INFORMATION AND ANALYTICAL MAGAZINE

QazaqGreen

qazaqgreen.com
www.kas.de

QAZAQ GREEN Association

KONRAD ADENAUER STIFTUNG

2023
№ 7 (11) December

ACHIEVEMENTS AND CHALLENGES OF RES SECTOR OF KAZAKHSTAN

5 YEARS QAZAQ GREEN


QAZAQ GREEN
RES ASSOCIATION
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 memebers to obtain attractive conditions for investing in the projects of renewable energy sourses
Astana,
Chubary microdistrict, A. Knyaginina Str., 11
qazaqgreen.kz
Members and partners of the Association
MINISTRY OF ENERGY OF THE REPUBLIC OF KAZAKHSTAN
MINISTRY OF ECOLOGY AND NATURAL RESOURCES OF THE REPUBLIC OF KAZAKHSTAN
Development Bank of Kazakhstan
Eurasian Development Bank

QazaqGreen

No. 7 (11) 2023
Information and analytical magazine

FOUNDER:
"Qazaq Green" Renewable Energy Association

EDITORIAL COUNCIL:
J.D. Rey
N.N. Kapenov
A.M. Sospanova
T.M. Shalabayev
A.Ye. Akhmetov
A.Sh. Tlebergenova

CHIEF EDITOR
N.N. Kapenov

ISSUING EDITOR
N.V. Shayakhmetova

PUBLICATION:
"NV-Media" IE

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

MAGAZINE REGISTERED:
Committee of Information of the Ministry of Information and Social Development of the Republic of Kazakhstan. Certificate # KZ19VPY00042949 dated November 19, 2021. Initial registration: November 20, 2019, KZ60VPY00017379.

Magazine coverage:
Republic of Kazakhstan,
Countries of Near and Far Abroad
Total circulation:
1,500 copies
Printed:
Print House Gerona LTD.

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

KONRAD ADENAUER STIFTUNG

kas.de

DEAR READERS! DEAR FRIENDS!

This year, the Renewable Energy Association "Qazaq Green" celebrates its 5th anniversary. In 2018, our country made a historic choice – the process of implementing renewable energy projects was changed from a system of fixed tariffs to auctions. This step resulted in creation of renewable energy market, which attracted more than 230 companies from 13 countries of the world, foreign and domestic investments flowed into renewable energy projects, and the country generated almost 6% of electricity from renewable energy in the first 9 months of 2023. Today, our auctions are recognized in the country and abroad, including by international organizations, as a fair and open mechanism for selecting winners, where the main role is played by the price and installed capacity of the project. This year, for example, we witnessed a record low price for wind energy – 10.38 tg / kWh for the construction of wind power plant with a capacity of 10,001 MW in the Abai region. And this is a great achievement!

Then, in 2018, there was a need to create an Association that would be a bridge between government agencies and business to solve all the pressing problems faced by the business community of the renewable energy sector in their daily practice. Thanks to the activities of the Association, renewable energy sources were included in the List of priority investment projects, which made it possible to use investment preferences, a mechanism for delaying the implementation of projects due to force majeure situations was introduced during pandemic, the conditions for indexing tariffs were significantly improved, the terms of PPA contracts were increased from 15 to 20 years, updated maximum auction prices were approved, plans for auctions for 5 years ahead, we have defended the rights of renewable energy facilities that have concluded PPA contracts before July 1, 2023 as part of their work on the balancing electricity market, clarity has been introduced on the issues of classifying renewable energy facilities as vulnerable in terms of terrorist actions, the issue of changing land plots for renewable energy facilities, generating equipment of stations in the Classifier of fixed assets of RES was separated from the facilities of the stations, which has reduced the tax burden of RES facilities, legislative measures are being introduced to stimulate the development of small-scale RES, educational programs on RES was launched at universities. And this is not an exhaustive list, but this is our daily work aimed at improving the conditions for the implementation of renewable energy projects in our country.

Qazaq Green is rightfully proud of its projects today. In 2019, the International Renewable Energy Business Festival Qazaq Green Fest was held for the first time. This year we will held the festival for the second time. The event has become virtually the only permanent platform for discussing topical issues of our sector. As a result of the events, Charters were formed – an Appeal to the Government of the Republic of Kazakhstan from the business community of the renewable energy sector, which were sent to the Prime Minister of the Republic of Kazakhstan. It is encouraging that many provisions of this document find legislative solutions.

I should also mention the Qazaq Green Expedition format, which is beloved by the market. The first expedition took place in July 2022 with a visit to the wind parks of the Akmola region based on the territory of the Buiratau National Park, the second expedition took place in September 2023 with a visit to the 100 MW CATEK Green Energy wind power station and discussions and a RES School at the KEGOC training base in Burabai National Park. Our expeditions provide an opportunity to unite the entire renewable energy sector and develop a common vision on the most important issues of renewable energy development.

The bright achievement of our Association was the launch of RES School in 2023, where everyone can get knowledge from RES sector practitioners on the implementation of projects. Students gain knowledge on the legislative framework for development of renewable energy sources, issues of integration of renewable energy sources into the National Grid System of the Republic of

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

Kazakhstan, technical features of the construction and operation of solar and wind parks, economic aspects of implementation of renewable energy projects, issues of carbon offsets. Today we see the interest of large companies and private entrepreneurs in the work of the RES School.

Since 2013, our Association has been publishing the information and analytical magazine Qazaq Green, which is published with the support of the Konrad Adenauer Foundation. The issue of the magazine was noted by the President of the Republic of Kazakhstan Tokayev K.K., who considered the publication of the magazine useful for highlighting environmental issues and "green" technologies in the country and Central Asia and contributes to the implementation of Kazakhstan's strategy for the development of "green" economy. Today you are holding the 13th edition of our magazine in your hands. In continuation of this topic, I would like to mention the launch of an online information portal QazaqGreen.com . News on the "green" topic is published daily in the state, Russian and English languages, and among the subscribers and users of the portal are readers from near and far abroad who are interested in the development of the "green" agenda in Kazakhstan.

I would like to take this opportunity to tell you about another important project. The Renewable Energy Association "Qazaq Green", realizing the importance of the goal set by the President of the Republic of Kazakhstan Tokayev K.K. to achieve carbon neutrality of the country by 2060, decided to create a voluntary standard of carbon offset mechanisms to reduce greenhouse gas emissions – Qazaq Green Certificate Program, and contribute to the fight against climate change and reduce greenhouse gas emissions.

Carbon offsets play an important role in the fight against climate change. They allow companies to maintain decarbonization beyond their own carbon footprint, thereby accelerating the transition to decarbonization of the company. Private companies that are not part of the trade system of the Republic of Kazakhstan do not have the opportunity to confirm their commitment to the ESG principles and cover the carbon footprint with carbon units. The Qazaq Green Certificate Program will allow individuals and corporations to contribute to the fight against climate change through the acquisition of voluntary offset units, thereby confirming their commitment to the ESG principles.

We successfully presented our standard at the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, as well as at the 28th Conference of the Participants of the UN Framework Convention on Climate Change.

Stimulating the development of renewable energy sources not only from the point of view of economic instruments, but also from the point of view of encouraging employees of the entire sector is an important part of sustainable development. As you know, " personnel is key" and the renewable energy sector is no exception to these rules. Thousands of specialists work in the sector today: power engineers, engineers, builders, economists, civil servants, investors, scientists, analysts. Thanks to their work, a completely new sector of the economy has appeared in the country in a short period of time, and 141 renewable energy facilities with a total installed capacity of about 2.7 GW generate renewable energy. In this regard, the Renewable Energy Association "Qazaq Green" once again raises the issue of the need to establish a professional holiday "Day of Employee of Renewable Energy Sector".

For achieving such results, the sector's employees deserve it, because today there is probably no other such young sector of the economy in our country, where there are such successes and huge prospects ahead. Moreover, the popularization of the industry will encourage the younger generation to choose renewable energy sector as their future profession.

The Association has many plans – the renewable energy sector is developing, and with it the players of the renewable energy market are developing. We are proud that members of Association include largest Kazakhstani and foreign investors, world-renowned equipment suppliers, domestic developers, design and engineering companies whose opinion is authoritative in the industry, law and consulting firms, universities that train specialists for the needs of the renewable energy sector. Without the support of our members, the Association would not exist. Therefore, I would like to express my gratitude to all our partners for their constant support in word and deed.

Today I can say with confidence that the Renewable Energy Association "Qazaq Green" has succeeded and got established. It is gratifying that our opinion is being listened to in the Parliament of the Republic of Kazakhstan, in government agencies and colleagues in the workshop. I am sure that we have a great future!

Alga, Qazaq Green!

I would like to take this opportunity to congratulate all our readers on the upcoming New Year and wish them good health and success!

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

“ Quote **number** ”

Energy security must also be addressed. We should rely as much as possible on our own resources.

The key role is assigned to the power generation sector. Over the next five years, at least 14 gigawatts of new energy capacity will be introduced. The reconstruction of the first unit of the Ekibastuz Hydroelectric Power Station-1 will be completed this year. For the first time, the plant will operate all eight units. The project to expand Hydroelectric Power Station-2 is in process, while the project on Hydroelectric Power Station-3 is about to start.

Kazakhstan should not have to import electricity or be dependent on neighboring countries. The current situation is unacceptable from all viewpoints, particularly in terms of state security.

Of course, the implementation of renewable energy projects will continue. Special emphasis should be placed on the development of hydroelectric power plants. Energy, heat, and water supply constitute a single, technologically interconnected system. This system should be treated as an important, separate branch of the economy. The current approach has largely exhausted itself. Today, new solutions are required.

Message of the President Kassym-Jomart Tokayev to the people of Kazakhstan "Economic course of a Just Kazakhstan", September 1, 2023.

OPEN DIALOGUE WITH THE RENEWABLE ENERGY COMMUNITY

AN OPEN DIALOGUE TITLED "BRAINSTORMING: PRESENT AND FUTURE OF RENEWABLE ENERGY" TOOK PLACE WITH THE PARTICIPATION OF VICE MINISTER OF ENERGY OF THE REPUBLIC OF KAZAKHSTAN, ZHANDOS NURMAGANBETOV. THE EVENT WAS JOINTLY ORGANIZED BY THE MINISTRY OF ENERGY OF KAZAKHSTAN, KEGOC, AND THE QAZAQ GREEN RENEWABLE ENERGY SOURCES (RES) ASSOCIATION.

Notably, the dialogue brought together a diverse group of participants from the RES business community, including investors, developers, equipment suppliers, international financial institutions, universities, and public organizations.

In the course of an open dialogue with the business community, topical issues of the RES sector were touched upon: participation of RES facilities in the balancing electricity market, development of energy storage systems, hydroelectric power plant projects, and further improvement of the auction bidding mechanism.

The Ministry of Energy will address the issues raised by industry players on a systematic basis.

Ainur Sospanova, Chairperson of the Board of Qazaq Green Renewable Energy Association, emphasized the crucial role of Central Asian countries collaborating to harness the potential of renewable energy efficiently. She shared her insights during the ENERGY WEEK CENTRAL ASIA&MONGOLIA 2023 event in Astana, held on September 19-20. Sospanova highlighted the need for government dialogues, similar to the successful Nord Pool project, to prevent issues such as underestimated output, disputes, and complications related to payment norms.

Ainur Sospanova: CENTRAL ASIAN ENERGY INTEGRATION TO GIVE IMPETUS TO DECARBONISATION

"In the case of Kazakhstan, Uzbekistan, and other countries, I believe it's essential for governments to engage in a dialogue on how these countries can come together, drawing inspiration from the Nord Pool project, and embark on similar initiatives in our own region. Otherwise, we will build these facilities, but they will not be able to work efficiently. Their output will be underestimated, there will be some disputes, take or pay norms will be fired, and so on, but there will be no efficiency from the introduction of renewable energy on a large scale, which is in the plans of the countries," she said.

Sospanova also emphasized the importance of cooperation at multiple levels, including system operators, markets, and digitalization of the industry. She noted the diverse energy generation profiles of countries in the region, such as Uzbekistan's gas-fired generation, Kazakhstan's coal-fired generation, and Kyrgyzstan and Tajikistan's hydroelectric focus. Collaborating would create a more balanced energy portfolio, aligning with both decarbonization goals and economic development.

The Chairperson underlined that renewable energy development is pertinent across the region, but to

achieve success, these countries must act cohesively within one energy system, considering each other's plans. As significant green projects are on the horizon, it is crucial for these countries to actively engage with one another.

Sospanova provided examples of the substantial renewable energy projects in Uzbekistan and Kazakhstan, which are set to have a substantial impact on the energy landscape. Kazakhstan, in particular, has attracted investment for solar and wind farms and has developed a skilled workforce for large projects. However, she acknowledged that the expansion of grid infrastructure faces challenges with the integration of new renewable energy sources.

Kathy Leach, the UK Ambassador to Kazakhstan, emphasized the pivotal role of government policy in effectively communicating directives to both corporations and the general public.

The Ambassador stressed that governments must prioritize the communication of strong policy messages to the private sector, and in this regard, Kazakhstan is no different. She pointed out that in the developmental trajectory of all nations, including Kazakhstan, from the grassroots to the summit, it is becoming progressively critical for small and medium-sized enterprises to acknowledge the importance of this agenda.

Additionally, Ambassador Leach underscored the importance of fostering cooperation among regional countries to strike a harmonious balance in the pursuit of zero carbon emissions. She also highlighted energy efficiency as a vital component in achieving carbon neutrality.

Zhaslan Kassenov, Director of the Department of Renewable Energy at the Ministry of Energy, discussed the need for a combination of small and large hydropower plants to balance the imbalances created by renewable energy sources. He pointed out that Kazakhstan has abundant hydropower potential, especially in regions like the Irtysh River basin, the Ili River basin, the Syr Darya, Talas, and Chu river basins.

"It should be noted that about 90 percent of all rivers in the country are small, which makes the construction of small hydropower plants economically feasible. Projects related to their commissioning are being systematically implemented. The country's need for maneuvering capacity sets us the task of introducing a large number of small and large hydropower plants in the near future," he said.

Open international auctions for new RES in Kazakhstan have been held since 2018. Over this period, a total of 232 companies from 13 different countries, including Kazakhstan, China, Russia, Turkey, Germany, France, Bulgaria, Italy, UAE, Netherlands, Malaysia, Spain, and Singapore, have actively participated in these bidding processes. Between 2018 and 2022, a notable tally of 54 auctions took place, culminating in the selection of 83 projects. The Ministry of Energy anticipates heightened investor attraction in these auctions, primarily due to the extension of the guaranteed purchase period for the entire electricity production by a renewable energy entity, now set at 20 years compared to the previous 15 years. This extension also incorporates annual tariff adjustments, further enhancing the appeal of these opportunities.

PLENITUDE INAUGURATES ITS FIRST 50 MW PHOTOVOLTAIC PLANT IN KAZAKHSTAN

ASTANA (KAZAKHSTAN), 27 SEPTEMBER 2023 – PLENITUDE (ENI) INAUGURATES TODAY, WITH THE ATTENDANCE OF THE GOVERNOR OF THE TURKISTAN REGION, DARKHAN SATYBALDY, THE AMBASSADOR OF ITALY TO KAZAKHSTAN, MARCO ALBERTI AND LOCAL AUTHORITIES ITS FIRST PHOTOVOLTAIC PLANT IN THE REPUBLIC OF
KAZAKHSTAN, CLOSE TO SHAULDER VILLAGE IN THE TURKISTAN REGION.

The facility, with a 50 MW installed capacity, further expands Plenitude's international portfolio and its presence, through its subsidiary Arm Wind, in the Kazakhstan's renewables sector.

Stefano Goberti, CEO of Plenitude, said: "The construction of the Shaulder photovoltaic farm represents the first important step for Plenitude in the solar energy sector in Kazakhstan. The plant will contribute to the development of Turkistan Region by making available to the local territory the most advanced technologies in this field. This project, which complements the two wind farms Badamsha-1 and Badamsha-2 inaugurated by the company in 2020 and 2022 respectively, will contribute to Kazakhstan's ongoing energy transition process and carbon neutrality goals".

The photovoltaic plant, spanning 100 hectares of land, will produce up to 90 GWh of electricity annually and will feature over 93,000 solar panels and an electrical substation. These components will be integrated into the local grid through a new overhead powerline extending for 7.5 kilometers.

Plenitude is Eni's Benefit Corporation (Società Benefit integrating the production of energy from renewable sources, the sale of energy services and an extensive network of charging points for electric vehicles. The company has an installed capacity from renewables of 2.5 GW and aims to reach more than 7 GW installed by 2026 and exceed 15 GW by 2030. In Kazakhstan, Plenitude operates in the renewable energy sector through its subsidiary Arm Wind with a total operating capacity of about 150 MW.

RENEWABLE ENERGY CAPACITY IN THE WORLD NEEDS TO BE TRIPLED BY 2030 – IRENA

BY 2030, THE WORLD NEEDS TO TRIPLE THE CAPACITY OF RENEWABLE ENERGY SOURCES (RES). THIS WAS ANNOUNCED AT THE XV EURASIAN KAZENERGY FORUM BY FRANCESCO LA CAMERA, DIRECTOR GENERAL OF THE INTERNATIONAL RENEWABLE ENERGY AGENCY (IRENA).

IRENA
International Renewable Energy Agency

"IRENA calls for achieving 11 terawatts of renewable energy by 2030, which will require $4 trillion in annual investments," he stressed.

According to the Director General of the agency, the world already has effective and competitive tools and technologies for the future based on renewable energy.

"Renewable energy sources, which have been introduced since 2000, have saved more than $500 billion in fuel costs in the electricity sector in 2022. In the same year, the world witnessed an unprecedented increase (of renewable energy capacity – Ed. note) by 295 gigawatts, $1.3 trillion was invested in renewable energy projects, and a million new jobs were created in the sector," Francesco La Camera stressed.

He noted that the electricity sector, despite the record figures for the introduction of renewable energy and attracting investment, needs changes.

"We have already noticed how fragile a system that depends on fossil fuels can be. This fragility is further enhanced by the climate crisis, which is now manifested in droughts and water scarcity in Central Asia," the head of IRENA stressed.

Therefore, according to him, today the whole world should focus on three fundamental areas: infrastructure, politics and the development of human resources.

"First, we need to modernize and expand our energy infrastructure so that it can accommodate decentralized renewable sources, transmission systems must adapt to this new landscape. Secondly, our policy and regulatory framework should prioritize accelerating the energy transition, reducing the role of fossil fuels and promoting renewable sources," IRENA CEO said.

Thirdly, qualified personnel are required. Millions of jobs can be created in renewable energy, and this requires coordinated efforts in education and vocational training.

"Investments are very important for this transformation. Kazakhstan has a good position, having large solar and wind resources. The country has already taken important steps to diversify its energy balance – about 2 gigawatts of renewable energy sources have been installed here over the past four years," Francesco La Camera said.

Women leaders in Renewable Energy Sector awarded in Kazakhstan

A significant event took place in Astana where the European Bank for Reconstruction and Development (EBRD) and the Green Climate Fund (GCF) closed their program dedicated to supporting the renewable energy sector and advancing gender equality in Kazakhstan. This initiative, organized by EBRD in collaboration with EY, GCF, and Ergon, included a special awards ceremony celebrating "Women in the Renewable Energy Sector."

The event offered a platform for engaging with key stakeholders and program partners while shedding light on the noteworthy progress made in promoting gender equality within Kazakhstan's green and energy sectors.

Zhandos Nurmaganbetov, Vice Minister of Energy in Kazakhstan, underscored the significance of elevating women to leadership roles in companies and emphasized the importance of increasing the representation of women among employees.

"The Ministry of Energy is committed to promoting gender equality, and according to our monitoring, 1,615 jobs have been created in the country, with 1,361 positions held by men and 254 by women. Although there is a male-skewed distribution, it's worth noting that women are primarily in leadership positions within the renewable energy sector. Within our ministry, which comprises 225 employees, 113 are men, and 112 are women," stated Zhandos Nurmaganbetov.

Ainur Sospanova, Chairperson of the Board of the Qazaq Green Renewable Energy Sources (RES) Association, expressed gratitude to EBRD, GCF, and their esteemed partners like EY and Ergon for their unwavering support.

"During the first decade of establishing renewable energy sources in Kazakhstan, we focused on building the nation's capacity, attracting investments, and more. Over the course of this three-year program, Kazakhstan has gained valuable insights from international experience in gender development within the renewable energy sector," she added.

The creation of the "Women in the Renewable Energy Sector Award" marks a pivotal milestone in strengthening the renewable energy industry in Kazakhstan. It identifies female role models, but also

Zhandos Nurmaganbetov, Vice Minister of Energy in Kazakhstan, underscored the significance of elevating women to leadership roles in companies and emphasized the importance of increasing the representation of women among employees.

raises awareness of the importance of equal opportunities for women in the renewable energy sector, government structures, businesses and public organisations.

Ksenia Babushkina, EY Central Asia and Caucasus Advisory Service Leader, emphasized the role of women in renewable energy as drivers of change, fostering innovation and sustainable development.

She stated, "Women in renewable energy act as catalysts for transformation."

The awards ceremony recognized exemplary individuals in various categories:

Gulzhan Nalibayeva, General Director of RFC RES Support LLP, was honored as "Female Leader in the Renewable Energy Sector".

Raigul Bulekbaeva, Project Manager at Smart Volt LLP, was honored as "Driver of Change in the Renewable Energy Sector".

Gulnur Kalimuldina, Project Manager for the "Mechanical Energy Harvesting System based on Hybrid Nanogenerators," was honored as "Young Researcher in the Renewable Energy Sector".

Kyzzhibek Ryszhanova, Founder and Director of SmartReEnergy LLP, was honored as "Business Leader in the Renewable Energy Sector".

Alina Fazylova, developer of a control and management system for vertical-axis wind turbines, was honored as "Best Startup in the Renewable Energy Sector".

These outstanding individuals play vital roles in managing power plants, contributing to the regulatory framework of the RES sector, and driving programs and research aimed at further developing Kazakhstan's green economy.

Ainur Sospanova concluded by highlighting the ongoing efforts of the Qazaq Green RES Association, which includes the formation of a women's club consisting of 24 members representing industry professionals dedicated to gender equality. This initiative not only caters to the renewable energy sector but also provides training for energy professionals, an essential step in decarbonizing traditional energy sectors.

It's worth mentioning that the EBRD and GCF program has achieved several significant milestones, including

- the development of a national roadmap that articulated key priorities and proposed activities to advance women's participation in renewable energy, providing a basis for coordinated action by the Government of Kazakhstan, other stakeholders, and EBRD. By bringing together key public and private sector actors, this work enabled joint planning of coordinated activities, highlighted the broader importance of the topic, and aligned gender equality objectives with key existing strategic priorities;
- the development of a baseline assessment of women's economic participation in renewable energy in Kazakhstan, which is the first study to provide an overview of the specific trends, challenges, and opportunities pertaining to women's economic participation in renewable energy;
- raising awareness activities of job opportunities for women in renewables by supporting student visits to RES facilities, as well as organizing a RES awards to highlight and celebrate women's achievements in the sector;
- the launch of a dedicated jobs platform in partnership with the Centre for Human Resource Development to help candidates identify vacancies at RES companies;
- technical assistance provided to clients in wind and solar to establish a work-based learning programme in partnership with local higher education institutions. This dual education Initiative Involves companies working together with educational Institutions to offer practical on-site work experience that complements female students' formal studies;
- support to and promotion of women's leaders in the renewable sector through the development of a tailored mentoring programme, connecting junior women with senior executives in the renewables sector via a Women's Energy Club, as well as an expert data base to be launched in cooperation with Kazakhstan's renewable energy association Qazaq Green to promote the visibility of women in the sector and enable networking.

QAZAQ GREEN ASSOCIATION PRESENTS KAZAKHSTAN'S FIRST VOLUNTARY CARBON STANDARD

THE QAZAQ GREEN ASSOCIATION OF RENEWABLE ENERGY SOURCES INTRODUCED THE INAUGURAL KAZAKHSTAN'S VOLUNTARY CARBON STANDARD, THE QAZAQ GREEN CERTIFICATE PROGRAMME, AT THE MINISTRY OF ECOLOGY AND NATURAL RESOURCES OF THE REPUBLIC OF KAZAKHSTAN.

The presentation, hosted by the Qazaq Green Association of Renewable Energy Sources, featured the participation of Minister of Environment and Natural Resources Yerlan Nyssanbayev. The Minister highlighted that the domestic emissions trading system encompasses a limited number of economic sectors, leaving many private sector companies without the opportunity to reduce their carbon footprint. Simultaneously, the global market for voluntary offsets is expanding, holding significant potential for the future.

Recognizing the importance of President Kazakhstan's goal to achieve carbon neutrality by 2060, the Qazaq Green Association of Renewable Energy Sources decided to establish a voluntary standard for carbon offset mechanisms, aiming to reduce greenhouse gas emissions and contribute to the fight against climate change.

Carbon offsets play a crucial role in combating climate change, enabling companies to support decarbonization beyond their own carbon footprint and hastening the transition to decarbonization. Private companies outside Kazakhtan's trading system lack the means to confirm their commitment to ESG principles and offset their carbon footprint with carbon units. The Qazaq Green Certificate Programme will now empower individuals and corporations to participate in the fight against climate change through the acquisition of voluntary offset units.

"There is a growing demand for projects that reduce carbon footprints within the country's business community following the commitment to carbon neutrality. Telecom and IT companies, the banking sector, and medium-sized businesses in the services sector—all of which are interested in integrating ESG principles into their corporate policies," stated Nurlan Kapenov, Chairman of the Board of Directors of the Qazaq Green Association of Renewable Energy Sources.

The presentation was attended by representatives from ENI, TotalEnergies, Polymetal Eurasia, Forte Bank, the Kazakhstan Electricity Association, and the ESGQ rating agency. Participants expressed the view that, currently, due to the underdevelopment of the voluntary offset market in Kazakhstan, companies are compelled to enter foreign markets. In response, the launch of the first domestic voluntary offset standard aims to fill this gap and contribute to achieving carbon neutrality.

Following the meeting, participants endorsed the initiative to launch the Qazaq Green Certificate Programme for voluntary offsetting, with the presentation scheduled on the sidelines of the 28th Conference of the Parties to the UN Framework Convention on Climate Change in Dubai (COP-28).

QAZAQ GREEN INITIATES THE CREATION OF A VOLUNTARY MARKET TO REDUCE EMISSIONS AND INCREASE ESG RATINGS

THIS YEAR, THE ASSOCIATION OF RENEWABLE ENERGY SOURCES QAZAQGREEN PROPOSED THE CREATION OF A VOLUNTARY MARKET IN KAZAKHSTAN AND FOR ALL CENTRAL ASIAN COUNTRIES. THIS INITIATIVE PROVIDES COMPANIES THAT ARE NOT INVOLVED IN REGULATORY MARKETS WITH THE OPPORTUNITY TO BECOME BUYERS AND IMPROVE THEIR ESG RATINGS. THIS WAS TOLD BY AIDA MAKSUT, A MEMBER OF THE BOARD OF DIRECTORS OF THE QAZAQGREEN RENEWABLE ENERGY ASSOCIATION, A CERTIFIED VERIFIER WITH EXPERIENCE IN MONITORING GREENHOUSE GAS EMISSIONS, AN EXPERT ON CLIMATE CHANGE AND THE EMISSIONS TRADING SCHEME IN KAZAKHSTAN.

"This year, our Association took the initiative to create a voluntary market in the republic. We offer an alternative to all Central Asian countries. Our market is open to projects that voluntarily reduce greenhouse gas emissions, are ready to fix this process and make additional profit by selling these reductions. The buyers may be companies that do not participate in regulatory markets, that is, they are outside the emission regulation, but want to improve their ESG ratings themselves," Aida Maksut stressed.

It is noted that the state operator of the carbon units trading system in Kazakhstan has identified a subordinate organization of the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan - Zhassyl Damu JSC.

The speaker also recalled that the greenhouse gas emission verifier service was launched in Kazakhstan in 2013. Verification is necessary to confirm the transparency of reports from third-party organizations on greenhouse gas emissions from companies.

"There is a Union of Verifiers of Kazakhstan in our republic, which includes companies accredited by the verification/validation authority," Aida Maksut noted. - "The country has already built an MRV system (measurement, reporting and verification), that is, issuers have learned how to monitor their emissions for 10 years, they submit reports annually. There are more than 15 verification bodies in our country that are accredited according to international standards. Active work is underway to improve the quality of verification, and further development of the country's verifiers themselves is planned to increase their level of competence so that in the future they will also be recognized in the European Union."

Verifiers in the republic can participate in verification and validation, for example, in such sectors as energy, oil and gas, chemical and mining industries, production of building materials, etc.

"This system has been operating since 2013. As an operator, we provide data on calculations of quotas for greenhouse gas emissions for further approval by the Ministry. Since 2013, 5 National Plans on Greenhouse Gas Distribution have been implemented. Currently, the allocation of quotas is carried out by benchmarking, taking into account the ratio of carbon dioxide emissions during production. It is aimed at an annual reduction," Nurzhan Kabdoldanov, Deputy Chairman of the Board of Zhassyl Damu JSC, said on the opening day of the Central Asia Pavilion in Dubai at SOR28.

According to him, this organization also implements a mechanism for the provision of offset units as a result of the implementation of offset projects aimed at absorbing or reducing greenhouse gas emissions. The offset project mechanism allows businesses to implement various measures to reduce greenhouse gas emissions, for example, in the field of renewable energy sources, or increase the absorption of greenhouse gases, including through tree planting. As a result, companies implementing such projects receive carbon units that can be sold on the domestic Kazakh market.

According to the experts of SOR28, since the signing of the Global Methane Commitment in 2021, there has been no overall reduction in methane emissions. Kayrros, a climate technology company, has found that countries are failing to reduce methane emissions by at least 30 percent by 2030.

"We are calling for a complete ban on superemitters. Rapid reductions in methane emissions from fossil fuels could reduce global temperature rise by 0.1°C by the middle of the century, which is equivalent to an emissions impact if all cars and trucks in the world were immediately taken off the roads," Antoine Rostand, CEO and Co-Founder of Kayrros, said at SOR28.

He welcomed the EU's proposed limits on methane emissions from gas imports, which force suppliers to reduce leaks. This may encourage others to consider similar measures.

5 YEARS OF QAZAQ GREEN: ACHIEVEMENTS AND CHALLENGES IN KAZAKHSTAN'S RES SECTOR

ON DECEMBER 7, A ROUND TABLE "ACHIEVEMENTS AND CHALLENGES OF DEVELOPMENT OF RES SECTOR IN THE REPUBLIC OF KAZAKHSTAN" WAS HELD, ORGANIZED BY RENEWABLE ENERGY ASSOCIATION "QAZAQ GREEN" AND DEDICATED TO THE 5TH ANNIVERSARY OF THE ASSOCIATION. THE ROUND TABLE WAS ATTENDED BY DEPUTIES OF THE PARLIAMENT OF THE REPUBLIC OF KAZAKHSTAN, REPRESENTATIVES OF THE MINISTRY OF ENERGY OF THE REPUBLIC OF KAZAKHSTAN, THE MINISTRY OF ECOLOGY AND NATURAL RESOURCES OF THE REPUBLIC OF KAZAKHSTAN, REPRESENTATIVES OF THE DIPLOMATIC CORPS, AS WELL AS THE BUSINESS COMMUNITY OF THE RENEWABLE ENERGY SECTOR.

RES sector is one of the youngest in our country. However, in a short period of development, the sector has demonstrated impressive results. Thousands of specialists work in the sector today: power engineers, engineers, builders, economists, civil servants, investors, scientists, analysts.

According to the UNCTAD World Investment Report – 2023, foreign direct investment in renewable energy sources in 2015-2022 in the Republic of Kazakhstan amounted to 31% of the total volume of foreign direct investment, and our country entered the top 10 developing countries in attracting foreign direct investment in the renewable energy sector, along with such countries as Brazil, Chile, India, Egypt and others.

"In 2018, our country made a historic choice – the process of implementing renewable energy projects was changed from a system of fixed tariffs to auctions. This resulted in creation of the renewable energy market, which attracted more than 230 companies from 13 countries to auctions, foreign and domestic investments flowed into renewable energy projects. For the first 9 months of 2023, country generated almost 6% of electricity from renewable energy sources. Today, our auctions are recognized in the country and abroad, including by international organizations, as a fair and open mechanism for selecting winners, where the priority is given to the price and installed capacity of the project. This year, for example, we witnessed a record low price for wind energy – 10.38 tg / kWh for the construction of wind power plant with a capacity of 10,001 MW in the Abai region. And this

is a great achievement!" said Nurlan Kapenov, Chairman of the Board of Directors of Renewable Energy Association "Qazaq Green".

Currently, 141 renewable energy facilities (over 100 kW and excluding out-of-order facilities) with an installed capacity of 2,715.8 MW operate in the Republic:

– 55 wind power plant facilities with a capacity of 1,246.6 MW;
– 44 solar power plant facilities with a capacity of 1,197.83 MW;
– 39 hydroelectric power plants with a capacity of 269,605 MW;
– 3 biogas power plant facilities with a capacity of 1.77 MW.

According to the results of 9 months of 2023, the volume of electricity generated by renewable energy facilities amounted to 4.91 billion.kWh (WPP – 2,575 million kWh; SPP – 1,571.9 million kWh; HPP – 760.9 million kWh; BioPP – 2.25 million kWh) or 5.97% of the total volume of electric energy production.

International organizations such as UNDP, USAID, as well as financial institutions (EBRD, ADB, EDB, Clean Technologies Fund, Green Climate Fund, etc.) work in the Republic of Kazakhstan on renewable energy, all of them have completed or ongoing projects in their portfolios. Global oil and gas companies ENI, Shell, Total are engaged in the implementation of renewable energy projects in different parts of our country.

Renewable Energy Association "Qazaq Green" is a key expert center for development of renewable energy sources in the Republic of Kazakhstan. The Association was established in 2018 and celebrated its 5th anniversary this year. The main task of Qazaq Green is to assist in the development of renewable energy sector, participate in development of regulatory documents regulating the development of the renewable energy sector, awareness-raising work to promote the "green" economy, formation of renewable energy competencies in the corporate sector, consolidation of business community of the renewable energy sector.

Qazaq Green is the organizer of International Business Festival on Renewable Energy Qazaq Green Fest, publishes the information and analytical magazine Qazaq Green, operates an online news portal on development of the "green" economy Qazaq Green.com, organizes business expeditions to renewable energy facilities, as well as teaches project implementation issues at the Renewable Energy School.

At the 28th Conference of the participants of the United Nations Framework Convention on Climate Change, Renewable Energy Association "Qazaq Green" presented the first domestic voluntary carbon standard Qazaq Green Certificate Program. Private companies that are not part of the trade system of the Republic of Kazakhstan do not have the opportunity to confirm their commitment to the principles of ESG and cover their carbon footprint with carbon units. The Qazaq Green Certificate Program will allow individuals and corporations to contribute to the fight against climate change through the purchase of voluntary offset units, thereby confirming their commitment to the principles of ESG.

The Association's members include domestic and foreign investors, developers, engineering and design companies, equipment suppliers, consulting firms, universities providing training in renewable energy specialties. The Association is accredited by the Ministry of Energy of the Republic of Kazakhstan, the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, NCE RK "Atameken".

Alessandro Lanza:
HUMANKIND HAS RESOURCES TO FIND SOLUTION FOR CLIMATE CHANGE

The ongoing battle against climate change stands as one of the foremost issues in global politics today. Nations worldwide, including Kazakhstan, are actively formulating strategies aimed at curbing emissions and mitigating adverse environmental effects, with a shared goal of achieving carbon neutrality.

In our discussion with Alessandro Lanza, the Executive Director of Fondazione Eni Enrico Mattei, a distinguished research center focused on energy and environmental studies, we delve into the intricate aspects of achieving success in decarbonization. The conversation explores the crucial role played by technology in attaining decarbonization goals and scrutinizes the essential actions required to address and surmount this challenge.

QG: Dear Mr. Lanza, good afternoon. Let me on behalf of the Qazaq Green Association, thank you for today's meeting and the opportunity for this interview. You are the head of the Enrico Mattei Foundation. In this regard, could you tell us about the activities of the foundation and what place the issues of sustainable development and energy transition have in your organisation's work?

Alessandro Lanza: Thank you very much for this opportunity. It's a pleasure to be here to talk with you. Our institution, which in Italian is called the "Fondazione Eni Enrico Mattei", a foundation created by - and named after the name of the founder of - Eni, Enrico Mattei in1989. So, it's not new and, since the very beginning, it has been devoted to the study, from an economic perspective, of energy and economics. So, basically our people are economists mainly focused on econometrics, modelling etc. and, consequently, the foundation is not a technical institution of engineers or other professionals, but of economists. This means that we study prices, markets, and the ways in which markets need to be constructed. This is our primary function. There are about 100 research projects underway now and we also publish books, this is our principal focus.

QG: Great. Well, today we see and feel how climate change negatively affects the economy. Problems arising in agriculture, a fall in crop yields, regions suffering due to drought, the populations enduring abnormal temperatures in summer. In this regard, ecology has already become a part of economic policy at both global and national levels. But what does energy transition mean, and why it is important for climate change?

Alessandro Lanza: Climate change is definitely the key issue, because it is the most serious threat that humanity will have to face in the next, let's say, half century. The current condition of the Earth is not good. We can see this also in this country. You can probably see this too. The average of the temperature of today is below the normal average for this season. But it's also true for Rome, Milan and in Europe in general. The concentration of CO_2 emissions in atmosphere, is the real problem we need to face. In this respect, energy transition is the key, the only solution, but, of course, it's expensive. And it's a question of policy effort and political coordination. As you may know in two weeks' time there will be the next climate conference in Dubai, the so-called COP 28 and, as you can see from the number, this means it is the 28th such meeting. We will be there, and progress is being made. But it's very complex: a technically complex, and politically very complex story. And what we expect in the next few years is more movement, because as we said, the energy transition is the key. Of course, we need to move from fossil fuels to non-fossil fuels. Of course, no one can think that it's possible to move from fossil fuels to non-fossil fuels overnight. This is not only impossible, it's not even desirable. What we know for sure is that there is no single solution that fits all the problems for every country in the world. So, we need to find national solutions for countries like this one, which is full of natural resources in terms of fossil fuels, but there is potentially even more that can be done. You need to keep developing non-fossil fuel related energy. This is something that needs to be done in the coming years. The next half century will be absolutely crucial for the future of the earth. This may sound too alarmist, but I'm absolutely convinced that what we have seen in the last six months is a very complex situation. And governments need to take the situation very seriously.

QG: Yes. So, one of the goals for this century is carbon neutrality. Consequently, in the process of achieving carbon neutrality, the decarbonization of the energy sector has a critical role. In Kazakhstan, about 70% of electricity is produced from coal and about 6% from renewable sources. In Italy the situation is different, 47% of electricity production is produced by gas, 37% from renewable sources and about 10% by coal. Nevertheless, the energy crisis has had a really painful impact on many countries. Indeed, also the Italian economy suffered from dependence on fossil sources. In your opinion, is a faster transition to low carbon energy sources possible? And is it actually possible to achieve carbon neutrality within the time frames set by many countries? In other words, the 2050s for Italy and the 2060s for Kazakhstan, for example.

Alessandro Lanza: OK, carbon neutrality is a political statement. It's a target, and an ambitious one as we move towards carbon neutrality. I do not think it is feasible for many countries to reach carbon neutrality. The problem is that we need to move collectively towards neutrality. So, in some countries, such as Italy for example, that has more gas, we have more or less eliminated coal which is the fossil fuel with highest CO_2 content. As you probably know, natural gas has a very significant role in Italy. In general countries need to move from fossil fuels to non-fossil alternatives and, where possible, in the interim, to choose between fossil fuels, for example gas rather than coal., given that the carbon content of natural gas per unit of energy is lower.

Here in your country I see that there are many investments in renewables which is good. Also because, generally speaking this country has an enormous potential endowment in terms of natural resources such as hydro, solar, and wind. Consequently, in around 10 years' time it's probable that your country will have changed its path. But the problem is that we need to move now, there is no time to waste on four other COPs. We have already had 28. It's time to stop talking and do things, because we already know what has to be done.

For countries around the world - G7 countries, non-G7 countries, the industrialised and the non-industrialised world, developing countries - everywhere we need to consider the threat, the very serious threat posed by climate change. The recently published New World Energy Outlook by the International Energy Agency provides all the information you need to understand how dangerous the situation is. I don't want to scare people, but I've been working on climate change for more than 30 years and I can tell you it's becoming extremely serious. You rightly mentioned the environmental impact, the impact on health, for example the excess mortality rate in some countries due to climate change, which is very high and is growing. What we really need to do is to act collectively to face this problem.

QG: So, the ongoing concern matters more than the time frames which have been declared by countries, right?

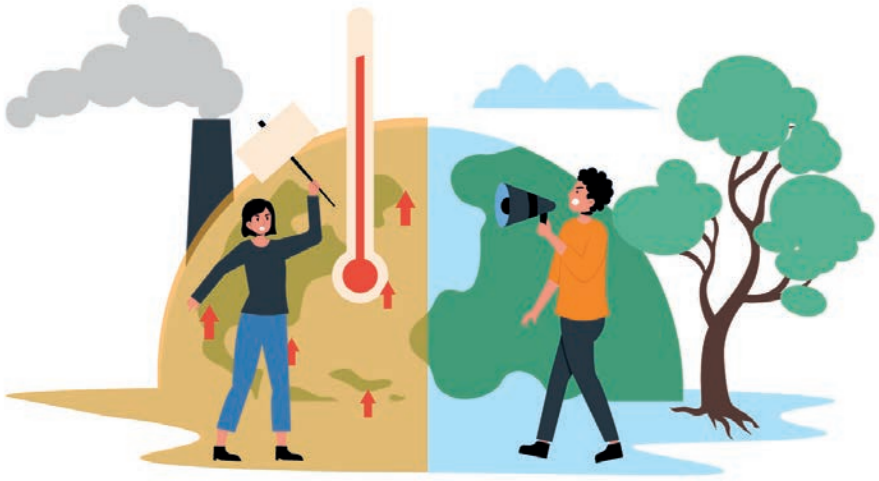
Alessandro Lanza: Yes, that's the problem. The problem is that there is global concern but we also need to consider particular aspects. For example, I would like to spend a few words on behalf of the kind of poor people who do not have access to energy. They face a double dilemma, because on the hand they do not have access so they continue with deforestation for example, which can make them environmental refugees. Climate change is a multi-faceted problem which means we have to take a multi-lateral approach.

QG: If rapid energy transition is successful, it is likely that states will have to help former coal mining regions to survive. We see successful examples of regional decarbonization in various countries where work in this direction in these regions began many years ago and now there have also been good results. The economies of these regions have taken the necessary steps and shown a readiness for the energy transition. Italy, for instance, has declared that it will shut down the coal generation fund by 2025. There is also the example of Sardinia which resembles the situation in our country due to the very low availability of gas infrastructure. Today electricity in Sardinia is mainly produced by coal. In 2020, the was a 75% of growth in the electricity produced from fossil sources.

The main renewable energy sources, wind and photovoltaics prospectively accounted for 15% and 7% of overall electricity production. So, what problems do regions face during their energy transition and how can we solve these problems?

Alessandro Lanza: I was born and raised in Sardinia, so I know the situation very well. As you said, the situation in Italy is that after the Russian invasion of Ukraine, we declares that our coal mining activities would be shut down by 2025, with the exception of Sardinia where the last coal-fired power station should close by 2028. Now we are already moving that date because we still have a problem with natural gas. But in any case, the situation is that, as you rightly said, there are some regions where coal is important Poland, for example, or even the US. During the election campaign of Donald Trump, the discussion was focused on how to sustain the coal mining industry. In Europe we still have a big problem, which is that Poland continues to extract large quantities of coal. But, again, there is not one single solution. Countries and regions need to be assessed one by one. And, of course there will be a transition period. You cannot say, "OK, from now on we need to shut down all coal", because it's simply impossible. Coal is still very important. In fact, after oil, coal remains the second source in the world, so there is a huge amount of coal around the world. And for countries like China or India it is still #1, even if they're moving and looking for alternative solutions. They're also exploring other technologies, so the solutions need to be assessed region by region. But, of course, you need to change the path.

If you cannot go straight from coal to renewables, you can go from coal to gas, again, as an interim. A step in the right directions. This is what will probably happen in Sardinia, which is a small place, even if there are more than a million people. The move from coal to gas is a transition. I'm not saying that everything needs to be shut down overnight because I know it's not politically doable. So, we need transition. Transition means moving from one state to another, and taking account the real situation in different locations. And also taking account of people, because we work for



If you cannot go straight from coal to renewables, you can go from coal to gas, again, as an interim. A step in the right directions.

people and so we need to know that each political region, every political decision affects people and they need to be protected. Poland is doing a terrific job, but other countries are moving too. As we said, transition means moving from one state to another and in doing so we need to organise this transition in the right way.

QG: Yes, of course. Everyone should stay sober and remember the economic impact.

Alessandro Lanza: Yes, but also the social impact. Because if you make the unwise decision to shut down overnight, you will have a social problem because you need to support people that previously lived off their wages as miners.

QG: Well,globally today there are obligations under the Paris Agreement to reduce greenhouse gases. Most countries have adopted carbon neutrality strategies and the carbon border taxes are being introduced in the European Union. At the same time, there is real evidence that coal-based generation plants are still being built or modernized. In your opinion, do investors in coal generation today understand that in the future their assets may not survive until the end of their expected life cycle? Do you have the feeling that their current behaviour falls under the classic: deny, hope and cross your fingers? Indeed, there are still investors and companies that are at the denial stage of the energy transition and are trying to jump onto the last carriage of the departing train.

Alessandro Lanza: Well, first of all, measures to combat climate change are still not legally binding in the sense that there are no sanctions and this is a problem because, if you say that people cannot drive in certain way and there are no fines, there's no legally binding reason for them to do what you ask. That's the problem, there are no adequate disincentives.

So legally binding solutions are the first step. And all the architecture of the Framework Commission on

Climate Change is based on this simple fact that as Article 2 of the convention states, we share common but differentiated responsibility. That means that we are together, though not necessarily united, but we are a single planet. So, we have a common, but differentiated, responsibility for our future. We should do this. You should do that. In this respect the European Union is ahead of the curve. The EU's Carbon Border Adjustment Mechanism (CBAM) is one of the tools created to address this problem, although it is not very clear how it will end.

In the European Union the discussion is about how to prepare a soft landing for coal. But, as you know, the financial sector has been among the first to react and say "we are not suggesting to invest or not to invest in coal because we don't know if in say 10 years' time if this investment will be a good investment or not." So, the financial sector has taken a clear position in this respect. Many funds don't, for example, recommend their clients to invest in weapons, but what about coal, or oil? Again, sometimes it seems there is a lack of balance between the different situations. So, the European Union is a good example of a policy-oriented approach, but one that cannot be adopted by everyone. Don't forget also that the EU is among the richest places on earth and, to be honest, the European Union can afford measures that other countries simply cannot. Consequently, you cannot propose the EU solution in sub-Saharan Africa, where a life expectancy is 35 years. Life expectancy in Italy, for example, is 82, so there are big differences between regions and countries.

QG: That makes sense. Historically, there has been a relationship between growing energy demand and the availability of various energy sources and technologies. Historically, we remember the role that the transition from wood to coal played in the industrial revolution. So, my next question is about technology. What role does technology play in accelerating the energy transition? And, in your opinion, which technologies will accelerate energy transition in the coming years?

Alessandro Lanza: We tend to consider the story of climate change as the evil of our generation, the big problem. And it's absolutely true. At the same time, we need to look at the numbers. For example, life expectancy, which is an interesting measure, can be calculated in England from year 1000, you will see that from 1000 to around 1820, to the beginning of the coal industry, we had generation after generation where the average life expectancy was between 35 and 40 years. So, when coal was developed on a large scale, there was an enormous boost in technology. In fact, energy transition means there are new energy sources which lead to new technology and the knock effect of this is that everyone will be better off. This is the story of first industrial revolution.

Then we had the second transition, which is related to oil and which came later, cars were invented at the end of the 1880s. The boom in the use of coal was succeeded by a boom in the development of oil, particularly in the United States and the development of the car industry, and many other industries too, meant that everyone was better off.

So, what I'm trying to say is that new technologies need fuel, often a new fuel. But I don't see a new fuel now although people talking about hydrogen. But hydrogen is not a fuel. It can be important, but what we really need in the end of the story - probably in 100 years' time - is nuclear fusion. Nuclear fusion, plus hydrogen, will be a complete game changer. But, as you know, we're not likely to see significant advances in the development of nuclear fusion until at least 2050 and it will take at least another 50 years from then. So, this is not something that I will live to see. But you won't see it either, because we're talking of a period of 100 years. But hope springs eternal!

Nevertheless, we need to act now, hoping and for sure waiting for new technologies. The world is working on fusion: the European Union, the United States and other countries are all working on fusion. Nuclear fusion is the number one, the ultimate tech solution, but it will take a century to get there.

QG: A century?

Alessandro Lanza: Yes, maybe a little less. But you know you need time to complete the first demonstration plant and that will probably be ready in about 20 or 30 years. Then you need time to develop the technology but then, once you have fusion, you have cheap and clean energy, cheap electricity and with electricity and water you can produce hydrogen. So, with fusion plus hydrogen, we won't need oil anymore. Problem solved.

QG: You mentioned the development of hydrogen energy. Today in Europe hydrogen is seen as an alternative to gas and a tool for the decarbonization. But at the same time, the production of green hydrogen requires significant resources, water and green electricity. Also, the technologies needed for the development of hydrogen energy are still at the end stage, as you mentioned also. What prospects so you see for hydrogen energy, and if I may add to the previous question, what is the time to market?

Alessandro Lanza: I can give you another answer. I can give you multiple answers, not different, but complementary.

QG: Essentially what I'm asking is how long will it take for such technologies to enter the market?

Alessandro Lanza: So, let's look at hydrogen first. Hydrogen is part of the solution. For sure it is not "the" solution. And hydrogen will not solve our problems for a number of different reasons. For sure, there are some industries, steel for example, where hydrogen can be very, very useful. But I don't see the possibility of hydrogen in cars. I think electric cars will predominate in the future. Hydrogen is developed, there are different ways to produce hydrogen as you mentioned there is also green hydrogen, there is steam, the blue variety, which is generated using natural gas and steam, so a chemical process etc. So, there are different ways to produce hydrogen. What is important for us - I mean the community, the world, the industry – is also to invest in nitrogen.

The bottom line is, thank you very much for investing in hydrogen. Hydrogen is part of the solution. In some sectors it will be important. But forget the idea that hydrogen will be the solution. Hydrogen is a vector, it's not an energy source, it's another story. But it is useful for some specific uses. For example, there is the idea of using hydrogen for trucks, for the transport of commodities. But goods need to be transported by train, not using roads and hydrogen. So, hydrogen will be important but, again, it is part of the solution, not "the" solution.

QG: Thank you. My final question, what is your vision for a sustainable carbon-free future?

Alessandro Lanza: We are in deep trouble and my view is that we are different, and so there will be different responses. We are facing difficult times in the world but sometimes humankind does realise quite incredible results in a very short time. When the US decided to send rockets to the moon, they decided and delivered, which seemed impossible at the time, in 10 years. So sometimes we have the resources. We also have good people, we have scientists, we have good universities. And in some parts of the world there is also the money to invest. I'm optimistic by nature, so I think that we will sort it out. We will find a solution. Unfortunately, I cannot say what the solution will be. I'm a believer in fusion and, I think, if we arrive alive in the time of fusion, fusion will be the solution. That will be the solution for sure, but it will be for our grandchildren.

QG: And that is very good news for our grandchildren. Mr Lanza, thank you for your time. Thank you for your answers. I believe that we have all learned something today.

Alessandro Lanza: Thank you. You have to work hard. Thank you!

INTERVIEW

Timur Zhantikin:
KAZAKHSTAN HAS THE NECESSARY HUMAN RESOURCES FOR CONSTRUCTION AND RELIABLE OPERATION OF NUCLEAR POWER PLANTS

From time to time, the topic of the construction of a nuclear power plant is actively discussed in Kazakh society. There are weighty arguments both for and against. However, according to experts, it is possible to achieve the goals of sustainable development and transition to carbon-free green economy only with the help of reliable basic energy of the country. Why does our country need a nuclear power plant, what other steps should be taken to ensure a painless transition to carbon neutrality? Of this and many other things – in the conversation of our correspondent with the Director General of Kazakhstan Nuclear Power Plants LLP Timur Zhantikin.

– Timur Miftakhovich, the issue of the construction of nuclear power plant has been raised independently in society for the last three decades. There are two opinions here. The first group of citizens of our country, remembering the accident at the Chernobyl nuclear power plant, at Fukushima, are categorically against the construction of nuclear power plant. The second group, which probably has more energy specialists, supports the construction of nuclear power plant. What group do you belong to and what arguments can be made in favor of the construction of nuclear power plant?

– As you correctly noted, the issue of construction of nuclear power plant in Kazakhstan has been raised for the third time. During this time, we have considered the possibility of building nuclear power plants in different regions of the country, stopped the world's first BN-350 fast neutron power reactor, which was operated in a trouble-free manner as part of Mangystau Nuclear Power Engineering Plant. The country came out on top in the world in uranium mining. New enterprises of the nuclear industry of the republic have been developed. For example, production of nuclear fuel was started in Ust-Kamenogorsk last year.

I am in the second group, because I am sure that achieving the goals of sustainable development and transition to carbon–free "green" economy is impossible without reliable basic energy of the country. Here we have a small choice – we have few hydro resources, traditional basic energy sources, such as coal, gas and oil, are not carbon-free. There remains the nuclear power industry, which, among other things, is a natural development of the chain of our nuclear fuel cycle enterprises.

Renewable energy has its niche in the energy system, but, as you know, it cannot guarantee uninterrupted energy. Let me remind you of the definition of energy security – the right amount of energy in the right place at the right time. This condition is fulfilled only by uninterrupted energy sources, such as nuclear ones, which provide energy 24/7.

The country came out on top in the world in uranium mining. New enterprises of the nuclear industry of the republic have been developed.

– In continuation of the previous question, we want to give the example of Germany. Relatively recently, the Germany announced complete abandonment of coal-fired electricity generation by 2035-2038. Earlier, Germany also abandoned nuclear energy. In fact, this formed the global agenda for the energy transition towards the "greening" of energy. If advanced countries abandon nuclear energy, including for security reasons, what decisions should we make?

– Perhaps, the thesis of the refusal of advanced countries from nuclear energy is very stretched. Let's look at the distribution of the number of operating nuclear power units by country (according to the International Atomic Energy Agency (IAEA) and the World Atomic Association), from which it is clear that the majority of nuclear power plants are concentrated in advanced countries that are not going to abandon them. Except for Germany. By the way, the rejection of nuclear energy has led to serious problems in the development of the German industry. The damage to the ecology of the country should also be mentioned: if we compare the amount of carbon emissions per 1 kWh of energy produced in Germany, which is 366 grams of CO_2, with France, where this figure is 57 grams of CO_2, then it is obvious that France's nuclear energy is much more environmentally friendly than Germany's non-atomic.

Thus, we can say that the global agenda for transition to "green" energy is formed taking into account the provision of reliable energy supply, as evidenced by the inclusion of nuclear energy in the European "green" taxonomy. Indeed, nuclear power plants are stable carbon-free energy sources that serve as the basis for the sustainable development of the country's economy.

---

[1] *https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2021-05-26_cc-45-2021_strommix_2021.pdf*

[2] *https://www.statista.com/statistics/1190067/carbon-intensity-outlook-of-france/*

[3] *Energy, Electricity and Nuclear Power Estimates for the Period up to 2050, Reference Data Series no.1, 2019 Edition – International Atomic Energy Agency, Vienna, 2019 (IAEA-RDS-1/39)*

According to the IAEA forecasts , by 2050, nuclear generation will double and reach 792 GW, which will account for 12% of the total global electricity generation. If you look at the distribution of nuclear power units under construction, you can see the shift of nuclear energy to Asia, as well as the emergence of new states developing their nuclear energy programs. Having a well-developed nuclear industry, experience in operating nuclear power plants, specialists of nuclear research centers and system of personnel training, Kazakhstan should definitely follow the path of efficient use of nuclear energy in its energy system.

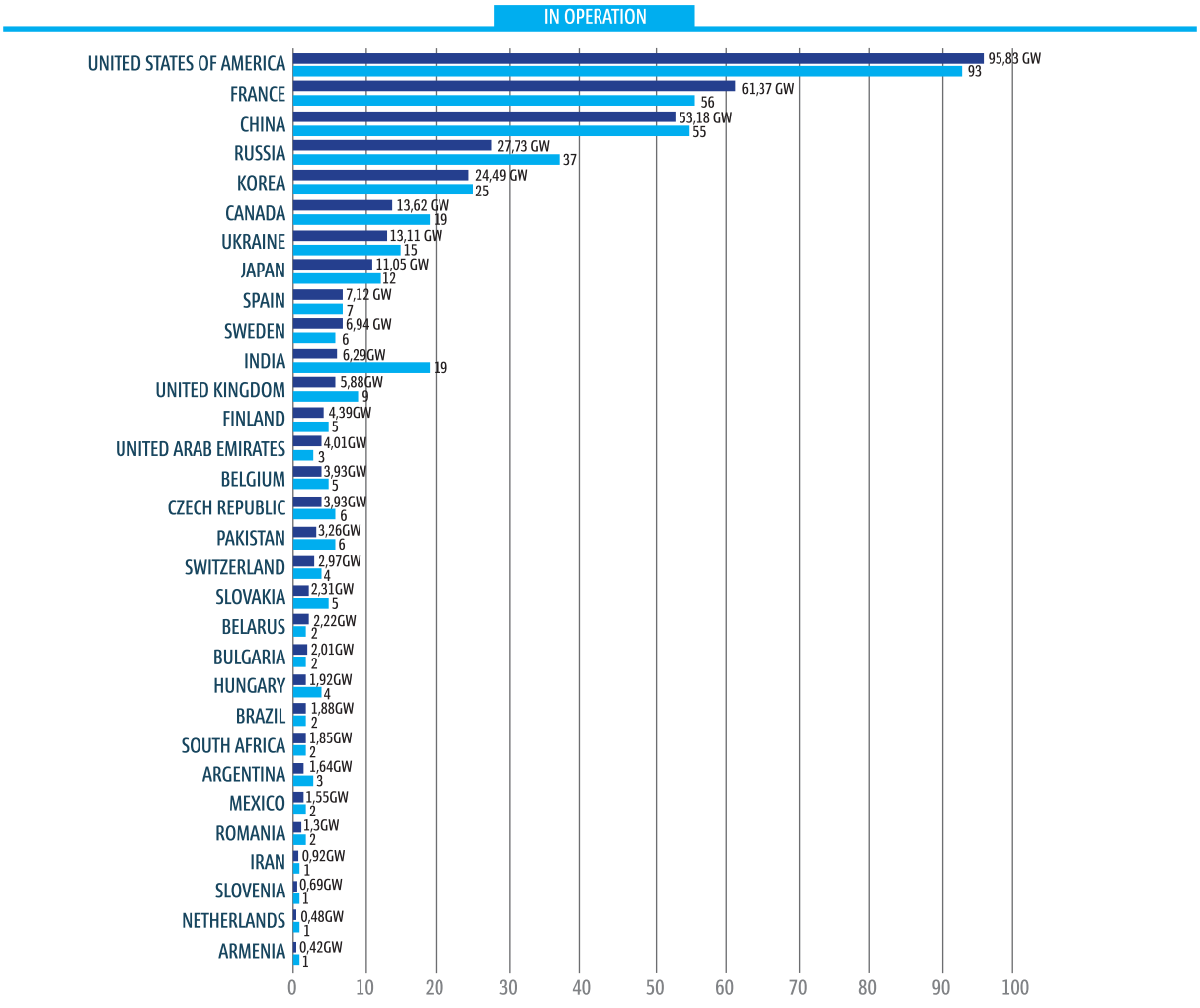
– Nuclear specialists claim that today the technologies used at nuclear power plants provide the necessary level of safety. But at the same time, when you watch planes fall or man-made disasters occur, you involuntarily think that the human factor becomes their cause. If the issue of the construction of nuclear power plant develops, do we have specialists who could design, build and, more importantly, operate such energy facilities?

– Today Kazakhstan has sufficient human resources for operation of the future nuclear power plant. It should be taken into account that more than 20 thousand people are employed in the nuclear industry of Kazakhstan, including 15 thousand people of the main production staff. In addition, a large number of specialists work at the National Nuclear Center and the Institute of Nuclear Physics, where nuclear reactors have been successfully operated for decades, as well as world-class work in the field of ensuring the safety of nuclear power plants is carried out. The results of these works are taken into account in a number of innovative NPP projects in Japan, France and other countries with which our nuclear scientists cooperate.

If we talk about the training of qualified personnel for our nuclear industry, then we can cite data on the number of students trained in universities in Kazakhstan in the period from 2010 to the present – 2,193 bachelors, 909 masters and 135 doctors. Also in the framework of Bolashak program since 2010, 21 bachelors, 12 masters and one specialist have been trained in the specialties "Nuclear Industry", "Physics of atomic nucleus and particles", "Technical physics. Nuclear Power Plants and Installations", "Nuclear Engineering".

On the basis of RSE "National Nuclear Center of the Republic of Kazakhstan", an internship is organized annually for more than 120 students. There is training and information center, on the basis of which specialists in the

Number of operating nuclear power units by country

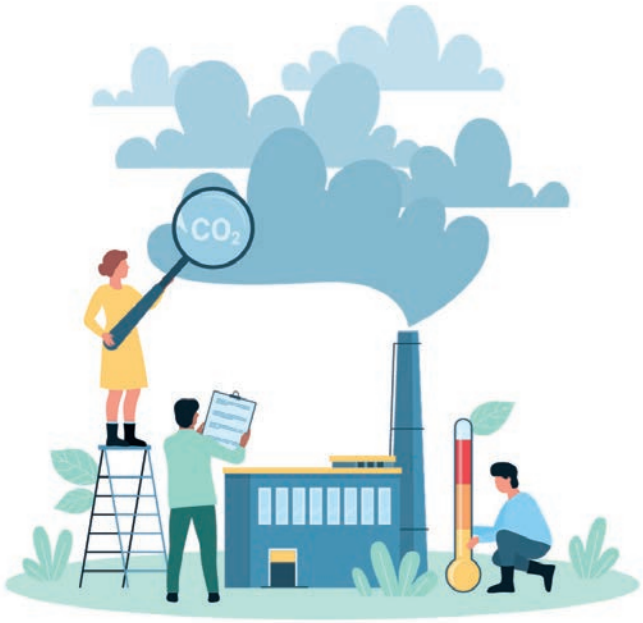


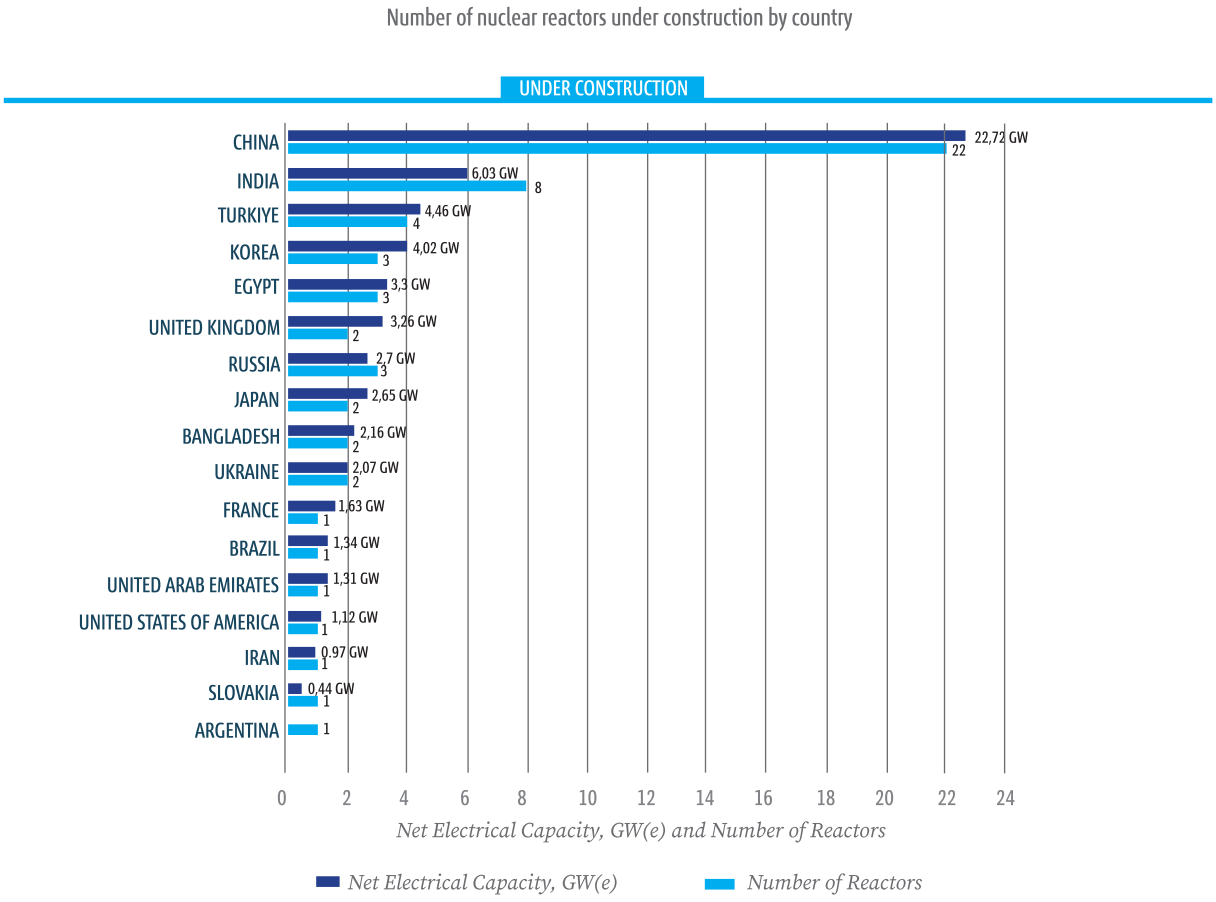
Net Electrical Capacity, GW(e) and Number of Reactors

Net Electrical Capacity, GW(e) *Number of Reactors*

field of radiation safety are trained. An extensive training program is being implemented at the Institute of Nuclear Physics in Almaty, where there is a Training Center on Nuclear Safety.

As is known, the operation of nuclear power plant with two nuclear power units requires about 2,000 people with different specialties, of which about 20% are nuclear. Special training of the plant's operating personnel begins immediately after the start of work on the construction of the NPP. This is a training and practical internship at the selected type of nuclear power plant reactors, which is carried out on the basis of vendor facilities.





That is, Kazakhstan today has the necessary human resources not only for the construction of a nuclear power plant, but also for its reliable and safe operation.

– At the beginning of this year, the Strategy (Doctrine) of low-carbon development of Kazakhstan until 2060 was adopted. This document clearly defines the vision for the exit from coal generation and replacement with environmentally friendly energy sources. One of the models of the energy system to the document showed that nuclear energy will remain uncompetitive until 2060 in Kazakhstan, and the model does not offer it. Is it profitable to build a nuclear power plant in our country from a strategic point of view and from the point of view of economic costs? Shall we clear our expenses?

– The Strategy talks provides the need to reduce greenhouse gas emissions in the country's energy sector, as well as the significant potential for the development of renewable energy and nuclear energy. As document states, "the capacity structure will include nuclear power plants as a stable source of energy, therefore a long-term vision for the development of nuclear energy will be developed," and accordingly, there is no question of non-competitiveness of nuclear energy.

There are many models for development of the republic's energy system, and among them there are those that deny the possibility of developing nuclear energy in Kazakhstan. But this does not mean that they are absolutely correct, since there are many other, more realistic approaches to forecasting the development of the country's economy, taking into account the role of stable and reliable energy system that guarantees its sustainable development.

Your question perfectly reflects the place of nuclear energy in the country's long-term development - it is a strategic direction for development of carbon-free energy, supporting the republic's declared transition to "green" economy with the achievement of carbon neutrality by 2060.

The construction costs of nuclear power plants are relatively high, and this is largely due to effective safety systems, the cost of which reaches half of all costs and which guarantee a high level of safety of modern power reactors. But taking into account the low amount of operating costs and significant operational life – 60 years for the project with the possibility of extension to 100 years – the average present cost of generation at nuclear power plants is comparable and even lower than at traditional power plants. One can give an example of tariffs at Pakistan's nuclear power plants, where the price of electricity output is 2 cents per kWh on operated units and 6 cents per kWh on new recently launched nuclear power plant units in Karachi. These are tariffs, and the cost of

generation, of course, is lower in order to ensure a positive economy of the enterprise.

– An important issue in the framework of the possible construction of a nuclear power plant is the choice of technologies and partners for implementation of this project. Which countries today have advanced technologies to implement such a project in our country?

– In 2019, our company conducted a non-binding marketing procedure, during which technical and commercial proposals were received from key global suppliers of nuclear power plants – companies from China, South Korea, Russia, the USA and France. They submitted 13 different NPP projects for consideration. All the proposed reactors corresponded to the parameters of generations 3 and 3+ according to the IAEA classification, that is, they had increased safety and improved economic indicators.

There is no doubt that these countries are leaders in the field of nuclear energy. The final choice of supplier for the first Kazakhstan NPP will be made after a thorough study of the details of the proposed projects, which are discussed during our negotiations with four companies included in the "shortlist", compiled on the basis of specially developed criteria.

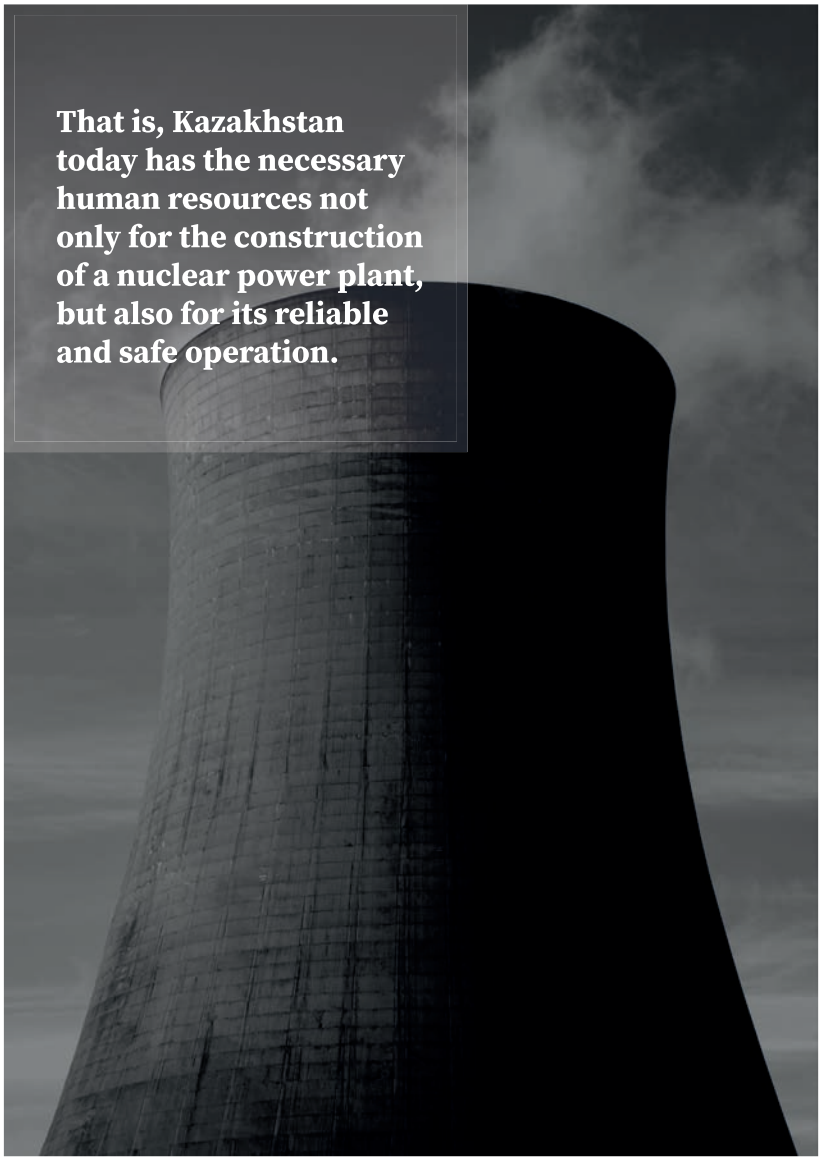
– Two options are often discussed in society. The first is construction of one large nuclear power plant in the energy–deficient south of the country. The second is construction of several medium–sized nuclear power plants of 300-400 MW in different regions of the country. How do you see the architecture of nuclear power plant construction? What else needs to be done besides the construction of the NPP facility itself?

– So far, at the initial stage, we are considering the construction of the first nuclear power plant on the basis of tested reactors available on the market. Their power lies in the range of 1000-1400 MW. The construction of two–block station in the south of the country not only provides coverage for the projected shortage of base capacity, but also increases the stability of power system as a whole by unloading North-South transmission lines.

I will answer an urgent question about the location and future nuclear power plant. At the beginning of this October, the IAEA "Site and External Events Design Review Service (SEED)" mission was conducted to assess the potential location of the first nuclear power plant in the village area proposed by us Ulken of Zhambyl district of Almaty region, including departure to the proposed sites. Based on the results of the mission, the conclusion of the IAEA experts is being prepared, which will be taken into account in our further work.

As for nuclear power plant projects based on small and medium-power reactors, we have two proposals from American companies for small modular reactors that fit well into the energy system of Kazakhstan. Unfortunately, there are no working prototypes of such reactors today. The first launches are expected by 2027-2028.

But we are considering the possibility of using such reactors in hybrid generation systems where nuclear power units are combined with RES. This makes it possible to dampen the negative technical and economic parameters of RES at the level of such an energy complex. We have built appropriate technical and economic models of hybrid generation energy complex, which have shown their viability. For example, the cost of generation is estimated at about 8 cents per kWh (with an honest calculation without preferential subsidization of RES). Also, such an energy complex is considered as a virtual power plant in a system with distributed generation, which is especially effective for Kazakhstan with a relatively small capacity and a large length of power grids.



Another project that is being prepared for consideration is related to the replacement of outgoing coal-fired power units with nuclear ones. The use of small modular reactors is also seen as optimal here. In this approach, as studies by American experts show, savings in construction costs can reach 15-20%, since part of the station's infrastructure is used. It should probably be recalled that a nuclear power plant is an ordinary power plant, only nuclear reactors work instead of coal boilers.

The key aspects of NPP construction project are, first of all, the choice of location, the choice of technology and vendor, the revision of regulatory legal acts related to the construction of nuclear power plants in Kazakhstan, the design of nuclear power plants, obtaining all necessary licenses and approvals from regulatory authorities, as well as maintaining compliance with all safety standards and environmental standards, construction itself, training of personnel, commissioning, integration into the energy system and much more. Road and other infrastructure, houses and apartments for workers and engineering staff will also be needed both during construction and for NPP workers during operation.

The development of nuclear energy requires the development of regulatory legal and technical base, the strengthening of state supervision and safety control bodies, and technical support organizations. The most important is development of conceptual and program documents for development of the country's energy system, which will adopt the terms and composition of energy sources for the medium and long term. It is necessary to understand how much and when nuclear generation will be needed. Or, perhaps, it should be excluded from consideration in the future – although this option, in my opinion, is very dangerous for the development of our country.

– Another important issue is the impact of NPP construction on electricity tariffs. At one of the events, you provided figures on the cost of electricity generated at a nuclear power plant based on your calculations. Could you share your opinion on the impact of nuclear power on tariffs for end users?

–The cost of electricity for the end user will be formed on the basis of existing tariff setting mechanisms. The initial data for calculating the cost are related to the average cost of electricity generation

at various stations of the country's energy system, including both existing traditional and new ones being developed, such as nuclear and renewable energy. I have already mentioned the actual tariffs for nuclear electricity in Pakistan. I can add that nuclear electricity in countries with developed nuclear power has turned out to be the cheapest and most stable in price, since the cost of fuel in operating costs is only about 7%. This means that in case of fluctuations in the cost of fuel on the market, the cost of generation changes slightly, unlike traditional energy sources.

The production of hydrogen at renewable energy plants is also very promising. However, in general, the development of hydrogen energy primarily requires the development and implementation of very large number of technologies for safe storage and use of this explosive gas (we can recall accidents involving the use of household gas and gas cylinder equipment).

– Quite recently, in accordance with instruction of the President, discussions were held in the country on the need to adopt a separate legislative bill regulating alternative energy sources. This document implies support for alternative non-renewable energy sources, such as coalbed methane, metallurgical secondary gases, and hydrogen. In this list, the most "exotic" for us is hydrogen energy. What prospects do you see in the development of this direction in our country?

– Now interest in hydrogen energy has resumed in many countries. In Kazakhstan, this promising area is being dealt with at the National Nuclear Center, where in the early 2000s a joint project with Japanese specialists for the construction of a high-temperature gas-cooled reactor was considered. The fact is that the production of hydrogen at such a reactor is quite efficient and relatively inexpensive.

The production of hydrogen at renewable energy plants is also very promising. However, in general, the development of hydrogen energy primarily requires the development and implementation of very large number of technologies for safe storage and use of this explosive gas (we can recall accidents involving the use of household gas and gas cylinder equipment).

– Today, the world is dominated by trends aimed at decarbonizing the economy and "greening" the energy sector. More recently, we have heard arguments from representatives of the country's coal lobby that we have enough coal for 300 years, and our coal energy is the cheapest in the world. Nevertheless, RES are snaping on the heels of coal generation. In your opinion, will Kazakhstan be able to get off the "coal needle"?

– Until now, only coal could cover up to 80% of Kazakhstan's needs for stable electric energy, and we must pay tribute to it. But in the realities of our time, the vector of development of electric energy sources has shifted towards carbon-free, and financial and credit institutions are no longer investing in energy from fossil sources. We can say that renewable energy sources and, undoubtedly, nuclear power plants are promising for the development of the country's energy system. But it is impossible to discount coal-fired power in the medium term, it is impossible to replace it completely with "green" generation sources. Especially if we take into account the thermal power industry, where RES, for example, are useless.

When modeling the development of the energy system of Kazakhstan, apparently, it is not necessary to rely entirely on the approaches of the same European experts, since the climatic conditions, structure and features of the energy system of Kazakhstan are not at all identical to European ones. Therefore, the term "coal needle" is not quite correct. And the main question arises – where do we want to get off this "needle", in which energy sector, how will we ensure the sustainable development of the country's economy, its competitiveness on the world stage?

I would like to add that we should not forget about the relationship of Kazakhstan's energy with the energy system of the region. When developing strategies and programs for the development of the republic's energy sector, it is absolutely necessary to take this factor into account.

The results of the auction for selection of renewable energy projects in 2023

Date of the auction	Company name	Type of RES	Auction price tg/kWh (excluding VAT)	Installed capacity, MW
August 31, 2023	Bekzat LLP	HPP	17,5	4.8
	DALA SOLAR LLP	HPP	17,51	2
	DALA SOLAR LLP	HPP	17,52	2
	DALA SOLAR LLP	HPP	17,53	2
	DALA SOLAR LLP	HPP	17,54	2
	DALA SOLAR LLP	HPP	17,55	2
	FTR Green LTD LLP	HPP	17,8	4,5
September 1, 2023*	-	HPP	-	200
November 13, 2023	SUNGROW KAZAKHSTAN HOLDINGS LLP	WPP	10,5	100
November 14, 2023	Argest LLP	WPP	13,49	100
November 15, 2023	Mars Wind LLP	WPP	12,33	50
November 16, 2023	Jupiter Wind LLP	WPP	11,88	50
November 17, 2023.	New Clean Energy LLP	WPP	11,78	50
November 20, 2023	Uranus Wind LLP	WPP	10,49	50
November 21, 2023	Hengist LLP	WPP	10,38	10,001
November 22, 2023	FTR-Green-LTD LLP	HPP	19,8	2,4
	Turan Energy LLP	HPP	19,88	2,5
	TK-Most XXI LLP	HPP	20,35	4,9
	Electrical Energy LLP	HPP	20,36	3,2
	Yntymak-Energo LLP	HPP	22,35	2
	Production cooperative "SEC "Yntymak"	HPP	22,36	3,5

Date of the auction	Company name	Type of RES	Auction price tg/kWh (excluding VAT)	Installed capacity, MW
	Azhur LLP	HPP	23	2
	Koksu Kuat LLP	HPP	25,44	4,5
	RSE on REM "Kazvodkhoz" WMC MWRI of the RK	HPP	25,89	2
	Ulken Qaqpaq Hydro LLP	HPP	26,9	4,9
November 23, 2023	Stellar Energy LLP	SPP	34,19	20
November 24, 2023**	Zharyk Su LTD LLP	HPP	34,8	33,1
	DALA SOLAR LLP	HPP	34,81	10,01
	MT & K LLP	HPP	34,9	15
	Baskan Power LLP	HPP	35,01	14,9
	Bekzat LLP	HPP	35,3	12,8
	Energobildservice LLP	HPP	35,32	42
	Alt Energy LLP	HPP	35,33	10,2
	Taraz Greenpower Genko LLP	HPP	35,8	18
	TURGUSUN-2 LLP	HPP	38,99	50
November 24, 2023	Alkhena LLP	SPP	17,38	20
November 27, 2023.	Horsa LLP	SPP	17,34	10,001
November 28, 2023.	Private company "BK-Energy Limited"	SPP	14,5	20
November 29, 2023.	DALA SOLAR LLP	SPP	13,89	20
November 30, 2023.*	-	BioPP	-	10

*The auction was declared invalid

** Repeat auction

Source: Kazakhstan Electric Energy and Capacity Market Operator JSC

Mikhail Kadymov: about our common mission to build a world that has a future

MIKHAIL KADYMOV - professional with extensive experience in finance, strategic management, sales, started his career at AES Global Energy and reached the position of financial manager at Borkit International LLP.

At Painting Solutions LLP in Atyrau, where Mikhail Kadymov was CEO, he successfully implemented a new legal structure, developed a brand and sales in the oil and gas sector. At Burnoye Solar-1 SPV in Astana, he supervised the construction of solar power plants.

Currently, Mikhail Kadymov is a co-founder and Director of Business Development at Alpha Center LLP and Alpha Energy LLP in Astana.

With this author's material, we begin a series of publications of personal essays by "environmentally oriented" people, those who have chosen the path of preserving the planet for the future of our children as their life mission. The first hero of the column was Mikhail Kadymov– independent director of the Board of Directors of Qazaq Green.

Without a clearly defined mission and image, to which we strive to lead the company as leaders, it is very difficult in principle to understand where our ship is sailing, not to mention the fact that we can want something and be happy to get up in the morning and hurry to the good old office, to the employees who hate us quietly in their own way. When we start a career, we may still be motivated by remuneration in some form, but over time we come to one thing - we need something more than just money.

For me, the catalyst for change and raising serious questions to myself was my children. I thought about their legacy not from the perspective of houses, refrigerators and cars, but about what kind of world they will live in and what kind of world they will continue to create after me. As responsible parents, we can protect them all our lives, but our time will come to leave and we should do something in advance in this regard. For example, right now is the time for this.

Back in 2014, I started thinking about ecology, the environment, about global climate change and responded to the offer to participate in the financial management of the Burnoye Solar-1 project, a 50 megawatt solar power plant, the implementation of which prevented the release of more than 435 thousand tons of CO_2 into the atmosphere and generated over 518 million kilowatt-hours of electricity since launch. After some time, this experience was projected onto the operational activities of my company as well.

My team and I have seriously thought about the fact that if humanity continues to increase consumption and disrupt the balance wherever possible, as it is done almost every day, consuming more than it is possible to produce and process, then someday it will all end. Five, ten, fifteen years will pass – and we risk being in an unpleasant situation if we do nothing now or simply brush it off, telling ourselves that someone else will definitely do it. One of the strongest realizations that ever visited me was that no one will take certain steps and only I can take them.

Let's leave behind something that no amount of money can buy: a cleaner world where our children and grandchildren will breathe deeply and live a healthy life in a world that has a future.

And then it began... individual responsibility in me began to gradually give way to global responsibility. Sorry for the pathos, but it's true. As an entrepreneur and head of business development (the legendary BD), I began to see that if each corporation allocates 1-2% of its budgets for even minor green initiatives, then, in common terms, it will be easier for the whole world to breathe.

The pandemic perfectly showed that after some month (!) of under-production in the heavy machinery industry in China, the Central Asian region showed a significant drop in CO_2 levels. Birds began to return to the region; the whole nature began to actively recover, the quality of oxygen improved ... And at the same time not to say that the world has just so much “suffered" from this underproduction.

From the virus, yes, but not from the lack of cars, engines and depleted uranium for surface-to-surface missiles.

Having tried on the simplified wording of the term "global responsibility" for our company, my team and I implemented a number of simple green protocols and immediately faced a number of obstacles, about which more than one article has been written.

In general, they can be described as "the unwillingness of companies to change, to rebuild, to take responsibility for this direction as well." This is precisely unwillingness, since a number of green innovations – take at least our sector of production of protective coatings for oil and gas and shipping – allow us to significantly increase the company's production indicators. For example, by modifying or rebuilding factory lines, you can not only save huge budgets on the production of coatings themselves, but also make them much more efficient in terms of increasing the coverage area, when 20 liters of composition can give not 80 squares but all 120; in terms of extending the service life of assets on which these coatings are used, to protect an oil platform that will not rot under the influence of an aggressive environment for 10 years (by the way, without special coating, it can rot in 6 months). But that's not all: the risk of leaks due to equipment failure is reduced, the total cost of its maintenance is reduced, the risks of accidents due to sudden equipment failure are reduced, and much more.

I have implemented a number of solutions in the company for a smooth transition to a new format of work. We really wanted to leave our mark. Only now it's green. Together we have identified a number of areas with a green bias in which we can work and at the same time be a cost-effective company. We have implemented several policies regarding the selection of suppliers, business partners and customers, giving strategic priority to those who are ready or planning to adapt to a new format. Having implemented absolutely basic, simple things, we faced – and in 80% of cases we continue to face now – the unwillingness of the market to look at our common present, which lies beyond productions and summary tables, endless corporate parties and strat sessions. We understand that no one can escape to the conditional Maldives from the situation that people are creating right now and we need to be able to project this very present into the foreseeable future, plan strategically and look for a delicate balance between building up capital and building a beautiful future with fresh air and a healthy biosphere.

Personally, I am afraid of the prospect of coming with my family on vacation and swimming in oil water or seeing how a wave will throw a garbage stream along with dead coastal inhabitants onto the shore.

Of course, it is not difficult to understand what exactly is behind the reluctance to change and the relatively sluggish process of strengthening the green agenda. It's not easy: to take and “green up” the whole company with all its internal and external systems of checks and balances. It is necessary to adjust thinking, introduce new protocols, change legislation and regulatory instruments for new types of industries and sectors, or even develop new bills and liability systems, plus hundreds of thousands more details, modifications and changes. We, as a country, have done a lot in terms of supporting a green world, developing green energy, complying with all kinds of conventions and new policies ... And, despite all that has been done, we are still at the very beginning of the road.

And I invite you to join me on this difficult but interesting green journey. After all, we already have everything: so let's leave even more behind. Let's leave behind something that no amount of money can buy: a cleaner world where our children and grandchildren will breathe deeply and live a healthy life in a world that has a future.

KAZAKHSTAN'S WATER RESOURCES: Balancing industrial needs and environmental sustainability

QG: Thank you for this opportunity to have an interview. My first question would be if you can explain about the Lincoln Centre for Water and Planetary Health (LCWPH) and what kind of problems, issues you're raising and maybe explain what kind of research you do in this field.

Professor Chris Thomas: Planetary health is a relatively new discipline, but it brings together approaches and knowledge from very established areas of science to understand the consequence for human health and wellbeing from the many the critical issues facing the planet, such as climate change, pollution, environmental degradation, biodiversity and habitat loss, and their interacting effects. This requires a lot of different expertise and angles of view – the kind of integrated approach needed to meet UN Sustainability Development Goals Our center is at the University of Lincoln, a relatively young and growing research university in the UK, where we are able to bring together novel groupings of people and expertise. Our research center focuses on rivers, especially major rivers, globally and locally in the UK and in the many countries and regions where we work. We currently have projects in the UK, Southern Africa, Australia, and of course Central Asia, where Mark has been working for over 12 years. We work with our network of collaborators around the world, and that includes here in Kazakhstan.

Part of our mission here, and the reason why the British Embassy has invited us over to speak is to help develop the new networks required for these very complex challenges. But of course we can only tackle some of the issues – in LCWPH we

Professor Chris Thomas

We currently have projects in the UK, Southern Africa, Australia, and of course Central Asia, where Mark has been working for over 12 years.

Qazaq Green suggests you and interview with experts of the the Lincoln Centre for Water and Planetary Health Professor Mark Macklin and Chris Thomas

Professor Mark Macklin

focus on water, biodiversity, pollution and human health, particularly infectious diseases and the emerging threat of antimicrobial resistance in the environment, but the main thrust of our current work- and what we are going to be talking about today - is contamination of our waterways from metal mining. For the green energy transition we absolutely need these new critical minerals, so that requires a strong mining sector and that is also important for the economy. Our work has shown how metal mining in the industrial era was very damaging to the environment, but there is no need to repeat these mistakes; mining can be done now in a responsible way and we hope our work can help industry with this. We believe that Kazakhstan can be a leader in responsible mining. But there is still the problem of long-lasting pollution from previous mining, which can be severe - certainly in Europe, North America, Australia, and places that were heavily mined in the industrial era 100 years ago. There is legacy pollution too in Kazakhstan. We think it is important to understand where that is, what the implications are, and then learn from that how responsible mining can best proceed in the future. This is a big focus for our research center .

QG: I think my next question will be in line what you're talking about because I went through some statistics about the water consumption in Kazakhstan and the statistic is saying that 66% of water is consumed by agriculture, 30% by industrial facilities and only 4% by population. So if we talk about sustainability goals, security in general of the state, what kind of measures the state should apply in order to decrease the level of consumption for industrial needs of water?

Professor Chris Thomas: Clearly, the use of a limited resource like water needs to be planned carefully – and these days that means taking into account that the climate is changing very rapidly. For all sectors that means being adaptable and open to new processes and ideas. Technological development and breakthroughs offers great hope for the future so it's important to be able to take advantage of that.

Professor Mark Macklin: To come back to your original question, I think there is a nexus

between water resources, between the need to transition and increasingly the need to do it as a green energy transition. The word 'nexus' means a series of connections or interactions among different things – which is why the Planetary Health interdisciplinary approach is so useful here. There are issues that we are going to need to understand in terms of making it a green energy transition and obviously this interacts with the way that climate change is impacting as Chris says. So we need to understand all of those elements to have responsible mining as part of this. We also need responsible uses of water, especially as it becomes a reduced and more variable resource. So it's its adaptation that we've got to move towards. But just to go back to your original point in terms of energy production, renewables are key globally and all those technologies need metals. As Chris was saying, unfortunately, because the UK was the first industrial relation, we severely damaged - and they are still damaged - our rivers, our floodplains and environments from the late 18th century onwards until regulation was introduced in the 1880s. There needs to be a dramatic increase of metal production across the world, which is going to be larger than in the industrial revolution, if we are going to get to the position that we can actually escape the use of energy production from fossil fuels. Kazakhstan is exceptionally well placed in terms of critical minerals to help meet this demand, certainly within Eurasia. However, it will require water in terms of the processing and in terms of the infrastructure that is required to support the system. What we are pushing is for is what we describe as responsible mining with much reduced environmental impact, and this includes the areas impacted beyond the mine site itself. So, it is important to understand where pollution from previous mining is actually the problem. We know is that Kazakhstan has a long history of metal mining and as a consequence of that there is significant legacy contamination in a significant portion of Kazakh Rivers.

66%

of water is consumed by agriculture

30%

by industrial facilities

4%

by population

In terms of the green energy transition, we have got to make sure that the same mistakes that particularly the UK made is not repeated in Asia. Sub-Saharan Africa is another area where a lot of the critical minerals are mined and why we are also working in Tanzania and Zambia. It's the same problem but obviously in a very different climatic, ecological and human context. What we're trying to do today is saying that there is a critical nexus between water, critical minerals and climate change. Obviously, people and ecosystems come into it as well. But unless we actually manage this process carefully, we are going to potentially repeat, but on a much larger scale, the problems that we had in our first industrial revolution. So, it's not necessarily a bad news story; it's actually a good news story because we can do things much better this time around. But we need to join things up in new ways and part of the aspiration of the Lincoln Central Water Planetary Health is to bring those things together with new, underpinning science. And then, to work with industry and government we have formed a commercial arm, which is called Walter and Planetary Health Analytics. WAPHA is run by Chris, me and our colleague Professor Pim Martins at Maastricht University in The Netherlands, who is a mathematician and social scientist. Chris is an ecologist and I'm a river scientist who works on flooding, so it's an interdisciplinary team of world leading scientists. We all research climate change

impacts in our disciplines. I've worked for 40 years in climate change and I didn't believe things would change so rapidly. When I was doing my PhD in the late 1970s, I thought it may be in my children's lifetime or my grandchildren's - but it's actually happening in my lifetime at a speed which is exceptional. I think it's really important that we position ourselves in terms of understanding those interrelationships because but otherwise we could make the same errors. We have the opportunity to do things differently.

QG: If we started to talk about the water metallurgy and mining, I would ask the next question from the other part. Due to the energy crisis in Europe especially, it seems that many countries got a deal that the next source of energy would be hydrogen. Many countries are thinking about production of hydrogen, which should be applied to the processes which are not able to be electrified, especially these processes are in metallurgy to produce metals. But the process of production of "green" hydrogen assumes the consumption of water. For our country the issue of water shortage is crucial. How it can damage the water resources, environment and different areas. So what do you think about it?

Professor Chris Thomas: The fact here is that water is very precious. It needs to go to a lot of places; it is needed to produce food, to preserve the environment, to be consumed by people, and it needs to go into other industries that are essential as well. It is certainly a challenge to think about another demand upon this supply. However, as I said earlier, I have great optimism for the potential of new technology and processes, so it is important the challenge is identified and tackled early in the development process.

Professor Mark Macklin: We had a discussion about this actually in our first meeting today with engineers from a firm which is developing green and also blue hydrogen. The point I would make from a non-technical point of view, is that in terms of resources, hydroclimate, and climate change the obvious fact is that Kazakhstan is a very big country. In terms of climate change impacts, they are very, very uneven across the country. The climate of Caspian Sea rivers, the Euro Volga are very different to the climate of Astana and the rivers which run, for example, in Northern Russia. There are very complex hydro climates and those are changing in slightly different ways. I would be very thoughtful knowing that the Caspian is an inland sea and we know what's happened to the Aral Sea and we are already seeing changes in Lake Balkash. Thus, it would have to be done carefully and with an understanding of what the climate trajectory was going to be in that catchment and water supply. That is the issue.

Yerlan Issayev,
Chairman of the Board of Association of Carriers of Bulky and Heavy Goods, General Director of the Kraft Spedition Company

TRANSPORTATION OF WIND TURBINES IN KAZAKHSTAN: PROS AND CONS

Relatively new type of transport services in our country is the transportation of wind turbines. In this regard, the development of the transportation of bulky and heavy cargo and the transport industry as a whole requires more attention.

KRAFT SPEDITION LTD

President of the Republic of Kazakhstan Kassym-Jomart Tokayev, in his annual Message to the People of Kazakhstan on September 1, 2023, noted about strengthening the transit potential of the country. The President pointed out the need to make full use of the opening opportunities and become a transport and transit hub of global importance. Taking into account the current geopolitical situation, Kazakhstan is becoming the most important land corridor between Asia and Europe.

Surely each of you has seen the fascinating spectacle of transporting a huge blade on country roads. I would like to note that wind energy is becoming an increasingly important component of the global energy system, and Kazakhstan does not stay on the sidelines from this technological progress. In recent years, the country has been actively developing its wind energy industry, striving to increase the share of renewable energy sources and reduce dependence on traditional sources. Kazakhstan has developed a strategy for development of wind energy, which provides for an increase in the installed capacity of wind power plants in the country. According to this strategy, a number of large wind power plants are planned to be commissioned in the coming years. These measures are aimed at strengthening the country's energy security and promoting environmental sustainability.

We have created the "National Association of Carriers of Bulky and Heavy Cargo of the Republic of Kazakhstan", the purpose of which is to develop the sphere of transportation of bulky and heavy cargo and the transport industry of the Republic of Kazakhstan as a whole. This also includes the application of international standards in formation and improvement of state policy in the field of transportation, the effective use of existing potential of domestic carriers for development of the economy of Kazakhstan and improving the welfare of citizens of the Republic of Kazakhstan.

To date, the Association's carriers participate in the project transportation of bulky and heavy cargo (BHC) using special trawls with complex technical and design features. One of the directions with a high intensity of transportation of wind turbines and equipment is China – Uzbekistan transit route through Kazakhstan, where domestic carriers are involved.

In the course of work, our carriers have encountered a number of problems. They include:

- distribution of foreign permit forms (FPF) for international transportation;

- discrepancy of actual empty weight of the vehicle (vehicle) with the empty weight of vehicle specified in the vehicle registration certificate (VRC). Often, according to the results of weighing an empty vehicle, facts of inconsistency with the VRC data are revealed, and carriers are subject to liability under part 5 of Article 590 of the Administrative Code of the Republic of Kazakhstan;

- there were difficulties associated with the lack of LSI regulating the work of coordinating organizations represented by KazAvtoZhol and KTZh in the issue of coordinating the route of transportation of BHC when obtaining a special permit;

- as a result of formal work of coordinating organizations, carriers face problems with the passage of road engineering structures. One of these sections is a bridge located in the Tyulkubas area, where passage by height is possible only in the oncoming lane.

One of the important issues is inspections by a mobile transport control post (MTCP) for vehicles transporting BHC.

The working procedure of MTCP and the Situation Center are determined by the Rules for Organizing the work of Transport Control Posts on the Territory of the Republic of Kazakhstan, approved by Order No. 362 of the Acting Minister of Transport and Communications of the Republic of Kazakhstan dated August 13, 2010.

When performing a state function, the actions of officials of MTCP and the Situation Center often cause disagreement and questions among carriers.

Thus, according to the requirements of the Rules of Operation of the Posts, the measurement of the actual weight parameters of the vehicle on mobile scales is carried out at pre-determined sites, the list of which is approved by the Head of the inspection in agreement with the Committee.

At the moment, the transportation of wind turbines in Kazakhstan faces a number of other, more objective problems affecting the efficiency and cost of wind energy projects. Below are few existing and potential problems.

Infrastructure and road network:

• Lack of specialized roads: Specialized vehicles and roads are required to transport large components of wind turbines. Some regions of Kazakhstan lack the necessary infrastructure.

Geographical features:

• Remoteness of regions: Large wind power plants can be built in remote areas, which complicates logistics and transportation of equipment from remote locations to the construction site.

Climatic conditions:

• Extreme weather conditions: Kazakhstan is characterized by a variety of climatic conditions, including strong winds, frosts and high temperatures. These factors can create difficulties during transportation and installation of wind turbines.

Customs procedures:

• Border crossing: As a rule, wind turbine components are supplied from abroad and, accordingly, border crossings and customs procedures cause delays and increase the cost of the project.

Technical limitations:

• Inaccessibility of some areas: Some promising sites for construction of wind farms may be difficult for

vehicles to access due to topographic features.

Training of performers:

• Lack of qualified specialists: Transportation and installation of wind turbines require certain skills and experience. Lack of qualified specialists can affect the effectiveness of the project.

To overcome these problems, it is important to carry out detailed planning and coordination during the development of wind energy projects. This includes collaborating with logistics companies, developing infrastructure, and improving the technical skills of the workforce. Strategic partnerships with local authorities, educational institutions and industrial enterprises can also help solve these problems.

In the transportation of wind turbines in Kazakhstan, an integrated approach is required, including improving infrastructure, logistics and coordination. Here are some ways to solve these problems:

1. Infrastructure development:

o Construction of specialized roads: The development of special roads designed to transport large components of wind turbines can significantly improve the logistical situation.

2. Improving logistics:

o Route optimization: The use of modern technologies to optimize routes and select the most efficient and safe transportation routes.

o Thorough planning and coordination: Thorough planning of all stages of transportation, including loading, unloading and intermediate points, can reduce risks and prevent delays.

3. Improving the energy grid infrastructure:

o Preliminary development of power grids: The development of power grid infrastructure in areas with great potential for wind power can facilitate the integration of wind power plants into the existing energy system.

4. Technological innovations:

o Development of compact models of wind turbines:Creation of compact and lightweight models of wind turbines can reduce the complexity and costs of their transportation.

o Self-assembly technologies: The development of technologies that allow assembling wind turbines on site can simplify the process and reduce dependence on complex logistics.

5. Cooperation with local authorities and educational institutions:

o Vocational training: Development of vocational training programs fore workforce involved in wind energy projects will help to improve their qualifications and reduce possible problems during transportation and installation.

6. International cooperation:

o The experience of international companies: The involvement of international companies with experience in the field of wind energy can contribute to the transfer of best practices and technologies to Kazakhstan.

7. Environmental assessments and standards:

o Environmental assessments of transport: Conducting environmental assessments to determine the optimal modes of transportation, taking into account environmental impacts.

Solving these problems requires joint efforts of the Government, the business sector and local communities. Only within the framework of an integrated approach and cooperation will it be possible to create an effective and sustainable system for the transportation of wind turbines in Kazakhstan.

THE ROLE AND SIGNIFICANCE OF STANDARDS IN THE DEVELOPMENT OF THE CIRCULAR ECONOMY IN KAZAKHSTAN

Lobuntsova Yuliya,
Director of the Waste and Chemical Safety Department of the Center "Cooperation for Sustainable Development"

Baizakova Aldina,
Specialist in standardization and certification of the Kazakhstan Waste Management Association "KazWaste"

Talgat Sholpan,
PR specialist of the Kazakhstan Waste Management Association "KazWaste"

The transition to a circular economy is currently a global trend, and this is obvious. The circular economy, which is an economy of a restorative and closed nature, strives to preserve the usefulness and value of products, materials and components all the time, while taking into account the differences in technical and biological cycles. Circular economy, unlike linear economy, which assumes the principle of “take– make – waste", is based on the principle of take–make – reuse. It allows minimizing the consumption of primary raw materials and the volume of processed resources, which is accompanied by a decrease in waste sent to landfill, while reducing the area of landfills and unorganized landfills.

The development of the circular economy is an important task of the Republic of Kazakhstan. The concept for transition of the Republic of Kazakhstan to "green economy" assumes an increase in the share of waste recycling, a reduction in the number of landfills and the development of a closed-cycle economy. In addition, the Strategy for achieving carbon neutrality until 2060 is based on the principle of circular economy and involves reducing waste generation, accelerating the introduction of full coverage of collection and sorting of solid waste and increasing the share of recyclable and composted waste.

For development of the circular economy, various countries actively use an integrated approach: from the establishment of legislative norms and rules, the introduction of technologies, financing and changing approaches to doing business, to the formation of society's willingness to change its habits.

The transition from a linear economy to a circular one is impossible without effective standards that would cover a wide range

of applications: from waste management and resource recycling to standards for products and technologies.

Here we can identify several key reasons why standards in the circular economy play an important role in ensuring efficient and sustainable use of resources:

• **Unification of processes**. This simplifies the implementation and maintenance of sustainable practices in various sectors and countries. For example, if the technologies for manufacturing products from recycled materials have already been introduced in another country or in the EU, it is advisable to introduce national standards based on foreign, already working standards.

• **Quality and safety assurance.** When there are certain criteria, it is much more effective to ensure the quality and safety of resources, materials and products used in the circular economy. The standards define these criteria. In this regard, it is through the development of standards in the field of circular economy that it is possible to achieve the quality of products produced on the principle of a closed cycle. This helps to prevent negative environmental and social consequences.

• **Improved compatibility and sharing.** The standards ensure compatibility between different resource management and recycling systems. And this, in turn, simplifies the exchange of materials and components between different enterprises and industries. If the secondary raw materials meet the requirements of the standards, then the manufacturer of products from this raw material will confidently use such raw materials in its production.

• **Building consumer confidence.** Clear and transparent standards will allow consumers to be confident in the quality and sustainability of products. After all, any consumer prefers to use and consume products of established quality, taking care of the health and well-being of themselves and loved ones.

• **Promoting the consistency of legislation.** Standards can serve as basis for development of appropriate legislation and regulations in the field of circular economy, which simplifies the implementation and compliance with requirements. Standards, unlike legislative acts, are adopted and work much faster. This makes it possible to see in practice the applicability of the requirements established in the standards, the relevance and the result of their work. And if the requirements set out in the standards are met, contribute to the development of the economy and improve the quality of products and services, then it is safe to set them at a mandatory level.

Today, there are a number of international and national standards focused on the circular economy. The key of them is BS 8001:2017 standard, developed by the British Standards Institute (BSI). It provides a guide to the application of the principles of circular economy in organizations. The standard was published in 2017 and is called "BS 8001:2017 Framework for implementing the principles of the circular economy in organizations - Guide".

BS 8001 offers a number of framework principles for integrating circular economy practices into business processes. These principles may include long-term planning, supply chain collaboration, risk and opportunity management, and monitoring and measurement. The standard defines how to implement the principles of circular economy in the organization in order to create value through process, product, service innovations or new business models (Figure 1).

It will help to establish standards for assessing the life cycle of products and processes in the circular economy, which will allow comparing different approaches and assessing their environmental and economic benefits.

BS 8001 is not a certification standard, but rather a guideline that organizations can use to develop their own circular economy strategies.

Currently, there are 88 standards in the field of waste management in Kazakhstan. However, separate standards in the field of circular economy have not been approved.

In order to develop the circular economy , the technical committee for standardization TC 122 "Circular Economy. Sustainable production and consumption" was created in 2023, the basic organization of which was KazWaste Association. The Technical Committee for Standardization in the Field of Circular Economy is of great relevance in the modern world. It will help to establish standards for assessing the life cycle of products and processes in the circular economy, which will allow comparing different approaches and assessing their environmental and economic benefits.

In general, the technical committee for standardization will play an important role in the development of the circular economy, ensuring the establishment of common standards and regulations, increasing transparency and reliability, reducing barriers and accelerating the introduction of circular approaches in various sectors of the economy.

As part of the work of TC 122 technical committee, it is planned to develop and introduce a national standard forimplementation of the principles of circular economy based on the above-mentioned British standard BS 8001. The approval of this standard will help Kazakhstani enterprises to come to

Brief overview of BS 8001 structure

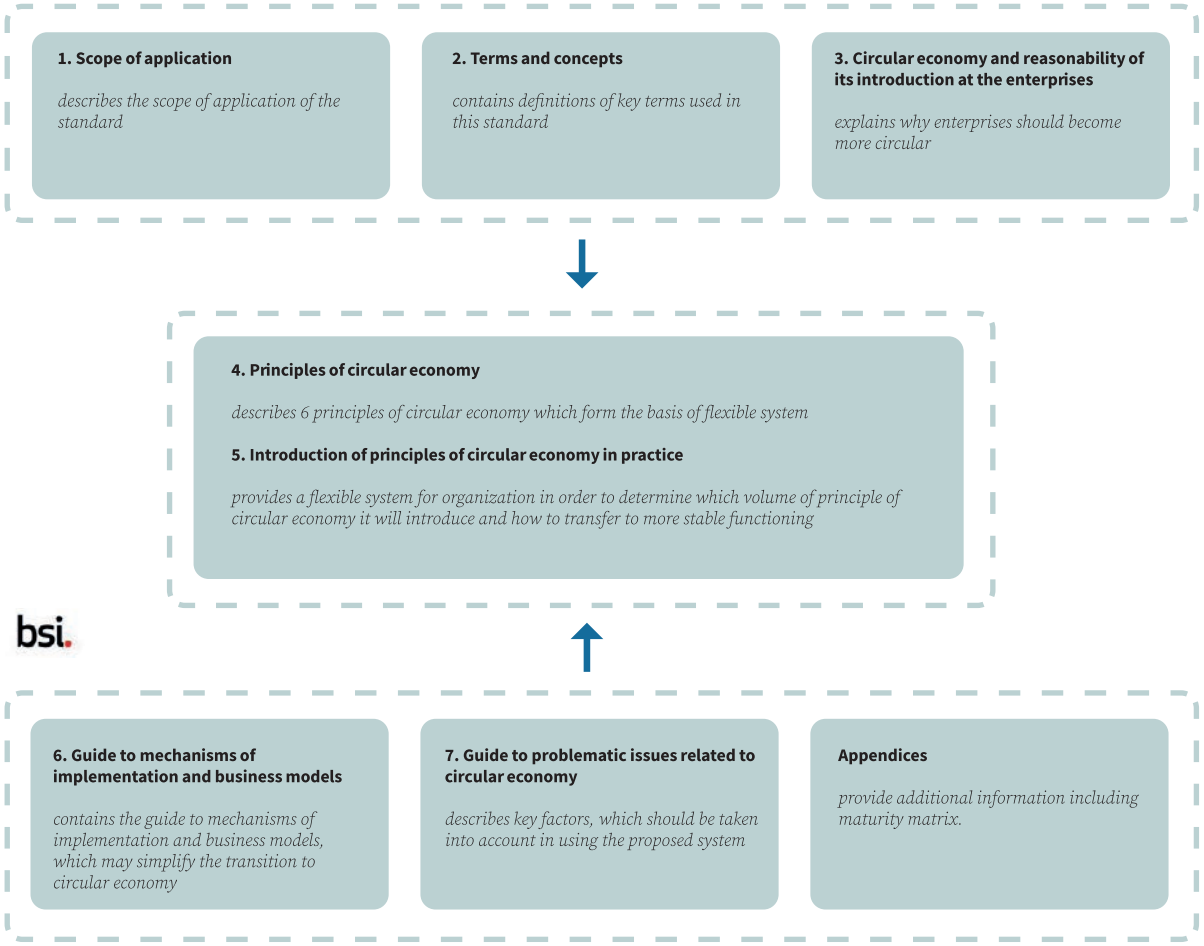


Figure 1. Brief overview of BS 8001*

an understanding of the processes of implementing the principles of the circular economy and take the first steps towards its development.

The Technical Committee for Standardization TC 122 plans to help in solving the issues of implementing the principles of circular economy, sustainable production and consumption by analyzing the experience of advanced countries and adapting foreign standards in this area to the specifics of Kazakhstan, as well as by developing new standards taking into account the practical experience of local enterprises.

Thus, the awareness of the importance of standardization in the circular economy, ensuring the effective implementation and development of this approach, plays a key role in the formation and strengthening of the foundations of the circular economy. The development and adoption of standards based on the principles of circular economy contributes to improving product quality, improving the efficiency of recycling processes and waste management. The development of standardization in the field of circular economy in Kazakhstan will contribute to the rapid and systematic development of the country's economy in the future in accordance with the strategic documents of the Republic of Kazakhstan.

**Source: Presentation by Kristina Allen – Lead Program Manager, Standards for Sustainable Development. British Standards Institute.*

LEARNING BY DOING: EXPEDITION TO RENEWABLE ENERGY FACILITIES

Dana Zhunissova,
Kazakh-German University

Saniya Akhmetova,
Kazakh-German University

Renewable energy sources (RES), which are an integral component of this process, play a key role in a sustainable energy transition. The use of renewable energy and production of hydrogen have untapped potential in the Central Asian region. Human capital is an important element of the successful implementation of the set goals. The development of professionals requires strengthening educational programs, training specialists and stimulating research. This is also achieved through the exchange of experience between countries, creation of community and establishment of partnerships among those who promote the green economy.

The annual Renewable Energy Trip, which is the flagship project of the Center for Natural Resources and Sustainable Development at the Kazakh-German University (KGU), provides a practical basis for training students and researchers from Central Asia, providing them with a unique opportunity to study in-depth the best practices in the field of renewable energy and exchange experience between countries. Since 2018, this expedition has become not only a source of new knowledge, but also a force uniting like-minded people in the pursuit of sustainable energy development in Central Asia. Over the past five years, more than 70 participants have formed long-term professional ties and actively interact with each other.

In the context of the Central Asian region, Renewable Energy Trip is of key importance in the formation of human resources capable of implementing innovative approaches and technologies in green energy. The project participants, having learned in practice, return to their countries with new knowledge and insights, contributing to the active development of the industry.

Renewable Energy Trip creates international bridges for the exchange of experience and transfer of advanced technologies in the field of renewable energy from Germany, China and other countries. This allows participants not only to assess local peculiarities, but also to apply global knowledge in the context of their countries.

This year, in the period from August 21 to 27, the Renewable Energy Trip 2023 educational trip was held, with the support of the German Ministry of Foreign Affairs, the Ministry of Energy of the Republic of Kazakhstan and the US Agency for International Development (USAID) project "Energy of Central Asia". The expedition attracted engineers, scientists, students and undergraduates in the field of energy and ecology from various Central Asian countries who successfully passed the selection for participation.

The energy transition in Central Asia was the main topic of discussion at the opening round table. The participants considered the issues of the transition to clean energy, the analysis of the current energy situation in the countries of Central Asia, and also identified the prospects for development in this region and its impact on the global energy picture.

In her welcoming speech, Barbara Janusz-Pawletta, Vice President for International Cooperation and Sustainable Development of KGU, expressed the importance of initiatives uniting professionals in the field of green energy and ecology who are passionate about their topic and are ready to contribute to the formation of an environmentally sustainable future. She urged the participants to take the opportunity to study the processes of the station from the inside, discuss challenges in this area with engineers and facility managers and be inspired by a joint search for ways to solve them.

Ainur Sospanova, Chairperson of the Management Board of Qazaq Green Renewable Energy Association, told about the development and barriers of the renewable energy sector in Kazakhstan. Qazaq Green Renewable Energy Association continues to support this trip for more than a year, contributing to the expansion of knowledge and professional growth of future industry specialists.

Deputy Head of the USAID project "Energy of Central Asia" Bayan Abylkairova shared an overview of the renewable energy sector in all five countries and presented recommendations based on the experience of implementing projects in these countries. The USAID project "Energy of Central Asia" supports undergraduates of the KGU educational program "Strategic Management of Renewable Energy and Energy Efficiency" (SMREEE) by providing an opportunity to study in this important and relevant area necessary for sustainable development.

Given the significant role that investments play, understanding financial instruments and analyzing current cases are important aspects in this area.

Given the significant role that investments play, understanding financial instruments and analyzing current cases are important aspects in this area. Senior Investment Specialist at the Asian Development Bank (ADB) Kseniya Rogan made a presentation on "Financing infrastructure growth in Central Asia and beyond". The head of Hydrogen Diplomacy Office in Astana, Manuel Andres, presented an overview of the potential applications of green hydrogen, relevant for Kazakhstan.

Dana Ermolenok, Senior National Advisor for the Global Program for Climate-Resilient Economic Development (CRED) project, presented a report covering important aspects of the relationship between decarbonization and adaptation to climate change, the impact of climate change on the energy sector, examples of adaptation measures in the energy sector, as well as the use of E3.kz macroeconomic model to prepare development plans and adaptation measures.

Director of Helio Solar KZ LLP Makpal Akpayeva told about innovative technologies in solar energy. Helio Solar is a leading provider of innovative technologies for renewable energy with a wide range of solutions. It is worth noting that the company is currently installing a mini-solar station on the roof of the KGU building. This station not only serves as a source of clean energy, but will also become a platform for sharing knowledge with future generations. Here schoolchildren, students and young professionals will be able to study the operation of solar panels and technological innovations of the station in practice.

Hydropower occupies a leading position in the energy complex of the region and all countries of the region are actively developing plans for the use of this energy source. At the same time, the challenges of climate change portend a shortage of water resources, which underlines the importance of comprehensive approach to energy development. Dr. Denis Krutov spoke about the existing potential of hydropower in Central Asian countries, highlighting the work of hydroelectric power plants and giving specific examples of facilities. On the

same day, the participants of the trip visited one of the considered facilities — Kapshagai hydroelectric power station (HPP), which has an installed capacity of 364 MW.

The route of the trip also included a visit to the Kapshagai solar power plant (SPP) with a capacity of 2.41 MW, where the technology of tracking the sun is used. In addition, the participants had the opportunity to compare the traditional coal plant, the Almaty thermal power plant CHPP-2 named after Zhakutov, with other facilities. They not only studied the operation of this facility, but also realized the need for its modernization due to equipment wear. The presence of women in the staff also caused surprise and admiration of the participants. Then the expedition group continued its route towards Taraz, where it visited the SPP "Burnoey Solar 1 and 2" in Baurzhan Momyshuly settlement in the Zhambyl region. Burnoye Solar 1 SPP was a pioneer in the production of renewable energy in Kazakhstan and Central Asia.

Then the participants went to the north of Kazakhstan, where they visited the Nura SPP in Akmola region and the Saran SPP in Karaganda region, and studied local characteristics and technologies used. In the following days, the members of the expedition group visited the wind power plants (WPP) "First WPP" in Yerementau town and "Astana EXPO-2017" Kostomar settlement in the Akmola region. The trip ended with a visit to the mosque with zero energy consumption "Allanyn Guli - the Flower of the Almighty" and the Museum of Future Energy "Nur Alem" in Astana.

This year's expedition was a significant event for 19 specialists and students from Central Asia, giving them the opportunity to expand their knowledge and understanding in the field of renewable energy development and prospects. Seven participants from Kazakhstan, four from Kyrgyzstan, five from Tajikistan and three from Uzbekistan made this journey together, discovering unique perspectives and establishing new connections. 42% of women and 58% of men took part in this trip. Women are showing an increasing interest in this industry. For example, thanks to the scholarship program for women in the field of renewable energy from the Organization for Security and Co-operation in Europe (OSCE) for SMREEE undergraduates, this year the number of girls exceeded the number of boys.

The participants were students and undergraduates specializing in renewable energy and already having experience in this field. Scientists and teachers, heads of departments, associate professors and doctors of sciences from Karaganda Higher Polytechnic College, Kyrgyz Technical University, Razzakov, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, as well as from other organizations also took part. They are ready to share their knowledge in the future and apply it in their educational programs and research, as well as in joint projects. Students, undergraduates and young scientists had the opportunity to gather information for writing their scientific dissertations and other research on best practices in the use of renewable energy.

During the excursions, the participants listened with great interest and enthusiasm to the engineers of the visited facilities and actively asked their questions to the staff and management of the stations. The trip was an incredibly useful experience for all participants, contributing to the strengthening of friendly and cooperative relations between citizens of Central Asian countries.

FEW FEEDBACKS ABOUT THE TRIP:

Aigul Orazbayeva (Kazakhstan) on visiting Kapshagai HPP

“It was a unique opportunity to see and get acquainted with the production process! HPP is a strictly guarded facility, we are very pleased that the management of HPP made an exception for the participants of our expedition. The project of such a large-scale HPP, as well as the reliable operation of the entire station for more than 40 years, admires the professionalism of the employees working at this HPP. We thank the management of Kapshagay HPP and Pavel personally for the tour!”

Aidar Kanatbekov (Kyrgyzstan):

“We have gained a lot of new knowledge about the processes of electricity production. Thank you for your hospitality, for answering all our questions and for your time. Such events not only broaden your horizons, but also allow us to better understand how important and difficult the work you do is!”

In addition to the feedbacks, the participants, and even the engineer of the stations visited, recommended thinking about the possible expansion of the boundaries of the expedition and the organization of such a trip throughout Central Asia. According to the participants, having studied the energy sector of Central Asia from the inside, we could contribute to the fight against global problems such as climate change and the depletion of natural resources.

Five key areas — water, green energy, land use, environmental management and green business and society — form an integrated approach to solving the challenges facing the region.

CENTER FOR NATURAL RESOURCES AND SUSTAINABLE DEVELOPMENT AT KGU

The Center focuses on education and research in Kazakhstan and Central Asia, capacity development in the field of environment and natural resources, as well as on establishing bridges for the transfer of knowledge from Germany and other international partners to this region.

The main mission of the Center is generation, transfer and dissemination of knowledge, technologies and competencies in the field of "water-energy-earth-ecosystems-mobility" against the background of climate change in Central Asia. Five key areas — water, green energy, land use, environmental management and green business and society — form an integrated approach to solving the challenges facing the region. Three master's programs for candidates from Central Asia, Afghanistan and Mongolia in the areas of “Integrated Water Resources Management”, “Strategic Management of Renewable Energy and Energy Efficiency”, “Management of Sustainable Business Development”, provide training necessary for effective resource management and formation of sustainable future.

On June 21, 2023, the Kazakh-German Institute of Sustainable Engineering Sciences opened in Aktau in partnership with Sh. Yesenov Caspian University of Technology and Engineering . The main focus of the Institute is aimed at developing future technologies, integrating advanced German experience into the educational process and becoming a catalyst for innovation in the Mangystau region. The establishment of the Institute is aimed at supporting research and innovation, contributing to the sustainable social and economic development of the region. One of the promising areas of this region is the implementation of large-scale project of Svevind, Hyrasia One, for production of hydrogen, planned for 2032, and providing for extensive production of up to 20 GW. The Institute will contribute to the expansion of knowledge in the context of this important hydrogen project.

Central Asian countries have significant potential to mitigate climate change by expanding the use of renewable energy and introducing innovative solutions. Personnel requiring training and advanced training play a key role in this process. Therefore, such unique projects as the Renewable Energy Trip and specialized training program are necessary, and should be promoted together with other projects.

Information on production of electric energy by renewable energy facilities for 9 months of 2023

INSTALLED CAPACITY INCLUDING:

2 715,8 MW

WIND POWER PLANTS

1 246,6 MW

2 575 million kWh

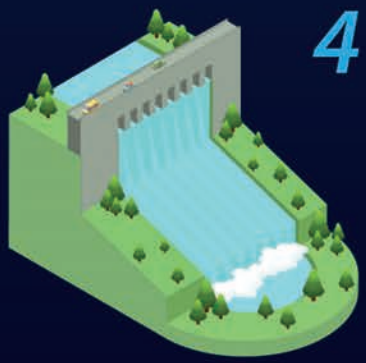
SOLAR POWER PLANTS

1 197,83 MW

1 571,9 million kWh

POWER GENERATION INCLUDING:

4 910 million kWh



SMALL HPP

269 605 MW

760,9 million kWh

BIOELECTRIC POWER PLANTS

1,77 MW

2,25 million kWh

The share of renewable energy generated in the total volume of electric energy production **5,97%**

The increase in electricity generation by renewable energy facilities for 9 months of 2023 compared to 9 months of 2022 is **25%**

QAZAQ GREEN EXPEDITION – 2023

In its activities, the Renewable Energy Association "Qazaq Green" uses various formats for discussion, organizing platforms for meetings of representatives of government agencies and business. Thus, the business expedition Qazaq Green Expedition is already a traditional event. For the first time, the expedition took place in 2022, and its route involved visits to a number of renewable energy stations in the Akmola region and setting up a camp at the Buiratau SNNP. The expedition included familiarization with the work of wind farms, multi-kilometer off-roading, discussions on ways to further develop renewable energy in the field conditions. Throughout the year, the participants of the previous expedition expressed opinions about the need to continue this format of work. In this regard, at the end of this September, the Qazaq Green Expedition – 2023 was organized.

QAZAQ GREEN

EXPEDITION

Aidar Zholshorinov,
Deputy Director for development and commerce, CATEC Green Energy LLP

The route of this year's expedition was changed due to seasonality and a gradual decrease in air temperature, especially at night, and included a visit to the wind farm in the Arshaly district of Akmola region and basing at the KEGOC training center in Burabay district.

CATEC GREEN ENERGY WIND POWER PLANT

The expedition began with a visit to Astana EXPO-2017 Wind Farm (the Project) of CATEC Green Energy LLP (the Company). The installed capacity of the wind farm is 100 MW, the Arshaly district of Akmola region was chosen as the best placement option in terms of resource potential.

The construction of the wind power plant was carried out by two launch complexes of 50 MW each. The first launch complex was successfully commissioned on August 26, 2019, the implementation of the 2nd launch complex was completed on November 26, 2020. To select the layout of wind turbines, the company analyzed data on the wind potential at the site of the wind power plant from 2011. In addition, its own meteorological tower was installed, through which more than 7 million wind measurements were carried out.

As part of the Project, the Company has installed 29 wind turbines manufactured by Vestas, one of the world leaders in the production of wind turbines with advanced technologies. The equipment used is designed to operate in extremely low temperature conditions.

It should be noted that the wind turbines have overcome a rather long supply route – more than six thousand kilometers by sea and land from the ports of Italy, Spain, Denmark.

The maintenance of main equipment is carried out under the contract with a subsidiary of the manufacturer of wind turbines, Vestas Kazakhstan LLP, which has specially trained personnel at the equipment plant.

In addition, during the implementation of the Project, the Company carried out the construction of such facilities as a 220,000 volt overhead power line with a total length of about 16 kilometers, a 220/35/10 kV booster substation with two 80,000 kVA power transformers, 35 kV cable lines with a total length of about 90 kilometers, general plant facilities, such as garage, storage facilities etc, as well as almost 25 kilometers of highways.

The Project's annual electricity generation is sufficient to cover the needs of 80,000 residential apartments, while the reduced greenhouse gas emissions are equivalent to the annual emissions of 113,000 cars.

QAZAQ GREEN EXPEDITION – DISCUSSION PLATFORM ON RES

After visiting the CATEC Green Energy wind farm, the expedition continued its route to the Burabai National Park, where discussions on topical issues of renewable energy development were organized for two days at the KEGOC training center.

As part of the first discussion, "New problems for RES with the introduction of BEM based on the experience of renewable energy power plants from July 01, 2023. Solutions" the participants noted a number of problematic issues. In particular, the lack of coefficients for calculations to RES tariff for positive and negative imbalances for projects launched from July 1, 2023, which creates uncertainty for investors in preparation for auctions in this November. In addition, there is no normatively fixed norm for the potential range of deviations. To determine these parameters, the participants requested FSE of RE LLP to provide information on statistics on deviations of renewable energy facilities within the framework of BEM and, following the results, discuss acceptable coefficients and ranges of deviations for new renewable energy projects.

In particular, the lack of coefficients for calculations to RES tariff for positive and negative imbalances for projects launched from July 1, 2023, which creates uncertainty for investors in preparation for auctions in this November.

As part of the discussion "Development of the market of bilateral RES contracts (corporate PPA) in new realities", the expedition participants noted that there were no Rules that would regulate the relationship between the renewable energy generating facilities, the consumer and the Single buyer. In addition, the issue of the requirements of the system operator JSC "KEGOC" on the availability of regulatory capacities for projects under bilateral contracts was also discussed.

In particular, representatives of the system operator noted that according to the approved Forecast balance of electric energy and capacity for 2023-2029, the deficit of regulating capacity is projected at the level of 1364 MW by 2025. Already today, the power system is operating in a monthly deficit mode, which necessitates the introduction of consumer restrictions.

As part of the discussion of the prospects for the development of renewable energy, the expedition participants discussed the Strategy for Development of the Electric power industry in 2035 developed and implemented at the initiative of the business community of the electric power industry by order of the Kazakhstan Electric Power Association. The strategy should not only show the key milestones in the development of generation and consumption of electric energy, but also give an economic assessment of further development of the industry, taking into account the interests of the state, business and the population and the impact on tariffs for end consumers. It is planned that the work will be completed by the end of this year.

RES SCHOOL "QAZAQ GREEN"

In parallel with the work of the expedition, the

3rd cohort of RES School Qazaq Green was trained at the KEGOC training center. This time, representatives of the private sector, the oil and gas sector, experts from consulting companies attended the RES school. The uniqueness of this cohort of RES School is that students could visit an existing renewable energy facility, as well as communicate with representatives of the renewable energy sector – investors, developers, equipment suppliers, representatives of government agencies regulating the development of the sector.

During the training, unique knowledge was obtained from industry experts in the field of legislative regulation of the renewable energy sector, topical issues of integration of the renewable energy sector into the National Energy System of the Republic of Kazakhstan, principles of operation of solar plants and wind turbines, economic indicators of the implementation of RES projects, ESG-colitics.

RES School "Qazaq Green" performs an important function by conveying qualified knowledge from expert practitioners to all those interested in the development of renewable energy. It is gratifying that the main students are representatives of private companies that plan to introduce renewable energy technologies for their own needs. We are confident that this will make an important contribution to the decarbonization of our country's economy," - said Ainur Sospanova, Chairperson of the Management Board of Renewable Energy Association "Qazaq Green".


QAZAQ GRE

EXPEDITION ☆ EXPEDITION
QAZAQ GREEN ☆ QAZAQ GREEN
QAZAQ GREEN

HYDROGEN DIPLOMACY: POLITICS, SCIENCE AND INDUSTRY

The importance of "green" hydrogen as a sustainable and universal energy carrier has received significant recognition both nationally and internationally. Many countries are considering the possibility of using "green" hydrogen to solve the problems of climate change, ensure economic security and economic growth. In this context, Germany has become a leading global player in promotion of hydrogen technologies and creation of sustainable hydrogen industry.

In order to study the best practices in the development and implementation of hydrogen policy, the German Society for International Cooperation (GIZ) organized a trip for the Kazakh delegation on October 16-20 within the framework of the Hydrogen Diplomacy Office, which was opened last year in Astana. During the trip, participants were provided with an overview of the adopted Hydrogen Strategy, existing technologies and infrastructure.

HYDROGEN POLICY: DECISIONS WERE MADE – GOALS WERE SET

The Kazakh delegation headed by the Chairman of the Committee on Ecology and Natural Resources of Mazhilis of the Parliament of the Republic of Kazakhstan Zhanbyrshin Ye.T. during a working trip on hydrogen diplomacy to Berlin (Germany), on October 16, 2023, met with the Director General for Climate Diplomacy, Economic Issues and Technologies in the Federal Ministry of Foreign Affairs of Germany Oliver Rentschler and representatives of the German Energy Agency (dena).

The Kazakh delegation included representatives of interested state bodies, departments, industry experts and the private sector of Kazakhstan. The Ministry of Energy of the Republic of Kazakhstan was represented by Vice Minister of Energy Nurmaganbetov Zh.D.

The German side presented the updated national hydrogen strategy and its role in the energy transition of Germany. During the discussion, the parties discussed the prospects of Kazakh-German cooperation on green hydrogen and decarbonization. At the same time, the parties noted the current geopolitical risks, challenges associated with the transportation and storage of hydrogen, as well as the need to create a new infrastructure and form a global hydrogen market.

Timur Shalabayev,
Executive Director
RES Association "Qazaq Green"

The energy crisis in Germany prompted the political forces of the country to reconsider National Hydrogen Strategy adopted in 2020. The new document aims at the growth of the hydrogen market through concrete and enhanced measures that will contribute to the transformation of Germany into a climate-neutral economy by 2045.

It is assumed that in the country, the installed capacity of the electrolyzers will be 10 GW by 2030, which will make Germany a leading supplier of hydrogen technologies. In addition, about one third of hydrogen will be produced in the country, while about 50-70% of the total demand for hydrogen in the country is planned to be imported, i.e. about 45-90 TW of hydrogen. To this end, the efforts of the German Government are aimed at discussing with partners in various regions of the world the issue of starting hydrogen production and further imports to Germany. The government also wants to build 1,800 kilometers of repaired and new pipelines for the "hydrogen start-up network" in Germany as early as 2027/2028.

In continuation of the political dialogue between Kazakhstan and Germany, on October 18, 2023 in Brussels (Belgium), the Kazakh delegation met with the Directors of the Departments of the European Commission for Energy DP ENER Cristina Lobillo Borrero and International Cooperation DP INTPA Peteris Ustubs.

During the meeting, the parties discussed the EU-Kazakhstan energy partnership, prospects for green hydrogen, Kazakhstan's plans for the modernization of power grids, as well as further cooperation on implementation of the EU-Kazakhstan Strategic Partnership Roadmap on Sustainable Raw Materials, batteries and Renewable Hydrogen Value Chains for 2023-2024.

Following the discussion, the European Commission expressed its intention to support Kazakhstan in the exchange of standards, best practices and other documents to improve the regulatory framework for hydrogen in Kazakhstan.

HYDROGEN TECHNOLOGIES AND SCIENCE: "PURE" CHEMISTRY AND NO "SPACE"

As part of the trip, the Kazakh delegation visited a number of research laboratories where projects implemented to develop technologies for the production and use of hydrogen.

Thus, on October 17, 2023, the delegation met with professors of the North German NRL laboratory. The North German Laboratory (Norddeutsche Reallabor) NRL is an innovative project aimed at exploring new ways to achieve climate neutrality. To this end, industrial and residential premises with particularly high energy consumption are gradually being defossilized and converted to renewable energy sources, especially in industry, as well as in the heat supply and transport sectors.

Professor Hans Schafers noted the importance of the development of hydrogen as an energy carrier in Germany: "At the moment, there are often surpluses of electricity. Storage systems are required. Large gas storage facilities underground. If there is a surplus, we convert electricity to hydrogen, then we convert it to gas and accumulate it in gas storage facilities."

The renewable energy capacity is 150 GW of electricity from wind and solar. The maximum electricity demand in Germany is 80 GW. In order to make Germany climate neutral, we need much more renewable energy capacity. In particular, it will be necessary to increase electricity production from RES by 3 times to 450 GW, which is a big challenge for power grids.

In this regard, according to NRL experts, battery solutions are used only for short-term stabilization in networks, mainly at the household and transport levels. Hydrogen is needed for longer-term energy storage. Germany does not plan to use hydrogen for heating buildings, it is planned to use heat pumps for this. Hydrogen will be used in industrial systems where high temperatures are needed.

The North German laboratory is backed by more than 50 business, scientific and public sector partners from the following regions: Hamburg and Schleswig-Holstein, West Mecklenburg–Vorpommern and Bremerhaven. The laboratories operate eight electrolyzers with a hydrogen production capacity of more than 40 MW. They are used to replace fossil fuels in industrial processes with hydrogen or its derivatives. In addition, several projects are being implemented in the laboratory that allow the utilization of waste heat in the amount of 700 GWh per year. In the transport sector, several hydrogen fueling stations and fuel cell vehicles are being tested under various use scenarios.

The purpose of the laboratory is to test the way of transformation of the integrated energy system, which will reduce CO_2 emissions in the north of Germany by 75% by 2035. Pilot projects planned for this period can reduce CO_2 emissions from 350 thousand to 500 thousand tons per year. The large-scale approach gives the project the role of supra-regional model for integration of hydrogen sectors in Germany and Europe.

At the moment, work is underway to connect different sectors: electric power, thermal power, industry and transport. We are talking about a complete systemic transformation of the energy sector through the development of hydrogen energy to achieve the goal of carbon neutrality. To do this, 9 working groups have been formed at the laboratory: 4 of them work with potential consumers and 5 on systemic issues.

On October 20, the Kazakh delegation met with representatives of Karlsruhe Institute of Technology (KIT). At KIT, the H2 group of the Institute of Thermal Energy Technologies and Safety (ITES) operates, which is responsible for development of research and projects related to the potential benefits of hydrogen in energy technologies and industrial areas. The range of these projects extends from experiments concerning fundamental phenomena

to applied safety assessment of hydrogen and hybrid mixtures. Areas of research include: methods for assessing the risks of hydrogen, "flame acceleration" and "combustion with detonation", alkaline electrolysis under high pressure, the use of hydrogen in the transport sector.

At the Institute, power to liquid and power to gas electrolysis plants operate at experimental sites. The Institute has developed a reactor that allows the electrolysis of CO_2 and water from carbon dioxide to separate them into carbon monoxide and hydrogen and produce synthetic fuel and paraffin.

The Institute has been participating in the Copernicus project since 2016, within the framework of which, at the first stage, work was carried out on the study of Power2X hydrogen production technologies, at the second stage, the developed technologies were scaled. Now the task is to design a 1 MW plant.

Following the meetings at the institutes, the participants concluded that Germany has been conducting the necessary research on hydrogen for a long time and today all the necessary technologies have been developed and are in scaling mode. In the near future, we can expect their commercialization and implementation on the industrial sites of the country.

DEMAND FOR HYDROGEN: TRANSFORMATION OF INDUSTRY

The main consumers of hydrogen in the future will be the industrial sector and transport. And if today cars run on hydrogen in European cities, then the issue of industrial transformation may take a longer time. However, the German industry is already preparing for the transition to hydrogen. An example of this is the transformation of the river port of Duisburg, which was visited by the Kazakh delegation.

The port of Duisburg has existed since 1926 . This is a state-owned company. 2/3 is owned by North Rhine Westphalia and 1/3 belongs to the city of Duisburg. The port is an inland port on the Rhine River – one of the most modern container ports in the world.

Traditionally, the Ruhr region specialized in traditional energy sources: coal and steel enterprises were located here. The port was used as a transshipment base for coal supplies. At the same time, the region is undergoing a stage of economic and energy transformation. In 2018, the last coal mine was closed.

The main consumers of hydrogen in the future will be the industrial sector and transport.

Today, the port management is working on forecasting energy consumption in the future. Even now there is an opinion that a lot of such energy will be required. However, it is difficult to make a prediction about what kind of energy mix it will be.

At the meeting, Johannes Eng, Responsible for Corporate Development and Strategy of duisport-Duisburger hafen AG, noted: "We are already considering hydrogen, ammonia, methanol. Today we understand that it will be the import of energy carriers.

The port is already considering the issue of transporting new types of energy to end users to provide the entire region. Supply flows are changing today, but so are the energy carriers themselves. The port is connected to western ports: Amsterdam, Rotterdam, Antwerp. Therefore, various types of transportation are being worked out today: (pipelines, railways, river transport, trucks)."

Since the port is neither an energy producer nor a trader, but a logistics company, the port of Duisburg is interested in energy storage and, in particular, hydrogen, energy distribution, energy utilization (electricity, transport, industry).

The port is working to create the necessary hydrogen infrastructure for the market. For example, coal is now stored in large quantities in the port, but the port is being transformed due to decarbonization. An electrolysis plant is currently being designed jointly with Lhyfe on the site of coal storage sites. It is also taken into account that the current grid infrastructure has limited electricity conductivity. Therefore, we are now thinking about how to supply energy to the regions of the country. To unload highways, it is planned to organize delivery by rail, and then by river transport in all regions. There will not be a single diesel-powered vehicle in the port, all the equipment in the port will be electrified. A hydrogen refueling station is also being designed in the port. To supply electricity, a solar station will be located in the port, and fuel cells and a block thermal power plant on hydrogen will provide electricity at night and during peak loads. The commissioning of the new port is scheduled for mid-2024.

A terminal will also be built for the transportation of hydrogen, ammonia, liquid organic components of hydrogen by river transport. Already today there are technologies for transporting hydrogen by containers, but it is difficult. It is also impossible to transport hydrogen in its pure form (it needs to be cooled). Therefore, a separate hydrogen storage site is being built. Including for transportation by means of ammonia or methanol.

A hydrogen training center (physics, chemistry, mechanical engineering) is also being built on the basis of the port to train specialists specifically in hydrogen for the needs of the port and the region. The port management has already submitted an application to the Government for funding.

INSTEAD OF A CONCLUSION

Based on the results of the trip and the study of the German experience in the development of the hydrogen economy, several conclusions can be drawn. Firstly, Germany and the European Union consider hydrogen as an energy carrier that allows storing and transporting energy in the long term. Hydrogen will be used as a substitute for gas at industrial and transport facilities. The energy crisis in Europe and the search for new energy sources for further economic growth became the driver for the rapid development of the hydrogen theme. In this regard, all the necessary political decisions have already been made both in Germany and in the EU, work is being completed at universities to develop the necessary technologies, the industry is preparing for the introduction, transportation, storage of hydrogen.

Secondly, our country needs to develop a vision for participation in the global hydrogen economy right now. In this regard, it is necessary to develop a separate document in the state planning system.

Thirdly, the hydrogen economy considers various issues that require an intersectoral and interdepartmental approach in the development of hydrogen policy. There are issues of organization of production, transportation, export/import of hydrogen, training and research, issues of availability of water resources, environmental impact. At the moment, there

is issue of creating a production of "green" hydrogen in the country (the Hyrasia One project of SVEVIND in the Mangystau region). This is more a question of creating a chemical industry, which is associated with the second no less important question – will industrial enterprises of Kazakhstan switch to "green" hydrogen as a source of clean energy in the future? And if so, to what extent and in what time frame will our country need hydrogen for the domestic consumption market? Based on the understanding of the answers to these questions, an appropriate strategy should be built for the export (if there is production in the Republic of Kazakhstan) or import of hydrogen. The issue of energy utilization of hydrogen, namely the production of electric or thermal energy to supply the power system of the Republic of Kazakhstan, is already 4-5 order issues that are not yet even in advanced Germany: RES will be developed for electricity generation, and heat pumps will be introduced on a large scale throughout the country for thermal energy. In this regard, it seems that the strategy for the development of the hydrogen topic in Kazakhstan should be developed by the authorized body in the field of industrial policy with the involvement of various state bodies, and the work on such a document is probably within the power of an interdepartmental working group headed by a representative of the leadership of the government of the country.

A terminal will also be built for the transportation of hydrogen, ammonia, liquid organic components of hydrogen by river transport. Already today there are technologies for transporting hydrogen by containers, but it is difficult.

The development of the hydrogen economy is a complete transformation of the most diverse fields of activity. It seems that there is a consensus in the world that hydrogen will become an energy carrier in the not so distant future. Should we produce hydrogen? Do we have enough water and energy resources? Will we export or import hydrogen? These are the questions that need to be answered right now. One thing is for sure – the hydrogen future is inevitable, and our country must decide what role it will play in it.

S&P Global
Commodity Insights

AMBITIOUS LARGE “GREEN” HYDROGEN ENERGY PROJECT ANNOUNCED FOR WESTERN KAZAKHSTAN

Key implications

A European wind energy project developer, Svevind Energy Group, and the Kazakh government signed an investment agreement in late October 2022. This agreement, signed in the presence of the President of the Republic of Kazakhstan and the President of the European Council, envisions development of one the world's largest hydrogen energy production projects. Hyrasia One, a Kazakhstan-based Svevind subsidiary, is responsible for the project.

- Despite being located in Mangystau Oblast in western Kazakhstan, a hydrocarbon-producing area, the project will use electricity generated by solar panels and wind turbines to produce "green" hydrogen from water electrolysis. It aims to start production by 2030 and produce 2 million metric tons per year (MMt/y) of hydrogen from 2032.
- This would make the project one of the largest in the world, with an estimated capital expenditure of $40– 50 billion.
- Given the difficulties and costs of transporting hydrogen from such an inland location, considered together with other aspects of the project's parameters and configuration, it seems unlikely that the project can be realized, particularly in the time frame envisioned.

INVESTMENT AGREEMENT SIGNED FOR MASSIVE "GREEN" ENERGY PROJECT IN WESTERN KAZAKHSTAN

The Kazakh government recently signed an investment agreement with European renewable energy group Svevind for the construction of a hydrogen production project that would rank as one of the world's five largest. To be located in Mangystau Oblast (a province in western Kazakhstan), the signing took place on

27 October in the Kazakh capital of Astana in the presence of President Kassym-Jomart Tokayev and the President of the European Council, Charles Michel.[1]

Mangystau Oblast currently is one of Kazakhstan's main hydrocarbon-producing areas (accounting for 20% of national oil production and 5% of national gas production), so the launch of this project could turn western Kazakhstan into a leading source of "clean" energy as well.

Svevind Energy Group has been developing and realizing large-scale onshore wind power projects in Germany, Sweden, and Finland since 1998. It is currently building Europe's largest onshore wind farm in its native Sweden, aimed at generating 8–12 TWh annually (or 8% of national electricity consumption) when completed, known as the "Markbygden 1101" cluster of wind farms, west of the city of Piteå in northern Sweden. The project surpassed 1,000 MW of operational wind turbines in 2021, with an additional 1,500 MW of wind turbines under construction.

According to Wolfgang Kropp, Svevind's chief executive, Kazakhstan is well suited to become a "green" hydrogen producer given its abundance of sun and wind, as well as the local skills base derived from its long association with hydrocarbon production. In addition to wind conditions being relatively stable and strong, Mangystau's arid steppe lands are sparsely populated, offering ample space for wind and solar development. In executing the project, Svevind plans to provide only the initial financing while it seeks to attract long-term investors into the project to finance the estimated capital cost of $40–50 billion.[2] A final investment decision for the project is slated for 2026.

The project will create 3,500 jobs during construction and 1,800 permanent jobs, the Kazakhstan president's office said. These would undoubtedly be welcome in an area that has long been a hotbed of social and economic disaffection.[3]

PLANNED PRODUCTION FACILITIES

The project will use wind and photovoltaic generation with a total capacity of up to 40 GW, generating approximately 120 billion kWh of renewable electricity annually.[4] In comparison, total electricity generation in Kazakhstan in 2021 was 114.8 billion kWh from 23.6 GW of installed generating capacity. The electricity will supply an industrial park with a capacity of 20 GW of hydrogen electrolysis, located near the Kuryk port on the Caspian Sea coast (see Figure 1). While the electrolyzers themselves have a relatively small land requirement, significant areas of land are required for the supporting renewables generating installations.

Hyrasia One's project incorporates a number of features emerging globally that are aimed at reducing costs and improving efficiencies. One of these is an emerging focus on creating large-scale regional hydrogen hubs to achieve economies of scale. Another is the need to achieve high electrolyzer utilization rates through development of a wind and solar hybrid supply structure (as opposed to standalone assets), as this extends the period when electricity generation is available; this is a crucial factor in driving down green hydrogen production costs.[5]

Although this project is essentially autonomous is terms of its power supply, grid connections for these types of projects can nonetheless remain a key factor for green hydrogen project economics.

---

[1] This is actually the second agreement to be signed on this project. In July 2021, Svevind Energy GmbH—a privately owned group of renewable energy companies based in Germany and Sweden—announced the signing of an initial memorandum of understanding (MOU) with the akimat (provincial administration) of Mangystau Oblast together with state-owned Kazakh Invest National Company to construct 30 GW of wind and solar power generation capacity in Mangystau Oblast, to be used to power electrolyzers to produce "green" hydrogen for domestic use or export; see KazEnergy, The National Energy Report 2021, p. 52. Svevind Group CEO Wolfgang Kropp and President Tokayev also met in September 2021.

[2] The investment agreement signed in October 2022, which allocates land and establishes certain project rights and access provisions, supposedly clears the way for Hyrasia One to move ahead with negotiations with potential coinvestors, customers, and equipment suppliers. The concept design study for the project was successfully completed in the summer of 2022. An important observation is that the new design apparently is slightly downgraded from initial plans. In an August 2021 presentation to the government, Svevind proposed over 45 GW of renewables generating capacity to produce over 3 MMt/y of hydrogen.

[3] See the IHS Markit Insight Demonstrations sparked by refined product price increases break out in Kazakhstan.

[4] The mix of generating capacity is not specified, but this represents a very ambitious capacity utilization factor for renewables of about 34%; typically, onshore wind averages about 25% and solar only about 13%.

[5] See the IHS Markit Strategic Report Global green hydrogen ambitions drive $418 billion in wind and solar PV investment by 2030.

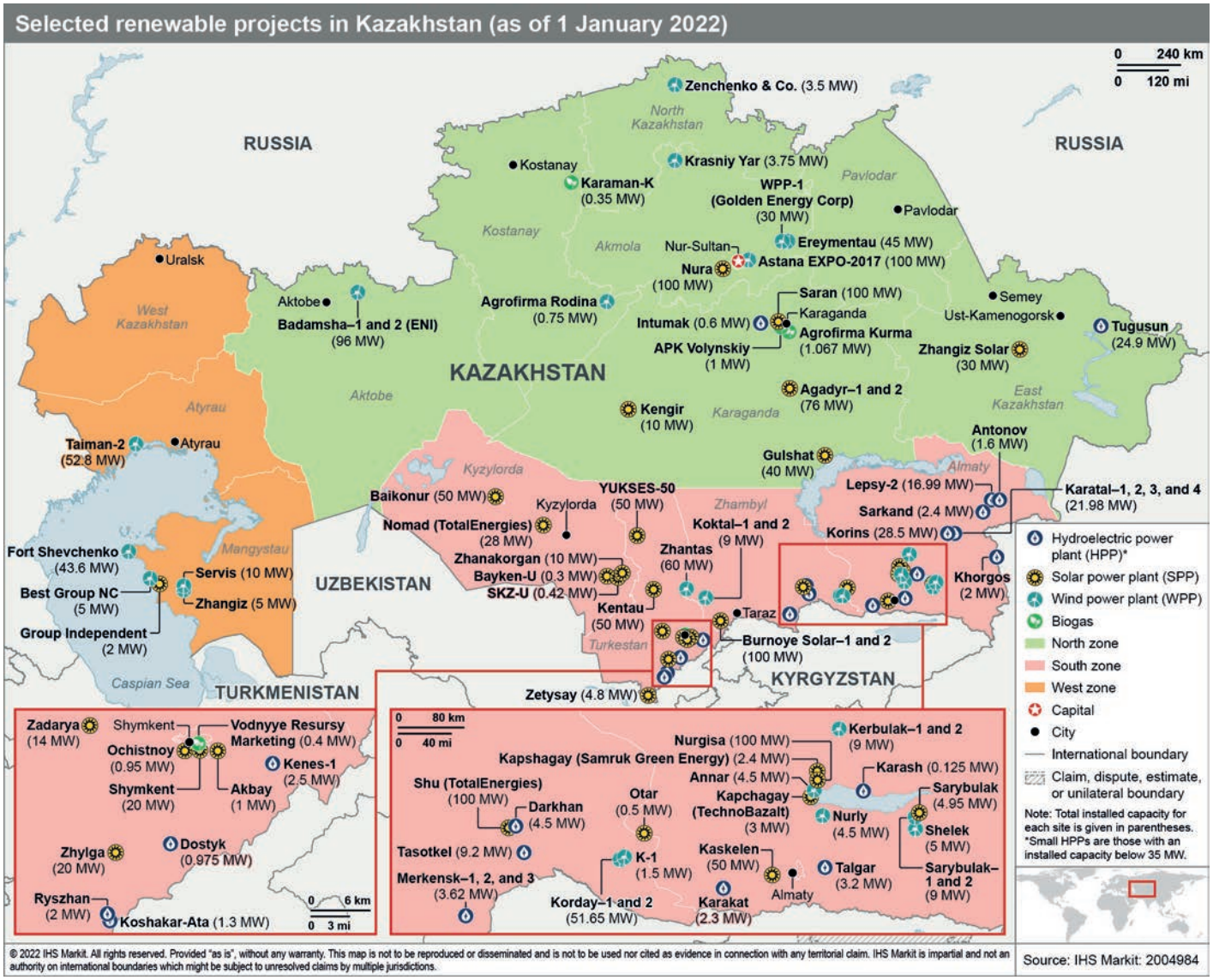


Figure 1 *Source: IHS Markit:*

The reason is that oversizing of renewal capacity (vis-a-vis hydrogen electrolysis) is a typical feature, to drive high electrolyzer utilization rates. But with oversizing, hydrogen projects then often have surplus electricity available for export into the grid at certain periods. This serves as an important additional revenue stream. This aspect is not crucial, but it is important to note that Kazakhstan's western zone grid is known to not be particularly strong. It does have a large share of Kazakhstan's gas-fired generating capacity, but is considered to have only limited ability to support additional renewable projects; Kazakhstan's western zone has the lowest penetration of renewable capacity.[6]

The Caspian Sea will be the source of water for hydrogen electrolysis, following desalinization. The project is said to include the construction and operation of a desalination plant with a capacity of 255,000 m^3 of seawater per day (93.075 million m^3 per year). But questions surrounding water availability are of paramount importance to Kazakhstan, and the project, and could very well emerge as one of the major obstacles preventingproject execution.

[6] *See the IHS Markit Insight Renewable power developments in Kazakhstan: Two steps forward, one step back?*

Freshwater availability has long been a major problem in Mangystau Oblast. Besides several local desalination plants (e.g., in Aktau, Kalamkas), one of its key sources of fresh water is water piped all the way from the Volga River delta in Russia, a distance of nearly 2,000 km.[7] Reflecting its economic and social importance, the pipeline has been the target of an ongoing refurbishment and modernization program in the last few years (ordered by Kazakhstan's president) to increase its throughput capacity to over 30 million m^3 per year. In 2023, for example, authorities intend to augment fresh water supply with completion of a 18 km water pipeline and water pumping station, financed by a 2.12 billion tenge ($4.7 million) investment by Freedom Holding Corp[8] Despite this, authorities in Mangystau Oblast still anticipate the region's water deficit will reach 110,000 m^3 per day by 2025.

Assuming Svevind's project will consume about 10 kg of purified water per 1 kg of hydrogen produced (and typical ratios of purified water from ordinary fresh water, and ordinary fresh water from seawater), the project would consume something like 132,000 m^3 of saline feedwater annually.[9] Hyrasia One itself has not specified how much water it would need, but it promised to keep "water withdrawal as low as possible" so the sea could be "used sustainably to protect the environment".

More broadly, it is important to note the general problem of water availability looms large in Kazakhstan. Water supply is increasingly precarious. Although Hyrasia One's water needs appear modest,

The Caspian Sea will be the source of water for hydrogen electrolysis, following desalinization

[7] *The main Astrakhan-Mangyshlak trunk line is 1,945 km in length, extending from an inlet on the Kigach River on Russian territory to Aktau and Kalamkas in Mangystau Oblast. It functions as part of a larger water pipeline system of 2,148 km in length, operated by a subsidiary of Kaztransoil (KTO), Kazakhstan's national oil pipeline company, Magistralny Vodovod (Trunk Water Pipelines). In 2021 the company pumped 21.361 million m3 of water.*

[8] *"Group of companies Freedom will help solve the freshwater deficit problem in Mangystau Oblast, inAktau.kz, 28 October 2022, https://www.inaktau.kz/ news/3487256/gruppa-kompanij-freedom-pomozet-resit-problemu-s-deficitom-presnoj-vody-v-mangistauskoj-oblasti. Retrieved 5 November 2022.*

[9] *See the IHS Markit Strategic Report Water requirements for hydrogen by electrolysis: Not a deal breaker.*

it still will have to compete with those of other producers, farmers, and consumers in Mangystau. Caspian Sea water already poses challenges to upstream producers (for waterflood injection and other enhanced recovery techniques) in western Kazakhstan in recent years because of high salt content, particularly as water levels in the Caspian Sea have fallen, reaching historically low levels in recent years. In June 2022, Kazakhstan's Minister of Ecology, Geology and Subsoil Resources Serikkali Brekeshev warned that the combination of rising water consumption and decreasing inflows from surrounding countries could drive Kazakhstan's annual water deficit to as much as 23,200 m^3.[10] The Ministry's prognosis is substantially worse than that of the World Bank, which, according to Senate Deputy Akhylbek Kurishbaev, anticipates Kazakhstan's annual water deficit will amount to 12,000– 15,000 m3 annually by 2030.[11]

[10] *"Perspectives on the development of Kazakhstan's water sector, Ministry of Ecology, Geology and Subsoil Resources, 17 July 2022, https://www.gov.kz/memleket/ entities/ecogeo/press/news/ details/390245?lang=ru. Retrieved 5 November 2022.*

[11] *"Water volume in Kazakhstan will decline in 8 years," Kazinform, 21 April 2022, https:// www.inform.kz/ru/ob-em-vody-v-kazahstane-snizitsya-uzhe-cherez-8- let_a3925352. Retrieved 5 November 2022.*

EXPORTS AND LOGISTICS

Hyrasia One indicates that no final decision has been made on specific markets for the hydrogen and consequently export destinations and routes. Svevind believes the hydrogen can find a ready market in Europe or alternatively can be used within Kazakhstan itself to manufacture "green" steel or aluminium. Clearly though, Europe ranks high on the list of potential markets given ambitious plans for hydrogen development there and the expectation that Europe will account for about 11% of global hydrogen demand by 2030 and 20%

But the problem is that the hydrogen is not a transportable product due to high transportation costs.

7. The main Astrakhan-Mangyshlak trunk line is 1,945 km in length, extending from an inlet on the Kigach River on Russian territory to Aktau and Kalamkas in Mangystau Oblast. It functions as part of a larger water pipeline system of 2,148 km in length, operated by a subsidiary of Kaztransoil (KTO), Kazakhstan's national oil pipeline company, Magistralny Vodovod (Trunk Water Pipelines). In 2021 the company pumped 21.361 million m3 of water.

8. "Group of companies Freedom will help solve the freshwater deficit problem in Mangystau Oblast, inAktau.kz, 28 October 2022, https://www.inaktau.kz/ news/3487256/gruppa-kompanij-freedom-pomozet-resit-problemu-s-deficitom-presnoj-vody-v-mangistauskoj-oblasti. Retrieved 5 November 2022.

9. See the IHS Markit Strategic Report Water requirements for hydrogen by electrolysis: Not a deal breaker.

10."Perspectives on the development of Kazakhstan's water sector, Ministry of Ecology, Geology and Subsoil Resources, 17 July 2022, https://www.gov.kz/memleket/ entities/ecogeo/ press/news/details/390245?lang=ru. Retrieved 5 November 2022.

11. "Water volume in Kazakhstan will decline in 8 years," Kazinform, 21 April 2022, https://www.inform.kz/ru/ob-em-vody-v-kazahstane-snizitsya-uzhe-cherez-8- let_a3925352. Retrieved 5 November 2022.

by 2040; furthermore, a significant share of demand is expected to be met with imports.[12] As noted by Svevind, Hyrasia One could become "a supporting pillar for the hydrogen markets currently emerging in Europe, as well as in Kazakhstan itself and in Asian countries".

While the European Union probably represents an eager market for green hydrogen as it weans itself off Russian gas,[13] unfortunately the most obvious export routes from Kazakhstan to Europe would be via Russia, and exporting hydrogen by pipe all the way across Kazakhstan and Chinese territory to mainland China's coastal demand centers makes little economic sense. Given the ongoing war in Ukraine, transit through Russia would seem to be effectively ruled out for the time being. However, alternative routes are possible across the Caspian and through the South Caucasus, but such routes probably would involve several multimodel transfers and the need for considerable new infrastructure. The situation, though, remains fluid and may be

[12] *See the IHS Markit Report Global Hydrogen Balance: Outlook to 2050, October 2022.*

[13] *See the IHS Markit Insight Russian gas crisis boosts Europe's "Fit for 55" ambition.*

[14] *See the IHS Markit Insight Russia's Inland Waterways Feel Impact from Tax Maneuver with Reduced Refined Product Shipments.*

[15] *Our analysis for Russia-produced hydrogen shows that it is extremely costly for the product to reach global markets. In the case of Europe, for example, our research indicates that it is actually less expensive on a delivered basis to use Russian gas export infrastructure to deliver gas to Europe and reform it there into hydrogen than to transport hydrogen produced within Russia to Europe; see the IHS Markit Strategic Report Russia's national hydrogen strategy: Toward a new energy future?*

entirely different by the time the project actually comes onstream.

Furthermore, importing the necessary equipment for the project will likely be challenging as well with the changed international situation. For example, TCO's FGP upstream expansion project relied in large part on Russia's inland waterway system to import large modular components for the megaproject.[14] This transport option may no longer be available following Russia's invasion of Ukraine, which means the project developer may have to use more costly multimodal options (i.e., transport by rail across Georgia and Azerbaijan, and then by ship or barge across the Caspian Sea to Kazakhstan).

However, the bottom line is that hydrogen is not a very transportable product, owing to the relatively high costs involved for transportation within the overall value chain, and this remains true even if hydrogen is transformed into "green" ammonia for long-distance transportation.[15] Logistically, western Kazakhstan is even more remote from Europe than a Baltic coast manufacturing location in Russia, for example, and lacks direct access to international sea lanes for transport by ship; furthermore, the only existing gas pipelines from the region that could potentially be reconfigured to carry hydrogen cross Russia first. Transport by rail is technically feasible but would be far more expensive than these other options.

POLICY SUPPORT

Another challenge is one that is now dormant: Kazakhstan's ability to provide meaningful policy support. Creating a supportive environment for the development of hydrogen energy is difficult everywhere (e.g., the United States, Australia, Europe). While Kazakh policymakers have repeatedly articulated support for a"green" transition, and President Tokayev issued a 2060 carbon-neutral strategy in the weeks leading up to the November 2021 COP 26 conference in Glasgow, the 2060 low-carbon strategy has yet to be adopted into law. It technically remains a policy document with no legal force. The country's policymakers are also still wrestling with challenges associated with integrating renewables into the overall energy balance and implementing Best Available Techniques (BAT) requirements by 2025 as part of the new Ecology Code. There is no doubt officials are keen to welcome Svevind's investment and expertise, but the ability of institutions to support this forward-looking project with prompt decision making, potential tax concessions, or other practical measures remains to be seen.

AstanaElectroStroyService

AstanaElectroStroyService LLP - Your reliable energy partner

Exists on the market since 2005.
More than 300 satisfied customers.
In August 2010, the "Certificate of conformity of ICO 9001-2009. Quality Management System" was received.

The main mission:

Turnkey design and implementation of the following systems:

· Automated system of commercial electricity metering (ASCEM)
· Telemetry
· Automated System of Technical Accounting of Energy Resources (ASTAER)

Automated system of commercial electricity metering (ASCEM)

Principle of operation of system – collection of data on consumers, both in terms of power and voltage; processing of all received data, on the basis of which a report is compiled; analysis and forecast for the next periods.

Telemetry – development and operation of telemetry systems that provide reception, conversion, transmission over a communication channel, reception, processing and registration of telemetric information about events for remote monitoring of various objects and processes.

✓ Partnership Benefits:

*According to Chapter 1, paragraph 3 of the “Rules of operation of the automated system of commercial electricity metering for subjects of the wholesale electric energy market", the presence of ASCEM at the enterprise is a condition for access to the wholesale energy market of the Republic of Kazakhstan.

*According to Chapter 2, Part 2, paragraph 16, subparagraph 6 of the "Rules for organization and functioning of the wholesale electric energy market", consumers of electric energy, when carrying out activities on the balancing (wholesale) electric energy market, ensure the availability of system for collecting and transmitting telemetric information connected to an authorized dispatch center.

*The ECMAS system allows the consumer to reduce financial costs for electricity by detecting theft of electricity, over-spending and reducing the price of purchasing electricity by entering the balancing (wholesale) market.

The economic effect of the implementation can reach 5-20% per year of total electricity consumption.

Large customers

ASTANA – Regional Electric Grid Company JSC

Ust-Kamenogorsk HPP NPP LLP

Pavlodar-Vodokanal LLP

MUS "Kostanay-Su"

Municipal utilities of Karaganda LLP

Semizbay-U LLP

MUS Semey Vodokanal

Uranenergo LLP

MUS "Kostanay Fuel and Energy Complex"

Kazenergocabel JSC

DEP LLP

Astana, 19/1Turan ave., (BC Edem), 3rd floor, 303 office

Email: aesservicekz@gmail.com
Mob.: +7(701) 554 09 39
www.aesservis.kz

QAZAQ GREEN

II International Business Festival on Renewable Energy Sources

QAZAQ GREEN FEST 2023

Energy security of Kazakhstan: low-carbon transition

QazaqGreenFest 2023

ЖАҢАРТЫЛАТЫН ЭНЕРГЕТИКА БОЙЫНША II ХАЛЫҚАРАЛЫҚ ІСКЕРЛІК ФЕСТИВАЛІ

Location: Rixos Borovoe Hotel
Burabay, Kazakhstan

RIXOS BOROVOE

MYD
PRODUCTION

ADVERTISEMENT LOCATIONS

PREMIUM CLASS

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

Nursultan Nazarbayev International airport JSC

Almaty International Airport JSC

Shymkent International Airport JSC

Turkestan International Airport JSC

Aktau International Airport JSC

Aktobe International Airport JSC

Kokshetau International Airport JSC

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

Atyrau International Airport JSC

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

QAZAQ GREEN Association

PLATFORM FOR NATIONAL AND INTERNATIONAL PLAYERS IN RENEWABLE ENERGY SOURCES

NURLAN KAPENOV
Chairman of the Board of Directors

ISLAMBEK SALZHANOV
Chairman of the Supervisory Board

AINUR SOSPANOVA
Chairperson – Member of the Board of Directors

ORAZ JANDOSOV
Member of the Board

ALEX STILLAVATO
Member of the Board

ANATOLIY SHKARUPA
Independent Director

VALERIY TYUGAY
Member of the Board

MIKHAIL KADYMOV
Member of the Board

ARSENIY KATERUSHA
Independent Director

ASSOCIATION AS INFORMATIONAL RESOURCE

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

ZHOMART MOMINBAYEV
Member of the Board

ARTYOM SLESARENKO
Independent Director

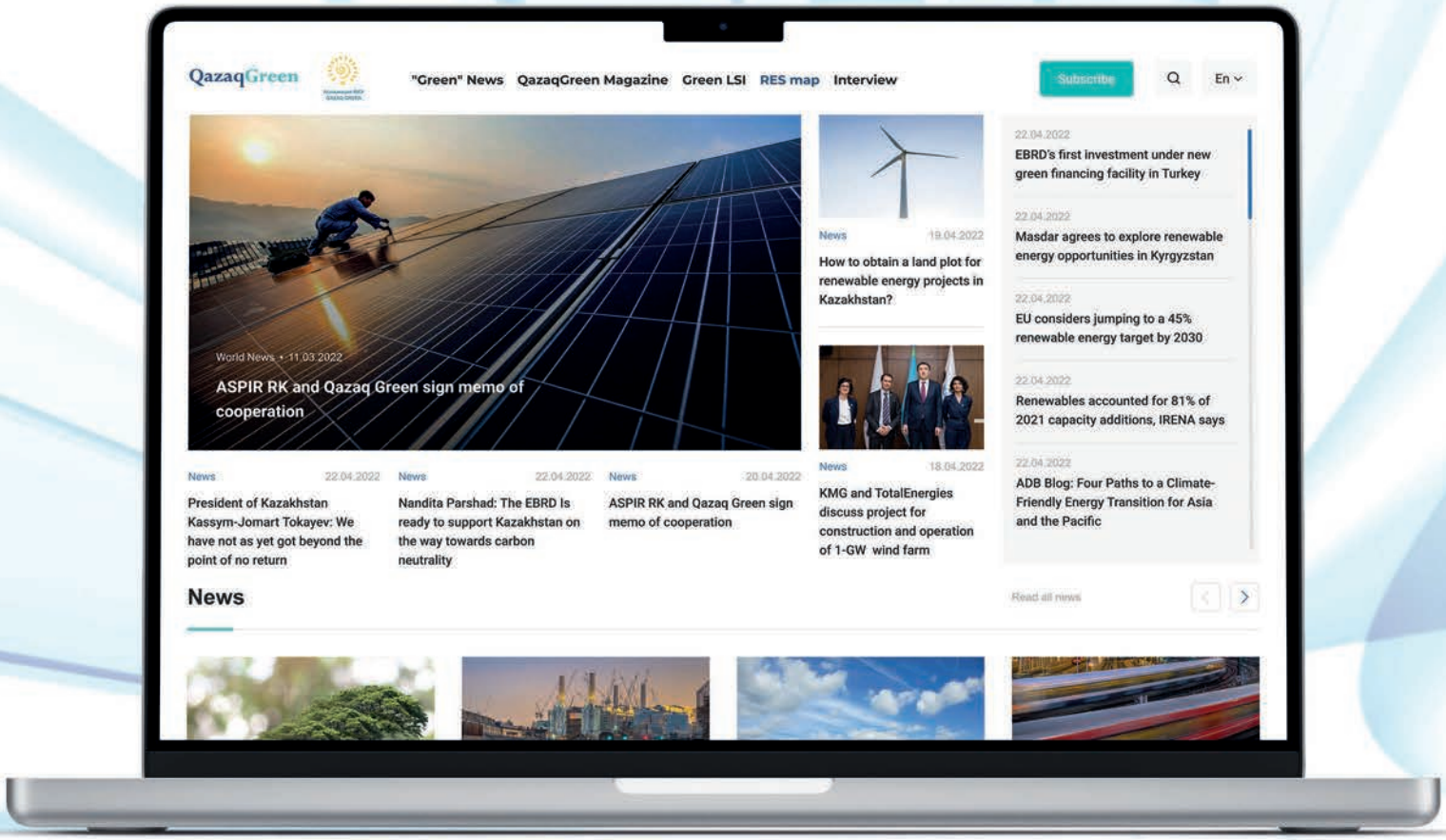
AIDA MAKSUT
Independent Director

TIMUR SHALABAYEV
Executive Director

ZHANAR KUANYSHBEK
Manager

QAZAQ GREEN Association

KONRAD ADENAUER STIFTUNG



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

www.qazaqgreen.com

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

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.

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

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

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

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

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

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

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

www.kas.de

Read all articles of QazaqGreen magazine at
www.qazaqgreen.com