ERG Kazakhstan Decarbonization Strategy

Approved in 2024

Key messages of ERG Kazakhstan's Decarbonization Strategy

01

Climate change

- The Group[1] acknowledges the global challenge of anthropogenic climate change and is committed to making substantial efforts to contribute effectively to mitigating these risks
- Historically , the Group, like Kazakhstan, has relied heavily on coal for its energy needs, which has made climate-related risks a significant factor in our decision-making processes

02

Climate governance

- Climate aspects are integrated into ERG Kazakhstan's management system
- We use the internal price of greenhouse gases to avoid investments in projects with negative climate effects
- CAPEX development prioritizes projects that remain relevant in a carbon-free paradigm

03

Goal

- We aim to reduce the carbon footprint of ferrochrome, aluminum, and iron ore pellets by 30% through 2035
- By 2050, our goal is to achieve net-zero greenhouse gas emissions

04

Investing in decarbonization

- The Group's portfolio encompasses over 100 decarbonization projects at various stages of development
- A substantial portion of the Group's development CAPEX is allocated to reducing specific carbon intensity
- Investment projects aimed at enhancing the Group's long-term value are actively being pursued

05

Sustainable business development is a top priority

- Decarbonization pace are determined based on regulatory policies and the demand for low-carbon products
- The Group prioritizes sustainable development and ensures a fair energy transition for all stakeholders, including over 60,000 employees

06

Basic decarbonization scenario

- Our baseline scenario anticipates ongoing ambitious global climate policies and the gradual advancement of carbon regulations in Kazakhstan, with a target of establishing an effective global greenhouse gas price of $60 per ton by 2035

07

Innovations

- We are confident that technological advancements will reduce CAPEX for decarbonization projects, making their implementation at industrial sites more feasible
- The Group emphasizes applied research through both its in-house R&D center and strategic partnerships to advance decarbonization technologies and drive down costs

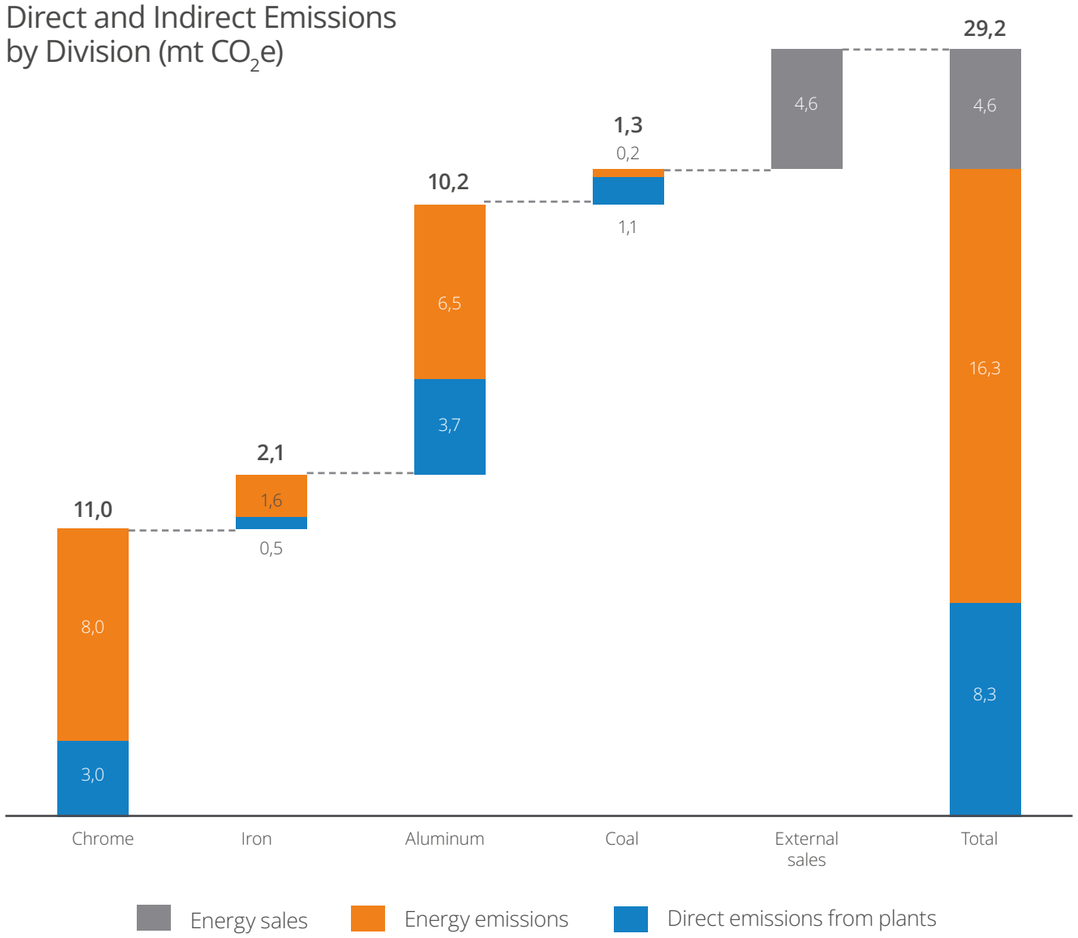
1. Group -a group of entities within the perimeter of ERG Kazakhstan

In 2023, ERG Kazakhstan's total emissions amount to 29.2 million tons of CO_2e

GHG emissions ERG Kazakhstan

Scope 1 and 2

Direct and Indirect Emissions by Division (mt CO_2e)



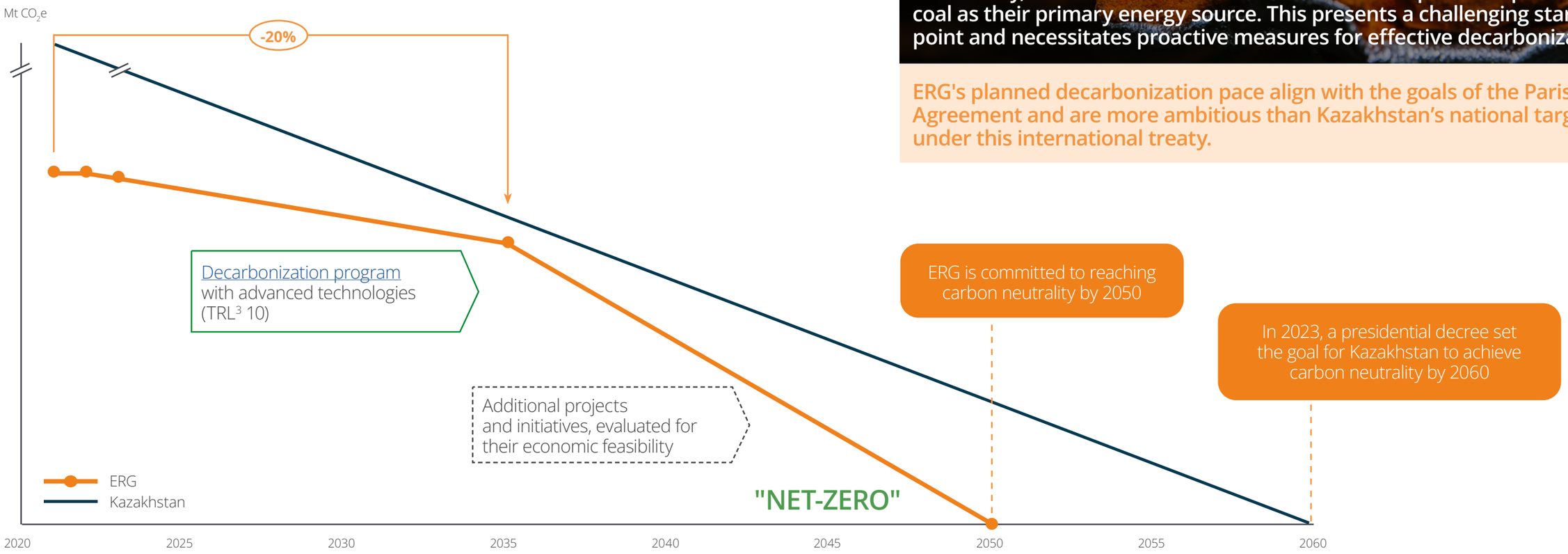
In 2024, we plan to calculate Scope 3 emissions volumes.

ERG Kazakhstan accounts for 9% of the country's greenhouse gas emissions and is committed to achieving carbon neutrality by 2050

Historically, both Kazakhstan and the Eurasian Group have depended on coal as their primary energy source. This presents a challenging starting point and necessitates proactive measures for effective decarbonization.

ERG's planned decarbonization pace align with the goals of the Paris Agreement and are more ambitious than Kazakhstan's national targets under this international treaty.

By 2035, ERG Kazakhstan aims to reduce emissions by 6 million tons of CO_2e (approximately 20%)[1] through the reduction of Scope 1 and 2[2] emissions associated with its primary products



1. Considering the production volumes outlined in the current 10-year plan
2. Reduction targets for Scope-3 emissions have not yet been approved
3. TRL (Technology Readiness Level) scale: 10 represents a fully proven and successful technology, while 1 denotes a conceptual idea

Accordingly, the reduction in carbon footprint of key products will be 30% by 2035

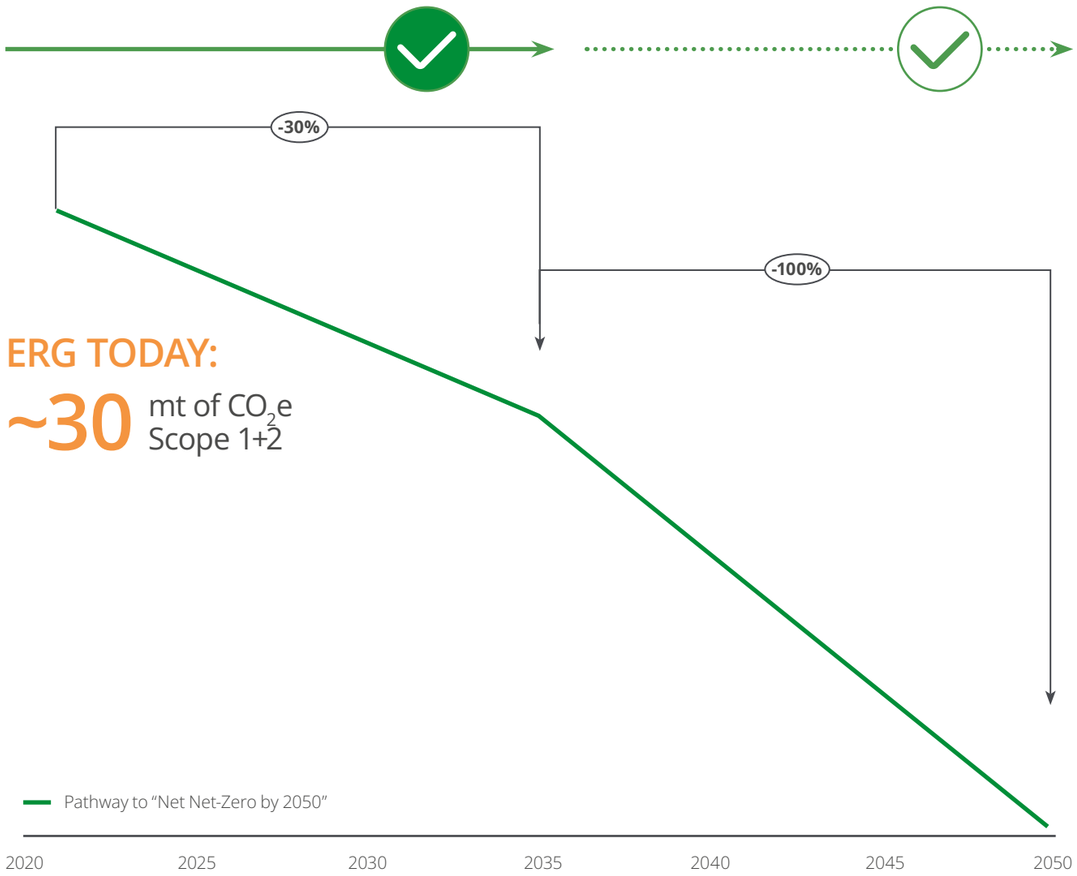
Medium-Term Goal for 2035

20% Reduction in overall emissions

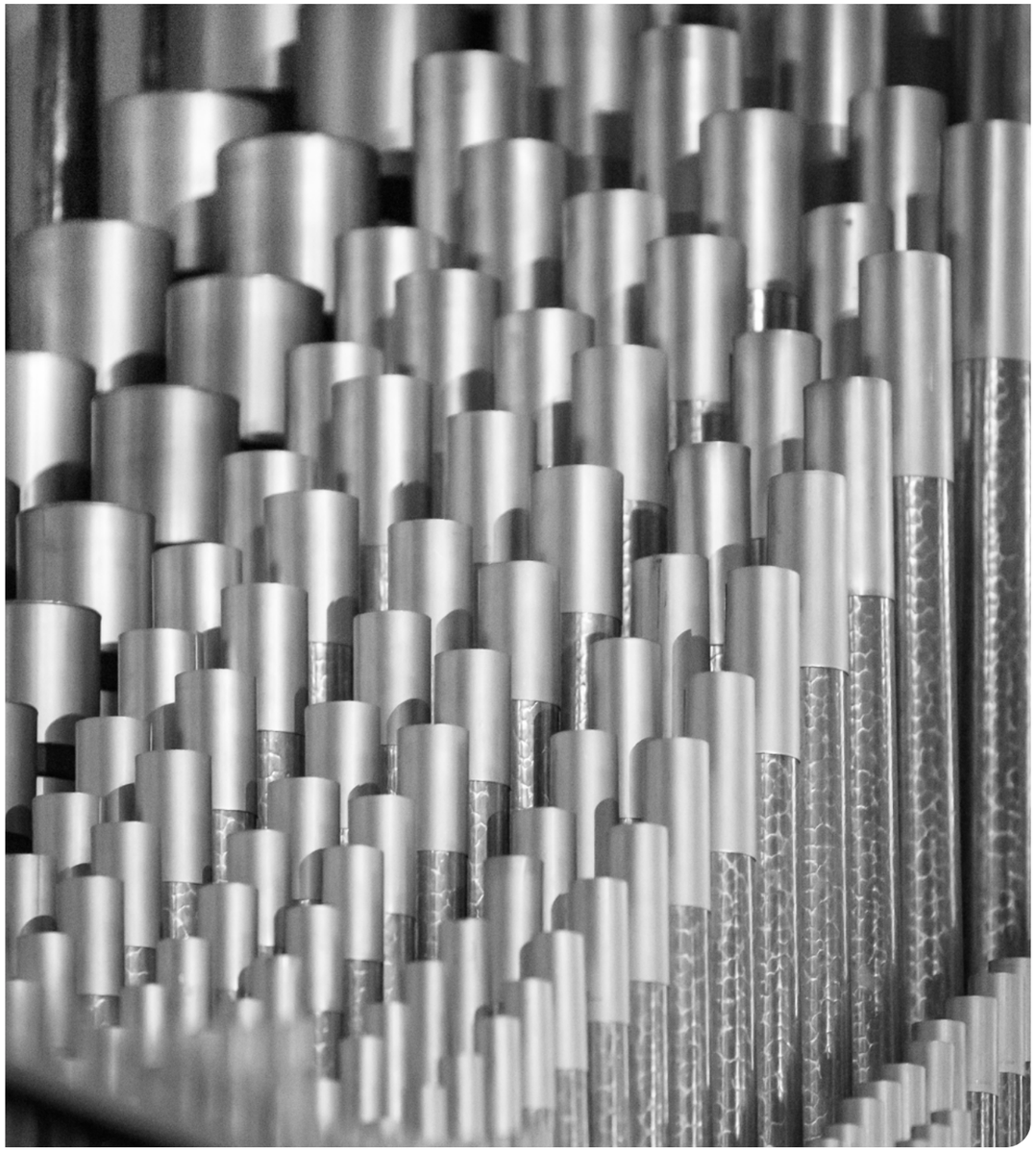
30% Reduction in the carbon footprint of key products, including aluminum, ferroalloys, and iron ore pellets

Long-term Goal 2050

Achieving carbon neutrality – **«Net-zero»**

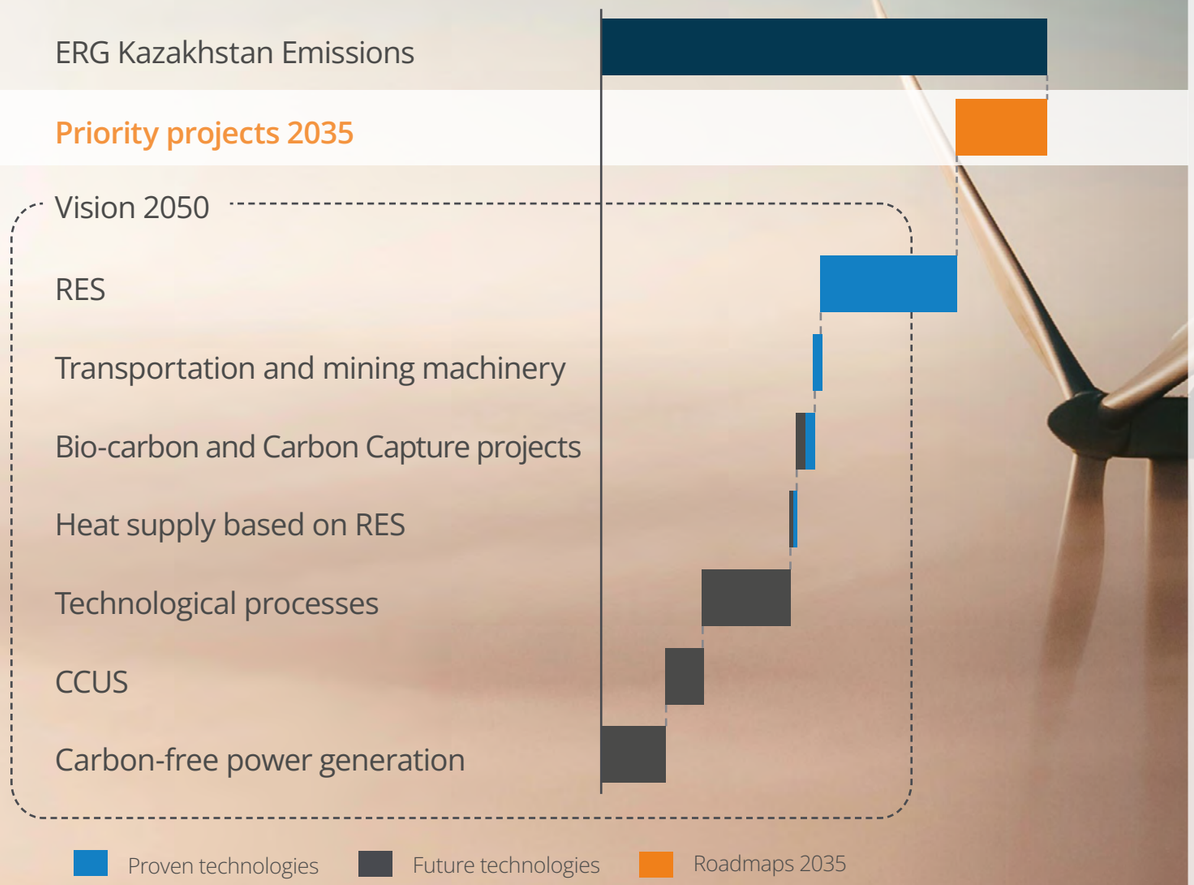


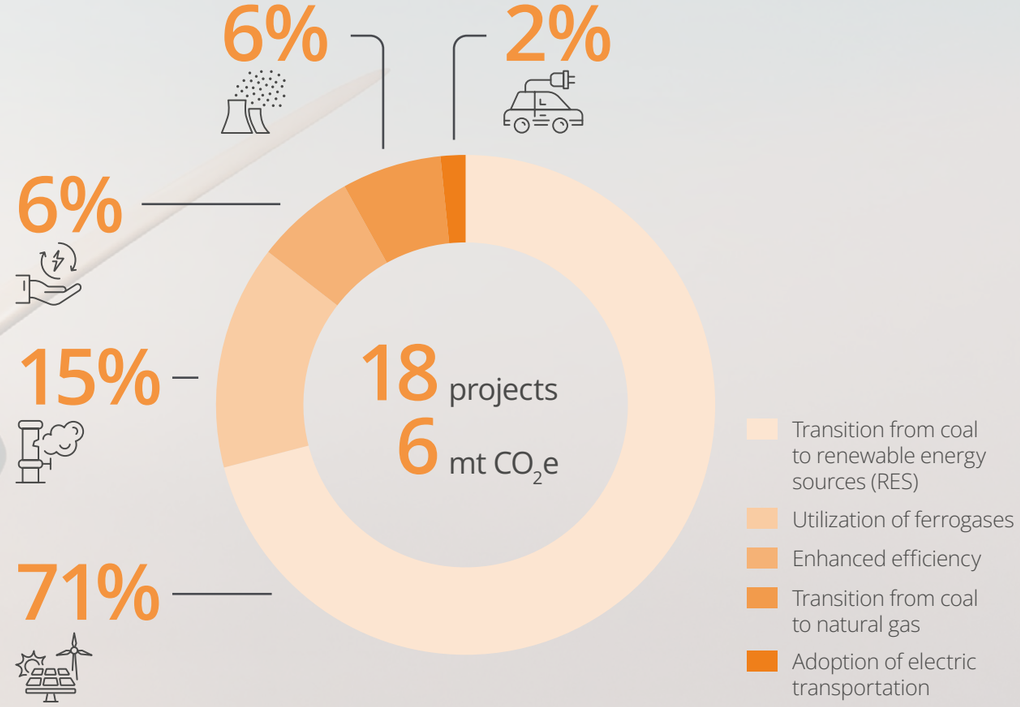
1. Reduction in carbon intensity of key products compared to the base year 2021



The strategy aims to decarbonize operations to mitigate climate impacts, sustain our competitive edge, expand green metal sales, and fully leverage the Group's ore base in Kazakhstan.

The medium-term goal of reducing emissions by 6 million tCO_2e will be achieved through the implementation of 18 priority projects within the decarbonization program

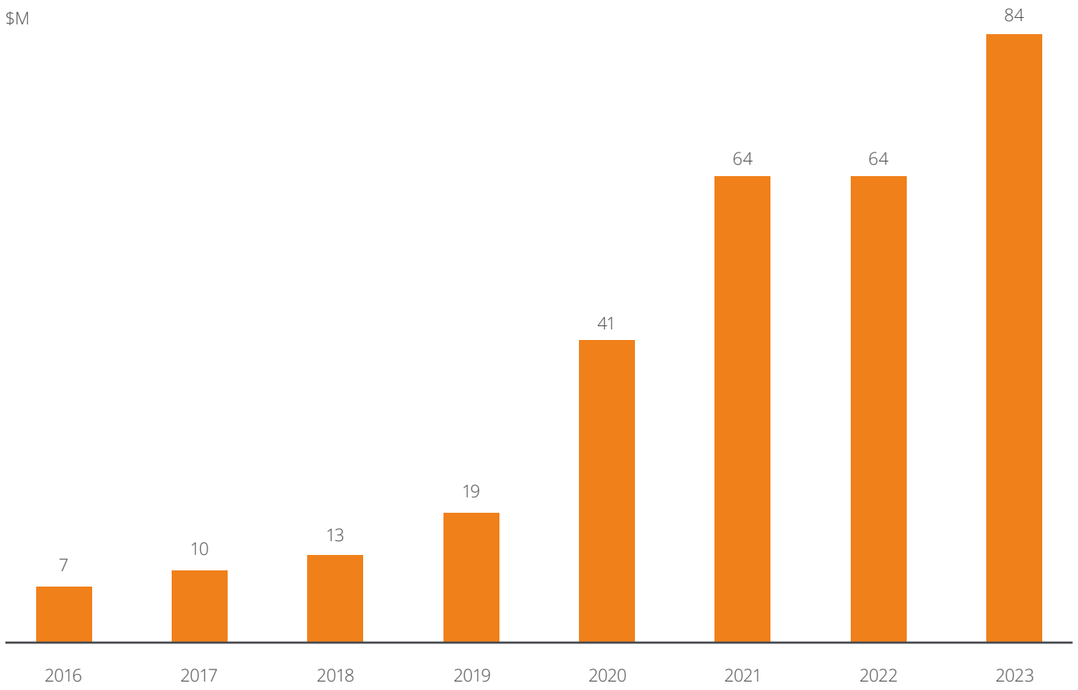




Projects will be undertaken to enhance the Group's long-term value. ERG is open to both technological and financial partnerships.

To date, the Group has invested over $300 million in decarbonization projects (excluding efficiency initiatives). Additionally, another $300 million is allocated to fully elaborated and initiated projects

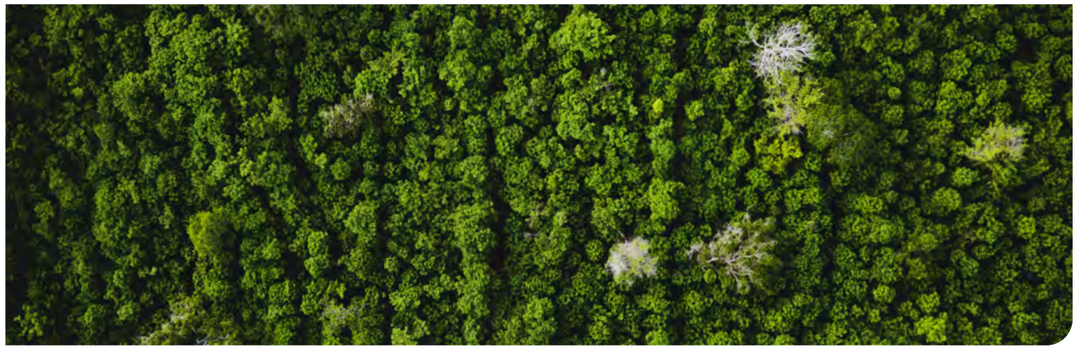
Since 2016, ERG has invested over $300 million in decarbonizing Kazakhstan's energy system and has committed to purchasing green electricity from investors. As a result, the share of renewable energy sources (RES) in the national energy system reached 6% in 2023.



Currently, projects totaling $300 million are underway. By 2025, the Group will complete the construction of its first 150 MW wind farm.

Emission reduction projects	2023	2024	2025	2026	2027	CAPEX estimate, $M	Emission reductions, estimate mt CO_2e
Energy Division							
Portfolio development of 6 GW "Big Wind" RES (wind monitoring ongoing)						5	Enabler
Iron Division							
Conversion of Kachar Heat Plant to gas						6	0,03
Aluminium Division							
Digital twin						3	Enabler
Steam Consumption Reduction Program at Pavlodar Aluminium Smelter						40	0,3
Chrome Division							
Khromtau wind power plant 150 MW						168	0,5
Ferrogas power plant 80 MW						100	0,5
						300 $M	1,33 mt CO_2e

Project stage
Execution



ERG Kazakhstan systematically advances a broad array of decarbonization initiatives and incorporates GHG impact assessments into its investment decisions

The effective price greenhouse gas emissions at which the project remains economically viable

$/т CO_2e

ERG TODAY:

Projects nearing break-even

- Executing both independently and in collaboration with partners

Complex and high-cost projects

- Seeking technology partners
- Assessing payback conditions and planning startup timelines

High-cost projects and untested technologies

- Driving innovations within captive ERG Innovations
- Exploring alternative technologies
- Open to research partnerships

Decarbonization projects, emission reductions, t CO_2e

Decarbonization costs will decrease as technologies advance, and ERG is investing significantly in green innovations at our captive R&D center

ERG INNOVATIONS

Examples of Research Platforms:

Digital twins of complex metallurgical operations

Optimization of furnace operation and use of reducing agents

Low-Carbon Footprint Chrome Production (New Pyrometallurgical and Hydrometallurgical Technologies)

New technologies for alumina production from Kazakhstani bauxite

Founded in 2012, the ERG Research Engineering Center (ERG REC) was established to develop and support ERG's innovation infrastructure.

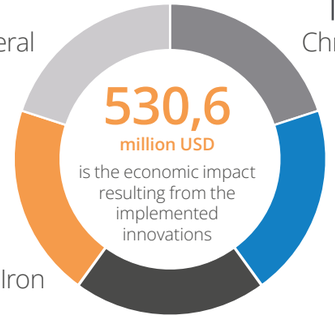
ERG Innovations

- Enhancing the integration of intermediate products into primary production
- Production of auxiliary raw materials
- New hydrometallurgical applications for ERG
- New products from by-products and non-hazardous production waste

- Exploration of advanced methods for chrome beneficiation
- Development of technologies for manganese concentrate production
- Solutions for reducing fines in ferroalloy production
- Alternative technologies and solutions for pyrometallurgy
- Alternative reducing agents derived from in-group raw materials

General

Chromium



- Alternative enrichment technologies for improving the quality of iron ore concentrates

Iron

Aluminum

- Pre-enrichment of Bauxites
- Alternative alumina production technologies

Coal

- Processing of coal fines
- Chemistry and gasification of large-scale coal volumes
- Advancement of coking technologies and products

2012

Office in Astana and 5 regional laboratories; the carbon chemistry lab is in the equipment installation stage

Collaborating with 39 leading universities and research centers across 11 countries, including 9 universities in Kazakhstan

The intellectual property and innovative achievements of the ERG R&D Center are validated by over 40 patents granted in the Republic of Kazakhstan

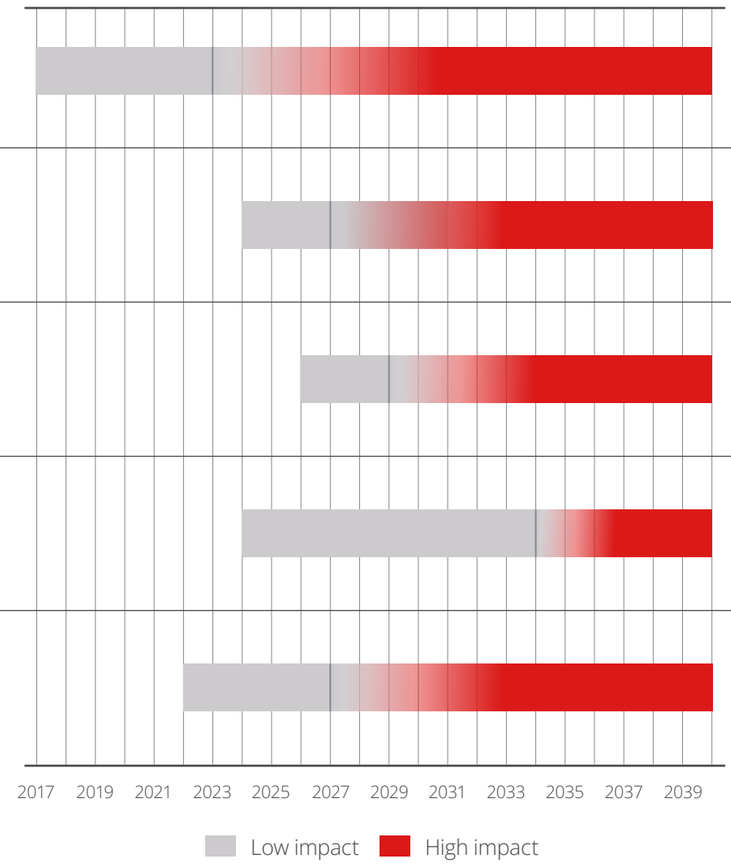
73 highly qualified employees, including numerous experts with unique competencies and experience

2024

The Group systematically assesses the impact of the risks of the low-carbon agenda on its operations

	Transitional Risks	Key Response Measures
State regulation in Kazakhstan	Increased costs for renewable energy sources (RES), flexible capacity, and energy storage within the national energy system	• Modeling the national power system to establish a strategic development position • Creating conditions to lower the carbon footprint of energy-intensive industries
	Rising greenhouse gas costs under Kazakhstan's emissions trading system	• Participation in Carbon Trading • Implementing a comprehensive decarbonization program
Foreign and international regulators	Carbon Border Adjustment Mechanism (CBAM) fees and potential similar regulatory mechanisms	• Reducing the carbon footprint of major export products • Exploring alternative supply markets
Markets	Possible product discounts and loss of customers due to high carbon footprints of products	• Conducting systematic analysis of competitive positions and decarbonization pace in key markets • Developing a range line of «green» products
Financial institutions	Challenges in securing financing due to reliance on coal capacity	• Building a clean energy portfolio • Formulating long-term plans for the gradual and early decommissioning of coal-fired power plants

Risk Impact Duration on ERG Kazakhstan

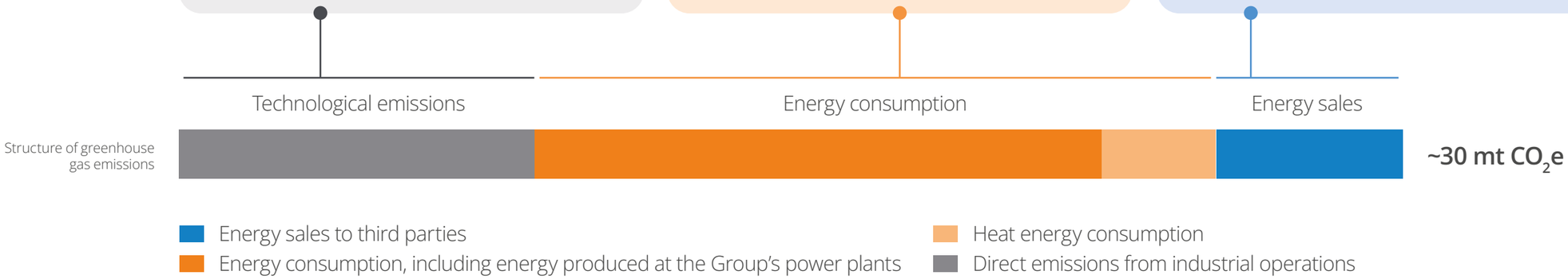


Additionally, a systematic approach for identifying and assessing physical climate risks has been established.

For 2024-2025, the plan is to develop a comprehensive risk management system that integrates these risks into investment and technological processes.

ERG has significant advantages for decarbonizing production facilities; however, there are still objective risks that could impact the achievement of our targets

Major sources of emissions	Reducers in metallurgical processes, process combustion of fuels, methane leaks	ERG's coal and gas-fired thermal power plants in Kazakhstan with a combined capacity of 3.1 GW
Advantages and opportunities of ERG Kazakhstan	• High quality of chrome ores (Cr content) • Substantial reserves of easily enriched magnetite iron ores, ideal for use in hot metal and hot briquetted iron production processes	• High potential for wind energy in Kazakhstan, including near ERG's production sites • Opportunity for energy utilization of metallurgical waste gases
Risks of not achieving carbon footprint reduction targets	• Lack of technologies for completely replacing carbon-containing reductants for chrome ores	• Slow advancement in the development of technologies for integrating variable energy sources, such as energy storage solutions
		• Rising energy demand in Kazakhstan's energy system will necessitate increased power generation at the Group's facilities • Significant contribution to the social role of providing heat energy



ERG establishes policies and objectives and implements a range of organizational measures to ensure the effective execution of its strategy and the achievement of decarbonization goals

The Group's Climate Change Impact and Adaptation Management Policy

Internal pricing of greenhouse gas emissions

15% of RES in consumed energy in 2030

Incentive program (KPIs) linked to the achievement of ESG metrics, including climate targets

Energy efficiency program for production facilities across the Group

Introduction of green ferrochrome supply in 2025

In process

Completed

Integration of the decarbonization strategy into ERG Kazakhstan's overall management system

Goal setting

CEO
- Adoption of a climate change policy
- Adoption of decarbonization goals and strategy

ESG Committee
- Establishing ESG goals
- Implementing ESG recommendations
- Monitoring progress towards goal achievement

Invest. Committee
- Approval of investment projects for implementation

Climate governance

Center for Sustainable Development
- Management of greenhouse gas emissions
- Prioritization of carbon footprint reduction initiatives
- Establishment of an internal carbon pricing system
- Development and ongoing refinement of decarbonization strategies and climate transition plans
- Engagement with external stakeholders on energy transition, carbon regulation, and sector-wide decarbonization efforts
- Implementation of leading sustainability practices
- Preparation of materials for the ESG committee regarding decarbonization and sustainable development goals

Strategy Block
- Climate aspects in the strategies of the divisions and the Group
- Priorities, including allocation of investment resources

ERG Sales
- Development of market strategies that account for carbon footprint considerations

Risk Directorate
- Sustainability Risk Management Framework

ERG Innovations
- Priorities, targets, and long-term potentials within the platforms for «Greenhouse Gas Reduction», «Low Carbon Footprint Ferrochrome Production», and other initiatives

Execution of decarbonization roadmaps

Divisions
- Pre-investment planning and implementation of decarbonization projects within their areas of responsibility
- Development of risk mitigation strategies and adaptation measures for production facilities to address physical climate risks

ERG Capital Projects
- Execution of capital-intensive decarbonization projects, within their areas of responsibility

Glossary

Goal

The anticipated result, for which potential achievement methods are defined, is attainable under specified assumptions and scenario conditions. Success depends on the availability of carbon-neutral technologies, economic development, market conditions, and effective government policies.

CO_2e

CO_2-equivalent (CO_2e) is a standard unit for measuring greenhouse gas emissions, accounting for the global warming potential of various gases based on their physical properties.

Net-zero

(Also referred to as carbon neutrality) is achieved when a company's greenhouse gas (GHG) emissions, after accounting for the sequestration achieved through its projects (e.g., post-combustion CO2 capture or forest sequestration), reach zero. In the context of this strategy, these terms are used interchangeably.

Scope 1, 2, 3

GHG emission calculation coverage based on the boundaries of the owner's emission source activities:

Scope 1 (Direct Emissions): Direct emissions from facilities owned or controlled by the operator.

Scope 2 (Indirect Emissions): Indirect emissions from the generation of purchased energy consumed by the operator.

Scope 3: Emissions associated with the production of purchased raw materials, transportation, and the use of finished products.

RES

Power plants using renewable energy sources.

CCUS

Carbon Capture, Utilization, and Storage (CCUS): A process that involves separating carbon dioxide from industrial and energy sources, transporting it to a storage site for long-term isolation from the atmosphere, or utilizing it as a resource to produce valuable products or services.

Bio-carbon

Also referred to as Biochar: A by-product product derived from the pyrolysis (thermochemical decomposition of organic materials in the absence of oxygen) of renewable biomass. It is used as an alternative to traditional carbon-containing mineral resources or products from their processing.