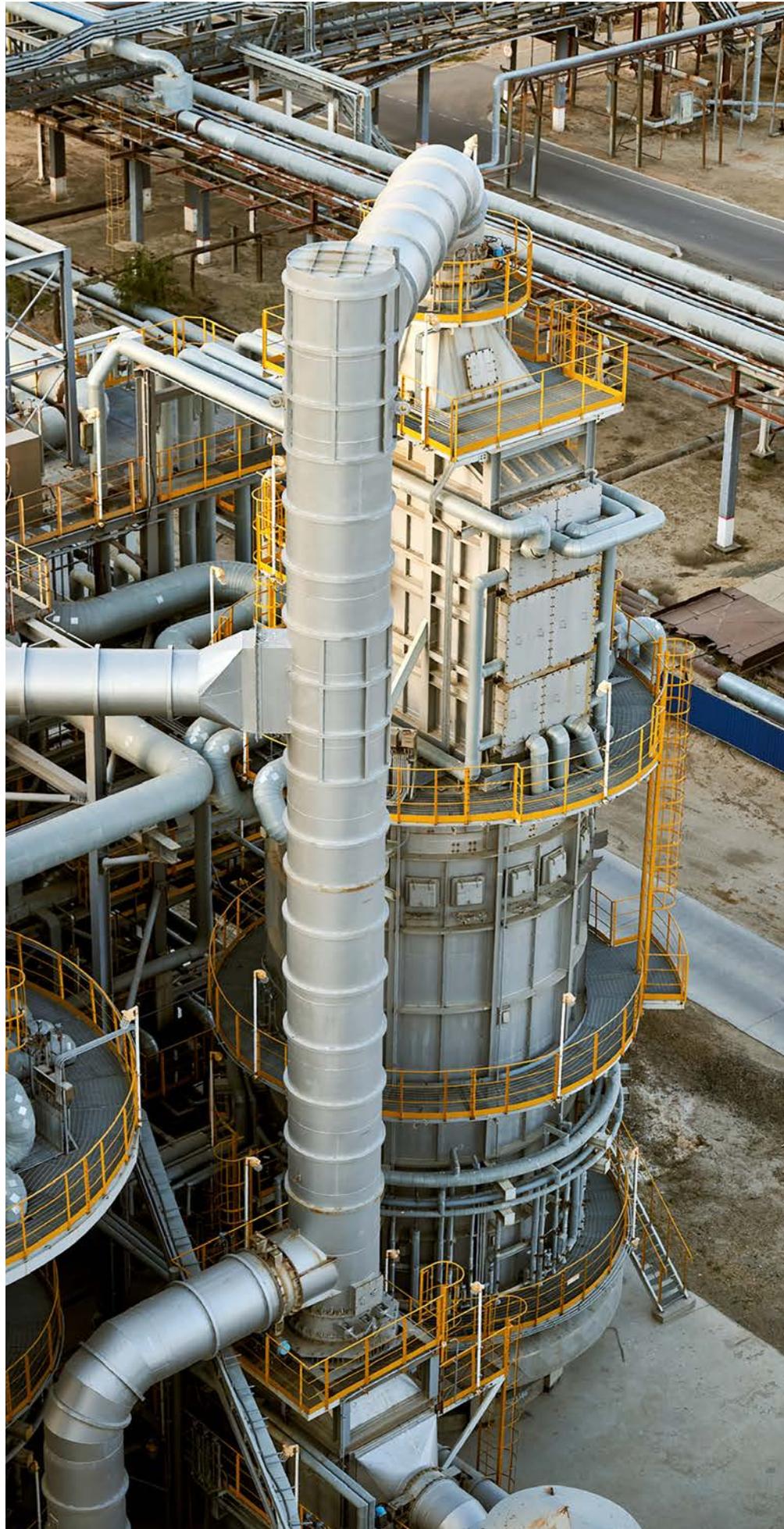


# DOWNSTREAM

The Company has completed a number of major modernisation projects across its oil refineries in Kazakhstan and Romania, successfully achieving higher refining depths. The Company's plans for the mid-term include:

- for Kazakhstan refineries: to drive operational excellence through cost optimisation and higher oil product output by reducing losses and fuel consumption for operational needs
- for Romania refineries: to improve performance by increasing the output of higher-margin products while cutting refining costs through streamlining and digitising production processes, optimising the product slate to achieve higher sales margins for refined products, and sustaining dividend payments to the KMG Corporate Centre
- integrated petrochemical projects: under its trusteeship agreements, KMG implements two major investment projects:
  - construction of the first integrated petrochemical complex with a capacity of 500 ths tonnes of polypropylene per year, to be commissioned in 2021
  - construction of a 1.25 mtpa polyethylene plant (currently at the design stage).



## Oil and condensate marketing

In 2021, sales of own oil and condensate produced by KMG amounted to 21,661 ths tonnes, including 13,745 ths tonnes of oil exports, and 7,916 ths tonnes

of domestic oil supplies. Supplies to KMG refineries in Kazakhstan are fully included in domestic oil supplies: 3,549 ths tonnes to Atyrau Refinery, 3,028 ths tonnes to Pavlodar Refinery, 875 ths tonnes to Shymkent Refinery and 464 ths

tonnes to CASPI BITUM. The year-on-year decline in performance was mainly due to lower oil production and consumption as a result of the COVID-19 pandemic and OPEC+ restrictions.

### Sales of KMG-produced oil and condensate, ths tonnes

Assets	2019			2020			2021		
	Export	Domestic market	Total	Export	Domestic market	Total	Export	Domestic market	Total
Operating assets <sup>1</sup>	8,472	7,137	15,609	7,524	6,849	14,373	6,126	7,916	14,042
including subsidiaries and associates <sup>2</sup>	5,325	3,453	8,778	4,911	3,517	8,428	3,805	4,458	8,262
Megaprojects <sup>3</sup>	8,215	1	8,216	7,637	2	7,639	7,619	0	7,619
<b>Total</b>	<b>16,688</b>	<b>7,138</b>	<b>23,826</b>	<b>15,161</b>	<b>6,851</b>	<b>22,012</b>	<b>13,745</b>	<b>7,916</b>	<b>21,661</b>

## KMG refining assets

Within KMG's asset mix, four refineries in Kazakhstan and two in Romania are responsible for processing liquid hydrocarbons (primarily oil).

### Prospective projects and innovations

In 2021, 3D General Layout engineering data management system – a digital twin of Atyrau and Pavlodar Refineries – was implemented to shift to modified

3D-based processes. Under the Digital Transformation Programme, Atyrau and Pavlodar Refineries are also implementing accurate engineering models of process units. Using special software HYSYS is used to develop digital twins of refining processes. Accurate calculations will improve the performance of the units.

Pavlodar Refinery has signed EPC contract on Construction of LPG Treatment Facility

with a capacity of 100 ths tonnes per year to be completed in 2023. The refinery also plans to implement by 2024 the project on reconstruction of diesel hydrotreating plant including a dewaxing unit with a capacity of 160 ths tonnes of winter diesel fuel per year. Basic design and feasibility study have been developed, tendering procedures for EPC contractor are on the way.

In 2021, a pilot project of hydrogen-powered car park including

### KMG refineries

Indicator	Kazakhstan refineries				Romania refineries	
	Atyrau Refinery	Pavlodar Refinery	Shymkent Refinery	CASPI BITUM	Petromidia Refinery	Vega Refinery
Location	Atyrau	Pavlodar	Shymkent	Aktau	Năvodari	Ploiești
Commissioning date	1945	1978	1985	2013	1979	1905
Design refining capacity, mln tonnes	5.5	6.0	6.0	1.0	6.0 <sup>4</sup>	0.5
Hydrocarbon refining volumes in 2021, mln tonnes	5.5	5.4	5.1	0.92	4.6 <sup>5</sup>	0.3
Refinery utilisation rate in 2021, %	100	90	85	92	77 <sup>6</sup>	60
KMG interest, %	99.53	100	49.72	50	54.63	54.63
Nelson Index	13.9	10.5	8.2	–	10.5	–
Light product yield in 2021, %	63	69	80	–	80	–
Refinery co-owners	–	–	CNPC	CITIC	Romanian Government	Romanian Government

<sup>1</sup> A JSC OzenMunaiGas, JSC Embamunaigas, JSC Karazhanbasmunai, JV Kazgermunai LLP, JSC PetroKazakhstan Inc., Kazakhturkmunay LLP, Kazakhoil Aktobe LLP, JSC MangistauMunaiGaz, Amangeldy Gas LLP, Urikhtau Operating LLP.

<sup>2</sup> JSC OzenMunaiGas, JSC Embamunaigas, Kazakhturkmunay LLP, Urikhtau Operating LLP.

<sup>3</sup> KMG Kashagan B.V., KMG Karachaganak, Tengizchevroil LPP.

<sup>4</sup> Design capacity includes refining 5 mln tonnes of crude oil and 1 mln tonnes of other hydrocarbons per year.

<sup>5</sup> Total refining volume of 4.86 mln tonnes includes 3.98 mln tonnes of crude oil and 0.88 mln tonnes of other and alternative feedstocks.

<sup>6</sup> Petromidia Refinery utilisation rate is 97.5% based on Solomon Associates' methodology.

construction of a hydrogen fuelling station in Atyrau was launched in cooperation with Air Liquide Advanced Technology. It is planned to construct one mobile and one fixed hydrogen fuelling stations by Q4 2022. Mobile Air Liquide AT station installed on a truck with 7.5 tonnes chassis will have 2 filling lines, 35 MPa and 70 MPa, with infrared communications, and it will consist of a transportation module filled at 76.5 MPa. The capacity of the mobile station will be 12.8 kg, the fuelling time – 5–20 minutes depending on the vehicle type. Fixed hydrogen fuelling station will be constructed in two stages. At stage 1, Air Liquide will ensure the required hydrogen purity in terms of carbon dioxide content by connecting to Atyrau Refinery's Hydrogen Production and Purification Plant 2 and installing proprietary final treatment unit. At stage 2, Atyrau Refinery will enter into EPC contract with Air Liquide Russia on construction of a fixed hydrogen fuelling station. Then, Air Liquide will consider the possibility of buyout of the fuelling station.

### Tariff policy

Kazakhstan refineries only offer oil refining services using the set tariffs (processing business scheme) and do not purchase crude for refining or sell refined products. Oil suppliers market finished products independently. The refineries focus exclusively on the operations side, streamlining refining activities and reducing operating expenses.

Oil refining tariffs at Kazakhstan refineries factor in actual production-related operating expenses and an investment component (capital expenditures to maintain current production rates, repayment of loans raised for modernisation).

### Weighted average tariffs to refine 1 tonne of tolling feedstock and relevant costs, KZT

Refinery	2019	2020	2021
Atyrau Refinery	37,436	41,168	42,434
Pavlodar Refinery	19,805	20,904	23,033
Shymkent Refinery	24,485	30,783	35,191
CASPI BITUM	18,010	18,003	18,472

### Hydrocarbon refining volumes (net to KMG), ths tonnes

Refinery	2019	2020	2021
Atyrau Refinery	5,388	5,016	5,473
Pavlodar Refinery	5,290	5,004	5,407
Shymkent Refinery (50%)	2,701	2,397	2,582
CASPI BITUM (50%)	443	433	464
<b>Total</b>	<b>13,822</b>	<b>12,849</b>	<b>13,927</b>

### Oil product output (net to KMG), ths tonnes<sup>7</sup>

Oil products	2019	2020	2021
<b>Atyrau Refinery</b>	<b>4,892 (100%)</b>	<b>4,525 (100%)</b>	<b>4,867 (100%)</b>
• Light <sup>8</sup>	2,998 (61%)	2,737 (60%)	3,169 (65%)
• Dark <sup>9</sup>	1,590 (33%)	1,383 (31%)	1,499 (31%)
• Petrochemicals <sup>10</sup>	166 (3%)	250 (6%)	52 (1%)
• Other	138 (3%)	155 (3%)	147 (3%)
<b>Pavlodar Refinery</b>	<b>4,794 (100%)</b>	<b>4,609 (100%)</b>	<b>4,935 (100%)</b>
• Light	3,600 (75%)	3,438 (75%)	3,736 (76%)
• Dark	894 (19%)	896 (19%)	862 (18%)
• Other	300 (6%)	275 (6%)	337 (7%)
<b>Shymkent Refinery (50%)</b>	<b>2,477 (100%)</b>	<b>2,145 (100%)</b>	<b>2,352 (100%)</b>
• Light	2,028 (82%)	1,970 (92%)	2,035 (87%)
• Dark	447 (18%)	172 (8%)	313 (13%)
• Other	2	3	4
<b>CASPI BITUM (50%)</b>	<b>439 (100%)</b>	<b>428 (100%)</b>	<b>460 (100%)</b>
• Dark	185 (42%)	185 (43%)	203 (44%)
• Other	254 (58%)	243 (57%)	257 (56%)
<b>Total</b>	<b>12,602</b>	<b>11,707</b>	<b>12,614</b>

### Refining volumes at Kazakhstan refineries Hydrocarbon refining and production of oil products

In 2021, hydrocarbon refining volumes at Kazakhstan refineries (net to KMG) amounted to 13,927 ths tonnes, with oil

product output at 12,614 ths tonnes. Year-on-year, hydrocarbon refining and oil product output were up 8.4% and 7.7% respectively mainly due to the restoration of pre-pandemic refining volumes and a return to average annual indicators.

<sup>7</sup> Calculation methodology adjusted, the data on oil products produced from hydrocarbon feedstocks now reflect the components that make up finished products (the data presented in the 2019 Annual Report disregarded the involved components).

<sup>8</sup> Including petrol, diesel fuel, jet fuel and LNG.

<sup>9</sup> Including fuel oil, vacuum gas oil and bitumen.

<sup>10</sup> Including benzene and paraxylene.

### Production and marketing of oil products derived from KMG's own oil

JSC OzenMunaiGas, JSC Embamunaigas, Kazakhturkmunay LLP and Urikhtau Operating LLP supply Atyrau, Pavlodar and Shymkent refineries with KMG's own crude oil, and the resulting refined products are subsequently sold wholesale domestically or for export.

In 2021, OzenMunaiGas, Embamunaigas, Kazakhturkmunay and Urikhtau Operating supplied 4,458 ths tonnes of crude oil for refining, including 2,781 ths tonnes to Atyrau Refinery, 1,527 ths tonnes to Pavlodar Refinery, and 150 ths tonnes to Shymkent Refinery. The refineries' combined output for the year was 4,419 ths tonnes of refined products, including 59% of light products, 23% of dark products, 0.6% of petrochemicals, and 17% of other oil products.

KMG sells oil products wholesale after the oil purchased from OzenMunaiGas, Embamunaigas, Kazakhturkmunay and Urikhtau Operating is refined at refineries in Kazakhstan. In 2021, KMG sold 4,454 ths tonnes of oil products, primarily light products and fuel oil (77%).

The bulk of oil products was sold domestically (3,577 ths or 80% out of 4,454 ths tonnes), and the remainder was exported (877 ths tonnes). The share of oil product exports was down 12% year-on-year due to a ban on light product exports.

### Refinery output of oil products derived from KMG's own oil in 2021, ths tonnes

Oil products	Atyrau Refinery	Pavlodar Refinery	Shymkent Refinery	Total	Average oil product wholesale prices over 12M 2021, KZT per tonne
Light	1,538	964	105	2,606	165,873.50
Dark	764	248	20	1,032	122,543.60
Petrochemicals	27	0	0	27	253,532.90
Other	416	318	21	755	33,628.95
<b>Total</b>	<b>2,744</b>	<b>1,530</b>	<b>146</b>	<b>4,419</b>	<b>134,191.43</b>

### Hydrocarbon refining volumes (net to KMG), ths tonnes

Refinery	2019	2020	2021
Petromidia Refinery	6,331	4,864	4,586
Vega Refinery	436	364	321
<b>Total</b>	<b>6,767</b>	<b>5,228</b>	<b>4,907</b>

### Oil product output (net to KMG), ths tonnes

Refinery	2019	2020	2021
<b>Petromidia Refinery</b>	<b>6,172</b>	<b>4,749</b>	<b>4,470</b>
• Light <sup>1</sup>	5,225	4,009	3,590
• Dark <sup>2</sup>	736	575	530
• Other	211	165	152
<b>Vega Refinery</b>	<b>442</b>	<b>361</b>	<b>320</b>
• Dark	120	123	93
• Other	321	238	226
<b>Total</b>	<b>6,614</b>	<b>5,110</b>	<b>4,790</b>

### Refining in Romania

The core business of KMG International is hydrocarbon refining, as well as wholesale and retail sales of oil products. The KMG International-owned Petromidia Refinery is responsible for primary hydrocarbon

refining, with the Vega Refinery focusing on secondary refining. The Petromidia and Vega Refineries operate according to the model where refineries purchase hydrocarbons for their own account, refine them and then sell them either wholesale

<sup>1</sup> Including petrol, diesel fuel, jet fuel and LNG.

<sup>2</sup> Oil coke, fuel oil, natural gasoline.

or retail through an owned retail network of filling stations.

KMG International also owns a major petrochemical complex producing polypropylene and low- and high-density polyethylene (LDPE and HDPE). In addition, KazMunayGas Trading AG, the trading subsidiary of KMG International, is focused on trading in crude oil and oil products produced by KMG International refineries or by third parties.

In 2021, our refineries in Romania processed 4,907 ths tonnes of hydrocarbons and other feedstocks and produced 4,790 ths tonnes of oil products. The volumes decreased by 6% year-on-year on average. The decline in crude oil refining was attributable to an incident at Petromidia Refinery which caused a fire at the diesel hydrotreating plant. Rapid action was taken and all facilities were shut down. The refinery resumed its operations in a limited mode on 24 September.

In 2021, Petromidia's refining margin calculated as the difference between Urals crude prices and oil product prices (petrol, diesel fuel, naphtha, liquefied gas, jet fuel, fuel oil, propylene, sulphur, and oil coke) amounted to USD 1 per bbl compared to negative values of the previous year (due to the gradual recovery of demand after lifting COVID-related mobility restrictions).

### Petromidia Refinery's refining margin

Unit	2019	2020	2021
USD per tonne	31.7	-5	7.2
USD per bbl <sup>3</sup>	4.2	-0.7	1

### Crude oil for resale, ths tonnes

	2019	2020	2021
Crude oil for resale	10,911	8,522	8,342

In 2021, crude oil volumes for resale marketed through KMG International's trading operations totalled 8.3 mln tonnes. The 2.4% reduction was due to the fall in demand amid the COVID-19 pandemic.

### KMG International's retail network

Romania's retail market is the most profitable market for KMG International's oil products. In 2021, we completed the programme of Romanian retail chain involving the construction of 25 new filling stations supported by the Kazakh-Romanian Investment Fund.

KMG International's share of the Romanian retail market in 2021 is estimated at 16.3%, up 0.6%

year-on-year (16.3% in 2021 vs 15.7% in 2020) and higher than in 2019 (14.8%).

At year-end 2021, KMG International's retail network was comprised of the following assets:

- Romania: 294 filling stations and 913 points of sale (DOEX, RBI and Cuves). 3 CODO, 7 DODO, 11 DOEX, 45 RBI и 86 Cuves stations were opened
- Neighbouring countries: 280 filling stations and points of sale, including 60 stations in Bulgaria, 109 stations in Georgia (13 new stations in key regions) and 99 stations in Moldova (7 new DOCO stations added to the retail network compared to 2020, but with 6 stations below the plan for 2022 due to several loss-making stations in rural regions).

<sup>3</sup> To convert tonnes to bbl a conversion factor of 7.6 was used.