



Sustainable development KPIs of KMG's management

To meet the 2023 strategic sustainability objectives and ensure sustainable development and gradual reduction in carbon intensity of production, the Board of Directors approved motivational KPIs for the Chairman of the Management Board (corporate KPIs), Management Board members, heads of units and chief executive officers of subsidiaries and associates. These KPIs include:

- corporate KPIs linked to investment projects, including in the realm of sustainable development, a comprehensive OHS indicator aimed at reducing LTIR, and identifying and communicating, among other things, unsafe working conditions and potential hazards throughout the Group;
- KPIs for the Management Board linked to investment projects, including in the realm of sustainable development, performance under the Low-Carbon Development Programme Action Plan for 2022–2031, and the ESG rating;
- a carbon footprint monitoring and reduction KPI for chief executive officers at subsidiaries and associates;
- KPIs for implementing the Company's sustainability goals for the heads of units, including:
 - reduction of associated petroleum gas flaring;
 - recovery of historical oil wastes;
 - automation of industrial safety and labour protection management;
 - development of Water Resources Management Programme;
 - implementation of the Employee Health Management Action Plan for 2023–2025;
 - income from the sale of carbon credits;
 - development of KMG's internal carbon pricing mechanism;
 - targeted audit of process furnaces and boiler equipment for identifying technically and economically feasible opportunities for improving fuel and natural gas utilisation efficiency at producing subsidiaries and associates;
 - preparation for initial TCFD disclosure;
 - screening of CO₂ emission sources and reservoirs suitable for CO₂ injection at KMG's assets (CCS/CCUS pilot);
 - conducting industrial relations screening to study social and living conditions at subsidiaries and associates / jointly controlled entities in accordance with Samruk-Kazyna's Corporate Standard for the Development of Industrial Relations.

Low-Carbon Development Programme

Global energy transition driven by decarbonisation, technical upgrade and ESG-based corporate governance lies at the heart of updated long-term economic growth strategies in both developed countries and EMDEs.

Today, to be more competitive, governments need to assess the potential for decarbonisation and the use of low-carbon technologies, while also taking steps to identify barriers and challenges to be addressed with the aim of reducing emissions.

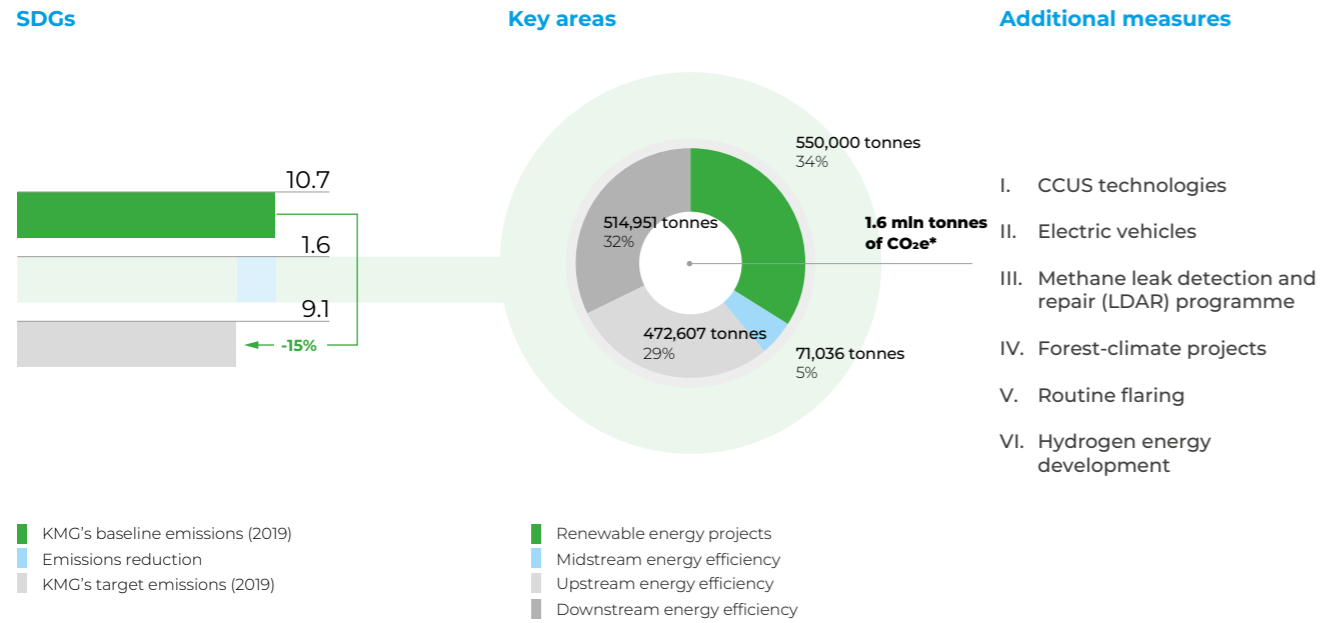
The analysis of global carbon markets shows that in the coming decades low-carbon development aimed at reducing climate impact and boosting energy efficiency will be the backbone of advanced economies. Oil and gas companies will play a key role in accelerating energy transition by investing in energy systems of the future such as renewable energy sources, low-carbon fuel, carbon capture, utilisation and storage (CCUS), low-emission hydrogen and other emission-cutting technologies. Considering the importance of the climate agenda and supporting national goals to achieve carbon neutrality by 2060 and reduce GHG emissions by 15% from the 1990 level, KazMunayGas intends to focus on a moderate,

balanced, and consistent decarbonisation of its operations. To pursue this objective, KMG adopted the 2022–2031 Low-Carbon Development Programme (LCDP) in November 2021, and approved a relevant Action Plan for 2022–2031 (the "Action Plan"). The Action Plan includes a number of initiatives aimed at reducing GHG emissions and focused on four areas: energy efficiency, renewable energy, methane monitoring, and organisational measures. These initiatives will help achieve the goal of reducing KMG's GHG emissions by 15% by 2031 set out in the Company's Low-Carbon Development Programme.

Within its remit, the **Board of Directors** helps build and implement the required sustainability framework, while the Company's officers and employees at all levels contribute to low-carbon development.

The Board of Directors approves climate-related policy and strategy together with goals in energy transition and combatting climate change. In 2023, the Board held several annual meetings to discuss sustainability issues, progress under the Low-Carbon Development Programme, TCFD disclosures and new financial reporting standards at KazMunayGas.

KMG's 2022–2031 Low-Carbon Development Programme



As part of the Carbon Disclosure Project (CDP), KMG has been disclosing data on direct and indirect greenhouse gas emissions, greenhouse gas management, and key risks and opportunities across all KMG's assets, including international assets in Romania and Georgia, since 2019. In 2023, CDP assigned climate score C to KMG. As part of the 2022–2031 Low-Carbon Development Programme, the Company plans to raise this score to A, which is granted to leaders in implementing best available technologies to manage climate change.

In July 2023, the KMG Climate Change 2022 Questionnaire was published. According to the report, direct carbon dioxide emissions at KMG Group totalled 7.6 mln tonnes

of CO₂ (8.1 mln tonnes of CO₂e) in 2022. The CO₂ equivalent data are presented using the global warming potential ratios set out in the IPCC Fifth Assessment report (28 for methane and 265 for nitrous oxide).

The greenhouse gas emissions data were verified by independent accredited organisations' reports for each subsidiary or associate. Data for 2023 will be disclosed in KMG's CDP report to be published in Q3 2024. We seek to ensure consistency and comparability when preparing our disclosures. We are committed to enhancing disclosures and increasing the scope of reporting around our Scope 3 emissions.

Indicator	Unit of measurement	2020	2021	2022
Scope 1 direct emissions	mln tonnes of CO ₂ e	15.8	10.6	8.1
Market-based Scope 2 indirect emissions	mln tonnes of CO ₂ e	3.5	3.3	3.2
Location-based Scope 2 indirect emissions	mln tonnes of CO ₂ e	3.5	3.3	3.3
Scope 3 indirect emissions	mln tonnes of CO ₂ e	61.3	62.1	61.8

Sustainable aviation fuel (SAF)

In September 2023, KMG together with Air Astana, with the support of the European Bank for Reconstruction and Development, started a feasibility study on the SAF market and its prospects in Kazakhstan. The bid winner ICF SH&E Limited presented the analysis of global and local strategies in aviation decarbonisation, along with a SAF market research study, including demand, feedstock availability and overview of applicable technologies for sustainable jet fuel.

At the meeting held on 23–24 November 2023, the study participants identified SAF technologies with the highest potential in Kazakhstan. At the next stages, they will be scrutinised to assess the feasibility of SAF production by KMG and review the relevant regulatory framework in Kazakhstan. The feasibility study results will be presented in 1H 2024.

Targeted energy audit of process furnaces and boiler equipment at Embamunaigas, Ozenmunaigas, Mangistaumunaigas and Karazhanbasmunai

In the reporting year, the Company held a targeted audit of process furnaces and boiler equipment at Embamunaigas, Ozenmunaigas, Mangistaumunaigas and Karazhanbasmunai to check their state, measure

actual fuel consumption and assess the potential to further reduce it. The project's analytical stage resulted in 20 initiatives set to save a total of 56,894 tonnes of reference fuel and cut CO₂ emissions by 87,212 tonnes. Following the analysis, the audited subsidiaries and associates came up with 23 initiatives, 14 of which were approved as economically and technically viable and will be included in their local action plans implemented as part of the Low-Carbon Development Programme. The total potential of these initiatives is 32.1 thous. tonnes of reference fuel or 42.9 tonnes of CO₂.

I-REC

To reduce indirect GHG emissions, KMG purchased International Renewable Energy Certificates (I-REC) and made a claim for 10.0 mln kWh, an equivalent of expected electricity consumption by KMG's headquarters in 2023.

Voluntary I-REC certification represents a proof of energy generation from renewable sources. The certificate is linked to 1 MWh of green electricity, location of the power station and time period of electricity generation. KazMunayGas acquired certificates issued in 2023 for solar and hydroelectric power stations in Almaty and Turkestan regions in line with the International Tracking Standard Foundation's standard. Recognised by GHGP, CDP, RE100, ISO and other international organisations, I-REC certificates are traded globally and issued in 51 countries.



CCUS project

KMG is running a pilot project to deploy carbon capture, utilisation and storage (CCUS) and explore the potential for CO₂ injection to enhance oil recovery from depleted oil reservoirs.

To date, we have completed R&D as part of the first stage.

It included screening CO₂ emission sources across subsidiaries and associates and breaking them down into main groups suitable for the CCUS pilot.

To inject and store the emitted CO₂, we analysed prospective traps and selected regions with the highest level of emissions within 100 km from these sources. Potential storage volumes and maximum injection duration are estimated for each trap taking into account the location of the nearest emission source. As CO₂ may be used to increase an oil recovery factor, the Company screened suitable assets, created a database for developed fields and forecast the development potential based on the injected CO₂.

As part of the FEED stage, we designed solutions for surface equipment and pipelines for the collection and cooling of exhaust gas from emission sources, CO₂ capture, drying, accounting, compression, transportation and injection into dedicated wells.

In 2024, we will complete the second stage to study the injection and underground storage technology and develop the methodology for CO₂ capture, use and storage.

Hydrogen energy development

As part of hydrogen energy development, we are doing a feasibility study to assess resources for the low-carbon production of hydrogen, technical, commercial and economic viability of investments in construction, and potential for blue hydrogen production with further CO₂ injection into oil and gas fields to intensify oil recovery.

Blue hydrogen technologies involving hydrocarbon (natural gas) processing into hydrogen are the backbone of nearly all methods of large-scale natural gas treatment:

- steam methane reforming;
- dry methane reforming;
- partial oxidation (gasification).

Then CO₂ capture and storage technologies come into play.

For steam reforming, CO₂ capture is a must to reduce GHG emissions, with blue hydrogen produced as a result. There is a wide range of carbon dioxide capture techniques.

CCUS-enabled methods of blue hydrogen production are key to conforming with the classification.

As a hydrocarbon production operator, KMG can produce hydrogen using steam reforming or pyrolysis of natural and/or associated petroleum gas combined with CO₂ capture and burying in accordance with carbon intensity requirements.

Regulations on Energy Saving and Efficiency at KazMunayGas

In 2022, the Management Board approved KazMunayGas' Energy Policy. In line with its paragraph 3, to ensure the integration of energy management system requirements into the Company's business processes, we drafted the Regulations on Energy Saving and Efficiency at KMG Group.

The Regulations set out an interaction procedure along with the scope of authority, responsibilities and duties of the Group's units and employees as part of energy saving and efficiency management including the following processes:

- 1) management of statutory requirements;
- 2) energy saving and efficiency planning;
- 3) energy saving and efficiency introduction and/or streamlining;
- 4) performance assessment.

Part of KMG's 2022–2031 Low-Carbon Development Programme, the Regulations lay foundation for setting and reviewing energy-related goals and objectives.

Internal Carbon Pricing Programme

In December 2022, the Management Board approved KMG's Internal Carbon Pricing Programme describing relevant international practices.

In 2023, in accordance with an order of the Chairman of the Management Board, a dedicated working group comprised of representatives of all KMG's relevant units came up with a mechanism to apply an implicit carbon price to assess the Company's carbon regulation costs.

In December 2023, the Management Board approved a new Internal Carbon Pricing Programme presenting an implicit pricing framework.

Light product benchmarks

In line with the Environmental Code of the Republic of Kazakhstan, carbon dioxide quotas are calculated using benchmarks approved by Order of the Acting Minister of Ecology and Natural Resources No. 260 dated 19 July 2021. The current benchmark for oil products relies on data that mostly take into account dark oil products, while the production of light oil products is a technologically more sophisticated process involving several stages of treatment and hence more energy- and carbon-intensive compared to dark oil products. This is why three major producers of light oil products – Atyrau, Pavlodar and Shymkent refineries – need to apply for additional quotas and provide relevant substantiation every year.

To further prove the need for a fair benchmark and reduce the shortage of quotas at KMG facilities, benchmarks for light oil products were calculated in 2023. In 2024, the Ministry of Ecology and Natural Resources will continue its work to agree on and approve new draft benchmarks.

Climate reporting

To improve GHG emissions reporting and management across the Group, KMG made an inventory of Scope 3 indirect emissions and designed the methodology to collect inputs for reporting.

In 2023, KMG also took steps to introduce financial disclosures consistent with TCFD (Task Force on Climate-related Financial Disclosures) recommendations. We published first such disclosure and drafted a Corporate Climate Governance Plan.

Methane emission initiatives

KMG pays special attention to reducing methane emissions as a potential tool to spearhead a carbon offset policy and minimise carbon footprint. For example, a key target of the 2031 Low-Carbon Development Programme is putting in place methane leak detection and elimination system at all KMG's producing assets by 2031.

As a participant of the COP28 UN Climate Change Conference in December 2023, the Company signed a number of landmark agreements in methane management and joined the OGMP (Oil & Gas Methane Partnership) 2.0 initiative on reporting of methane emissions by oil and gas companies. The OGMP 2.0 membership will enable KMG to learn from the experience of international companies that have a well-established management and prevention system for methane leaks and get methodological assistance in emissions inventory, calculations and selection of technological solutions to reduce leaks. The Company also signed a memorandum of cooperation with TetraTech engaged in the Power Central Asia (PCA) Activity financed by the USAID to take stock of methane emissions sources across KMG assets and further cut relevant emissions. The parties drafted a joint action plan.

In 2023, KMG signed a memorandum of cooperation with Carbon Limits. In September 2023, a workshop was held for the Group's experts on methane emission management, including quantitative assessment, gas utilisation, identification of key leak sources and elimination methods. From 26 February to 1 March 2024, Mangistaumunaigaz and KazGPZ benefited from the presentation of LDAR technologies and procedures. Carbon Limits will also assist KMG with its first OGMP 2.0 disclosure as part of Mist-driven GHG emissions inventory.

On the sidelines of the conference, 50 oil and gas companies, including KMG, announced joining the Oil and Gas Decarbonisation Charter, a global industry document to deliver ambitious results and accelerate climate action. The key objectives are to achieve carbon neutrality by 2050, cut routine flaring by 2030 and reduce methane emissions to near zero.

Projects in 2024:

- Developing the 2060 Low-Carbon Development Programme and a related action plan;
- embedding steps recommended after the targeted audit of process furnaces and boiler equipment into the Action Plan to implement the Low-Carbon Development Programme;
- SAF market research;
- developing a project to process natural and/or associated petroleum gas using low-carbon technologies;

A feasibility study for a pilot to build a full-chain CCUS (second stage).

- analysis of low-carbon hydrogen production from APG / natural gas, utilised formation water and/or wastewater at fields;
- feasibility study of a project to expand the EV charging infrastructure in Kazakhstan;
- initiatives to introduce methane management at KMG Group;
- offset projects.

