“SAMRUK-ENERGY” JSC ENERGY TRANSITION PROGRAM FOR 2022-2060
PUBLIC VERSION

Approved by the resolution of “Samruk-Energy” JSC Board of Directors:

- Program (minutes No. 03/22 dated 01.04.2022)
- Changes to the Program (Minutes No. 13/22 dated 28.10.2022)

Astana 2022

PREREQUISITES FOR THE IMPLEMENTATION OF ENERGY TRANSITION

GLOBAL TRENDS IN COMBATING CLIMATE CHANGE

- Paris Agreement
- Various ambitious decarbonization goals at countries and corporations' level

INTERNATIONAL CARBON REGULATION

- The EU “Green Deal” and carbon border adjustment mechanism(CBAM)
- The RK emissions trading system and plans for introduction of carbon tax

THE RK AND SHAREHOLDER GOALS

- Message of the President of the Republic of Kazakhstan to the people of Kazakhstan dated September 1, 2021 on achieving carbon neutrality **by 2060**
- Emission requirements have been tightened from **July 1, 2021** (Environmental Code of the Republic of Kazakhstan)
- “Samruk-Kazyna” JSC Concept of low carbon development until 2060
- Introduction of ESG standards (Creation of a unified ESG reporting standard)

Impact on “Samruk-Energy” JSC

Risks and challenges

- Decrease of investment potential
- Decrease of export potential
- Decrease of long-term sustainability

Opportunities

- Development of new industries
- Creation of new jobs and staff professional trainings
- Access to finance and investments
- Technology and knowledge transfer

GLOBAL ENERGY TRILEMMA

Economic availability

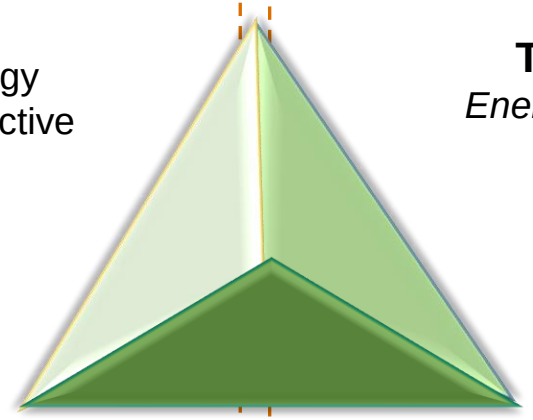
The imperative of emerging markets

Focus on cheap generation caused by high energy intensity of the economy and the relatively low effective demand of the population

Sustainability

The imperative of emerging markets

Energy transition – decarbonization based on RES



Reliability of supply

Smart Grid

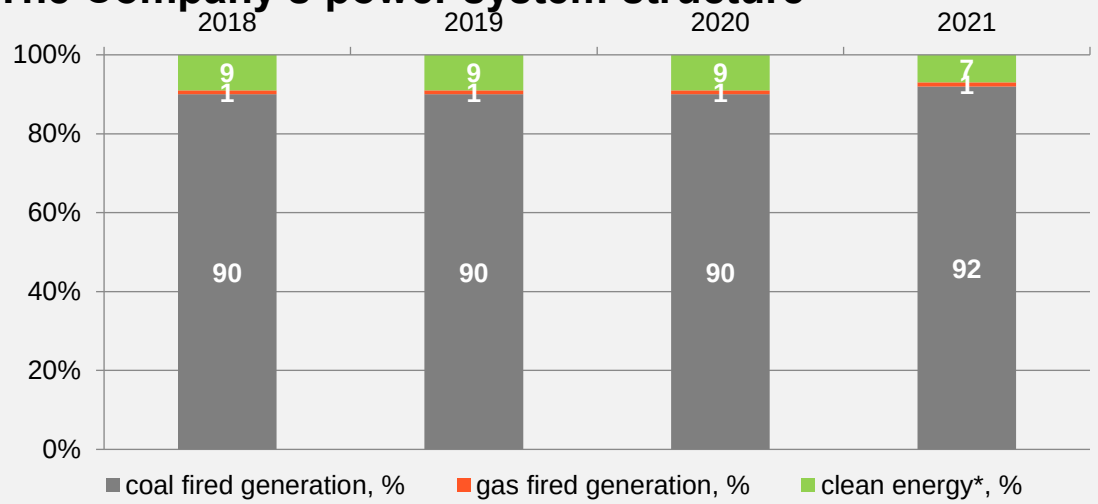
Opportunities for Samruk-Energy **for the medium term**

The priority for Samruk-Energy **for the long term**

Development level and resources availability determine Energy Transition Program priorities

CURRENT SITUATION ANALYSIS

The Company's power system structure



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

- ✓ Coal generation represents ~70% emissions of total output
- ✓ Poor emissions accounting at facilities (including scope 1 and 2)
- ✓ Manual data collection and emission calculations based on standards and coefficients

Description	meas.unit	2018	2019	2020	2021
Electricity production	**mln.kWh**	**31 703**	**30 200**	**31 385**	**35 609**
CO_2 emissions	*mln.tons*	*29,4*	*27,6*	*28,7*	*32,9*
Coal mining	**mln.tons**	**44,9**	**44,8**	**43,3**	**44,6**
CO_2 emissions	*mln.tons*	*4,4*	*3,9*	*4,7*	*0,5*
Total CO_2 emissions	***mln.tons***	***33,8***	***31,5***	***33,4***	***32,9***

Sources of emissions

- Burning fuel for generation of electricity and heat energy (котлы)
- Transport
- Fugitive emissions of methane and CO2 from open coal seams, as well as during coal storage and resulted in endogenous fires
- Consumption of electricity and heat energy to cover needs of stations (~5-6%)

For accurate determination of the carbon footprint it is required a detailed inventory and independent data validation/verification

Energy transition Program

Vision *– Efficient high-tech operating energy company with high social and environmental responsibility - the leader of Kazakhstan's power sector*

SCENARIOS OF THE COMPANY'S ENERGY TRANSITION BY 2060

1. BUSINESS AS USUAL

SE market share	**28%**
"clean" energy share at SE	**44%**
Conventional generation share at SE (coal, gas)	**56%**

Samruk-Energy positioning itself as a responsible producer of electricity using coal with further development of actions on elimination of greenhouse gases, development of RES, planting trees, etc.

2. DEEP CARBONIZATION

SE market share	**17%**
"Clean" energy share at SE	**82%**
Conventional generation share at SE (coal, gas)	**18%**

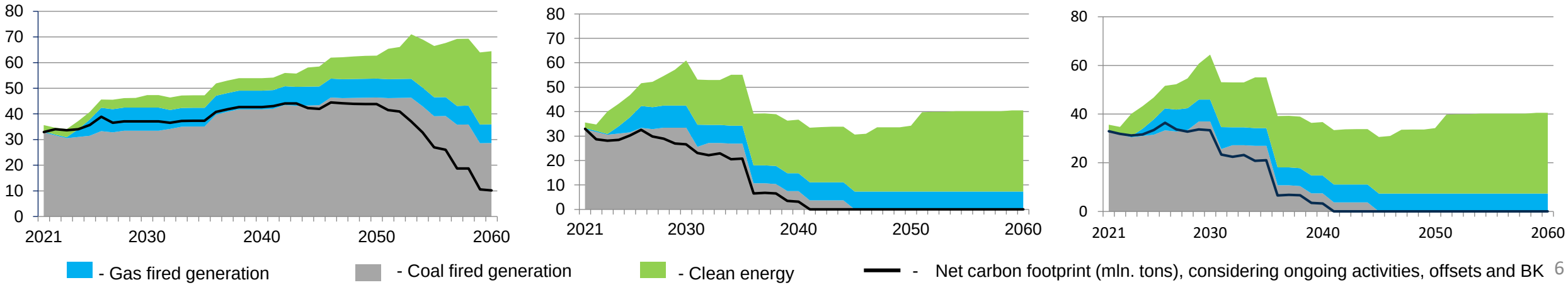
Development of RES and alternative energy and conservation of coal-fired power plants starting from 2036.

3. CHANGING OF BUSINESS STRUCTURE

SE market share	**17%**

Restructuring of the Company's assets by creating a subsidiary that combines "green" assets, followed by a "green" company undertaking an IPO and the use of available "green" financial instruments

DYNAMICS OF REDUCTION OF NET CARBON FOOTPRINT BY TYPE OF GENERATION (BN. KWh)



KEY DIRECTIONS FOR THE TRANSITION TO A LOW-CARBON DEVELOPMENT

Strategic goal

Reduction of net carbon footprint

Directions of Energy Transition Program

Alternative energy	- WPP and HPP - Solar energy - Geothermal energy - Hydrogen energy
Conventional energy	- Transfer from coal to gas
Grid infrastructure and regulation	- Modernization of grids and implementation of Smart Grid - Electricity accumulation and storage systems - Maneuverable generation
Emissions management	- Coal enrichment and gasification - Carbon capture and storage (CCUS) - Energy efficiency and resource saving - Green transport - Carbon polygons and offsets
Supporting activities	- Carbon accounting and digitization - Changes in the regulatory environment - Green finance - Compliance with ESG criteria

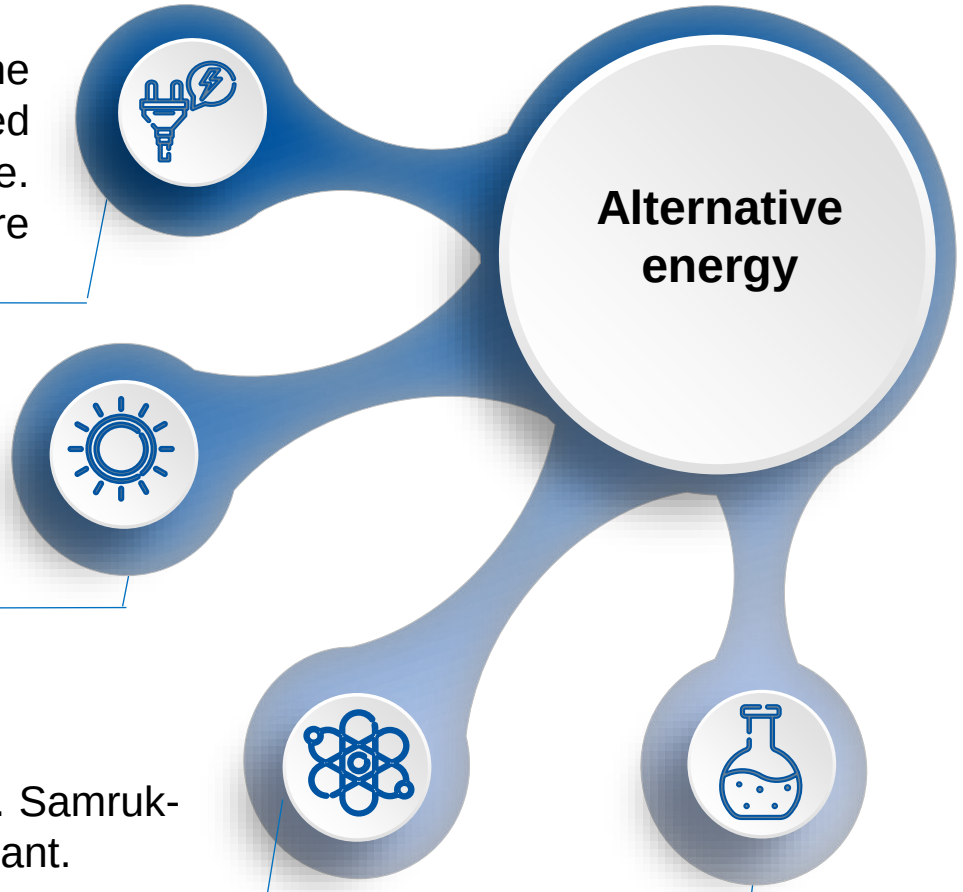
Targets (with respect to 2021)

≥ (30%) reduction of net carbon footprint (by 2031)

Carbon neutrality (by 2060)

ALTERNATIVE ENERGY

Development of WPP and HPP, considering the resource potential, the need for electricity and the maximum allowable capacities in the Unified Electric System zones, as well as the readiness of the infrastructure. Samruk-Energy plans to implement WPP and HPP with a capacity of more than 6000 MW by 2060



Solar energy is an alternative energy direction based on direct use of solar radiation to produce energy in any form. Samruk-Energy plans to build circa 200 MW of solar power facilities by 2060

Geothermal energy– using the Earth's heat to generate electricity. Samruk-Energy plans to build a pilot project of 20 MW Geothermal power plant.

Hydrogen energy - the study of a new promising technology designed to decrease the carbon footprint, as a universal secondary energy carrier

CONVENTIONAL ENERGY
Coal-to-gas conversion (Implementation of projects for gasification of AIES JSC)

- Capacity increase for reliable heating and electrification

Expansion of CHP-1 with the construction of 200-250 MW CCGT unit

- 35% reduction in CO2 emissions
- Zero ash emissions

Modernization of CHP-2 Including the construction of a CCGT unit up to 600 MW

- 35% reduction in CO2 emissions
- Zero ash emissions

Reconstruction of CHP- 3 with construction of a CCGT unit with a capacity up to 450MW

GHG emission reduction
~1,5 times

GRID INFRASTRUCTURE AND REGULATION

Grid retrofit and deployment of Smart Grid

Smart Grid is an entirely new approach to creating the power industry, the electric grid complex and is a system that reduces energy costs, allowing redistributing electricity. "Smart" grids - a set of technical means that allows swiftly changing the characteristics of power grid.

Electricity accumulation and storage systems

Procurement and installation of accumulator energy storage stations at existing and new Samruk-Energy clean energy facilities. Long-term energy storage can solve the issue of daily and seasonal fluctuations at power plants that use RES

Maneuverable generation

The construction of a pumped storage power plant will facilitate addressing the shortage of regulating capacity in the power system, and cover the most difficult peak load while increasing the stability of the power system

EMISSIONS MANAGEMENT

Emissions management

Coal gasification at Bogatyr Komir and pilot project for the enrichment of Ekibastuz coal at the "Severny" mine gas condensate (obtained from tests of underground conversion of coal) contains hydrocarbon gases that can be used in thermal power plants. Comprehensive research is currently underway

CCS (Carbon Capture & Storage) : Capture of CO2 released during the combustion of carbon fuel, and its subsequent disposal in the appropriate geological formations. The technology is a relatively new, it requires studying the possibility of using it at the Company's coal-fired power plants.

Energy efficiency and energy saving: develop measures for the rational and economically feasible use of fuel and energy resources and ensuring country-wide economy

Development of green transport using "clean" energy from RES at EV charging stations and, in the future, partial transfer to gas / electric motors of the Company's transport

Carbon polygons– forests are essential carbon stores. Considering the potential for absorption of CO2, the total area of greening under the Program will be 1 800 ha by 2060. To obtain **carbon offsets**, the Company plans to develop generation using renewable energy sources and implement tree planting project

SUPPORTING ACTIVITIES

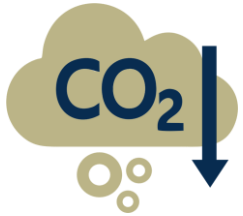
Carbon accounting and digitization. Adoption of digital solutions for recording and forecasting emissions. Making decisions based on analytical data, complying with best corporate governance practices in terms of information disclosure, providing data validation and verification tools, automating production processes, etc.

Changes in the regulatory environment. Conduct of works on improvement of legal framework of the Republic of Kazakhstan in order to address issues that hinder the development of renewable energy in the country. Proposals for improving tariff regulation, as well as liaising with authorized bodies as part of improving measures to support renewable energy, improving the mechanism for distributing quotas, introducing incentives to reduce electricity consumption

Green financing. The Company developed a Green Finance Policy, which aims to ensure transparency in attracting investments through green finance tools.
Key green finance instruments are green bonds, green concessional lending and subsidies for green projects.

Compliance with ESG criteria. Obtaining an ESG rating. The company will improve its sustainability management system focused on ESG standards, commitments and best practices. Compliance with ESG factors is an important element of the Company's assessment, since the risks of these factors may directly or indirectly affect the Company's investment attractiveness

RESULTS EXPECTED BY 2031 and 2060

	By 2031	By 2060
	✓ 30% reduction of **net carbon footprint** including measures taken and carbon offsets	✓ 100% reduction of **net carbon footprint** including measures taken and carbon offsets
	✓ ~ 7 times increase in net electricity volumes compared to 2021	✓ **~ 13 times increase in net electricity volumes compared to 2021**
	✓ Study and implementation of Carbon Capture & Storage technologies - “carbon capture and storage” at Ekibastuz GRES power units	
	✓ **Tree-planting project**(**Greening** of **500 hectares** territory)	✓ **Tree-planting project** (Greening of **1800 hectares** territory)
	✓ Obtaining of **ESG rating by 2023 and its further upgrade**	