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SUSTAINABLE DEVELOPMENT:

Kazakhstan and Central Asia


QAZAQ GREEN
UNITED PLATFORM
for Kazakhstan and international players
in the field of renewable energy sourses
AIM – SECTOR CONSOLIDATION
to bring together actors in the field of renewable energy sourses
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
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NURLAN KAPENOV

Chairman of the Board of Directors QAZAQ GREEN RES Association

Dear readers, Dear friends!

As is commonly known, a number of important documents have been developed in the industry today, such as the Concept for the Development of Fuel and Energy complex of the Republic of Kazakhstan until 2030, the Projected energy balance until 2035, the issues of the development of the electric power industry have been included in the National Project "Sustainable Economic Growth aimed at improving the welfare of Kazakhstanis". The Ministry of Energy of the Republic of Kazakhstan has recently developed a draft Concept for development of the electric power industry of the Republic of Kazakhstan until 2035.

As experts, we can state that above documents are lacking economic calculations and models for the development of the industry. There was no cross-sectoral approach and interdepartmental interaction during development of the documents. Moreover, we think that Carbon Neutrality Strategy 2060 to be developed by the RK Government according to the instruction of the President cannot be developed without a strategic vision for the development of the electric power industry, since the role of the energy sector in achieving “net zero” is very significant.

In this regard, Qazaq Green took the initiative to develop a Strategy for the development of the electric power industry of the Republic of Kazakhstan. To this end, on November 22, 2021, we held a round table on: "The current situation in the electric power industry of Kazakhstan: challenges and solutions." Following the results of this round table, request was sent to the President of the Republic of Kazakhstan K.K. Tokayev on the need to develop such a document. In April 2022, Qazaq Green has signed a Memorandum of Understanding on development of Strategy for Development of the Electric Power Industry of the Republic of Kazakhstan with the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. As of today, Qazaq Green, together with the Kazakhstan Electric Power Association, under the auspices of the Presidential Administration of the Republic of Kazakhstan and the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, held a number of kick off meetings on strategy development.

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

In our opinion, the Strategy should determine the key principles and mechanisms for ensuring the energy security of the Republic of Kazakhstan in the period of up to 2060, as well as provide the results of economic modeling of the development of the industry, which will include tariff policy in the field of electricity and heat supply in the period of up to 2035 to ensure infrastructure investments in the industry.

The Forecast Balance approved by the Ministry of Energy of the Republic of Kazakhstan until 2035 can be taken as a basis for calculation of economic models. Yes, stakeholders have a lot of questions about this document. However, we must state that today this is the only document in the industry that demonstrates the structure of generating capacities for the medium term. At the same time, according to the systemoperator, the generation structure displayed in the balance sheet "adds up" to annual and daily schedules of electricity generation. It means that with such a generation structure, the UES of the Republic of Kazakhstan will operate in a stable mode. Practically the same principle works here that "physics" is primary.

Unfortunately, there is no other balance yet. Ideally, of course, we need such a balance until 2060 in light of achieving the goal of carbon neutrality. However, such a long planning period depends on a large number of factors – the development of new technologies, geopolitics, availability of resources, socio-economic development, etc. In this regard, Qazaq Green suggests that the Ministry of Energy of the Republic of Kazakhstan develop such a Forecast Balance until 2060, with a mandatory requirement for its monitoring and revision every 5 years. Such a measure will give more confidence to market players in the future of the industry.

Today we hear many different opinions about Strategy development. There is a large number of protogonists and like-minded people, consisting of representatives of government agencies, international organizations, traditional stations, and the RES business community. But there are also those who oppose the development of Strategy. I am very glad that there are a minority of them. However, I would like to note that such a conservative view "nothing is needed, everything is already there, the main thing is not to touch the power system" has led to the current sad condition of the industry. Qazaq Green does not agree with this opinion, because we believe that our industry needs a strategic vision, sustainable development, transformation and reforms.

Qazaq Green expresses confidence that the development of the Strategy for Development of the Electric Power Industry of the Republic of Kazakhstan will provide a clear vision that will take into account the interests of the government, business and population and will propose new initiatives and reforms within the framework of the priority action plan for development of the electric power industry for short and medium-term prospects.

We take this opportunity to invite all interested parties to discuss and develop solutions as part of the work on this document at Qazaq Green platform.

Climate does not respond to what people, companies or governments say, it reacts to what they do

M-R MARCO ALBERTI,
Ambassador of Italy
to Kazakhstan

WELCOME SPEECH OF MARCO ALBERTI, AMBASSADOR OF ITALY TO KAZAKHSTAN

In May 2019, the Mauna Loa Observatory, located in Hawaii, recorded an amount of CO_2 in the atmosphere of 415 parts per million, a level of carbon dioxide concentration equal only to that assumed in geological eras prior to the advent of human beings. The data recorded by the Loa Observatory , indeed, are comparable only to those hypothesized in the Pliocene, a geological era between 2.5 and 5 million years ago, when average temperatures were 2-3 ° C above the current ones. The decade 2010-2019 was the hottest in history since there are reliable records of the average surface temperature of the Earth and the planet keeps heating.

The climate crisis represents one of the main threats to people's health, but also to the political-institutional, economic and social stability of countries and entire areas of the planet. The WHO estimates more than 7 million premature deaths in the world every year due to the same emissions responsible for climate change, almost seven times the inhabitants of Nur-Sultan and more than the victims caused so far by Covid-19. The World Bank foresees over 200 million climate migrants by 2050, while the “NATO 2030 Report” classifies the climate crisis as one of the main causes of insecurity and instability for the countries of the Alliance. Finally yet importantly, a sick planet represents a multiplier of the economic risk, as significant climatic variations affect the transmission channels of monetary policy, influence the work of financial intermediaries and determine the emergence of new threats to the monetary policy of central banks. Hence the growth of environmental, social and governance (ESG) indicators as a tool for assessing government policies and company performance, as well as the use of these metrics to quantify the ability of companies to create long-term value. Nor surprisingly BlackRock, the largest asset management company in the world with over $ 7,000 billion in assets, has declared that it no longer wants to invest in companies with high environmental risks.

Today, compared to the past, global influence depends on "transversal" revolutions, such as the digital and the energy revolutions. Both have turn inseparable, since both are essential to de-carbonize. The fight against climate change, for example, has become a reference element to design national and international policies; a strategic axis to revive or re-design alliances (especially the multilateral ones), promote more sustainable growth and pursue a rebalancing of power. At stake is the future of humanity, but together with this, also global leadership in a strategic sector like climate, in which huge economic resources and extremely advanced technologies converge. Climate policies and technologies reshape business models and change the same concepts of competitiveness and global power. The geopolitical derivative of such scenario is that the environment can be a ground of collaboration or, vice versa, of confrontation. This will depend, largely, on the choices of the players involved. The 2015 Paris Agreement offered an unprecedented platform for relaunching multilateral dialogue on a global issue like climate protection. At the same time, however, the "race to green" has relevant policy implications and, additionally, requires a different use of natural resources, reallocation of production factors, radical changes of pattern that can exacerbate competition.

We live in a transformative time. Delaying decisions will only lead to more problems, and those problems will require more decisions. Regarding the energy transition, three considerations are particularly important.

The first: targets are not enough. Everyone agrees on the urgency of adopting more sustainable models of growth; yet, climate ambition requires precise and long-term choices, a lot of collaboration and adequate resources to convert commitments into projects, develop new industrial supply chains and limit the destabilizing impacts of the transition. Climate does not respond to what people, companies or governments, say. Climate responds to what people, companies or governments do, through tangible actions. All countries face the challenge to adopt a well-designed strategy, based on projects (concrete), players (skilled), resources (abundant) and partnerships (at both national

and international level). Italian companies are here in Kazakhstan to accompany the energy transition of the country, according to the priorities outlined by its government. In March, Eni-Arm Wind inaugurated the Badamsha-II, second half of a 96 MW wind plant in Aktobe, and one 50MW PV solar plant is under construction in the Turkestan region. Italy is a European top performer in many indexes of circular economy, like recycling, and we have more than 440 thousands SMEs that have invested in green products and technologies over the last five years[1]. Most of them are competitive, innovative, internationalized. We will help them catch the opportunities offered by the "new Kazakhstan".

Second consideration: renewables are not enough. As said, a sick planet is an economic and financial risk. Investors are well aware of that and bet on countries, companies and projects with a high index of environmental, economic and social sustainability. In 2021, renewables accounted for 70% of the $530 billion invested globally on energy generation[2]. Yet, even if renewables bring investments and contribute to cut emissions, they are not the silver bullet of the transition. The ecological transformation does not end with a diversification of the generation mix. It also requires greater demand-side management; massive processes of electrification and decentralization; infrastructure digitalization; the involvement of a range of new energy actors, and demand for new energy inputs, such as critical minerals. According to IRENA (International Renewable Energy Agency), by 2050 33 trillion US$ of additional investments are required into efficiency, renewables, end-use electrification, power grids, hydrogen and innovation[3]. Each of these changes infers a need to re-think how the energy system is designed and how it affects geo-politics and geo-economics. Without flexible, digitized electric grids, for instance, countries cannot achieve de-carbonization targets and move quickly from a carbon-intensive economy to a more efficient, cleaner one. De-carbonizing the system requires a transformation in the way societies generate, transport, distribute and consume energy.

A third consideration: governments are not enough. The fight against environmental degradation, and the creation of a net-zero society, first require the vision of the public, but also ideas, skills and resources of the private sector. De-carbonization is a shared challenge, not only a governmental responsibility; its success depends on the ability (and availability) to create multi-stakeholders platforms and orchestrate their action. Today, what countries need is not simply flows of investments, but innovative blending of capitals, supported by an enabling convergence of policies, strategies and regulatory frameworks to modernize the system, scale-up climate investments, accelerate the low-carbon transition. Moving this way will require an unprecedented level of investment, particularly in the form of green finance. A new public-private alliance is required, since no government alone will be able to provide all the resources necessary to accelerate its own transition. In this regard, partnerships with development banks play a key-role. The solid, long-standing cooperation with the EBRD, for example, is helping, and will help, Kazakhstan to achieve its de-carbonization goals faster and more effectively. From this point of view, the Astana Financial Days, organized by AIFC in Nur-Sultan at the end of June, provided interesting insights. Among those, the need to enhance ability of the financial system to mobilize private capitals for green and sustainable investments. Additionally, the importance to develop new financing tools, like green bonds, and - particularly – the innovative sustainability-linked bonds, to match potential investors with the green financing requirements and to help mobilize capitals in the scale required.

As the world is heating up, any country faces a dual challenge: scaling up climate action and managing the potential disruptions following from the energy transition. The current geopolitical tensions emphasize one of the messages sent last year at Glasgow: the future is green, but visions on the transition are different. Even under the most aggressive climate change policies, evidence show that the world will continue to use oil and gas for some time, and for sure until 2050. Empowering the early winners of the green transition is good and desirable, but we should also focus on risks related to the potential disruption resulting from a (too) rapid transition. In response to that, governments and international organizations, should make any possible effort to link low-carbon transition with foreign and security

policy, as they did with oil and gas in the past decades. The EU pays a special attention to the importance of balancing these two aspects. Fit for 55, for example, commits the EU to cutting emissions by at least 55% by 2030, an intermediate step towards climate neutrality by 2050. On one side, Fit for 55 stands as an opportunity to accelerate the green race. On the other side, yet, it recalls the importance to promote a fair transition, trying to make it fast, but also just.

As for diplomats, from now on we should consider the transformative impacts of the green revolution on geopolitics. We still ignore what the energy geopolitical map will look like in 30 years, but we already know that pursuing net-zero society requires managing three transitions at a same time: digital, ecological and geopolitical. Digitalization boosts the green race, and, in turn, digital and ecological transformations affect geopolitics and geo-economics, reshaping the concepts of power and influence; the relations between States; the concept of alliance and the economic dispute or convergence of developed/developing countries. In such new scenario, we face two, overlapped "geopolitics of energy": the traditional one and the transitional one.

[1] *Source: Symbola - https://www.symbola.net/ricerca/italia-in-10-selfie-2022/*
[2] *Source: IEA - https://www.iea.org/reports/world-energy-investment-2021/executive-summary*
[3] *Soure: IRENA - World Energy Transitions Outlook 2021 - https://irena.org/newsroom/pressreleases/2021/Jun/IRENAs-World-Energy-Transitions-Outlook-Re-Writes-Energy-Narrative-for-a-Net-Zero-World*

QUOTES

“In June, the moratorium on the increase in energy tariffs ended. Taking into account the high wear and tear of equipment and the need to prepare for the heating season, we can expect an increase in tariffs. This issue should be approached in a balanced way, avoiding a sharp jump and excluding any excess margins of companies. It is extremely important to provide support to socially vulnerable segments of the population. The government needs to switch to a proactive format of social support, making it more targeted...

We should not forget about the existing deficit of energy capacities. According to the energy balance plans, this year we had to commission more than 1 gigawatt of capacity. However, several projects have been put on hold. Only 31% of the planned capacity (347 MW) will be commissioned this year.

During the energy shortage, such rates are unacceptable. I hope that the government understands this phenomenon. Strengthening of the electrical network of the Southern and Western zones of the unified energy system of the country is also progressing at an insufficient pace. Currently, work on the Western zone is only 10% completed. It is necessary to take all measures for the timely implementation of projects. The energy security of Kazakhstan depends on this progress.”

WE SHOULD NOT FORGET ABOUT THE EXISTING DEFICIT OF ENERGY CAPACITIES.

Kassym-Jomart Tokayev,
President of the Republic of Kazakhstan
Speech at an expanded meeting of the Government of the Republic of Kazakhstan
July 14, 2022.

Source: akorda.kz

QUOTES

«The global energy system is broken and bringing us ever closer to climate catastrophe. Fossil fuels are a dead end — environmentally and economically. The only sustainable future is a renewable one. We must end fossil fuel pollution and accelerate the renewable energy transition, before we incinerate our only home... Transforming energy systems is low-hanging fruit. Renewable energy technologies such as wind and solar are readily available and in most cases, cheaper than coal and other fossil fuels. Over the past decade, the cost of wind energy has declined by more than half. The cost of solar energy and batteries has plummeted 85 per cent. And investment in renewables creates jobs — three times more jobs than fossil fuels... It's time to jump-start the renewable energy transition before it's too late».

Antonio Guterres
UN Secretary-General
Remarks at the launch
of the World Meteorological Organization's State
of the Global Climate 2021 report
May 18, 2022

Source: media.un.org

OVER THE PAST DECADE, THE COST OF WIND ENERGY HAS DECLINED BY MORE THAN HALF.

Polymetal will develop renewable energy in Kazakhstan

Kazakhstan has embarked on the development of renewable and alternative energy. The President of the Republic of Kazakhstan stated that the RES ratio in the total electricity generation in the country by 2030 must be at least 15%. For these purposes, the Government of the Republic of Kazakhstan has developed the Energy Balance until 2035; and it is also developing a Strategy to achieve net-zero emissions by the Republic of Kazakhstan by 2060. Today, 139 renewable energy facilities with an installed capacity of 2,180 MW operate in the republic, which generate 3.69% of the country's electricity.

However, the current active development of renewable energy sources has exposed the problems accumulated in the electric power industry over decades. One of the key problems in the electric power industry of the Republic of Kazakhstan is the shortage of power cycles, i.e., such stations that, at the command of the System Operator in the event of deviations in electricity generation, could take part in the alignment of imbalances and regulation in the Unified Electricity System of the Republic of Kazakhstan in a short period of time. The shortage of power cycles leads to the need in organization of flows from the energy systems of neighboring countries, the volume of which today is 10 times higher than the allowable range.

In order to solve the task of developing RES, as well as solving the problems of imbalances in the energy system, for the first time in our country, the gold mining company Polymetal and the Qazaq Green RES Associations will implement a comprehensive project involving the construction of two solar power plants with a total installed capacity of 39.6 MW and one gas engine mobile station with an installed capacity of 40 MW to cover the unstable generation of solar stations. The project will be implemented in the Abay and Kostanay regions within five years and will provide more than 80 MW of clean electricity per year. The total investment will be more than $90 million.

The Ministry of Energy of the Republic of Kazakhstan and KEGOC JSC will support the implementation of this project. To this end, on July 14, during the 60th meeting of the CIS Power Council in Nur-Sultan, a quadripartite memorandum was signed between the Ministry of Energy, Polymetal Eurasia LLP, KEGOC JSC, and Qazaq Green RES Association ALE. The document establishes the responsibility of each party to fulfill their obligations as part of the construction of new generating capacities.

"Polymetal follows a sustainable development strategy, including high standards in the field of environmentally friendly production. One of the company's goals is to reduce emissions by 30% by 2030 compared to 2019 levels, as well as to achieve 7% of total electricity generation from renewable sources by 2025. In this regard, the projects planned for construction will be the key to reducing carbon footprint of the company," said Kanat Dosmukametov, General Director of Polymetal Eurasia LLP.

"The project planned for construction is unique in that, on the one hand, we are developing renewable energy sources and building new solar stations; and on the other hand, understanding the instability of the generation of renewable energy sources, we are helping the country's energy system to introduce new flexible capacities that will help solve the problem of imbalances and reduce dependence on flows from neighboring states. In this sense, such a project is the first in the history of the electric power industry of Kazakhstan," said Nurlan Kapenov, Chairman of the Board of Directors of the Qazaq Green RES Association.

FOR INFORMATION ONLY: Polymetal is one of the leaders in the recovery of precious metals with assets in Russia and Kazakhstan. It is included in the top 10 gold mining companies in the world. Polymetal's shares are traded on the London and Moscow stock exchanges, as well as on the exchange of the Astana International Financial Center – Astana International Exchange (Kazakhstan). It includes ten active gold and silver mines, as well as a high-quality portfolio of development projects.

Qazaq Green RES Association was founded in 2018 to support the development of the renewable energy sector in Kazakhstan. This company brings together investors, developers and equipment manufacturers, as well as international financial institutions, research and design institutions. The Association is accredited by the Ministry of Energy of the Republic of Kazakhstan, the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan and the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" and is currently one of the key expert centers for the development of renewable energy in Kazakhstan.

The third climate dialogue was held in Kazakhstan

The Scientific and Educational Center "Green Academy" together with the Ministry of National Economy of the Republic of Kazakhstan, KAZENERGY, AMME with the support of the EU delegation, EBRD in Kazakhstan held the Third Climate Dialogue in a hybrid format (off/on-line) on August 18, 2022 in the city of Nur-Sultan on the topic "Priorities and mechanisms of the Strategy for achieving carbon neutrality of the Republic of Kazakhstan until 2060". The event was attended by over 100 representatives of government agencies (MNE, MEGNR, MIID,ME, MIT, MES), international financial institutions (World Bank, EBRD, ADB, Islamic Bank) and organizations (CICA, UNDP, US Embassy in Kazakhstan, GIZ, EY, EGA, NCOC), business (KMG, Samruk-Energo, Kazakhmys, AMT, Kazatomprom, Kostanay Minerals, etc.), National Chamber of Entrepreneurs of the Republic of Kazakhstan «Atameken», KEA, Chamber of Energy Auditors and Energy Experts of the Republic of Kazakhstan and other associations and NGOs.

The welcoming speech was delivered by K.Ibrashev, General Director of KAZENERGY, M. Madalinsky, Deputy Ambassador of the EU Delegation, and N. Radostovets, Executive Director of AMME.

The moderator of the dialogue was a member of the Council for Green Economy under the President of the Republic of Kazakhstan, Director of the REC "Green Academy" B.Yessekina.

The meeting participants discussed the draft Strategy for achieving Carbon Neutrality of the Republic of Kazakhstan until 2060, prepared by a group of national experts, which was presented by the Deputy Chairman of the Board of the Institute of Economic Research of the Ministry of National Economy of the Republic of Kazakhstan – K. Beysengazin. Proposals for the Strategy

were made by the Deputy Director of the EBRD, Regional Head of the Department of Energy Resources, Eurasia, Middle East and Africa E. Ramazanov on the bank's policy in the field of low-carbon development. Proposals in the field of decarbonization of the fuel and energy complex were made by Acting Chairman of the Board of Samruk-Energo JSC S.Tutebayev, Executive Director of KAZENERGY M.Kalmenov, Executive Director of the Qazaqreen Associations T.Shalabayev, Director of the Department of Low-carbon Development of NC Kazmunaygas R.Zhampiisov. The issues of attracting climate investments were presented by the Director General of the GFC A.Kazybayev.

During the discussion, the participants of the Dialogue approved the structure, general approaches, principles, and sectoral policy of the presented document. At the same time, the speakers noted the need to finalize the document regarding the definition of target indicators in the field of reducing hydrocarbon production and the timing of their achievement, in the field of improving climate incentives, tariff regulation and carbon pricing.

It is planned that this document, after completion, will be submitted to the Government as a document of the highest level of the current state planning system of Kazakhstan

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Have BEM - no problems!

In mid-July, the Ministry of Energy of the Republic of Kazakhstan presented a draft concept of the law "On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on Issues of Heat and Power Industry".

The main message of this document is aimed at launching a balancing electricity market (BEM) in a real mode, which until now has existed in a simulation mode for 13 years. The peculiarity of the BEM operation in the simulation mode is that all costs for imbalances in the UPG of the Republic of Kazakhstan, admitted by any market participant, are distributed to all its participants, that is, there is an even distribution of responsibility of certain market participants to all market participants at once. In this case, everyone pays the average price in proportion to the sum of their consumption and their generation, regardless of whether large or small, significant or insignificant imbalance was allowed. The authors of the draft document note a number of factors that negatively affect the energy system:

- lack of financial responsibility for created imbalances (deviations of hourly actual volumes of production and consumption of electric energy from hourly planned values);
- lack of economic incentives for balancing among market entities, leading to the lack of interest of

these entities in the optimal planning of the schedule for the production and consumption of electricity and participation in covering deviations;

- increasing volumes of deviations of subjects of the electricity market of the Republic of Kazakhstan;
- significant deviations of the actual balance of electricity flows at the border with the energy system of the Russian Federation from the planned values (with an allowable range of 150 MW, the volume of deviations is 1,500 MW).

As the renewable energy sources (RES) being developed in the country today, which are unstable and do not bear any responsibility for their imbalances, have already reached such a volume in terms of capacity that about 10% of all daily deviations in the energy system of the Republic of Kazakhstan occur in the evening due to such sources. It is noted that this upward trend in the negative impact of the renewable energy on the energy system of the Republic of Kazakhstan continues to persist, as the introduction of renewable energy from year to year is growing. Considering target indicators until 2030, the situation will be even more difficult. As a result, according to the developers of this document, the BEM introduction in a real mode will solve the problem of imbalances in the energy system of the Republic of Kazakhstan. In addition, created mechanism for the financial settlement of imbalances will allow plants with a maneuverable generation mode to work effectively in the power system.

Certainly, from the point of view of the RES stations' functioning in the energy system, Qazaq Green has always advocated improving the quality of forecasting electricity generation and increasing the responsibility of RES facilities. However, it is necessary to understand that BEM is, first of all, a market mechanism, designed by an economic method to increase the responsibility of market entities in terms of generation and consumption of electricity.

In addition, there are infrastructural problems in the energy system, which put forward the thesis that "physics" is still primary, and economic methods are secondary. First of all, I mean the problem of obsolescence of generating capacities and the growth in the volume of emergency repairs. Thus, in terms of the growth rate of accidents, the results for 2021 exceeded the volumes for the previous year by 6%. We all remember the alarming messages of the system operator in November 2021, when 1,150 MW of power was in the emergency repair at the key generating facilities of the country and regional CHPPs.

It is also unsatisfactory with scheduled repairs, which at the beginning of the autumn-winter period had capacities that worked 2–4 times more than the established standards. For example, in November, power unit No. 2 at the Ekibastuzskaya GRES-2 with a capacity of 500 MW was under scheduled repair (it worked for 12,304 hours without taking it out for repairs with an annual operating standard of 6,570 hours); power unit No. 7 at the Ekibastuzskaya GRES-1 with a capacity of 500 MW (worked without withdrawal for repair 25,968 hours with an annual work standard of 6,570 hours).

We believe that without solving these problems, UPG of the Republic of Kazakhstan, even when BEM works in real time, will continue to experience difficulties, since a set of problems in the domestic energy system requires not only market and organizational solutions, but also infrastructure investments.

However, so far neither traditional energy market players, nor potential investors in gas generation, nor large renewable energy companies are ready to make serious investments due to the lack of clear signals from the government about the future fate of the electric power industry as an industry, lack of a strategic vision for the development of the industry and, importantly, lack of a predictable electricity tariff policies. As a result, taking into account the current situation in the industry and all internal and external risks, there is a big problem of ensuring the energy security of our country.

Huawei has joined the Qazaq Green RES Association

According to the decision of the Board of Directors of Qazaq Green Renewable Energy Association ALE, the representative office of the world-famous Huawei company in Kazakhstan was accepted as a member of the Association.

Huawei provides its services and sells high-quality products worldwide. One of the company's priority areas is development of solutions for solar energy, including the production of high-quality solar inverters and intelligent systems to monitor the operation of solar power plants. Huawei network inverters are used for switching photovoltaic power generating stations with a unified power grid. Huawei network inverters are designed based on the company's own patented technologies, which provides high performance at a reasonable price.

In addition, Huawei offers solutions in the field of energy storage systems – one of the most promising segments of renewable energy development in our country. Due to reduction in the cost of energy storage systems and introduction of technical innovations, the market of battery energy storage systems undergo a boom in all corners of the world and its further growth is expected. Kazakhstan faced with the need to develop energy storage systems in the light of the challenges of developing renewable energy and the problem of a shortage of balancing capacities.

"Our participation in the Qazaq Green Renewable Energy Association is primarily aimed at spreading the knowledge, approaches, and technical solutions that Huawei has accumulated over decades of its research and innovation activities. Our main goal of participation in development of renewable energy in the country is to improve competencies and apply necessary technological products in Kazakhstan in the light of global trends in the electric power industry, such as decentralization and digitalization" - Zhao Xu, CEO of Huawei in Kazakhstan.

"Our Association has been cooperating with Huawei for a long time, and we know them as reliable partners representing modern technological solutions for further development of renewable energy in our country. The industry is currently facing a serious issue: "What technical requirements are necessary for the introduction of energy storage systems?" We hope that Huawei's active

participation in the work of the Association will allow all interested parties to find an answer to this question," – commented Nurlan Kapenov, Chairman of the Board of Directors of Qazaq Green RES Association.

Huawei is a leading global supplier of infocommunication and infrastructure solutions, as well as smart devices. Its main areas of work include telecommunications networks, information technology, smart devices and cloud services, and Huawei strives to make digital technologies accessible to both businesses and end users, thereby approaching the creation of an intelligent, perfect world of communication.

Products, solutions and services presented in Huawei's comprehensive portfolio are highly reliable and competitive. Through open cooperation with ecosystem partners, Huawei creates commercial potential for its customers, expanding the range of their capabilities.

Huawei allocates a significant part of its investments to fundamental research that contributes to global progress. The company employs more than 195,000 employees in more than 170 countries around the world. Huawei is a private company founded in 1987. It is completely owned by employees.

▶ More detailed information can be found on the website: https://huawei.com/kz /

Arm Wind has become a member of Qazaq Green Renewables Association

Arm Wind LLP, a subsidiary of Plenitude (in turn 100% owned by Eni), that has been implementing renewables projects in Kazakhstan, has decided to join Qazaq Green Renewables Association as part of its development strategy to achieve the carbon neutrality and key climate goals in synergy with Kazakhstan renewable and decarbonizationtargets.

'Arm Wind aims not only at the implementation of renewable energy projects in Kazakhstan under its

decarbonization strategy, but it is also committed to support the improvement of the renewable energy policy of Kazakhstan and the application of the industry best practices . To that end, the cooperation with the expert community through Qazaq Green Association represents the perfect way to find joint solutions for further development of the renewable energy sector in the Country' noted Mr. Alex Stillavato, Managing Director of Arm Wind LLP.

'We are very pleased to cooperate with Arm Wind on green energy development and have enthusiastically accepted their request for membership in our association. It is symbolic that companies like Eni from conventional energy sectors are increasingly concentrating on renewable energy sources. We are confident that we will boost the sector's development with such members in Qazaq Green' mentioned Mr. Nurlan Kapenov, Chairman of the Board of Directors of Qazaq Green RES Association.

Arm Wind launched its first renewable energy project in the Republic of Kazakhstan in March 2020 and started the commercial operation of a 48 MW Wind Farm near Badamsha settlement in Aktobe Oblast, with an annual electricity generation of about 195 GWh ensuring CO_2 emissions reduction by 172,000 tons per year. In March 2022, the company held the inauguration of the Badamsha-2 Wind Farm with an additional installed capacity of 48 MW. To date, the wind turbines of Badamsha-2 Wind Farm are the largest ones ever installed in Kazakhstan, both by size (rotor diameter is 158 meters, hub height is 101 meters) and capacity (4.8 MW each).

Furthermore, in March 2021, Arm Wind also set to build a 50 MW photovoltaic power plant near Shaulder settlement, Turkestan Oblast, in the South of Kazakhstan.

These projects are being implemented in line with the company's full-scale course to energy transition, and they will also contribute to Kazakhstan's goal of carbon neutrality. Arm Wind LLP will carry out Plenitude's renewable energy strategy aimed at achieving a balanced and diversified portfolio of renewable energy projects with a total installed capacity of more than 6 GW by 2025 and above 15 GW by 2030.

Eni has been present in the Republic of Kazakhstan since 1992. Eni is a participant of joint operations in the Karachaganak field and a shareholder in various North Caspian projects, including the giant Kashagan field. In 2018, Eni began joint operations on the Isatai and Abai exploration blocks, together with KazMunaiGaz national company. The same year Eni acquired Arm Wind LLP with the aim to expand its operating portfolio to renewables projects. Today Arm Wind LLP is a subsidiary of Plenitude (in turn 100% owned by Eni) and all the three renewables' projects of the company in Kazakhstan are operated by Arm Wind. The company is also set to search for new development opportunities in the renewables sector in the Country.

LONGi Solar joins Qazaq Green Renewables Association

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

This Chinese giant solar company has dedicated itself to technology innovation and established five business sectors, covering mono silicon wafers, cells and modules, commercial and industrial distributed solar solutions, green energy solutions and hydrogen equipment. The company has honed its capabilities to provide green energy and has, more recently, also embraced green hydrogen products and solutions to support global zero carbon development.

In 2021, LONGi achieved wafer shipments of 70.01GW, and shipped 38.52GW of mono-crystalline modules. And the company's global sales performance, market share and brand influence ranked it first in the world, with its total shipment volume of domestic and exported modules exceeding the second place by more than 10GW.

In 2022, LONGi plans to increase the shipment for wafers and modules to 90-100GW (including for internal use) and 50-60GW (including for internal use), which will inject strong impetus into the development of renewable energy around the world. In order to better promote the energy transition in the world, especially in Central Asia, LONGi applied to join the Qazaq Green RES Association.

"We are very much interested in Kazakhstan market. The great target for renewable energy has been set up and the programme for the same has been launched. We, LONGi Solar, are ready to support on the same with our best technology and products. We hope that our participation in the Qazaq Green RES Association will enable us to better understand the market and will guide us to the right direction to success!" said Alex Lee, general sales manager of LONGi Solar.

"Kazakhstan is one of the leaders in the development of renewable energy sources in the region. Currently, there are 139 renewable energy facilities operating in the country with a total installed capacity of 2,180 MW. Of these, 53 facilities are solar power plants with a capacity of 1,148 MW. Forecast balance up to 2035, more than 6 GW of RES capacities are planned to be commissioned. This year alone, the Ministry of Energy of the Republic of Kazakhstan plans to hold auctions with a total capacity of 690 MW, of which 60 MW for solar power plants. Therefore, the interest in our country and the Qazaq Green RES Association from the world's giants for the production of generating equipment for solar power plants, such as LONGi Solar, is natural. We will be happy to work with LONGi Solar in this direction," said Nurlan Kapenov, Chairman of the Board of Directors of Qazaq Green.

Headquartered in Xi'an, China, the company has its Marketing & Sales Center located in Shanghai and has also sales offices in Japan, India, Australia, Europe, the U.S., Brazil, andthe Middle East. Focusing on the research and development, production, sales and marketing of monocrystalline silicon products, LONGi Solar is committed to providing the best LCOE solutions, as well as promoting the worldwide adoption of monocrystalline technology.

Ministry of Energy of the Republic of Kazakhstan initiated a number of changes in legislation on RES

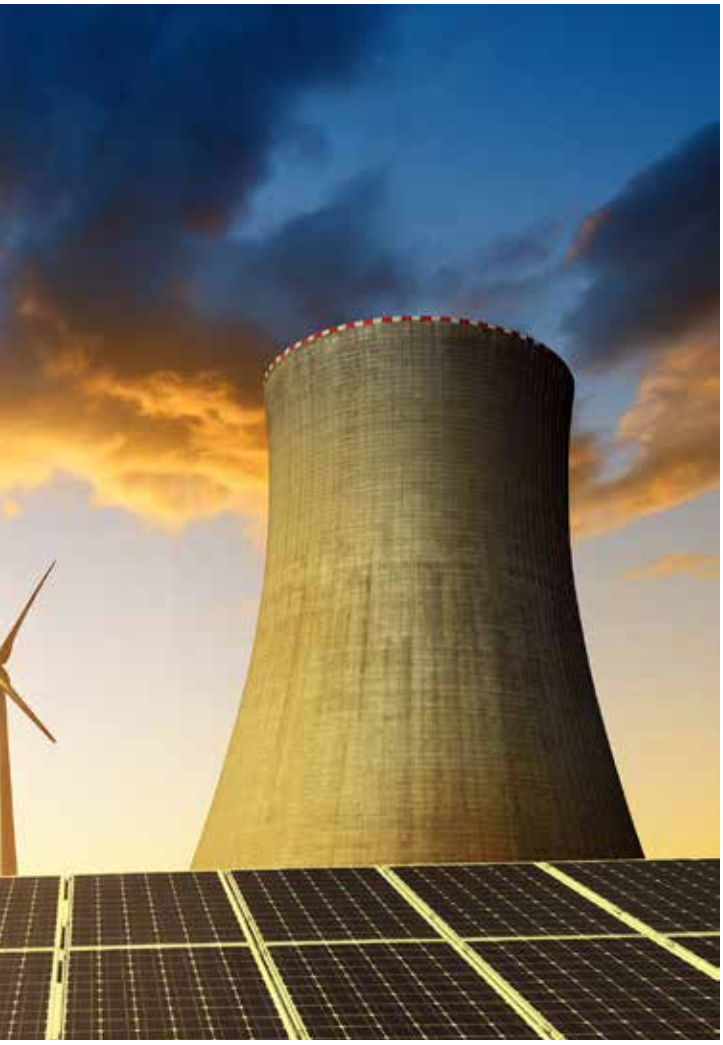
This spring, at the Qazaq Green site, the Ministry of Energy of the Republic of Kazakhstan discussed topical issues of the development of renewable energy in Kazakhstan with the participation of representatives of the association members: the business community, international, and financial organizations. Based on the results of these discussions, the Ministry launched draft amendments to a number of legal acts regulating the development of renewable energy sources.

The draft regulatory legal act "On Amendments and Additions to the Resolution of the Government of the Republic of Kazakhstan No. 271 dated March 27, 2014, "On Approval of the Rules for Determining Fixed Tariffs and Limit Auction Prices" involves the determination of Threshold Auction Prices at the level of fixed tariffs, approved by the Decree of the Government of the Republic of Kazakhstan No. 645 dated March 27, 2014. June 12, 2014.

- SPP– 34.61 KZT/kW*h
- WPP– 22.68 KZT/kW*h
- BioPP – 32.23 KZT/kW*h

This initiative is in line with the instruction of the head of state dated March 2, 2022, regarding the improvement of the regulatory framework in order to stimulate large renewable energy projects.

At the same time, according to the LSI draft "On Amendments and Additions to the Decree of the Government of the Republic of Kazakhstan No. 645 dated June 12, 2014 "On Approval of Fixed Tariffs", the Ministry of Energy of the Republic of Kazakhstan



proposed to determine a fixed tariff for the hydrodynamic energy of water in the amount of 41.23 KZT/kW*h. Such a measure will stimulate investment activity at auctions for HPPs and is designed to overcome one of the main problems associated with the implementation of HPP projects - the low marginal auction price (15.2 KZT/kWh).

In addition, amendments to the Decree of the Government of the Republic of Kazakhstan No. 271 dated March 27, 2014 "On Approval of the Rules for Determining Fixed Tariffs and Threshold Auction Prices" involve a number of initiatives aimed at improving the indexation mechanism:

- introduction of a one-time indexation for the construction period from the purchase agreement date and until the start of the electricity supply from renewable energy sources to the settlement and financial center for projects based on the results of tenders from January 1, 2022;
- possibility to choose the indexation mechanism once during the life cycle of the RES project either for the consumer price index or for the change in the exchange rate of the national currency to the US dollar;
- taking into account changes in the exchange rate and CPI by 100% as of October 1 compared to October 1 of the previous year.

Qazaq Green expresses confidence that all these measures will contribute to the creation of a more favorable investment climate in the renewable energy sector.

Amendments were also initiated to the LSI "On Amendments to the Rules for Organizing and Conducting Auctions, including qualification requirements for auction participants, content and procedure for submitting an application, types of financial security for an application for participation in the auction and conditions for their introduction and return, procedure for summing up the results and definitions of winners approved by the Order of the Minister of Energy of the Republic of Kazakhstan No. 466 dated December 21, 2017".

The proposed changes relate to the time of the trading session, as well as the price change step. Thus, according to amendments, paragraph 32 of the LSI draft is planned to be worded as follows: "During the main time - 30 (thirty) minutes of the trading session - the price change step is at least 5 (five) tiyn per 1 (one) kilowatt-hour, from the period time of prolongation of the trading session by 5 (five) minutes, the price change step will be at least 50 (fifty) tiyn per 1 (one) kilowatt-hour."

Qazaq Green encourages interested organizations and companies to follow the changes in LSI on RES on official sources ("Open LSIs") and invites them to discuss the issues at the association site.

Calculation of property tax for RES plants

> ***Qazaq Green RES Association ALE represents the interests of investors implementing investment projects in the field of renewable energy sources in the Republic of Kazakhstan.***

Kaliya Khissamidinova,
Chief Financial Officer – Member of the Board of Directors of Qazaq Green Renewable Energy Association

ALE RES Association "Qazaq Green" represents the interests of investors implementing investment projects in the field of renewable energy sources in the Republic of Kazakhstan.

The renewable energy sector is currently concerned that despite the approved National Fixed Assets Classifier of the Republic of Kazakhstan (FAC), which provides for the division of plants in the field of renewable energy into a group of "machines and equipment" and "structures", which allows paying the annual property tax on the group of "structures", the tax authorities of the Republic of Kazakhstan when conducting tax inspections express a position of disagreement with this classification and insist that renewable energy facilities should be recognized as structures in full. This means that the annual payment of property tax must be calculated from the total cost of renewable energy facilities.

It is worth noting that the main cost of renewable energy plants is generating equipment (about 60-65%), therefore, an increase in property tax will lead to the default of implemented projects due to the insolvency of renewable energy facilities. For example, a solar power plant includes solar panels, inverters, transformers, junction boxes, etc., which are equipment, not structures. Accordingly, this equipment is not subject to inclusion in the tax base for calculating property tax.

Disputes over the classification of generating equipment of the plants began several years ago. Due to a lot of appeals from business entities due to incorrect classification of tax payments, and as a result, significant monetary consequences, on behalf of the Minister of Finance of the Republic of Kazakhstan dated March 4 and March 17, 2020 No. 17-12/3612, state bodies and interested parties began work on making clarifying changes to the FAC.

The essence of the issues in relation to generating equipment was that the original version of the FAC allowed for a certain double interpretation.

Since January 1, 2021, as part of the execution of the above-mentioned order, Amendments No. 1 to the FAC (Amendments) have been put into effect, according to which clarifying formulations have been introduced for various positions, including explanations to some FAC codes have been changed for the purpose of eliminating double interpretation of the FAC. All types of equipment for generating and converting electrical energy are clearly and unambiguously assigned to the section "Machinery and equipment".

Thus, the correctness of the logic of renewable energy plants was confirmed, in which generating equipment was classified as equipment and was not subject to property tax.

However, in practice it turns out that the tax authorities are still inclined to the interpretation of the FAC, according to which all equipment of renewable energy plants is classified as "structures". In our opinion, if the position of the tax authorities of the Republic of Kazakhstan is adopted, further development of the renewable energy industry is not possible due to the economic inexpediency of projects for all market participants.

Investors and financial institutions that have invested in existing renewable energy facilities did not foresee in their financial models a significant outflow of funds to pay property tax in an amount that will increase several times. After the inevitable default of existing renewable energy facilities due to cash shortages and inability to service long-term loans, the demand

for the construction of new renewable energy facilities will decrease.

The Ministry of Energy of the Republic of Kazakhstan and other interested state bodies of the Republic of Kazakhstan managed to significantly reduce the tariff for electricity from renewable energy facilities by holding auctions. In case of an increase in property tax, potential investors will not be interested in investing in renewable energy facilities at auction rates.

Participation in auctions will be accompanied by a demand for an increase in the tariff in order to compensate for additional property tax expenses. As a result, the renewable energy market may stagnate, the targets for the development of the renewable energy sector in the Republic of Kazakhstan will not be achieved, and stakeholders will lose confidence and interest in the industry as a whole, considering that long-term investments are risky.

In this regard, we believe that it is necessary to take into account the opinion of the RES business community, and make a decision that will allow us to develop a unified law enforcement practice of state revenue bodies for classification of electric energy generating and converting equipment as "Machines and Equipment" of FAC in order to prevent the requirements of the authorities for additional taxes on such equipment for RES stations.

According to the request of the Renewable Energy Association "Qazaq Green" and Kazakhstan Electricity Association, this issue was put up for discussion by the State Commission on the Modernization of the Economy of the Republic of Kazakhstan. Following the results of the meeting of the commission held on July 13, the Prime Minister of the Republic of Kazakhstan A.A. instructed the Committee of Technical Regulation and Metrology of the Ministry of Trade and Integration of the Republic of Kazakhstan, together with the Ministry of Energy of the Republic of Kazakhstan to submit an agreed conclusion on classification of energy generating and converting facilities as equipment or structures with an evaluation of the socio-economic effect.

Qazaq Green will continue to keep in touch with these state bodies to resolve the issue of taxation of energy-producing organizations.

In addition, it should be noted that within the framework of the implemented initiatives of the Renewable Energy Association "Qazaq Green" following the results of the International Business Festival "Solar Fest – 2019", renewable energy projects were included in the list of the priority investment projects and according to the provisions of the Entrepreneurial Code of the Republic of Kazakhstan, investment priority projects are subject to tax preferences: 100 % reduction in the amount of assessed CIT, the application of 0 coefficient to the land tax rates, assessment of property tax at the rate of 0 percent to the tax base. To obtain preferences, it is necessary to contact the authorized investment authority.

KAZAKHSTAN'S PROSPECTS FOR ACHIEVING CARBON NEUTRALITY

The pace of the global energy transition, as well as the implementation of the Paris Agreement aimed at keeping the temperature change no higher than 1.5 °C, has slowed down due to the changed geopolitical situation. At the same time, the decisions of the UNFCCC Bonn Conference[1] held in June this year, as well as the EU Environment Ministers' Conference[2], demonstrated commitment to climate policy and readiness to implement COP-26 measures (Glasgow Pact).

An example of decisive action and global cooperation in the field of adaptation to climate change was launched at the platform in Glasgow, the so-called coalition of pioneers that unites companies with supply chains in carbon-intensive sectors[3]. It includes representatives of large consumer goods and transportation companies, as well as companies engaged in renewable energy sources and using steel for construction of wind turbines. Currently, the Coalition unites more than 50 companies from nine countries (Denmark, India, Italy, Japan, Norway, Singapore, Sweden, the United Kingdom and the USA), which account for more than 40% of global GDP and 30% of global emissions. Companies with a combined market value of more than $8.5 trillion on five continents have demonstrated their willingness to commercialize new environmentally friendly technologies by committing to zero-carbon technology purchases by 2030 in six sectors: carbon dioxide removal; aluminum; aviation; shipping; cargo transportation; steel.

Many countries, including those in the top 10 world leaders in hydrocarbon production, are making efforts to justify new ways to decarbonize their economies by developing and updating national strategies and plans for their implementation (Table 1).

B.K. YESSEKINA
Member of the Green Economy Council under the President of the Republic of Kazakhstan, Director of the scientific and educational center "Green Academy", Doctor of Economics, Professor

For example, China plans to achieve carbon neutrality by 2060 by accelerating the development of renewable energy, strengthening control over energy consumption, green transformation of industry, urban

[1] *Source: https://unfccc.int/SB56*
[2] *Source: https://www.consilium.europa.eu/en/meetings/env/2022/06/28/*
[3] *Source: https://www.weforum.org/first-movers-coalition*

construction, transport, agriculture and regions. According to the country strategy presented in October 2021, the country plans to reach a peak in carbon dioxide emissions by 2030 and then begin the transition to carbon neutrality.

Table 1. Overview of long-term low-emission development strategies of producing countries

Country	Date of delivery	Purpose	Sectors	Approaches
Australia	29.10.2021	Reducing emissions by 35% by 2030 and carbon neutrality by 2050 while simultaneously growing the economy and jobs	Energy; Transport; Buildings; Agriculture; Forestry and other land use.	1. Technology instead of taxes – no new costs for households or businesses; 2. Expanding the choice of energy sources; 3. Reducing the cost of new energy technologies; 4. Reducing energy prices with affordable and reliable energy; 5. Responsibility for progress – transparency is necessary to achieve goals.
Germany	17.11.2016	Reduction of emissions by 80-95% compared to 1990	Energy; Buildings; Transport; Agriculture; Forestry and other land use.	1. Focus on technological neutrality and openness to innovation; 2. Renewable energy sources and energy efficiency - the standard for investment.
Canada	17.11.2016	80% reduction in emissions compared to 2005.	Energy; Forests; Agriculture; Waste.	1. Electrification; 2. Energy efficiency is the key to achieving a significant reduction in greenhouse gas emissions; 3. Some industries will switch to fuels with lower carbon content, including second-generation biofuels or hydrogen; 4. Combating greenhouse gas emissions other than CO_2 is a priority; 5. Behavioral changes will be taken into account; 6. Canada's forests and lands will continue to play an important role in gas capture; 7. Innovation will be crucial; 8. Cooperation will be important.
China	28.10.2021	Achieve peak CO_2 emissions by 2030 and achieve carbon neutrality by 2060.	Energy; Industry; Transport; Agriculture.	1. Accelerate environmentally friendly and low-carbon transformations in the industrial sector; 2. Actively promote changes in energy production and consumption; 3 .Comprehensively promote "green" and low-carbon development of urban and rural construction; 4. Accelerate the development of low-carbon transport system and will actively expand the use of electricity, hydrogen energy, natural gas and modern liquid biofuels in transport; 5. Include sustainable use of natural resources in policy; 6. Create and improve legal and institutional systems.

Netherlands	11.12.2020	Reduce emissions by 95% by 2050 compared to 1990	Buildings; Industry; Transport; Forestry and other land use.	1. Transformation of the energy system; 2. Long-term approach in all sectors; 3. Work on an attractive perspective for all stakeholders; 4. Be adaptive, keeping up; 5. Intensification of cross-border cooperation.
Norway	25.11.2020	Reduction of emissions by at least 50% and up to 55% by 2030 compared to 1990.	not defined	1. Adapt to the new situation where the country no longer has oil and gas resources 2. Direct support for technology development is provided; 3. Setting the price of emissions–ETS; 4. Taxation; 5. Laws are adopted to regulate issues.
USA	01.11.2021	Reduction of emissions by at least 80% by 2050	Energy; Transport; Buildings; Industry; Forestry and other land use.	1. Decarbonization of electricity; 2. Electrification of end users and transition to other clean fuels; 3. Reduction of energy loss. 4. Reduction of methane and other products other than CO_2; 5. Scale CO_2 removal.

The European Union countries, which were among the first to present Low-Carbon Development Strategies (2016-2021) to the UNFCCC, despite rising prices for traditional energy carriers, are gradually tightening national emission reduction obligations (NDC) and requirements for importers of carbon products. As is commonly known, the list of goods subject to the border carbon tax (CBAM), starting from 2023, includes products of ferrous and non-ferrous metallurgy, chemical industry, building materials and other industries with a large carbon footprint. From 2026, it is planned to supplement this list with products of oil and gas and petrochemical industries, which makes the exports of producing countries vulnerable, including Kazakhstan.

In addition to tightening previously adopted national commitments in the field of emissions reduction –Fitfor55[4], EU countries supplement national strategies with regulations.

For example, Germany was one of the first to present a Strategy for low-carbon development until 2050 and adopted the federal Law on Climate Change. The country is choosing the path of restructuring the energy sector, plans to further expand renewable energy sources and gradually abandon the production of electricity from fossil fuels, which will reduce emissions in the energy sector by 60-62% by 2030 compared to 1990. The Strategy Implementation Plan, within the framework of the Paris commitments, will be updated according to the adopted Law every 5 years.

The decarbonization plan of the Norwegian economy provides for support for low-carbon technologies, an increase in the emissions tax (from $95 to $240 per ton), the transition to zero-emission transport from 2022 (city buses from 2025) and other regulatory measures. The country has also adopted a Law on climate change (2018).

The prospects for low-carbon development in France are reflected in the National Strategy for Reducing Carbon Emissions and the Long-term Energy Program, which are based mainly on the transition from nuclear energy to renewable energy, technology development, etc.

In general, the EU countries consistently continue the policy of decarbonization of their economies. This, in this May, a new EU energy transition plan was adopted – REPowerEU[5], aimed at accelerating the transition to clean energy sources and reducing Europe's dependence on Russian energy resources. This plan is supposed to be

[4] *Source: https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/*
[5] *Source: https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131*

implemented by solving the following tasks: 1) energy saving at all levels from households to industrial enterprises; 2) diversification of energy supplies; 3) rapid replacement of fossil fuels with renewable energy; 4) reasonable combination of investments and reforms.

The USA and Canada are also characterized by the continuation of the policy of achieving carbon neutrality and the adoption of legislation in the field of climate policy. The United States presented a Strategy in November 2021, the main priorities of which are: 1)Decarbonization of electricity; 2) Electrification of end users and the transition to other clean fuels; 3) Reduction of methane and other products other than CO_2.

In the Strategies of Canada and Russia, energy efficiency, adaptation to climate change through improved forest and land use, technology and innovation are identified as priorities for the transition to low-carbon development.

For the Republic of Kazakhstan, which has ratified the Paris Agreement and submitted national commitments in the field of greenhouse gas emissions (in the amount of 15-25% compared to the level of 1990 by 2030, UNFCCC, 2016), the task of achieving carbon neutrality by 2060, set by the President of the Republic of Kazakhstan K.Tokayev, remains very ambitious and requires a balanced climate policy.

According to the Statistics Bureau of ASPR RK, most of the greenhouse gas emissions (77.1%) are accounted for by energy activities related to the extraction, processing, transportation, storage and combustion of fuel (Fig.1). In this regard, it is these sectors that should become the object of close study and research by scientists, practitioners and politicians.

As the discussions within the framework of the Coal Forum recently held by the AGMP have shown, the collectives of coal industry enterprises, mines and branch research institutes are in urgent need of both studying, researching effective international experience in decarbonization of coal deposits, and developing special programs for technological modernization of production. Equipment wear is of great concern to miners: at some enterprises it reaches 80-85%, which causes an increase in the energy intensity of production and, accordingly, an increase in greenhouse gas emissions.

According to preliminary data of the Ministry of Energy of the Republic of Kazakhstan, the rejection of coal and other measures to decarbonize the economy can lead to the release of 27 thousand workers in the field of coal mining and energy production, and taking into account workers in other related fields – about 35 thousand. In this regard, this category of workers, the most vulnerable and at risk of losing their jobs in the process of energy transformation, should be covered by social protection measures, retraining programs, and provided with new jobs in low-emission industries. For this category of persons, it is necessary to develop programs offering alternative employment and retraining in order to carry out activities in new "green" areas.

Regarding the reduction of carbon intensity in other extractive sectors of the economy, in particular, in the oil and gas and petrochemical industries, it is necessary to continue the policy of decarbonization by increasing the share of RES, improving energy efficiency through the introduction of the best available technologies (BAT), the development and implementation of carbon capture and storage technologies (CCS), especially during the transportation of raw materials. Despite the development of corporate strategies for low-carbon development, in a number of companies in this sector (KMG, NCOC, SHELL

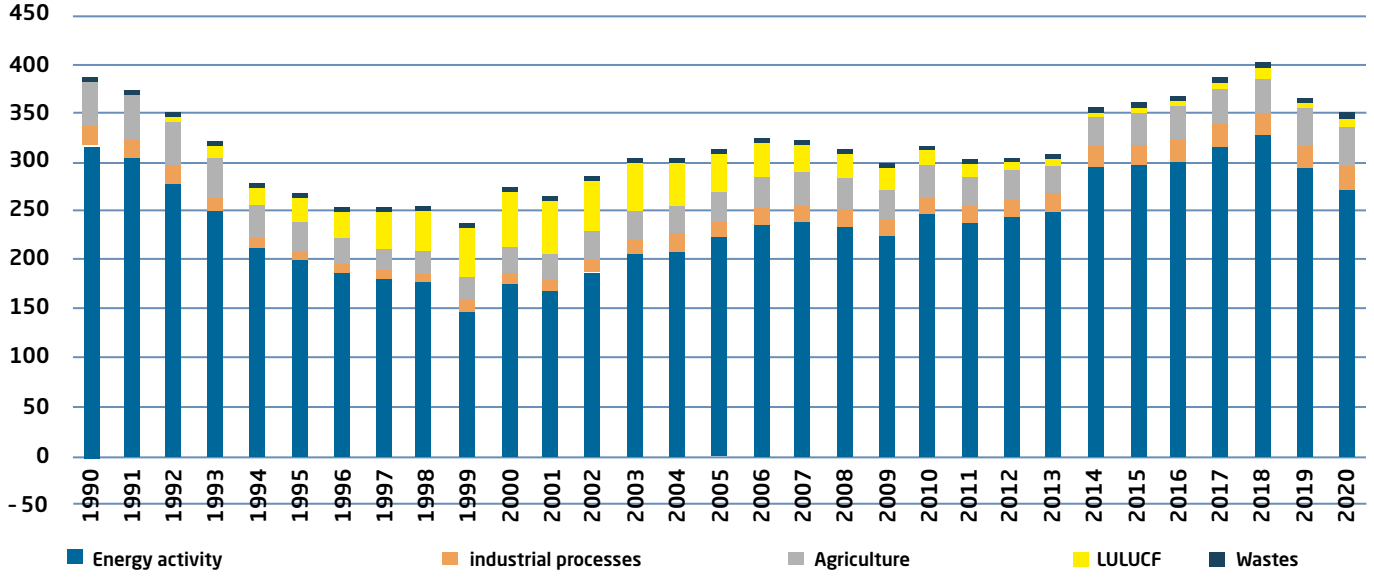


Figure 1 Structure and dynamics of emissions by sector, million tons of CO2 eq.

According to preliminary data of the Ministry of Energy of the Republic of Kazakhstan, the rejection of coal and other measures to decarbonize the economy can lead to the release of 27 thousand workers in the field of coal mining and energy production, and taking into account workers in other related fields - about 35 thousand.

and others), which are certainly progress towards achieving carbon neutrality, a number of such areas as conducting independent technical, technological, energy audits to identify the carbon footprint and "leaks" of CO_2, the introduction of digital monitoring for emissions remain out of sight of the environmental management of enterprises.

Of course, systemic issues of decarbonization of the energy sector and, in general, the country's extractive enterprises, such as the promotion and introduction of hybrid, maneuverable renewable energy, applied research in the field of hydrogen and nuclear energy, BAT, CCS and the introduction of carbon management standards and other measures, should receive support from the government within the framework of the currently being developed Strategy for achieving carbon neutrality until 2060.

The basic element of this strategic document, taking into account the above international experience and the specifics of the national economy, should be the improvement of the carbon regulation system that stimulates decarbonization. An analysis of the current situation shows that the current system of carbon regulation in Kazakhstan does not allow the country to achieve its commitments to reduce greenhouse gas emissions and needs to be radically improved.

Emissions trading also does not have the proper stimulating effect. According to the data of the Kazakh company CCE (CaspyCommodityExchange), which carries out emissions trading, in 2021 the cost of carbon units at the auction was at the level of 1-1.2 US dollars, while in the EU the price of carbon is over 70 dollars per ton of CO_2. The updated NDC project (the contribution of the Republic of Kazakhstan determined at the national level for 2021-2025), developed by the MEGNR within the framework of the commitments of the Paris Agreement, assumes an increase in the price of a carbon unit to 16.9 US dollars in 2023-2025 and to 50.8 US dollars in 2026-2030. To achieve such a price for greenhouse gas emissions, it is necessary to take urgent measures to improve the efficiency of the carbon regulation system, stimulate emission reduction and the introduction of green technologies.

To achieve this goal in our country, according to research by McKinsey, it is necessary to increase the share of investments in decarbonization to 15% of GDP against 7.5% of the global average.

To solve these problems, we consider it appropriate to take the following actions at the national level:

1. Climate goals should be legally documented in legislative act. It is important to have an ambitious and stable long-term political environment. Among the world's 10 largest sources of greenhouse gas emissions, Japan, Canada, EU countries and South Korea have legally binding targets. Given the increasingly unstable political climate marked by the rise of populism, climate change efforts should not be held hostage to changing political priorities. The consolidation of the country's climate goals in the strategies, plans and programs of central and local government agencies and national companies to be implemented at the sectoral and local levels can ensure stability and certainty, contributing to the sustainable progress of the country.

2. Energy security planning should move from just-in-time planning to just-in-case planning, which requires maintaining sufficient reserve capacity and storage infrastructure using market mechanisms to encourage investment in these solutions. Additional benefits and a role in the field of energy security should be played by energy efficiency and energy conservation. Transparent and consistent dissemination of information, restoration of energy supervision institutions and the development of measures that take into account the distribution of responsibility between consumer groups can help stimulate public participation in improving energy efficiency.

3. Reducing the risk of investments in clean energy is essential to maintain capital inflows. Over the past decade, investment in the country's energy transition has increased, but this surge in investment came during a decade of economic growth and was partly driven by

[6] *Source: https://forbes.kz//process/energetics/trudnosti_energoperehoda_1651836783 /?*

stimulating monetary policy and low benchmark interest rates. To date, the funding gap remains significant, so reducing the risk of energy investments is crucial.

4. **The issues of equality and justice should occupy a central place in the energy transition.** In recent decades, due to the relative inelasticity of energy demand, high energy prices have contributed to a high level of consumer price inflation. First of all, vulnerable segments of the population and small businesses suffer from this, which highlights the problems of equality and justice in the transition to new energy. Maintaining energy availability is very important not only for economic growth and social well-being, but also for supporting climate change policies. In this regard, it is necessary to take long-term systemic solutions to ensure equal access for vulnerable groups and small businesses.

In general, the decarbonization process at the country level requires systematic work and the adoption of appropriate investment, regulatory and institutional reforms both in the field of public administration and in the field of planning the development of the national economy and its basic industries. Due to the intersectoral nature of measures to achieve carbon neutrality, the importance for ensuring the energy security of the country in the subregion, there is an urgent need to create a coordinating structure under the President of the Republic of Kazakhstan in the form of the Agency for Alternative Energy and Climate with the support of the United Nations.

To date, the funding gap remains significant, so reducing the risk of energy investments is crucial.

In this regard, the government, scientists, experts, and the business community need to understand that the decisions that will be incorporated into the Strategy today will determine the prospects for sustainable development not only of Kazakhstan, but also of the entire Eurasian region in the future.

Thus, the RK Strategy of achieving carbon neutrality until 2060, which is essentially a strategy for economic diversification and its technological breakthrough, should become a **new long-term strategic document in the period of updating the socio-economic policy of the country.**

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RES auction schedule in 2022

The Ministry of Energy of the Republic of Kazakhstan invites all interested parties to participate in auctions for the selection of projects for construction of renewable generation facilities in 2022.

In accordance with the Rules for Organizing and Conducting Auctions (approved by the Order of the Minister of Energy of the Republic of Kazakhstan dated December 21, 2017 No. 466), the schedule of auctions for 2022 is published on the official website of the Ministry of Energy of the Republic of Kazakhstan.

No.	Type of RES	Installed capacity, MW		UES zone	Auction time	Auction date
		Small	Large			
1	HPP	20		Northern and Southern zones	from 14.00	24.10.2022
2	HPP		200	Northern and Southern zones	from 14.00	25.10.2022
3	BioPP	10		All zones	from 14.00	07.11.2022
4	SPP		20	Southern zone	from 14.00	08.11.2022
5	SPP		20	Southern zone	from 14.00	09.11.2022
6	SPP		20	Southern zone	from 14.00	10.11.2022
7	WPP		50	Northern Zone	from 14.00	11.11.2022
8	WPP		50	Western zone	from 14.00	21.11.2022
9	WPP		50	Northern Zone	from 14.00	22.11.2022
10	WPP		50	Northern Zone	from 14.00	23.11.2022
11	WPP		50	Northern Zone	from 14.00	24.11.2022
12	WPP		50 (with doc)	Northern Zone	from 14.00	28.11.2022
13	WPP		100 (with doc)	Northern Zone	from 14.00	29.11.2022

Source: Ministry of Energy of the Republic of Kazakhstan

The total auctioned installed capacity in 2022 is 690 MW, broken down by type of power plants:
- solar power plants (SES) - 60 MW;
- wind power plants (WPP) - 400 MW, of which: 150 MW with documentation;
- hydroelectric power plants (HPP) - 220 MW;
- biogas power plants (BioPP) - 10 MW.

In order to prepare for participation in auctions for the selection of renewable energy projects, interested parties can request explanations on the official websites of the Ministry of Energy of the Republic of Kazakhstan, the "Financial Settlement Center of RE" (http://www.rfc.kegoc.kz/) and KOREM JSC (http://www.korem.kz /) or take part in explanatory seminars and webinars.

Talgat Temirkhanov
Chairman, ALE Kazakhstan Electric Association

ҚАЗАҚСТАН ЭЛЕКТР ЭНЕРГЕТИКАЛЫҚ ҚАУЫМДАСТЫҒЫ
КАЗАХСТАНСКАЯ ЭЛЕКТРОЭНЕРГЕТИЧЕСКАЯ АССОЦИАЦИЯ
KAZAKHSTAN ELECTRICITY ASSOCIATION

Actual problems and vision of the development of the electric power industry in Kazakhstan

"The Association of Legal Entities "Kazakhstan Electric Association" has existed for almost a quarter of a century - since January 1999. All these years, the Association helps in conducting a dialogue between representatives of the energy industry and government agencies. The Association is actively working on the creation and adoption of a strategy for the development of the energy sector of Kazakhstan."

The global campaign against climate change has grown to an unprecedented scale, which has led to increased pressure on the energy sector. A year of 2020 was a new turning point and "accelerated" this process under the influence of a whole range of new factors. Today, the energy industry of our country is facing a number of large-scale challenges, questions, and uncertainties, both accumulated in previous years and newly emerged. Large-scale changes in the regulatory framework and market structure, as well as growing pressure from the public and the judiciary, are forcing companies and individuals to mobilize.

The response of businesses to the "energy transition", including energy companies, information technology and other companies, as well as financial institutions and even individual citizens, is complex and multifaceted.

In the Republic of Kazakhstan, as in many other large hydrocarbon-producing countries, the government, while striving for carbon neutrality, simultaneously relies on hydrocarbon revenues as a source of replenishment of state budgets. This confluence of competing interests and goals highlights the challenges facing the energy transition and the importance of sustained foreign investment in the energy sector of producing countries in the short to medium term.

Kazakhstan remains one of the most energy intensive countries in the world as

The response of businesses to the "energy transition", including energy companies, information technology and other companies, as well as financial institutions and even individual citizens, is complex and multifaceted.

upstream accounts for 50% of the industry. Nearly 70% of the electricity production still depends on coal. A complete refusal to finance coal projects and a shift in emphasis from natural gas and oil products to the use of hydrogen in the foreseeable future will have a significant impact on hydrocarbon exporting countries. In the world export of energy resources, Kazakhstan occupies a significant place, and the decrease in demand for those resources is a challenge for the entire economy of the country.

Serious problems have accumulated in the energy sector of Kazakhstan due to the unprofitability of companies, high wear and tear of equipment and networks, high staff turnover, limited opportunities for tariff setting, lack of profit in tariffs for business and social development, and low wages.

The energy sector in Kazakhstan is regulated by various state bodies. Of relevance for Kazakhstan today is the use of a systematic approach to planning of the development of the republic's energy sector.

While maintaining a multidirectional regulation model, the country as a whole and the energy sector in particular are waiting for the most negative scenarios, among which may be the final degradation of the industry and the complete loss of energy independence, failure to fulfill international obligations (such as the Paris Climate Agreement).

The Association of Legal Entities "Kazakhstan Electric Association" (Association or KEA), established on January 7, 1999, as a non-government, non-profit organization, realizing the responsibility to its customers, directs all efforts to eliminate risks beyond the control of the subjects through a dialogue between representatives of the energy industry and government agencies.

The Association at the venues of energy committees under the AMANAT party and Atameken RPE, working groups of government agencies with the participation of experts, entrepreneurs, representatives of government agencies, large corporations and regional enterprises discuss the problems of the energy industry: to improve legislation in the field of electricity, including powers between government agencies and return to the sectoral ministry a number of functions to approve and harmonize technical norms and regulations, determine the technical conditions for non-discriminatory access, and carry out licensing. To date, the Association unites more than 100 organizations in the energy industry, including the generation, transmission, and supply of electrical and thermal energy: regional power grid companies, generating companies, a system operator, a centralized trading operator, major industry research and design institutes, manufacturers of power equipment, United States Energy Association, etc.

In our opinion, the following fundamental positions can be distinguished for the energy industry: ensuring the energy security of the country, fulfilling international climate obligations, modernizing and developing the energy sector, and resolving the problems of the current tariff regulation.

We are aimed at the development of the energy industry through the solution of problematic issues of natural monopoly entities (NME), as well as energy supply organizations. Together with interested parties, proposals are formed and sent to state bodies on amendments and additions to regulatory legal acts on the issues of the electric power industry, natural monopolies and socially significant markets, taxation, energy saving, fire safety, renewable energy sources, and the environment.

To date, the Association is actively working on the development of a profile law on heat supply, on solving issues of implementing the norms of the Environmental Code of the Republic of Kazakhstan in the energy industry, on initiating, improving, and adopting a strategy for the development of Kazakhstan's energy sector with a separate program for the development of combined generation plants (CHP) in accordance with the Master Plans for the Development of Cities and Regions of the Republic of Kazakhstan, because CHPs are socially significant facilities that provide regions with thermal energy.

We have developed a number of proposals to the state authorized bodies on introducing amendments and additions to some legislative acts, implementation of which will allow the energy industry to solve the issues of NME, in terms of increasing the wages of production personnel (based on the normative number of personnel of the subject and the average monthly salary that has developed according to statistics for the year), inclusion in the tariffs of all reasonable costs incurred by NME (when taking networks into ownership or trust management, taking into account corporate income tax, etc.), the development of renewable energy sources, and the implementation of environmental initiatives without a negative impact on the energy industry.

INDUSTRY CENTER OF TECHNOLOGICAL COMPETENCES: TO DEVELOP THE ELECTRIC POWER INDUSTRY COLLABORATIVELY

Alexey Doronin,
Managing Director for Strategy and Development,
Director of ICTC

Tanais Medetbekova,
Lead Data Collection and Strategic Research Manager

"The Industry Center for Technological Competences (ICTC) in the field of electric power industry of the Ministry of Energy of the Republic of Kazakhstan was created on the basis of KOREM JSC on behalf of the Head of State Kassym-Jomart Tokayev a little over a year ago."

In the meantime, ICTC is entrusted with promoting the development of the electric power industry of the Republic of Kazakhstan by ensuring effective interaction between leading universities, research institutes, leading TADs in the electric power industry and government agencies in the implementation of projects. The industry center should assist in the staffing of the industry by identifying expected changes, participate in the development of educational platforms, implementation of innovation policy and coordination of power industry entities, scientific community, TSDs, investors and government agencies, facilitate industry conferences, round tables, forums, webinars, lectures, seminars, and other educational events.

The main four directions of the center activity are determined. Firstly, it is the organization of collaboration between the state, business entities, science, and civil society by creating the conditions for the "Legal Framework", "Organizational Structure", and "Technological Platform".

Secondly, the development of professional personnel in the electric power industry is planned to be carried by creating the Learning Management System (LMS) - a platform to promote the staffing of the industry by determining the expected changes in the competencies of workers and the specialty, participating in the development of standards and educational programs.

Thirdly, Research & Development (Research and Development) involves the participation of ICTC in the development and organization of the implementation of innovation policy and coordination of electric power industry entities, consumers, scientific and educational organizations, domestic producers, investors, and government agencies. Finally, the fourth direction - Energy Events - involves the experience exchange.

ORGANIZATION OF COLLABORATION

As part of the creation of a legal framework to ensure collaboration between the state, business entities, science, and civil society, ICTC was developed. The order of the Minister of Energy of the Republic of Kazakhstan No. 283 dated September 06, 2021 stipulated the approval of the Regulation on ICTC, which regulates the powers, rights, and obligations. In addition, the following documents on planning, project management, various regulations and memorandums were developed and adopted as well as the rules for holding competitions at the Astana Hub were approved.

For the effective interaction of the business community, associations, and other legal entities with public authorities to solve the problems of implementing the tasks set, three CCS were created as part of ICTC. Their goal was to develop centralized trading in electric energy, operators of the centralized trading market, trading platform, develop and/or create information security systems for functioning of the centralized trade market, necessary to improve the reliability, security, and quality of electricity supply to consumers, as well as reduce the cost of electricity.

CCS for technological monitoring is designed to solve the tasks of implementing the National project "Technological breakthrough through digitalization, science and innovation", approved by the Decree of the Government of the Republic of Kazakhstan No. 727 dated October 12, 2021, on the creation of a "Digital Map of Generation".

The third CCS will contribute to the development of the human resources potential of the electric power industry.

Each CCS included representatives of companies in the electric power industry, associations, vendors, scientific community (universities), and independent experts. With the participation of the leadership of the Ministry of Energy of the Republic of Kazakhstan, meetings were held via videoconference to discuss the organizational issues of CCS, results of the ICTC work, and problematic issues in specified directions. Based on the results of these meetings, a survey of participants was conducted to determine a consolidated opinion and vision for further work.

Thus, CCS became permanent bodies of ICTC for the implementation of directions. Regular face-to-face meetings and videoconferencing meetings were held with donor representatives. With a number of companies such as Tetratek (USAID), PWC, AFD, AIKON, E2 Energy, memorandums of cooperation and non-disclosure of information have been concluded, which allowed more successful project support and information exchange.

Thus, CCS became permanent bodies of ICTC for the implementation of directions.

IMPLEMENTATION OF ICTC PROJECTS

On October 7, 2021, President of the Republic of Kazakhstan Kassym-Jomart Tokayev approved a list of “national projects” aimed at improving the quality of life in the country. Two of them provide for activities aimed at digitalization of the electric power industry of the Republic: the National Project "Technological breakthrough through digitalization, science, and innovation" and the National Project for the Development of Entrepreneurship for 2021-2025.

The implementation of the Digital Map of Generation project provides for the implementation of a platform solution for monitoring the state of the equipment fleet of power generating organizations, with full certification and functionality for managing repair regulations.

Relevant work on the project for the Energy Metering and Loss Monitoring System includes the development of the Smart Grid concept, implementation of a pilot in the city of Nur-Sultan, and development of standards for Smart metering technology (Smart energy metering) and communication systems. This includes the

provision of a data transmission infrastructure for power facilities and coverage of digital commercial electricity metering systems and telemetry systems for wholesale and retail market entities with data transfer to a single digital platform and SCADA system.

The creation and implementation of a digital cabinet for electricity consumers is of great importance. The digital map of hydro potential project is aimed at implementing the activities of the Development Plan for the hydropower industry of the Republic of Kazakhstan for 2020-2030, approved by the Deputy Prime Minister of the Republic of Kazakhstan on September 4, 2020.

DIGITAL MAP OF GENERATION PROJECT

The goal of the "Digital Map of Generation" project is to organize the operational mode of fixed production assets, ensuring the maximum possibility of loading production by maintaining the technical readiness factor at an acceptable level of planned downtime for maintenance and repair.

Digital Map of Generation is aimed at automating the process of obtaining data on the execution of repair and investment programs, equipment loading; determination of the technical condition index; substantiation of point budgeting for the modernization of production equipment; reducing the gap between installed and available capacity; increasing the technical reliability of the equipment of generating facilities; submission of reports on technological violations and operational messages; creation of Status Twin prototypes for all stations.

Based on the results of 2021, the Company performed certain work under the Digital Map of Generation Project. Thus, the initial stage of surveying the generating stations was carried out to identify primary data on the processes and tools that ensure the processes of accounting for the equipment fleet and monitoring the technical condition. The data has been received from all stations and is being processed. Official letters were sent to form working groups at the stations of Astana-Energy JSC and UKHPP LLP. Working groups have been formed and approved at both stations.

Also, all the materials provided on the main and auxiliary equipment from UKHPP LLP were developed and studied; a detailed analysis of business processes to ensure repair activities was carried out. Currently, work is underway to organize a complete certification, within the framework of which questionnaire templates are created for filling out. Details of all existing stations are being studied and the search for technologically and structurally identical equipment is being carried out. All types of reports received by CAESC from generating organizations have been developed and converted into a digital format.

A complete hierarchy of Astana-Energy JSC equipment was compiled; certification of the main and auxiliary equipment of Astana-Energy JSC and UKHPP LLP was carried out. An electronic archive of technical documentation for Astana-Energy JSC and UKHPP LLP has been developed.

The Concept for implementation of the project "Digital Map of Electricity Generation Facilities of the Republic of Kazakhstan" and the basic requirements for software for the digitalization of processes have been developed. Station profile layouts were designed.

For 2022-2023, it is planned to conduct a technical audit at 59 facilities, amend the regulations regarding the submission of data to the system (approval of the reporting form, data transfer regulations, strengthening measures to control the transfer of data from metering devices). It is planned to put into commercial operation the software of the Digital Generation Map, as well as to integrate it with systems of energy producing organizations to obtain data.

The technical audit of energy producing organizations will be carried out under a project opened and financed by the World Bank. Project title: "Analysis of the power system grid to support grid stability and clean energy development strategies for Kazakhstan."

To date, the Company has registered on the World Bank website (hereinafter referred to as WB) and received confirmation; bank data are sent to receive project financing; account registration was verified and confirmed; the Technical Proposal (hereinafter TP) was prepared, signed by the project participants and verified by the WB consultant, sent to the WB office; the Financial Proposal (hereinafter FP) has been prepared.

It is planned to conclude an agreement with WB to carry out work on the coordination of consultants in conducting a technical audit; selection of consultants by the bank; organizing the work of consultants in the process of conducting a technological audit; and closing the initial stage of the project.

Documents for consultants, technical audit algorithm (hereinafter referred to as TAA), and the work schedule of consultants for TAA have also been prepared. These documents will be agreed and developed with the consultant after the start of the project.

CREATION OF THE DIGITAL ACCOUNT OF CONSUMERS

The project to create a Digital Consumer Cabinet is aimed at implementing a number of measures approved by the Government. The main goal of the project on the creation of a Digital Consumer Cabinet is the comprehensive development of competition in the electricity market of Kazakhstan, aimed at providing access to markets in the electricity industry as part of eliminating pricing distortions.

Within the framework of this project, the following should be solved: tasks of introducing an online digital platform for changing the supplier of electricity; increase in the volume of electricity sold at centralized auctions from the total volume of sales; and increase in the proportion of consumers who switched to alternative electricity suppliers.

At present, ICTC has carried out an analysis of the legislation of the Republic of Kazakhstan in the field of organizing energy supply to end consumers of electricity. The world experience in the digitalization of activities of energy supply organizations has been studied. A project has been developed to create a digital consumer cabinet. This year, it is also planned to discuss problematic issues on the project with independent experts within the framework of the established CCS. Proposals and additions to the current legislation of the Republic of Kazakhstan are being developed. The development of the software for the Digital Account of the Consumer has begun.

CREATION OF A DIGITAL HYDRO POTENTIAL MAP

The goal of the project on the creation of a Digital Hydro Potential Map is to promote the development of the hydropower industry by developing an information platform for attracting investments in the hydropower industry.

The project on the creation of a Digital Hydro Potential Map provides for the determination of the effective physical hydro potential of rivers of the Republic of Kazakhstan. Creation of an online map with a list of HPP construction projects being implemented by investors. Information on the status of implementation of projects included in the online map is supported. The following information is being supported: the location, load, and plans for the development of the power grid infrastructure; status of lands for promising hydropower projects; and site selection for HPP design auctions. Information is also being prepared for the creation of a master plan for the hydropower development.

As for the work done, at the request of the Ministry of Energy of the Republic of Kazakhstan,

information was received on the issued technical conditions for connecting HPPs, maps of electrical networks for EKREC (VK REC), TATEK, and AZhK. Information was received from most investors on the technical and economic indicators of HPP projects for inclusion in the online map. Maps of 1:50000 and 1:25000 scale were received. They show stock materials of the water-energy cadaster and surface water resources of KazSSR, water flow at the gauging stations of Kazhydromet RSE, and water at hydroelectric facilities of Kazvodkhoz RSE.

Based on the analysis and processing of the information received, 54 river basins and 2070 rivers with tributaries were identified. A hydrological network of rivers was drawn along the basins of rivers of South-Eastern Kazakhstan, including Tekes, Sharyn, and Shelek as well as along the basins of rivers of East Kazakhstan, including Uba and Ulba. The database configuration for the digital map was defined; the definition of users and their roles, the terms of reference were discussed and brought to the developers.

A software prototype for the Digital Hydro Potential Map was developed, and information on the hydrological network was entered for three river basins: Tekes, Sharyn, and Shelek. The rivers were

divided into sections with the determination of the height difference, flow rate, length of sections with the calculation of the hydropower potential, etc.

The Digital Generation Map software was launched in a pilot mode at the end of 2021. It currently consists of the following information layers:

- Data on rivers (Coordinates, sites, gauging stations, waterworks).
- Data on networks and infrastructure (Substations, lines (power lines), roads, communication networks).
- Data collection environment (Continuous data enrichment and updating).
- Feedback (Tools of information support for investors).

Within the framework of cooperation with UNICASE (USAID), there is a study on the land legislation of the Republic of Kazakhstan for the allocation of land for the construction of a hydroelectric power station. Based on the results of this study, proposals will be developed to amend the current land legislation of the Republic of Kazakhstan on the allocation, use, and return of land for the implementation of investment projects for the construction of hydroelectric power plants.

It includes the modernization of educational programs and training of specialists, design of new educational programs, development and implementation of additional professional education programs.

DEVELOPMENT OF PROFESSIONAL PERSONNEL

The creation of an industry platform for the registration and development of professional personnel (LMS) is aimed at promoting the improvement of the education system, which should provide the digital economy with competent personnel. It includes the modernization of educational programs and training of specialists, design of new educational programs, development and implementation of additional professional education programs. The LMS platform will have two main functions:

1. Organization and running of advanced training courses for professional technical specialists of the power and heat energy industry:
2. Audit by entities of the electric power industry of professional technical specialists and planning of advanced training courses

To date, several meetings have been held in this area with the Bureau for Continuing Professional Development (BCPD) of AIFC to study the experience of organizing distance learning and mutually beneficial cooperation. Meetings were held with USAID and AFD representatives to identify opportunities to assist in the preparation of educational content within the framework of their programs. The study of advanced educational platforms was carried out and the terms of reference for the LMS platform were developed.

Within the CCS framework CCS created to develop the human resources potential of the electric power industry with the involvement of experts who are employees of HR departments of electric power companies and universities, it is anticipated to discuss the ICTC proposals and to determine a balanced decision on them.

QAZAQ GREEN EXPEDITION:

SHAPING THE PATH TO GREEN GROWTH

THE QAZAQ GREEN ASSOCIATION ORGANISED A TWO-DAY EXPEDITION TO BUIRATAU NATURE PARK WITH 50 REPRESENTATIVES OF STATE AND PRIVATE COMPANIES AND EXPERTS TO DISCUSS IMPORTANT ISSUES IN THE RENEWABLE ENERGY SECTOR IN KAZAKHSTAN.

RENEWABLE ENERGIES ARE NO LONGER THE FUTURE, IT'S THE PRESENT

The purpose of the expedition focused on exchanging views on the problems in the sector and discussing opportunities to give renewable energy sources a new impetus.

The expedition began with a visit to two renewable energy sites in the Akmola region - the Astana Expo 2017 wind farms and the First Wind Power Plant.

The first one is located very close to the capital. It was built by CAPEC Green Energy, a subsidiary of the CAEPCO, a vertically integrated power utility holding company in Kazakhstan. The first stage was launched in 2017, the second stage in 2020, and the total capacity of the plant is now 100 megawatts.

The project cost 45.1bn KZT, including 30.5bn borrowed by the Development Bank of Kazakhstan and its subsidiaries.

We have 29 wind turbines manufactured by VESTAS, one of the world's leaders in green energy technology.

The project was ambitious. For example, the turbines travelled 5,000 kilometres with shipping before being installed outside the capital. It required a 700-tonne crane to install the wind turbine tower, which was brought in parts by 40 trucks. Each tower is 64 metres high, and the diameter of the circumference formed by the ends of the blades is 100 metres. In other words, the maximum height of each wind turbine is more than 100 metres.

One generator has a capacity of 3.45 megawatts. The management is very technologically advanced: wind speed and power generation can be monitored in real-time from the control centre, and the status of any node can be monitored.

The turbines are automatically regulated, and if wind speeds exceed 25 metres per second, they are stopped so that the equipment does not wear out.

The participants in the Qazaq Green expedition visited one more RES facility – the First Wind Power Plant. It is also contributing to the development of green energy in Kazakhstan.

This wind farm, located near Ereymentau, has an installed capacity of 45 megawatts, which is generated by 22 units of two megawatts each.

Here the wind turbines are slightly higher: the tower is 85 meters high and the blades are 93 meters.

The wind farm generates 170m kilowatt-hours of electricity per year, and it has transferred more than 1.2bn kilowatt-hours of energy into the Kazakh energy system since it was launched. Thus, the average citizen of Kazakhstan in 2021 consumed about 6 thousand kilowatt-hours of electricity, which means that 170 million KWh would be enough for almost 30 000 Kazakh citizens for all their electricity needs for a year.

CROSSING THE STEPPE

Dozens of cars drive slowly along a steppe road. Ereymentau, a small town in the Akmola region, was left behind and the scenery of the Buiratau Nature Park opened up before the caravan of cars.

The route is short, according to the map, from the wind farm to the Buiratau Nature Park, several tens of kilometres along a steppe dirt road.

Normally it does not take more than an hour, but after heavy rains the ground became muddy, and a column of two dozen cars stretched along a narrow road.

Instead of the usual picture of monotonous steppes that Kazakhs are used to seeing outside megacities, there are hills and mountains, small islands of forests and abrupt changes in altitude. But this time travellers were not entirely lucky. After heavy rains the ground became slack, and even four-wheel drive cross-country vehicles did not find it easy to drive over low-lying areas with accumulated water.

Fortunately, almost all of them were off-road vehicles that could traverse water-filled depressions and deep ruts.

Even when some had trouble getting over obstacles, the other members of the expedition were quick to help get the stranded vehicles out.

However, all these problems and occasional rain showers from the sky compensated for the views of the Buiratau Park. After arriving at the assembly point, the expedition members got down to the main thing - a discussion of the situation in the renewable energy sector.

CHALLENGES FOR DISCUSSION

Market participants are convinced that in order to stimulate the development of renewable energy sources we need to improve energy trading mechanisms in the market. This was the main topic of discussion "Prospects and problems of RES projects implementation under bilateral contracts".

Both RES facilities and green energy consumers need clear game rules to predict their economy. For example, it is important for exporters to understand exactly how much clean energy they buy to reduce their carbon footprint and, therefore, avoid overpaying taxes abroad in countries with strict carbon regulations. This is particularly the case, for example, with the forthcoming introduction of a carbon tax in the European Union.

Representatives of the Qazaq Green Association, KazMunayGas, KOREM, KEGOC, ArcelorMittal Temirtau, CATEK Green Energy, ERG and others took an active part in the discussion.

Both the future of this energy sector and the export potential of Kazakhstan depend on the regulation of renewable energy sources.

WHY DOES KAZAKHSTAN NEED IT?

Despite the availability of large reserves of coal, cheap raw material for electricity generation, Kazakhstan has set itself the ambitious goal of significantly increasing the share of renewable energy in its energy system.

Both the future of this energy sector and the export potential of Kazakhstan depend on the regulation of renewable energy sources.

Thus, the Concept for the Transition to a Green Economy (set out in 2013) defines specific indicators to be achieved by the energy sector on its way to reducing its environmental impact. By 2020, the share of renewables in total electricity production was to reach 3%, by 2030 - 15%, and by 2050 - half of all electricity production, albeit together with alternative sources.

By the way, the 2020 target has already been achieved:

in 2021, the total installed capacity of renewable energy power plants in Kazakhstan exceeded 2 gigawatts, and the share of RES in electricity production across the country reached 3.6%.

Overall, the sector is growing rapidly, with the installed capacity of renewable energy facilities increasing nearly 11-fold, from 177.52 megawatts to more than 2 gigawatts between 2014 and 2021. By the end of 2021, 134 renewable energy facilities were operating in Kazakhstan.

The development of renewable energy is a necessity for Kazakhstan today, economist Olzhas Khudaibergenov said. There are several main reasons for this.

First of all, in 2025, a European Union regulation will come into force, which implies the introduction of a cross-border carbon regulatory mechanism, i.e. a carbon tax on imports.

"This implies some transformation of our economy and the energy sector, including increasing the share of renewable sources," Olzhas Khudaibergenov said.

The second reason is that Kazakhstan still has an energy deficit, and the new RES

facilities will help overcome it. At the same time, such power plants will meet the growing demand for electricity from the economy and the population, rather than replace the existing coal-fired generation facilities.

The main goal of this work is to make Kazakhstan's economy greener and therefore more environmentally sustainable. Dialogue platforms like the Qazaq Green Expedition help to create a common understanding of the problems in the sector, thereby accelerating their resolution.

Nurlan Kapenov, Chairman of the Board of Directors of the Qazaq Green Association, explains that such events are necessary for networking

among energy industry participants.

"In general, the development of RES in Kazakhstan is currently on hold. There are contradictions: the Kazakh President talks about the need to achieve carbon neutrality by 2060, and the Ministry of Energy is developing a forecasting balance, stating the introduction of six gigawatts of RES capacity and two gigawatts in hydroelectric power until 2035. On the one hand, it says so, but on the other hand, over the past two years, KEGOC has not issued technical specifications for RES facilities, except for those that have passed through auctions," said Nurlan Kapenov.

According to him, Kazakhstan currently lacks a unified strategic document that would form the basis of an understanding of the development of the electricity market, including renewables, in economic terms, with calculated mathematical models, he said. As in the government, there is also a misunderstanding within the industry of its development prospects.

"Market players hope the market will develop. We say, 'No, it will not develop' with the current state of affairs. That's why we organised the expedition to bring market players together. Everyone understands that the industry needs transformation. We wanted to unite the market to make a collaborative, professional networking," Nurlan Kapenov said.

According to Qazaq Green's Chairman, the expedition was one of the first steps in uniting the industry and organising work to develop common approaches to its development.

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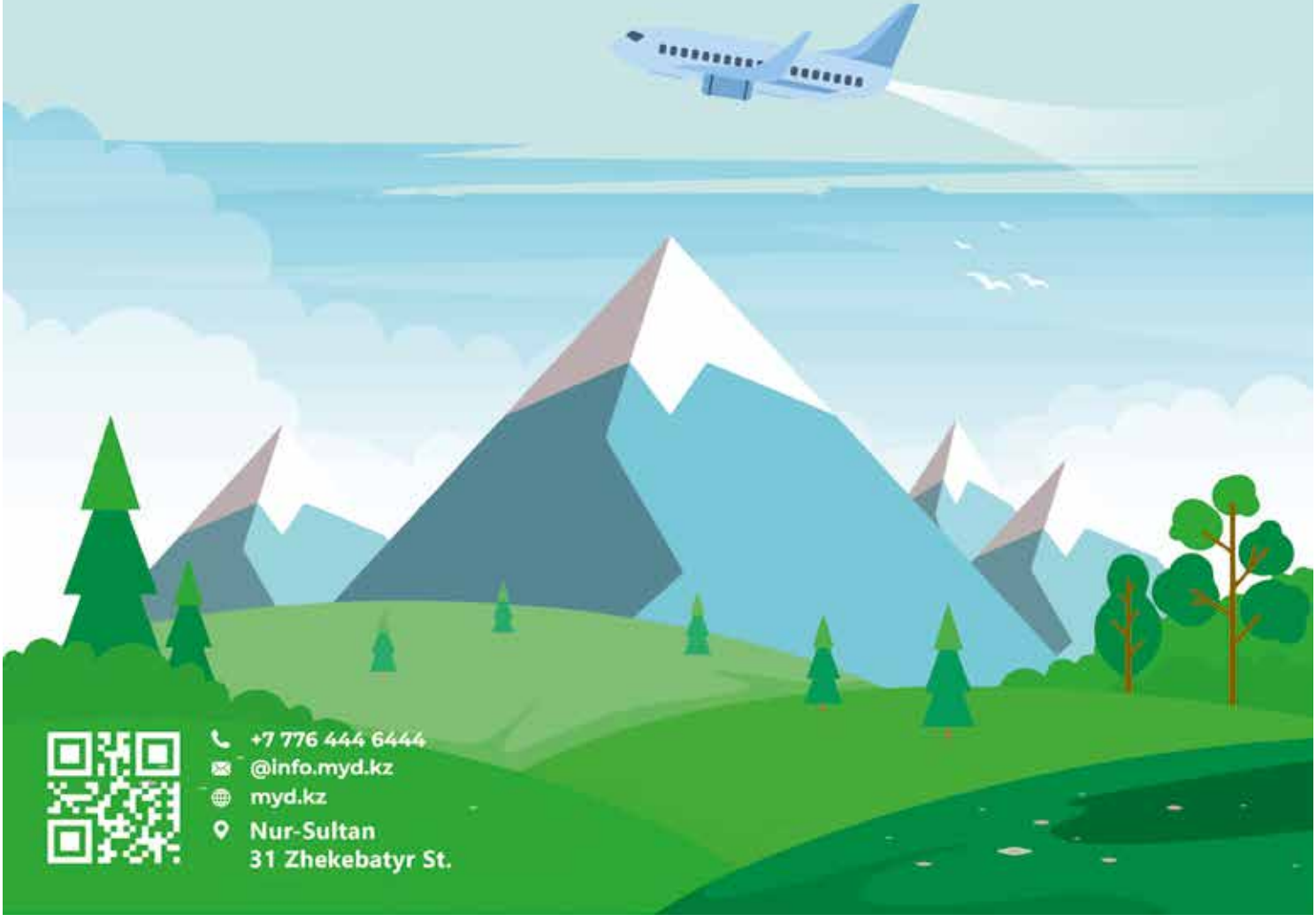

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ENI AND UNDP

completed the investment project for energy efficiency

Eni is committed to investing in projects that improve the lives of the communities where we operate all over the world, in line with the UN Sustainable Development Goals (SDGs) that underpin our mission, as well as our ambitious decarbonisation goals.

Eni in Kazakhstan further reinforced this principle in May, through the completion of a project to bring solar power and other energy efficiency measures to a high school for 1,900 students in Turkistan (in the southern region of the country).

With winter temperatures in the region known to reach up to -9°C and summer temperatures climbing well above 30-35°C, smart insulation and green energy solutions will ensure indoor temperatures are comfortable for students and staff all year round, with additional benefits for the environment and the school's energy budget.

In partnership with the United Nations Development Programme (UNDP) and the Governor of Turkistan Region, Eni helped to install a 50 kW capacity solar power plant for the school, already resulting in a 20% reduction of electricity costs and carbon emissions.

In addition, experts installed thermostats on heating devices and an energy-saving insulation film for the building's windows, as well as replacing outdoor and indoor lighting with energy-efficient LED bulbs and running an educational awareness campaign for both children and the school staff.

The awareness campaign included seminars on energy efficiency and renewable energy sources, as well as information materials including brochures, presentations and leaflets provided to the school and campaign participants. The seminars had an audience of 1,400 people: 1,200 schoolchildren and 200 teachers.

▶ Luciano Vasques
Head of Central Asia Region, Eni

This project marks a concrete and clear contribution to the future of Kazakhstan through the younger generations, increasing the level of knowledge on green energy while being a role model for others. Overall, our effort as Eni to support Kazakhstan in its energy transition path provided tangible results in the last few years and now we have the ambition to scale it up in order to reach bigger targets.

▶ Yakup Beris, UNDP Resident Representative in Kazakhstan, told the audience at the inauguration of the solar plant: "As UNDP, we are supporting Kazakhstan's Government in finding sustainable pathways and defining clear strategies for low-carbon growth, with energy sector transformation at its core. The Turkistan school modernisation is a vivid example of how we can localise these national goals. And more importantly, the project helps to nurture a responsible attitude towards the environment among the younger generation and carry this culture into their homes and families."

▶ Alex Stillavato
Managing Director, Arm Wind LLP

This innovative project developed by Eni and UNDP is fully on the decarbonisation pathway, as it combines renewable energy, energy efficiency and clean energy imprinting on new generations, who can act as future multipliers and accelerators of this positive model. Overall, it represents a milestone for Kazakhstan and other countries.

This project marks a concrete and clear contribution to the future of Kazakhstan through the younger generations, increasing the level of knowledge on green energy while being a role model for others.

Zarina Temirbulatova
Legal & Corporate Affairs Coordinator

We are very proud of the results of our partnership with UNDP that launched a truly unique initiative. This project will have a great impact on the education for local students in the sphere of green technologies and open a platform for the new young generation to realise their potential in the rapidly evolving renewables sector.

▶ Yerlan Dairbekov
National Project expert on RE UNDP-GEF Ministry of Energy joint initiative, UNDP – Eni joint initiative's project.

In addition to saving energy and upgrading schools, projects of this type of help build capacity and raise awareness of renewable energy and energy efficiency among schoolchildren and local communities. The use of energy-efficient and small-scale renewable energy projects has many advantages, e.g. the cost of electricity generated is not dependent on the price of energy, while energy consumption is reduced in the medium and long term, which in turn leads to resource savings.

Many thanks to Eni team for collaboration and technical assistance.

▶ Federica Gastaldello
Local Development Programs and Business Integration

Our partnership with UNDP is a clear example of how public-private alliances can have a concrete impact on people's living conditions and, in this case, on school communities. This project sets the path to the collaboration we wish to further with UNDP to contribute to the achievement of the Sustainable Development Goals. In fact, this project is a small but concrete contribution to SDG 7 by improving access to sustainable energy and emissions reduction, thus helping to reach the just energy transition Eni aims for.

The use of energy-efficient and small-scale renewable energy projects has many advantages, e.g. the cost of electricity generated is not dependent on the price of energy, while energy consumption is reduced in the medium and long term, which in turn leads to resource savings.

DATA ON THE *ELECTRICITY PRODUCTION* BY RENEWABLE ENERGY ***FOR THE 1ST*** *HALF OF 2022*

Installed power including: **2330,26** MW

wind farms

893,95 MW

small hydropower plants

280,98 MW

solar power plants

1,147.51 MW

biopower plants

7,82 MW

Power generation including: **2,392.49** Mln kWh

wind farms

1,053.78 Mln kWh

small hydropower plants

484,963 Mln kWh

solar power plants

853,327 Mln kWh

biopower plants

0,421 Mln kWh

The share of electricity generated by RES in the total volume of electricity generation

4,24%

The increase in the electricity generation by renewable energy facilities for the 1st half of 2022 compared to the 1st half of 2021 is **17%**

ON THE WAY TO DECARBONIZATION:

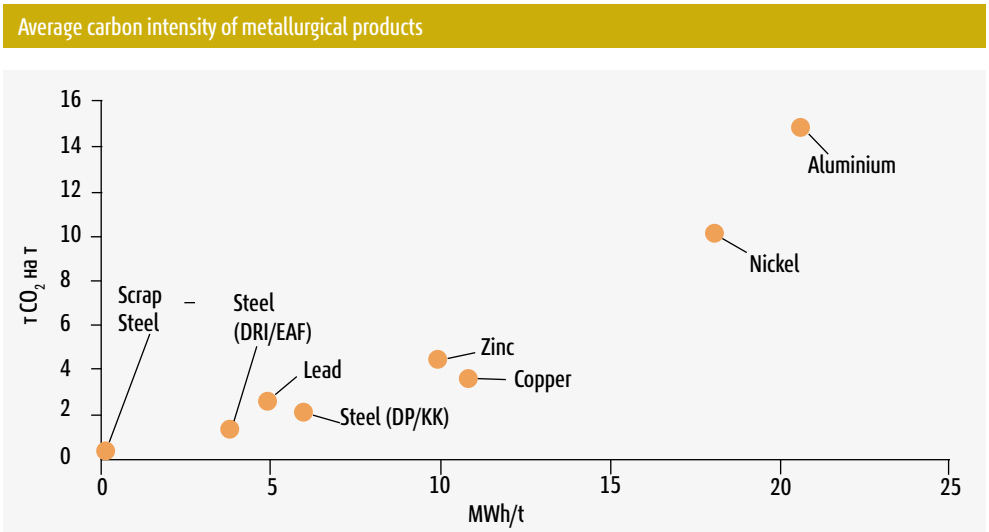
According to estimates for 2020, 13.5% of global greenhouse gas (GHG) emissions were from ore mining and smelting of steel, aluminum, copper, nickel and cobalt[1]. These components of "clean energy" sources, such as wind and solar power plants, hydroelectric power plants and electric vehicles, must now themselves be "clean" along the entire value chain – from ore extraction processes to the final product. The degree of "purity" is determined by Scope 1, Scope 2, and Scope 3 emissions.

The intensity of emissions depends on the volume of production, the specific product, the technology used and its energy efficiency (Figure1). For example, in the steel sector, where coal accounts for 70% of energy consumption, the carbon intensity of a traditional basic oxygen furnace is approximately 2.0 tons of CO_2 per ton of product. To put it into perspective, when using the method of direct reduction of iron in an electric arc furnace, 1.4 tons of CO_2 / t are emitted, and when using scrap – 0.3 tons of CO_2/t. The global average carbon intensity of aluminum production is about 15.0 tons of CO_2 per ton of metal, but it decreases to 4.0 tons of CO_2 when switching to hydroelectric power. The carbon intensity of copper, which averages 2.6 tons of CO_2/ton[2], can be reduced by 80% when implementing a scenario with the transition to renewable energy and electrification of mine trucks[3].

Victor Kovalenko,
Partner, Leader in Central Asia, Caucasus and Ukraine, EY Sustainability Services

Anara Samambayeva,
Consultant, EY Sustainability Services in Kazakhstan

Figure1. Average carbon intensity of metallurgical products



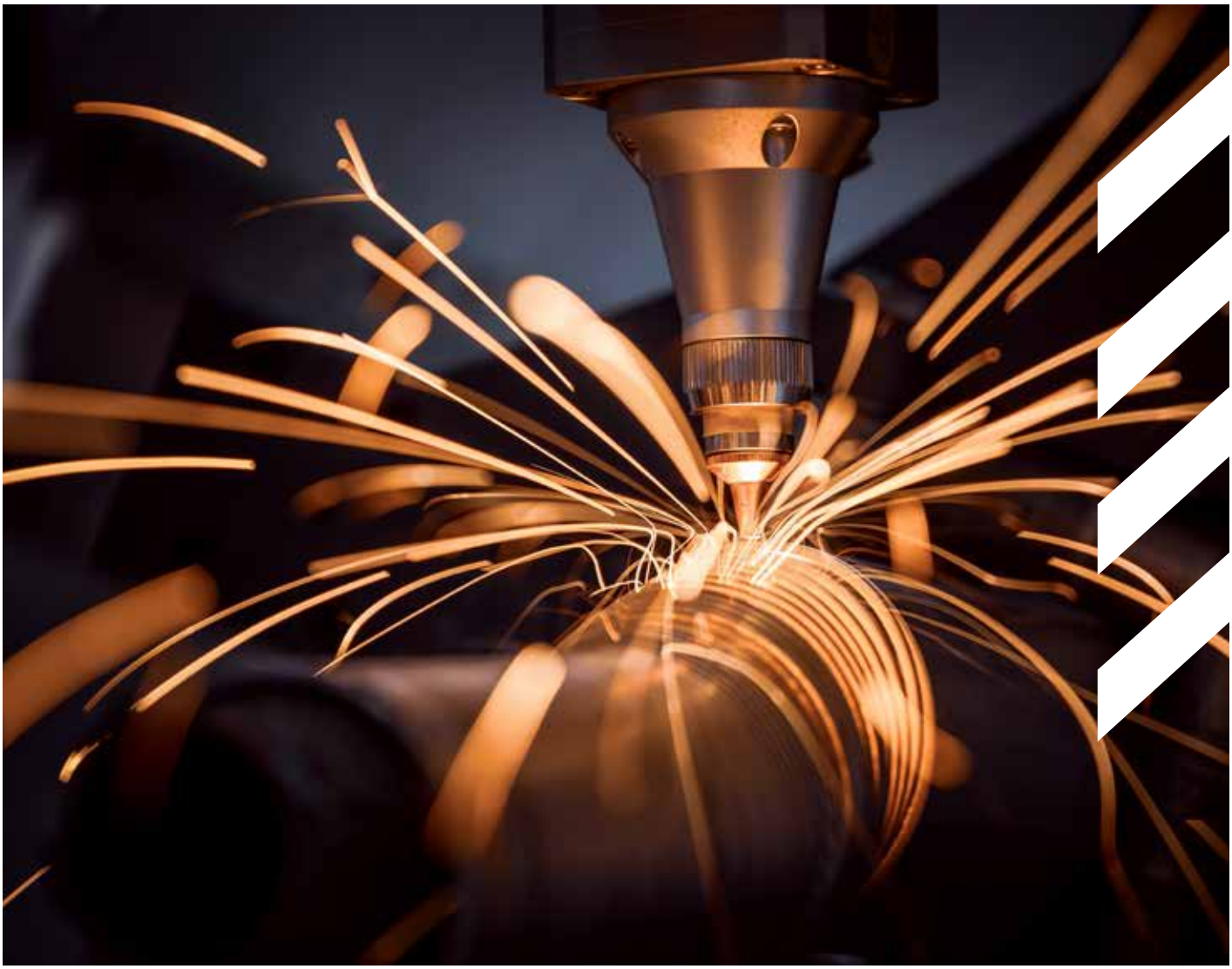
Sources: Transition Pathway Initiative, open data of the companies

WHAT DRIVES DECARBONIZATION IN THE MINING AND METALLURGICAL SECTOR?

According to the results of the EY survey in 2022, international operators of the mining and metallurgical sector associate the main business risks and opportunities with the "three pillars" of sustainable development: environmental, social and managerial factors (ESG) and decarbonization. In the last four years, the demand for ESG has more than doubled. 72% of respondents stressed the importance of ESG in formation of their asset portfolio, compared with 32% in 2018[4].

[1] *Metals & mining decarbonisation and sector disclosure | Article | ING Think*
[2] *Zero Emission Copper Mine of the Future, Warren Centre, University of Sydney, May 2020*
[3] *The Role of Critical World Energy Outlook Special Report Minerals in Clean Energy Transitions, World Energy Outlook Special Report, International Energy Agency, March 2022*
[4] *ey-final-business-risks-and-opportunities-in-2022.pdf*

THE AGENDA OF THE MINING AND METALLURGICAL INDUSTRY OF KAZAKHSTAN



ESG factors become decisive for the attractiveness and long-term success of investments. Being underestimated in the past, their importance has recently been demonstrated everywhere from the coast of Peru to the steppes of Kazakhstan, often in the form of strikes, which leads to significant losses in production volumes.

The driving factors of decarbonization in the mining and metallurgical industry are the tightening of international and national regulation in order to reduce emissions. Thus, the EU package of measures (Fit for 55), and in particular, the cross-border carbon regulation mechanism (CBAM) introduce additional payments for importers of iron, steel and aluminum. Next year, it is planned to introduce a requirement for mandatory reporting on the carbon intensity of the supplied products, and in 2026 – the full implementation of a mechanism where the supplier will have to purchase a certificate of carbon intensity of products at carbon prices set in the EU market. These requirements will not apply only to those producers who have already paid for their emissions in the country of production. For reference, the carbon price in the European Emissions Trading System (ETS)

at the beginning of 2021 amounted to 30 euros per ton of CO_2[5], whereas in Kazakhstan the price will increase from 1 euro/ton of CO_2 in 2022 to 15 euros/ton of CO_2 in 2023-2025.

At the national level, Kazakhstan plans to reduce the number of quotas for GHG emissions by 2030, and to introduce a carbon tax for non-quota emissions of smaller enterprises in 2023-2025. The Doctrine on achieving carbon neutrality of the Republic of Kazakhstan until 2060 focuses on those areas of industry that will primarily be affected by CBAM (aluminum, steel). The document highlights the existing potential to reduce the carbon footprint by increasing waste recycling for the production of "green" aluminum and steel, replacing coal with natural gas and hydrogen, technological transformation, carbon capture and storage mechanisms and equipment modernization.

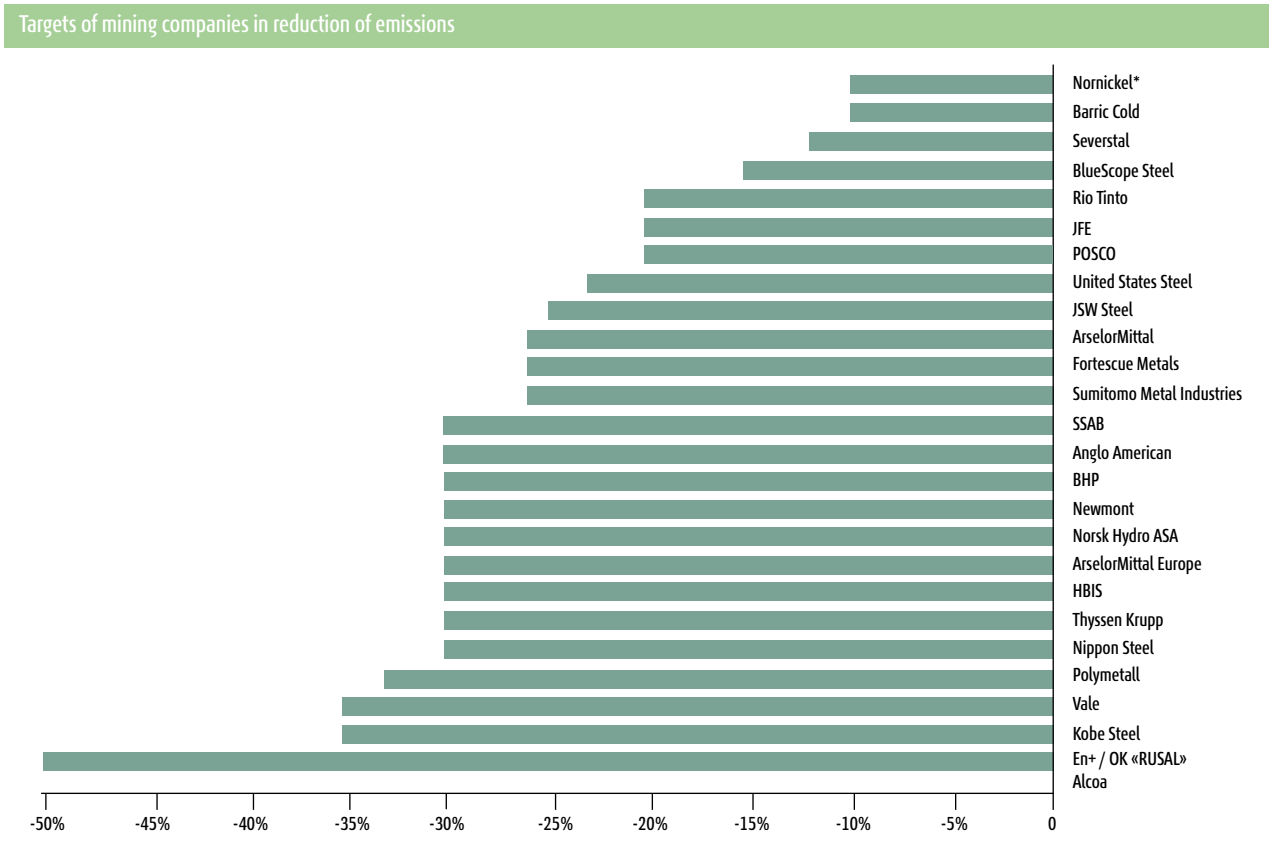
HOW TO DECARBONIZE THE MINING AND METALLURGICAL SECTOR OF KAZAKHSTAN?

As a result of these new developments, there is a risk of increasing the cost of production in the industry. In order to reduce the impact of these measures and adapt the sector to stricter climate regulation, it is recommended that business decarbonization strategy be developed right now, integrate it into all business processes of the company so that it becomes not an "appendage" of the business, but a key indicator of its effectiveness.

The largest players in the industry have already announced quantitative goals (Figure 2) and an action plan to reduce direct and indirect emissions generated during the extraction and production of metals (Table 1). Thus, to reduce Scope 1 and 2 emissions the asset portfolio is revised with more emphasis placed on less carbon intense assets and substituting coal with renewables and hydrogen, as well as energy recycling using batteries instead of fossil fuels in different areas of application. At the same time, measures are being taken to improve energy efficiency by introducing new technologies and improving operational processes, which often has the additional advantage of increasing labor productivity.

[5] *Effective Carbon Rates 2021, OECD, 2021*

Figure2. Targets to reduce GHG emissions by mining and metallurgical sector giants by 2030



* with increase in production by 30-40%

Source: open data of the companies

The set of tools for each operator in the industry will be individual, but it is already possible to distinguish the following:

• Preparing scenarios to determine the scale of activities and using this data to develop a strategy for decarbonizing the business, taking into account changing conditions, which will prompt the direction of the flow of capital and operating expenses;

• The change in the fuel and energy balance traditionally formed by the burning of coal towards the predominance of renewable energy and hydrogen;

• Reducing the energy intensity of production by introducing the best available technologies (for example, melting in an electron-arc furnace);

• Formation of tandem between mining and metallurgical assets pursuing similar goals of decarbonizing products in the supply chain offers opportunities not only to share the financial burden, but also to reduce category 3 emissions;

• Participation in emissions trading systems on both mandatory and voluntary carbon markets already has its advantages in the world in the form of carbon tax reduction (Colombia, South Africa);

• Introduction of carbon capture, utilization and storage systems (CCUS) with the possibility of recycling carbon dioxide in the technological cycle;

• The use of blockchain technologies to track and identify opportunities for the reuse of raw materials in metallurgical production.

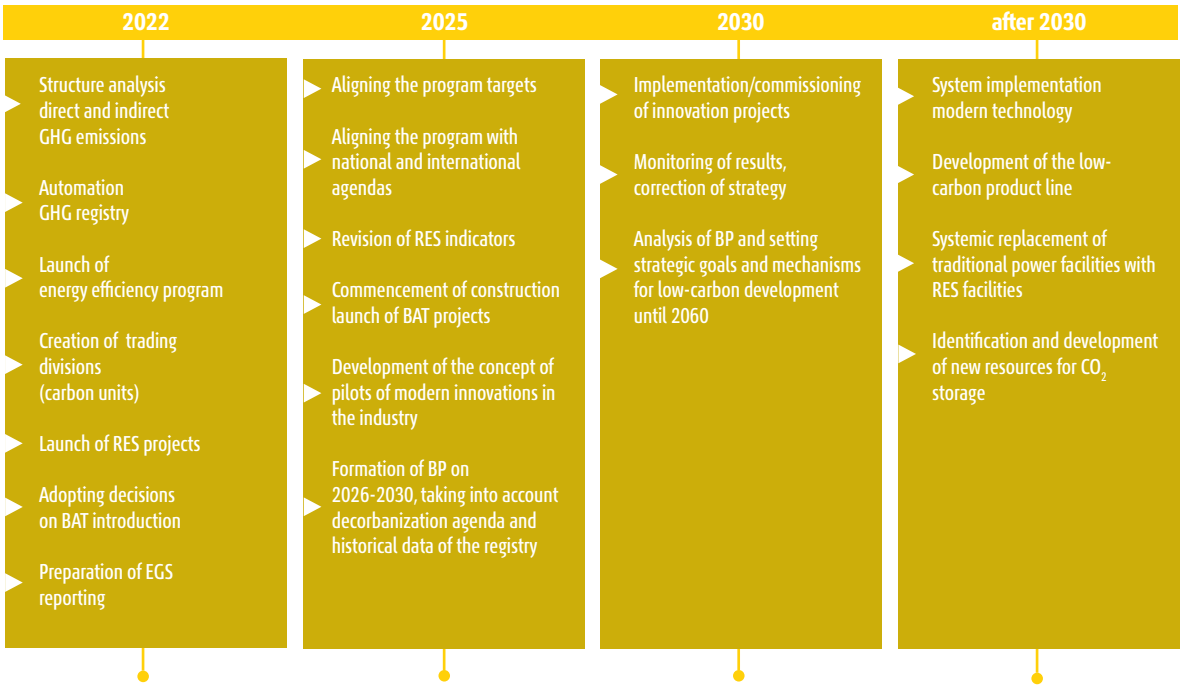
Table1. Goals and objectives of transnational MMCs to reduce emissions of categories 1 and 2, 3

Decarbonization direction	Stated goal	Description	Companies
Operational improvements	-20%	• introduction of electrical equipment for mining and transportation in underground mines • reduction of production of hard-to-reduce emissions, • production of "green economy" metals	Rio Tinto BHP Teck Resources Codelco Aurubis Nornickel UMMC Russian Copper Company
Asset portfolio optimization	-50%	• priority to low-carbon assets • support for broad and effective carbon pricing • increasing resilience to climate risks	Rio Tinto BHP Teck Resources Codelco Aurubis Nornickel
New business model	-75%	Development of new low-carbon business lines (renewable energy, electric vehicle charging stations, hydrogen, CCUS)	
Carbon neutrality	-100%	Achieving zero emissions in the long term, including by offsetting emissions by 2050.	Rio Tinto BHP Teck Resources Codelco

Currently, the replacement of coal with RES at the enterprises of the sector can be successfully synchronized with the state program to increase the share of RES in the country's energy sector to 15% by 2030 and 50% by 2050. This opens up opportunities to receive government support, investment preferences and access to financing by international institutions (EBRD, UNDP, etc.).

In addition, the country already has a platform for trading unused emission quotas, which, in light of the implementation of CBAM and the reduction in the number of quotas by the Government of the Republic of Kazakhstan, may bring additional profit and eliminate cross-border export fees. According to forecasts, both in the mining and metallurgical industries, the national carbon quota plan for 2022-2025 assumes a reduction of quotas by 1-2% with each subsequent year.

It is expected that the progress on decarbonization of the mining and metallurgical sector of Kazakhstan will be as follows:



Decarbonization presupposes the next world revolution – the abandonment of coal. World leaders have already announced the termination of state subsidies for the extraction of thermal coal, and the EU countries have made it clear that the number of permits for emissions will decrease linearly with each passing year, and the price of carbon will increase.

According to the results of the last five-year plan, it is obvious that the trade turnover between Kazakhstan and the EU countries is growing (in 2021 it amounted to about 40% of the total volume of exported goods[6]), while the export of metals and products from them (copper, aluminum, rolled metal), ferroalloys and metal-containing ores consistently ranks second and third after hydrocarbons. Therefore, urgent and effective measures are needed to reduce the fiscal burden on the mining and metallurgical industries, maintain and even increase the presence of Kazakh products on the European market. In order to remain competitive, industry companies will have to achieve a dynamic equilibrium, where operating costs and capital investments are offset by new or expanded sales markets and stable investment injections in a favorable social climate.

[6] *Results of foreign trade of the RK for 2021 - Economic Research Institute (economy.kz)*

GREEN CLIMATE HUB: prospects for Central Asia region

Saule Bishimbayeva,
Head of the Center of Commercialization Competencies of Technologies, IGTIPC NJSC, PhD in Economics

Kazakhstan following global trends, sets ambitious goals in the fight against climate change – to achieve carbon neutrality by 2060 – and also to act as a regional climate hub of Central Asia for sustainable development.

In this regard, the President of the Republic of Kazakhstan, Kassym-Jomart Tokayev, at the recent 4th Consultative Meeting of the Heads of State, held on July 21 this year in Cholpan-Ata, emphasized the need to consolidate the efforts of the Central Asian countries in overcoming the consequences of climate change and taking urgent joint measures:

«...I am deeply convinced that it is no longer possible to overcome the consequences of climate change in Central Asia without consolidating our efforts. Therefore, in order to coordinate joint actions, we propose to establish a Central Asian project office for environmental protection and implementation of a coordinated policy on climate change in the region.»

President of Kazakhstan Kassym-Jomart Tokayev

This message of the Head of State is inextricably linked with the modern climate challenges faced by the countries of Central Asia - rising temperatures, growing demand for water and energy resources, which as a result affects the environmental security of the region on a global scale.

These challenges dictate the need for the accelerated development of certain areas of innovation and technological developments ("clean" energy, waste-free technologies, new technologies for efficient water management, convergent technologies, etc.), for many of which there are certain groundwork in the countries of Central Asia, but there is low level of their development and implementation.

Thus, according to the rating of the Center for Environmental Policy and Law of Yale University in the USA, the countries of Central Asia occupy very low positions in the rating of environmental efficiency.

Out of 180 countries, Kazakhstan ranks 85th (index - 44.7), Uzbekistan – 89th (index – 44.3), Turkmenistan - 92nd (index – 43.9), Kyrgyzstan – 105th (index – 39.8), Tajikistan 114th (index – 38.2) after Algeria and Burkino Faso. At the same time, the general trend of being behind in all five countries of Central Asia is growing, and the level of air pollution in these countries is exacerbating every year.

This rating was calculated using two aggregated indicators of respondents – the viability of ecosystem and the state of environment, which in turn were formed from 32 indicators:

- Air quality;
- Emissions of pollutants (SO_2, NOx);
- Water resources, drinking water;
- Climate change (CO_2, N_2O, CH_4, GHG);
- Biodiversity and habitat;
- and others.

This rating once again confirms

the fact that the low environmental performance of the countries of Central Asia is a consequence of the aggravation of the environmental problems of the region, as well as the low level of implementation of environmentally friendly technologies in the countries of Central Asia, which is also a consequence of the lack of close interaction between the countries of Central Asia in solving problems of climate change and the environment.

Currently, the common problems of the Central Asian countries can be identified as:

- **Temperature increase,** climate warming. The temperature increase over the past 40–50 years has been observed throughout the territory of Central Asia, which exceeds the global average. The number of hot days above 40 °C is increasing, which has a negative impact on agriculture and people's well-being.
- **Tragedy of the Aral Sea.** One of the largest in the history of global environmental disasters in Central Asia is the tragedy of the Aral Sea. The Aral Sea crisis zone covers the territories of Turkmenistan, Kazakhstan, and Uzbekistan, as well as indirectly - Tajikistan and Kyrgyzstan.
- **Problems of transboundary water resources management.** The Central Asian countries have common ecosystems and rivers, where it is necessary to solve the problem of parity distribution of transboundary waters.

To overcome these and many other environmental problems, the Central Asian countries need technological transformation and the rapid exchange of efficient and cost-effective green technologies that would maintain balance and safety and restore the environment. Also, they can only be solved together, by combining the efforts of all partners from the countries of Central Asia to meet the environmental challenges for the transition to a green economy by creating a favorable environment for the development of innovations and the introduction of green technologies in the countries of this region.

It should be noted that according to UNIDO data, the global market for green technologies in the next decade is 6.4 trillion US dollars, of which 1.7 trillion US dollars is for the development of green business in developing countries.

Therefore, new opportunities and prospects are also opening up for the Central Asian countries within the framework of the climate agenda - through regional cooperation, to become growth engines for green companies in the Eurasian economic space.

KAZAKHSTAN AS A LEADER OF THE REGIONAL CLIMATE HUB

Within the framework of the COP 26 climate summit, held in 2021 in Glasgow, Kazakhstan proposed the creation of a Central Asia Climate Hub to address environmental problems of a regional and transboundary nature.

Currently, Kazakhstan has every opportunity to become a Leader in organizing a regional platform for green technologies – the Central Asian Climate Hub (hereinafter referred to as the Green Climate hub).

Kazakhstan is one of the first Central Asian countries that signed the Paris Agreement and, according to the concept of transition to a “green” economy, the country should increase GDP by 3% by 2050, increase the share of renewable energy to 15% by 2030, and reduce greenhouse gas emissions by 2030. by 15% of the 1990 level.

Considering Kazakhstan's geographic location in the Central Asian region and the intention to develop financial and institutional capacity for green technologies, Kazakhstan is a favorable place for attraction of the innovative activity in the field of green technologies to support business and all stakeholders.

Figure 1. Green Climate hub

Figure 2

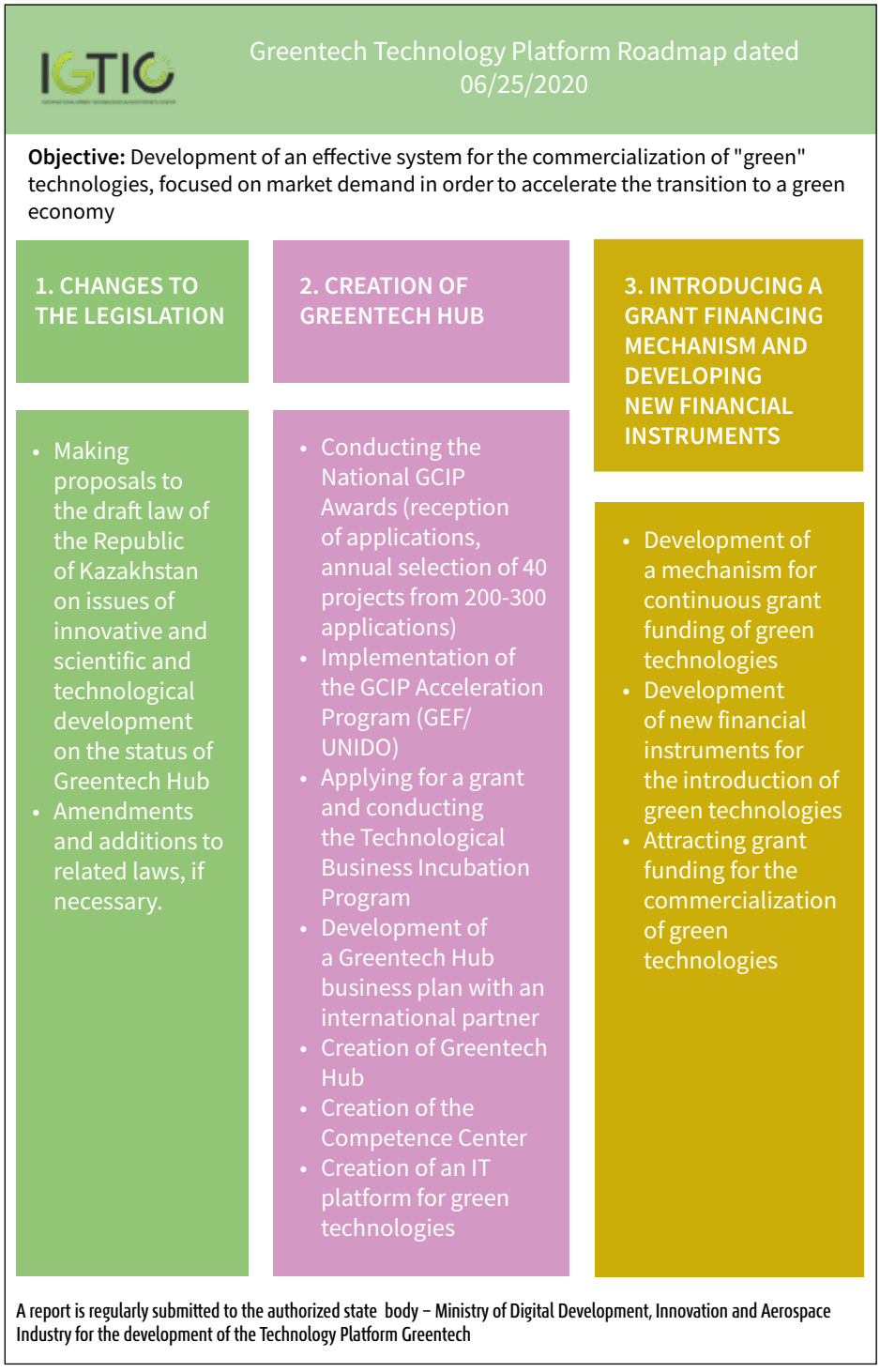
WHAT ARE INNOVATION HUBS?

According to the Massachusetts Institute of Technology University (MIT), Innovation Hubs are centers of attraction for innovation activity, where dense networks of interconnected technology companies and technology customers are concentrated.

As a rule, hubs are special territories or spaces where conditions are created to revive the possibilities of the economy by stimulating a favorable environment for accelerated development and promotion of innovations in various industries and areas.

The main task of innovation hubs is to create and support professional innovation platforms, the success of which depends on the involvement of all key partners from the private and public sectors.

Typically, innovation hubs are created as independent legal entities that own a single material and technical complex on the basis of ownership or other legal grounds, where favorable conditions are created for the development of technological entrepreneurship in the relevant industry or area.



It should be noted that the creation of the GreenTech hub is one of the key activities in the implementation of the Roadmap for the development of the Green tech technology platform, approved on June 25, 2020 by the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan (hereinafter MEGNR) and is aimed at the implementation of three components: (Figure 2).

The roadmap was developed as part of the instructions of the Head of State (reg. No. 19-01-7.30 dated 23.08.2019), together with the Ministry of Innovation, Digital Development and Aerospace Industry (hereinafter MIDDAI), where approaches were developed to prioritize the development of green technologies in innovation policy of the country.

The activities of the Green Climate Hub will be aimed at the

commercialization of product innovations (batteries, cars, solar panels, sensors, micro-grid components, etc.), with economic incentives for the development of startups, where service support, acceleration, and business incubation of startups will be carried out at early stages. stages. This is due to the fact that over 70% of green projects in the country are projects at an early stage of readiness for implementation.

The creation of the Green Climate Hub will allow, with the help of state support instruments and special tax preferences, to revive the possibilities of the economy by stimulating an innovative environment for the development of green technologies and technological entrepreneurship.

LAUNCH OF GCIP- KAZAKHSTAN PROGRAM

This year, the launch, together with GEF/UNIDO, of the 3-year GCIP – Kazakhstan – "Global Cleantech Innovation Program in Kazakhstan – Promoting Cleantech Innovation and SME Entrepreneurship to Create Green Jobs in Kazakhstan" could be a good foundation to create a GreenTech Climate hub.

The project is unique in that Kazakhstan is becoming part of a large Global GCIP platform covering 15 developing countries, and it is aimed at implementing transformational changes through the implementation of three components (Figure 3).

Currently, GCIP has become the basis for creating national Cleantech accelerators and incubators in 10 countries: Turkey, India, Armenia, Malaysia, Thailand, Pakistan, South Africa, Morocco, Moldova, and Ukraine.

The National Green Startup Competition will be held annually, which will identify the most promising innovative entrepreneurs across the country for their subsequent support in the form of startup acceleration, risk reduction and linking them with potential investors, clients and partners.

This will eliminate market and policy shortcomings that hinder the emergence, deployment and implementation of environmentally friendly technologies in the long term, which will help Kazakhstan to make a leap to a more environmentally friendly economy.

The CUP Kazakhstan competition will give priority to women entrepreneurs, coaches, mentors (at least 35%).

MISSION, GOALS AND OBJECTIVES OF THE GREEN CLIMATE HUB:

✓ **The Green Climate hub** is a special area where favorable conditions will be created for the implementation of innovative activities in the field of adaptation of the Central Asian states to climate change, commercialization, and transfer of green technologies.

✓ **The mission of the Green Climate hub** is to become a center for the development of innovative projects and breakthrough companies in the Central Asian region in the field of green technologies, as well as a center for technological entrepreneurship and attraction of a critical mass of talented specialists, and thereby to accelerate the process of transition of the Central Asian countries to a green economy.

✓ **The purpose of creating the Green Climate hub** is to promote innovation in the field of green technologies through an intersectoral and multilateral approach to reducing greenhouse gas emissions

Global clean technologies innovation programme for creation of "green" jobs in Kazakhstan (GCIP-KAZAKHSTAN)

IGTIC

Global Cleantech Innovation Programme 15 COUNTRIES

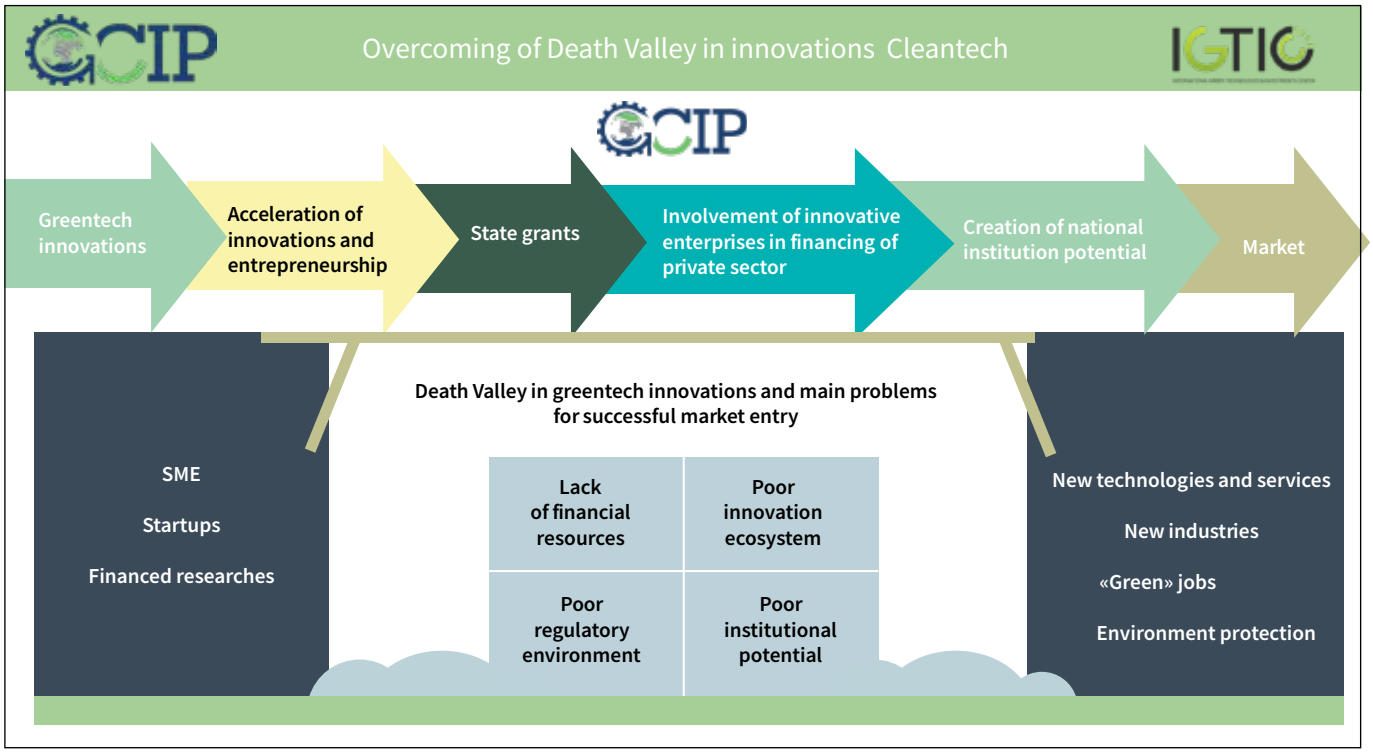
Turkiye, RSA, Ukraine and Morocco have extended for another few GEF cycles

GCIP COMPONENTS

1. CONVERSION OF INNOVATIVE SOLUTIONS CLEANTECH AT EARLY STAGE INTO COMMERCIAL ENTERPRISES	2. STRENGTHENING AND UNIFYING THE CLEANTECH ENTREPRENEURSHIP AND INNOVATION ECOSYSTEM (CIEE))	3. KCOORDINATION AND CONSISTENCY OF THE PROGRAMME
• Pre-acceleration, acceleration • Identifying the best ideas and technologies for the development of green business • GCUP Forum and National Competition • Investor connect and technology brokerage events • Continuous post-acceleration support	• Strengthening clean technology policy • Creating an innovative ecosystem • Certification and training of trainers, mentors, investors • Train-the-trainer	• Monitoring and evaluation • Coverage and dissemination of knowledge

Figure 3.

Figure 4.



and creating a sustainable regional innovative ecosystem of green technologies for companies in the Central Asian countries in the following areas:

- Alternative energy (including hydrogen energy)
- Energy efficiency
- Adaptation, use of transboundary waters
- Green Building
- Waste management
- Modern materials and chemicals
- Transport

✓ **The key task of the Green Climate hub** is to ensure a high-quality flow of green technologies and projects for their further implementation in production, taking into account environmental and economic efficiency (and, as a result, social efficiency), i.e., reducing the negative impact on the environment and improving the quality of life of the population.

HOW CAN THE GREEN CLIMATE HUB WORK?

With appropriate political support, the Green Climate Hub can play a key role in creating a regional innovation platform - an ecosystem of "green" technologies, coordinating the process of adaptation to climate change in the Central Asian countries, commercialization, and transfer of technologies, focused primarily on the technological demand of the Central Asian region.

MAIN STREAMS OF THE GREEN CLIMATE HUB:

Stream 1

Continuous support of companies from the Central Asian countries in the field of green technologies for the development of commercially successful companies;

Stream 2

Strengthening a favorable innovation ecosystem of entrepreneurship for the creation of new regional projects and programs;

Stream 3

Transfer of technologies and exchange of competencies between the countries of Central Asia;

Stream 4

Monitoring and collection of environmental information in the Central Asian region;

Stream 5

Coordination and consistency of actions of Central Asian countries.

IMPLEMENTATION OF STREAM 1

Green technology companies differ from typical companies in that the business is most often built on physical components (batteries, cars, solar panels, sensors, micro-grid components, etc.). Therefore, unlike, for example, IT technologies (process innovations), the commercialization and implementation of green technologies (product innovations) is a more complex process and companies have a longer "valley of death".

It takes time for companies to mature, higher levels of financial backing, and a variety of skills to succeed: accelerated prototype development, intellectual property protection, building and then scaling production, go-to-market strategy.

The Green Climate hub will consider projects with ready and proven technology, when all scientific research has already been completed and there is evidence of the existence of a well-defined product or service with properties and benefits that

can be evaluated and tested by commercial customers. Assistance in the commercialization of green technologies will end when the product is successfully launched on the market.

Continuous support for entrepreneurs can be carried out through acceleration programs, technological business incubation (hereinafter referred to as TBI) – a program of continuous support for projects that provide entrepreneurs with opportunities and access to networks of investors/clients - informational, technological, legal, economic assistance.

As part of TBI, the Green Climate hub can provide the following range of services: project expertise, marketing services, assistance in creating prototypes, developing business plans, legal, information and consulting support, attracting investments, project management, as well as other services necessary for the implementation of green projects in the Central Asian and GBPP countries.

Green finance promotion methods based on the best world practices will be applied to achieve the SDGs defined by the UN by countries. In Kazakhstan, such activities are already classified into a single taxonomy. Moreover, in Kazakhstan, there is a strong relationship between the best available technologies and green technologies at the level of the new Environmental Code. This positive experience is proposed to be transferred to all countries of the Central Asian region.

With the help of comprehensive support through TBI programs and incentives for green companies, it is possible to accelerate the technological transformation of the Central Asian countries in the field of green climate technologies. In this case, the introduction of any green technology will be evaluated in terms of its environmental and economic efficiency, i.e., taking into account the impact on the environment and human health.

IMPLEMENTATION OF STREAM 2

Based on the best practices of countries, an innovative platform will be created. This an ecosystem of green technologies will bring together all market players - specialized companies, large businesses, SMEs, authorities, development institutions, research institutes and universities, NGOs for cooperation and integration of information, technology and financial resources in order to create new products and technological solutions.

This platform will eliminate the gaps between the players in the green technologies market and

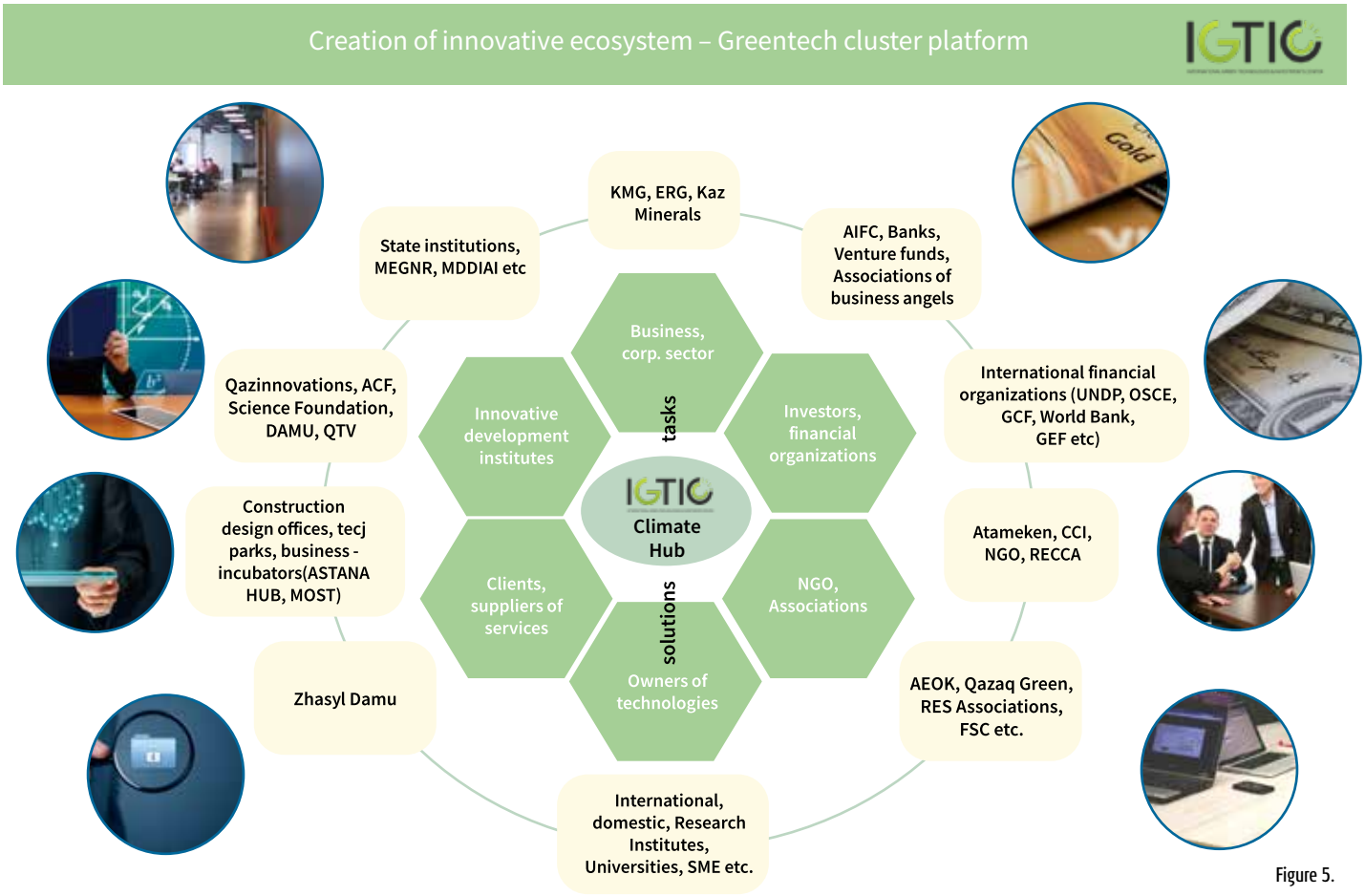


Figure 5.

will be the basis for creating a favorable environment for the development of innovations and the use of competitive advantages by combining the competencies of various stakeholders, and ultimately lead to the creation of joint projects and programs of the Central Asian countries. The success of the innovation platform will depend on the degree of involvement of all partners from the public, scientific and business sectors.

To do this, a competency map (mapping) will be created – this is the process of identifying the knowledge, skills, and contacts of organizations and their comprehensive classification,
which will determine the strengths and
weaknesses of the participants in the innovation platform. This will allow you to determine which area can be improvedthrough joint activities and cooperation between platform participants and to develop a specific strategy to use existing strengths. Networking events, seminars,
technology brokerage events will be held regularly, where investors, project/technology developers and representatives of legal entities meet.
These events will result in co-operation of teams and partners.

To be effective, a Green Climate hub must be inclusive of a range of partners, drawing on a range of sources of knowledge and experience, and leveraging different types of resources, while maintaining flexibility and coordination. Partners need to be engaged, motivated, and persuaded to cooperate with each other.

The effective functioning of the innovation platform will contribute to the dissemination of new "green" technologies among the countries of Central Asia, based on the collaboration of countries, the partnership of the state with business, the public and international organizations. At the same time, the focus on practical results in the promotion and implementation of green technologies and projects remains an important aspect.

Also, the innovative platform can be strengthened by a digital platform in order to systematize a huge flow of information and become a single window in the field of green technologies for all partners in the region.

IMPLEMENTATION OF STREAM 3

The transfer of technologies and the exchange of competencies between the Central Asian countries will be aimed at adapting to climate change and solving common environmental problems of countries of this region.

Currently, a Charter has been signed between 16 GBPP countries, which will include new Central Asian countries.

However, to start practical activities on technology transfer, exchange of knowledge and competencies between the Central Asian countries, it is necessary to develop a mechanism for technology transfer between the Central Asian countries based on the best world experience. In addition, it is necessary to take into account the national legislation of each country in the field of Intellectual Property protection, to develop general legal acts on the transfer of technology or joint ownership of IP. It is also necessary for all Central Asian countries to join various international technology transfer networks such as WIPO GREEN and others.

As part of the exchange of competencies, at the national level in the Central Asian countries, it is necessary to move towards the introduction of the best available technologies. An increasing number of governments are making efforts to use a BAT approach. Among the Central Asian countries, Kazakhstan is the first state to apply BAT approaches that could transfer its experience, knowledge, and competencies in the implementation of this approach.

IMPLEMENTATION OF STREAM 4

The fight against climate change requires a long-term strategic approach and monitoring of the environmental situation. One of these areas is adaptation to climate change and preparation for its expected consequences. Adaptation is a global challenge that affects everyone at the national, regional, and international levels.

Moreover, for the correct implementation of measures to accurately determine the risks, it is necessary to model situations with climate change and the consequences of its change. In this regard, the countries of Central Asia may need to create an integrated digital information system. It should be noted that this area is very extensive, labor-intensive, requiring large financial investments.

IMPLEMENTATION OF STREAM 5

Effective implementation of the above directions requires clear coordination and compliance of actions of the Central Asian countries. In this regard, it is necessary to agree and subsequently legalize the mechanism of interaction, as well as to monitor the effectiveness of the current program.

One of the important components of activities of the Green Climate hub will be the creation of the Coordinating Center of the Central Asian countries, where clear coordination of activities, monitoring, and evaluation, as well as coverage and dissemination of knowledge will be carried out. In this regard, the Project Office of the Central Asian countries, the creation of which was announced at the meeting of the heads of state in Cholpon-Ata, could

play the role of such a coordinating center.

With the right development of regional interaction and the introduction of working business models, the Green Climate hub can become one of the effective regional mechanisms for implementing the climate agenda and achieving the goals of the Paris Agreement by Kazakhstan.

Therefore, it is desirable that the Green Climate hub to be created together with an experienced international partner with a history of success in implementing an effective business model for the operation of an innovation hub in the field of environmentally friendly technologies.

CONCLUSION

Thus, the creation of the Green Climate hub will allow, using a systematic approach, to carry out a technological transformation, as well as to revive the opportunities of economies of the Central Asian countries by stimulating a favorable environment for creating a green business and developing technological entrepreneurship, attracting investments.

In essence, the Green Climate hub is a way to solve regional environmental problems on a mutually beneficial and self-sustaining basis, where the modernization of production should be evaluated in terms of environmental and economic efficiency, i.e., taking into account its impact on the environment, as well as the benefits for both technology developers and industrial companies themselves.

Benefits for the Central Asian countries:

Best practices clearly show that the pace of learning new knowledge in the field of ecology and environmental protection can be significantly accelerated through a set of active coordinated actions and interactions in the field of climate change adaptation, technology commercialization and development of technological entrepreneurship, stimulated and supported at the level of regional government policies.

For Kazakhstan, the creation of a Green Climate hub – a territory of innovative activity for green technologies – will bring closer the achievement of the indicators of the Strategy – 2050 and the Concept for the transition of the Republic of Kazakhstan to a green economy and will establish technological cooperation and technology exchange with all countries of Central Asia.

The creation of the Central Asian hub of green technologies "Green Climate Hub" will solve the main tasks of the Central Asian countries:

1. Promoting multisectoral cooperation in Central Asia at the national and regional levels to solve environmental problems.

2. Establishment of an intersectoral dialogue in Central Asia with the participation of SMEs and the entire business community of countries.

3. Facilitating the attraction of advanced knowledge, best international practices and technologies in the field of environmental management and sustainable development to Central Asia.

For Kazakhstan, the creation of a Green Climate hub - a territory of innovative activity for green technologies - will bring closer the achievement of the indicators of the Strategy - 2050 and the Concept for the transition of the Republic of Kazakhstan to a green economy and will establish technological cooperation and technology exchange with all countries of Central Asia.

In addition, the Green Climate hub will contribute to the implementation of the Green Bridge Partnership Program, designed to strengthen the "green" economic growth in the region, which was approved in 2012 at the UN World Summit on Sustainable Development "Rio + 20" as an interregional mechanism open to for all parties. At the same time, the main goal of the Green Bridge Partnership Program (hereinafter-GBPP) is to achieve an optimal level of consumption of energy and other natural resources by all countries of the world by the middle of the 21st century.

The development of the Central Asian Green Climate Hub will create significant benefits for the countries of Central Asia and will create new green jobs, find technological solutions for the environmental problems of industrial enterprises in the region, which will subsequently improve the state of the environment of these countries.

This will create in the countries of Central Asia a real practical system for the accelerated promotion of "green" technologies, as a result of which the number of successful commercially implemented "green" technologies and projects will increase, which in turn will increase the added value for the local and regional economy, will allow the integration of the countries of Central Asia in the field of "green" climate technologies.

7 BASIC PRINCIPLES OF THE NEW ENVIRONMENTAL CODE OF THE REPUBLIC OF KAZAKHSTAN

THE FIRST PRINCIPLE IS
THE POLLUTER PAYS AND CORRECTS

1. It implies pollution prevention and control measures, but also responsibility for recovery from environmental damage. Thus, the state should create such conditions under which it is more profitable for nature users to take measures to prevent negative impacts on the environment than to pay environmental fines. In a word, the mechanism of "prevention". In addition, the polluter who has caused environmental damage is obliged to restore the environment to its original level.

THE SECOND PRINCIPLE IS
NEW APPROACHES TO ENVIRONMENTAL IMPACT ASSESSMENT

2. According to the current Environmental Code, the requirement to pass the environmental impact assessment procedure (EIA) applies to almost all, that is, 19 thousand enterprises. Such an approach is ineffective and impractical. Therefore, the new Environmental Code proposes to apply this requirement only to 2.6 thousand enterprises of the "first category", which account for 80% of emissions. At the same time, the public participates in all stages of the EIA.

THE THIRD PRINCIPLE IS
THE INTRODUCTION OF THE BEST AVAILABLE TECHNOLOGIES (BAT) AND ECONOMIC INCENTIVES

3. To maximize the environmental situation, it is necessary to implement the best available technologies. For this purpose, industrial enterprises undergo a technological audit. They are offered technologies that will reduce emissions. Enterprises that have implemented BAT will be exempt from emission fees. If they do not switch to BAT, their emission fee rates will increase.

4. At present, the current legislation does not require spending on environmental protection measures of funds received from payments for emissions into the environment. Therefore, local executive bodies allocate from 0 to 400% for environmental protection, on average 45% only. The current situation with environmental payments and their spending has been repeatedly criticized by international experts. In this regard, the draft accompanying law provides for mandatory financing of environmental protection measures at the expense of incoming environmental payments in the amount of 100%.

5. In order to obtain timely and reliable information on the qualitative and quantitative composition of emissions and discharges, the draft Environmental Code provides for mandatory automation of industrial environmental monitoring with data transmission to the authorized body.

THE FIFTH PRINCIPLE IS
THE CREATION OF AN AUTOMATED EMISSION MONITORING SYSTEM

THE FOURTH PRINCIPLE IS
TO DIRECT THE PAYMENT FOR EMISSIONS TO ENVIRONMENTAL MEASURES

THE SEVENTH PRINCIPLE IS
TO IMPROVE THE MANAGEMENT OF PRODUCTION AND CONSUMPTION WASTE

THE SIXTH PRINCIPLE IS
TO STRENGTHEN ENVIRONMENTAL CONTROL

7. The draft of the new Environmental Code focuses on the implementation of the principles of circular economy used in the OECD countries. Within the framework of this project, a waste hierarchy is envisaged, which is aimed at step-by-step waste management, that is, a sequence of measures aimed at preventing the formation, reuse, recycling, and disposal of waste. In order to reduce the number of unauthorized landfills, licensing of the activities of enterprises engaged in the processing and disposal of waste, and a notification procedure for garbage collection organizations will be introduced.

6. The draft accompanying law proposes to amend the Entrepreneurial Code in terms of conducting inspections on facts directly affecting the living conditions of the population. These changes are aimed at rapid response to the facts of negative impact on the environment. The responsibility for environmental offenses is strengthened by increasing administrative fines by 10 times.

INTERVIEW

How scientists of Nazarbayev University introduce "green" technologies in the field of heat supply of Nur-Sultan city

One of the recognized centers for the dissemination of knowledge and awareness in the field of renewable energy sources (RES) in Kazakhstan is Renewable Energy Testsite, operating under the PI "Nazarbayev University Research and Innovation System" (NURIS). University scientists are successfully implementing vacuum solar collectors in the local district heating system, which provide heat and hot water supply to facilities of the Nazarbayev University campus. The editorial board of QazaqGreen magazine asked Aidar Zhakupov, CEO of NURIS, Candidate of Technical Sciences, to share his achievements in this field.

NAZARBAYEV UNIVERSITY
RISK-TAKING
INSPIRATION SYNERGY

CEO of PI "NURIS",
Candidate of Technical Sciences
Aidar Zhakupov

– Aidar Beksultanovich, two years ago you told the readers of QazaqGreen magazine in detail about the activities of the NURIS renewable energy testsite. In social media, we observe a shift in the activity of this testsite towards the development and implementation of renewable energy in the field of heat and hot water supply. What is the reason for this change in priorities in the development of the activities of the renewable energy testsite?

– I am very pleased that you remembered my previous interview about the activities of the NURIS renewable energy testsite. Feedback from our target audience is very important to us, and we intend, along with conducting a series of webinars in the field of renewable energy, to inform our colleagues about the current achievements of the renewable energy testsite. As I noted earlier, an increase in the share of renewable energy generation by 3% in the production of electric energy in 2020 in Kazakhstan using wind turbines and photovoltaic systems, unfortunately, did not lead to an improvement in the environmental situation in cities and settlements. It is clear that the main factor of outdoor air pollution remains the traditional use of coal in heating systems of individual housing. I understand that people need a comfortable temperature in their individual housing, but it causes me emotional stress when I, a resident of the capital, cannot afford to open a window in my apartment to let some air into my bedroom before going to bed. Suffocating smog from stove heating causes a contradictory feeling among many citizens: how did it happen that we, living in the age of digital and space technologies, have not gone far from our cave ancestors, heating their primitive dwellings with fire? Therefore, we decided to intensify the activities of the renewable energy testsite in the direction of expanding the introduction of renewable energy in heating and hot water supply systems. Moreover, we had significant developments in this direction and experience in the successful implementation of a pilot project for design and construction of an energy-efficient house in the form of a Shell-yurt, with full provision of heat from renewable energy sources (solar collectors and a heat pump).

– Can you tell us more about the system of vacuum solar collectors integrated into the local district heating and hot water supply of townhouses and cottages in the campus of Nazarbayev University.

Figure 1. Townhouse No. 6.

–As facility for the installation of the system, a townhouse with a total area of 347 square meters was chosen, in which the Rastigrad kindergarten is located.

The objectives of the introduction of solar systems for heating and hot water supply are: 1) to demonstrate the use of renewable energy sources (solar collectors) for local district heating of residential buildings in the climatic conditions of Nur-Sultan; 2) to reduce CO2 emissions, reduction of energy costs for heating and hot water.

When designing the heating system, it was necessary to know the initial data:

– energy efficiency class of the building;

– required thermal power for heating and hot water supply of the facility;

– type of structural materials of the roof of the facility;

– principle and scheme of functioning of the existing (traditional) heating system.

The energy efficiency class of the building is high (B+). This indicator means that the building effectively consumes thermal energy and has a deviation from the standard value in the range from -30 to -40%.

The equipment was selected based on modeling and calculations performed. The schematic diagram of the heating system with solar systems is shown in Figure 2, and the mnemonic circuit displayed on the PC is shown in Figure 3.

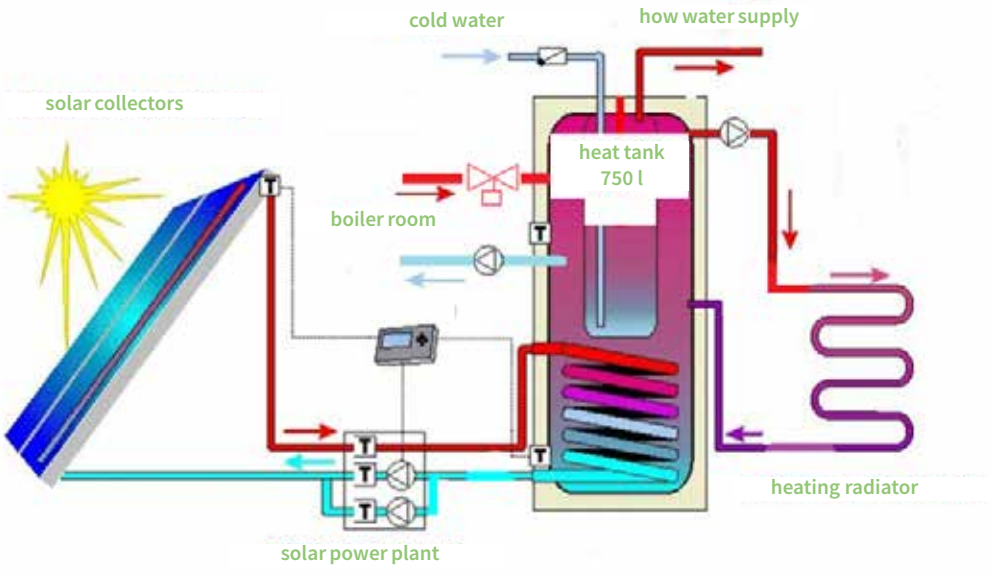


Figure 2.

The heating and hot water supply system based on solar collectors works together with the heating scheme from the boiler house of PI "USM". The location of the thermal equipment was chosen by the premises of the thermal point of townhouses.

System Characteristics:

- The thermal power of the GC – 17.5 kW;
- The volume of the heat tank – 750 liters;
- Heating and hot water supply;
- Heat sources: solar collectors, boiler room
- Separate use of heating sources;
- Automatic control and regulation of thermal parameters.

The heating system is capable of performing the following functions:

– heating of residential building from the energy of sunlight;

– automatic switching of heating system sources: solar collectors or boiler room;

– possibility of automatic temperature control in the house;

– accounting and archiving of thermal parameters;

– visualization of the heating system operation in real time on a computer.

– How effective is the implemented solar collector system in operation?

– Description of the efficiency of the solar system, let's start with a comparative table of the heat consumption of two townhouses – No. 10 and No. 6:

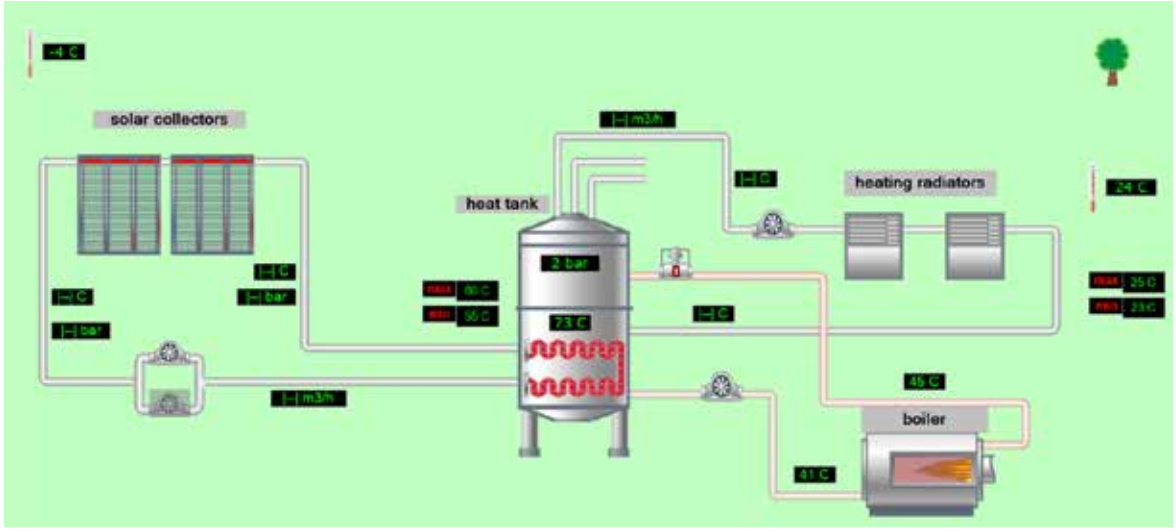
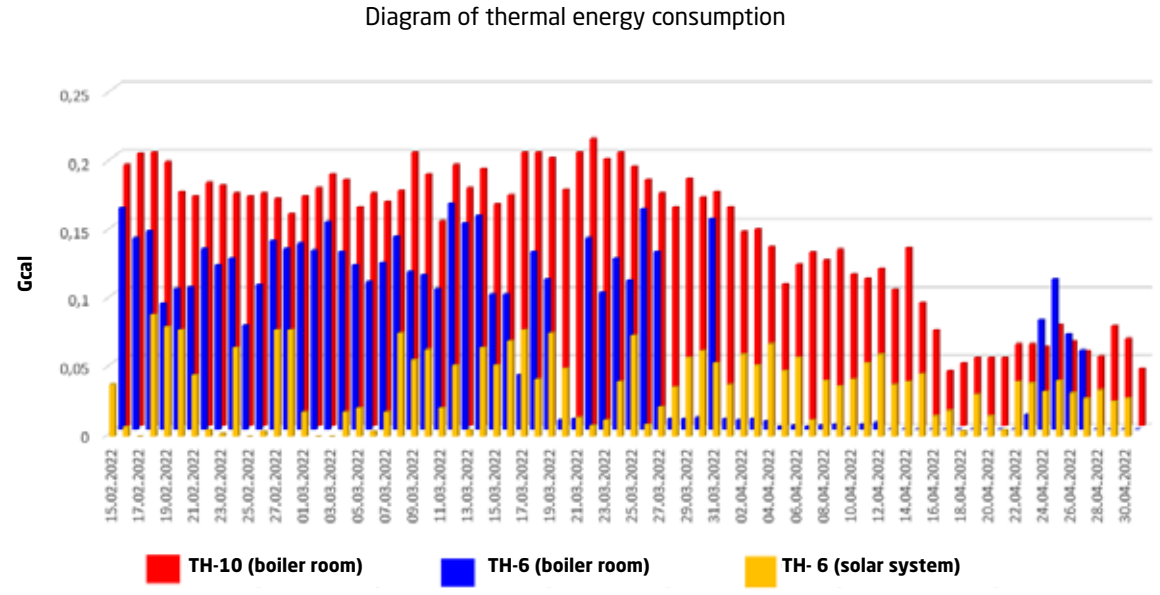


Figure 3.

Month	Thermal energy, Gcal		Price, thousand KZT		Savings, %
	TX No.6	TX No.10	TX No.6	TX No.10	
January	5,627	5,08	109,9	99,2	–
February	3,921	5,63	76,6	110	+31
March	1,69	3,04	33,02	59,4	+45
April	1,25	2,53	19,53	49,4	+49

In February, heat savings on heating and hot water amounted to 31%, or 33.3 thousand tenge. In March and April, the savings in heat consumption for heating and hot water amounted to 45% and 49%, or from 26 to 30 thousand tenge, respectively.

In order to understand how effectively the solar system works, let's consider the diagram of the thermal energy consumed by townhouses No. 6 and No. 10, as well as the generation of heat from the solar system.



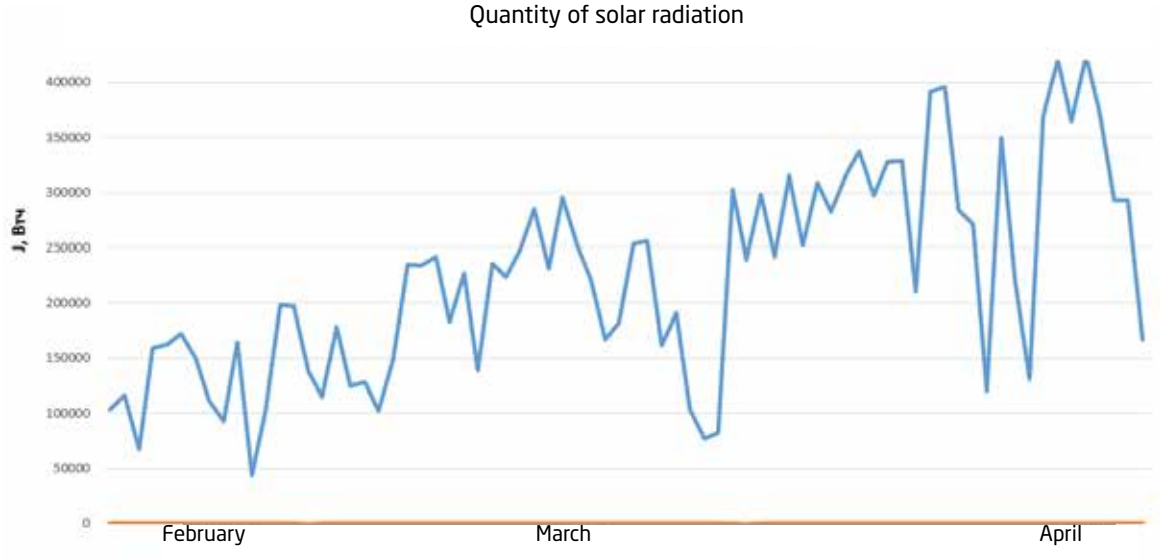


Figure 4.

Therefore, I also consider it an urgent need to actively participate in the improvement of legislation in this area. Our colleagues from the renewable energy testsite in June took part in two meetings of working groups on development of the draft law "On Heat Power Engineering" (DLRK).

In the period from February to March, there is a small number of sunny days, which leads to a reduction in heat consumption from the boiler room of townhouse No. 6 in comparison with townhouse No. 10.

In April, there is a large number of sunny days and an increase in the average daily air temperature, the efficiency of heat generation by solar collectors increases, which leads to the absence of heat consumption for heating and hot water supply (DHW) of townhouse No. 6 from the boiler room.

Based on the analysis of the indications of heat consumption and the generation of thermal energy for heating and hot water supply by an indirect method, the efficiency indicators of the use of solar collectors were calculated.

Key performance indicators:

– reduction of CO_2 emissions, if liquefied gas were burned, to 1.0 t

– reduction of energy consumption for background heating up to 80%

– reduction of energy consumption for hot water supply with year-round use up to 75%

– reduction of the volume of liquefied gas burned to 500 cubic meters.

General conclusions can be drawn:

1. The use of solar collectors as a heat source for heating and hot water supply for individual housing is possible in the climatic conditions of Nur-Sultan.

2. The use of solar systems is especially effective in a combined heat supply system when there is a main heat source (heat pump or gas boiler).

3. Scaling up the use of solar systems for individual housing should be considered as an innovative solution to reduce CO_2 emissions.

– We are all witnessing a large-scale growth in the number of new solar and wind power plants in Kazakhstan. Recently, information appeared in the media about the development of a draft law "On heat power engineering". Do you and your colleagues plan to initiate the introduction of the necessary standards so that renewable energy sources can be actively introduced in Kazakhstan's heat supply systems?

– Yes, you are absolutely right, the improvement of the regulatory framework for supporting renewable energy has significantly affected the positive dynamics and progress achieved in the field of decarbonization and decentralization of the electric power industry using renewable energy. The current net consumer rate allows owners of individual housing with renewable energy sources to sell electricity at the same rate at which electricity is purchased from an electricity supply organization, or to make offsets. Therefore, I also consider it an urgent need to actively participate in the improvement of legislation in this area. Our colleagues from the renewable energy testsite in June took part in two meetings of working groups on development of the draft law "On Heat Power Engineering" (DLRK). We have also made our proposals to supplement the two articles of the DLRK concerning the inclusion of measures of state support for the use of renewable energy systems in heat supply systems. These are Article 16 "Local district heating system" and Article 17 "Individual heating system".

Currently there are active discussions about the form in which state support for use of renewable energy in heating and hot water supply systems will be implemented. This may be the reimbursement of part of the cost of RES equipment costs or the purchase of thermal energy from RES at the same rate at which the heat supply organization releases the energy to consumers. This means that practice of supporting RES through the mechanism of a net consumer of electric energy can be extended to the practice of supporting RES net consumer of thermal energy.

We hope that in the process of discussing DLRK, our proposed standards will be included, and we will achieve significant progress in integrating renewable energy with traditional heating and hot water supply systems. This will lead to an improvement in the environmental situation in cities and will be able to breathe clean air.

– Aidar Beksultanovich, thank you for an interesting interview!

– Thank you, I also thank the editors of QazaqGreen magazine for the opportunity to share NURIS' achievements in the field of renewable energy.

Enrvironmental Performance Index - 2022

RANK	COUNTRY	SCORE	REG
1	Denmark	77.9	1
2	United Kingdom	77.7	2
3	Finland	76.5	3
4	Malta	75.2	4
5	Sweden	72.7	5
6	Luxembourg	72.3	6
7	Slovenia	67.3	1
8	Austria	66.5	7
9	Switzerland	65.9	8
10	Iceland	62.8	9
11	Netherlands	62.6	10
12	France	62.5	11
13	Germany	62.4	12
14	Estonia	61.4	2
15	Latvia	61.1	3
16	Croatia	60.2	4
17	Australia	60.1	13
18	Slovakia	60.0	5
19	Czech Republic	59.9	6
20	Norway	59.3	14
21	Belgium	58.2	15
22	Cyprus	58.0	7
23	Italy	57.7	16
24	Ireland	57.4	17
25	Japan	57.2	1
26	New Zealand	56.7	18
27	Spain	56.6	19
28	Bahamas	56.2	1
29	Greece	56.2	8
30	Romania	56.0	9
31	Lithuania	55.9	10
32	Seychelles	55.6	1
33	Hungary	55.1	11
34	North Macedonia	54.3	12
35	Botswana	54.0	2
36	Barbados	53.2	2
37	St. Vincent and Grenadines	53.2	2
38	São Tomé and Príncpe	52.9	3
39	Antigua and Barbuda	52.4	4
40	United Arab Emirates	52.4	1
41	Bulgaria	51.9	13
42	Dominica	51.2	5
43	United States of America	51.1	20
44	Namibia	50.9	4
45	Singapore	50.9	2
46	Poland	50.6	14
47	Panama	50.5	6
48	Portugal	50.4	21
49	Belize	50.0	7
50	Canada	50.0	22
51	Gabon	49.7	5
52	Ukraine	49.6	1
53	Saint Lucia	49.4	8
54	Kiribati	49.0	3
55	Belarus	48.5	2
56	Armenia	48.3	3
57	Israel	48.2	2
58	Grenada	47.9	9
59	Trinidad and Tobago	47.8	10
60	Cuba	47.5	11
61	Djibouti	47.5	6
62	Albania	47.1	15
63	Montenegro	46.9	16
64	South Korea	46.9	4
65	Chile	46.7	12
66	Ecuador	46.5	13
67	Venezuela	46.4	14
68	Costa Rica	46.3	15
69	Zimbabwe	46.2	7
70	Suriname	45.9	16
71	Brunei Darussalam	45.7	5
72	Jamaica	45.6	17
73	Mexico	45.5	18
74	Taiwan	45.3	6
75	Central African Republic	44.9	8
76	Eswatini	44.9	8
77	Equatorial Guinea	44.8	10
78	Mauritius	44.8	10
79	Serbia	43.9	17
80	Tonga	43.8	7
81	Afghanistan	43.6	1
82	Brazil	43.6	19
83	Jordan	43.6	3
84	Moldova	42.7	4
85	Bhutan	42.5	2
86	Comoros	42.5	12
87	Colombia	42.4	20
88	Kuwait	42.4	4
89	Dominican Republic	42.2	21
90	Bahrain	42.0	5
91	Cabo Verde	41.9	13
92	Argentina	41.1	22
93	Kazakhstan	40.9	5
94	Paraguay	40.9	23
95	El Salvador	40.8	24
96	Tunisia	40.7	6
97	Malawi	40.6	14
98	Guinea-Bissau	40.2	15
99	Bolivia	40.1	25
100	Repu blic of Congo	40.1	16
101	Peru	39.8	26
102	Bosnia and Herze govina	39.4	18
103	Georgia	39.1	6
104	Azerbaijan	38.6	7
105	Guyana	38.5	27
106	Zambia	38.4	17
107	Uzbekistan	38.2	8
108	Thailand	38.1	8
109	Saudi Arabia	37.9	7
110	Nicaragua	37.7	28
111	Niger	37.7	18
112	Russia	37.5	9
113	Maldives	37.4	3
114	Micronesia	37.4	9
115	Uruguay	37.4	29
116	South Africa	37.2	19
117	Tajikistan	37.1	10
118	Turkmenistan	37.0	11
119	Dem. Rep. Congo	36.9	20
120	Vanuatu	36.9	10
121	Honduras	36.5	30
122	Gambia	36.4	21
123	Samoa	36.4	11
124	Marshall Islands	36.2	12
125	Uganda	35.8	22
126	Kyrgyzstan	35.7	12
127	Burkina Faso	35.5	23
128	Egypt	35.5	8
129	Timor-Leste	35.1	13
130	Malaysia	35.0	14
131	Solomon Islands	35.0	14
132	Sri Lanka	34.7	4
133	Iran	34.5	9
134	Tanzania	34.2	24
135	Togo	34.0	25
136	Senegal	33.9	26
137	Qatar	33.0	10
138	Côte d'Ivoire	32.8	27
139	Rwanda	32.8	27
140	Sierra Leone	32.7	29
141	Lesotho	32.3	30
142	Lebanon	32.2	11
143	Ethiopia	31.8	31
144	Eritrea	31.7	32
145	Mozam bique	31.7	32
146	Guinea	31.6	34
147	Fiji	31.3	16
148	Kenya	30.8	35
149	Laos	30.7	17
150	Oman	30.7	12
151	Angola	30.5	36
152	Burundi	30.5	36
153	Cameroon	30.2	38
154	Cambodia	30.1	18
155	Algeria	29.6	13
156	Benin	29.6	39
157	Mongolia	29.6	19
158	Philippines	28.9	20
159	Mali	28.5	40
160	China	28.4	21
161	Morocco	28.4	14
162	Nepal	28.3	5
163	Nigeria	28.3	41
164	Indonesia	28.2	22
165	Chad	28.1	42
166	Mauritania	28.1	42
167	Guatemala	28.0	31
168	Mad agascar	28.0	44
169	Iraq	27.8	15
170	Ghana	27.7	45
171	Sudan	27.6	16
172	Turkey	26.3	19
173	Haiti	26.1	32
174	Liberia	24.9	46
175	Papua New Guinea	24.8	23
176	Pakistan	24.6	6
177	Bangladesh	23.1	7
178	Viet Nam	20.1	24
179	Myanmar	19.4	25
180	India	18.9	8

Asia -Pacific
Eastern Europe
Former Soviet States
Global West
Greater Middle East
Latin America & Caribbean
Southern Asia
Sub -Saharan Africa

Monetization

of reduction of greenhouse gas emissions in the energy sector

Liliya Zavyalova, Ph.D – international expert for low-carbon development, expert of AvantGarde Group, Uzbekistan

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Alexandr Belyi , Ph.D. – Director of AvantGarde Central Asia, Kazakhstan

The declared transition to low-carbon development of the global economy is impossible without the transformation of national energy systems based on the use of fossil fuels into a sustainable and decarbonized system. This implies the abandonment of the construction of new and the gradual closure of existing power plants, primarily those burning coal and petroleum products. Fossil fuels are being replaced by renewable energy sources (RES) with zero carbon emissions, such as wind, solar energy, hydropower, geothermal energy and biomass. The idea of decarbonizing energy by switching to renewable energy is supported by both the government and the public. In this regard, regulators, investors and consumers are putting increasing pressure on energy companies to reduce their carbon footprint.

It should be noted that in recent years, renewable energy sources have become so cost-effective that they account for most of the new energy generation capacity. Over the past 10 years, prices for solar energy have fallen by about 80%, and for wind energy by 40%. However, in 2022, due to the tense international situation, there was a slight increase in prices for equipment for solar and wind power plants.

Despite the large-scale reduction in prices for solar and wind installations, renewable energy is still losing out to traditional energy in countries with large reserves of fossil fuels and supporting fuel energy, for example, Central Asia countries. Small and medium-sized businesses do not seek to abandon the energy generated at fuel stations in favor of autonomous power supply using, solar stations. The main problem is the large initial investment costs when buying equipment. State benefits, if they exist, do not always solve the problem of investing. Additional sources of funding are needed.

A cost-effective tool used by businesses and governments in their low-carbon development strategies has become the setting of carbon price (the introduction of a fee per ton of 2-eq.). Monetization of greenhouse gas (GHG) emissions creates a financial incentive to reduce them.

Before proceeding to the analysis of possible options for monetization of emission reductions obtained during the implementation of carbon offset projects, let's consider the basic information related to the carbon pricing.

1. Basic information about carbon taxes and carbon markets

Carbon pricing can be direct – carbon taxes, GHG emissions trading systems, carbon credit mechanisms; and indirect – through the introduction of tax on fuel and goods, fuel subsidies. In this publication, only direct carbon pricing will be considered.

According to the World Bank report "The State and Trends of Carbon Pricing for 2022", there are 64 systems of direct carbon pricing in the world, covering more than 20% of global GHG emissions and generating annual revenue of 53 billion US dollars. Figure shows the jurisdictions (states, regions, provinces, cities) where a carbon tax has been introduced or an emissions trading system is operating (as of 2021).

Fossil fuels are being replaced by renewable energy sources (RES) with zero carbon emissions, such as wind, solar energy, hydropower, geothermal energy and biomass.

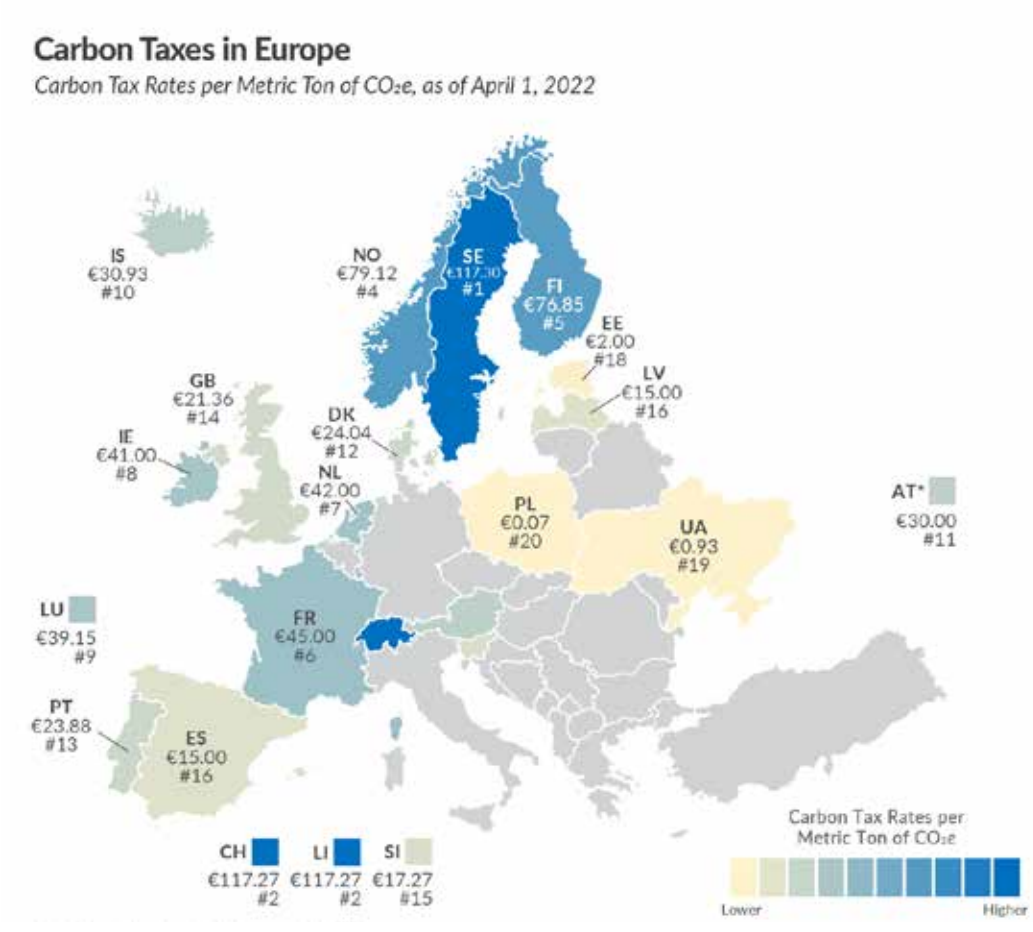
1.1 Carbon tax

Carbon tax is a fee for burning fossil fuels, typically in the energy and transportation sectors. The price of a carbon tax for each ton of CO2 emissions from burning fuel is set by the government. If the fee for GHG emissions is high enough, then the carbon tax becomes a powerful factor motivating the transition to renewable energy and the introduction of energy-efficient technologies.

As of 2021, 35 carbon tax programs have been implemented in the world. For example, in British Columbia, the carbon tax has been in effect since 2008. In 2019, South Africa became the first African country to introduce a carbon tax. In 2006, Boulder, Colorado became the first U.S. city with a carbon tax. In 2022, the maximum price per ton with 2-eq. In European countries, the carbon tax was 117.27 euros (Sweden), the minimum was 0.07 euros (Poland).

Jurisdictions with introduced carbon tax and emissions trading systems

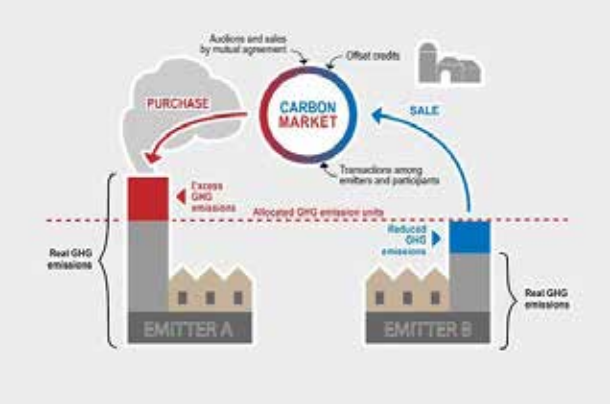
Source: State and Trends of Carbon Pricing 2022, the World Bank, 2022



Source: https://files.taxfoundation.org/20220613155626/Carbon-taxes-in-Europe-2022-carbon-tax-rates-in-Europe-EU-carbon-tax.png

1.2 Carbon markets

Conditionally, carbon markets can be divided into two main segments: mandatory or regulated (for compliance) emissions trading systems and voluntary – carbon offset programs.



Source: https://climatechange.lta.org/carbon-markets/figure-marche-du-carbone-en-2/

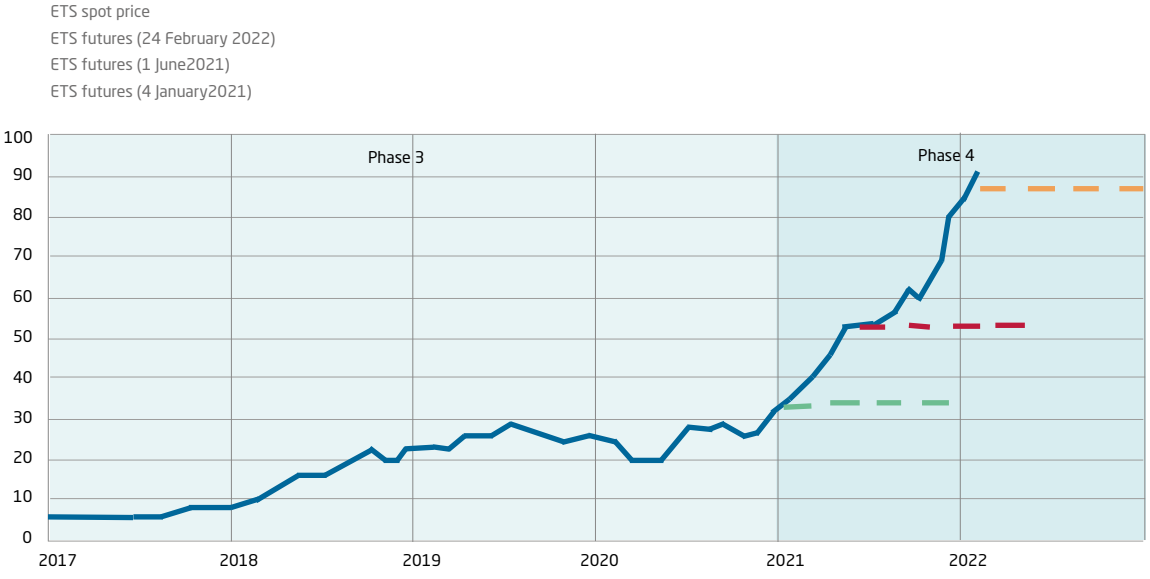
Regulated markets are conditioned by the existence of mandatory GHG emission reduction targets for their participants. Voluntary markets allow companies and individuals to offset their emissions on a voluntary basis by purchasing carbon credits. In practice, there are also hybrid options, for example, through the EU ETS, so-called international credits were also implemented, representing certified emission reductions obtained during the implementation of projects under the Clean Development Mechanism (CDM) and the Joint Implementation (JI) of the Kyoto Protocol. After 2021, the European Commission no longer allows the use of international credits to fulfill obligations under the EU ETS.

GHG EMISSIONS TRADING (CAP-AND-TRADE GHG EMISSIONS SYSTEM)

The establishment of regulated Emissions trading System (ETS) involves the establishment of a limit on the total amount of GHG emissions in one or more sectors. The total amount of absolute emissions is divided into certificates / allowances /permits for emissions, each of which allows emitting one ton of CO_2-eq. Emission quotas are distributed by regulatory authorities between companies free of charge or through an auction. If necessary, companies can buy additional quotas for their own needs or sell excess quotas on the carbon market.

Currently, the largest carbon market in the world is the European Union Emissions Trading System (EU ETS) , operating since 2005. The EU ETS provides for the distribution and trade of GHG emission quotas/permits throughout the EU. Emission permits are set by each Member State and distributed to each facility included in the EU ETS (power plants, industrial enterprises and the aviation sector). It should be noted that the number of emission quotas is decreasing annually (from 2021 – by 2.2%, previously – by 1.7%), forcing the economy to decarbonize.

The price of carbon units in the EU ETS is not set by the government, but is determined by the supply and demand of emission quotas. Since the beginning of 2018, the price of EU emission allowances (EUA) traded in the EU Emissions Trading System has increased from less than 10 euros per metric ton of carbon to more than 90 euros.



https://www.ecb.europa.eu/pub/economic-bulletin/focus/2022/html/ecb.ebbox202203_06~ca1e9ea13e.en.html

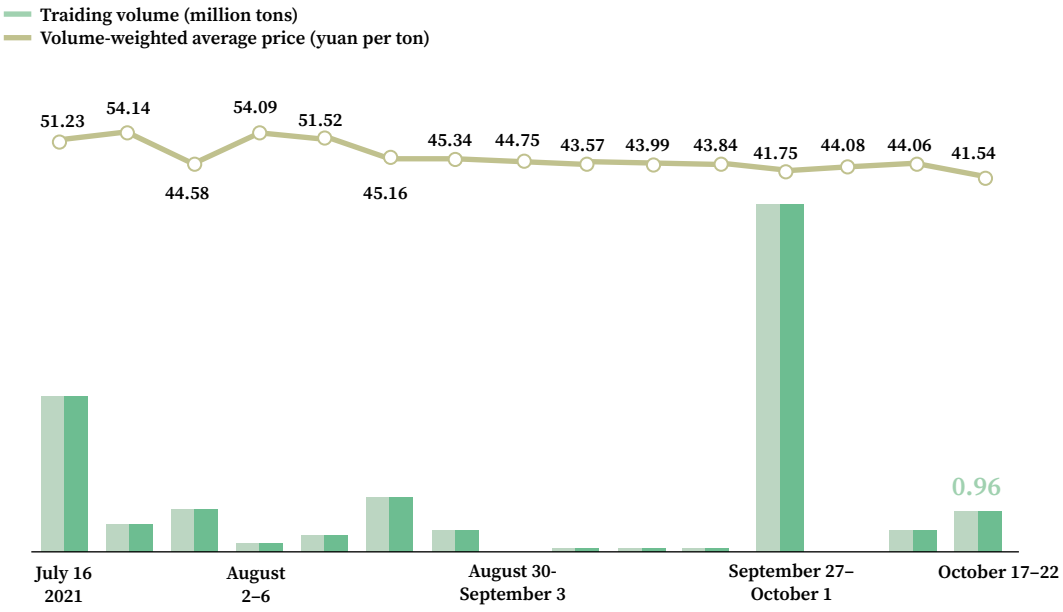
[1] *https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/emissions-cap-and-allowances_en*

It should be noted that the pricing of EU ETS is nevertheless monitored by the regulator in order to avoid defaults, as it was in the 1st and 2nd phases. A Market Stability Reserve (MSR) has been created to increase market stability and reduce excess emissions permits. In the period from 2019 to 2023, the amount of permits placed in reserve will double and amount to 24% of the permits put into circulation.

Since 2011, China has implemented eight regional pilot projects on emissions trading. Since 2017, the national carbon market begins to form, the operational phase of which was launched on February 1, 2021. The market covers more than 2,600 companies in regions with a population of more than 258 million people. Companies specific emissions of which exceed the benchmarks for this type of activity are required to purchase additional quotas on the carbon market.

The pilot phase of the Emissions Trading System (ETS) in Kazakhstan was launched in 2013. The ETS covers only CO_2 emissions generated by the combustion of fossil fuels (electric power, oil and gas

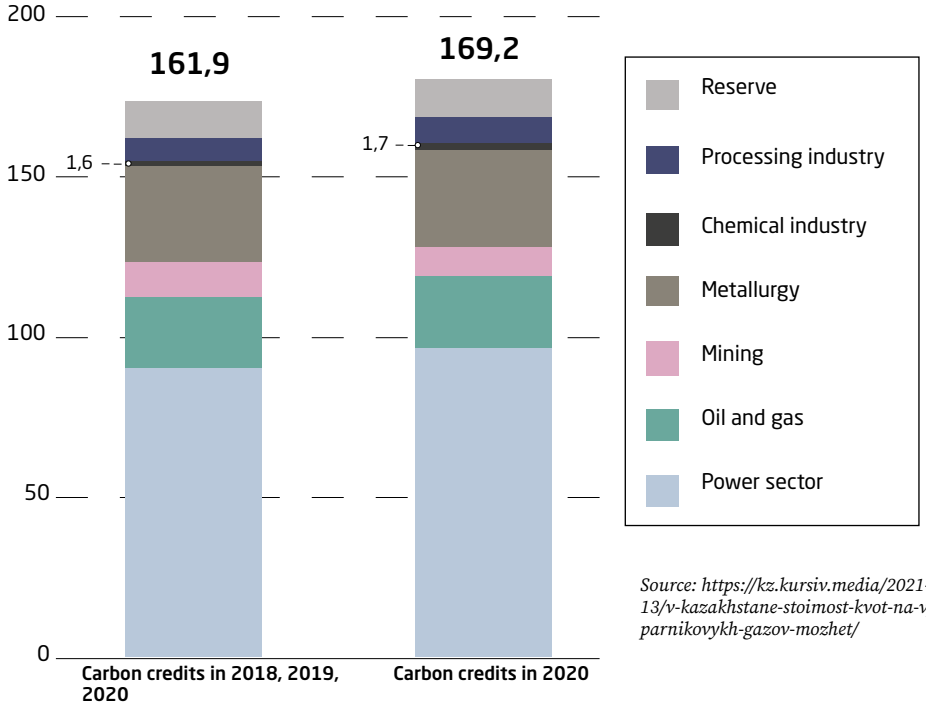
Record Low Carbon Price in China



Source: Shanghai Environment and Energy Exchange

Source: https://www.caixinglobal.com/2021-10-27/china-carbon-watch-trading-price-hits-record-low-101792431.html

CO_2 credits allocated to Kazakhstan's ETS in 2018-2021



Source: https://kz.kursiv.media/2021-10-13/v-kazakhstane-stoimost-kvot-na-vybrosy-parnikovykh-gazov-mozhet/

***In average per annum of 485.9 mln allocated for 2018-2020**

Source: National Carbon Credits Allocation Plans for 2018-2020 and 2021

industry), in industrial processes (metallurgy, mining, chemical industry, manufacturing industry), as well as aviation. The emissions trading system includes enterprises with annual emissions exceeding 20,000 tons of CO_2/year.

According to the National Energy Report Kazebergy-2021, from 2018 to 2020, 5.6 million tons of CO_2 quotas were sold in Kazakhstan's STV, 52 transactions were made.

CARBON CREDIT MECHANISMS

Initially, the fundamental difference between regulated emission trading systems and carbon credit mechanisms was the method of obtaining a "virtual" commodity expressed in tons of CO_2. In the first case, the certificate/permit/quota gives the legal right to emit 1 ton of CO_2-eq. In the second case, we are talking about the purchase and sale of emission reduction units or offset credits in tons of CO_2-eq received as a result of the implementation of the carbon project.

As a rule, emissions trading systems are regulated by the state, while participation in carbon credit mechanisms is voluntary. Hybrid options include the California Compliance Offset Program (CCOP), which generates carbon offset credits sold on the California ETS. Until 2021, the EU ETS served as a platform for trading international carbon credits (CERs, ERUs) received during the implementation of projects under the Clean Development Mechanism and the Joint Implementation of the Kyoto Protocol.

▶ INSERT: The term "carbon offset" refers to a reduction in GHG emissions/an increase in GHG effluents used to offset emissions occurring elsewhere. The term "carbon offset credit", or carbon credit/carbon emissions credit, means a certificate used when buying or selling emission reductions per metric ton of CO_2 equivalent. The buyer of the offset credit must "cancel" it in order to declare a corresponding reduction in their GHG emissions.

Carbon offsetting credits can be obtained through various activities that reduce GHG gas emissions or increase carbon pickup. For example, a carbon offset project may include:

- Use of renewable energy sources;
- Improving energy efficiency;
- Capture and destruction of highly potent GHGs, such as methane, N_2O or HFCs;
- Prevention of deforestation/improvement of land use.

It should be emphasized that any reduction in GHG emissions acquires the status of a compensatory credit only after passing the verification procedure, or obtaining a kind of quality certificate for this "virtual" product.

Voluntary carbon offsetting programs[2] were created by non-governmental organizations (NGOs). As this direction became established , offset programs assumed three main functions:

- Development and approval of standards establishing quality criteria for carbon offset credits;
- Verification of offset projects for compliance with these standards (usually with the help of third-party verifiers);
- Management of registry systems that are put into circulation, transferred from account to account and written off carbon offset credits.

Currently, carbon offsetting programs are often referred to as standards or registries. Each standard issues credits under its own trademark. Table 1 shows the most significant both regulated and voluntary carbon offset programs.

Table 1. Examples of major carbon offsetting programs

Carbon offset programs	Geographical coverage	Marking used for offset credits
Regulated carbon offset programs		
Clean Development Mechanism (CDM)	Low- and middle-income countries	Certified Emission Reduction (CER)
Joint Implementation (CO)	High-income countries	Emission Reduction Units (ERU)
California Compliance Offset Program (CCOP)	USA	Air Resources Board Offset Credit (ARBOC)
Regional GHG Initiative (RGGI)	Northern states of the USA	Offset Permit for CO_2 (ROA) RGGI
Alberta Emissions Offset Program (AEOP)	Alberta, Canada	Alberta Emissions Offset Credit (AEOC)

[2] *The carbon offset program refers to a set of standards developed by an organization to measure, regulate, and analyze carbon offset projects.*

Voluntary carbon offsetting programs		
American Carbon Registry (ACR)	USA, some international	Emission Reduction Tonne (ERT)
Climate Action Reserve (CAR)	USA, Mexico	Climate Reserve Ton (CRT)
Gold Standard (GS)	International	Verified Emission Reduction (VER)
Plan Vivo	International	Plan Vivo Certificate (PVC)
Verified Carbon Standard (Verra)	International	Verified Carbon Unit (VCU)
Global Carbon Council (GCC)	International	Approved Carbon Credit (ACC)

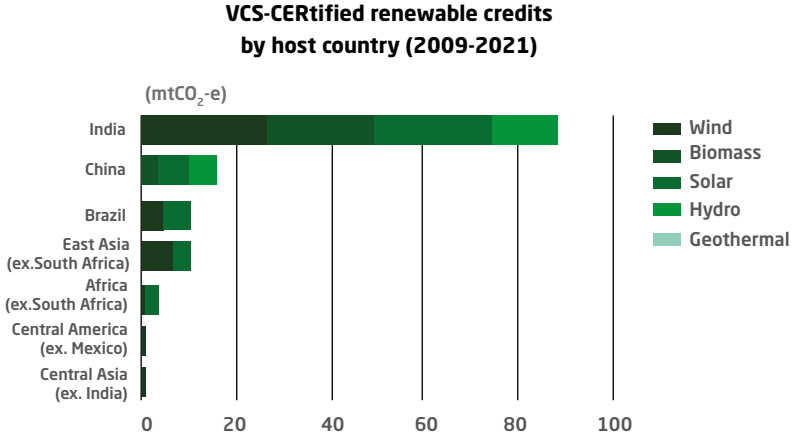
Table 2 shows the four largest carbon offset programs for 2022. Central Asian countries can participate in two of them: the verified Carbon Standard and the Gold Standard.

Table 2: The four best voluntary carbon offset programs in 2022

Program	Market volume (in millions)	Sectoral coverage
Verified Carbon Standard (Verra)	746 million carbon credits (70%)	All sectors
Gold Standard (GS)	184 million carbon credits (17%)	All sectors except REDD+
American Carbon Registry	63 million carbon credits (6%)	AFOLU projects, waste, industrial processes
Climate Action Reserve (CAR)	62 million carbon credits (6.2%)	Agriculture, forestry, energy and non-carbon emission reduction

Source: https://carboncredits.com/the-4-best-carbon-offset-programs-for-2022 /

The Verra program has more than 1,806 certified projects with a total reduction/absorption of carbon emissions in the amount of more than 928 million tons of emissions CO_2-eq. The projects cover 15 sectors, including renewable energy sources, conservation/restoration of forests and wetlands, improving transport efficiency and etc. The figure below shows the number of carbon credits in the field of renewable energy introduced by Verra in 2009-2021.



Source: Ferra Registry

Projects registered under the Gold Standard (GS), should provide long-term social, economic and environmental benefits to local communities. As a rule, offsetting projects must contribute to the achievement of at least three of the 17 UN Sustainable Development Goals in order to be certified for their emission reductions.

1.3 "Life cycle" of carbon offset credit

Regardless of the program, there are five main stages on the path of a carbon offset credit, starting with its creation and ending with cancellation.

1) Development of methodology. GHG emission reductions obtained during the implementation of any carbon project become a commodity (offset credit) only after confirmation of its quality or certification. The document defining the project requirements, including the emission calculation algorithm, is a methodology or protocol specific to this type of offset project. Most carbon offset programs have their own libraries of approved methodologies. However, if there is no methodology acceptable for this type of activity, you can develop your own methodology and approve it in the selected program.

2) Development of the project document, validation and registration. The project document is developed in full compliance with the methodology or standard. After validation by an independent company, the project is registered in the selected carbon offset program. The official "registration" means that the project has received approval and has the right to start generating carbon credits.

3) Project implementation, verification and introduction of offset credits into circulation. The implemented project is monitored in accordance with the Monitoring Plan. The generated emission reduction is periodically (usually once a year) verified by an independent verifier. The offset program approves verification reports, and then puts into circulation the amount of carbon offset credits equal to the number of verified GHG emission reductions in CO_2 equivalent. Carbon credits are usually deposited to the project developer's account in the registry system administered by the offset program.

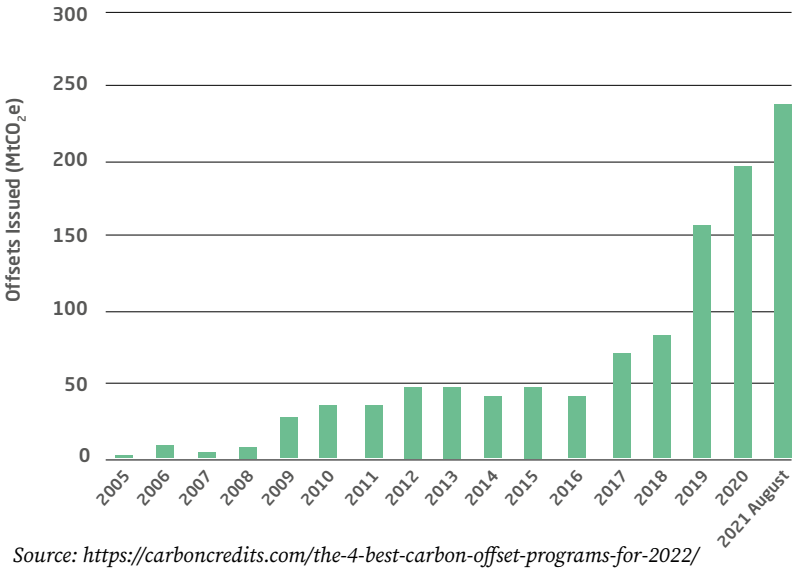
4) Transfer of offset credits. Carbon credits put into circulation can be transferred to different accounts in the register of the offset program. Transfers are usually made when buying or exchanging. Buyers can then use the offset credits by writing them off, withholding them, or transferring them to other accounts. Credits can change hands several times (transferring between multiple accounts) before they are deleted and used.

5) Withdrawal of offset credits from circulation. Before using carbon credits, owners must "write them off" in order to declare the associated GHG emissions reductions. Withdrawal from circulation takes place in accordance with the process specified in the register of each carbon offset program. After repayment of the offset credit, it cannot be transferred or used (this means that it has actually been withdrawn from circulation).

1.4 What influences the demand and pricing of carbon credits

Voluntary commitments of the world's largest companies to decarbonize business served as a kind of trigger in the revival of the voluntary market. Since 2019, there has been a steady increase in the number of carbon credits put into circulation, and in 2021, the volume of transactions on the voluntary market exceeded the volume of transactions in 2020 by 92%[3].

Voluntary Carbon Offsets issued Since 2005



Source: https://carboncredits.com/the-4-best-carbon-offset-programs-for-2022/

According to the World Bank's annual report "The State and Trends of Carbon Pricing for 2022", in November 2021, the total value of the voluntary carbon market exceeded $1 billion for the first time. This rapid increase in value reflects both rising prices and growing demand from corporate buyers, which leads to an increase in transaction volumes. According to McKinsey's forecast, the annual demand for carbon credits in the world by 2030 may reach from 1.5 to 2 billion tons of CO_2–eq., and by 2050 –up to 7–13 billion tons of CO_2–eq[4].

[3] *State and Trends of Carbon Pricing 2022, the World bank, 2022*

[4] *https://www.visualcapitalist.com/sp/why-the-demand-outlook-for-carbon-credits-is-bright/*

International aviation can also be attributed to large consumers of carbon offset credits. In 2016, the International Civil Aviation Organization (ICAO) introduced the "Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)", according to which by 2027 90% of international flights should be "compensated" with certificates corresponding to CORSIA. In the period from 2021 to 2026, GHG emissions from flights between states voluntarily participating in the pilot phase of CORSIA should be compensated. Volunteer countries cover about 77% of all international aviation activities. From 2027, almost all international flights will be subject to mandatory offset requirements. It is expected that in the period from 2021 to 2035, the demand for offset credits under CORSIA will be from 1.6 to 3.7 billion.

The completion of the Article 6 rulebook of the Paris Agreement will create conditions for increased private sector investment in voluntary carbon offsetting projects. expand the number of participants from 17 to 30 or more. The Central Asian States are also considered as potential participants.

THE PRICE OF CARBON CREDITS

The price of carbon offset credits varies in a very wide range from <1 to > 50 US dollars per ton. As with any commodity, the carbon price is determined by supply and demand, and also depends on:

- The type of project that compensates for carbon emissions;
- The carbon standard/program according to which it was developed;
- Associated benefits (environmental, social, economic) associated with the project.

In addition, pricing is influenced by what stages of the "life cycle" of credit a deal on its sale is concluded. As a rule, the nominal price will be the minimum at the conclusion of the transaction at the first stages, the maximum – after receiving a certificate from the carbon offset program.

Table 3: Carbon price as of July 4, 2022

Name of the emissions trading system/credit programs	Cost per ton of GHG emissions
Regulated markets (compliance)	
European Emissions Trading System (EU ETS)	88.46 euros
California Emissions Trading System	25.59 USD
Australian Emissions Trading System (AID)	35.25 USD
New Zealand Emissions Trading System (NZD)	76.00
South Korea's Emissions Trading System	16.07
Voluntary markets	
Carbon offsetting in the aviation industry[1]	4.11 USD
Offset of carbon emissions based on nature[2]	8.85 USD

Source: https://carboncredits.com/carbon-prices-today

[1] The CORSIA standard of the International Civil Aviation Organization. These carbon offsets are from three main registries – Verra, the American Carbon Registry and the Climate Action Reserve. They are sometimes referred to as "carbon offsets in the aviation industry."

[2] Offset projects based on natural resources from the Verra register are projects that fall under the categories of "Agriculture, forestry or other land use" (AFOLU).

This growth in demand and the upward trend in prices are attracting investors who are beginning to view carbon credits as an investment product that should bring high returns in the coming years.

Some countries are also starting to think about purchasing carbon credits to fulfill their obligations under the Paris Agreement. In Japan, the Joint Crediting Mechanism (JCM) program has been operating since 2013, acquiring carbon credits in developing countries through partial financing of carbon projects. In 2022, it is planned to

The World Bank report "The State and Trends of Carbon Pricing for 2022" indicates that in the voluntary market, global average prices for carbon credits increased from US$ 2.49 per ton of CO_2–eq. in 2020 to US$ 3.82 per ton of CO_2–eq. in 2021.

According to S&P Global Platts, from June 2021 to January 2022, the price of offset credits related to carbon dioxide uptake (tree planting) has more than tripled, from about $4.65 per ton of carbon to about $14.40[5].

1.5 Sale of carbon credits

There is no global carbon market where all the trade brands related to GHG emissions are represented. Numerous emissions trading systems operate according to the rules established by their own regulator. The unification of all ETS into a single global system is a matter of the future. So far, such an attempt has been made when linking the EU ETS and the Swiss Quota Trading System.

Carbon credits received under voluntary carbon offsetting programs cannot be sold in regulated markets. The platform for trading such compensatory xredits are stock exchanges trading in finished goods (respectively, the price is higher), brokers, retailers, as well as direct purchase through the signing of an Emission Reduction Purchase Agreement (ERPA) at the project development stage. In the latter case, the price will be lower than the market price and depends on how the carbon risks are distributed. The buyer can also bear the costs of developing the project.

2. Practical steps to generate carbon offsetting credits

As discussed above, monetization of carbon emissions is a source of additional income that increases the investment attractiveness of the project. But it should be remembered that in addition to carbon revenues, there are also carbon costs associated with:

- Preparation of PDD and its validation by an independent company;
- Monitoring, including the purchase of measuring equipment, if necessary;
- Verification of emission reductions by an independent company and their introduction into circulation;
- Entering the project and carbon credits into the register, as well as using the register.

Depending on the scale of the project, the average costs for performing all these activities vary from tens to hundreds of thousands of US dollars.

Model estimates have shown that, taking into account any income and a small margin, the minimum price of carbon credits covering the average project costs should be 8.20 euros for energy efficiency projects, 8.10 euros for renewable energy projects and 13 euros for forest management projects[6]. It means that before making a decision on the implementation of a carbon project, it is necessary to estimate at least approximately the carbon costs and revenues from the sale of emission reductions.

2.1 Standard selection

The first step in the development of any carbon offsetting project is the choice of a standard or program for carbon offsetting, since each of them has its own requirements for the preparation of documentation, including the choice of methodology. There are two main standards in the voluntary market: the Gold Standard (GS), Switzerland, and the Verified Carbon Standard (VCS), USA.

[5] *https://www.ft.com/content/29565f44-ba71-4a44-8e84-d1e421ddb958*

[6] *https://climatetrade.com/what-influences-carbon-offset-pricing/*

Central Asian countries can register their projects in the registries of the Verified Carbon Standard, the Gold Standard, as well as the Global Carbon Council (GCC), Qatar.

2.2. Preparation of the project document design (PDD) based on the approved methodology

In the case of a carbon offset project, the preparation of design and technical documentation goes beyond the scope of a standard feasibility study. Additionally, the project document design is being developed, including a description of the baseline and the project, calculation of emissions from the baseline and the project, calculation of emissions reduction, as well as a monitoring plan. When developing a PDD, the methodology recommended by the selected standard for this type of activity should be applied. If there is no appropriate methodology, then it can be developed and approved. However, this option, which is quite time–consuming and expensive, should be used in cases where it is a question of large amounts of emission reduction or the implementation of a number of projects.

In all standards, the project must also meet four requirements:

- Complementarity
- Exclusion of double counting
- Constancy
- Regular independent checks

The complementarity of the project – whether the project will be implemented without financing provided by carbon offset – determines the quality of the carbon offset credit. For this reason, currently carbon credits generated by renewable energy projects are losing out in price to other types of projects.

2.3 Independent validation

The PDD validation procedure was well developed during the implementation of projects under the Clean Development Mechanism of the Kyoto Protocol. Audit companies accredited by the CDM Executive Board are also used for validation of offset projects.

During the validation process, the auditor must ensure that the project document has been prepared in accordance with the appropriate methodology and meets all the requirements of the standard. Upon completion of validation, a report is prepared indicating whether the project meets the requirements of the standard or not.

2.4 Project registration

The validation report with the auditor's conclusion is transmitted to the standard operator, who opens an account in the registry. The duration of the project's stay in the registry is usually 10 years. After all the preparatory work is completed, the physical implementation of the project begins. From the perspective of the carbon component of the project, the main attention should be paid to monitoring processes related to GHG emissions. Emissions monitoring is carried out in strict accordance with the Monitoring Plan, which is an integral part of the PDD. A monitoring report should be prepared at the end of each period. It is important that all monitoring results are documented, including the availability of certificates for the measuring equipment used. A qualified monitoring report with supporting documents is the key to success in monitoring.

2.6. Verification and introduction of emission reductions

Verification of emission reductions is a mandatory element of any international standard for carbon credits. Verification is carried out by independent audit companies that are part of the pool of a specific standard. As a rule, verifiers travel to the project implementation site to verify the reliability of the data presented in the monitoring report. Then, a verification report is being prepared with recommendations on the introduction of certain volumes of emission reduction into circulation.

Based on the verification report, the standard operator puts into circulation or issues certificates for each ton of emission reduction. Only after this procedure, the "virtual commodity" – GHG emissions – becomes a carbon offset credit with a specific name (commodity brand) and can be the subject of purchase/sale on voluntary carbon markets.

The received carbon offset credits are entered into the register of the standard at the account of their owner. Further, they can be stored, transferred, withdrawn from circulation/canceled when the credit is used to compensate for carbon emissions in some place.

2.7 How to Sell Carbon Credits

There are several options for finding potential buyers of carbon offset credits.

To organize the sale of their carbon credits, many project developers work with brokers. Brokers purchase offset credits and then transfer (or write off) them on behalf of clients. Some brokers sell offset credits from projects they have invested in, in addition to projects developed by others.

Another option is to sell carbon credits on the stock exchange. There are a number of environmental commodity exchanges, mainly in North America and Europe, that trade carbon offset credits and work with registries to ensure their transfer.

Some buyers of offset credits directly invest in a offset project in exchange for receiving the right to a portion of the credits generated by the project. This approach can provide deeper interaction and a more complete understanding of the strengths and weaknesses of the project.

As an option, it is possible to enter into a contract directly with the project developer in the form of an "Emissions Reduction Purchase Agreement" (ERPA). ERPA

gives project developers confidence that they will be able to sell a reliable volume of offset credits. For buyers, the advantage lies in the ability to fix the price of credits in advance, which is usually lower than market prices (in exchange for some risk of delivery). ERPA can be structured in various ways, including in the form of option contracts.

Offset credits can also be sold through retailers. For buyers who want to receive only a small amount of offset credits (for example, for small companies or individuals), this is the most suitable option. In most cases, the retailer will keep records in the registers of carbon offset programs and withdraw offset credits from circulation directly on behalf of the buyer.

3. Example of selling carbon credits in a renewable energy project

Alibey Adasy Wind Power Plant (WPP), located in the Aegean region of Turkey, in Izmir province, was commissioned in 2018. The installed capacity of the plant is 30 MW, including four turbines with a capacity of 3 MW and five turbines with a capacity of 3.6 MW. The annual electricity generation is 111.66 GWh.

The total cost of the project is 34,094,662 euros, including capitalized financial costs and working capital requirements[7]. The proposed financial scheme includes debt financing in the amount of 28,967,000 euros and the borrower's own contribution in the amount of 5,127,662 euros. The ratio of borrowed and own funds is approximately 85:15.

The estimated emission reduction was estimated at 58,000 tons of CO_2–eq. per year. The project was registered with the Global Carbon Council (GCC) in 2020. The term of crediting or putting into circulation of carbon credits is 10 years. The price of 1 ton of carbon credit is equal to 5 US dollars. The additional revenue from the sale of carbon credits is estimated at approximately US$ 3 million.

The material was prepared by experts of the AvantGarde Group, a team of like–minded people with more than 20 years of experience in the carbon markets in Central Asia and the EU. We will be happy to advise you on the issues covered in this article.

Our website: www.avantgarde-group.eu

[7] *https://www.midseff.com/assets/frontend/uploads/f657fed558f96040747e4e121f4b7f43.pdf*

A NEW ERA IN DECARBONIZATION POLICIES: Carbon Border Adjustment Mechanism (CBAM)

What will the CBAM dictate to Kazakhstan's economy?

"As the adverse impacts of the climate crisis are becoming more frequent every day, limiting the anthropogenic GHG emissions becomes more crucial. In this context, there is a strong decarbonization policy called carbon pricing. As carbon pricing becomes more effective, the carbon leakage risk brought together also becomes more visible for countries that implement carbon pricing measures. To prevent this economic threat along with aiming for climate action improvement globally, the EU has introduced the Carbon Border Adjustment Mechanism (a.k.a. CBAM) as part of the European Green Deal (a.k.a. EGD). For countries having a routed trading relationship with the EU, it is crucial to assess the potential impacts and the risks that will be imposed by the CBAM to their economies, especially for those that are not regulated by a carbon pricing instrument. As an example, for these countries, Kazakhstans's economy is expected to be impacted by the CBAM whereas its environmental ambition likely increases."

Oğuz Tosun,
Designation: Region Head – Turkey & MENA
Organization: EKI Energy Services Limited (EKI)

INTRODUCTION

According to the World Bank (2020), anthropogenic activities across the world emit approximately 55 Gigatonnes CO_2e of greenhouse gas (GHG) emissions to the atmosphere annually. Such an emission trend increased the atmospheric GHG emissions to 412.89 parts per million (ppm) which is drastically greater than the safest level for human civilization. Considering the consequences of this extraordinary atmospheric GHG concentration level (i.e., climate change), humanity has a significant liability to reduce the volume that is pumped into the atmosphere. In other words, people must decarbonize the way they live (i.e., the economy) a considerable extent as soon as possible. In this context, 64 carbon pricing instruments that are in force in different countries/ regions draw much attention with their ability to regulate the global GHG emissions by almost 23% (World Bank, 2020).

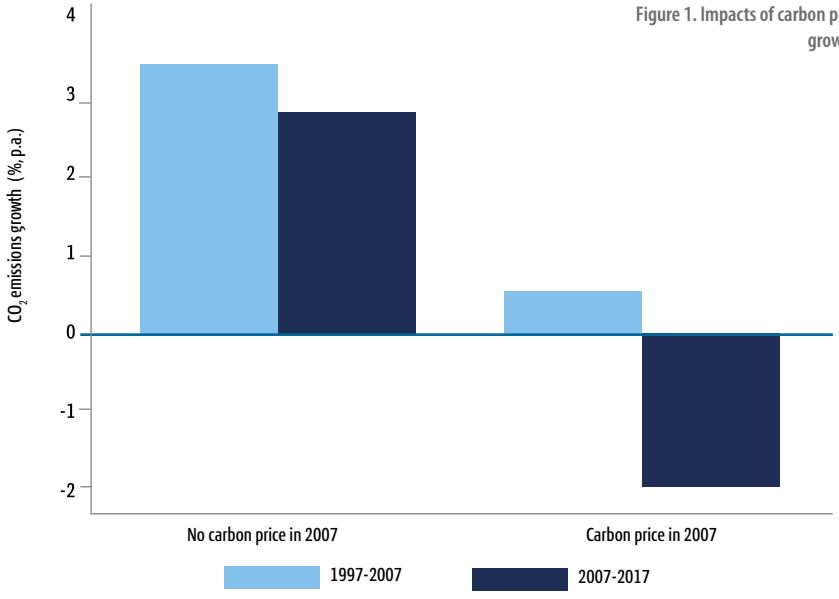


Figure 1. Impacts of carbon pricing measures on countries' carbon emission growths in between 1997-2017 (Best et. al. 2020).

As shown in Figure 1, a recent published study has shown how carbon pricing instruments have facilitated the governments in slowing down their carbon emissions growth post-2007. According to the study, while the emission increase rate of the countries that do not apply a carbon price has decreased relatively between two decades, the carbon emission increase rate of the countries that do have decreased significantly.

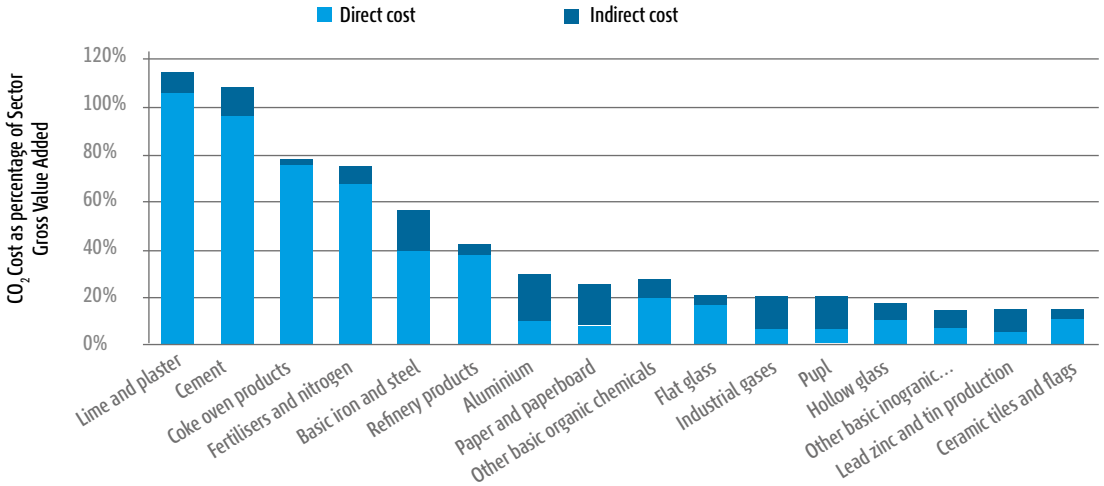
EU ETS & CARBON LEAKAGE RISK

As the most experienced carbon pricing tool in the world, European Union Emissions Trading Scheme is one of the most successful one among all the carbon pricing instruments. For example, it covers 45% of EU emissions, its carbon unit European Union Allowance (EUA) has been transacted at a pricing level range of 77-96 EUR per tons of emissions between July 2021 and July 2022; collected more than EUR 80.7 billion revenue since its beginning (ICAP, 2022).

Figure 2. EUA Prices (EUR/t) – July 2021 – July 2022.

On the other, this successful carbon pricing brings an economic risk to the regulated sectors which is called carbon leakage. Carbon leakage refers to the risk of relocation of the headquarters of the companies regulated by a carbon pricing measure to a different country/region with laxer climate laws to avoid being subjected to carbon regulation (Tosun, 2019). In such a case, the emissions owned by these companies are not mitigated but occurred simply elsewhere (i.e., outside carbon border). For example, there are several sectors that are at risk of carbon leakage in EU borders, as shown in Figure 3. Thus jurisdictions like the European Commission adopts new policies to prevent this carbon leakage risk.

Figure 3. The sectors that are at risk of carbon leakage in EU ETS



There are two ways for allocating the emissions allowances (EUAs) to the polluters in the borders of the EU. The first one is allocating the allowance freely (i.e., grandfathering) whereas the second one is allocation of the allowance through auctions. In the second option, the jurisdiction basically gains carbon revenue from the regulated entities. Here a logical question would be like why to give the emissions permits to the polluters freely (i.e., grandfathering) rather selling them (i.e., auctioning). The answer arises from the carbon leakage risk. The EU ETS has completed its 3rd phase and started the 4th as of 2020. In the initial phases, in order to protect its industry players' competitiveness against the owners of imports in EU borders, the EU has used this way of allocation of allowances. However, this application has brought some environmental and economic concerns together.

Figure 4. Volumes of grandfathered allowances and verified emissions through the phases of EU ETS

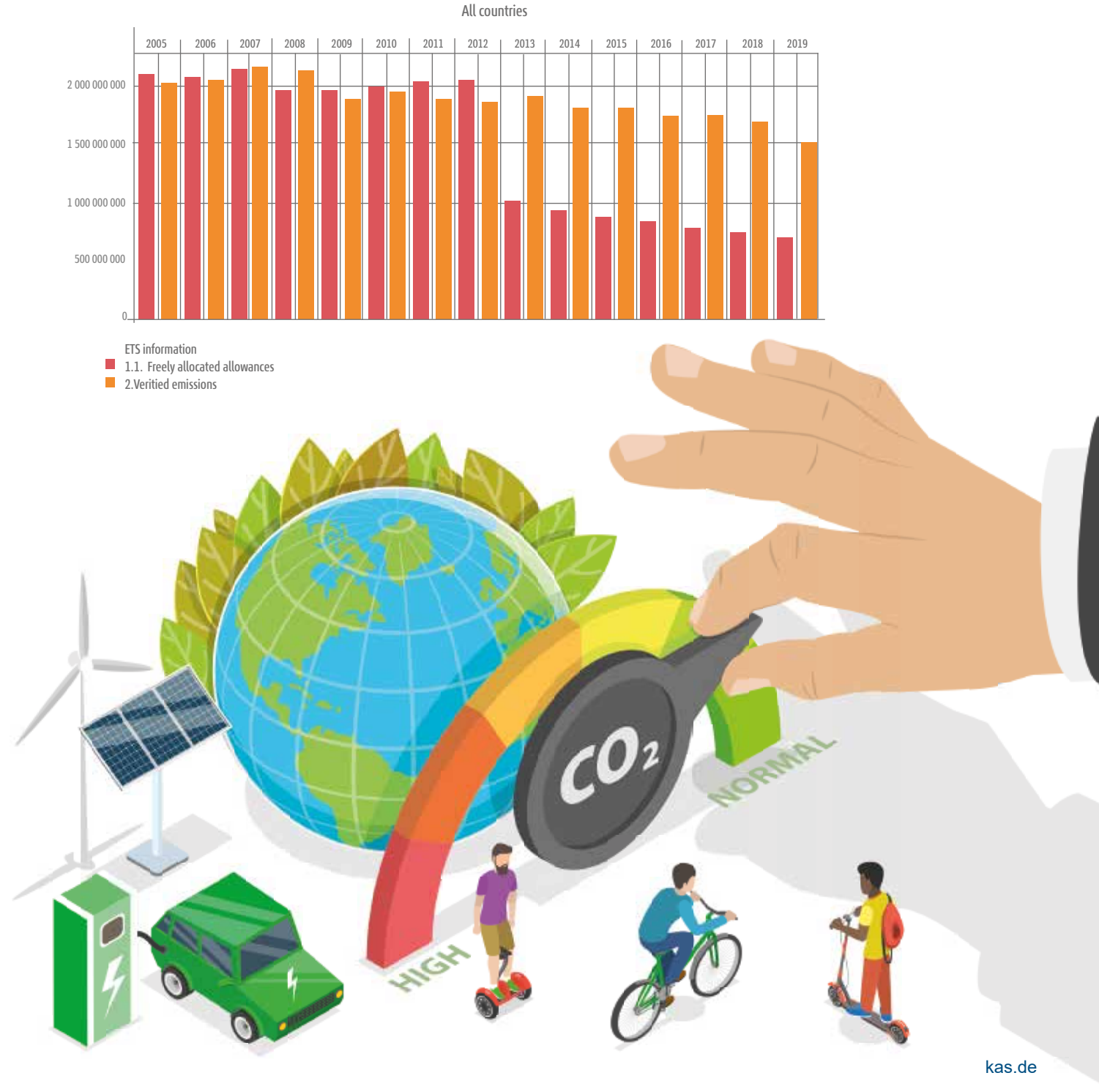


Figure 4 taken from European Environmental Agency (2020) shows the volume of the EUAs that are freely allocated, and the volumes of the verified emissions owned by the associated regulated sectors since the beginning of EU ETS. So, there are two main interpretations drawing attention with this figure. First, in the initial phases of the EU ETS, it is seen that the volume of the grandfathered allowances is greater than those verified emissions owned by the particular sector, which means EU ETS to lose a level of environmental integrity. Second, EU ETS has lost money on the allowances who were not auctioned but freely allocated. For example, a European NGO Carbon Market Watch has organized a campaign against the grandfathering by drawing attention to the extra money made by a regulated entity within the EU ETS (Figure 5). In response to these political concerns, the European Council (EC) has decided to adapt another and long-term way to deal with carbon leakage which is called Carbon Border Adjustment Mechanism (CBAM).

Figure 5. Counter argument against freely allocated allowances raised by CMW

CARBON BORDER ADJUSTMENT MECHANISM

The Carbon Border Adjustment Mechanism idea is a climate policy not only meant to protect the industrial competitiveness of the EU industry players but also to foster the transition to climate neutrality by 2050. European Council has declared an agreement on the general approaches of the CBAM on 15 March 2022. With this new carbon pricing measure, the non-EU companies who are not regulated or regulated less by a carbon pricing instrument (e.g., carbon tax or cap and trade) in their origin countries will be (further) regulated by a border carbon taxation for their exports from particular industries such as "Iron&Steel, Cement, Fertilizers, Aluminum and Electricity" by the European Council.

Since the first official rumors on the CBAM were first heard, many technical issues came into discussion tables across the Europe and in its top trading partners. Major issues are addressed in Table 1 as per the expectation raised before the declaration of the agreement.

Table 1. Clarifications given in the CBAM Agreement

Issue	Clarification given in the agreement	Next steps
Mode of Pricing	Mirror of EU ETS	Not expected.
Sectorial Scope	The products of the following sectors will be covered by CBAM: cement, aluminum, fertilizers, electric energy production, iron and steel	It is expected that the CBAM will be extended to cover all EU-ETS sectors in the coming compliance periods.
Emissions Scope	Only Scope-1 emissions of (i.e., consumption of heat/cooling and on-site electricity production) will be covered.	It is expected that Scope-2 emissions will be covered in the coming compliance periods. However, either technical or political serious thoughts have not been aired on Scope-3 emissions coverage yet.

Governance	Centralized registry run by the European Commission	None
Nature of commodity	CBAM certificates issued by the European Commission	It is expected that the CBAM certificate will be directly linked to EUA in terms of financials and legal nature by the first compliance period.
Reporting Requirement	Puts serious liability on the European Commission	The Commission shall publish official views on the future implications of the CBAM regulation with an inclusion on sectorial, scope related extension for a better addressing of carbon leakage. First official evaluation by the Commission shall be published before 1 Jan 2026; new reports shall be published every two years.
Exemptions	On consignment rates only	European Council expects a minimum threshold which exempts from the CBAM obligations consignments with a value of less than €150. Decision on another potential exemptions based on different criteria such as geographical exclusions (i.e., exempting the exports from LDC) shall be made in the coming compliance periods.
Avoidance of EUA Grandfathering	Missing	Stopping allocating the allowance freely is one of the major expectations from the CBAM. The Commission needs to publish a rigid timeline to phase out the grandfathering era.
Export Rebates	Missing	No clarification has been published the alignment to World Trade Organization's principles and rules. The Commission needs to address an avoidance policy for export rebates in the new pricing scheme.
Revenue Use	Missing	No clarification has been published for the use of the carbon revenue that will be gained from the CBAM. The Commission shall publish a rigid framework for the beneficiary groups of the CBAM revenue. For instance, WWF calls for CBAM revenues to be returned to developing countries in the form of international climate finance.

The EU has two fundamental purposes behind the implementation of the CBAM. While the first one is to protect the European industry players' competitiveness from the economic impacts of carbon leakage, the second one is to enhance the climate action beyond EU borders by incentivizing the decarbonization policies via market-based instruments. Moreover, with the CBAM, it is also aimed to foster global climate action to make the global economy in line with the Paris Agreement.

CASE STUDY: THE CBAM & KAZAKHSTAN - MAGNITUDE OF EXPOSURE

Qazaq economy will be one of those countries that will be impacted by the upcoming CBAM referring the aggregated European import volume from Kazakhstan, recorded as US$20.51 Billion. Table 2 shows the volume of the export activity from various Qazaq industries to EU. Addressing this figure, developments on implementation of a carbon border adjustment mechanism by EU shall draw the attentions from its trading partners such as Kazakhstan. Although the Qazaq economy is regulated by a national emissions trading scheme, the Qazaq ETS' ambition level is not well enough to prevent from adverse economic impacts of the EU CBAM. Thus, its competitiveness for EU exports is at risk against its rivals in the list.

Table 2. European Union Imports from Kazakhstan

Industry	Export Volume
Mineral fuels, oils, distillation products	$18.67B
Inorganic chemicals, precious metal compound, isotope	$387.43M
Copper	$318.86M
Iron and steel	$255.00M
Oil seed, oleagic fruits, grain, seed, fruits	$208.34M
Aluminum	$176.19M
Pearls, precious stones, metals, coins	$101.97M
Cereals	$54.21M
Others	$336.37 M

Recent study by The Task Force on Climate, Development and International Monetary Fund (TCD-IMF) reveals the economic exposure level owned by Kazakhstan against the CBAM. The study considers Kazakhstan's 2026 greenhouse gas emission inventory projection data and the and different pricing scenarios of EU ETS which is given in Table 3:

Table 3. CBAM Scenarios

Scenario	Description
1	Only direct emissions (Scope 1) from the production of imported goods are used to calculate the carbon embodied in the imports
2	All imported goods and services, and all indirect emissions from upstream value chains (Scope 3) are included in calculating the carbon contents

Addressing these scenarios, Qazaq economy's magnitude of exposure by the EU CBAM with respect to several parameters are summarized in Table 4.

Table 4. The Impact of the CBAM with respect to different parameters and scenarios

Parameter	Unit	Magnitude of Exposure	
		Scenario 1	Scenario 2
Impact on Exports of CBAM Products to the EU	% from baseline, 2030	-1.4	-46.8
Impact on GDP	% from baseline, 2030	-1.4	-46.8
Change in Welfare from Baseline	in USD bn, 2030	-0.2	-9.0

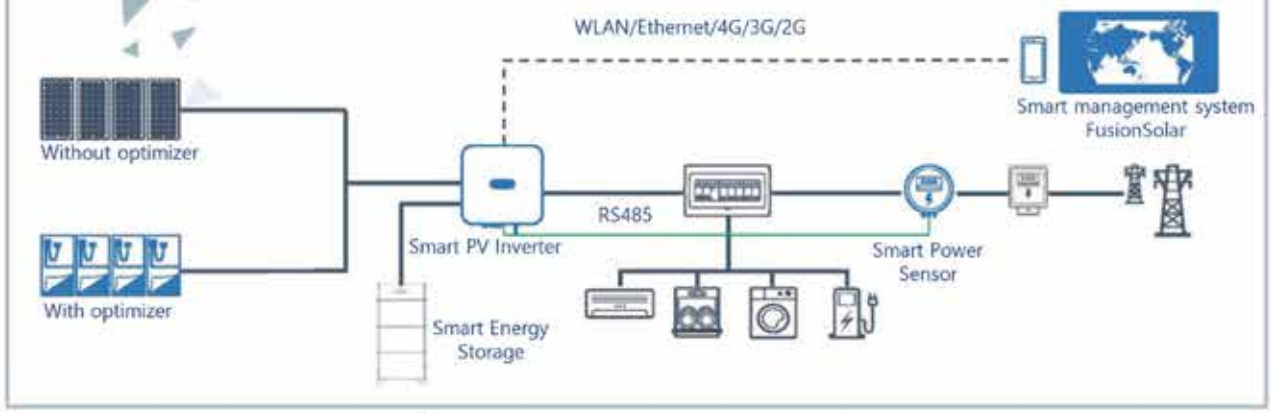
Another interpretation of the study by the United Nation Conference on Trade and Development (UNCTAD) addresses how the CBAM enhance the environmental integrity of Kazakhstan's economy. The study says that the national greenhouse gas emission can decrease by 0.83% in case the CBAM is implemented where EUA is transacted at 44 USD/t and %1.24 where EUA is transacted at 88 USD/t. In this respect, the question that shall be raised by the respective Qazaq regulatory authorities is how to achieve this minimum climate ambition by circulating the same amount of carbon revenue in the borders of Kazakhstan by avoiding the potential financial outflows to European industry competitors.

CONCLUSIONS

When it comes to carbon pricing, there are always some arguments that assert it is actually a danger for the particular economies. However, in the era of the new climate regime which will be dictated by the contemporary climate regulations such as the Carbon Border Adjustment Mechanism as part of the European Green Deal (EGD), actually such anti-carbon regulation arguments are not good for the economy neither at national nor international level. Countries like Kazakhstan that implements weak carbon regulations need to prepare themselves to the requirements of the new climate regime which will be possibly dictated by several overseas climate actions. Although Kazakhstan has already taken the first step to respond to the EU CBAM, its economy is still at risk against the rocket carbon prices owned by its trade partners such as European Union and many others that are in preparation for their own border carbon regulation instruments such as China or USA. Indeed, as also seen in Table 3, it can be easily understood that adapting emerging economies like Kazakhstan's to the EGD is cheaper than being regulated under it. Thus, preparing for the potential risks of the Carbon Border Adjustment Mechanism by firstly enhancing the existing Qazaq ETS can be a good start. The best strategy in the medium term then will be introducing an economy wide carbon pricing regulation where many industries are regulated for all three scopes of emissions at fair at environmentally competitive carbon prices to deal with the implications of the new climate regime best.

HUAWEI

Smart Solution for Residential Solar Power Plants



Optimal cost of electricity	Active safety system	Optimal functionality
Up to 30% increase in power generation with optimizers	Smart arc protection system	One-stop solution, easy to operate
Dual battery capability for high-power scenarios	Specifying an arc closure point	Automatic calibration of new modules within 5 seconds

Official global distributor – **Photomate**
Regional Director- Michael Alekseev
Email: michael.alekseev@photomate.eu

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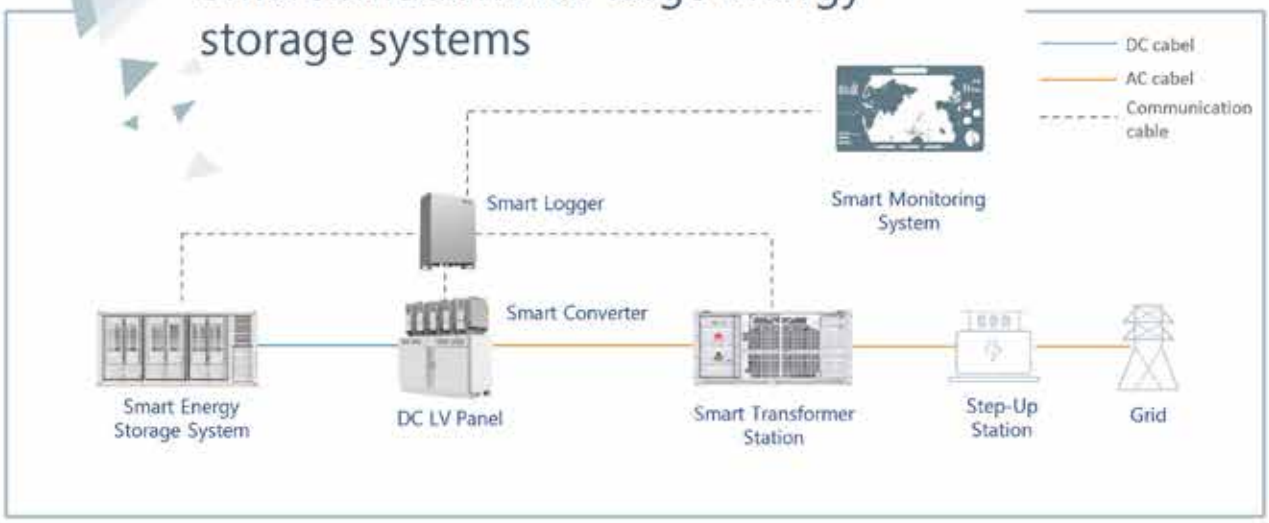
HUAWEI

Smart solutions for large energy storage systems



Efficient energy	Optimal design	Simple O&M	Reliability and Safety
Pack - level optimization	Ability to add new battery packs	Without periodic balancing	Modular design
Rack - level optimization	Lightweight design compared to the original configuration	Without visiting the site by experts	High availability

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O'ZBEKGIDROENERGO

INTERVEW

The Republic of Uzbekistan is using renewable energy sources on a large scale in order to fulfill its obligations under the Paris Agreement. Uzbekhydroenergo JSC is engaged in projects in this area with the involvement of foreign investors, international financial institutions and private capital. Mr. Fozil Mahmudov, the First Deputy Chairman of the Board for Investments of Uzbekhydroenergo JSC tells the correspondent of the magazine about what has already been done, what are the prospects.

Fozil Mahmudov:
Development of renewable energy in Uzbekistan contributes to the formation of a new sector of the economy

– What are the key renewable energy goals adopted by Uzbekistan and how can financial institutions (banks, credit organizations etc.) stimulate renewable energy development?

– The development of the use of renewable energy sources (RES) devices in the Republic of Uzbekistan is being carried out to prevent environmental problems, compensate for the demand for fossil energy resources, and in order to help form a new economic sector.

There is an increasing number of people willing to invest in energy efficiency and small-scale RES projects in Uzbekistan. However, the selling price of electricity, and especially the purchase tariff, is reducing the interest in these projects. Therefore, the Ministry of Energy is currently working on a new tariff methodology with Economic Consulting Associates with the technical support of the European Bank for Development & Reconstruction and World Bank.

At the same time, the Asian Development Bank is providing technical support for the development of distributed RES and is currently organizing a pilot project. In addition, a preliminary methodology has been developed by the Ministry of Energy regarding the tariff methodology (attached), and it has been proposed for review. It is planned to use the conclusions obtained at the end of the above-mentioned projects and re-develop the relevant proposals. When the proposals are approved by the inter-departmental agreement, a corresponding draft of the decision will be developed.

It is believed that the adoption of balanced tariff methodology, which is the main factor in the organization of the market environment and

Financial institutions have been providing technical support to ensure transparency of RES power plant tenders.

the introduction of investments in the sector, will create a safe and efficient environment for the use of RES.

On the basis of public-private partnership, cooperation with international financial institutions is underway for the implementation of RES power station projects. Financial institutions have been providing technical support to ensure transparency of RES power plant tenders. This increases the attractiveness of the investment project and increases the interest and confidence of potential investors.

– In 2018, Uzbekistan ratified the Paris Agreement and adopted a national commitment to reduce GHG emissions per unit of GDP by 10% of the 2010 level by 2030. How can the renewable energy sector accelerate this transition process in Uzbekistan? Please also specify the role of hydropower projects in this?

– The commitment within the Paris Agreement ratified by the Republic of Uzbekistan in 2018 is defined as the initial national contribution and at the United Nations Conference on Climate Change held in Glasgow in November 2021, the Republic of Uzbekistan increased this indicator by 35%. The Republic of Uzbekistan has been implementing the use of renewable energy sources on a large scale in order to fulfill its obligations under the Paris Agreement.

It should be noted that during the past period, several investment projects were created anew. Also, even today, construction of large-scale hydrotechnical structures and modernization of existing ones are being carried out at a high pace throughout our country.

As a result of these creative works and reforms implemented in the field, the energy sector, including the hydropower sector, is progressing year by year. If we look at the numbers, due to the projects implemented in the last 5 years, it was ensured that the power generation capacity will be increased from 1,731 MW in 2017 to 2,054 MW in 2021. In 2017-2021, a total of additional 323 MW of new capacities were commissioned. In particular, 13 new modern hydroelectric power stations were built, while 9 existing hydroelectric power stations were fully modernized based on modern requirements. In 2017-2021, a total of additional 244 MW of new capacities were commissioned.

– What are the further steps implemented to accomplish the targets pledged by Uzbekistan in the scope of the Paris Agreement and recent COP26 Conference in Glasgow?

– The goal is to increase the share of electricity generated from RES to more than 25 percent by 2030. Increasing the share of RES is carried out at the same time as changing the unified energy system to the level that can accept them. These works, in particular, are being carried out simultaneously with the construction of new power grids and renovation of old ones, digitization of the energy system, construction of flexible energy sources and renewal of the portfolio of old thermal power plants, coordination of regional energy systems of Central Asia, and improvement of professional training of personnel.

According to the "Concept of providing electricity to the Republic of Uzbekistan in 2020-2030" developed and approved by the Ministry

of Energy, it is aimed to increase the number of RES power plants on an industrial scale by implementing the construction of 5 GW solar photovoltaic and 3 GW wind power plants.

– What are the major projects carried out as a result of the cooperation between the Government of Uzbekistan and international organizations to accelerate Uzbekistan's transition towards a greener economy? What are the peculiarities of Uzbekistan's financial market that international organizations should consider in order to provide efficient support? Is there any cooperation between financial institutions and the Government of Uzbekistan for financing renewable energy projects?

– According to the "Regulation on the procedure for allocating compensation from the State budget funds of the Republic of Uzbekistan for the purchase of energy-efficient and energy-saving devices and for covering a part of the interest costs on loans obtained for these purposes" approved by the decision of the Cabinet of Ministers of the Republic of Uzbekistan No. 217 dated April 14, 2021 Compensations are set for installing RESs.

FOR REFERENCE:

According to the information received from enterprises producing renewable energy sources, during the past period of 2019-2020 and 2021 in households, enterprises and social sector objects 2,679 solar photoelectric stations with a capacity of 3,494 kW and 2,476 solar water heaters with a capacity of 6,274 Gcal have been introduced across Uzbekistan.

For diversification of fuel and energy resources and reduction of dependence on fossil energy sources, the target parameters given in the "Concept of providing electricity to the Republic of Uzbekistan in 2020-2030" can be cited as an example. According to these parameters, by 2030 it is planned to form a portfolio of 5 GW solar photovoltaic, 3 GW wind, 2.4 GW atomic, 3.4 GW hydro, and 15 GW coal and gas thermal power plants.

Although the potential of organic waste from agriculture and water management, as well as municipal management is relatively small, it can be developed as an energy resource for bioenergy. In the use of these resources, it is required to carry out a number of works in cooperation with other state organizations. Also, it will be necessary to support the formation of a free entrepreneurship environment and financing of private sector projects, assuming the participation of the private sector in the use of bioenergy resources.

As for the country's hydropower industry, Uzbekhydroenergo JSC plans to develop and implement 19 major projects with a total additional capacity of 857 MW in 2022-2026, including 7 projects with a capacity of 268 MW in 2022, in which 3 new construction projects and 4 modernization projects; 10 projects with a capacity of 171 MW in 2023-2024 and 2 projects with a capacity of 418 MW in 2025-2026.

Under a grant from the Asian Development Bank, the hydropower potential of the republic was analyzed and, in accordance with the provided recommendations, a hydropower development program until 2030 was developed in 2021.

Huge work is underway to implement more than

30 investment projects for the construction of new and modernization of existing HPPs, a lot of work is being done in this direction, industry specialists of local and foreign significance are involved.

We can proudly announce that in 2017-2021 the JSC "Uzbekhydroenergo" increased the number of operating 36 HPPs to 50 due to the commissioning of new large, medium and micro HPPs, and the total hydropower capacity of the country today is about 2,054 MW.

– There seem to be several anticipated large hydropower investment projects in Uzbekistan. Can you mention them and how will Uzbekistan benefit from them?

– Over the past 5 years, 13 new hydroelectric power plants have been put into operation in the Republic of Uzbekistan. Another 9 hydroelectric power plants have been modernized.

In 2020-2022, Uzbekhydroenergo JSC working together with Russian companies will build and modernize five hydroelectric power plants in Uzbekistan with a capacity of 269 MW with attraction of credit from Russian banks for an amount of 144 million euros.

Based on the decision of the President of the Republic of Uzbekistan No. PQ-44 of December 10, 2021, it is planned to implement 14 prospective projects, 11 of which will be implemented on the basis of the principle of public-private partnership.

Currently, a total of 7 HPP construction projects are planned to be implemented on the basis of public-private partnership, and their concept projects and technical and economic bases are currently being developed. Discussions are being held with IFC (International Finance Corporation) regarding the development of tender documents by an independent international expert for the implementation of projects on the basis of PPP.

The feasibility study of the project “Construction of the Khojikent pump storage power station in the Bostonlyk area of Tashkent region" (capacity 200 MW) is currently being developed by K-Water Corporation (Korea) based on Memorandum of Understanding signed between Uzbekhydroenergo JSC and K-Water on February 15 of this year. It is expected that the preliminary feasibility study will be completed in August, and from October this year the process of developing the final version of the feasibility study will begin.

Along with this, promising projects such as "Upper Pskem HPP construction" (capacity 100 MW) on Pskem river in Tashkent region, "Mizut-Kshtut HPP construction" (capacity 75 MW) on Topalang river in Surkhandarya region are planned to be implemented till 2030.

– What measures and actions have been taken in the area of transformation and innovation?

– It should be emphasized the acceleration of the transformation processes of Uzbekhydroenergo JSC, which are provided for by the Decree of the President of the Republic of Uzbekistan dated April 8, 2022 No. UP-101 “On regular reforms to create conditions for stable economic growth by improving the business environment and developing the private sector”, increasing the attractiveness of investment environment in the implementation of investment projects, which are considered as priority areas implemented with the participation of the private sector and under the terms of public-private partnership.

– Thank you for the informative interview.

FOR REFERENCE:

Orishchuk Roman Nikolaevich (Russia) is Director General of Hydroproject JSC from 2021.

The diversification of the economic activities of Uzbekhydroenergo JSC began with the study of the possibility of launching the production of mini- and medium-sized turbines and units for hydroelectric power plants.

Uzbekhydroenergo JSC's financial reports for 2018–2021 were prepared on the basis of the International Financial Reporting Standards (IFRS) and received positive mark from the international consulting company PwC. Fitch Ratings assigned Uzbekhydroenergo JSC an international credit rating of "B+" ("Positive") in 2020, which was upgraded to "BB-" ("Stable") in October 2021. It is expected to receive “BB” rating in 2022, which indicates a stable financial and economic position of Uzbekhydroenergo JSC and confirms the increase in company's attractiveness to investors and international financial organizations.

The introduction of innovative technologies in Uzbekhydroenergo JSC began with the study of the specifics of the design and operation of hybrid power plants based on renewable energy sources. Hybrid power plants represent the "mix" of hydro, solar and wind generation of electric energy in one station. In our case, it is planned to rebuild hybrid power plant or to modernize (transform) the existing HPP.

OPEN WORLD IN THE "CITY OF LIGHT"

A pandemic situation is making a mark in the history books. Business activity is being renewed, interest in new projects and initiatives is accelerating, borders are finally opening, exchange programs are being resumed. In May 2022, Timur Shalabayev, an Executive Director of the Qazaq Green RES Association took part in the short-term professional program called "Open World" funded by the US Congress, on the following topic: "Mass media coverage of the development of renewable energy sources." As part of this trip, the Kazakhstani delegation took part in the seminar of the US Congress Office on the International Leadership in Washington, DC, and also had the opportunity to get more acquainted with the initiatives of the State of New York in Buffalo to develop a sustainable economy.

Timur Shalabayev,
Executive Director of Qazaq Green Renewable Energy Associations

The choice of location for the program for the Kazakh delegation was chosen purposefully. The city of Buffalo, like the whole State of New York, can be safely called an example of the development of the electric power industry. At the beginning of the 20th century, the city inhabitants began to call it the "city of light." There were two important reasons for this name. Firstly, because of the construction of a hydroelectric power station on the Niagara Falls, which provided a huge amount of electricity. Secondly, Buffalo became the first American city to have a street with electrified lights.

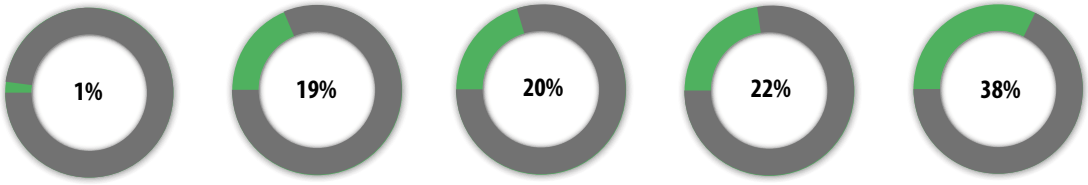
This was primarily due to the rapid industrial development of the region in the 19th-20th centuries. Also, there were big consequences associated with environmental pollution, which directly affected and continue to affect the health of local residents.

In addition, at many meetings held during the exchange program, participants from the American side emphasized that the environmental movement in the United States takes its roots from this particular region of the country. This was primarily due to the rapid industrial development of the region in the 19th-20th centuries. Also, there were big consequences associated with environmental pollution, which directly affected and continue to affect the health of local residents.

Therefore, the Buffalo International Institute organized a very intense program with various stakeholders: the New York State Energy Authority, the Erie Department of Environmental Conservation and Planning, a visit

Kazakhstani delegation at the Open World Program, Buffalo, New York

Electricity generation by types of resources in the USA in 2021



Source: U.S. Energy Information Administration

to the Robert Moses Hydroelectric Power Plant and the Lewiston Hydroelectric Power Plant, the Buffalo Toronto Public Media Corporation, the University of Buffalo and several public non-governmental organizations.

U.S. AND NEW YORK STATE POWER NETWORK

In 2021, about 4,116 billion kWh of electricity was generated from electric power facilities in the United States of America. In comparison with Kazakhstan, in 2021, 114.3 billion kWh of electricity was generated at the country's power plants.

Overall, in the US, about 38% of this electricity generation comes from gas, 21.8% - from coal, and about 1% - from oil. At the same time, about 19% comes from the nuclear energy and about 20% comes from the renewable energy (of which WPP - 9.2%; HPP - 6.3%; SPP - 2.8%; BioPP - 1.3%; Geothermal energy - 0.4%). The US Energy Information Administration estimates that in 2021, an additional 49 billion kWh of electricity will be generated by small solar PV systems (less than 1 MW of installed capacity). As of December 31, 2020, there were 23,417 electrical generators in the United States operating at approximately 11,070 industrial power plants.

There are currently two major AC power networks in the US: Eastern Interconnection and Western Interconnection. In addition to them, there are two small power systems: Alaska Interconnection (in Alaska) and Texas Interconnection (in Texas). The three grids, Eastern, Western, and Texas, are connected to each other via DC links, allowing power to be sent across the continental US, to Canada, and to Mexico.

In 2021, carbon dioxide (CO_2) emissions from the US electricity sector were 1,551 million metric tons (Mt), or about 32% of total US energy-related CO_2 emissions of 4,872 (Mt). Coal plants account for 59%, gas plants - for 40%, and oil plants - for 1%.

Since 2012, natural gas, nuclear and hydropower together have provided more than nine-tenths of New York State's net industrial-scale electricity generation (1 megawatt or more). Non-hydroelectric renewable resources such as wind, biomass, and solar power provide most of the remaining energy resources.

In 2019, New York State revised its Clean Energy Standards to move to 100% carbon-free electricity from both renewable and nuclear power by 2040.

According to the results of the data on electricity generation in February 2022, 45% of electricity generation in New York State comes from gas, 23% each from hydroelectric and nuclear power plants, about 8% - from renewable energy, and about 1% - from oil. In 2019, New York was the sixth largest consumer of natural gas among all states. Today, three out of five households in the state use natural gas to heat their homes.

All in all, the share of nuclear energy in the energy system of the state is declining. In 2019, Nuclear power plants accounted for 34% of New York State's electricity generation. This is due to the 2021 closure of Indian Point, one of the state's four nuclear power plants.

Coal was a small source of New York State's electricity generation. Coal-fired generation, which was about one-sixth of the state's output two decades ago, provided only 0.1% of New York State's electricity in 2020 when the state's last coal-fired power plant, located on the shores of Lake Ontario, was closed.

US RENEWABLE ENERGY AND NEW YORK STATE PLANS

Renewable electricity production from sources other than hydroelectricity has grown steadily in recent years, mainly due to the addition of wind and solar generating capacity. Since 2014, the total annual production of electricity from non-hydro industrial-scale renewable sources has exceeded the total annual electricity production from hydroelectric power plants.

Wind power's share of total industrial power generation capacity in the United States has risen from 0.2% in 1990 to about 12% in 2021, and its share of total annual industrial power generation has risen from less than 1 % in 1990 to about 9% in 2021.

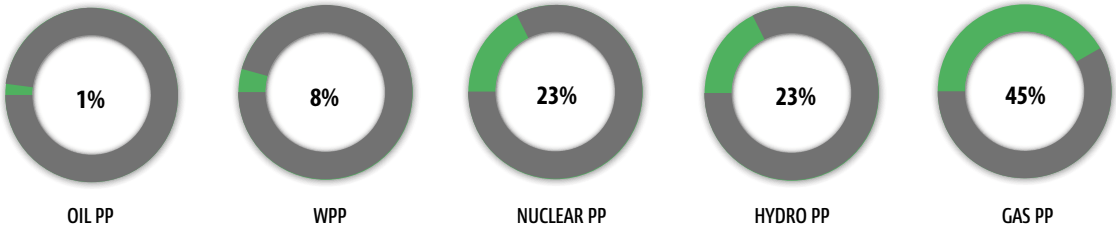
Despite a relatively small share of total U.S. power and generation, solar power capacity and generation have grown significantly in recent years. Solar power generation capacity on an industrial scale has grown from about 314 MW in 1990 to about 61,014 MW at the end of 2021, of which about 98% was from solar photovoltaic systems and 2% from solar thermal power systems.

The share of solar energy in total U.S. electricity generation in 2021 was about 2.8%, compared to less than 0.1% in 1990, and small-scale photovoltaic generation was about 49 billion kWh.

In 2019 New York State passed the Climate Leadership and Community Protection Act. The law sets targets to reduce emissions by 40% from 1990 levels by 2030 and then to 85% from 1990 levels by 2050. The remaining 15% of emissions will be offset, for example, by planting trees that remove carbon dioxide from the air to achieve net zero emissions.

One of the key principles to achieve this goal is the energy transition in the New York State. By

Electricity generation at the end of February 2022 in the New York State



Source: U.S. Energy Information Administration

2030, New York City plans to get 70% of its electricity from renewable sources, and by 2040, the goal is for all of the state's electricity to come from carbon-free sources such as wind, solar, and water.

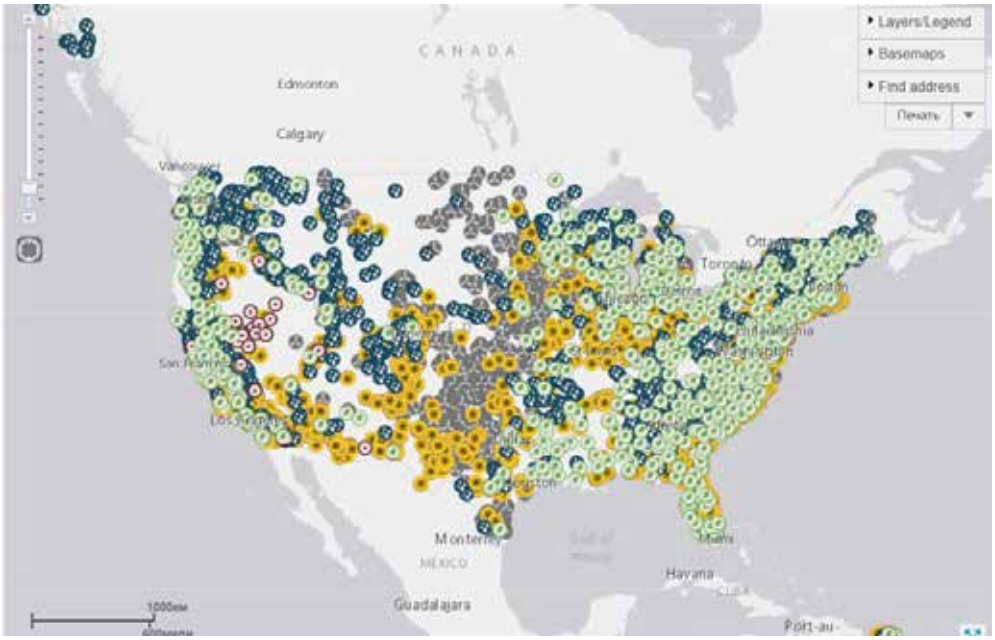
The legislation also requires the state's entire economy to be carbon fre by 2050. Under the Clean Energy Standard, the state's nuclear power plants qualify as zero-emission resources. Properties that are not technically capable of eliminating all carbon emissions may purchase offsets for a fraction of the 100% carbon neutrality required to achieve the goal. Compensation should be from nearby sources that reduce carbon emissions, such as forests and agriculture. In 2018, energy-related carbon emissions per capita in the New York State were lower than in any other state in the country.

In 2020, for the first time, renewables produced more electricity than nuclear power plants in the New York State. Hydroelectricity provided almost a quarter of the New York State's net electricity generation. Wind, biomass, and solar power provided nearly all of the rest of the state's renewable generation. The contribution of both industrial and small-scale (less than 1 megawatt) solar photovoltaic (PV) generators has increased substantially over the past decade and exceeded the amount of electricity generated from biomass in 2019 for the first time.

New York is consistently ranked among the top four hydroelectric producers in the country, and in 2020 the state produced more hydroelectric power than all other states except two states, Washington and Oregon. The Robert Moses Hydroelectric Power Plant produces the largest share of New York City's hydropower. The station is the third largest conventional hydroelectric plant in the United States.

Practically both stations are an example of base (HPP named after Robert Moses) and flexible generation PSP (Lewiston pumped storage power plant). The Lewiston PSP has a water tank, which is located on an area of 770 hectares. At night, with the help of pumps, when the demand for electricity is reduced and tariffs are much lower than during the day, electricity is used from the nearby HPP. Robert Moses to fill the reservoir. During the day, at the command of the system operator, the 12,240-MW turbines of the Luston Pumped Storage Plant use water from the reservoir to regulate the State's power grid. At the same time, the 2,535-MW Robert Moses HPP effectively acts as the base power generation for the entire state and

Map of renewable energy facilities in the USA



Source: U.S. Energy Information Administration

New York is consistently ranked among the top four hydroelectric producers in the country.

Robert Moses HPP (foreground) and Lewiston PSP (background)

covers about 25% of the electricity demand. Both stations are interconnected and can practically supply 2.6 GW of power to the system.

Wind is New York's second largest renewable source of clean electricity. In 2020, wind energy accounted for almost 4% of all useful generation in New York. As of June 2021, New York had a total of about 2,000 megawatts of wind power from almost 24 wind farms. The state is in the process of applying to develop 9,000 megawatts of offshore wind power by 2035. As of 2020, there were over 4,300 megawatts of offshore wind power in development in New York.

In 2020, solar power provided 2.5% of New York's total net power generation, two-thirds of which came from small systems less than 1 MW each. New York encourages small solar installations, such as rooftops, through net metering and various financial support programs. In 2020, the state ranked fifth in the nation in small-scale solar power generation. Most of the state's more than 240 commercial solar installations are under 20 MW, but there are three large solar installations with over 20 megawatts. All of them are located on Long Island. Between January 2020 and June 2021, about a quarter of New York City's commercial-scale solar capacity was commissioned. In mid-2021, New York State had nearly 2,700 MW of installed PV capacity. The next goal is to reach from 3000 megawatts of solar photovoltaic capacity by 2023 to 6,000 megawatts by 2025.

NEW YORK STATE SUSTAINABLE ENERGY INITIATIVES

As part of the exchange program, a meeting was held with the Erie County Department of Environment and Planning. In general, it must be said that Buffalo was a major industrial site. Since the end of the 19th century, heavy industry has been developing here: the production of steel, coke, the chemical industry, etc. This was facilitated by the use of the Erie Canal for transport purposes. South of the city in the locality of Lackawanna was a large industrial site, where the largest steel corporation in the world, Bethlehem Steel Plant, was operating. In the early 1980s the plant was closed, the soil under the plant, as well as the environment in the surrounding area, was poisoned. At the same time, the expansion of the city prompted the local government to decide on the further use of these areas, since reclamation and cleanup would be very expensive for the local budget. The solution was found within the framework of the sustainable development program - it was decided to organize a renewable energy zone on the site of the former steel production.

Currently, 35-MW wind power plant and 8.8-MW solar power plant have been built here with plans for further expansion. Since they received a cheap source of energy, they are now considering the possibility of cheap renewable electricity being sold to the urban poor in the first place.

Equally interesting is the commitment to sustainable development goals of the University of Buffalo. The university has a separate department responsible for sustainable development. Over the past three years, the University at Buffalo has reduced its carbon footprint by an average of 33% (measured in metric tons of carbon dioxide equivalent) by replacing 671,594,561 kilowatt-hours of electricity with renewable sources. Case studies of the implementation of the university's sustainability policy are the realization of projects of two solar systems on campus, the 4.5-MW Steel Winds project off campus in Buffalo, the implementation of the Buffalo Future of Renewable Energy

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Wind and solar park on the site of an industrial site Bethlehem Steel Plant

Solar Station at the University of Buffalo

Localization initiative, and the purchase of 100% of the electricity consumed from carbon credits from renewable energy stations. The goal of the university is to switch to 100% electricity consumption through renewable energy sources by 2030.

ACTIVITY OF CIVIL SOCIETY AND ASSOCIATIONS

During the program, meetings were also held with a number of non-governmental organizations and associations that were actively involved in environmental protection, protection of the local community interests, and development of the clean energy. Among them were such organizations as: Citizens' Campaign for the Environment, Open Buffalo, Clean Air Coalition, Sierra Club.

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One of the most memorable meetings was the presentation of activities of the Erie Clean Air Coalition in New York State. The coalition presented interesting cases of its activities, approaches to solving the problems of which could also be of interest to us.

For example, in the Erie region, the 780-MW Huntley coal plant was closed in 2016. The thermal power plant was closed due to economic reasons - coal energy has become expensive and unprofitable. According to the report by the Institute of Energy Economics and Financial Analysis (IEEFA), Huntley's pre-tax profit fell by $113 million between 2008 and 2012; and the plant has posted an average annual loss of $1 million more recently. Because the station was the largest taxpayer in the region, the Erie area lost a lot of government revenue. For example, between 2008 and 2012 due to low tax revenues, three public schools in Thanawanda were closed. The closure of the plant as a whole reduced the tax revenue of the City of Tonawanda, Erie County, and the Kenmore Tonawanda School District by US$6.2 million. The government of the region turned to the government of the State, which, in order to solve the problem with the deficit in budget revenues, founded the Fund (Electric Generation Facility Cessation Mitigation Fund), which would cover this deficit. The fund was launched as part of the 2016-2017 state budget, with the New York State initially providing $30 million to help communities that are losing property tax revenue due to the plant's closure. In April 2018, another $24 million was added to the program, with a balance of $56 million as of October 2020. The program uses proceeds from the Regional Greenhouse Gas Initiative to compensate counties, towns, cities, school districts, and special district payments for a period of 7 years.

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Until now, the power plant building and all surrounding areas belong to the company. Now the Coalition has raised the issue for the State to exercise its legislative right and sell all buildings and territory for $1 for the needs of the local community (legislation thus allows the removal of inactive assets for the needs of the population). Since this plant was very polluting and caused many types of cancer (brain, esophagus, lung cancer) among the local population, and people live here already at a distance of 1 mile, all residents through civil organizations want to force the owner's company to demolish the plant at their own expense and make a complete cleaning of the territory in accordance with environmental requirements. Why? Because the local budget has been paying for healthcare services and treatment of cancer patients for many years.

Huntley Coal Power Plant, Tonawanda, New York

Forstistar gas plant in North Tonawanda, New York

One of the most important problems was the issue of re-employment of people who worked at the coal plant. The coalition involved trade unions in this work, with the help of which people were retrained at the expense of trade union funds and re-employed. At the same time, state funding was not used for these purposes.

Another interesting case was with the Fortistar gas power plant. Now the plant works as a maneuvering power to smooth out daily schedules in the network and is a balancing power, that is, it turns on only during peak hours. The management of the plant decided to maximize profits and run a mining farm in order to increase their income and practically generate profit 24/7. The Coalition for Clean Air joined the project. Since gas-generated energy also pollutes the air and causes diseases of the local population. They took advantage of the State Zoning Act, which is trying to ban mining activity in the Erie area. Currently, they have prepared a bill that will introduce a moratorium for two years on this activity and will oblige to conduct a full study of the impact of mining on electricity consumption, and as a result, the intensification of environmental pollution and the impact on the health of the local population.

Civic activists point to the case of a closed plant in Dresden, where a former coal plant was trying to reopen its operations for mining cryptocurrencies using natural gas.

Conclusion

In general, the energy system of the state of New York is the desired balance of resources, which they are trying to find responsible persons for the development of energy in Kazakhstan. Economic realities, the unprofitability of coal-fired generation, cheap gas prices have led to the closure of coal-fired stations and the development of gas-fired power generation. At the same time, sustainable development of hydropower and nuclear power should be noted as the basic generation. On this note, the ambitious plans for the development of renewable energy and practical plans to achieve the goal of net-zero emissions by the state by 2040 are certainly understandable.

Talking to stakeholders representing various organizations in the New York State, one can understand the great power that comes from civic engagement and non-governmental organizations that raise important issues for the local community. Thanks to this, at the level of ordinary citizens and communities there is an understanding of the goals and need for the development of the clean energy. Standing up for one's rights, protecting the environment, protecting the health of loved ones, understanding responsible coexistence with nature and a clear vision of a clean future are the hallmarks of the citizenship of modern and advanced Americans. It seems that this is where the secret of success in sustainable development in the "city of light" lies.

QAZAQ GREEN Association

PLATFORM FOR NATIONAL AND INTERNATIONAL PLAYERS IN RENEWABLE ENERGY SOURCES

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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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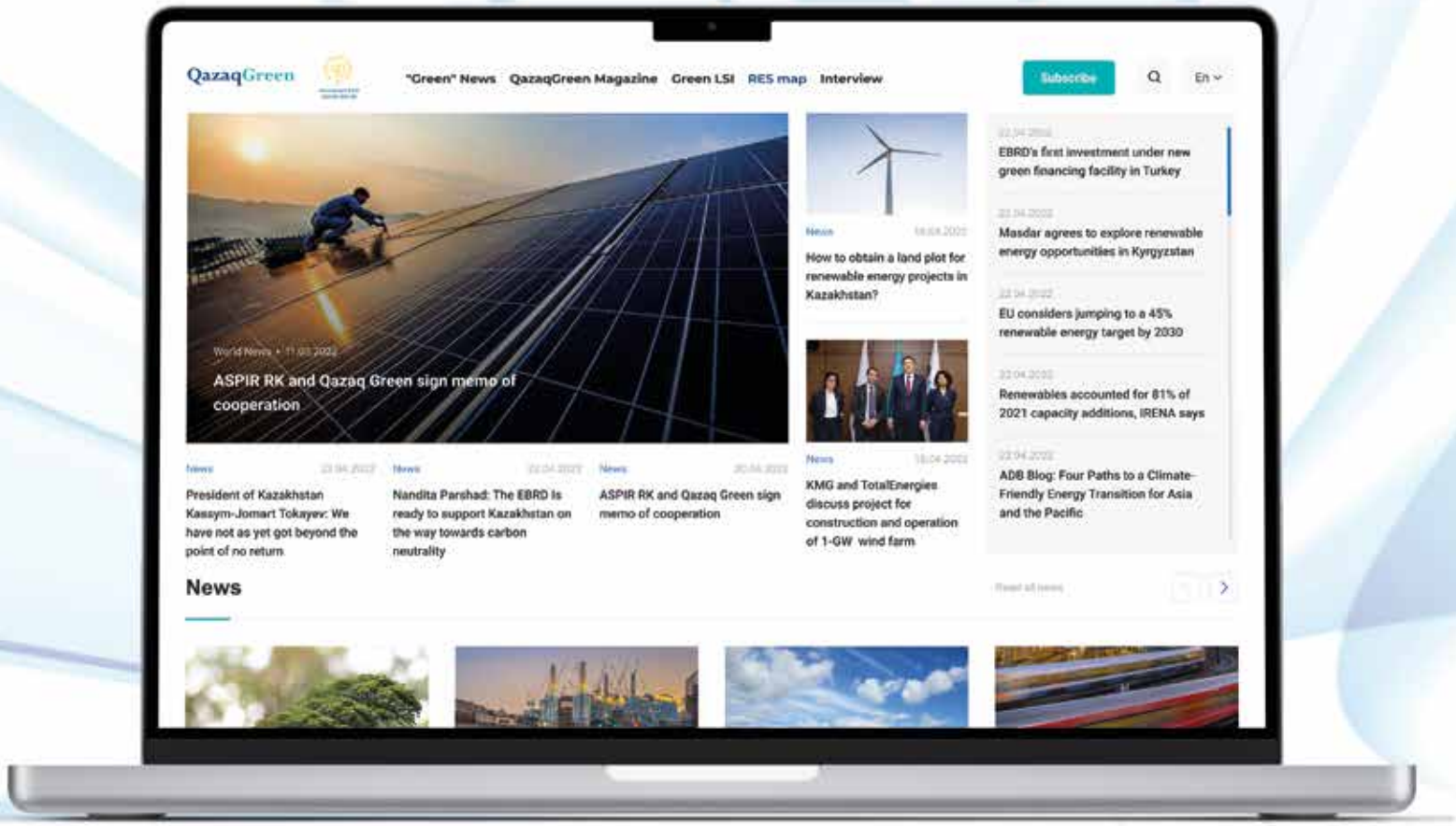

QazaqGreen launches information portal on "green" economy of Kazakhstan

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.

KONRAD ADENAUER STIFTUNG

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.

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- **Policy and Party Counselling**
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