APPENDIX 2. ENVIRONMENTAL INDICATORS

	Production			Transportation			Processing		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
Greenhouse gas (GHG) emissions									
Direct GHG emissions (CO_2, mln tonnes)	2.2	2.4	**2.3**	0.2	0.1	**0.1**	4.5	5.1	**5.01**
GHG emission intensity (tonnes of CO_2 per 1,000 tonnes of HCs)	102	114	**114**		-		226	236	**238**
APG flaring									
Flaring (mln tonnes of CO_2)	0.11	0.09	**0.08**		–	**–**	–	–	**–**
Flared gas amount per unit of HCs produced (tonnes per 1,000 tonnes of HCs produced)	2.1	1.5	**1.4**		–	**–**	–	–	**–**
Flaring (mln m^3)	52.5	35.7	**33.3**		–	**–**	–	–	**–**
Energy intensity									
Energy consumption (mln GJ)	53.9	58.2	**55.0**	5.4	5.3	**4.6**	67.3*	68.7	**64.4**
Pollutant emissions									
Sulfur oxides (SOx) (thous. tonnes of SO_2)	7.4	6.0	**5.5**	0.1	0.09	**0.1**	4.7	4.5	**5.3**
Nitrogen oxides (NOx) (thous. tonnes of NO_2)	5.6	7.5	**7.6**	0.6	1.2	**0.48**	6.5	7.3	**7.1**
Spills									
Unauthorised tie-ins – volume (thous. tonnes)	–	–	**–**		–	**–**	–	–	**–**
Unauthorised tie-ins – quantity	–	–	**–**		–	**–**	–	–	**–**
Oil spills – volume (onshore) (thous. tonnes)	0.33	0.29	**0.12**		–	**–**	–	–	**–**
Water									
Total water withdrawal volume of KMG (mln m^3)	45.1	43.0	**37.7**	23.1	24.9	**25.4**	16.1	15.8	**17.3**
Water discharge volume (mln m^3)	0.4	0.5	**0.5**	0.2	0.3	**0.2**	12.9	10.0	**10.5**
Waste (recovery and disposal)									
Dangerous (thous. tonnes)	788.4	1,026.5	**1,470.12**	69.1	15.4	**26.77**	106.7	55.3	**62.78**
Non-hazardous (thous. tonnes)	34.7	18.0	**19.96**	11.1	4.1	**5.37**	22.0	3.1	**23.72**
Total waste (thous. tonnes)	823.1	1,044.4	**1,490.08**	80.2	19.5	**32.14**	128.7	58.3	**86.50**
*including drill cuttings, onshore (thous. tonnes)	158.6	220.4	**228.4**		–	**–**	–	–	**–**
*including drill cuttings, offnshore (thous. tonnes)	0	0	**0**		–	**–**	–	–	**–**

*the difference is due to the difference in the conversion factors used for fuel resources. Namely, KMG does not use average coefficients, but adjusted coefficients that take into account the actual caloric content of fuel resources.
**excluding Service operations

ENVIRONMENTAL COSTS

Costs		2021				2022		2023	
		KMG KZT mln	USD mln	KTG (10 m.) KZT mln	USD mln	KZT mln	USD mln	KZT mln	USD mln
1	Costs associated with waste emissions and pollutant discharges, total	23,468.9	55	328.7	0.77	28,229.6	61.01	44,564.2	98.03
1.1	Waste processing and disposal	12,750.86	299	80.3	0.18	14,370.8	31.06	22,888.85	50.35
1.2	Purification of emissions and pollutant discharges	10,104.56	23.7	197.7	0.46	13,032.5	28.17	20,772.55	45.69
1.3	Costs of development and verification of document packages on greenhouse gas emissions	229.29	0.5	22.5	0.05	702.0	1.51	173.3	0.38
1.4	Environmental liability insurance	370.35	0.9	28.2	0.06	37.9	0.08	40.9	0.089
1.5	Costs of elimination of environmental damage, including spill response costs	4.4	0.01	0	0	86.2	0.18	41.82	0.09
1.6	Costs of environmental compensatory activities	9.42	0.02	0	0	0	0	646.73	1.42
2	Investments in prevention of environmental impact and environmental management, total	5,607.5	13	23.8	0.05	667.7	1.44	9,742.79	21.43
2.1	Personnel for education and training of employees	68.2	0.16	0	0	22.4	0.04	69.47	0.15
2.2	External certification and development of environmental management system	39.21	0.09	2.7	0.006	56.8	0.12	81.23	0.17

Costs		2021				2022		2023	
		KMG KZT mln	USD mln	KTG (10 m.) KZT mln	USD mln	KZT mln	USD mln	KZT mln	USD mln
2.3	Personnel for general environmental management activities	3.4	0.008	4.1	0.009	1.02	0.002	12.20	0.02
2.4	Research and development	520.98	1.2	0	0	470.5	1.01	363.27	0.79
2.5	Additional expenses on introduction of cleaner technologies	4,489.8	10.5	0	0	0	0	7,448.623	16.38
2.6	Additional costs on green procurement	38.1	0.08	6.2	0.01	115.5	0.24	264.74	0.58
2.7	Other environmental management costs	447.7	1	10.8	0.02	1.5	0.003	1,503.23	3.30

ENVIRONMENTAL PAYMENTS (REGULATORY)

	2021		2022		2023	
	KZT mln	USD mln	KZT mln	USD mln	KZT mln	USD mln
Atmospheric emissions from APG flaring	2,329	5.5	1,462	3.2	1,178	2.6
Atmospheric emissions (other than APG flaring)	1,546	3.6	1,697	3.7	2,043	4.5
Pollutant discharges	100	0.2	122	0.3	146	0.3
Waste disposal	228	0.5	202	0.4	43	0.1

LOCATION AND SCALE OF PRODUCTION OPERATIONS IN RELATION TO KEY BIODIVERSITY AREAS

Site	Location	Key biodiversity areas (KBA)	Location in relation to KBA	Contract territory area (sq. km)	Impact mitigation plan
Urikhtau	Mugalzhar District, Aktobe Region	Kokzhide-Kumzhargan State Integrated Nature Reserve of local status	Includes part of the territory	239.9	Hydrogeological monitoring
Alibekmola and Kozhasai	Mugalzhar District, Aktobe Region	Kokzhide Sands Kokzhide underground water	Located nearby	156.5	Hydrogeological monitoring
Isatai	Central part of KSCS, North Mangystau Region	Special environmentally sensitive zone of KSCS	Located in the nature conservation area	1,343.0	Seasonal baseline environmental studies, regular environmental monitoring
Abai	North-western part of KSCS, Atyrau Region	Special environmentally sensitive zone of KSCS	Located in the nature conservation area	1,233.8	Seasonal baseline environmental studies, regular environmental monitoring
Al-Farabi	Southern part of KSCS, Mangystau Region	Special environmentally sensitive zone of KSCS	Does not affect KBA	6,046.6	Seasonal baseline environmental studies, regular environmental monitoring
Kalamkas-Khazar	North-western part of the Caspian Sea	Special environmentally sensitive zone of KSCS	Located in the nature conservation area	1,707.17	Seasonal baseline environmental studies, regular environmental monitoring