



**ENERGY TRANSITION PROGRAM  
Of  
“Samruk-Energy” JSC  
until 2060  
Public version**

Approved by the resolution of “Samruk-Energy” JSC Board of Directors  
(Minutes No.16/24 dated 18.10.2024)

Astana 2024



## GLOBAL TRENDS IN CLIMATE CHANGE MITIGATION

- Paris Climate Agreement
- Decarbonization goals with varying levels of ambition at the national and corporate levels
- Kazakhstan's commitment to the global methane emissions reduction initiative

## INTERNATIONAL CARBON REGULATION

- EU "Green Deal" and the Carbon Border Adjustment Mechanism (CBAM)
- Kazakhstan's emissions trading system and plans to introduce a carbon tax

## GOALS OF THE REPUBLIC OF KAZAKHSTAN AND THE SHAREHOLDER

- The President of Kazakhstan's address to the people of Kazakhstan on September 1, 2021, regarding the achievement of carbon neutrality by 2060
- Stricter emission requirements effective from July 1, 2021 (Environmental Code of Kazakhstan)
- Strategy for achieving carbon neutrality in Kazakhstan by 2060
- Concept of low-carbon development for "Samruk-Kazyna" JSC until 2060
- Implementation of ESG standards (Development of a unified ESG reporting standard)

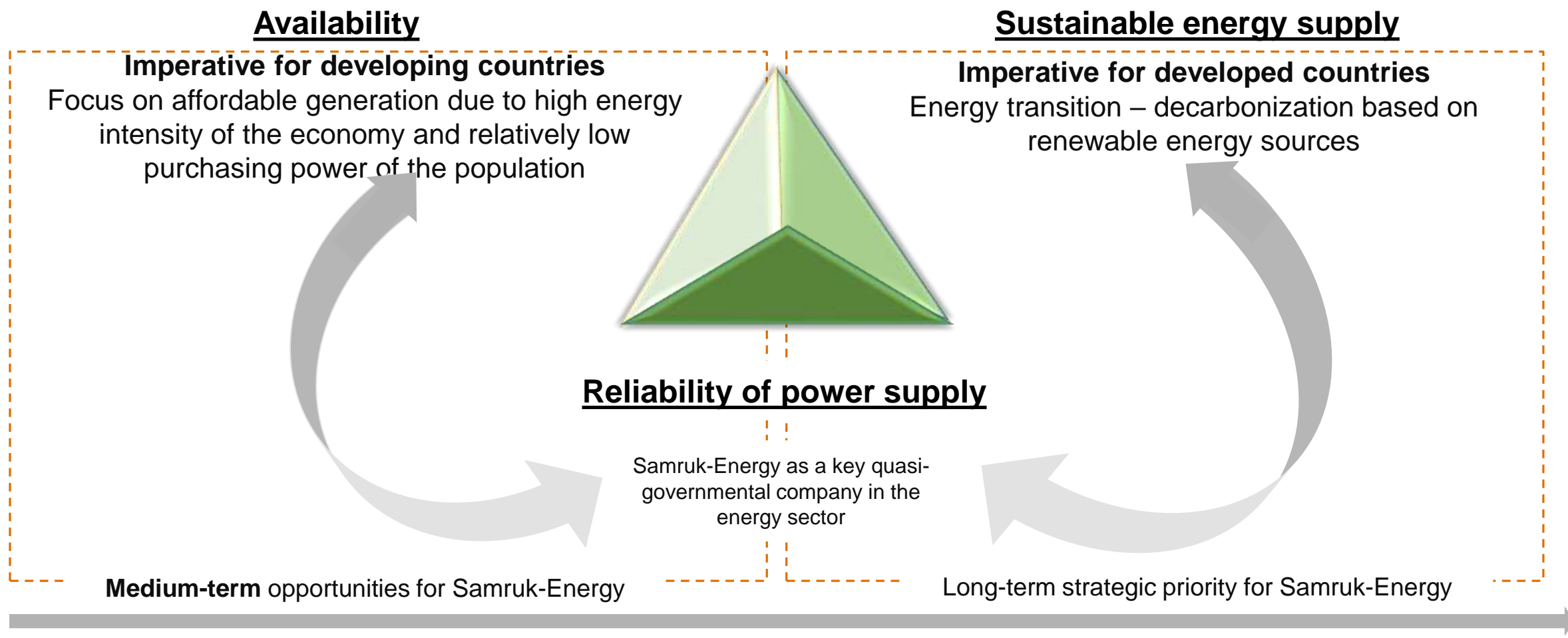
## Influence on "Samruk-Energy" JSC

### Risks and Challenges

- Decreased investment attractiveness
- Decreased export potential
- Reduced long-term sustainability

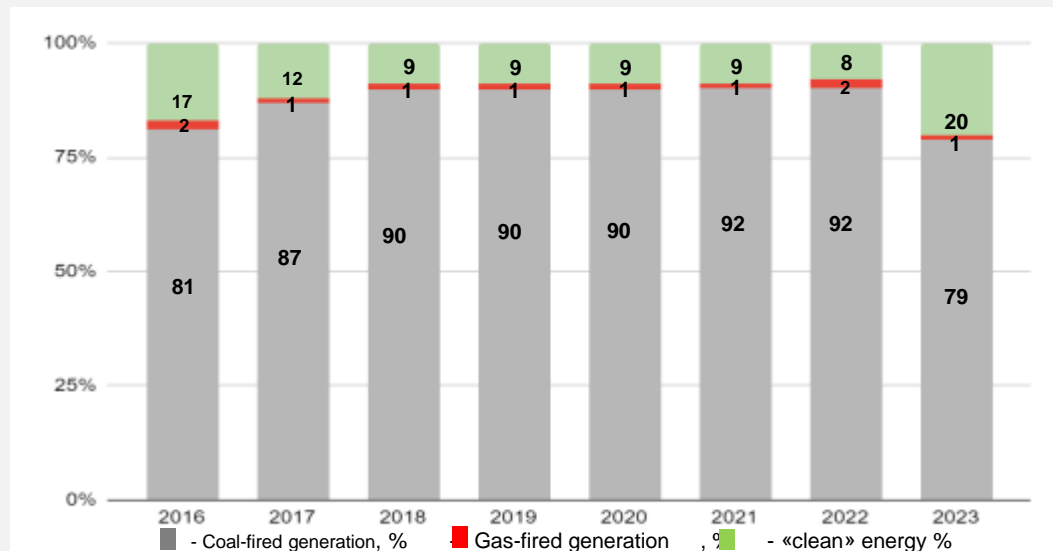
### Opportunities

- Development of new industries
- Creation of new jobs and improvement of workforce skills
- Access to financing and investments
- Technology transfer and knowledge sharing



The principles of sustainable development and efficient resource management define the priorities of the energy transition program

## “Samruk-Energy” JSC energy system’s structure



\* WPP, SPP, HPP (small/large)

- ✓ The country’s energy system is predominantly based on coal generation, accounting for approximately 70% of total production.
- ✓ There is no established system for emissions accounting at the level of individual installations (including Scope 1 and 2).
- ✓ Data collection is manual, with emissions calculated based on standards and coefficients.

## CO2 emissions volume (Scope 1) across “Samruk-Energy” JSC group

Description	Measurement unit	2018	2019	2020	2021	2022	2023
<b>Electricity generation</b>	<b>Mln.kWh</b>	<b>31 703</b>	<b>30 200</b>	<b>31 385</b>	<b>35 609</b>	<b>35 884</b>	<b>40 541</b>
CO <sub>2</sub>	<i>mln.t</i>	33,7	31,5	33,4	32,9	31,9	31,8
<b>Coal mining</b>	<b>mln.t</b>	<b>44,9</b>	<b>44,8</b>	<b>43,3</b>	<b>44,6</b>	<b>42</b>	<b>44</b>
CO <sub>2</sub>	<i>mln.t</i>	4,4	3,9	4,7	0,49	0,51	0,48
<b>Total CO2 emissions</b>	<b>mln.tons</b>	<b>38,1</b>	<b>35,4</b>	<b>38,1</b>	<b>33,4</b>	<b>32,4</b>	<b>32,3</b>

### Emissions sources

- Fuel combustion for electricity and heat generation (boilers).
- Fugitive methane and CO<sub>2</sub> emissions from exposed coal seams, as well as during coal storage, handling, and from spontaneous combustion.
- Consumption of electricity and heat for own needs (~5-6%).



# Energy transition program

**Vision** – *ensuring the country's energy security and promoting an accelerated energy transition, adhering to the principles of sustainable development and effective resource management.*

**Mission** – *A highly efficient innovative leader in the electricity sector, creating a favorable ecosystem for all stakeholders based on the principles of reliable partnership, care for people, and environmental sustainability.*



## Program goals

Reduction of net carbon footprint

## Energy transition program's directions



### Alternative energy

- Wind power and hydropower
- Solar energy
- Geothermal energy
- Hydrogen energy
- International cooperation



### Traditional generation

- Reduction of CO<sub>2</sub> emissions through the gasification of coal-fired thermal power plants



### Grid infrastructure and regulation

- Modernization of grids and introduction of Smart Grid
- Energy storage systems and flexible generation



### Emissions management

- Coal enrichment and gasification
- Carbon capture and storage (CCUS)
- Energy efficiency and resource conservation
- Green transport
- Carbon farms and offsets



### Supporting activities

- Carbon accounting and digitization
- Changes in the regulatory environment
- Green financing
- Compliance with ESG criteria
- Localization of production

# Scenarios for the development of energy transition at "Samruk-Energy" JSC until 2060

## 1. BUSINESS AS USUAL (BAU)

Description	2030	2040	2050	2060
SE market share	64%	63%	59%	55%
Share of clean energy	33%	30%	30%	30%
Share of traditional generation (coal, gas)	67%	70%	70%	70%
Net carbon footprint	<b>+33%</b>	<b>+24%</b>	<b>+25%</b>	<b>+25%</b>

This scenario envisions the further development of all types of power generation, including renewable energy sources (RES), alternative energy, and conventional generation.

## 2. DECARBONIZATION

Description	2030	2040	2050	2060
SE market share	64%	63%	55%	47%
Share of clean energy	33%	30%	34%	37%
Share of traditional generation (coal, gas)	67%	70%	66%	63%
Net carbon footprint	<b>+33%</b>	<b>-22%</b>	<b>-87%</b>	<b>-100%</b>

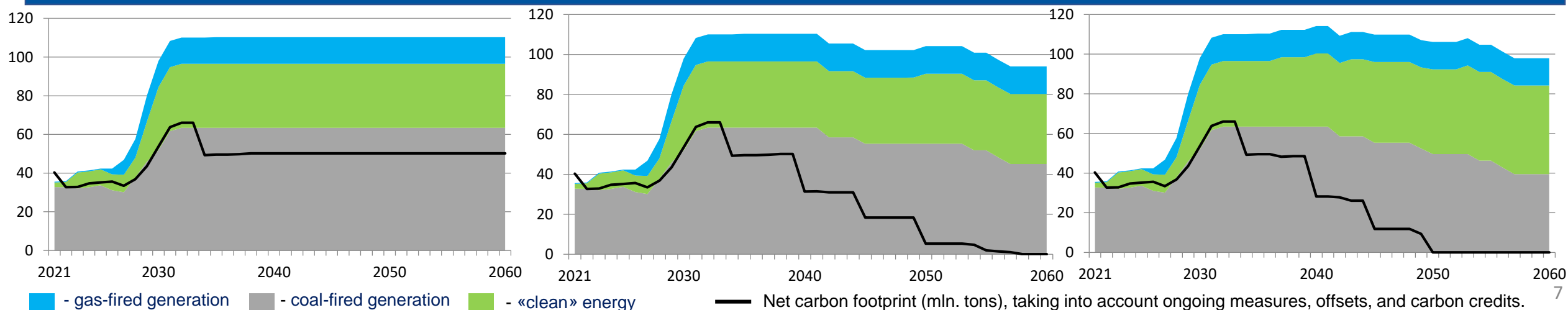
Expansion of renewable energy capacity, implementation of carbon capture, utilization, and storage (CCUS) technologies at coal-fired power plants, execution of offset projects, and the gradual decommissioning of coal-based generation.

## 3. DEEP DECARBONIZATION

Description	2030	2040	2050	2060
SE market share	64%	65%	56%	48%
Share of clean energy	33%	32%	40%	46%
Share of traditional generation (coal, gas)	67%	68%	60%	54%
Net carbon footprint	<b>+33%</b>	<b>-30%</b>	<b>-100%</b>	<b>-100%</b>

The scenario envisions a significant increase in the share of renewable energy within the Company through promising and future projects, as well as the adoption of existing low-carbon technologies.

Dynamics of net carbon footprint reduction by generation types (bn kWh).



# CLIMATE PHYSICAL RISKS (MATERIAL) OF ENERGY TRANSITION PROGRAM IMPLEMENTATION



No	CATEGORIES	DESCRIPTION	ACTIVITIES
<b>1</b>	<b><i>For wind energy:</i></b>		
1.1	Wind speed	<ul style="list-style-type: none"> <li>Low wind speed reduces electricity generation.</li> </ul>	
<b>2</b>	<b><i>For solar energy</i></b>		
2.1	Cloud cover and precipitation	<ul style="list-style-type: none"> <li>Decrease the efficiency of solar panels.</li> </ul>	
<b>3</b>	<b><i>For hydro power</i></b>		
3.1	Precipitations	<ul style="list-style-type: none"> <li>Uneven rainfall leads to fluctuations in reservoir levels, potentially reducing electricity generation.</li> </ul>	<b>Development and implementation of adaptation measures:</b> <ul style="list-style-type: none"> <li>Establishing backup energy sources</li> <li>Modernizing energy equipment</li> <li>Enhancing forecasting and emergency response systems</li> </ul>
3.2	Temperature	<ul style="list-style-type: none"> <li>Low temperatures may freeze water bodies, while high temperatures increase evaporation.</li> </ul>	
3.3	Wind	<ul style="list-style-type: none"> <li>Enhances water evaporation from reservoirs</li> </ul>	
<b>4</b>	<b><i>For traditional energy:</i></b>		
4.1	Temperature	<ul style="list-style-type: none"> <li>High temperatures risk equipment overheating, while low temperatures increase the demand for heat.</li> </ul>	
<b>5</b>	<b><i>For coal mining:</i></b>		
5.1	Temperature	<ul style="list-style-type: none"> <li>Low temperatures may complicate coal extraction and transportation.</li> </ul>	
<b>6</b>	<b><i>For overall energy infrastructure:</i></b>		
6.1	Precipitations	<ul style="list-style-type: none"> <li>May damage power lines, roads, and other infrastructure. Extreme weather events (hurricanes, floods, severe frosts) may damage transmission lines, substations, and other infrastructure elements.</li> </ul>	



# CLIMATE TRANSITION RISKS IN THE IMPLEMENTATION OF ENERGY TRANSITION PROGRAM (1/2)



No	FACTORS	DESCRIPTION	ACTIVITIES
<b>1</b>	<b><i>Political, legal, and regulatory risks:</i></b>		
1.1	Tightening of international climate policies	<ul style="list-style-type: none"> <li>Achieving carbon neutrality before 2050.</li> <li>Strengthening the cross-border carbon regulation mechanism or carbon border tax.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring information (policies, analytics, etc.) on climate change</li> <li>Timely adjustment of the Company's Energy Transition Program</li> </ul>
1.2	Strengthening environmental legislation	<ul style="list-style-type: none"> <li>Increase in emission fees</li> <li>Heightened responsibility for traditional thermal power plants</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of BAT (Best Available Technologies) classified under Category 1</li> </ul>
1.3	Carbon pricing	<ul style="list-style-type: none"> <li>Increase in the cost of carbon credits</li> <li>Growth in operating expenses for carbon-intensive companies</li> </ul>	<ul style="list-style-type: none"> <li>Implementing energy-efficient solutions to reduce dependence on carbon credits</li> </ul>
<b>2</b>	<b><i>Reputational</i></b>	<ul style="list-style-type: none"> <li>Damage to the Company's reputation</li> </ul>	<ul style="list-style-type: none"> <li>Regular disclosure of information about environmental impact and measures to reduce it.</li> </ul>
<b>3</b>	<b><i>Ongoing and prospective investment projects in the framework of the Program implementation</i></b>	<ul style="list-style-type: none"> <li>High project costs;</li> <li>Insufficient own funds to finance projects and limited borrowing capacity;</li> <li>Lack of funding sources;</li> <li>Insufficient study of CCUS technologies and their potential application at the Company's thermal power plants (TPPs);</li> <li>Electricity and capacity tariffs that do not ensure the projects' profitability;</li> <li>Delays in project timelines.</li> </ul>	<ul style="list-style-type: none"> <li>Conducting outreach and awareness activities among the population and stringent oversight during project implementation (technical and safety aspects);</li> <li>Monitoring the execution of activities in accordance with the project timelines;</li> <li>Obtaining individual tariffs for electricity and capacity;</li> <li>Attracting strategic investors for the projects;</li> <li>Comprehensive study of new technologies with the involvement of scientific research institutes and international organizations;</li> <li>Continuous monitoring of project implementation in line with timelines.</li> </ul>
<b>4</b>	<b><i>Technological</i></b>	<ul style="list-style-type: none"> <li>Challenges in data measurement and monitoring</li> <li>Financial losses due to investments in outdated technologies</li> <li>Regulatory changes</li> </ul>	<ul style="list-style-type: none"> <li>ongoing monitoring of technological advancements;</li> <li>development of proprietary solutions in energy efficiency</li> <li>improving energy efficiency in production through energy conservation, energy management, and streamlining industrial processes.</li> </ul>
<b>5</b>	<b><i>Threat to the country's energy security</i></b>	<ul style="list-style-type: none"> <li>Decommissioning of traditional thermal power plants (loss of generating capacity)</li> <li>Divestment of traditional assets</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of renewable energy projects</li> <li>Development of energy storage technologies</li> <li>Construction of coal-fired generation facilities equipped with modern, eco-friendly equipment</li> </ul>

# CLIMATE TRANSITION RISKS IN THE IMPLEMENTATION OF ENERGY TRANSITION PROGRAM (2/2)

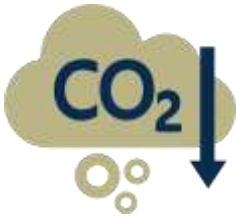


№	FACTORS	DESCRIPTION	ACTIVITIES
6	<b><i>Growth of electricity consumption by 2060</i></b>	<ul style="list-style-type: none"> <li>Increase in energy consumption considering external and internal factors (digital mining, blockchain, population growth in Kazakhstan, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Consideration of the introduction of additional "clean energy" capacities</li> <li>Development of energy conservation and energy efficiency programs</li> </ul>
7	<b><i>Limitation of energy resources</i></b>	<ul style="list-style-type: none"> <li>Limited potential of water resources, wind, gas, geothermal sources, etc., in Kazakhstan.</li> </ul>	<ul style="list-style-type: none"> <li>Development of new technologies in power sector (hydrogen, SPP)</li> </ul>
8	<b><i>Social</i></b>	<ul style="list-style-type: none"> <li>Workforce reduction due to the decommissioning of traditional thermal power plants (industries that are vital to the local economy)</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of new business areas (development of "clean" energy, coal gasification, greening projects) aimed at enhancing social stability in the region.</li> <li>Development of a training/reskilling program for employees within the framework of new promising business areas.</li> </ul>
9	<b><i>Currency</i></b>	<ul style="list-style-type: none"> <li>Change in the exchange rate of the national currency.</li> </ul>	<ul style="list-style-type: none"> <li>Preventing the raising of foreign currency loans that lead to violations of the established foreign exchange policy</li> <li>Timely adjustment of the Energy Transition Program.</li> </ul>

# EXPECTED RESULTS BY 2033 AND BY 2060 (ACCORDING TO DEEP DECARBONIZATION SCENARIO)

by 2033

by 2060



✓ An increase in net carbon footprint by **64%** considering the ongoing measures and offset carbon units.

✓ A reduction in the net carbon footprint by **100%** considering the implemented measures and offset carbon units.



✓ An increase in the volume of clean electricity by approximately **13 times** compared to 2021, from 2.3 bn.kWh to 33.13 bn. kWh.

✓ An increase in the **volume of clean electricity by approximately 18 times** compared to 2021, from 2.3 bn. kWh to 44.6 bn. kWh.



✓ Study and implementation of **Carbon Capture & Storage (CCS)** technologies at the power units of Ekibastuz SDPP (Ekiabstuz coal-fired power plants).



✓ **Afforestation project (Greening of an area of 0 ha)**

✓ **Afforestation project (Greening of an area of 1000 ha)**



✓ On December 15, 2023, an ESG rating of 24.1 points was awarded by the international rating agency Sustainalytics, with expectations for future improvements