The primary legislative measure is a ban on the production and import of products that form POPs waste. Production of pesticides is allowed only with a license, and also involves the introduction of control system for technological processes and nature of emissions into the environment.

It is important to note that the import of pesticides to the Republic of Kazakhstan requires a license for sale and



import, which ensures control over their use.

At the stage of implementation, pesticides must undergo state registration and can only be used after obtaining the appropriate license. The release of pesticides to consumers should be allowed only in special containers with mandatory information on safe use and disposal.

IMPORTANT STEP IS TRANSPORTATION OF HAZARDOUS SUBSTANCES, WHICH MUST BE CARRIED OUT WITH PRECAUTIONS TO PREVENT BOTTLING AND MINIMIZE THE IMPACT ON HEALTH AND THE ENVIRONMENT.

The storage of hazardous substances also requires compliance with strict rules and safety measures, including separate storage according to the properties of substances and the use of specialized storage facilities.

The use of hazardous substances should be regulated and controlled to minimize the risk of their negative impact on human health and the environment.

Detoxication of pesticides is an important step in the management of pesticides. The disposal of pesticides and their containers is carried out at the expense of the owner of pesticides.

In accordance with the legislation, methods of detoxication of pesticide are developed by manufacturers and are examined and included in the documentation



for I think "products" will be better here. Because drugs usually mean medications, including safety data sheets, a protective label and recommendations for use for consumers. The burial of pesticides and their containers is not allowed, the processes of detoxication of pesticide should not harm the environment.

Companies licensed to carry out detoxication of pesticides are required to provide centralized collection and transportation of pesticides to warehouses with appropriate storage conditions, excluding access by unauthorized persons. Pesticides with compromised packaging integrity must be repackaged in containers that meet the requirements of regulatory documents.

With regard to destruction of pesticides containing POPs, legislation prohibits the disposal of such waste. In addition, it is prohibited to use technologies for destruction of persistent organic pollutants and chlorine-containing waste without comprehensive treatment of waste gases, which should ensure the content of dioxins and furans in purified waste gases in concentrations not exceeding 0.1 nanogram per cubic meter.

WHAT IS CURRENTLY BEING DONE TO IMPROVE THE MANAGEMENT OF OBSOLETE PESTICIDES, INCLUDING THOSE CONTAINING POPs?

Various efforts are being made by stakeholders to improve the situation in this area.

Within the framework of FAO/GEF project "Lifecycle Management of Pesticides and Disposal of POPs

Pesticides in Central Asian countries and Türkiye", it is planned to destroy up to 900 tons of POPs and obsolete pesticides. In addition, it is planned to carry out the reclamation of some areas contaminated with pesticides.

The project also works on development of legislative recommendations aimed at improving the regulation of the product life cycle, as well as improving institutional interaction and ensuring the safe disposal of obsolete pesticides, including POPs.

In order to effectively coordinate the actions and should be Public Fund «The Center "Cooperation for Sustainable Development"» the support of FAO, created "National Network on Chemical Safety, POPs and Obsolete Pesticides ToxicNet". The purpose of this Network is to strengthen cooperation and enhance the capacity of local communities and other stakeholders in the field of risks associated with obsolete pesticides. Additionally, for a purpose of quick response in case of detection of obsolete pesticide storage sites, landfills and contaminated sites, a "hotline" was created, accessible to residents of Kazakhstan.

WHAT APPROACHES CAN BE APPLIED TO REDUCE THE NEGATIVE EFFECTS OF PESTICIDES AND REDUCE CO₂ EMISSIONS IN AGRICULTURE?

In order to reduce the negative effects of pesticides and reduce CO₂ emissions in agriculture, it is necessary to introduce organic farming practices, including integrated pest control methods. This includes the use of biological plant protection products, chemical-free pest management methods and support for biodiversity.

The implementation of these and other measures will reduce the amount of pesticides used and prevent their negative impact on the environment. At the same time, these measures will contribute to reducing CO₂ emissions in agriculture, which is an important step towards more sustainable and environmentally friendly agriculture.

In general, the problem of obsolete pesticides and POPs poses a serious threat to the environment and human health. The need for action by the State and the public is becoming increasingly urgent. National efforts to inventory obsolete pesticides and assess contaminated areas, supported by international organizations, are an important step in addressing this problem. However, in order to effectively solve this problem, it is necessary to strengthen control over the production, use and disposal of pesticides, as well as the development of organic farming practices. It is also important to raise public awareness about the hazard of pesticides, as well as ways to handle them safely. Only through the joint efforts of the state, business, scientific and public organizations can the dangerous effects of chemicals on the environment and climate change be reduced.





Timur Shalabayev,
Executive Director
RES Association "Qazaq Green"



DEVELOPMENT OF LOCAL CONTENT FOR RES PROJECTS: **INTERNATIONAL EXPERIENCE**



T

he issue of the development of local content within the framework of the implementation of industrial and infrastructure projects in the Republic of Kazakhstan is one of the most urgent. The solution of this issue is aimed at supporting domestic producers of goods, works and services.

The President at a meeting with business representatives held on September 12, 2023 paid special attention to the development of local content, especially noting that many states actively apply measures to protect the

domestic market. However, he noted that strict requirements for local content should be applied to enterprises that receive public contracts and at the same time admitted that only goods that cannot be produced in the country should be imported.

The problem of developing local content for RES sector has also been repeatedly raised at various levels over the past few years. Thus, **the President of the Republic of Kazakhstan K.K. Tokayev at a meeting on development of the electric power industry and renewable energy, held on May 21, 2021, set a clear task for Government of the Republic of Kazakhstan to make proposals for localization of production of components and other elements of RES structures and energy in general. However, in general, the task was not completed.**

INTERNATIONAL EXPERIENCE IN DEVELOPMENT OF LOCAL CONTENT FOR RES SECTOR

Despite the ambitious goals for development of RES sector, researchers note that the requirements for development of local content make renewable energy sources more expensive than necessary, thereby exacerbating rather than mitigating climate change¹.

In particular, it is noted that local content requirements — rules requiring companies to use a minimum level of domestic goods or services supplied domestically — directly distort trade and encourage import substitution with domestic goods, even if domestic goods are worse and more expensive than foreign imports. Such trade distortions hinder competition and increase the overall costs of electricity producers in the short term. For example, between 2014 and 2017, local content requirements led to an increase in the cost of solar photovoltaic energy generated in locally owned projects in India by 6 percent per kilowatt hour compared to similar projects that do not meet the same requirements. During the same period, Indian solar panels remained about 14 percent more expensive than imported panels².

¹Hogan M., *Local content requirements threaten renewable energy uptake*, Peterson Institute for International Economics, 2021
²Benedict Probst, Vasilios Anatolitis, Andreas Kontoleon, and Laura Diaz Anadon, "The Short-Term Costs of Local Content Requirements in the Indian Solar Auctions," *Nature Energy* 5 (November 2020): 842–50

Local content requirements also often lead to local manufacturers specializing in relatively simple components, such as housings and bearings, which can usually be used in other production chains. Over-specialization in such basic goods undermines the efficiency and competitiveness of industry and discourages investment in new technologies.

Local content requirements are most often introduced as a precondition for access to government programs that guarantee above-market prices to renewable energy producers, known as feed-in tariff programs. They are also introduced as part of the qualification requirements in government tenders for renewable energy sources.

Since 2014, high-income countries have increasingly included local content requirements in the processes of public tenders for solar photovoltaic and wind energy.

of the World Trade Organization and, ultimately, the closure of such auctions.

Nevertheless, a number of countries use local content requirements in one way or another as part of industrial development support for RES sector. For example, in the Australian Capital Territory, each applicant's local content proposal accounted for 20 percent of the positive assessment of its solar energy offer in 2014 and 7.5 percent in 2020.

In Japan, local content includes stakeholder engagement experiences and impacts on employment and production at the local and national levels, and scored 40 out of 240 in the evaluation of offshore wind energy bids in 2020.

In Taiwan, the bid requirements are particularly strict. To participate in the 2022 offshore wind energy

International experience in local content requirements for RES sector

Support measures	Number of countries	Countries
Access to FiT and bonuses	16	Argentina, Canada, Croatia, France, Greece, India, Indonesia, Italy, Jordan, Malaysia, South Africa, Spain, Turkiye, Ukraine, USA, UK
Access to participation in public tenders / auctions	9	Australia, Germany, Japan, Morocco, Oman, Uruguay, Russia, Saudi Arabia, Taiwan
Access to participation in public financing	3	Brazil, China, Ghana
Access to FiT and participation in government tenders / auctions	3	Canada, India, United Kingdom

Analysis of the local content policy for RES sector in 29 countries conducted by the Peterson Institute of International Economics shows that the requirements for local content were mainly applied within the framework of feed-in tariff programs or as part of participation in public tenders.

16 of the local content policies analyzed were prerequisites for becoming eligible for FiT fixed tariff program and receiving bonuses, 9 were prerequisites for public tenders for renewable energy sources, 3 were prerequisites for access to public financing and 3 were prerequisites for both eligibility for FiT fixed tariff program, and for public tenders.

At the same time, it should be borne in mind that local content requirements within the framework of open auctions are less common practice, since they entail risks of hidden subsidies for local production, which contradicts international trade rules. In particular, attempts to launch such auctions in India as part of the National Solar Mission and in Canada (Ontario) led to proceedings within the framework

auctions, applicants must commit to locally purchase 26 "key components" installed by the Taiwan Industrial Development Bureau (IDB) for at least 60 percent of the proposed capacity. In addition, to become qualified bidders, candidates must score at least 10 points for "points-adding items." This means that they must either purchase locally more key components than required, or purchase locally other elements that the IDB considers to be points-adding factors."

Germany also uses green requirements for local content, but more purposefully. Thus, in order to encourage the spread of wind energy in southern Germany, the Renewable Energy Act 2021 stipulates that 15 percent of successful tenders between 2021 and 2023 should be awarded to power plants in southern Germany. In the period from 2024 to 2028, this quota will increase to 20 percent.

Until recently, the United States did not have a national policy on local content in the field of renewable energy. Previously, the United States restricted imports through the introduction of anti-dumping

and countervailing duties (AD/CVD). For example, on December 7, 2012, the U.S. Department of Commerce, through AD/CVD orders, imposed 30 percent import duties on crystalline silicon photovoltaic products (CSPV) from China.

However, some states that have tried to adopt a local content policy for renewable energy have rejected it as too expensive. California and Washington implemented FiT programs in the mid-2000s, which continue today, but Massachusetts, New Jersey and Ohio rejected their local content requirements for renewable energy after three years or less.

However, the \$1.2 trillion Infrastructure Investment and Job Creation Act (IIJA), signed by President Biden on November 15, 2021, does include basic requirements for domestic procurement of infrastructure materials, fulfilling the president's promise in 2020 to support U.S. industry through local content requirements.

The Law essentially prohibits the use of federal financial assistance for infrastructure if the iron and steel, industrial products, and building materials used in the project are not manufactured in the United States, although there are several exceptions. Exceptions include: (1) when the use of domestic products increases the total cost of the project by more than 25 percent, (2) when the application of the "buy American" policy would be incompatible with the public interest, and (3) when iron, steel, manufactured products and building materials produced in the United States are not in reasonable quantities or of unsatisfactory quality.

According to the Law, for solar and wind energy projects launched before 2025, preferential bonus credits are awarded if 40 percent of the project's resources are obtained from internal sources. This percentage will increase to 45 percent in 2026 and to 55 percent thereafter. In addition, the Biden's administration has also stated that it will seek to protect domestic producers by imposing countervailing or anti-dumping duties on imported renewable energy sources if trading partners use unfair subsidies or export products at a price below cost.

Thus, the researchers note that despite all their good intentions, local content requirements for renewable energy projects tend to increase costs, impede international competition, and increase investment risk and uncertainty by hindering rather than encouraging local production. If the goal of renewable energy policy is to make solar photovoltaic



and wind energy more affordable and widely used, local content requirements are an obstacle, not a solution³.

Then, we will consider in more detail several country cases on the promotion of local content policy on the example of Russia, Uzbekistan, Brazil and India.

THE EXPERIENCE OF THE RUSSIAN FEDERATION IN THE DEVELOPMENT OF LOCAL CONTENT FOR RES SECTOR

The Russian Federation is pursuing an industrial policy of import substitution. In particular, prices on the wholesale electricity market and the capacity of generating facilities operating on the basis of renewable energy sources depend on the qualification of the generating facility, which in turn depends on the degree of localization in the Russian Federation. Moreover, localization requirements are also imposed on participants in the retail renewable energy market (except for generation due to biomass, biogas).

³Hogan M., *Local content requirements threaten renewable energy uptake*, Peterson Institute for International Economics, 2021

Rules for determining the price of the capacity of generating facilities operating on the basis of renewable energy are approved by the Decree of the Government of the Russian Federation "On Mechanisms for stimulating the use of RES in the wholesale market of electric energy and capacity" No. 449 dated May 28, 2013 (DGRF- 449).

This Decree (DGRF 449) introduced the concept of "degree of localization" into the Rules for Qualification of Generating Facility based on the Use of RES, approved by Decree of the Government of the Russian Federation No. 426 dated June 3, 2008 (DGRF 426).

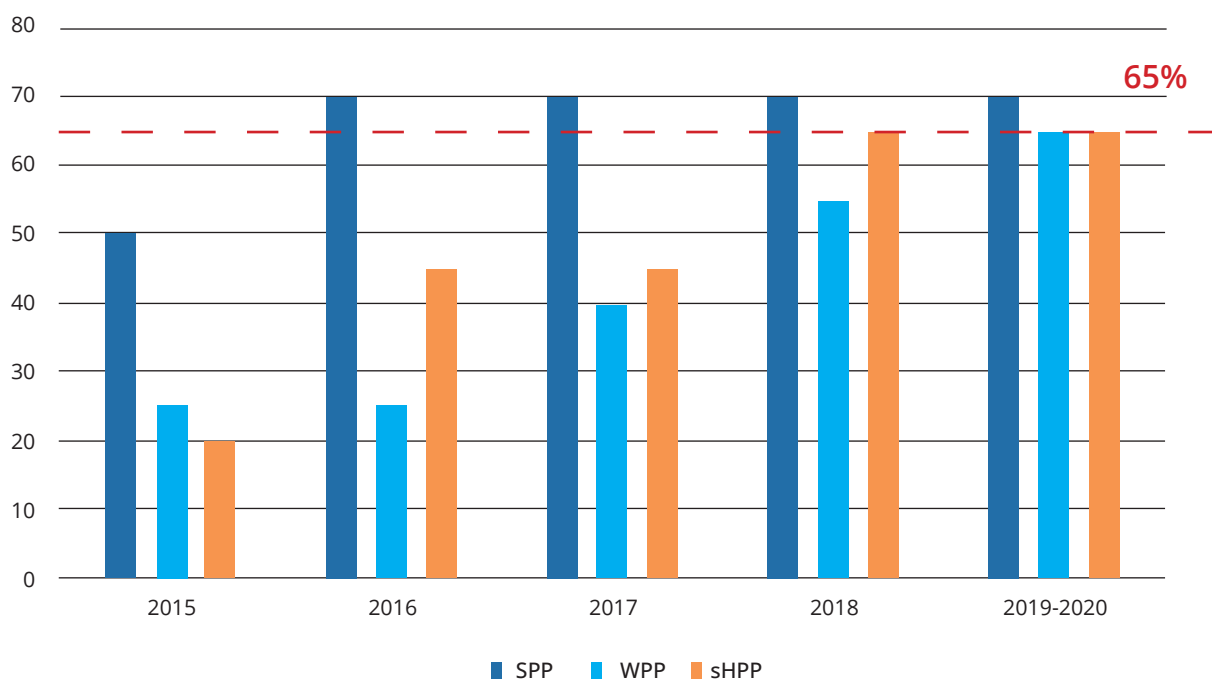
DGRF 426 determines which components and operations and to what extent contribute to the calculation of the degree of localization. The generating facility and its components (equipment) must be partially manufactured in Russia. In order to create economic incentives for development of production of basic and (or) auxiliary generating equipment used in the production of electric energy using renewable energy sources on the territory of the Russian Federation, targets are set for degree of localization of the production of basic and (or) auxiliary generating equipment used in the production of electric energy using renewable energy

sources on the territory of the Russian Federation. Since 2016, 70% of the generating equipment of solar power plants should be Russian-made. For wind power plants, the target localization rate is 55% in 2018 and 65% from 2019. For small hydroelectric power plants, the degree of localization is set at 65%. Failure to comply with them threatens the investor with a serious fine.

In general, it should be noted that the policy for development of RES in the Russian Federation is based on the principles of supporting local production⁴:

- involvement of innovative high-tech technologies and solutions in the energy sector and development of local production of high-tech generating and auxiliary equipment;
- transfer of innovative renewable energy technologies and creation of competencies in the field of design, construction and operation of renewable energy generation facilities;
- establishing effective cooperation between Russian industry and science with major international industrial companies;
- economic incentives for manufacturing the main and auxiliary generating equipment used in the production of

Requirements for degree of localization of RES equipment in the Russian Federation



Source: Decree of the Government of the Russian Federation "On main directions of state policy in the field of improving the energy efficiency of the electric power industry based on the use of renewable energy sources for the period up to 2035" dated 08.01.2009 No. 1-p

⁴Decree of the Government of the Russian Federation "On the main directions of state policy in the field of improving the energy efficiency of the electric power industry based on the use of renewable energy sources for the period up to 2035" dated 08.01.2009 No. 1-p

electric energy using renewable energy on the territory of the Russian Federation formed the basis of the policy in the field of development of generation based on RES;

– As an incentive for development of domestic production, the support program provides targets for degree of localization of equipment used in the construction of power plants.

Thus, in accordance with GDRF 449, the Concept of development of renewable energy sources in Russia focuses on local production of power plants (generating facilities). The degree of localization is a crucial prerequisite for ensuring an economically attractive price for supplied capacity, which is a barrier for foreign manufacturers to enter the renewable energy sector of the Russian Federation.

Requirements for localization of production of basic and auxiliary equipment used in the construction of generating facilities based on renewable energy sources (RES) have led to the creation of new high-tech engineering cluster for production of equipment components for solar and wind energy, the global demand for which is constantly growing.

The main manufacturers of generating equipment for SPP in Russia are: GC Hevel, Solar Silicon Technologies and HELIOS-Resurs. The following scientific and production companies can also be distinguished: Telecom-STV (Zelenograd), Ryazan Plant of Metal-Ceramic Devices (Ryazan), Saturn (Krasnodar), NPP Kvant (Moscow). Thus, the production of photovoltaic modules was established in Russia.

The wind energy industry is dominated by three participants: the Wind Energy Development Fund (joint investment fund created on a parity basis by PJSC Fortum and the RUSNANO Group), NovaVind (part of SC Rosatom) and Enel Russia. Each of these companies implements its own approach to the localization of equipment, each investor has chosen a technology partner (vendor) to implement the localization program. The country has launched the production of gondolas, blades and towers for WPP in cooperation with foreign companies Vestas and Siemens. However, it should be noted that due to the outbreak of war in Ukraine, these companies announced the closure of production in 2022.

The following enterprises also produce solutions for small HPP in Russia:

1) hydraulic power equipment (with unit capacity of up to 50 MW): PJSC "Power Machines" (also electrical equipment for HPP/PSPP), JSC "Tyazhmash" (including a subsidiary of ČKD Blansko Holding a.s.), JSC

"Uralgidromash", LLC "Voit Hydro", LLC "Ruselprom" (also electrical equipment for HPP/HPSP);

2) hydrogenerators (with unit capacity of up to 50 MW): Elektrotyazhmash-Privod LLC, PJSC NPO Elsib (also hydrogenerator excitation systems);

3) microhydroelectric power plants (with unit capacity from 0.01 to 5.6 MW): MNTO "INSET".

Rather strict requirements for local content, import substitution policy, the war in Ukraine and the withdrawal of a number of manufacturers from the Russian market are key factors in the low level of RES development in the country as a whole. As of January 1, 2023, the installed capacity of solar power plants in Russia amounted to more than 2.1 thousand MW, wind power plants are also 2.1 GW.

UZBEKISTAN'S EXPERIENCE IN DEVELOPING LOCAL CONTENT FOR RES SECTOR

Uzbekistan's experience in supporting local content for RES sector differs significantly from the Russian experience. The country has not followed the path of setting targets for local content. To date, measures to support renewable energy sources include: tax preferences for manufacturers of equipment and "generators" of RES, compensation for cost of purchasing equipment, subsidizing interest rates.

Thus, for example, RES plant manufacturers are exempt from paying all types of taxes for a period of five years from the date of their state registration. In addition, renewable energy producers and producers of RES plants are granted the right to create local networks (electric, thermal and/or gas) and conclude contracts with legal entities and individuals for sale of electric, thermal energy and (or) biogas produced from RES supplied through the local network⁵.

In order to support the widespread use of renewable energy sources, from October 1, 2022, individuals will be given the opportunity to purchase solar and wind power plants and solar water heaters manufactured in the republic, with payment in installments without interest for 3 years at the expense of the Extrabudgetary Inter-Sectoral Energy Conservation Fund under the Ministry of Energy. Consumers are also given the opportunity to pay in installments or deduct the amount of compensation from the final retail price when purchasing renewable energy installations directly from domestic manufacturing enterprises, enterprises providing delivery, installation and start-up services at domestic retail facilities, including through e-commerce tools⁶.

⁵The Law of the Republic of Uzbekistan "On use of renewable energy sources", Decree of the President of the Republic of Uzbekistan dated 22.08.2019 No.IIII-4422

⁶Decree of the President of RU "On additional measures for introduction of energy-saving technologies and development of low-power RES"



The "subsidiary" of the Kazakh company Renerca intends to invest over \$34 million in the project.

These measures made it possible to organize the production of equipment and components for RES sector in a short time. For example, Procab LLC has developed the production of specialized cables for solar panels. At the moment, the company is the first and only cable manufacturer in this field.

In Yangiyul, Tashkent region, the production of solar panels was launched in 2023. The plant has already been built, and equipment commissioning is currently underway on site. Enter Solar Green Energy will be able to produce 200 MW of equipment per year. This is 377.36 thousand solar panels. each panel produced at the factory will be designed for 540-560 watts. The company will operate around the clock.

SUN-HIGHTECH LLC is one of the largest professional manufacturers of solar photovoltaic plants in Uzbekistan. The company has developed a new technology for the production of solar modules based on the HJT heterojunction. The new generation modules combine the advantages of thin-film and crystal technologies. The efficiency of the cell is 23.5%, the power of the module is up to 340 watts.

Alutex, together with Proxima Energy, is launching the production of facade windows with integrated solar panels. Facade windows with solar panels are an innovative solution that makes it possible to receive electricity directly from sunlight. Such windows can be installed on the facade of the building. They can be used for both commercial buildings and residential buildings.

The "subsidiary" of the Kazakh company Renerca intends to invest over \$34 million in the project. With the participation of Renerca (Free Volt), up to 40,000 sets of solar cells will be produced per year. The company invests more than \$34 million in production.

MIR SOLAR LLC is a leading manufacturer of solar systems in the Republic of Uzbekistan. The company is engaged in production of photovoltaic plants for generating electric energy and solar water heating plants. Photovoltaic plants include solar panels developed and manufactured at the enterprise, electronic control units, which, at the customer's request, are equipped with rechargeable batteries and the most economical indoor and street lighting systems based on high-brightness LEDs.

Thus, tax preferences, coupled with programs to subsidize the purchase of domestic equipment, made it possible to launch production of generating and auxiliary equipment for RES sector (photovoltaic modules, solar collectors, solar cable, etc.) in a short time.

BRAZIL'S EXPERIENCE IN SUPPORTING LOCAL CONTENT FOR THE RENEWABLE ENERGY SECTOR

In Brazil, local content is not a prerequisite for participation in auctions and is not a criterion for evaluating bids. Local content requirements are necessary to obtain cheap financing from the BNDES National Development Bank as part of its Finem program⁷. The bank's financing is carried out in Brazilian reals, which eliminates high currency risks, since all electricity purchase agreements are denominated in local currency.

If the project uses equipment manufactured outside Brazil, such a project is not eligible for a loan from BNDES, which assumes interest rates half as low as those offered by commercial banks. BNDES offers concessional financing of up to 80% of the total cost of the project at an interest rate of 7-9% for up to 20 years. Between 2004 and 2018, BNDES accounted for more than 70% of the total debt financing of renewable energy projects in Brazil⁸. Thus, most of the wind farms in the country were implemented with the help of these requirements and financing from BNDES.

Thanks to these support measures, Brazil has developed a wind industry specializing in less technologically complex components such as blades, towers, bearings and castings – because they are

easier to produce locally and transport throughout the country. Thus, by 2016, the country had 8.7 GW of blade production capacity, of which the share of domestic companies was 79%.

At the end of 2016, local companies accounted for only 6% of the 1.6 GW gondola production market, which was divided between foreign companies: Enercon (Germany), Vestas (Denmark), GE (USA), and Siemens Gamesa (formerly Spain, now Germany, after the merger in 2016).

As for supporting the development of solar energy, it should be noted that since 2015, the sector as a whole has experienced difficulties with the supply of equipment, high financing costs and uncertainty about the demand for this type of energy in the future. In particular, in 2015-2017, there was a decrease in auctions for SPP in the country. In this regard, historically, uncertainty about the demand for photovoltaic energy in Brazil has meant that international suppliers have been reluctant to initiate production in the country. However, BNDES has developed local content requirements for SPP projects.

Currently, SPPs that plan to receive funding from BNDES must use PEM assembled in the country using metal frames produced in the country. Electronic components and metal structures must also be purchased from local manufacturers.

BNDES requirements for proportion of local content for wind power plants in Brazil

Stage 1 – January 2013.	Stage 2 – July 2013.	Stages 3-4 – 2014	Stage 5 – January 2015.	Stage 6 – July 2015.	Stage 6 – January 2016.
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They can be produced in the country or purchased from a local supplier

Tower	1 of 4 components: tower, blade, hub or gondola	70% steel, 100% cement	Internal components of the tower			At least 60% of the foundation
Blades			40%	50%	50%	60%

They must be purchased from local companies and assembled in the country

Hub	at least 1 of 4 criteria: tower, blade, hub or gondola	at least 1 of 4 criteria: tower, blade, hub or gondola	at least 2 of the 4 criteria: tower, blade, hub or gondola	at least 3 of the 4 components: tower, blade, hub or gondola	all 4 components
Gondola		Business plan for the plant	Plant is under construction. The equipment is ordered	Construction is completed. Equipment is installed. Gondolas are being assembled	All components are manufactured locally

Source: Bazilian M, Cuming V. Kenyon T, Local content rules for renewables don't always work, 2020

⁷Bazilian M, Cuming V. Kenyon T, Local content rules for renewables don't always work, 2020

⁸Abdulrasheed Isah, Michael O. Dioha, Ramit Debnath, Magnus C. Abraham-Dukuma & Hemen Mark Butu, Financing renewable energy: policy insights from Brazil and Nigeria, 2023

BNDES requirements for share of local content for SPP in Brazil

		Stage 1 – August 2014.	Stage 2 – January 2018.	3 – January 2020.
Modules (min. 36%)	Assembling	obligatorily		
	Metal frame	obligatorily		
	Power distribution box	optional	obligatorily	
	Cells	optional		obligatorily
Electronic components and metalwork		Local content share - 20%		
Inverter		optional	Local content share - 20%	

Source: Bazilian M, Cuming V, Kenyon T, *Local content rules for renewables don't always work*, 2020

It should be noted that the requirements for local content for solar energy did not have a proper impact on development of the local content market due to uncertainty about the volume of auctions for SPP in 2015-2017. Despite the fact that the Government has prepared new auctions for the sun, BNDES predicts that they will not help form the local photovoltaics manufacturing industry.

INDIA'S EXPERIENCE IN DEVELOPING LOCAL CONTENT FOR RES SECTOR

In India, the demands for local content and the desire

to form a domestic renewable energy manufacturing industry were at the center of the National Solar Mission. This initiative aimed at providing 20 GW of grid-connected solar parks in India by 2022 in order to create "favorable conditions for development of production facilities for solar energy and achieve an established annual production capacity of 4-5 GW by 2020.

At first stage of program (2010-12), the rules of local content applied only to crystalline silicon technologies, but at the second stage (2013-2017), project developers had to use locally produced photovoltaic systems to participate in "DCR" (domestic content requirement) auctions held within



the framework of the National Solar Mission. Alternatively, they could participate in the "Open" category, where local content requirements were not applied, or in both types of auctions by submitting separate bids.

In 2016, conflict arose between the United States, supported by the WTO, and India that the local content requirements under Stage 1 and 2 break international trade rules and constitute unfair competition with

respect to imported cells and modules.

The Government of India has been instructed by the WTO to remove local content requirements from RES auctions. Over the next 2 years, the United States repeatedly stated that India had not complied with the WTO decision and asked for retaliatory measures. As a result, the last auctions with local content (DCR) were held in December 2017.

Local Content Requirements for DCR Auctions in India as part of the National Solar Mission

National Solar Mission			
		Stage 1 (2010-2012)	Stage 2 (2013-2017)
SPP (PV)		30% local content	
	Silicon	1: Locally produced modules, cells can be imported 2: Locally produced modules and cells	RES auctions with local content (DCR): locally produced modules and cells Open auctions: no requirements
	Thin-film	Can be imported	

Source: Bazilian M, Cuming V. Kenyon T, *Local content rules for renewables don't always work*, 2020

Local content requirements as part of the "Make in India" order

2019 – present		
SPP (PV)		
	Network	for modules – 100%, other components – 40%
	Non-network	70%
WPP		80%
sHPP		80%
Biomass		80%
Solid waste		60%
Waste to Energy		80%

Source: Bazilian M, Cuming V. Kenyon T, *Local content rules for renewables don't always work*, 2020

At the same time, it is noted that even within the framework of auctions, the winners preferred to buy thin-film modules, since they were cheaper and accompanied by cheap financing. It was also difficult to compete with Chinese imports due to low prices.

In December 2018, the Ministry of New and Renewable Energy (MNRE) approved an order to launch a new "Make in India" program for public procurement in the clean energy sector. The order applies to renewable energy projects proposed by the federal government, ministries and quasi-public sector enterprises" (companies in which the federal government owned at least 51% of the

shares). The required share of local content should vary depending on the technology: 100% of solar modules for grid-connected power plants and 70% for autonomous/decentralized solar projects.

The Make in India order was implemented through the CPSU program, according to which government organizations should hold auctions for 12 GW by 2022. In parallel, the PM Kusum program was launched with a budget of 5 billion US dollars for the installation of solar water pumps for farmers, where the requirement was to use locally produced equipment.

National certification program has also been



launched, requiring that any manufacturer wishing to sell WPP turbines in the country must have a quality certificate for their equipment with a local assembly unit and an operation and maintenance (O&M) team. This was done to deter Chinese companies from opening production facilities in India.

After the announcement of the launch of the program, domestic manufacturers such as Adani Solar have already announced that they intend to expand the capacity for production of cells and modules. Developers of RES projects without local capacity may have to enter into deals with local suppliers or build their own facilities. Some Chinese companies are expected to accelerate their plans to manufacture modules and cells in India. For example, Longy Green Energy has announced plans to build a plant for production of cells (500 MW) and modules (500 MW)

Before the start of the program, the country had already developed the production of components for WPP. Large domestic and international turbine manufacturers had production and assembly lines in India and received most turbine parts from local suppliers, as production costs were low and transportation of large parts was expensive.

CONCLUSION

Today, the auction market for selection of RES projects attracts private domestic and foreign investors, the process of their internal procurement activities is unregulated by the state. Each investor independently gives preference to one or another equipment manufacturer, based on the main indicators of its financial model, because at auctions the decisive factors are the lowest price and the proposed amount of installed capacity.





Alua Amirbekova,
Unicase Partner



Raushana Chaltabayeva,
Unicase Partner



REGULATION OF WASTE IN KAZAKHSTAN: BASIC PERMITS

Waste is one of the main environmental problems, carrying potential hazards to human health and the environment. The dynamic population growth rate in major cities of Kazakhstan, increased consumption levels, and the rising number of legal entities lead to constant growth in the volumes of municipal and industrial waste. Furthermore, undeveloped legal regulation aggravated the situation in waste management.



Waste is one of the main environmental problems, carrying potential hazards to human health and the environment. The dynamic population growth rate in major cities of Kazakhstan, increased consumption levels, and the rising number of legal entities lead to constant growth in the volumes of municipal and industrial waste. Furthermore, undeveloped legal regulation aggravated the situation in waste management.

Starting in 2021 changes have been taking place in the field of waste management by development of more detailed regulations and

increased requirements for waste generators. The main novelty of the environmental legislation is the principle of "polluter pays and rectifies." According to the "polluter pays" principle, waste generators are responsible for ensuring compliance with environmental requirements for waste management until such waste is transferred to the possession of entities engaged in waste recovery or disposal operations.

In connection with the tightening of environmental legislation, private individuals, international financial institutions and

Under Article 106 of the Environmental Code, individuals or legal entities may only carry out negative impacts on the environment after obtaining an environmental permit.

investors are reaching out to us in terms of obtaining permits related to waste management or waste disposal.

Different types of permits are required for each entrepreneur depending on the sphere of activity. However, for informational purposes, we describe the most common type of permit.

The most common and universal type of permit is an environmental permit, which determines the environmental requirements for waste generation. According to the environmental code, operators of facilities categorized as I and (or) II, due to their significant negative impact on the environment, must possess environmental permits and relevant documentation related to waste management.

Under Article 106 of the Environmental Code, individuals or legal entities may only carry out negative impacts on the environment after obtaining an environmental permit. The Environmental Code distinguishes between environmental impact permits and comprehensive environmental permits. Obtaining an integrated environmental permit for Category I facilities is mandatory from 1 January 2025.

Having an environmental impact permit is mandatory for Category I and II facilities. An environmental permit is not required for activities related to the construction and operation of Category III and IV facilities unless they are located within the industrial site of a Category I or II facility and are technologically linked to it. Category III facilities must submit an environmental impact declaration to the local executive body of the relevant administrative-territorial unit.

An environmental permit includes a waste management program, emission standards into the environment, and limits on waste accumulation.

• **Standards of Environment Emissions:** Emissions into the environment must comply with emission standards developed to prevent violations of environmental quality standards. Emission standards are calculated and justified in a distinct document known as the emission standards project, which is developed in connection with the relevant project documentation for the facility operation.



Emission standards are set for the duration of the environmental permit. Emission standards are not established for Category III and IV facilities. Emission volumes into the environment exceeding the emission standards established by the environmental permit are considered excessive.

• **Waste Accumulation Limits:** Individuals and legal entities operating enterprises, buildings, structures, facilities, and other waste-related objects are required to develop waste placement standards projects to reduce their quantity. Waste accumulation limits and burial limits are established for Category I and II facilities based on the corresponding environmental permit.

• **Waste Management Program:** An integral part of the environmental permit is the waste management program. Operators of Category I and (or) II facilities, as well as individuals performing sorting, and processing, including neutralization, recovery, and (or) disposal operations, are obliged to develop a waste management program. The waste management program must contain information on the volume and composition of waste generated and (or) received from third parties, methods of accumulation, collection, transportation, neutralization, recovery, and disposal, as well as a description of proposed measures to reduce waste generation, increase the proportion of their reuse, recycling, and disposal. The waste management program for Category I facilities is developed taking into account the need to use the best available techniques.

It should be noted, that exceeding the emission standards limits and waste accumulation limits established by the environmental permit are considered excessive and shall be fined under the Administrative Code of the Republic of Kazakhstan. For instance, submitting an inaccurate declaration of environmental impact shall entail a fine in the range between one hundred and fifty to one thousand monthly calculated indexes depending on the size of the legal entity. While for violating waste accumulation or burial limits shall entail a fine in the amount of ten thousand percent of the waste burial fee rate for the quantity of waste accumulated or buried beyond the established limit.



**THE LIST OF PERMITS IS NOT EXCLUSIVE AND
REQUIRES AN EXTENSIVE AND CAREFUL APPROACH
WHEN PERFORMING ACTIVITIES IN KAZAKHSTAN
IN CONNECTION WITH WASTE TRANSPORTATION,
REUSE, RECYCLING, DISPOSAL, ETC.**

DEVELOPMENT OF RENEWABLE ENERGY SOURCES

as a key instrument for decarbonization of industry in Kazakhstan

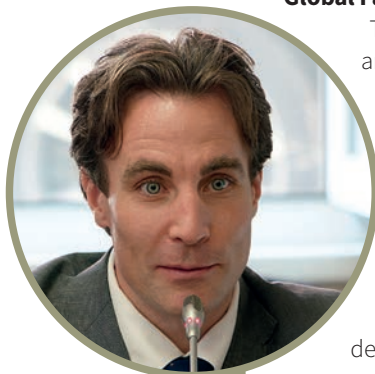
Global Factor, an international team of experts dedicated to offering innovative solutions for global green transformation, recently conducted a visit to Kazakhstan. During their visit, the experts engaged in a series of meetings with representatives from both the public sector and private enterprises. Their objective was to assess the influence of the climate agenda on the Kazakh economy and to gauge the country's preparedness for the energy transition.

In an exclusive interview with Qazaq Green, the specialists from Global Factor shared their insights into low-carbon development and elaborated on the outcomes of their endeavors in Kazakhstan.



QG: What results does GIZ expect from the dialog between industry and decision makers? What specific questions will be addressed in the sectoral study on industry needs during the decarbonization period?

Craig Menzies, Head of the Department of Energy, Global Factor Consulting:



The dialog between industry and decision makers in Kazakhstan is expected to support the development of processes, methodologies and instruments for long-term decarbonization planning. It will develop products that show industrial actors and market players that decarbonization interventions are economically viable and attractive.

It will propose solutions that shield those companies from key risks within an international context of rapid decarbonization.

This is necessary for the integration of climate and economic transformation targets with significant potential for sustainable and climate neutral development. Kazakhstani industry (and the metal production sector) needs to be aligned with the country's forthcoming updated NDC. Kazakhstan is aiming to become climate neutral by 2060.

The sectoral study will deal with topics such as the use of renewable energy sources in the industry and the options for decarbonization for the players in the metallurgic sector.

The study will provide pathways for metallurgy sector decarbonization without decreasing Kazakh companies' competitiveness. It will look at aspects such as the effect that CBAM (the Carbon Border Adjustment Mechanism) introduced in the EU will have on metallurgical sector companies' exports, for example.

The project will also consult widely with sectoral actors and stakeholders, and will integrate their needs as regards decarbonization interventions, and will assess the barriers, concerns, and ways to overcome these.

QG: Why is the transition to green energy so important for Kazakhstan's industry and what specific decisions do the country's authorities need to take to decarbonize industries?

Alex Bologa, Global Factor Consulting:

The Government of the Republic of Kazakhstan has set a goal of achieving the share of renewable energy sources up to 15% in the electricity generation structure by 2030. Potentially, by achieving this goal, the amount of greenhouse gases will be reduced by almost 8 million tons.

The main problem of the energy sector in Kazakhstan is that a large percentage of the installed generation capacity consists of morally and physically obsolete coal power plants dating back to the Soviet era. For the production of electricity from renewable energy sources, the country has "raw materials": wind and solar radiation as natural energy carriers. But there is no mass production of means of generating electricity from them. In order for wind energy and renewable energy sources to become a competitively dominant sector of the economy, not only conditions are needed in the form of raw materials and sales markets, but also industries related to the generation, transport and sale of electricity, many enterprises united in clusters and creating an added value chain from design to final product and even environmentally friendly processing of exhausted RES elements. With this approach, the price of components for renewable energy facilities can be reduced due to the effect of scaling production.



To develop the renewable energy industry in Kazakhstan, it is necessary to solve a set of problems:

1. Creation of regulatory mechanisms regarding the connection of new renewable energy facilities to the energy system and the order of priority for the supply of electricity.
2. Development of the legislative framework and establishment of competitive tariffs for green electricity.
3. Solving the problem of balancing capacities for renewable energy sources will accelerate the growth of the share of renewable energy sources in the structure of electricity generation in Kazakhstan.
4. Development of own technologies and infrastructure for the production and maintenance of solar and wind generation facilities, as well as environmental disposal and processing of spent technical resources of renewable energy sources.

QG: Svevind Energy Group will build a green hydrogen plant in Kazakhstan. How does green hydrogen differ from other types of hydrogen and what challenges are predicted in terms of production, transportation and use?

Abdul Qader, Global Factor Consulting:

- Green hydrogen is produced by splitting the water molecule by the process of electrolysis, where the energy is supplied from renewable energy source of sun, or wind, or hydro, or biomass, or in combinations.

Hydrogen can also be produced by the synthesis of fossil fuels (coal, petroleum and natural gas).

- Grey Hydrogen is produced from fossil fuels, mainly from natural gas, using steam methane reforming (SMR) process. Currently this is the widely practised route.

- Brown Hydrogen is produced from coal gasification.

- If Grey or Brown hydrogen is accompanied by CCS, it is termed as Blue Hydrogen. But CCS is complex and expensive.

So, the Green Hydrogen is the only hydrogen which is completely emission free and the cleanest option for climate change measures.

However, green hydrogen has three challenges associated with its production process:

- It's electrolysis process is an expensive process, which needs more R&D investment to reduce its cost,
- It requires a lot of power and water, and also
- Requires significant investment in renewable energy infrastructure, to produce the necessary electricity.

Hydrogen Transport

Green hydrogen is transported either in gaseous or liquid state or transforming it into ammonia or methanol or dimethyl ether using pipeline or tanks or ships.

The challenges for each transport option are given below:

1. Though liquid state can handle high volume, but it must be cooled to cryogenic temperatures (below -253°C) through a liquefaction process. Liquid tankers and ships need to be designed to handle liquid hydrogen at that temperature.
2. Maintaining hydrogen purity through transports
3. Hydrogen transportation and distribution pose specific issues in terms of safety. It's wide flammability range, and the limited amount of energy needed to ignite it, all represent barriers to safe use.
4. With the development of hydrogen as an



alternate fuel, a reliable and efficient hydrogen transportation network is essential.

Use of Hydrogen

The use of hydrogen is widespread. Apart from its traditional use in industrial processes such as in chemical manufacturing [like ammonia, methanol, and Dimethyl ether (DME) productions] and steel manufacturing, hydrogen-powered vehicles/fuel cell electric vehicles (FCEVs) are commercially available now and will increase in volume every year ahead. It can be used to generate electricity, power industry, and heat our homes and businesses.

The challenges in uses are:

1. Lack of hydrogen infrastructure and lack of its high-volume production prevent its extensive use,
2. Fuel cell-powered vehicles are expensive now, which requires R&D investment to lower the cost,
3. Implementing its widespread use in practice.

QG: Increasing adaptation to climate change is a priority for development and an economic necessity. What role can international cooperation and sharing of best practices play in helping Kazakhstan prioritize investments in climate change adaptation and ensure long-term economic resilience?

Dana Yermolyonok, Project Manager for CDCP III project in Kazakhstan:

Drawing on international best practices is crucial when implementing changes, especially in the context of climate adaptation. Many countries, including Kazakhstan, face similar challenges and are experimenting with various strategies to cope with climate change and its effects.

There is much we can learn from their experiences. It's important to recognize that adaptation is a process rather than a static set of actions. We must clearly understand how the measures we adopt reduce climate-related risks.

As climate-related disasters become more frequent, the need to adapt to our changing environment becomes ever more apparent. Regular climate risk assessments should be integrated into standard and routine long-term planning processes, we need to consider the impacts of climate change on our plans and investments just the same way as we evaluate the impact of global economic situations or crises. To conclude, international cooperation and the sharing of best practices are vital in helping us collectively address future challenges. 





International cooperation on adaptation is highly beneficial. It allows us to share best practices, navigate new approaches, and join forces.

One of the projects currently being implemented by GIZ is focused on the economic assessment of the impact of climate change on the economy of Kazakhstan. We have developed a macroeconomic model e3.kz, which allows us to see in which sectors the impact is maximum and where investments in adaptation measures will bring the greatest benefits.

It is important to remember that any decarbonization efforts should also take into account climate risks. If you want water-based renewable energy sources, do you correctly assess the long-term availability of water resources in the context of climate change? And what will the water situation be, for example, for cooling your thermal power plants? Perhaps it would be more profitable to build underground power lines somewhere that would not be damaged during storms? Long hot periods, so-called "heat waves", have a strong impact on energy demand – and there are many such examples.

In general, increasing the resilience of infrastructure – roads, pipelines – to climate change is one of the key issues globally today. Long-term climate forecasts show that there will be more and more extreme weather events.

International collaboration on adaptation is essential. It enables the exchange of best practices, exploration of new methods, and a collective effort to address issues.

One of the current GIZ projects focuses on economic modeling and assessments of the impacts of climate change on Kazakhstan's economy. The macroeconomic model, e3.kz, developed by this project, helps identify which sectors are most affected and where investments in adaptation measures are most beneficial.

It's also crucial to incorporate climate risks into any decarbonization efforts. For example, if you are considering hydro-based renewable energy sources, have you thoroughly evaluated the long-term availability of water resources in a changing climate? What about the water supply for cooling your thermal power plants? Perhaps underground power lines would be more effective and feasible in areas prone to storms? Extended periods of heat, known as "heat waves," significantly influence energy demand – this is just one of many examples.

Ultimately, enhancing the resilience of infrastructure – such as roads and pipelines – to climate impacts is a critical global issue. Projections indicate that extreme weather events will become more frequent in the future.

Global Factor is an international team of experts specializing in providing global, innovative, and sustainable solutions in areas such as climate change mitigation and adaptation, energy transition, green growth, climate finance, circular economy, and carbon markets.



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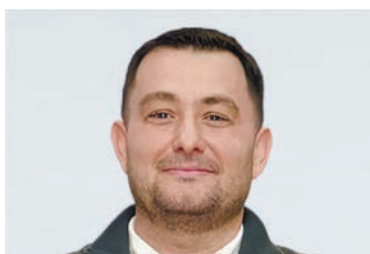
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ASSOCIATION AS INFORMATIONAL RESOURCE

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.



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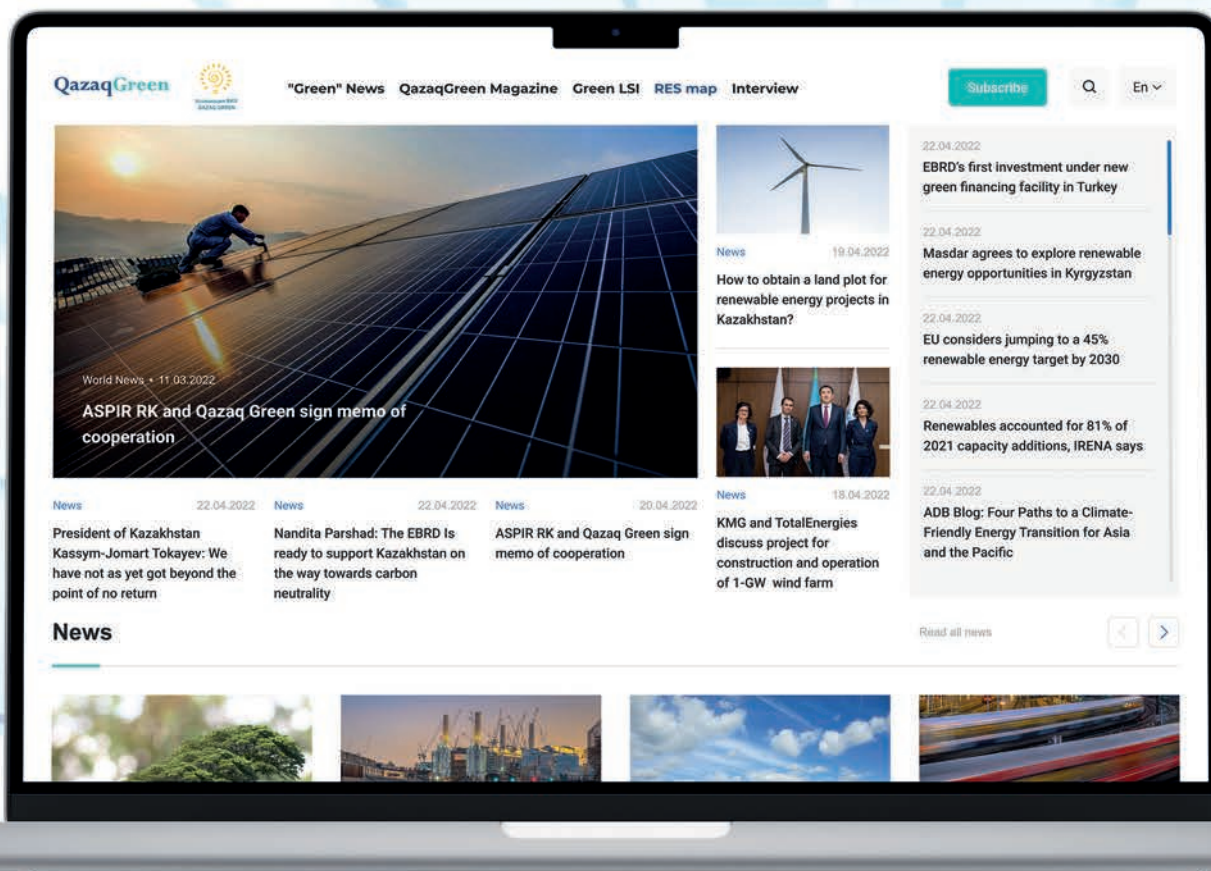
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Qazaq Green has launched information portal on "green" economy of Kazakhstan



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
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