

## UPSTREAM

In 2021, KMG continued to honour its commitment under the OPEC+ agreement to cut production as a way to rein in global oil demand and prices.

In order to maintain social and financial stability in some regions of operation, the Company partnered with Kazakhstan's Ministry of Energy to redistribute oil production restrictions within KMG Group.

Oil and gas are produced by KMG's operating assets and megaprojects where KMG has non-operating interests.

KMG participates in three major oil and condensate production projects in Kazakhstan, with interests of 20%, 10% and 8.44% in Tengiz, Karachaganak and Kashagan, respectively.

The Company partners with the world's oil giants to deliver on its megaprojects. These giants include Chevron Corporation, Exxon Mobil Corporation, Royal Dutch Shell plc, Eni S.p.A., TOTAL S.A., INPEX CORPORATION, China National Petroleum Corporation (CNPC) and LUKOIL.

### Production assets

Operating assets	KMG's interest, %
JSC OzenMunaiGas	100
JSC Embamunaigas	100
JSC Mangistaumunaigaz	50
JSC Karazhanbasmunai	50
JV Kazgermunai LLP	50
JSC PetroKazakhstan Inc.	33
Kazakhturkmunay LLP	100
Kazakhoil Aktobe LLP	50
Amangeldy Gas LLP (condensate)	100
Urikhtau Operating LLP	100
Non-operating assets (megaprojects)	KMG's interest, %
Tengizchevroil LLP	20
North Caspian Operating Company N.V.	8.44
Karachaganak Petroleum Operating B.V.	10





## Oil production

In 2021, as part of Kazakhstan's commitment to cut oil supply under the OPEC+ agreement, KMG reduced its oil and condensate output by 900 ths tonnes vs the previously approved annual targets. KMG's total output was 21.6 mln tonnes or 444 ths bbl per day, down 0.5% year-on-year. Despite that, KMG remains the national leader in Kazakhstan's oil and gas

industry, accounting for one third of the country's oil and condensate production.

KMG has a balanced portfolio of upstream assets with a significant growth potential. The share of operating projects and megaprojects in its total oil and condensate production was 64% (14 mln tonnes) and 36% (7.7 mln tonnes), respectively.

### Oil and gas condensate production, ths tonnes

Indicator	2019	2020	2021
<b>Oil and gas condensate production</b>	<b>23,618</b>	<b>21,752</b>	<b>21,654</b>
<b>Operating assets</b>	<b>15,476</b>	<b>14,113</b>	<b>13,965</b>
JSC OzenMunaiGas	5,586	5,347	5,332
JSC Embamunaigas	2,900	2,601	2,522
JSC Mangistaumunaigaz	3,204	2,977	2,944
JV Kazgermunai LLP	1,114	778	727
JSC Karazhanbasmunai	1,082	1,001	1,048
JSC PetroKazakhstan Inc.	844	661	600
Kazakhoil Aktobe LLP	320	295	298
Kazakhturkmunay LLP	409	432	434
Amangeldy Gas LLP (KTG)	17	15	14
Urikhtau Operating LLP	0	6	47
<b>Megaprojects</b>	<b>8,142</b>	<b>7,639</b>	<b>7,654</b>
Tengizchevroil LLP	5,958	5,292	5,311
KMG Kashagan B.V.	1,169	1,253	1,344
KMG Karachaganak LLP	1,015	1,094	1,034

### Oil and gas condensate production, ths bbl per day

Indicator	2019	2020	2021
<b>Oil and gas condensate production<sup>1</sup></b>	<b>485</b>	<b>445</b>	<b>444</b>
<b>Operating assets</b>	<b>307</b>	<b>279</b>	<b>277</b>
JSC OzenMunaiGas	111	106	106
JSC Embamunaigas	58	52	50
JSC Mangistaumunaigaz	63	59	58
JV Kazgermunai LLP	23	16	15
JSC Karazhanbasmunai	20	18	19
JSC PetroKazakhstan Inc.	18	14	16
Kazakhoil Aktobe LLP	7	6	6
Kazakhturkmunay LLP	8	9	9
<b>Megaprojects</b>	<b>178</b>	<b>166</b>	<b>168</b>
Tengizchevroil LLP	130	115	116
KMG Kashagan B.V.	25	27	29
KMG Karachaganak LLP	22	23	22

<sup>1</sup> Assuming individual average weighted bbl/tonne conversion rates used for each asset.



## Planned and actual production including OPEC+ cuts, ths tonnes

Indicator	2021		
	Production target	Actual output, including OPEC+ cuts	Variance
Oil and gas condensate production	22,588	21,654	-934
Operating assets	14,471	13,965	-506
Megaprojects	8,117	7,688	-436

## Parameters of KMG production assets

Assets	Porosity	API density	Sulphur content, %	Number of fields	Average flow rate of new wells, tonnes/day	Average flow rate of current producing well stock, tonnes/day	Oil barrelisation ratio, bbl/tonne
Ozenmunaigas	0.19	36.51	0.14	2	11.2	4.2	7.23
Embamunaygas	0.27	32.03	0.62	33	12.2	3.7	7.3
Karazhanbasmunai	0.32	19.81	2.00	1	2.13	2.13	6.68
Kazgermunai	0.26	39.95	0.1	5	19.5	28.3	7.38
Petro Kazakhstan Inc.	0.09-0.30	51.25	0.03-0.08	19	11-18.2	0.9-30.4	7.75
Mangistaumunaigaz	0.14	30.77	0.2	15	9.7	5	7.23
Kazakhoil Aktobe	0.085	38.89	1.12	2	45.3	16.3	7.516
Kazakhturkmunay	0.14	36.12	3.17	6	-	39.4	7.21
Urihtau Operating	0.1	41.7	0.7	3	46.5	75.1	7.717





The technical characteristics of the produced oil differ significantly from region to region. The heaviest oil is produced in Karazhanbasmunai, with a bbl ratio of 6.68 bbl. per ton. The lightest at PetroKazakhstan Inc. with a bbl ratio of 7.75 bbl. per ton.

The quality of crude oil can be determined by two main parameters: high API gravity and low sulfur content. The sulfur content of the CPC Blend brand (KMG's main megaprojects)

is 0.56%, the density in API degrees is 45.3, thus it can be considered as one of the best oil in the world in terms of quality.

Crude oil brand	API Gravity	Sulfur content, %
CPC Blend (Kazakhstan, Novorossiysk)	45.3	0.56
West Texas Int. (USA, Cushing)	40.0	0.42
Arab Extra Light (Saudi Arabia)	39.4	1.09
Brent (UK)	37.5	0.40
Urals (Russia, Novorossiysk)	31.3	1.36

Data is from open sources of S&P Global Platts





## Megaprojects

KMG develops world-class projects through partnerships with international oil and gas companies.

### Tengiz

The largest gem in Kazakhstan's oil and gas industry, a unique supergiant oil field unrivalled elsewhere in the world.

The agreement on Tengizchevroil LLP was signed between the Republic of Kazakhstan and Chevron Corporation on 2 April 1993, with a 40-year hydrocarbon exploration

and production licence granted to Tengizchevroil in 1993. Tengizchevroil focuses on the exploration, production and sales of hydrocarbons from the Tengiz and Korolevskoye fields in the Atyrau Region.

Tengizchevroil LLP (TCO) operates a licence that includes the unique supergiant Tengiz field

and the adjacent Korolevskoye field with significant reserves. The Tengiz oil field was discovered in 1979. It is the world's deepest supergiant oil field.

Currently, oil is produced and processed by highly reliable modern operating facilities, including complex technology lines (CTL,



Oil production (total)	26,553 ths tonnes (580 ths bbl per day) <sup>1</sup>
Oil production (attributable to KMG) (20%)	5,311 ths tonnes (116 ths bbl per day)
Outlook	Implementation of the USD 45.2 bln Future Growth Project / Wellhead Pressure Maintenance will boost oil production from the Tengiz field by 12 mtpa
2P oil reserves life	Over 20 years
Associated gas production (total), including gas consumed in own operations and gas reinjection	14.8 bln m <sup>3</sup>
Interests	KMG (20%), Chevron (50%), ExxonMobil (25%), LUKOIL (5%)
Operator	Tengizchevroil LLP

13.48 mln tonnes of oil processed in 2021), Second-Generation Plant (SGP, 13.07 mln tonnes of oil processed in 2021) and sour gas injection unit (SGI, 2.98 bln m<sup>3</sup> of gas handled in 2021). The well stock currently comprises 200 production wells and 8 gas injection wells.

In 2021, oil output increased by 0.4% year-on-year to 26,553 ths tonnes (including KMG's share of 5,311 ths tonnes), while gas output was up 0.1% year-on-year to 14.8 bln m<sup>3</sup> (including KMG's share of 2.95 bln m<sup>3</sup>). Higher production was attributable to the suspension of OPEC+

restrictions in the second half of 2021 and completion of the large-scale SGP/SGI overhaul four days ahead of the schedule, which resulted in the incremental production of 238 ths tonnes of oil (including KMG's share of 47.6 ths tonnes).

### Tengizchevroil's operational highlights

Year	Oil production, ths tonnes	Associated gas production, mln m <sup>3</sup>	Dry gas production, mln m <sup>3</sup>	Liquefied petroleum gas (LPG) production, ths tonnes	Sulphur production, ths tonnes	Gas injection, mln m <sup>3</sup>
2019	29,791	16,290	9,471	1,348	2,589	3,655
2020	26,457	14,748	8,674	1,482	2,451	3,069
2021	26,480	14,767	8,717	1,449	2,493	2,982

### Progress on the Future Growth Project and the Wellhead Pressure Management Project

Tengizchevroil is implementing two integrated projects – the Future Growth Project (FGP) and the Wellhead Pressure Management Project (WPMP). The two projects make a significant contribution to the national economy: FGP–WPMP has generated around 48,000 jobs in Kazakhstan, with about 1,000 more permanent jobs to be added to support the operation of FGP–WPMP. The implementation of the projects will boost oil production from the Tengiz field by 12 mtpa.

At the end of 2021, the total cost of FGP–WPMP was USD 38.3 bln, with the overall project progress at 89%. Under the updated 2021 schedule, the launch of the WPMP and FGP facilities is slated for March 2023 and November 2023, respectively.

As at 1 January 2022, general construction progress was 82.6% (target – 81.9%), engineering design – 100.0% (target – 100.0%), management systems and power supply – 97.1% (target – 99.5%), well drilling – 94.6% (target – 94.2%), logistics – 100%, procurement – 100% (target – 100%), module manufacturing – 100%, systems completion – 12.5% (target – 17.7%).

All process modules have been placed on the foundations, construction and installation for the Single Centre for Process Management have been completed, and new group metering stations have been commissioned (GZU-53 and GZU-54 in February and September, respectively).

In Q1 2022, Tengizchevroil and the Partners plan to assess the project schedule and costs based on the 2021 progress, with the final dates for FGP facilities commissioning to be announced in Q2 2022.

<sup>1</sup> 1 tonne = 7.98 bbl



Works scheduled for 2022:

- Migrating and launching the Single Centre for Process Management
- Commissioning GZU-55
- Supplying fuel gas for pre-commissioning at FGP energy assets
- Completing construction and installation at the Third Generation Raw Gas Injection power plants
- Powering the Third Generation Raw Gas Injection power plants
- Completing mechanical works to lay Pressure Maintenance System pipelines
- Completing works to lay Pressure Maintenance System cables

- Completing construction and installation at raw gas injection drilling sites
- Completing mechanical works to install a demineralised water unit and waste heat boilers at 3GP

#### COVID-19

Because of the COVID-19 spread on the Tengiz territory and recurring outbreaks between June 2020 and August 2021, around 35,000 employees working at the field and the FGP–WPMP construction sites had to be repeatedly put on leave and brought back. Starting September 2021, the coronavirus situation began stabilising, and currently approximately

32,000 employees are working on FGP–WPMP construction.

By now, over 100,000 people have been vaccinated, out of whom 4,300 are Tengizchevroil employees, and the rest are contractors. Employee revaccination is now underway, with more than 1,800 people having already received booster shots.

As at the end of 2021, 49,000 people were working at the Tengiz field.

Additionally, a 200-bed modular hospital in Kulsary was commissioned.

## Kashagan

The huge Kashagan field is the largest discovery in recent four decades. Kashagan is one of the most complex projects in the industry globally.

The Production Sharing Agreement in respect of the North Caspian Sea (NCSPSA) was signed by the Republic of Kazakhstan and an international consortium in November 1997. North Caspian Operating Company N.V. is the project operator, acting on behalf of the project contractors.

The North Caspian project is the first major offshore oil and gas project in Kazakhstan. It includes five fields: Kashagan, Kalamkas-Sea, Kairan, Aktoty and Kashagan South-West.

The Kashagan field lies in an offshore location 75 km from Atyrau at water depths of 3 to 4 m. The field reservoir lies at a depth of over 4 km

and is characterised by high pressures (over 700 bar) and high hydrogen sulphide (H<sub>2</sub>S) concentration. At the same time, sour gas reinjection at high pressure improves oil recovery.

Kashagan is one of the most challenging industry projects globally due to harsh environmental conditions at sea and significant design, logistics and safety challenges. Located in the subarctic climate, the North Caspian Sea is covered with ice for about five months a year, requiring innovative technical solutions. KMG, together with international partners, is successfully implementing the project, having achieved sustainable production rates with further growth potential.

The Kashagan field infrastructure comprises onshore and offshore facilities. Onshore facilities include

the Bolashak Onshore Processing Facility (an integrated oil and gas treatment plant) while the offshore facilities comprise a range of manmade structures including an operations and process complex on Island D, Island A, and early production islands EPC-2, EPC-3 and EPC-4. A total of 40 wells were drilled on the Kashagan field, 6 of which are injection wells and 34 are production wells.

Currently, KMG (through Cooperative KazMunayGaz U.A.<sup>1</sup>) jointly with JSC Samruk-Kazyna on a parity basis (50%/50%) owns KMG Kashagan B.V. which, in turn, has a 16.88% interest in the North Caspian project. Thus, KMG indirectly owns 8.44% of the project. KMG also has an option to acquire another 50% in KMG Kashagan B.V. between 2020 and 2022.

<sup>1</sup> A wholly-owned subsidiary of KMG, with the direct ownership of 99.7440256% and indirect ownership via KMG Kumkol LLP of 0.2559744%.



## Highlights

Oil and condensate production in 2021 (total)	16,2 mln tonnes (353 kbopd) <sup>2</sup>
Oil and condensate production net to KMG (8.44%)	1,344 ths tonnes (29 kbopd)
2P oil and condensate reserves life <sup>3</sup>	Over 120 years
Gas production (total)	9.9 bln m <sup>3</sup>
Interests	North Caspian Operating Company N.V. (16.88%), Eni (16.81%), ExxonMobil (16.81%), Shell (16.81%), TOTAL SA (16.81%), CNPC (8.33%), and INPEX North Caspian Sea (7.56%)
Operator	North Caspian Operating Company N.V. (NCOC)

<sup>2</sup> 1 tonne = 7.9272 bbl.

<sup>3</sup> Reflects the current relatively low oil production level, which has an upside potential.



## NCOC's operational highlights

Year	Oil production, ths tonnes	Natural and associated gas production, mln m <sup>3</sup>	Sulphur production, ths tonnes	Gas injection, mln m <sup>3</sup>
2019	14,127	8,453	1,323	3,148
2020	15,141	9,152	1,228	3,807
2021	16,236	9,878	1,372	4,315

In 2021, oil and gas production from the North Caspian project stood at 16.2 mln tonnes and 9.9 bln m<sup>3</sup>, respectively. Kashagan production grew by 7.2% year-on-year to 1,094 ths tonnes of oil and 726 mln m<sup>3</sup> of gas. The significant boost in production in 2021 was driven by an increase in Kazakhstan's quota from August under the OPEC+ Agreement. In Q4 2021, successful tests were carried out on the capacity of the raw gas injection compressors (SGI), which increased the gas injection rate to 15 mln m<sup>3</sup> per day and increased the average daily output to ~ 410 kbopd.

Under the terms of the Production Sharing Agreement (PSA), all oil produced at the Kashagan field is exported, including KMG's share of the oil. The produced oil is mostly exported to Europe, East Asia and India via Novorossiysk, where the oil is delivered by the CPC pipeline.

### Outlook for Kashagan

Once sustainable production rates are achieved, two projects are under consideration in phase 1 to ramp up to plateau production with the potential to grow oil and condensate production to 450 kbopd (57 ths tonnes per day) in the medium term.

- Bundle 1.
- Project to supply raw gas to a third party. (Gas processing plant (GPP) with a capacity of 1 bln m<sup>3</sup> per year).

Two separate projects, A and B, are considered for phase 2 to increase oil and condensate production to 700 kbopd (88 ths tonnes per day) over the next 10 years.

- Phase 2A.
- Phase 2B.

### Bundle 1

The project will enable oil production increase by 15–20 kbopd (1.9–2.5 ths tonnes per day) by upgrading existing injection compressors and expanding their capacity. Bundle 1 was split into two phases: raw gas injection compressor upgrade (to be completed in 2022) and an ultra-high pressure pipeline with well conversion (2026). The cost of the project is around USD 207 mln. It is expected to be completed in the second half of 2022.

### Project to supply raw gas to a third party (Gas Processing Plant (GPP) with a capacity of 1 bln m<sup>3</sup> per year)

The project will provide for increasing oil production by 17–20 kbopd (2.1–2.5 ths tonnes per day) by delivering additional volumes of associated raw gas to KazTransGas' planned new gas processing plant (GPP) with raw gas processing capacity of 1 bln m<sup>3</sup> per year. The project is scheduled for completion in 2024.

### Phase 2A

The project seeks to increase oil production to 500,000 kbopd (63 ths tonnes per day at existing

facilities, through additional supplies of ~ 2 bln m<sup>3</sup> per year of raw gas to JSC National Company QazaqGaz. The project is now at the FEED stage. An FID is expected in 2023, with the project start-up in 2026.

### Phase 2B

The project aims to increase oil production to 700 kbopd (88 ths tonnes per day). An option to build a multi-phase pipeline and a new onshore plant and to supply 6 bln m<sup>3</sup> per year of raw gas to Tengizchevroil or KazTransGas was selected last year. Currently, this option undergoes technical and economic review and optimisation as part of a pre-FEED study. An FID is expected in 2024, with the project start-up in 2030.

### COVID-19

As part of its COVID-19 response, the operator of the North-Caspian project has been implementing an effective COVID-19 prevention and control programme in order to protect operational staff while taking steps to minimise impact on operations and curb further spread of the virus. For today, 2,838 people have been vaccinated.

## Karachaganak

One of the world's largest gas and condensate fields

The Final Production Sharing Agreement (FPSA) in respect of the Karachaganak oil and condensate project was signed by the Republic of Kazakhstan and an international consortium on 18 November 1997. Royal Dutch Shell and Eni are the joint operators of the Karachaganak project (development via Karachaganak Petroleum Operating B.V.).

### Highlights

Production of liquid hydrocarbons (stab. <sup>1</sup> ) (total)	10.3 mln tonnes (250 kbopd) <sup>2</sup>
Production of liquid hydrocarbon (stab.) net to KMG (10%)	1,034 ths tonnes (25 kbopd)
Outlook	The implementation of investment projects to maintain the achieved liquid hydrocarbon production plateau levels
2P oil and condensate reserves life	Over 20 years
Gas production (total)	18.9 bln m <sup>3</sup>
Interests	KMG (10%), Eni (29.25%), Shell (29.25%), Chevron (18.00%) and LUKOIL (13.5%)
Operator	Royal Dutch Shell and Eni are the joint operators of the Karachaganak field (Karachaganak Petroleum Operating B.V.)

<sup>1</sup> A conversion factor of 0.9 is applied to total oil and condensate production to estimate stable liquid hydrocarbons.

<sup>2</sup> 1 tonne = 7.86 bbl.





Karachaganak oil and condensate field is one of the largest oil and condensate fields in the world, located in the West Kazakhstan Region and covering an area of over 280 sq km. The field was discovered in 1979, with pilot development started in 1984.

The Karachaganak project has three core process facilities, comprising a single system of interrelated and interdependent process units within the Karachaganak field's production process:

- KPC – the Karachaganak Processing Complex, located in the northwestern part of the field and processing liquid hydrocarbons coming from wells as well as feedstock transported from Unit 2;
- Unit 2 – a gas treatment unit located in the southeastern part of the field, which separates and reinjects raw gas at high pressure and feeds liquid hydrocarbons to the KPC for stabilisation before shipment for export;
- Unit 3 – a gas treatment unit located in the northeastern part of the field, which separates and partially stabilises liquid hydrocarbons and gas before shipment for export.

In 2021, the field's operating well stock was 158 wells and 19 injection wells.

Liquid hydrocarbon production from Karachaganak decreased by 5.5% year-on-year to 10,338 ths tonnes in 2021, including KMG's share at 1,034 ths tonnes. Gas production was down 6.1% year-on-year at 18,980 mln m<sup>3</sup> in total, with KMG's share at 1,898 mln m<sup>3</sup>. The decline was mainly caused by a reduction in raw gas intake by the Orenburg GPP, which is supplied under a long-term gas purchase and sale contract and by long unscheduled maintenance.

## Karachaganak Petroleum Operating B.V.'s operational highlights

Year	Gas production, mln m <sup>3</sup>	Liquid hydrocarbon production, ths tonnes	Gas injection, mln m <sup>3</sup>
2019	18,615	10,147	8,711
2020	20,214	10,941	10,362
2021	18,980	10,338	9,998

### Outlook for Karachaganak

The Karachaganak oil and condensate field is in Phase 2 commercial development (phase 2M), which includes a number of major capex projects (Production Plateau Extension Projects and the Karachaganak Expansion Project) aimed at increasing raw gas treatment and reinjection capacity to extend the duration of the liquid hydrocarbon production plateau at the achieved rates.

### Production Plateau Extension Projects (phase 2M):

- Installation of the additional 5th Trunk Line (5TL) – the project will increase the annual volume of gas injection to 10 bln m<sup>3</sup> in order to maintain reservoir pressure and add 2.6 mln tonnes of liquid hydrocarbons in incremental production over the remaining life of the FPSA. It was commissioned in December 2019.
- KPC Gas Debottlenecking (KGDBN) – the project envisages commissioning of new glycol gas-dehydration and low-temperature gas separation units with a total capacity of 4.0 bln m<sup>3</sup> per year to increase the volume of gas treatment for reinjection and/or export to the Orenburg Gas Processing Plant (OGPP), as well as add 9.1 mln tonnes of liquid hydrocarbons in incremental production over the remaining life of the FPSA. It was put into operation in April 2021.

- Installation of Unit 2 4th Injection Compressor (4ICP) – the project will install a network of process pipelines to maintain reservoir pressure and the liquid hydrocarbon production plateau by increasing annual gas injection volumes from 10 bln m<sup>3</sup> to 13 bln m<sup>3</sup>, as well as add 6.8 mln tonnes of liquid hydrocarbons in incremental production over the remaining life of the FPSA. Commissioning is scheduled for March 2022.
- Installation of the additional 6th Trunk Line (6TL) – the project will optimise the injection process by shifting gas to new parts of the field while adding 2.2 mln tonnes of liquid hydrocarbons in incremental production over the remaining life of the FPSA. Commissioning is scheduled for March 2024.

Combined, the Production Plateau Extension Projects will maximise the benefits through:

- increased gas treatment capacity;
- incremental liquid hydrocarbon production;
- upgrades to existing liquid hydrocarbon treatment units;
- reduced rates of reservoir pressure declines.



### Karachaganak expansion Project (KEP)

A major expansion of production units is an option to further extend production plateau post phase 2M. This expansion is to be implemented in phases in 2025–2026. The KEP project which will enable a further boost in gas treatment and reinjection capacities through the phased commissioning of the 5th and 6th injection compressors to sustain oil production at 10 mln to 11 mln tonnes per year. The project cost is estimated at USD 1.8 bln. In December 2020, a final investment decision was taken for the 5th Injection Compressor Project (5ICP), and a FID for the 6th Injection Compressor Project (6ICP) is expected in Q3 2022.

### Digital projects to transform operations

As part of the Digital Kazakhstan innovative development state programme, Karachaganak Petroleum Operating B.V. has developed a roadmap for a digital transformation and technology innovation. The current work streams are focused on the areas of production optimisation, well surveillance, smart plant and digital transformations for project delivery, minimisation of paper-intensive processes and maximisation of the automated workflows, warehouse management, improvement of the monitoring and intervention activities.

Digitising key field parameters will enable Karachaganak Petroleum Operating B.V. to make timely decisions maximising productivity through automated integrated data analysis tools. With progress at 65%, the project's expected completion year is 2022.

### COVID-19

COVID-19 response

at the Karachaganak field included the following crisis response measures implemented early on:

- suspension of drilling until September 2021;
- curtailing well operations not using drilling rigs, postponing non-essential well operations from 2020 to 2021;
- partially postponing preventive maintenance activities from 2020 to 2021;
- shifting employees to work from home;
- increased shifts for Karachaganak Petroleum Operating B.V. employees and contractor personnel;
- regular PCR tests for Karachaganak Petroleum Operating B.V. employees and contractor personnel;
- frequent cleaning and sanitation protocols, etc.

By the beginning of 2022, the number of vaccinated employees at Karachaganak Petroleum Operating B.V. was around 3,500 persons, or 92%.



## Oil production at operating assets

As a legacy of more than a hundred years in the oil and gas industry, KMG's producing asset portfolio consists mostly of mature fields. In this regard, KMG's key priority is to improve production efficiency. The Company is committed to energy saving across operations while also maintaining a strong focus on continuous production process optimisations and improvements and driving higher oil recovery rates.

Today about 85% of total oil production at the Company's operating assets comes from seven key fields: Uzen and Karamandybas (JSC OzenMunaiGas), Kalamkas and Zhetybai (JSC MangistauMunaiGaz), S. Nurzhanov and East Moldabek (JSC Embamunaigas) and Karazhanbas (JSC Karazhanbasmunai).

In 2021, construction and installation works continued on the stage 2 facilities of Phase 1, namely "Construction of a 29-km gas pipeline from BPS-GTU Kozhasai" and "Extension of BPS" – construction of the site and installation of a gas dehydration unit (GDU) on the East Urikhtau field. The Urikhtau field is to be put into commercial operation in mid-2023, with expected production of up to 1.5 bln m<sup>3</sup> of gas and 500 ths tonnes of oil per year.

In 2021, KMG's share in the oil production of the operating assets decreased by 152 ths tonnes to 13,961 ths tonnes (or 277 kbopd). This reflects a natural decline in production from mature fields and the implementation of arrangements reached under the OPEC+ agreement.

In 2021, the total well stock in operation was 15,081 wells, of which 11,206 wells were classified as the current declining well stock. Most of oil and condensate production comes from the current declining well stock.

### Number of wells at KMG-operated assets

Indicator	2019	2020	2021
New wells	581	518	475
Current declining well stock, including idle wells	12,235 462	11,961 616	11,206 781
Injection wells	3,748	3,338	3,400
<b>Total for KMG-operated assets</b>	<b>16,564</b>	<b>15,817</b>	<b>15,081</b>

### Lifting costs

Unit	KZT per tonne	USD per bbl
JSC OzenMunaiGas	38,508	12.5
JSC Embamunaigas	31,694	10.34
JSC Mangistaumunaigaz	23,696	7.69
JV Kazgermunai LLP	11,869	3.62
Kazakhturkmunay LLP	19,212	6.26
Kazakhoil Aktobe LLP	13,986	4.26
JSC Karazhanbasmunai	39,651	13.3

### Netbacks

Unit	Exports	Domestic market
	USD per bbl	USD per bbl
JSC OzenMunaiGas	36.3	16.95
JSC Embamunaigas	37.65	16.87
JSC Mangistaumunaigaz	32.56	16.29
JV Kazgermunai LLP	38.55	19.07
Kazakhturkmunay LLP	39.25	8.1
Kazakhoil Aktobe LLP	38.9	18
JSC Karazhanbasmunai	39.22	12.91

## Gas production

Natural and associated gas production decreased by 0.7% to 8,135 mln m<sup>3</sup> in 2021. Operating assets produced 2,466 mln m<sup>3</sup> (30% of the total), and 5,669 mln m<sup>3</sup> (70%) came from megaprojects, with the Tengiz and Karachaganak megaprojects accounting for the bulk of production.

Gas production values are the actual volume of gas produced, including gas reinjected for own needs. Gas reinjection is used to maintain reservoir pressure, which is essential for sustaining high oil production rates.

Commercial gas production in 2021 was 4,625 mln m<sup>3</sup>, of which 1,760 mln m<sup>3</sup> were produced from operating assets and 2,865 mln m<sup>3</sup> from megaprojects. Year-on-year, commercial gas production decreased by 173 mln m<sup>3</sup>, or 3.6% cumulatively.

Along with processing own feedstock, the KazGPZ plant produces commercial gas using feedstocks supplied by KMG's other operating assets that do not produce commercial gas themselves.

### Natural and associated gas production

Indicator	2019	2020	2021
<b>Natural and associated gas production by asset (net to KMG), mln m<sup>3</sup></b>	<b>8,455</b>	<b>8,191</b>	<b>8,135</b>
<b>Operating assets</b>	<b>2,636</b>	<b>2,463</b>	<b>2,466</b>
JSC OzenMunaiGas	709	726	665
JSC Embamunaigas	260	217	202
JSC Mangistaumunaigaz	394	334	376
JV Kazgermunai LLP	224	188	185
JSC Karazhanbasmunai	27	27	31
JSC PetroKazakhstan Inc.	181	142	125
Kazakhoil Aktobe LLP	348	361	412
Kazakhturkmunay LLP	143	140	167
Amangeldy Gas LLP	350	326	278
Urikhtau Operating LLP	0	2	24
<b>Megaprojects</b>	<b>5,819</b>	<b>5,729</b>	<b>5,617</b>
Tengizchevroil LLP	3,258	2,950	2,953
KMG Kashagan B.V.	700	758	818
KMG Karachaganak LLP	1,861	2,021	1,898

### Commercial gas production from KMG-operated assets, mln m<sup>3</sup>

Indicator	2019	2020	2021
JSC OzenMunaiGas + KazGPZ <sup>1</sup>	680	751	636
JSC Mangistaumunaigaz (PD Zhetybaimunaigaz) <sup>1</sup>	116	161	172
JV Kazgermunai LLP	184	150	303
Amangeldy Gas LLP	346	326	
Kazakhoil Aktobe LLP	157	185	383
JSC Embamunaigas	135	152	145
Kazakhturkmunay LLP	163	103	121
JSC PetroKazakhstan Inc.	43	49.5	0
JSC Karazhanbasmunai	0	0	0
<b>Total for operating assets</b>	<b>1,823</b>	<b>1,877</b>	<b>1,760</b>

### Commercial gas production from megaprojects (net to KMG), mln m<sup>3</sup>

Indicator	2019	2020	2021
Tengiz	1,894	1,735	1,743
Karachaganak <sup>2</sup>	911	899	818
Kashagan	293	287	304
<b>Total for megaprojects</b>	<b>3,099</b>	<b>2,921</b>	<b>2,865</b>

<sup>1</sup> Raw gas from JSC OzenMunaiGas and JSC MangistauMunaiGaz's PD Zhetybaimunaigaz is supplied to the KazGPZ plant.

<sup>2</sup> Raw gas supplies to the Orenburg Gas Processing Plant.