Approved
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LOW CARBON DEVELOPMENT PROGRAMME JSC NC "KAZMUNAYGAS" FOR THE PERIOD UNTIL 2060

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INTRODUCTION

Climate change represents one of the most pressing challenges of our time, impacting ecosystems, economies, and communities worldwide. As global temperatures rise and weather patterns become increasingly unpredictable, the need for decisive action to mitigate greenhouse gas (GHG) emissions has never been more critical. Businesses and governments alike recognise the importance of transitioning to a low-carbon economy to ensure sustainable development and environmental stewardship.

In this context, NC KazMunayGas JSC (KMG) is committed to addressing climate change through its Low-Carbon Development Programme (LCDP), which aims to align with international climate goals and foster a resilient, sustainable future.

1.1 Purpose of the LCDP

KMG's LCDP is strategically designed to integrate comprehensive emissions reduction initiatives into its core operations, to effectively combat climate change and align with global sustainability goals.

1.1.1 Strategic Alignment

The LCDP of KMG is aligned with the legislation of the Republic of Kazakhstan, the Kazakhstan's Strategy for Achieving Carbon Neutrality by 2060, the KMG Charter, the Development Strategy of KMG for 2022-2031, and the Emissions Management Policy within the KMG group. This alignment ensures that the Programme is integral to corporate governance, systematically guiding KMG's efforts to reduce its emissions footprint.

1.1.2 Low-Carbon Transition Framework

The LCDP establishes a unified framework for KMG's climate strategy, providing a clear and actionable roadmap for reducing emissions and transitioning to a low-carbon economy. This framework is essential for embedding sustainability into KMG's governance and operations to achieve significant emissions reductions by 2060.

KMG is deeply committed to effective climate governance, with the board of directors playing a pivotal role in overseeing climate-related issues. Their active involvement ensures that climate considerations are integrated into strategic decision-making and corporate operations, aligning with best practices in corporate governance.

1.2 Scope and Objectives

The Programme is designed to integrate the low-carbon agenda into KMG's development strategy, aiming to significantly reduce GHG emissions. This integration reflects KMG's commitment to ambitious climate goals and sustainable development, focusing on achieving substantial emissions reductions by 2060.

1.2.1 Key Focus Areas

To achieve these ambitions, the Programme focuses on:

1. Analysing existing potential for GHG emissions reduction and setting climate goals for KMG.
2. Identifying critical areas for decarbonization and measures to achieve these goals.
3. Enhancing capacity and awareness within KMG to support these efforts.
4. Providing a detailed emissions reduction roadmap to guide KMG towards its 2060 carbon-neutral target.

1.3 Strategic Importance

By embedding the low-carbon agenda into its strategic framework, KMG aims to enhance its investment attractiveness and competitiveness, especially in the context of the global energy

transition. This strategic importance underscores KMG's commitment to sustainable growth and resilience in a rapidly evolving energy landscape.

2 ABBREVIATIONS

AEGS	Autonomous Electric Generating Station
BAT	Best available techniques (technologies)
CAPEX	Capital Expenditure
CBAM	Carbon Border Adjustment Mechanism
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Utilisation and Storage
CDP	Carbon Disclosure Project
CI	Capital Investments
CH_4	Methane
CHP	Combined heat and power plant
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
EAEU	Eurasian Economic Union
EE	Energy efficiency
EPA	Environmental Protection Authority
ESG	Environmental, social, and corporate governance
ETS	Emissions Trading System
EU	European Union
EUC	European Union carbon credits
Eud	Specific energy intensity of production units. products
FER	Fuel and energy resources
GDP	Gross domestic product
GHG	Greenhouse gases
GW	Gigawatt
GWP	Global Warming Potential
HCF	Hydrocarbon feedstock
HP	Heat pumps
IATA	International Air Transport Association
ICP	Internal Carbon Pricing
IEP	Integrated environmental permit
IOC	International Oil Company
IOGP	International Association of Oil and Gas Producers
IPCC	Intergovernmental Panel on Climate Change
I-REC	International Renewable Energy Certificate
JV	Joint Venture
Kee	Energy efficiency factor of installation/equipment
KIUM	Installed capacity utilisation factor
KMG	JSC NC "KazMunayGas"
kT	Thousand (kilo) tonne
KZQ	Carbon unit of the Kazakhstan Emissions Trading System
KazSTV	Kazakhstan's emissions trading system
LCDC	Low Carbon Development Concept
LCDP	Low Carbon Development Programme
LDAR	Leak Detection and Repair
LRF	Linear reduction factor
ME	Ministry of Energy of the Republic of Kazakhstan
MEGPR	Ministry of Ecology, Geology & Natural Resources of the Republic of Kazakhstan
MIST	Methane Inventory Systematic Tool
MNE	Ministry of National Economy of the Republic of Kazakhstan
MRV	Monitoring, Reporting, and Verification
MT	Million (mega) tonne
NDC	Nationally determined contribution
NGFS	Network for Greening the Financial System
NGPP	New Gas Processing Plant
OCA	Operational Carbon Accounting
OGMP	Oil & Gas Methane Partnership

OPEX	Operational expenditure
PS	Pumping station
RCP	Representative Concentration Pathways
RES	Renewable Energy
RS	Resource saving
RSE	Republican State Enterprise
SAF	Sustainable Aviation Fuel
SEZ	Special Economic Zone
SDCq	Subsidiary and dependent organization
SDGs	Sustainable Development Goal
SEAP	Sustainable Energy and Climate Action Plan
TCFD	Taskforce on Climate-related Financial Disclosures
toe	Tonne of oil equivalent
thousand m3	Thousand cubic meters
UN	United Nations
UNDP	United Nations Development Programme
URUT	Specific consumption of equivalent fuel
USA	United States of America
VRU	Vapour Recovery Unit
WHO	World Health Organization
WTO	World Trade Organization

3 CONTEXT

Due to the increasing attention of the world community to the global problems of climate change, climate regulation is tightening worldwide.

3.1 International Climate Policy

The international climate policy landscape is shaped by a complex interplay of global agreements, national commitments, and corporate strategies to address the urgent challenge of climate change. As climate change poses significant risks to ecosystems, economies, and societies, international policies have become pivotal in guiding the transition towards sustainable and low-carbon development.

These policies set the framework for reducing GHG emissions and influence the strategic priorities of nations and corporations alike, driving innovation and adaptation in response to evolving environmental challenges.

3.1.1 International Policy - Paris Agreement

The Paris Agreement, adopted in 2015, is a landmark accord in the global effort to combat climate change. It represents a collective commitment by nearly every nation to limit global warming to well below 2°C above pre-industrial levels, with efforts to limit the temperature increase to 1.5°C.

This agreement has stimulated international climate action, influenced national policies, and set the stage for subsequent climate agreements and initiatives. The Paris Agreement has encouraged countries to enhance their climate commitments over time, fostering a global movement towards sustainable development by establishing a framework for transparent reporting and review of climate actions.

3.1.2 Global Carbon Regulation Trends

Recent trends in global carbon regulation reflect a growing emphasis on accountability and sustainability within corporate strategies. Governments worldwide increasingly implement stringent carbon regulations, including carbon pricing mechanisms, emissions trading systems, and mandatory disclosure requirements.

These regulatory trends are reshaping the business landscape, compelling companies to align their operations with evolving standards to maintain competitiveness and mitigate regulatory risks. As companies navigate these changes, they adopt innovative strategies to reduce their emissions, enhance energy efficiency, and invest in low-carbon technologies, contributing to the broader goal of decarbonizing the global economy.

3.2 Kazakhstan's Climate Commitments

Kazakhstan has been actively engaged in international climate policy to address the challenges of GHG emissions. By ratifying the Kyoto Protocol in 2009 and the Paris Agreement in 2016, Kazakhstan committed to reducing its GHG emissions by 15% by 2030, compared to 1990 levels. These commitments reflect the country's dedication to playing a significant role in global climate action.

3.2.1 Kazakhstan's Current Commitment and National Climate Strategy

In 2023, Kazakhstan adopted a comprehensive strategy for achieving carbon neutrality by 2060. This strategy outlines a long-term vision for modernizing the economy and reducing carbon intensity based on modelling various development scenarios for critical economic sectors. The strategy is complemented by corporate business programmes for low-carbon development, which aim to support government measures in transitioning to a low-carbon economy. A detailed Roadmap is being developed to guide the implementation of this strategy across different sectors.

Kazakhstan joined the Global Methane Pledge in 2023, committing to a collective reduction of methane emissions of 30% by 2030, compared to 2020. This initiative aims to slow global

warming by 0.2°C by 2050. Nationally, a Methane Emissions Management Programme is expected to be adopted, setting clear goals and state policies for methane regulation.

3.2.2 Kazakhstan's Regulatory Framework

The regulatory framework in Kazakhstan has evolved to support its climate commitments. A new edition of the Environmental Code came into force on July 1, 2021, introducing a state environmental policy focused on applying Best Available Techniques (BAT) in industry. This policy encourages industrial enterprises to adopt technologies and processes that minimize environmental impact while ensuring economic and technical feasibility. The transition to this new regulatory approach aims to modernize production, enhance energy efficiency, and significantly reduce GHG emissions.

By a government decree dated April 19, 2023, Kazakhstan adopted an updated Nationally Determined Contribution (NDC) to the global climate response. The NDC emphasizes introducing energy-efficient and low-carbon technologies across various sectors, developing renewable energy sources, sustainable natural resource use, climate change adaptation, and participation in international initiatives and research.

3.3 Review of Climate Policies

Understanding different approaches to climate regulation worldwide is crucial for assessing their impact on Kazakhstan's operating activities and shaping its climate strategies.

3.3.1 Comparison of Major Economies

To provide a clearer understanding of the diverse strategies employed by leading global economies, the table 1 summarizes the main approaches in climate policy adopted by the European Union, the United States, and China.

Table 1: Main Approaches in Climate Policy of the EU, USA and China

EUROPEAN UNION	USA	CHINA
Emission Reduction Targets		
Carbon neutrality by 2050. **Reduce emissions by 55% by 2030,** compared to 1990. Commitment at the EU level to reduce GHG emissions by 40% of total emissions by 2030.	**Carbon neutrality** by 2050. **Reduce emissions by 50-52%** by 2030, compared to 2005. Electricity production completely without CO_2 emissions by 2035.	**Carbon neutrality** by 2060. **Reduce CO_2 emissions per unit of GDP by more than 65%** compared to 2005. **Peak emissions** by 2030.
Legislative Measures		
European Green Deal. Includes measures to reduce emissions, develop renewable energy sources, improve energy efficiency, support green technologies, and support sustainable agriculture. ***Indicators:*** emissions reduction by 55% by 2030, the share of renewable energy sources by 42.5% by 2030. **Emissions Trading System (ETS)**. A carbon market where companies buy and sell emissions credits. **Renewable Energy Directive (RED II)**. Sets binding national targets for the share of renewable energy sources	**Inflation Reduction Act 2022.** Includes measures to reduce emissions, support clean energy, and provide subsidies and tax credits for renewable energy sources. ***Indicators :*** emissions reductions of approximately 40% by 2030. **Clean Energy Act Air Act.** Regulates emissions of pollutants, sets air quality standards, and controls emissions of GHG. Indicators**:** air quality standards, emission standards. **Federal Fuel Economy (CAFE) Standards.** Regulates vehicle emissions. Indicators: Fuel efficiency will increase to 50.4 mpg by 2031, with a 2% increase between 2027 and 2031**.**	**Nationally Determined Contribution.** Includes measures to develop renewable energy sources, reduce emissions, and improve energy efficiency. ***Indicators****:* share of renewable energy sources 25% by 2030, by 2060 increasing the share of non-fossil fuels in primary energy consumption to more than 80%. **The National Air Pollution Control Plan.** Regulates emissions of pollutants into the atmosphere. Indicators: reducing PM 2.5 concentration by 18% by 2025 compared to 2020 and keeping the number of days with heavy pollution to less than 1%. **Carbon Neutrality Action Plan.** Includes measures to achieve carbon neutrality by 2060. ***Indicators****:* emissions reduction by 65% by 2030, compared to 2005.
Investments		
EUR 1 trillion for the period 2021-2027. **Just Transition Fund (EUR 40 billion).**	**Inflation Reduction Act, USD369 billion** for climate and energy initiatives.	**CNY 2.8 trillion (circa USD391 billion)** in key renewable energy projects under construction or recently launched.

EUROPEAN UNION	USA	CHINA
Sustainable Finance Facility, InvestES, European Green Deal Investment Plan	**Greenhouse Gas Reduction Fund, USD 27 billion (2024).**	
Regulation of Methane Emissions		
EU Methane Reduction Regulation (2024). ▪ Improved measurement, reporting and verification (MRV) of methane emissions in the energy sector. ▪ Leak Detection and Reporting (LDAR). ▪ Ban on ventilation and flaring. ▪ Require transparency of methane imports.	**EPA Rules (2024).** ▪ LDAR with different frequencies depending on the complexity of the object (allows third-party measurements). ▪ Regulatory requirements of various departments for tanks, pneumatics, torches, compressors. ▪ New EPA methane emissions fee. Operators will pay a fee (USD 900 per ton in 2024) of emissions that exceed sector-specific intensity values (fee increases per year, no import requirements).	**Methane Action Plan (2023).** ▪ Improving the measurement, reporting and verification (MRV) of methane emissions in the energy sector, agriculture, and waste management. ▪ Accelerating the creation of regulatory systems, standards and policies.
Renewable Energy		
Investments in wind (500 GW of installed capacity until 2030), **solar** (600 GW) **and hydropower,** support for private projects.	**USD369 billion to develop renewable energy sources,** stimulate solar and wind energy. Indicators**:** 80% renewable energy production by 2030, 100% clean electricity by 2035.	**Projects to increase the capacity of solar and wind power plants, hydropower.** Indicators**:** share of RES 50% by 2030, increase in RES capacity by 50% by 2030; total wind and solar power capacity to more than 1.2 million MW by 2030.
Adaptation Measures to Climate Change		
EU Adaptation Strategy. ***Indicators****:* increase investment in adaptation by 25% by 2025 and protect biodiversity in 30% of the EU territory by 2030.	**National system of resilience to climate change.** **The President's Emergency Plan for Adaptation and Resilience** (PREPARE). ***Indicators****:* Target for construction of zero-emission buildings by 2045.	**National Strategy for Adaptation to Climate Change.** **Actions to promote a healthy environment.** ***Indicators****:* Increasing energy efficiency ensuring energy for all.
CCUS (Carbon Capture and Storage)		
CCUS development projects. **EU Zero Industry Law.** ***Indicators****:* capture 50 MT of CO_2/year by 2030.	**Infrastructure Investment and Jobs Act.** USD12 billion in new investment to support CCUS. **Bipartisan Infrastructure Act.** USD2.5 billion in CCUS technology funding. ***Indicators****:* capture 128 MT of CO_2 by 2030.	**Plans of Sinopec Corp (CCUS).** ***Indicators****:* creating a CCUS research and development centre by 2025, building two more carbon capture plants by 2025.
Hydrogen Energy		
European Hydrogen Strategy. ***Indicators****:* production of 10 MT of hydrogen and import of 10 MT of renewable hydrogen by 2030.	**US National Clean Hydrogen Strategy and Plan.** ***Indicators****:* production of 10 MT of pure hydrogen per year until 2030, 20 MT per year until 2040, and 50 MT per year until 2050. Reducing the cost of hydrogen production to USD1 per kilogram by 2030.	**Hydrogen Energy Development Plan for 2021-2035 (China Hydrogen Union).** ***Indicators****:* Annual hydrogen production from renewable energy sources will reach 100 - 200 kT /year by 2025.
SAF (Sustainable Aviation Fuel)		
The European Union has proposed requiring fuel suppliers to include SAF in aviation fuel supplied to EU airports from 2025 at 2%, increasing this figure to 5% from 2030, and up to 63% in 2050.	**Intergovernmental Program SAF Grand Challenge.** ***Indicators:*** by 2030, produce 3 billion gallons of SAF (approximately 15%), and completely replace fossil fuels with SAF by 2050.	**The Civil Aviation Administration of China** has mandated the use of 50 kT tons of SAF in China by 2025, roughly equivalent to 0.1% of the total jet fuel used in the country in 2019. By 2050, SAF use will reach 2.5 MT/year.
Transport (Including Electric Transport and Air Transport)		
Strategy "Smart and Sustainable Mobility". ***Indicators****:* 30 million cars with zero emissions and readiness of aircraft with zero emissions by 2030, reducing emissions from transport by 90% by 2050.	**Federal Sustainable Development Plan.** ***Indicators****:* 100% of new car sales with zero emissions by 2030.	**National Plan for Developing Electric Transport.** ***Indicators****:* Reduce CO_2 emissions from transport by 80% by 2050, compared to the level of 2015 by 2035. Electric vehicles will become the main focus of new car sales, and the passenger sector will be fully electrified.

3.4 Barriers and Challenges

Several challenges and barriers exist, particularly in relation to the emissions trading system (ETS) and related policies. The Ministry of Ecology & Natural Resources of the Republic of Kazakhstan is working on developing Nationally Determined Contributions (NDCs) for 2030-2035. However, despite the existence of Kazakhstan's emissions trading system (KazETS) since 2013, which includes subsidiaries and dependent organizations of KMG, notable limitations are affecting its effectiveness.

The national plan for the distribution of GHG Emission Quotas for 2022-2025, a vital instrument of the quota trading system, targets large installations in energy-intensive sectors with emissions exceeding 20kT of CO_2 per year. Since 2021, a linear reduction coefficient of at least 1.5% per year has been applied. The draft national plan for 2025-2030 proposes a more ambitious reduction of 2.5% to 4.5%.

Despite these efforts, several limitations and gaps persist, as outlined in Table 2.

Table 2: The Primary Limitations and Problems of KazETS

Limitations	
Quotas and Limits:	*Established limits:* There is a set limit on the amount of CO_2 emissions, which is gradually being reduced. However, current quotas may not be stringent enough to reduce emissions. *Free quota distribution:* Most allowances are distributed free of charge, reducing the economic incentive for companies to reduce emissions.
Administrative Sanctions:	*Low fines:* Fines for exceeding quotas are relatively low, making the financial penalty small compared to the costs of reducing emissions.
Comprehensiveness and Transparency:	*System complexity:* The system can be challenging to understand and comply with, especially for new entrants to the market. *Transparency:* Lack of transparency in monitoring and reporting can lead to underreporting of emissions and reduced confidence in the system.
Gaps	
Technical Support and Infrastructure:	*Lack of developed infrastructure:* The lack of Monitoring, Reporting and Verification (MRV) infrastructure makes quota enforcement and trading difficult. *Lack of technical support:* Many companies lack access to modern technologies and methods to reduce emissions effectively.
Economic Incentives:	*Low cost of quotas:* The cost of allowances remains low, reducing the economic incentive for companies to invest in reducing emissions. This may also lead to speculation and a lack of liquidity in the market. *Cap-and-trade restrictions:* Legal entities where more than fifty per cent of shares (shares in the authorized capital) belong to the state cannot carry out wholesale trade in carbon units, which leads to a deficit or surplus of carbon quotas.
Limited Participation:	*A limited number of participants:* The ETS covers a limited number of sectors and companies, reducing the system's overall impact. Only large companies that emit more than 20kT of CO_2 per year participate in the system, which excludes many small and medium-sized enterprises.
Control and Execution Mechanisms:	*Weak execution mechanisms:* The lack of strict enforcement and monitoring mechanisms can lead to unscrupulous practices and unreliable GHG emissions data.

These challenges indicate a pressing need for reforms to enhance the effectiveness of the KazETS and achieve Kazakhstan's GHG reduction goals.

3.5 Climate Policies of Peer Oil and Gas Companies

After examining the strategic directions of the world's leading oil and gas corporations in an evolving market, it is evident that these companies are at various stages in their development and adoption of approaches to the energy transition. This diversity in progress reflects the evolving technology and commercialization aspects inherent in each company's operations (Table 3).

Table 3: Main Initiatives for Decarbonization by Major International Oil Companies (IOC)[1]

Target	Company	Directions for Decarbonization					
		RES	**CCUS**	**Reducing CO_2 Emissions**	**Reducing GHG Emissions**	**Hydrogen Energy**	**SAF**
Carbon Neutrality by 2050	**Total Energies**	Bring renewable energy assets to 25 GW by 2025	Creation of CCUS cluster by 2030 for more than 10 MT / year	Zero emissions across Total's global operations by 2050	Reduction to less than 38 MT of CO2e by 2025	By 2030, produce 1 MT of green hydrogen / year	-
	B.P.	By 2030, the increase in renewable energy capacity from 2.5 GW in 2019 to 50 GW	Technology development	Reduce emissions by 415 MT	-	-	By 2030, biofuel production will go from 22 thousand barrels / day to more than 100 thousand barrels / day
	Equinor	Increase renewable energy capacity 10 times by 2026 to 12-16 GW	Technology development	Reducing CO2 emissions below 8 kg / barrel of oil by 2025	Zero GHG emissions targeted by 2050	-	-
	Repsol	Bringing the target renewable energy capacity by 2025 from 3 to 7.5 GW	Technology development	Reducing CO2 emissions by 10% by 2025, 20% by 2030 and 40% by 2040.	Reduce methane leaks to zero	Integration of renewable energy sources into the production of green hydrogen by 2025	-
	Chevron	Increasing renewable energy assets to 12 GW by 2028	Storing up to 25 MT of CO2 by 2030	Reduce CO2 emissions by 30% by 2028	Reduce methane emissions by 50% by 2028	Green hydrogen pilot projects by 2028	Production of 1 million barrels per year by 2030
Zero Emissions by 2050	Shell	Construction in 2024 of an energy storage system with a capacity of 200 MW/capacity of 400 MWh	Technology development	-	Achieve net zero emissions no later than 2050	The company plans to begin implementing green hydrogen production	-
Eni's Long-term Strategic Development Plan until 2050	**Eni**	Growth of renewable energy capacity to 55 GW by 2050	Implement CCS projects over 40 MT by 2050	Reducing CO2 emissions by 80% by 2050	Reducing methane emissions by 80% by 2050	Increasing biofuel production to 5 MT	

The decarbonization strategies of significant oil and gas companies worldwide reveal that industry leaders, such as Total Energies, BP, and Equinor, have set ambitious targets to achieve carbon neutrality by 2050. Similarly, numerous other prominent companies, including PetroChina, Saudi Aramco, Exxon Mobil, Shell, ADNOC, and SOCAR, are committed to reaching net-zero emissions.

3.6 Strategic Framework to Address Gaps

This LCDP provides the strategic framework necessary for KMG to address the gaps between its current carbon reduction target of a 15% decrease by 2030, based on 2019 levels, and the more ambitious global goals set by leading oil and gas companies. This framework is designed to enhance KMG's efforts and position the company as a leader in decarbonisation.

[1] The listed companies are major IOCs and also have assets in Kazakhstan.

4 CLIMATE RISK EXPOSURE

In its commitment to understanding and addressing climate-related risks, KMG has conducted a detailed assessment of both physical and transitional risks at corporate and asset levels. This assessment is crucial for informing KMG's LCDP and ensuring the company is well-prepared to navigate the complexities of climate change.

4.1 Physical Climate Risk Assessment

KMG has conducted a detailed assessment of physical climate risks, employing several scenarios known as Representative Concentration Pathways (RCPs). These RCPs are climate change scenarios developed by the Intergovernmental Panel on Climate Change (IPCC) to project future GHG concentrations and their potential impacts on the climate. Each RCP represents a different trajectory of radiative forcing values by 2100, reflecting varying levels of GHG emissions and subsequent climate impacts.

- **RCP 2.6**: A low-emission future scenario aiming to limit global warming by implementing stringent climate policies.
- **RCP 4.5**: An intermediate emissions scenario representing moderate mitigation efforts.
- **RCP 8.5**: A high emission future scenario, assuming continued increases in GHG emissions without significant mitigation efforts.

The analysis focused on crucial climate risk factors, including cold snaps, rising average temperatures, precipitation patterns, floods, extreme weather conditions (such as wind speed), and drought. These factors were selected because they could potentially impact KMG's operations and assets.

The findings revealed that KMG's assets are particularly vulnerable to two primary climate risk factors:

- **Temperature**: Rising average temperatures can decrease worker productivity and increase energy demand for cooling buildings and structures.
- **Drought**: If water supplies become limited in affected regions, water shortages could significantly impact operations.

The analysis indicates that the physical impacts of these risk factors are likely to intensify over time, varying according to each *scenario.* Table 4 below summarises the physical risks, consequences, and proposed mitigation measures.

Table 4: List of Physical Climate Risks and Mitigation Measures

Physical Climate Risks	**Consequences**	**Mitigation Measures Undertaken / Planned by KMG**
Long periods of abnormally high/low air temperatures	1. Deterioration in workers' health, increasing the likelihood of injuries and deaths. 2. Decrease in labour productivity 3. Increased labour costs due to reduced staff working hours due to high/low temperatures. 4. Increased operating costs	To mitigate the effects of prolonged periods of high or low temperatures, a company can take the following measures: 1. Provide adequate heating and air conditioning to maintain a comfortable temperature for employees and equipment. 2. Regularly maintain equipment to avoid overheating or freezing in extreme conditions. 3. Ensure sufficient insulation of buildings and premises to prevent freezing water pipes, heating systems, and electrical equipment. 4. Establish regular and systematic checks for adequate weather protection to avoid property damage and business loss. 5. Provide timely information to employees and clients about upcoming weather changes and recommendations on behaviour in such conditions. In addition to these measures, the risk management team will develop specific action plans and procedures to quickly respond to extreme temperature emergencies and minimize business impacts.
Extreme risks are caused by the increased severity of extreme weather events (floods, landslides, mudflows, storms, winds, hurricanes, and wave impact on fixed offshore platforms).	1. Accelerated wear/damage to production facilities/technological equipment. 2. Stop production 3. Increased likelihood of injury and death	
Systematic (chronic) risks caused by long-term changes in climate patterns (extended periods of abnormally high/low air temperatures, increased likelihood and severity of fires, precipitation		

Physical Climate Risks	Consequences	Mitigation Measures Undertaken / Planned by KMG
intensity, humidity and air speed, sea level rise/decrease, drought)		
Lack of water for technological processes	1. Stop production 2. Increased costs for providing water for technological processes	1. Implement a water reuse system to minimize fresh water consumption. 2. Investing in water purification and disinfection technologies to improve the efficiency of using a limited resource. 3. Develop emergency water supply plans to ensure the continued operation of technological processes in the event of a water supply problem. 4. Conducting employee training on the efficient use and conservation of water in production. 5. Monitor and control water flow to identify and eliminate leaks and other sources of loss. 6. Cooperation with government agencies and foreign organizations to develop and implement innovative water resource management solutions. 7. Carrying out environmental activities and campaigns to reduce water use among the population and other companies.

4.2 Transitional Risk Assessment

KMG faces transitional risks encompassing regulatory changes, market dynamics, and technological advancements. These risks are expected to evolve, and KMG is committed to continuously reviewing and managing them to adapt to changing exposures.

To analyse these risks, KMG employed a set of scenarios from the Network for Greening the Financial System (NGFS):

- **NDCs**: This scenario includes all committed policy measures, even if they have not yet been implemented.
- **Below 2°C**: In this scenario, the severity of climate policy gradually increases, providing a 67% chance of limiting global warming to below 2°C.
- **Delayed Transition**: This assumes that global annual emissions will not decrease until 2030, necessitating decisive policy action to limit warming to below 2°C, with limited negative emissions.
- **Net Zero 2050**: An ambitious scenario that limits global warming to 1.5°C through robust climate policies and innovation, achieving net-zero emissions by 2050.

The analysis considered various transition risks, including regulatory, market, technological, supply chain, financial, operational, reputational, legal, and workforce-related risks.

The three indicators to which KMG's assets are most vulnerable include:

- **Prices for Carbon Emissions**: Fluctuations in carbon pricing can significantly affect operational costs and financial planning.
- **Primary Energy Sources**: Changes in the availability and cost of primary energy sources can impact production and supply chain dynamics.
- **Number of Purchased Allowances**: The need to purchase carbon allowances can increase financial burdens, affecting KMG's bottom line.

KMG recognizes the importance of proactively managing these transitional risks and will continue to monitor and adapt its strategies to address evolving challenges in transitioning to a low-carbon economy. Table 5 below summarizes the identified transitional risks, their consequences, and proposed mitigation measures.

Table 5: List of Transitional Climate Risks

Transitional Climate Risks	Consequences	Mitigation Measures Undertaken / Planned by KMG
Tightening legislation on reporting GHG emissions, including methane emissions	1. Additional costs for purchasing carbon credits 2. Payment of environmental fines 3. Stop production	1. KMG regularly monitors GHG emissions and quantifies direct and indirect emissions in accordance with international standards and guidelines, such as the GHG Protocol and ISO 14064.

	4. Additional costs for compliance	2. KMG have committed to the Oil & Gas Methane Partnership 2.0 (OGMP), to accelerate the reduction of methane emissions. 3. In addition, KMG plans to expand its work on climate risk and opportunity analysis in accordance with the Taskforce on Climate-related Financial Disclosures (TCFD) requirements. 4. KMG plans to maintain dialogue with regulators and participate in developing new standards and legislation to reduce GHG emissions.
Changes in demand for oil/petroleum products due to customers switching to goods/services with a low carbon footprint	1. Decrease in income 2. Overstocking	1. Develop and introduce new products and services with a low carbon footprint to meet customers' demand for switching to such products. 2. Invest in technology development to reduce carbon emissions and improve the efficiency of producing petroleum products with a low carbon footprint. 3. Improved marketing strategies with an emphasis on environmental responsibility to attract more customers interested in products with a low carbon footprint 4. Train and retrain staff to work with new technologies and products that meet the requirements of customers moving to low-carbon products. 5. Interaction with government and public organisations to assist in developing and implementing environmental standards for producing petroleum products. 6. Conduct awareness campaigns to customers and the public about the importance of switching to low-carbon footprint products and services and the environmental benefits. 7. Constant monitoring of changes in demand and analysis of market trends to quickly adapt company strategies to new customer requirements.
An increase in the cost of goods/services of suppliers (due to the use of technologies/raw materials with increased/lower emissions), for example, an increase in electricity tariffs	Additional costs.	1. Developing a strategy for diversifying the supply of goods/services to reduce dependence on a single supplier. This will help reduce the risk of rising prices for products/services and maintain KMG's competitiveness. 2. Optimisation of production processes to reduce energy costs. Introducing energy-saving technologies and increased energy efficiency will help reduce the negative impact of increasing electricity tariffs on KMG's financial performance. 3. Negotiating with suppliers to establish long-term contracts with fixed prices. This will allow resolution of the cost of goods/services for a certain period and avoid sudden increases in costs. 4. Develop a marketing strategy to increase company profits by increasing prices for goods/services. Focusing on product quality, unique features, and advantages over competitors will help retain customers and offset price increases.
Lack of legislative and permitting standards for the implementation of low-carbon projects	Potential cancellation of projects	1. Conduct an analysis of the risks and possible consequences of violating missing standards for the project to prevent problems. 2. Collaborate with government agencies, public organizations and other stakeholders to develop rules and regulations at the industry level.
Negative decisions on judicial and arbitration disputes, can lead to a decrease in reputation	1. Fines, orders. 2. Additional compliance requirements. 3. Additional costs	1. Careful study of the circumstances of the case and development of a strategy to minimise negative consequences. 2. Maintaining an open dialogue with stakeholders and providing full information about the progress of the process. 3. Using opportunities for mediation and agreeing to an out-of-court dispute settlement with the other party. 4. Contact professional lawyers and consultants to develop the best strategy for protecting KMG's interests. 5. Develop an action plan in the event of a negative court or arbitration decision, including the possibility of appeal. 6. Compliance with the principles of corporate responsibility and transparency in relations with stakeholders.

4.3 Strategy for Adapting KMG Assets to Climate Change

Climate change increasingly impacts KMG's key assets and production processes. To ensure business resilience, prevent potential risks, and minimize the impact of climate change, the company is developing and implementing an asset adaptation strategy considering regional climate risks. The strategy aims to protect infrastructure and ensure the stability of the company's operations in the long term.

KMG conducts a systematic assessment of climate risks, considering physical and transitional factors that can impact the company's activities. Within this approach, the following risks are analyzed:

- **Physical risks:** temperature increases/decreases, changes in precipitation patterns, increased frequency and intensity of extreme weather events (storms, floods, droughts, etc.).
- **Transitional risks:** tightening climate regulations, changes in carbon policies, the introduction of new environmental standards, and the transition to low-carbon technologies.

Risk assessments are conducted considering regional climatic conditions and the vulnerability of specific production assets. For each region of Kazakhstan, where the company's production facilities are located, an analysis of current and projected climatic conditions is conducted to identify potential threats and develop measures to mitigate them.

4.3.1 Adapting Infrastructure and Operational Processes

As part of the climate change adaptation strategy, KMG will implement the following measures:

- **Strengthening infrastructure:** Modernizing production capacities and infrastructure facilities to increase their resilience to climate risks. This includes building protective structures against floods, improving cooling and ventilation systems at facilities exposed to temperature increases, and reinforcing engineering structures in areas with a high risk of earthquakes.
- **Investing in sustainable technologies:** Transitioning to new, more climate-resilient technologies, including energy-efficient and environmentally friendly production processes. Implementing "green" technologies and the best available techniques (BAT) will be a priority to enhance the company's environmental and economic sustainability.
- **Creating emergency response systems:** Developing and implementing response plans for extreme weather events, such as storms or abnormal temperatures, to minimize downtime and losses associated with force majeure climatic circumstances.

4.3.2 Managing Transitional Risks

KMG is intensifying its efforts to reduce its carbon footprint and prepare for potential changes in regulatory frameworks and climate policy requirements:

- **Monitoring and Compliance with Legislation:** Adapting the company’s operations in line with stricter climate regulations, including emission standards and new sustainability norms.
- **Implementing Carbon Pricing Mechanisms:** Developing and integrating internal carbon accounting and trading systems to effectively manage carbon obligations and minimize financial risks.

4.3.3 Scenario Modelling of Climate Risks

The company will implement a scenario modeling system to assess the impact of various climatic conditions on production assets in the long term. Scenario modeling will include:

- **Optimistic Scenario:** Assessing the impact of minor climate changes on key assets and minimal adaptation measures.
- **Pessimistic Scenario:** Developing an action plan for high levels of climate risk, including extreme weather events and significant deterioration of climatic conditions.

The results of the modeling will allow the company to prepare adaptive measures for various climate scenarios, thereby minimizing the impact of risks on the company’s operations.

4.3.4 Leveraging global experience

The adaptation strategy is based on the best international practices in business adaptation to climate change, accumulated by the oil and gas and other sectors. In this regard, KMG focuses on the successful practices of leading global companies to reduce climate risks:

- **Applying Best Available Techniques (BAT)** to minimize climate impact.
- **Developing Climate Risk Management Programs** based on international standards and recommendations (including TCFD and CDP).

4.3.5 Supporting Innovation and Continuous Improvement

KMG aims to actively promote innovations aimed at adapting to climate change and integrate them into its operations. In this regard, the company plans to:

- **Promote Scientific Research and Development:** Collaborate with international experts, research institutions, and technological partners to create and implement new technologies that facilitate asset adaptation to climate change. Research in energy efficiency, emissions reduction, and climate risk management will be priority areas for R&D investments.

- **Support the Implementation of Innovative Solutions:** Implement advanced technologies in energy efficiency, water conservation, emissions monitoring, and sustainable resource management. The implementation of Best Available Techniques (BAT) and climate risk management practices will be a key element of the company's asset modernization program.

- **Create a Knowledge and Experience Sharing Platform:** Support internal and external educational initiatives that help develop a culture of climate risk awareness. KMG will conduct regular training programs for employees to enhance competencies in climate change adaptation and build the company's capacity to manage climate challenges.

- **Improve Climate Risk Management Processes:** Continuously enhance its operations by using cyclic management approaches that involve continuous monitoring and adjustment of adaptation measures based on changing climatic conditions and updated information.

KMG views innovation and continuous improvement as integral parts of its climate change adaptation strategy. Supporting innovation, investing in R&D, developing internal capabilities, and closely collaborating with external partners will enable the company to successfully address climate challenges and ensure the resilience of its assets in the long term.

KMG's climate change adaptation strategy will be based on continuous monitoring of climate changes and regular assessment of the effectiveness of the measures taken. Periodic updates to the strategy will be made considering new data on climate risks and technological innovations, as well as analysis of best global practices. This will allow the company to respond timely to changes and maintain high resilience in the face of global climate challenges.

Integrating adaptive measures into the company's core activities will ensure its long-term stability and compliance with international climate policy commitments. KMG will continue to invest in sustainable infrastructure development and innovative solutions to minimize climate risk impact and ensure the successful achievement of carbon neutrality goals by 2060.

5 KMG GREENHOUSE GAS EMISSION INVENTORY

5.1 Methodology for GHG Emissions Analysis

The KMG group has implemented a system for monitoring, accounting, and verifying GHG data. The company aims to conduct comprehensive GHG inventories, analyzing both direct and indirect emissions throughout the entire product lifecycle.

The inventory encompasses:

Scope 1 Emissions: These include direct carbon dioxide equivalent (CO_2e) emissions resulting from the combustion of hydrocarbon fuels, inevitable fugitive emissions (leaks), and emissions from production facilities and processes. **Methane emissions**, a significant component of natural gas are closely monitored due to their contribution to climate change. This scope is crucial for reporting purposes and aligns with established guidelines. Scope 1 emissions account for approximately 14% of the KMG GHG inventory, as detailed in Section 5.5.1.

Scope 2 Emissions: This scope captures indirect CO_2e emissions associated with the consumption of electricity, thermal energy, hot water, and steam supplied from external sources. These emissions are significant for understanding the energy footprint of KMG's operations. Scope 2 emissions account for approximately 5% of the KMG GHG inventory, as detailed in Section 5.5.2.

Scope 3 Emissions: In this category of GHG emissions, other indirect emissions are assessed that occur along the value chain of the produced goods outside the company's boundaries. The assessment of Scope 3 indirect GHG emissions is carried out in accordance with the GHG Protocol Corporate Value Chain Accounting and Reporting Standard.

Currently KMG reports on five key categories within Scope 3 as defined by the GHG Protocol, reflecting indirect emissions across its value chain:

- Category 3: Other indirect emissions from energy consumption, including electricity losses during transmission.
- Category 6: Emissions from business travel and employee commutes.
- Category 7: GHG emissions from employee transportation to and from work.
- Category 9: Emissions from the transportation and delivery of finished products.
- Category 11: Emissions from the use of goods and services sold by KMG.

Scope 3 emissions account for over 80% of the KMG GHG inventory, as detailed in Section 5.5.3.

5.2 GHG System Boundaries

KMG is the leading vertically integrated oil and gas company in Kazakhstan. It manages assets across the entire production cycle, from hydrocarbon exploration and production to transportation, processing, and service provision.

The company represents the interests of the Republic of Kazakhstan in the country's oil and gas industry.

KMG's GHG inventory model encompasses subsidiaries and affiliates under its operational control, subject to national GHG emissions regulations.

The assessment includes all subsidiaries and affiliates, grouped according to their primary activities into four key areas and encompasses 22 subsidiaries.

- **Oil Production and Gas**: This category includes Ozenmunaigas JSC, Embamunaigas JSC, Kazakhturkmunai LLP, Urikhtau Operating LLP, Dunga Operating GmbH, Mangistaumunaigaz JSC, Kazgermunai JV LLP, Karazhanbasmunai JSC, Kazakhoil Aktobe LLP, and Ural Oil and Gas LLP.

- **Oil Refining and Petrochemicals**: This includes Pavlodar Petrochemical Plant LLP, Atyrau Oil Refinery LLP, JV CASPI BITUM LLP, PetroKazakhstan Oil Products LLP (PKOP), Kazakhstan Petrochemical Industries Inc. LLP (KPI), and Kazakh Gas Processing Plant LLP, KMG International (Refineries «Petromidia», «Vega»).
- **Oil Transportation**: This is represented by KazTransOil JSC, Batumi Oil Terminal Ltd.
- **Oilservice companies:** OzenMunaiService LLP, Oil Construction Company LLP, Oil Services Company LLP.

5.3 Exclusions

The inventory boundaries exclude foreign assets, subsidiaries and affiliates under financial control, and joint ventures (non-operated), focusing solely on those under operational control.

Emissions from three major projects (Kashagan, Tengiz, Karachaganak) are not included in the scope of the Program, as KMG does not have operational control over these projects and is not a majority shareholder. North Caspian Operating Company N.V., LLP Tengizchevroil, and Karachaganak Petroleum Operating B.V. have their own strategies to reduce their carbon footprint by 2060.

Other subsidiaries' installations emit less than 20 kT per year and are not subject to regulation under national legislation, and therefore are not included in the scope of the LCDP. Scope 2 includes emissions from oil service companies: OzenMunaiService LLP, Oil Construction Company LLP, Oil Services Company LLP, Batumi Oil Terminal LLC and KMG Corporate Centre.

Installations of other subsidiaries and affiliates emitting less than 20kT CO_2 per year are not included in the analysis, as they fall outside the scope of national regulation.

In addition, Scope 3 emissions have been quantified in Section 5.5.3, however the focus of this plan is on mitigating Scope 1 and 2 emissions.

5.4 GHG Baseline Year

The baseline year for the GHG inventory is 2019. This year was selected because it best represents typical operations of the KMG Group, unlike 2020, which was impacted by the coronavirus (COVID) pandemic, and 2021, which was influenced by the post-COVID economic crisis. By establishing 2019 as the baseline, KMG ensures a stable reference point for measuring and managing its emissions over time.

5.5 GHG Forecast (Scope 1 & 2)

The total Scope 1 and 2 GHG forecast (Figure 1) provides a comprehensive overview of KMG's direct and indirect emissions. Under the basic scenario, emissions are projected to follow production, reflecting the ongoing operational activities across KMG's vertically integrated oil and gas operations. This analysis serves as a baseline for understanding current emission levels and informs future strategies for emissions reduction.

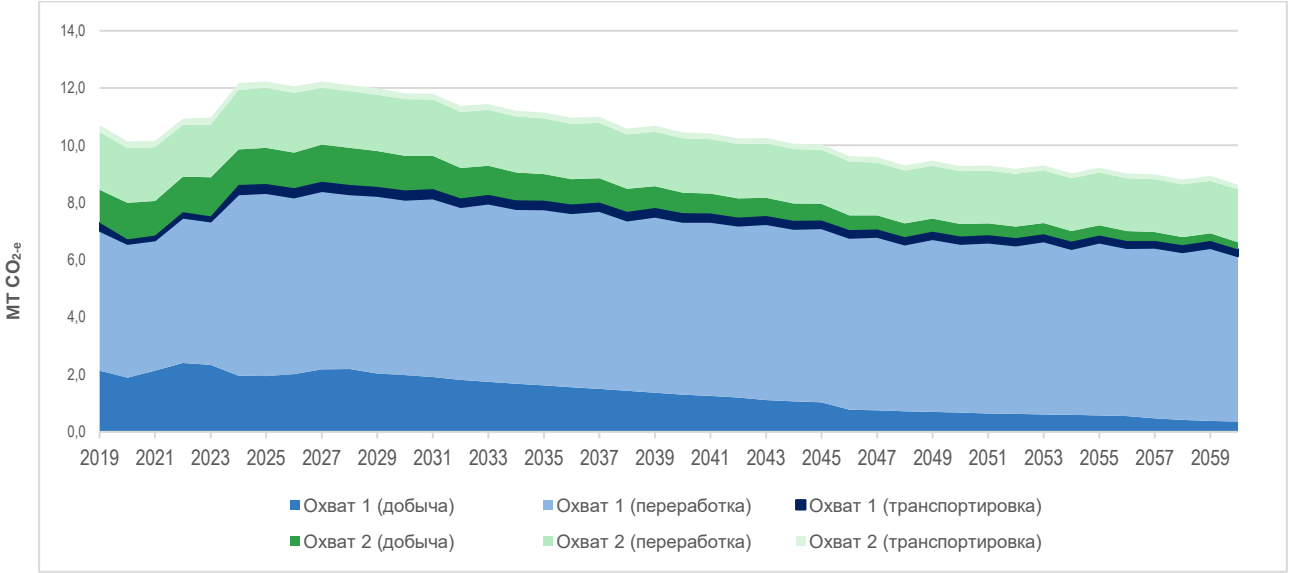

Figure 1: KMG GHG Emission Forecast (basic)

5.5.1 Scope 1 Emissions

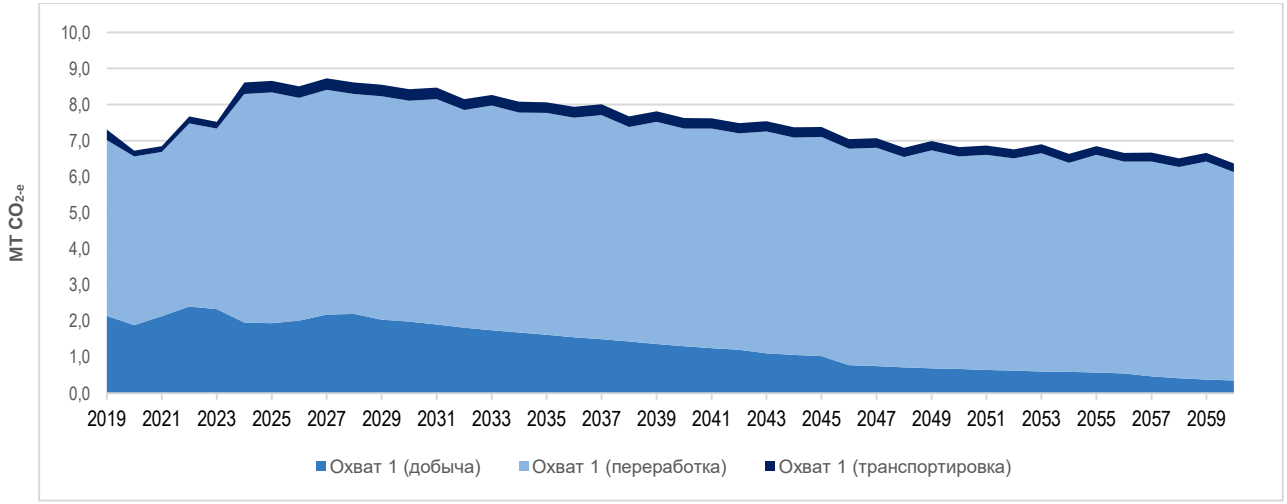

Figure 2: KMG GHG Scope 1 Emission Forecast by Segment (basic)

The main contribution to Scope 1 comes from the oil and gas production segment (Fig. 2), where emissions are closely tied to production levels. As reserves deplete, both production and emissions are expected to gradually decrease. However, during periods of increased activity, such as the anticipated peak gas production at LLP «Uriktau Operating» and LLP «Ural Oil and Gas» from 2026 to 2029, a temporary increase in emissions is projected.

The oil refining and petrochemical segment also accounts for a significant share of Scope 1 emissions. Although refineries operate on a tolling basis and process oil from various sources, emissions in this segment are expected to remain stable, reflecting steady processing volumes.

According to forecasts, the capacity of LLP «JV CASPI BITUM» is planned to increase 1.5 times, from 1 million to 1.5 MT per year.

Additionally, LLP «Kazakhstan Petrochemical Industries» began operations in 2023, with its emissions expected to remain stable at 0.8 MT of CO_2e annually until 2060.

5.5.1.1 Methane Emissions

Methane is a significant component of KMG Scope 1 emissions. Due to the lack of regulation of methane quotas in Kazakhstan, there are no official statistics on methane emissions.

KMG subsidiaries and affiliates estimate methane leaks using calculation methods with averaged coefficients. KMG acknowledges that the current emission factor-only approach may underrepresent methane emissions from leaks at the facility level. This recognition highlights the potential for methane emissions to be larger than previously quantified. To address this, the Methane Mitigation Measures identified in Section 7.1.3 aim to provide further granularity (baseline determinations) on methane emissions at a facility level.

Recent calculations, conducted in partnership with Carbon Limits (Norway) using the Methane Inventory Systematic Tool (MIST) software for the 2023 reporting year, indicate that methane emissions from KMG's production assets, including MMG, OMG, EMG, KBM, KOA, KTM, KGM, KazGPZ, and KazTransOil, amounted to 70.75 kT of CH_4. When converted to carbon dioxide equivalent (CO_2e), these emissions total approximately 1.98 MT of CO_2e, based on a 100-yr Global Warming Potential (GWP) of 1 kT CH_4 equal to 28 kT CO_2e.

The breakdown of methane emissions by segment is as follows:

- Oil Production: 66.88 kT of CH_4 (1.87 MT of CO_2e).
- Gas Processing (KazGPZ LLP): 3.66 kT of CH_4 (0.10 MT of CO_2e).
- Transportation (KazTransOil JSC): 0.21 kT of CH_4 (0.01 MT of CO_2e).

Emissions from the Refining segment were not included due to the recommendations of the OGMP 2.0, which exclude oil refining facilities from reporting.

The primary sources of methane emissions include leaks (fugitive emissions), hydrocarbon storage tanks, well operations (testing, drilling, repairs, well injection), compressors (centrifugal, reciprocating), gas flaring, and combustion. Through the adoption of methane mitigation measures as detailed in Section 7.1.3, the contribution of methane-related emissions to the overall GHG forecast is provided in Figure 3.

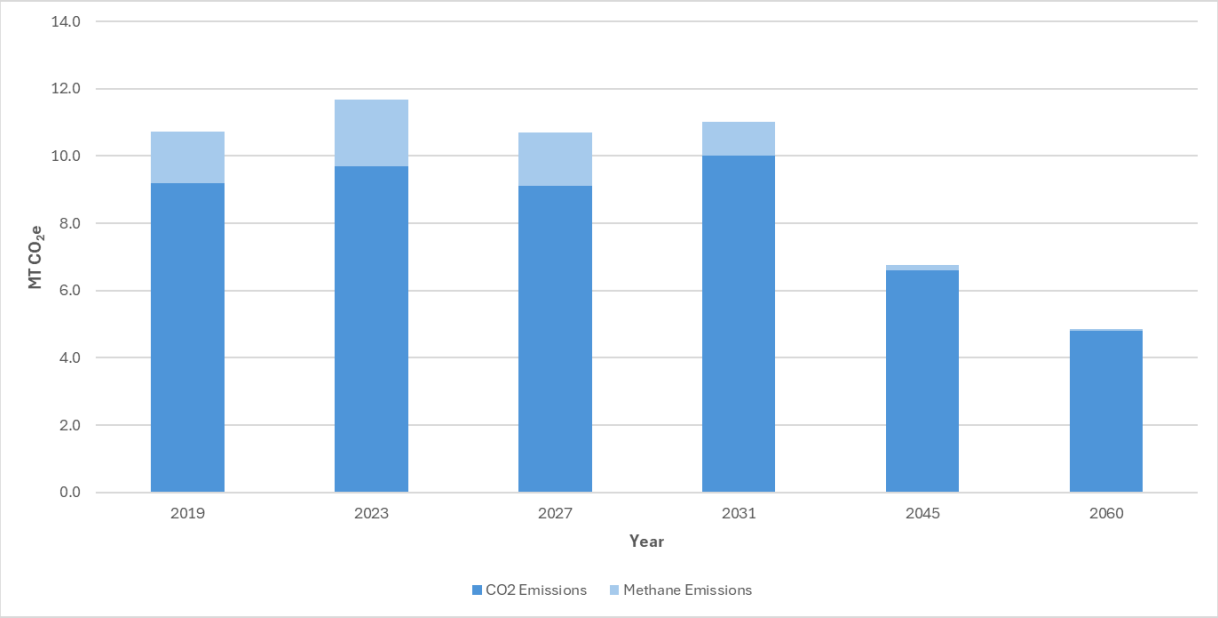

Figure 3: KMG Methane Emissions Contribution with Proposed Mitigation Measures

KMG submitted its first OGMP report and developed a comprehensive implementation plan to address methane emissions, as detailed in Section 7.1.3. This plan outlines strategic measures for improving emissions estimation methodologies and enhancing leak detection and repair programmes, reinforcing KMG's commitment to reducing methane emissions as part of its broader LCDP.

5.5.2 Scope 2 Emission Forecast

Scope 2 emissions, which encompass indirect emissions from purchased electricity, heat, and steam consumption, are projected to exhibit varying trends across different segments (Figure 34).

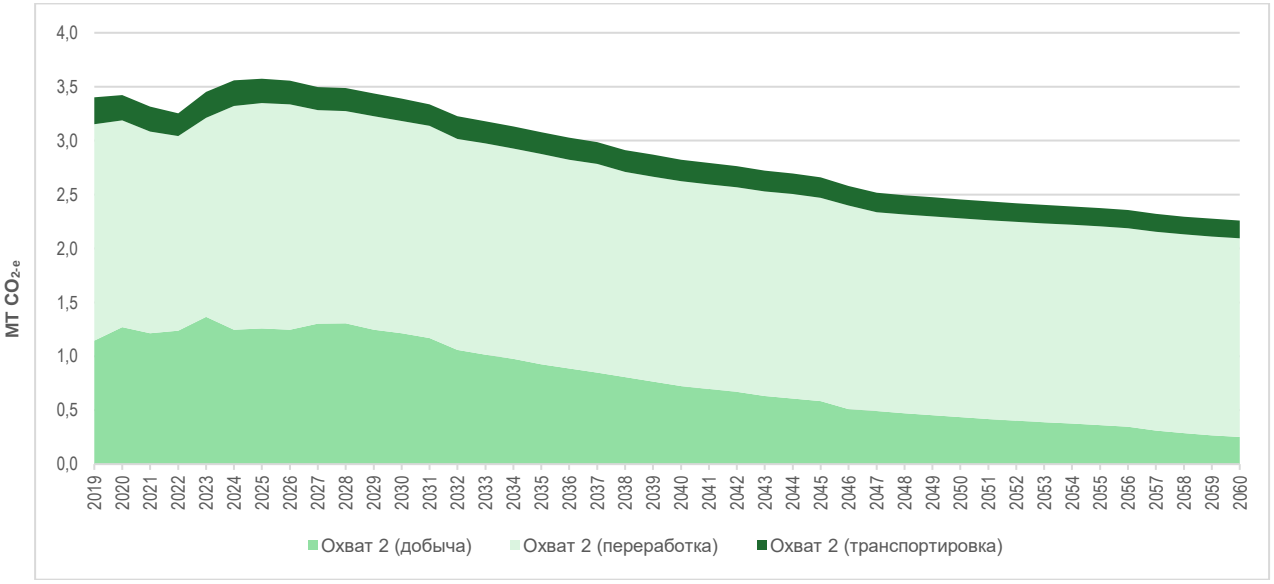

Figure 4: KMG GHG Scope 2 Emission Forecast by Segment (basic)

For the Oil and Gas Production segment, indirect emissions are expected to maintain their growth trajectory until 2028, after which they will decline. This anticipated reduction aligns with the broader trend of decreasing production levels due to reserve depletion.

In the refining and petrochemicals segment, indirect emissions are projected to increase slightly from 2024, with emissions gradually declining until 2060.

5.5.3 Scope 3 Emissions

KMG assesses Scope 3 emissions to evaluate the energy efficiency and carbon footprint of individual supply chain segments throughout the product lifecycle. This comprehensive assessment is crucial for understanding the broader climate impact of KMG's activities and identifying opportunities to reduce its carbon footprint (Figure 5).

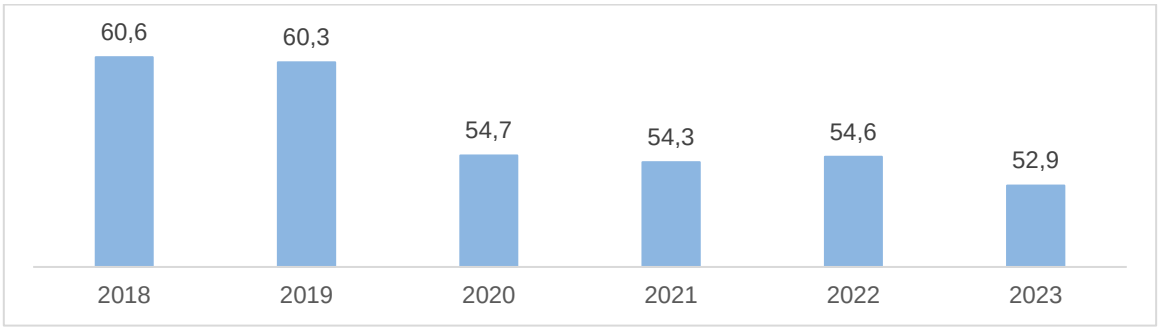

Figure 5: The dynamics of indirect GHG emissions for Scope 3 from 2018 to 2023, MT CO2

From 2018 to 2021, the calculation of emissions of Scope 3 for the KMG Group was limited to category 11 "Use of sold products", including hydrocarbons and fuels. From 2022 to 2023, the assessment was expanded to 5 categories out of 15, considering the specifics of assets and the inapplicability of some GHG Protocol categories. However, emissions from Category 11 contribute the most to the total Scope 3 emissions, reflecting the primary activities of the KMG Group, focused on hydrocarbons and fuel.

The calculation of Scope 3 emissions for Kazakhstani assets is based on the use of products from upstream companies, since KMG refineries operate according to a toll-free scheme. In the future, it is planned to improve the monitoring of emissions by increasing the categories.

When calculating Scope 3 for international assets, the Rompetrol plant in Romania is considered, but the volumes of the Vega plant are not included, since the raw materials are supplied from the Petromidia plant. The evaluation of products is carried out on the principle of "clean" production, with the exception of technological losses and products not used as fuel.

Segment-wise, the "Refining" category accounts for the largest share of Scope 3 emissions, constituting 63% of the total volume. This highlights the significant impact of refining on KMG's carbon footprint and underscores the importance of implementing strategies to improve energy efficiency and reduce emissions in this segment. As KMG continues to refine its Scope 3 emissions assessment, efforts are being made to reduce uncertainty and errors in the data, ensuring more accurate and reliable reporting.

6 LOW CARBON SCENARIO MODELLING

6.1 KMG Low Carbon Development Scenarios

From the point of view of practical implementation, directions for reducing GHG emissions can be presented in three main scenarios:

- Realistic scenario,
- Green scenario and
- Deep decarbonization scenario.

The modelling used approaches to determine baseline GHG emissions, considering KMG's current production plans (in terms of oil production and refining), opportunities to improve operational efficiency, and pilot projects for deep decarbonization of operations (including hydrogen and CCUS projects). These approaches are described below in three specific simulation scenarios.

REALISTIC DEVELOPMENT SCENARIO

A realistic development scenario involves reducing CO2e emissions by implementing measures:

- to improve operational efficiency and energy efficiency,
- implementing two renewable energy projects with a total capacity of 1.28 GW in the Mangystau and Zhambyl regions.

Key measures to improve the operational efficiency of KMG subsidiaries and affiliates are:

- **Implementation of an Energy Management System** - electricity and heat supply at production subsidiaries and affiliates;
- **Optimization of furnaces and track heaters** - a programme to control parameters and increase the efficiency of fuel consumption;
- **Mechanical asset optimization programme** - optimization of the sizes and operating modes of pumping and auxiliary equipment to increase the efficiency of electricity consumption;
- **Improving the efficiency of NP3** - defining efficiency targets (EII) and programmes to achieve them, increasing the efficiency of furnaces;
- **Reduction of burning fuel oil at NP3** - increasing the share of gas combustion at the refinery;

The consolidated effect of implementing measures to improve energy efficiency and two renewable energy projects is to reduce emissions by 2060 by 48% from the 2019 level *(from 10.7 million to 5.5 million tCO2e).*

GREEN DEVELOPMENT SCENARIO (ENERGY EFFICIENCY, RES and OFFSET PROJECT)

The green development scenario assumes a reduction in CO2-e emissions through the implementation of:

• energy efficiency and energy saving measures at subsidiaries and affiliates;

• implementation of two renewable energy projects with a total capacity of 1.28 MW in the Mangistau and Zhambyl regions;

• 1 forest-climatic pilot offset project;

• projects for the construction of renewable energy facilities, purchasing from the market the required volume of electricity produced by renewable energy sources.

The consolidated effect of the implementation of measures of the energy efficiency improvement program, renewable energy sources and the offset project allows for a reduction in CO2 emissions by 2060 by 58% of the 2019 level *(from 10.7 million to 4.5 million tCO2).*

DEEP DECARBONIZATION SCENARIO (INNOVATION AND OFFSETS)

The deep decarbonization scenario assumes several directions for reducing GHG emissions:

1. Reducing emissions by implementing measures to improve operational efficiency, including energy efficiency measures and methane emission reductions.
2. Reducing emissions through new facilities implemented at the corporate level and helping to reduce the carbon footprint of the Group as a whole. This scenario considers the construction of renewable energy facilities, and purchase from the market of the required volume of electricity produced by renewable energy sources;
3. Reduction of emissions due to CCUS, development of hydrogen energy and production of SAF;
4. Offsetting the carbon footprint through carbon sequestration, through forestry offset projects and the purchase of offset units and certificates.

Until 2060, KMG is considering maximizing the reduction of direct and indirect GHG during its production activities and offsetting the remaining unavoidable emissions through offset mechanisms, including projects to absorb carbon from the atmosphere (*Figure 6)*.

Potentially, unavoidable GHG emissions can be offset through the large-scale implementation of carbon capture and storage projects, an active offset policy, the implementation of forest climate projects, and the development of hydrogen energy and SAF production.

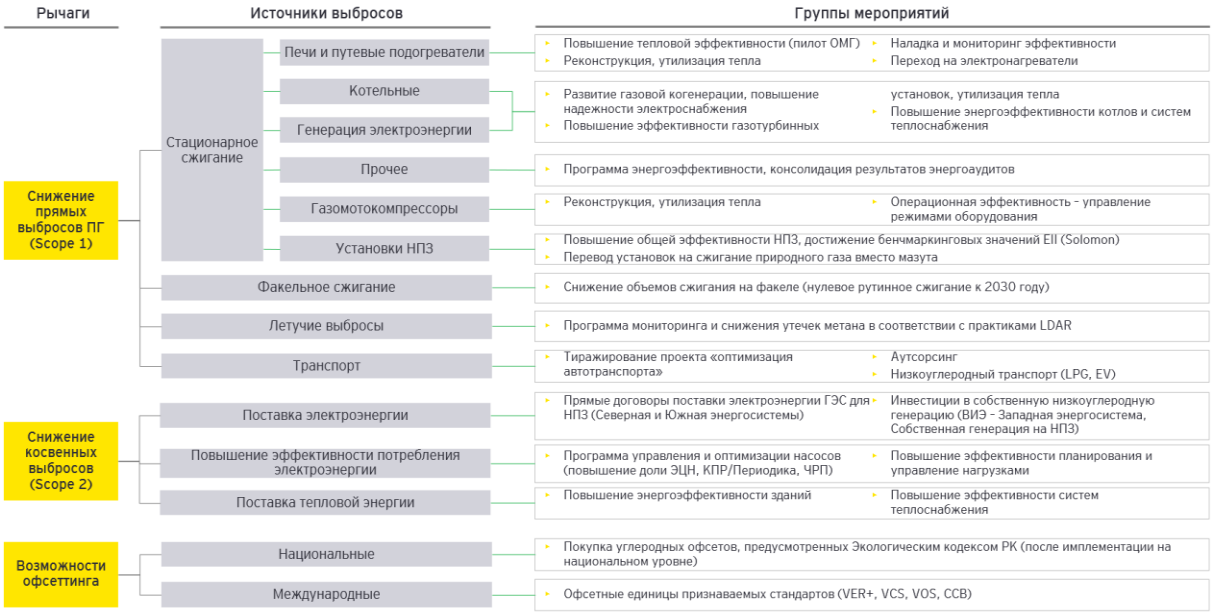

Figure 6: Main Decarbonization Levers for KMG Emission Sources

The deep decarbonization scenario will reduce CO2 emissions by 64% by 2060 compared to 2019 levels (from 10.7 million to 3.9 million CO2-eq).

6.2 Scenarios for Reducing Methane Emissions

Given Kazakhstan's commitment to the Global Methane Pledge and the anticipated adoption of a national Methane Management Programme, it is crucial for KMG to proactively consider scenarios for reducing methane emissions. This involves setting reduction targets and establishing state policies for methane regulation. By forecasting these scenarios now, KMG can align its strategies with national objectives and ensure compliance with forthcoming regulations.

KMG has evaluated two distinct scenarios for methane reduction:

1. **Base Case Scenario**: This scenario focuses on regular monitoring and leak elimination. By implementing these measures, KMG aims to reduce methane emissions by 80% by 2060.
2. **Green Development Scenario**: This more ambitious approach involves implementing a comprehensive Leak Detection and Repair (LDAR) programme at all production subsidiaries and affiliates and as well as the implementation of technical solutions to reduce methane emissions. Under this scenario, KMG projects significant emissions reductions starting in 2030. By 2045, KMG aims to achieve a 92% reduction in methane emissions from 2024 levels, with a further decrease to 98% by 2060.

These scenarios are examined in greater detail below. By adopting this proactive approach, KMG will be well-positioned to effectively manage methane emissions and contribute significantly to national and global climate change mitigation efforts.

6.2.1 BASE CASE (BUSINESS AS USUAL)

KazMunayGas, within the framework of the OGMP 2.0 Partnership, strives to achieve the "gold" standard for reporting methane emissions for 3 years at operated asserts and for 5 years at non-operated asserts. To do this, you need to use your own emission factors based on measurements at the source level.

In the coming years, KMG plans to implement a methane Leak Detection and Repair program (LDAR) at all of its upstream facilities and gas processing plant. This includes the purchase of special equipment, staff training and regular monitoring, with measurements carried out every six months or at least once a year.

According to preliminary data, LDAR programs can reduce methane emissions by 40-70%. The cost estimate will be refined as the methane emissions management program improves and a deeper understanding of the requirements for its implementation at various enterprises is gained.

6.2.2 GREEN DEVELOPMENT SCENARIO

The green development scenario includes measures to implement LDAR and long-term investment-cost measures. These include vapor recovery installations at hydrocarbon storage tanks and gas recovery systems at wells.

In this scenario, vapor recovery systems are planned to be installed in stages at tank farms, at each of the seven production subsidiaries and affiliates, in a phased approach.

Implementing a programme to detect and eliminate LDAR methane leaks at all production subsidiaries and affiliates and installing vapor recovery systems at all tank storage facilities is forecast to have the potential to reduce methane emissions by 92% (approximately 1.8 MT CO_2e) by 2045 from the 2024 level. By 2060, it has the potential to reduce emissions by up to 98% (approximately 1.9 MT CO_2e).

6.3 KMG Scenario Summary

The green development scenario (energy efficiency and renewable energy sources) is the most acceptable from the point of view of supporting KMG’s decarbonization strategy in the face of uncertainty in the country’s carbon regulation and pricing agenda. The scenario is devoid of the risk of unnecessary investments in technologies that may potentially not be in demand in the future and achieves the stated goal of reducing GHG emissions (-15% by 2030 from the base level of 2019) with simultaneously reducing energy costs, increasing the service life of capital equipment and reliability of energy supply. Through leveraging proven technology, significant reductions in methane emissions in the near-term will support this accelerated green development scenario.

At the same time, promising areas of decarbonization, such as the introduction of CCS technologies, hydrogen energy, forest climate projects, etc., should be tested in pilot mode to build competencies and their potential for subsequent scaling if favourable conditions arise.

Considering the results of the above scenarios, it is proposed to focus on the deep decarbonization scenario.

7 KEY AREAS OF KMG LOW-CARBON DEVELOPMENT

KMG has developed a comprehensive low-carbon pathway that aligns with Kazakhstan's national climate goals and global decarbonization efforts.

This strategy is based on thoroughly analysing KMG's operations, country policies, and long-term industry forecasts. KMG's deep decarbonization scenario outlines an ambitious yet pragmatic approach to significantly reducing its carbon footprint while maintaining its role as a key energy provider in Kazakhstan (*Figure 7)*.

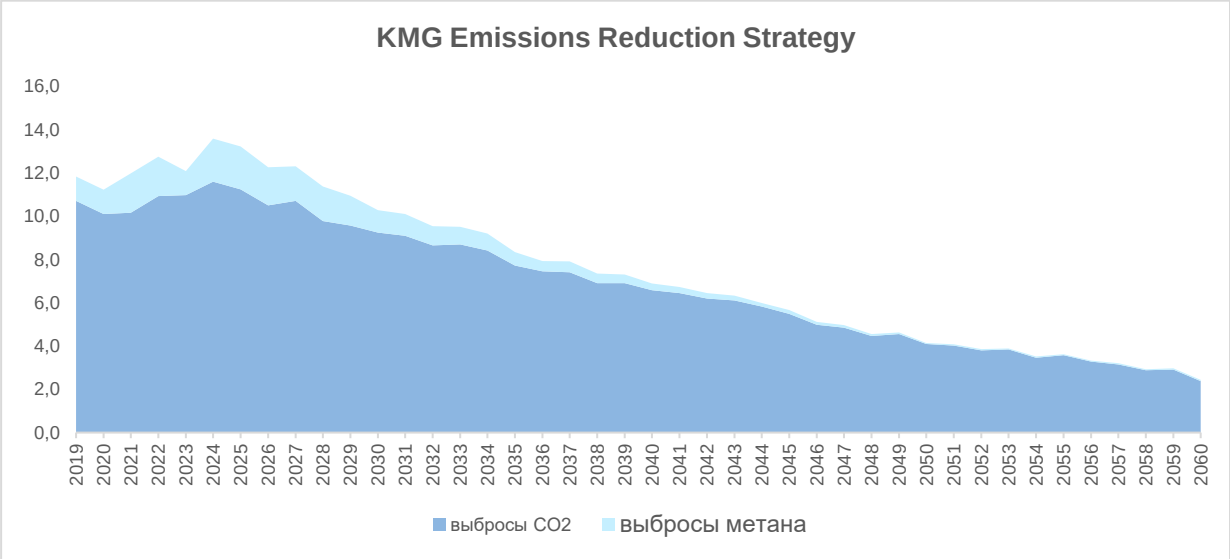

Figure 7: Reduction of KMG emissions under the deep decarbonisation scenario, mln $_{CO2\text{-}eq}$

Based on the detailed scenario analysis conducted and considering national policies and the company's growth projections, KMG has established the following strategic targets for emission reductions until 2060. (Table 6)

Table 6: Strategic Guidelines for Reducing Emissions Under a Deep Decarbonization Scenario

№	Indicator Name	Base Year (2019)	Indicator (2023)	Short-Term Goal (2027)	Medium-Term Goal (2031)	Medium-Term Goal (2045)	Long-Term Goal (2060)
Key indicator							
1	Reduction of direct (Scope 1) and indirect (Scope 2) CO2 emissions*	10.7 million tons CO2-e	10.9 million tons CO2-e +2%	10.7 million tons CO2-e 0%	9.1 million tons CO2-e **-15%***	6.2 million tons CO2-e **-43%***	3.4 million tons CO2-e **-64%***
2	Reduction of methane emissions	54.2 ktons CH4 (1.52 mln tons CO2-e)	70.5 ktons CH4 (1.98 mln tons CO2-e)	56.9 ktons CH4 (1.59 mln tons CO2-e) **(-20%)**	36 ktons CH4 (1.01 mln tons CO2-e) **(-32%)**	6.0 ktons CH4 (0.17 mln tons CO2-e) **(-88%)**	2.0 ktons CH4 (0.06 mln tons CO2-e) **(-96%)**
Target benchmarks							
3	Reduction of carbon intensity	-	+2%	-0%	-15%	-40%	-60%
	Oil production**	147 tons CO2-e / k tons of oil	198 tons CO2-e /k tons of oil	155 tons CO2-e / ktons of oil	130 tons CO2-e / ktons of oil	88 tons CO2-e / ktons of oil	52 tons CO2-e / ktons of oil
	Gas production***	-	-	0.18 tons CO2-e/ thousand m³ of gas	0.15 tons CO2-e / thousand m³ of gas	0.13 tons CO2-e/ thousand m³ of gas	0.09 tons CO2-e / thousand m³ of gas
	Major refineries	330 tons $CO_{2\text{-}e}$ / k tons of oil	328 tons $CO_{2\text{-}e}$ / k tons of oil	302 tons $CO_{2\text{-}e}$ / k tons of oil	264 tons $CO_{2\text{-}e}$ / k tons of oil	208 tons $CO_{2\text{-}e}$ / k tons of oil	152 tons $CO_{2\text{-}e}$ / k tons of oil
	Romanian refineries	189 tons $CO_{2\text{-}e}$ / k tons of oil	237 tons $CO_{2\text{-}e}$ / k tons of oil	196 tons $CO_{2\text{-}e}$ / k tons of oil	163 tons $CO_{2\text{-}e}$ / k tons of oil	118 tons $CO_{2\text{-}e}$ / k tons of oil	80 tons $CO_{2\text{-}e}$ / k tons of oil
	Bitumen production	54,4 tons $CO_{2\text{-}e}$ / k tons of oil	71 tons $CO_{2\text{-}e}$ / k tons of oil	53 tons $CO_{2\text{-}e}$ / k tons of oil	47 tons $CO_{2\text{-}e}$ / k tons of oil	37 tons $CO_{2\text{-}e}$ / k tons of oil	27 tons $CO_{2\text{-}e}$ / k tons of oil
	Transportation	9,3 tons $CO_{2\text{-}e}$ / k tons of oil	9,6 tons $CO_{2\text{-}e}$ / k tons of oil	12 tons $CO_{2\text{-}e}$ / k tons of oil	10 tons $CO_{2\text{-}e}$ / k tons of oil	8 tons $CO_{2\text{-}e}$ / k tons of oil	6 tons $CO_{2\text{-}e}$ / k tons of oil

№	Indicator Name	Base Year (2019)	Indicator (2023)	Short-Term Goal (2027)	Medium-Term Goal (2031)	Medium-Term Goal (2045)	Long-Term Goal (2060)
	*KazGPZ gas processing***	0,28 tons $CO_{2\text{-}e}$ / thousand m3 of gas	0,35 tons $CO_{2\text{-}e}$ / thousand m3 of gas	0,16 tons $CO_{2\text{-}e}$ / thousand m3 of gas	0,14 tons $CO_{2\text{-}e}$ / thousand m3 of gas	0,18 tons $CO_{2\text{-}e}$ / thousand m3 of gas	-
	KPI gas processing	-	-	1032 tons $CO_{2\text{-}e}$ / thousand m3 of gas	930 tons $CO_{2\text{-}e}$ / thousand m3 of gas	771 tons $CO_{2\text{-}e}$ / thousand m3 of gas	562 tons $CO_{2\text{-}e}$ / thousand m3 of gas
4.	Reduction of methane intensity [2]	3,28 tons CH_4 / thousand toe	3,28 tons CH_4 / thousand toe	2,62 tons CH_4 / thousand toe	1,6 tons CH_4 / thousand toe	0,51 tons CH_4 / thousand toe	0,29 tons CH_4 / thousand toe
5	Reduction of energy intensity	-	+2%	-0%	-15%	-40%	-60%
	*Oil production***	2225 MJ/ toe HCF	2682 MJ/ toe HCF	2 574 MJ/ toe HCF	1 810 MJ/ toe HCF	1 183 MJ/ toe HCF	573 MJ/ toe HCF
	*Gas production****	-	-	2 086 MJ / thousand m3 of gas	1 470 MJ / thousand m3 of gas	1 298 MJ / thousand m3 of gas	896 MJ / thousand m3 of gas
	Major refineries	3580 MJ/ton of oil	3641 MJ/ton of oil	4 445 МДж/ т нефти	3 164 MJ/ton of oil	2 578 MJ/ton of oil	1 748 MJ/ton of oil
	Bitumen production	650 MJ/ton of oil	1025 MJ/ton of oil	751 MJ/ton of oil	550 MJ/ton of oil	445 MJ/ton of oil	302 MJ/ton of oil
	Transportation	120,9 MJ/ton of oil	102,0 MJ/ton of oil	125 MJ/ton of oil	91 MJ/ton of oil	73 MJ/ton of oil	50 MJ/ton of oil
	*KazGPZ gas processing****	-	-	3 563 MJ / thousand m3 of gas	2 607 MJ / thousand m3 of gas	3 281 MJ / thousand m3 of gas	-
	KPI gas processing	-	-	16 080 MJ / thousand m3 of gas	12 095 MJ / thousand m3 of gas	9 950 MJ / thousand m3 of gas	6 766 MJ / thousand m3 of gas
6	Share of renewable energy in KMG's electricity consumption from the base level	0,005%	0,089%	10%	15%	40%	50%
7	Injection using CCUS technology	-	0	0	9.0 ktons CO2	421.0 ktons CO2	421.0 ktons CO2
8	CO2 injection in blue hydrogen production	-	0	0	-	172.0 ktons CO2	172 .0 ktons CO2
9	SAF production	-	0	0	40 ktons / year	710 ktons / year	1440 ktons / year
10	Routine flaring	0,43%	0,3%	0,25%	0% (29,8 ktons CO2-e)	0% (29,8 ktons CO2-e)	0% (29,8 ktons CO2-e)
11	Implementation of the Leak Detection and Repair (LDAR) Program in KMG's production subsidiaries	0%	0%	100% coverage of subsidiaries	100% coverage of subsidiaries	100% coverage of subsidiaries	100% coverage of subsidiaries
12	Implementation of forest climate projects	0	0	1600 ha	1600 ha (7-14 k tons CO2-e / year)	11600 ha (50-60 k tons CO2-e / year)	11600 ra (50-60 k tons CO2-e / year)
13	Implementation of energy management service	Partial coverage of subsidiaries	Partial coverage of subsidiaries	50% coverage of subsidiaries	100% coverage of subsidiaries	100% coverage of subsidiaries	100% coverage of subsidiaries
14	A climate rating CDP*****	C awareness of impacts and climate issues	C awareness of impacts and climate issues	B/B- implementation of modern best practices	B/B- implementation of modern best practices	A/A- implementation of modern best practices	A implementation of modern best practices
15	Annual allocation of funds for low-carbon projects	0	0	not less 2% of CI	not less 10% of CI	not less 20% of CI	not less 30% of CI

** The indicator will be adjusted with the commissioning of new projects (expansion of PKOP, the joint development project of Kalamkas sea - Khazar fields, and the construction of a gas separation complex by LLP "PetroChem").*

*** - calculation for 7 oil production subsidiaries;*

**** - calculation for 2 gas production subsidiaries, LLP "Uriktau Operating", LLP "Ural Oil and Gas";*

***** gas processing at LLP "KazGPZ" until 2046 and increase associated with the reduction in gas processing volumes.*

****** CDP is the most authoritative non-profit organization that assesses companies' environmental performance, strategy, corporate governance, and risk management systems related to climate change issues. CDP climate ratings, which are assigned to companies based on their assessment of their reports, are published by leading research agencies along with financial information and are taken into account by investors when evaluating assets.*

[2] The IOGP industry average for CH4 emissions intensity for 2022 was 0.5 tons of CH4 per 1000 toe HCF produced.

7.1 Emission Mitigation Measures

KMG has identified several key emission mitigation measures that will be instrumental in achieving our low-carbon pathway. These measures are designed to address the most significant sources of emissions across our operations while leveraging emerging technologies and best practices in the energy sector. By implementing these measures, KMG aims to meet its decarbonization targets and position itself as a leader in sustainable energy production in Kazakhstan and the broader region.

7.1.1 Recommendations for Subsidiaries and Affiliates to Achieve Target Indicators

Given the current scenario where the annual reduction in energy intensity is only 0.4%, it is imperative to adopt enhanced strategies to achieve significant improvements. The following recommendations outline the main directions for consistently reaching target indicators:

- **Optimize Energy Management**: Establish a dedicated energy management service to streamline processes and improve efficiency.
- **Personnel Training**: Conduct training programmes to enhance the skills of personnel responsible for operating technological furnaces and boilers and adjusting combustion modes.
- **Experience Exchange**: Facilitate the exchange of expertise among specialists directly involved in improving energy efficiency across enterprises.
- **Automated Systems**: Implement automated systems for the accounting and managing of fuel and energy resources to ensure accuracy and efficiency.
- **Breakthrough Projects**: Assess the applicability of innovative projects on the assets of specific subsidiaries and affiliates to drive progress.
- **Best Available Technologies (BAT)**: Integrate BAT to optimize operations and reduce emissions, including methane reduction technologies such as LDAR.
- **Research and Development**: Introduce new technologies through research and development and pilot projects to foster innovation.
- **Project Working Groups**: Form working groups to develop implementation concepts and present them to company management for approval.
- **Thermal Integration**: Conduct pinch analysis of process installations to enhance thermal integration and process efficiency.
- **Regular Energy Audits**: Conduct energy audits every five years and develop action plans to improve energy efficiency.
- **Modernization Efforts**: Modernize mechanical stock and optimize transport equipment to enhance overall performance.

Key Results to be Achieved by 2060:

1. **GHG Footprint Reduction**: Achieve GHG footprint levels that meet or exceed established targets.
2. **System Harmonization**: Align the automated energy management system with production processes for seamless integration.
3. **Policy Implementation**: Implement a comprehensive policy to improve energy efficiency, including tools to motivate KMG employees to propose rationalization ideas.
4. **Framework Optimization**: Optimize the regulatory and technical framework to enhance energy consumption and resource-saving practices.

By implementing these strategic measures, subsidiaries and affiliates can significantly contribute to KMG's overall energy efficiency goals and sustainability objectives. Section 8 details the reporting framework KMG will utilise to provide transparency of action and progress against these recommendations.

7.1.2 Development of Renewable Energy in KMG

In the future, further development of the renewable energy sector in Kazakhstan is expected as part of achieving the goals of increasing the share of alternative and renewable types of energy in the country's energy balance to 15% by 2030 and up to 50% by 2050 according to the Concept of Kazakhstan's transition to a green economy and the "Strategy Kazakhstan - 2050". These goals contribute to the realization of Kazakhstan's untapped potential in the field of renewable energy sources.

According to the Ministry of Energy of the Republic of Kazakhstan, the resource potential of renewable energy sources in Kazakhstan is assessed by the following indicators:

- Wind energy - 920 billion kWh / year;
- Hydro potential - 62 billion kWh /year;
- Solar energy - 356 billion kWh / year;
- Bioenergy - 1.7 billion kWh /year.

Wind energy has particularly high potential, given that about 50% of Kazakhstan's territory has a wind speed of 4-5 m/s at an altitude of 30 m.

7.1.2.1 Determination of Key Directions for the Development of Renewable Energy Sources

The development of renewable energy technologies in Kazakhstan can be categorized into four main blocks:

1. **Large RES Projects**: These projects aim to supply electricity to KMG's enterprises and sell electricity to third parties or the Settlement and Financial Centre LLP. Strategies include acquiring operating assets and collaborating with technology partners.
2. **Small-Scale Renewable Energy Projects**: These projects, targeted for use in public sectors like rotational camps and office premises, can be implemented independently or through EPC contractors, possibly via ESCO contracts.
3. **RES Projects Integrated into Production**: These projects focus on integrating renewable energy into the technological production cycle, such as extraction, processing, and transportation. Implementation can occur independently or with EPC contractors, particularly in remote areas lacking access to stationary power grids.
4. **Purchasing Green Electricity**: This involves purchasing "green" energy through bilateral contracts or existing renewable energy facilities, in line with current legislation.

7.1.2.2 Renewable Energy Targets for KMG

Following the establishment of renewable energy targets for KMG, it is essential to outline the strategic pathways and legislative frameworks necessary to achieve these ambitious goals.

- **Block 1**: The capacity of renewable energy facilities can be:

	2031	2040	2045	2050	2060
Electricity Consumption by KMG, million kWh	4 283	3 619	3 330	3 112	2 877
Share of Renewable Energy Sources (Target)	15%	30%	40%	50%	50%
RES Power, MW	300	345	423	494	548
Renewable Energy Production, million kWh	945	1085	1052	1556	1726

The preliminary budget for achieving these targets is estimated at USD477 million for 2060, USD634.5 million for 2045, based on an average investment cost of USD1,500 per kW of installed capacity.

- **Block 2**: While contributing a minor share to total energy consumption, widespread adoption of renewable technologies in this block could reduce GHG emissions by 0.1% from 2019 levels.
- **Block 3**: To determine the targets for the share of renewable energy sources (RES), it is necessary to conduct pilot industrial tests, such as solar collectors or the use of geothermal sources for preheating. The potential for reducing the total energy resource (TER) in the production and technological cycle, especially in the segments of oil extraction and transportation, is quite significant. However, in the processing segment, the application of RES technologies is considered challenging due to the limited free space on the processing facilities' premises and the complex technological schemes for equipment binding.
- **Block 4**: By 2025, renewable energy sources could account for 5% of total energy consumption (200 million kWh), and by 2031, this share could rise to 15% (945 million kWh).

Renewable Energy Source Utilization

- **Bilateral Contracts for Green Energy**: Legislation needs to be adjusted to support the use of renewable energy sources for the internal needs of company groups. This includes enabling the purchasing and selling of "green" energy under bilateral contracts. Current legislation lacks provisions for such agreements, which limits the development of distributed generation of renewable energy sources.

Stimulating the Market for Bilateral RES Contracts: A Future of Growth and Opportunity

The concept of "green certificates" needs to be established to confirm the origin of electrical energy from renewable sources. The International Renewable Energy Certificate (I-REC) certifies the origin of 1 MWh of electricity produced from renewable sources. I-RECs are recognized in over 50 countries, excluding the US and EU, which have their own standards. By purchasing I-RECs, companies can:

- Claim reductions in electricity-related GHG emissions under Scope 2 emissions.
- Incorporate I-RECs into their ESG strategies to attract investments.
- Use I-RECs to comply with international sustainability standards such as GHG Protocol, CDP, RE100, and ISO.

The sale of I-RECs presents a significant financial opportunity for renewable energy producers. This additional financing can be used to modernize existing facilities or construct new ones. The International REC Standard Foundation's approval of I-RECs in Kazakhstan in January 2022, accrediting the ECOJER Association as an issuer, further enhances this potential.

Improving the mechanism for accounting and offsetting of carbon credits

- **Offset Units**: Improve the mechanism for accounting and mutual offsets of offset units by creating a transparent system for tracking such units.

7.1.3 Methane Management

Methane emission reductions are a strategic imperative in achieving KMG's deep decarbonization scenario. This underscores the urgency and importance of comprehensive management strategies to effectively reduce emissions.

Determining accurate methane emissions levels is a complex task requiring industrial measurements and sophisticated calculation methods. KMG has adopted a multifaceted approach to address this challenge, leveraging technological solutions and strategic initiatives.

7.1.3.1 Methane Quantification and Reporting

KMG is proactively addressing methane emissions by implementing comprehensive quantification and reporting measures. In a significant step towards transparency and

accountability, KMG joined the Oil & Gas Methane Partnership 2.0 (OGMP 2.0), submitting its first voluntary methane emissions report on May 31, 2024. This commitment underscores KMG's dedication to achieving the OGMP 2.0 "Gold Standard" for methane reporting to reach Level 4/5 reporting across all material assets by 2026.

Recognizing the critical role of accurate data in managing emissions, KMG has calculated initial methane emission volumes across its operations to identify material emissions sources.

This has enabled KMG to establish a baseline for methane emissions, facilitating targeted reduction strategies.

7.1.3.2 Leak Detection and Repair (LDAR) Programme

Recognizing that leaks are estimated to contribute approximately 45% of methane emissions, KMG is implementing a comprehensive Leak Detection and Repair (LDAR) programme. This initiative is crucial for identifying and mitigating leaks, which are significant sources of methane emissions.

KMG plans to invest in specialized methane detection and quantification equipment, ensuring that personnel are trained to conduct regular identification and measurement at all facilities. Additionally, KMG is developing an internal corporate standard for leak management at its subsidiaries and affiliates to ensure consistent and effective practices across the organization.

Moving forward, KMG has identified several critical steps to advance its LDAR efforts:

- **Equipment Investment**: Procuring specialized equipment for methane detection and quantification.
- **Best Available Technologies (BAT)**: Leverage and integrate proven BAT to mitigate methane emissions.
- **Personnel Training**: Training staff to regularly identify and measure methane leaks.
- **Corporate Standards**: Developing internal standards for leak management.

In addition to measuring technologies, initial work to date has identified venting from tank storage facilities as a material methane emission source. KMG is investigating the feasibility of vapor recovery units (VRUs) to mitigate this. VRUs can capture up to 95% of hydrocarbon vapours from storage tanks, providing an effective engineering solution for reducing methane emissions.

7.1.3.3 Technology and Innovation

KMG is leveraging advanced technologies to enhance methane detection and quantification, recognizing the importance of innovation in emissions management. By partnering with international companies, KMG is utilizing state-of-the-art equipment to measure and quantify methane emissions.

Pilot measurement campaigns will be undertaken, and these will employ technologies such as Optical Gas Imaging (OGI) cameras and mobile monitoring systems. KMG is also exploring satellite-based monitoring for large-scale methane detection, demonstrating its commitment to adopting cutting-edge solutions.

To leverage these solutions, KMG will prioritize the following actions:

- **International Partnerships**: Collaborating with global companies to access advanced methane detection equipment.
- **Pilot Campaign**: Conducting a pilot measurement campaign at Ozenmunaigas using OGI cameras and mobile systems.
- **Satellite Monitoring**: Exploring satellite-based solutions for large-scale methane detection.

7.1.3.4 Capacity Building and Collaboration

KMG invests in capacity building and collaboration to strengthen its methane management capabilities. KMG conducts technical seminars on methane emissions management best practices, ensuring its workforce is equipped with the latest knowledge and skills.

Collaborations with international partners are enhancing KMG's ability to manage methane emissions effectively. Additionally, KMG engages in knowledge-sharing initiatives with other industry leaders and international organizations to foster a culture of continuous improvement.

To enhance methane management capabilities, KMG will pursue the following core activities:

- **Technical Seminars**: Organizing seminars to share best practices in methane management.
- **Collaborative Projects**: Partnering with industry leaders to enhance methane management capabilities.
- **Knowledge Sharing**: Engaging in initiatives to exchange knowledge and foster improvement.

7.1.3.5 Strategic Roadmap

KMG has developed a strategic roadmap for reducing methane emissions, aligning its efforts with broader sustainability goals. This roadmap includes conducting materiality assessments to prioritize high-emitting assets and sources, ensuring that resources are allocated effectively.

KMG is implementing a phased approach to achieve OGMP 2.0 Level 4/5 reporting across all material assets by 2026, integrating methane reduction targets into this LCDP. This strategic alignment underscores KMG's commitment to reducing its environmental impact. KMG will be able to utilise learnings and technologies from initial mitigation projects to implement at scale across other facilities accelerating the methane mitigation pathway.

To bring this vision to fruition, KMG has developed an action plan centred around these key elements:

- **Materiality Assessments**: Prioritizing high-emitting assets and sources for targeted action.
- **Phased Approach**: Implementing a step-by-step plan to achieve OGMP 2.0 Level 4/5 reporting by 2026.
- **Programme Integration**: Incorporating methane reduction targets into the Low-Carbon Development Programme.

7.1.3.6 Regulatory Engagement

KMG is actively working with regulatory bodies to improve the legislative framework for methane management. By advocating for enhancements in state carbon regulation to include methane as a regulated GHG, KMG is contributing to developing a more robust regulatory environment.

KMG supports the introduction of technical standards for methane management across various sectors of the economy and seeks international support and best practices for methane emissions reduction. These efforts aim to create a conducive environment for effective methane management.

To drive progress in methane management regulation, KMG will concentrate on executing the following priority actions:

- **Regulatory Advocacy**: Engaging with regulators to include methane in carbon regulation.
- **Technical Standards**: Supporting the development of standards for methane management.

- **International Support**: Seeking global best practices and support for methane reduction initiatives.

7.1.4 Carbon Capture, Storage and Utilization (CCS/CCUS)

7.1.4.1 Prospects for Implementation in KMG and Key Approaches

Kazakhstan's large point sources of CO_2 emissions, primarily associated with hydrocarbon production and processing, are concentrated near KMG's main oil and gas facilities. Preliminary research suggests that many of these sources are within 500 km of regions potentially suitable for geological CO_2 storage.

KMG is actively working on a pilot project to capture, store, and utilize CO_2 (CCUS) and assess the potential for using CO_2 injection to enhance oil recovery from depleted reservoirs.

7.1.4.2 Initial Steps and Screening Analysis

In 2023, KMG conducted a screening analysis of CO_2 emission sources across its subsidiaries and affiliates. This analysis identified the primary groups of emission sources suitable for a CCUS pilot project.

The project involved selecting promising geological traps for CO_2 injection and storage, focusing on regions with high emissions within a 100 km radius of these sources. Suitable deposits were screened, and a database of potential development sites was compiled. Design solutions for infrastructure, including equipment and pipelines, were also developed.

7.1.4.3 Pilot Project and Site Selection

The New Gas Processing Plant (NGPP) and the AEGS (ENI hybrid station) under construction were identified as ideal candidates for the CCUS pilot project. Depending on the project configuration, the forecasted CO_2 injection volume is expected to range from 244 to 412 kT per year.

Due to limited studies and insufficient data on CO_2 injection into reservoirs, several uncertainties must be addressed. These include the effects of CO_2 on reservoir dynamics and potential complications in producing well products with additional CO_2 volumes, which can impact equipment and pipeline systems.

7.1.4.4 Alternative Concepts and Long-term Plans

Given the high capital costs, KMG is exploring an alternative concept involving a pilot plant with a capacity of 15-20 kT of CO_2 per year.

Site selection for key facilities meeting pilot project criteria is underway, including:

- Integrated gas treatment installation at the Prorvinskaya group of fields of Embamunaigas JSC
- Steam generator units at the steam preparation shop of Karazhanbasmunaigas JSC

For the long term, post-2040, KMG plans to implement a full-scale CCUS project with an estimated injection volume of up to 412 kT per year, utilizing the new NGPP and AEGS (ENI hybrid station).

7.1.4.5 Key Risks and Barriers and Government Support Measures

Implementing Carbon Capture, Storage, and Utilization (CCS/CCUS) technologies presents several challenges and requires robust government support to ensure success. Addressing these risks and barriers is crucial for effectively deploying CCS/CCUS projects and maximizing their potential benefits.

- **Legislative and Permitting Challenges**: Collaboration with the Ministry of Ecology, Geology, and Natural Resources of Kazakhstan is essential to address legislative and

permitting standards for the pilot project, as there is a risk of lacking necessary CO_2 injection permits.

- **Short-term and Long-term Legislative Reforms**: Obtain permissions for the pilot project, consider scientific research, and reform legislation to permit long-term technology use (Environmental Code).
- **Government Support Measures**: If the pilot project is successful, government support for a full-scale CCUS project will be crucial. Key support instruments include subsidies and loan guarantees to enhance profitability and reduce payback periods. Government support measures may also include obligations for the government to annually purchase a certain number of storage certificates for each ton of CO_2 (with an increasing index).

By addressing these challenges and leveraging government support, KMG aims to advance its CCUS initiatives, contribute to Kazakhstan's carbon reduction goals, and enhance its position in the global energy market.

7.2 Development of Hydrogen

KMG is strategically positioning itself in the hydrogen market with a phased approach across three-time horizons (*Figure 8)*:

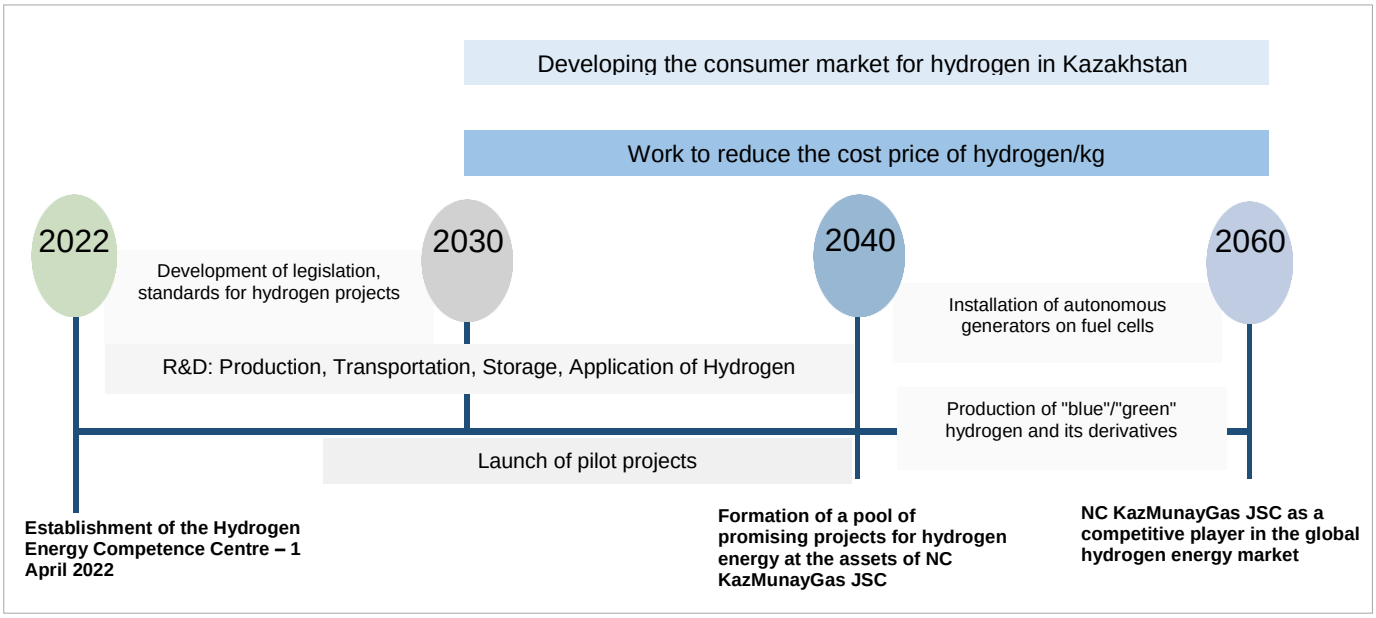

Figure 8: Three-phase Hydrogen Development Pathway

7.2.1 Short-term (2022-2030)

KMG will focus on exploring the potential of hydrogen technologies in Kazakhstan, analyzing green hydrogen production in the west of the country and developing a Water Resources Atlas for hydrogen production, considering the availability of water resources and the potential of renewable energy sources.

7.2.2 Medium-term (2030-2040)

KMG plans to reduce the cost of hydrogen production and expand its use. The main measures include developing infrastructure for the production and transportation of hydrogen, creating conditions for the commercialization of hydrogen technologies, and forming a consumer market for hydrogen in Kazakhstan.

7.2.3 Long-term (2040-2060)

KMG aims to strengthen Kazakhstan’s position in the global hydrogen market. Key measures include expanding research into hydrogen production, storage, transportation, and use, as well as promoting technological growth and market foundations for the hydrogen economy.

7.2.4 Key Hydrogen Enablers

Critical activities in developing hydrogen energy include producing blue hydrogen with carbon dioxide capture, utilizing renewable sources for green hydrogen production, conducting scientific research, and developing new hydrogen storage and transportation technologies. Notable projects involve pilot initiatives for green hydrogen production, including collaborations with ACWA Power.

To ensure the successful implementation of these projects, KMG will focus on establishing standards and legislation for hydrogen production, storage, and transportation. Additionally, the company plans to introduce amendments to the Concept for the Development of Hydrogen Energy in the Republic of Kazakhstan until 2040.

In April 2022, Kazakhstan's first Competence Center for Hydrogen Energy was established at KMG Engineering. It serves as a research hub dedicated to developing low carbon fuels.

KMG is committed to advancing hydrogen energy to reduce carbon emissions and create a sustainable energy system in Kazakhstan. The company aims to gain a competitive advantage in the global hydrogen energy market by executing short-, medium-, and long-term projects.

7.3 Implementation of Offset Projects

7.3.1 Forest Climate Projects

Globally, one of the most effective strategies for increasing forest cover and enhancing carbon mitigation capacity without burdening state budgets is to engage private entrepreneurs in growing commercial timber on reserve lands. This approach aligns with the directives of the Head of State to plant 2 billion trees in forest areas within the State Forest Fund and an additional 15 million hectares in populated regions from 2021 to 2025.

7.3.1.1 KMG's Role in Tree Planting Initiatives

KMG's subsidiaries and affiliates are expected to participate in these tree-planting activities in collaboration with local executive bodies and as part of their environmental action plans. EmbamunayGas and the Atyrau Oil Refinery have incorporated tree planting into their operational plans.

7.3.1.2 Economic Viability of Forest Projects

According to the Ministry of Economic Development and Natural Resources of the Republic of Kazakhstan, forest cultivation becomes economically viable at a carbon price of USD10 per ton of CO_2. Currently, the carbon price stands at USD1.5 per ton. However, forecasts suggest that by 2030, the carbon price will rise to USD 16.9 per ton, ensuring the profitability of KMG's investments in forest planting projects.

7.3.1.3 Challenges and Risks

Implementing forest climate projects requires ongoing involvement from project applicants due to the need for funding for forest protection, management, and monitoring. There is also a significant risk of losing accumulated carbon stocks in a year due to fires or other forest losses, known as fragility risk.

7.3.1.4 Expertise and Resources

Successful implementation of forest climate projects necessitates specialized knowledge in afforestation and long-term resource commitment. For KMG, executing these projects through contractors, whether commercial or non-profit entities, that specialize in forest planting and can offer carbon credits in exchange for investment is more practical.

By leveraging private sector involvement and strategic partnerships, KMG can effectively contribute to Kazakhstan's afforestation goals while ensuring its forest projects' economic viability

and sustainability. This approach supports national environmental objectives and aligns with global best practices in forest management and carbon mitigation.

7.3.2 Production of Sustainable Aviation Fuel (SAF)

SAF represents a low carbon alternative to conventional Jet-1 fuel, offering up to an 80% reduction in carbon emissions. SAF can be produced from two primary feedstocks:

- **Synthetic Sources**: Derived from carbon dioxide and water.
- **Biofuel Sources**: Produced by converting various types of biomass.

SAF and Jet-1 are interchangeable, allowing them to be mixed in airport storage tanks alongside existing fuels.

7.3.2.1 KMG's SAF Production Consideration

KMG is exploring the potential for producing SAF in Kazakhstan. Concurrently, Air Astana JSC is evaluating the feasibility of incorporating SAF into its fleet operations and developing the necessary infrastructure at Kazakhstan's international airports. According to the Low-Carbon Development Concept of Samruk-Kazyna JSC, Air Astana JSC aims to achieve SAF consumption targets of 5% by 2040, 15% by 2050, and 25% by 2060.

7.3.2.2 Feasibility Study and Market Analysis

A comprehensive market study was conducted to make an informed and economically viable decision on the SAF project. This study included:

1. **Global and Local Decarbonization Trends**: The first stage involved identifying trends in CO_2 emission reductions within the aviation sector. The International Air Transport Association (IATA) has committed to achieving net-zero CO_2 emissions by 2050.
2. **Market Research**: The second stage focused on developing SAF demand scenarios and analyzing the availability of raw materials for SAF production.
3. **Technology Assessment**: The third stage evaluates certified SAF production technologies. The Alcohol-to-Jet (AtJ) technology, using bioethanol as a raw material, was identified as the most promising initial technology.
4. **Technical and Economic Evaluation**: The fourth stage included a detailed technical and economic assessment of the project, considering data from technology licensors. Two potential locations were evaluated: SEZ "Pavlodar" and SEZ "Chempark Taraz."

7.3.2.3 Next Steps and Long-term Vision

Further work on the project's feasibility study is necessary based on the study results. In the long term, a diverse range of technologies will be employed, including Fischer-Tropsch (FT), Power-to-Liquid (PtL), and Hydrogenated Esters and Fatty Acids (HEFA) technologies.

This initiative underscores KMG's commitment to sustainable aviation practices and aligns with global efforts to reduce carbon emissions in the aviation industry.

8 MECHANISM FOR IMPLEMENTATION OF LCDP

8.1 Organizational Events

8.1.1 Climate Change Impact on the Oil and Gas Sector

In the oil and gas sector, climate change has become a critical factor affecting companies' long-term development, especially multinational corporations with global operations and supply chains. There is growing recognition of the need to integrate climate-related issues into company management, strategic planning and decision-making processes. The sector is bracing for significant restructuring, technological shifts and supply chain disruptions as it tries to cope with the challenges posed by climate change.

Companies may face increased regulatory and financial pressures, and those that fail to adapt to these trends will likely face limited external financing options. However, industry leaders can seize opportunities and generate additional revenue by meeting the growing demand for low-carbon oil and gas.

8.1.2 Addressing Climate-related Challenges

Therefore, when considering a company's future growth over the medium to long term, it is advisable to recognize the multifaceted and cross-sectoral nature of climate-related challenges. To effectively address these challenges, it becomes necessary to change approaches to management decision-making, implementation and monitoring at all organizational levels, striving for a more seamless integration of climate considerations throughout the company's activities.

Successful execution of such a transformative process requires formulating a clearly defined strategy, active participation of senior management, close coordination of various functions and significant capital investment.

8.1.3 Climate-Related Corporate Governance

In this regard, measures will be developed to improve climate-related corporate governance, in particular by defining the roles and responsibilities of the Board of Directors (and relevant Board committees), the Management Board, and its members on climate-related issues.

Climate issues that financially impact KMG's operations and business plans will be included in the Board of Directors' decisions on strategy, business plans and financial planning.

In addition, a climate risk materiality assessment will be conducted on an annual basis, covering both physical and transition risks, to understand which climate risks significantly impact KMG's operations and each site/location.

Conducting systematic monitoring and assessment of climate risks will be the basis for developing and implementing effective risk reduction and adaptation strategies to climate change. They help you be prepared for potential threats and protect your interests when climate conditions change.

Climate risks will be integrated into planning processes (strategies, development plans). This will prevent the negative consequences of climate change, ensure economic efficiency, and comply with international climate obligations.

8.2 Policy in the field of increasing energy efficiency and resource conservation

In response to the significant potential for reducing energy intensity and meeting CO_2 reduction targets, on December 20, 2023, KMG approved the Management Regulations in the field of energy saving (ES) and energy efficiency (EE) (KMG-RG-4890.1-11).

This document implements the LCDP and establishes the basis for analyzing goals and energy objectives.

8.2.1 Strategic Objectives

The regulation aims to achieve the following strategic objectives:

- **Long-term Strategic Planning**: Develop comprehensive plans for energy efficiency improvement across the KMG group of companies.
- **Efficient Energy Management**: Ensure transparent energy flow management with reliable and measurable standards.
- **Centralized Monitoring**: Implement centralised monitoring of operational processes to enhance energy efficiency.
- **Government Coordination**: Maintain consistent collaboration with government agencies on energy-saving initiatives.
- **Best Practices Dissemination**: Promote and replicate effective energy-saving practices across the organisation.
- **Cost Reduction and Optimisation**: Identify and eliminate non-production costs while optimising resource use.
- **Profitability Enhancement**: Increase profitability by implementing measures to reduce fuel and energy resource losses and eliminate inefficiencies.
- **Financial Performance Improvement**: Enhance financial outcomes through energy resource conservation.

8.2.2 Implementation Mechanisms

To achieve these objectives, the following mechanisms will be implemented:

- **Continuous Optimization**: Optimize the accounting and management system for energy efficiency and resource conservation.
- **Target Determination**: Set reasonable current and future energy efficiency targets.
- **Standardization**: Establish specific energy consumption standards for technological processes by activity type.
- **Technology Application**: Apply the best available energy efficiency technologies.
- **Competence Enhancement**: Enhance the competence of subsidiaries and affiliates in energy saving and efficiency.
- **Stakeholder Interaction**: Collaborate with stakeholders to develop and implement innovative energy efficiency technologies.
- **Employee Involvement**: Motivate employees to contribute energy-saving and efficiency ideas through initiatives like the “Bank of EE and DC Ideas.”
- **Energy Service Contracts**: Utilize energy service contracts to facilitate energy efficiency improvements.
- **Energy Audits**: Conduct energy audits and develop measures to improve energy efficiency.
- **Ranking System Development**: Develop a system for ranking energy-saving measures and reducing GHG.
- **Modernization Roadmap**: Implement a roadmap for modernizing mechanical and power plant stock to energy-efficient equipment.
- **Water Conservation**: Implement measures to save water and increase recycling water consumption.
- **Programme Implementation**: Execute Energy Efficiency and Resource Saving Programmes.
- **Awareness and Compliance**: Inform employees, contractors, and suppliers about the policy, relevant regulations, and compliance requirements.

This structured approach ensures that KMG systematically addresses energy efficiency and resource conservation, aligning with its broader strategic goals for sustainability and operational excellence.

8.3 Methodology for monitoring and reporting GHG emissions

As outlined in Section 5, to effectively track progress towards reducing emissions and to ensure transparent disclosure of GHG emissions, KMG has approved a uniform methodology for monitoring and reporting GHG emissions. This methodology ensures alignment with international practices in the oil and gas sector.

8.3.1 Compliance and Standards

The methodology incorporates:

- **Kazakhstan Legislation**: Adherence to national legal requirements.
- **International Reporting Practices**: Integration of global standards and guidelines, such as IPCC guidelines, ISO standards, and World Business Council for Sustainable Development protocols.

This comprehensive approach enables KMG to monitor emissions at both Scope 1 and Scope 2 levels.

8.3.2 Scope 3 Emissions

In addition to direct emissions, the methodology extends to the accounting and monitoring of indirect GHG emissions (Scope 3) across five categories. This expansion ensures a holistic view of KMG's GHG impact and aligns with best practices in sustainability reporting.

By implementing this methodology, KMG aims to enhance its decarbonization transition, improve transparency, and support its commitment to reducing GHG emissions in line with global expectations.

8.4 Application of Systemic Financing Mechanisms

Low-carbon system financing mechanisms are structures and processes designed to provide sustainable and consistent financial resources for projects to reduce GHG emissions and transition to cleaner technologies.

The main elements of system financing are:

1. Sources of financing include internal company resources, external investments, government subsidies and grants, and international financial organizations.
2. Structures for the management and distribution of funds: specialized funds (for example, a domestic decarbonization fund), committees or working groups for the distribution of funds, transparent procedures and criteria for selecting projects (regulatory rules).
3. Financing instruments: loans and borrowings, bond issues (including green bonds), grants and subsidies, and carbon pricing mechanisms (for example, emissions trading).
4. Monitoring and reporting: Regularly monitor project implementation, report on results achieved, and assess the impact of reducing carbon emissions.

The main tools for attracting private investment in “green” projects in the world are stock market instruments, such as “green” bonds, “green” investment funds, “green” indices and ETFs, “green” loans.

8.4.1 Global Trends in Green Financing

The global practice of green debt finance shows that in recent years, the green bond market has become a driving force for the development of green, social, and sustainable bonds. Europe is a key player in driving the growth of these bonds, which accounted for around 40% of issuance in 2022.

According to the Climate Bonds Initiative (CBI), the green finance market reached USD 4.4 trillion by the end of 2023 [3], and the volume of bonds in the 1st quarter of 2024 already amounted to USD 272.7 billion, showing an increase of 15% relative to the same indicator in 2023 [4]. However, according to Statista, investments in the energy sector remain the largest - 35% of total green bonds between 2014-2023. Low-carbon construction ranks second with 25%, transport third with 19%. This is followed by water infrastructure (7.4%) and waste management (4.9%) [5].

For example, BP issued its first green bond worth USD 500 million to finance renewable energy and energy efficiency projects.

The volume of green financing is increasing rapidly, and its priority is the transformation of the energy sector. In this regard, using green financing mechanisms can help obtain an additional source of investment for the implementation of the LCDP.

8.4.2 Potential Financing Instruments for KMG

Below are various financing instruments that KMG can utilise to support the low carbon pathway:

1. **Partnership with international financial institutions**

   Attracting funding from international financial organizations such as the World Bank, International Finance Corporation (IFC), European Bank for Reconstruction and Development (EBRD), Green Climate Fund and others (for example, research on SAF).

   Mechanism: preparing and submitting applications for grants and loans for decarbonization projects.

2. **Corporate social investment (CSI)**

   Integration of decarbonization initiatives into the corporate social investment program, i.e., charity/sponsorship.

   Mechanism: inclusion of decarbonization projects in the CSI strategy (for example, planting saxaul in ODAM). Directing part of the KSI budget to implement low-carbon initiatives.

3. **Government subsidies and tax breaks**

   Government subsidy programmes and tax incentives are used to finance decarbonization activities (for example, the transition to IEP).

4. **Issuing green bonds**

   Issue of “green” bonds, the proceeds of which will be used to finance environmental projects, including decarbonization measures.

   Mechanism: Determining the parameters of the issue, such as term, interest rate, and volume. Placing bonds to institutional and private investors interested in environmentally sustainable investments (for example, Samruk-Kazyna). Targeting funds to specific decarbonization projects, with regular reporting to investors on progress.

5. **Domestic decarbonization fund**

   In accordance with the KMG ICP Programme, an internal fund intended exclusively for financing decarbonization projects for the central office and subsidiaries and affiliates is planned (for example, Shell has created the Shell Fund Ventures with USD 200 million budget to support clean energy startups. Chevron has created a private equity fund that operates in Kazakhstan and can finance low-carbon projects).

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[3] Climate Bond Initiative : Sustainable Debt, Global Market State 2023, document link: cbi_sotm23_02h.pdf (climatebonds.net)

[4] Climate Bond Initiative: Overview market sustainable debt for the 1st quarter of 2024 , link on document : A Record Start to the Year for Sustainable Debt | Climate Bonds Initiative

[5] German online database Statista: Distribution of use of green bond proceeds worldwide between 2014 and 2023 by sector, link: https://ibb.co.com/hLP1LYG

However, the working group recognized this mechanism as premature for implementation in KMG. Therefore, it is necessary to continue studying the world practice of creating and operating such funds.

6. **Internal carbon market**

Creation of an internal carbon trading market that allows company divisions to sell and buy carbon credits, incentivizing emissions reductions and financing related projects.

Under the current conditions of state carbon regulation, such a mechanism cannot be implemented; it is necessary to provide such an opportunity at the legislative level.

Green loans are provided to eligible borrowers and only for green projects. The definition of a green project is carried out in accordance with the Classification System (taxonomy) of “green” projects subject to financing through “green” bonds and “green” loans approved by a Decree of the Government of the Republic of Kazakhstan dated December 31, 2021 No. 996.

Thus, for the successful implementation of the Programme, it is necessary to use all available green financing tools and ensure that the volume of investment in decarbonization is at least 10% of KMG’s capital costs, which in absolute numbers will correspond to the average investment in decarbonization of other oil and gas companies.

KMG must meet specific requirements and principles to attract additional investments through green financing instruments. The need to comply with the provisions of openness, accuracy, and completeness of information disclosed by issuers to interested parties regarding the use of funds, the process of evaluation and selection of projects, management of funds, and reporting is emphasized.

8.5 Sustainable Procurement of Samruk-Kazyna JSC

8.5.1 Current Procurement Landscape

At the end of 2023, KMG’s CC and subsidiaries and affiliates jointly spent more than KZT 1.2 trillion on purchases, of which KZT 3.5 billion, or 0.3% of the total purchase amount, was spent on energy efficiency issues.

A large budget represents the costs of environmental activities while purchasing goods and works, and the mandatory requirements of the Environmental Code primarily limit services. Thus, KMG’s procurement budget is currently configured to meet the company’s operational and capital needs but does not reflect sustainability criteria.

At the same time, it should be noted that the current procurement rules of the Samruk-Kazyna Fund (hereinafter referred to as the Rules) do not pay attention to environmental criteria and do not provide any incentives for environmentally friendly goods, such as, for example, domestic producers. Due to the determination of the winner at the lowest price offered, environmental or energy-efficient products cannot always compete with conventional products, and the specified criteria are not always included in the technical specifications.

8.5.2 Strategic Shift Towards Carbon Neutrality

Considering that the Head of State has set the task of achieving carbon neutrality by 2060, we believe that the concept of “innovation” should also include projects that will be implemented for the first time in Kazakhstan, with a focus on further scaling and aimed at reducing the carbon footprint, increasing energy, and saving resources.

The trend towards low-carbon technologies should also be translated through a programme to support new production, which currently does not pay attention to such areas as support for renewable energy sources, the development of energy-efficient and resource-saving technologies, and measures to reduce the carbon footprint, including carbon absorption mechanisms.

8.5.3 Recommendations for Sustainable Procurement

Certification and Standards

- **Certification Requirements**: Implement certification standards, such as Energy Star, to establish energy consumption benchmarks for equipment and machinery.
- **Minimum Energy Efficiency Standards**: Adopt corporate-level Minimum Energy Efficiency Standards for appliances and equipment, with regularly updated indicators.
- **Higher Efficiency Requirements**: Use the Order of the Minister for Investment and Development of the Republic of Kazakhstan (dated March 31, 2015, No. 407) as a basis to establish efficiency requirements that exceed national standards. KMG should refrain from purchasing machinery or equipment that fails to meet these standards.

Sustainable Procurement Incentives

- **Conditional Discounts for Sustainable Suppliers**: Introduce conditional discounts for suppliers who meet sustainable procurement criteria, similar to those offered to domestic producers. This includes support for local suppliers and the production of goods with recycled materials, lower GHG footprints, and minimal emissions.
- **Support for Domestic Producers**: By implementing these mechanisms, the Fund can justify support for domestic producers within the EAEU and the WTO frameworks.

Streamlined Procurement Processes

- **Single-Source Procurement for Environmental Solutions**: Allow single-source procurement for goods, works, and services essential for addressing environmental challenges, including carbon footprint reduction, to expedite the procurement process.

By integrating these sustainable procurement practices, KMG can better align its purchasing strategies with its sustainability goals, supporting domestic producers and contributing to Kazakhstan's broader environmental objectives. These measures will enable KMG to justify support for domestic producers within the EAEU and the WTO framework, while advancing its commitment to reducing its carbon footprint.

8.6 Changing Consciousness and Introducing a Culture of Resource Conservation

In modern conditions, the tasks facing the LCDP require not only technological and organizational changes but also a fundamental change in the consciousness of employees and the introduction of a culture of resource conservation at all levels of the organization. The main directions of this work are:

8.6.1 Awareness Raising, Education and Training

KMG is committed to developing and maintaining a qualified workforce to implement its low-carbon strategy. The main areas of education support include:

1. Partnership with educational institutions:
    - cooperation with leading universities and technical institutes to train specialists in the field of energy, ecology and sustainable development for the oil and gas industry;
    - development and financing of special educational programmes and courses aimed at in-depth study of low-carbon technologies and methods for increasing energy efficiency in the oil and gas industry.
2. Internships and practical training:
    - organizing internships and practices for students and young professionals at KMG production facilities;
    - Support and finance scientific and research projects for students, experimental research projects, and innovative developments related to issues of decarbonization and reduction of GHG emissions in the oil and gas industry.

3. Professional development of employees:
    - regular training and advanced training of company employees on issues of energy saving, renewable energy sources and environmentally friendly technologies.
    - Implement internal training programmes, including seminars, trainings, and webinars on current topics in low-carbon development.
    - Implement internal experience exchange programmes between KMG CC and subsidiaries and affiliates through internship invitations.

8.6.2 Development of a Corporate Culture of Resource Conservation

- Introduction of corporate norms and standards focused on energy efficiency and resource conservation.
- Supporting employee initiatives aimed at reducing the company's carbon intensity.
- Implement “green office” practices, such as minimizing energy consumption and saving.
- Digitalization of processes and introduction of artificial intelligence.

8.6.3 Motivation and Encouragement

KMG is investigating the development of a comprehensive motivation system that includes both material and non-material incentives for achievements in low-carbon development. These could be:

a. **Long-term reward programmes**: Include objectives whose effects are expected to last several years. For key employees, a system of annual KPIs must be developed, the achievement of which contributes to the fulfilment of the LCDP's objectives.

b. **Material incentives**: Include bonuses for achieving KPIs related to sustainable development, reducing the carbon footprint, and reducing operating costs and fuel and energy resources. A separate fund could also be created to reward innovative ideas and projects to improve the environmental situation.

c. **Non-material incentives**: Organization of foreign internships and training programmes for key employees, exchange of experience and best practices within KMG, constant support and advice to employees from the Low-Carbon Development Department.

d. **Reward system for exceeding the plan**. Develop an incentive system for subsidiaries and affiliates and their employees, providing for the creation of their own material fund. If the plan to reduce CO_2 emissions is exceeded, the funds received from the sale of excess carbon can be distributed at KMG's discretion. The procedure and criteria for the distribution of funds must be approved at the level of the KMG CC.

e. **Shares and options**: Introduce shares and options as an element of long-term remuneration. An example is the experience of companies such as BP and Shell, which use company shares as a motivation tool, linking them to the achievement of environmental and operational performance.

f. **Competitions and Awards**: Introduction of competitions and awards for the best initiatives and projects.

g. **Corporate fund**: Creation of a corporate fund to support innovative projects and ideas about reducing KMG’s carbon footprint.

A modern motivation system that considers the experience of leading energy and oil companies must be introduced to achieve these goals.

For example, TotalEnergies has implemented a system where employees receive bonuses for achievements in sustainable development and also participate in shareholder programmes. ExxonMobil has created a corporate fund to support innovative projects aimed at reducing emissions and increasing energy efficiency, with the goal of incentivizing employees to participate in such projects.

8.6.4 Communication and Engagement

To ensure the success of KMG's low-carbon development initiatives and foster a culture of sustainability throughout the organization, the following communication and engagement strategies will be implemented:

- Develop and implement communication strategies to inform employees about progress made and plans in the field of low-carbon development.
- Involving employees in decision-making processes related to energy saving and resource consumption initiatives.
- Organizing internal and external promotions and events to increase employee awareness and active participation.

By implementing these strategies, KMG aims to foster a sustainability and resource conservation culture that aligns with best practices in the energy sector.

8.7 Support for Innovation and R&D

KMG recognizes the importance of innovation and research and development (R&D) as key elements to achieving sustainable low-carbon development and increasing competitiveness in the face of global climate change and energy transition.

8.7.1 Innovation Support

KMG actively encourages and implements innovative solutions to reduce the carbon footprint and improve environmental efficiency. Key innovation support initiatives include:

1. Research grants and funds:
    - include the ideas of KMG employees aimed at reducing the company's carbon footprint in the nominations of the annual competition "Best innovative ideas and practices in the field of safety, occupational health and environmental protection of the group of companies of JSC NC KazMunayGas (KMG-PR-2191.3-13 Rules on the procedure and conditions for holding the annual competition of the Chairman of the Board of JSC NC KazMunayGas "The best innovative ideas and practices in the field of safety, occupational health and environmental protection of the group of companies of JSC NC KazMunayGas").
2. Technology partnerships:
    - cooperation with international and national research centres and technology companies to exchange knowledge and best practices.
    - participation in consortia and alliances to develop and promote low-carbon technologies in the oil industry.

8.7.2 Research and Development (R&D)

As part of KMG's development strategy, KMG-Engineering LLP is designated as responsible for research and development (R&D). KMG recognizes the importance of scientific activities in achieving its strategic development goals, including those related to the Energy Transition. In this regard, strengthening the direction of R&D at KMG-Engineering LLP in terms of considering climate risks is necessary.

Supporting R&D innovation is an integral part of KMG's low-carbon development strategy, contributing to the creation of a sustainable and competitive company in the context of the energy transition and global climate change.

9 TRANSPARENCY IN KMG'S ACTIVITIES

KMG is dedicated to maintaining high standards in external reporting, with a strong commitment to continuous improvement in monitoring and reporting practices. This commitment is crucial for tracking progress in the LCDP and ensuring alignment with international sustainability standards.

9.1 LCDP Annual Reporting

KMG is committed to reporting annually on the progress of this LCDP. This annual reporting will track key performance indicators, measure progress against targets specified within this programme, and provide transparency to stakeholders about KMG's efforts in reducing GHG emissions and advancing sustainability initiatives.

9.2 External Reporting Frameworks

KMG participates in several external reporting frameworks to ensure comprehensive disclosure of its environmental, social, and governance (ESG) performance.

9.2.1 KMG Rreporting Under ETS

The Kazakhstan emissions trading system covers 15 KMG subsidiaries and affiliates (Installation Operators), which are included in the National Plan for the allocation of GHG Emissions Quotas (NPA).

Facility operators develop GHG inventory reports on an annual basis, which are subject to verification by an accredited third party. Verified reports within the established requirements of national legislation are submitted to the authorized environmental protection agency.

Based on the results of the NPA for 2021-2025, 5 subsidiaries and affiliates participated in the emission trading system in the form of a buyer and seller of carbon units.

9.2.2 CDP Reporting

In 2018, KMG announced its participation in the initiative the Carbon Disclosure Project (CDP) is an international investor community for disclosure of direct and indirect GHG emissions and risks associated with climate change, including estimating the entire carbon footprint of a commodity product from well to end use.

For the sixth year in a row, KMG calculates its carbon footprint and publishes the KMG Climate Questionnaire on the CDP site, which includes data on the volume of direct and indirect GHG emissions (Scope 1, 2 and 3) for all KMG assets, including subsidiaries in Romania and Georgia, with a participation share of 50% or more. Based on the results of 2022, KMG was assigned a Climate Rating of "C".

The emissions management policy of the KMG group of companies defines key climate operating principles, including regular recording, inventory and monitoring of GHG emissions, as well as taking measures to reduce their carbon footprint.

9.2.3 Reporting Under the OGMP 2.0 Partnership

In 2023, within the framework of the UN Climate Change Conference (COP 28) in December 2023, KMG, having signed a Memorandum of Understanding with UNEP, joined the OGMP 2.0 Partnership, organized by UNEP and IMEO. Partners submit reports on methane emissions on an annual basis.

Joining the initiative provides opportunities for KMG to exchange experience with international companies that have established management in managing and reducing methane leaks, methodological assistance in inventory issues and calculations of methane emissions, and in selecting technical solutions to reduce methane leaks.

In May 2024, the first reporting on methane emissions was submitted to UNEP, carried out desk-based using emissions estimates for each subsidiary and affiliate facility.

9.2.4 KMG Participation in the ESG Rating

KMG undergoes an annual assessment of its ESG performance. In 2023, KMG's ESG risk management was assessed at 32.3 points by Sustainalytics, ranking 40th among 306 global oil and gas companies. KMG's ESG challenges include reducing emissions and waste, enhancing labour protection, and supporting corporate governance. KMG is committed to improving its ESG rating and managing ESG risks effectively.

Detailed information about the Sustainalytics rating is available at: https://www.sustainalytics.com/esg-rating/kazmunaygas-nc-jsc/1028382256

9.2.5 Transition to International Sustainability Standards

KMG is committed to aligning its reporting with the International Sustainability Standards Board (ISSB) climate disclosures, which have absorbed the TCFD framework. This transition will enhance KMG's transparency and accountability in sustainability reporting, ensuring alignment with global best practices.

9.3 Commitment to Transparency

KMG's commitment to robust external reporting and transparency is integral to its sustainability strategy. By aligning with international standards and continuously improving its monitoring and reporting practices, KMG aims to provide stakeholders with a clear understanding of its progress in reducing GHG emissions and advancing sustainability initiatives. The annual reporting on the LCDP will serve as a key tool for tracking progress and ensuring accountability.