



Organization of the Petroleum Exporting Countries

2019
**World
Oil
Outlook
2040**

Executive Summary





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OPEC's World Oil Outlook (WOO) is part of the Organization's commitment to market stability. The publication is a means to highlight and further the understanding of the many possible future challenges and opportunities for the oil industry. It is also a channel to encourage dialogue, cooperation and transparency between OPEC and other stakeholders within the industry.

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Foreword

“The goal is to turn data into information, and information into insight.” This pertinent line from Carly Fiorina, former Chief Executive Officer (CEO) of HP, aptly underscores the key linkages between data, research and analysis, and is fitting for the tremendous work undertaken by the research, editorial and design teams at the OPEC Secretariat in compiling this year’s **World Oil Outlook (WOO)**. The efforts of all those involved, including the direct collaboration with OPEC Member Countries, should be widely lauded.

This year’s publication also comes on the back of the July 2019 endorsement of the **‘Charter of Cooperation’**, which provides a longer-term institutional framework for the cooperation between 24 OPEC and non-OPEC partners. It builds on the success of the **‘Declaration of Cooperation’** that has done so much to bring more balance to the oil market, more optimism to the industry and help restore sustainable stability.

There is no doubt this historic cooperation between OPEC and non-OPEC producing nations will be vital in the years and decades ahead. Its permanence will not only be beneficial to the 24 countries of the **‘Charter’**, but it is also in the interest of producers, consumers and the global economy.

This is apparent in the **WOO 2019**, which emphasizes the linkages between the short-, medium- and long-terms. None can be viewed in isolation; it is vital that all stakeholders have an understanding of our oil and energy futures given the great importance they have to our everyday lives. With much talk of an energy transition, we need to have a better appreciation of what this actually means and look to follow a realistic path that leads us to a **sustainable energy future for all**.

The **WOO 2019** analyzes developments in areas such as the global economy, energy demand, oil supply and demand, both in the upstream and downstream sectors, policy and technology developments, and environment and sustainable development concerns. This forms the basis for the WOO’s projections, with breakdowns provided by region, sector and timeframe.

What is clear is that the world will need a great deal more energy in the decades to come. It is easy to appreciate why. The global population is expected to increase by almost **1.6 billion** from around **7.6 billion** in 2018 to a level of **9.2 billion** in 2040. The global economy in 2040 is expected to be double the size it was in 2018. And we should



also not forget that energy poverty remains a scourge, with almost **one billion people** still **lacking access to electricity** and **three billion** with **no access to clean fuels** for cooking.

Total primary energy demand is expected to increase by **25%** between **2018 and 2040** with renewables leading the way in terms of growth, but **oil and gas** are still forecast to meet more than **50%** of the world's energy needs by the end of the forecast period. These trends can also be viewed in similar forecasts from other reputable organizations with long-term energy outlooks.

From the perspective of oil demand, given recent signs of stress in the global economy, and the outlook for global growth, at least in the short- and medium-term, the outlook for **global oil demand** has been lowered slightly this year to **110.6 mb/d** by **2040**, but demand expands in every five-year period to the end of the timeframe.

On the supply side, market stability, on the back of the voluntary production adjustments through the '**Declaration of Cooperation**' has generally been maintained over the past year. This is all the more striking and welcome in the face of the considerable risks and uncertainties to the global economy, including threats to global trade, rising debt levels, shaky economies in a number of key countries and Brexit-related worries.

Over the past year, **OPEC Member Countries** have continued to underscore their commitment to **market stability** and remain **dependable, reliable** sources of supply for their customers worldwide.

Non-OPEC supply prospects have been revised up sharply, as US tight oil, in particular, has again outperformed expectations. While there continues to be talk of more financial prudence in the tight oil patch, prospects for growth remain given that efficiency and technology gains have further increased. The expectations of a return to growth in some key mature producers, such as Norway, major new field start-ups in Brazil, Guyana and elsewhere, mean that other sources of non-OPEC supply will also likely have a meaningful medium-term impact.

In the long-term, however, it is OPEC that will be expected to meet the majority of oil demand requirements. Demand for OPEC liquids will rise to **44.4 mb/d** by **2040**.

For the downstream sector, the medium-term outlook envisages significant crude distillation capacity additions of around **8 mb/d** between **2019** and **2024**, with over **70%** of the additions in the Asia-Pacific and the Middle East. Moreover, this is close to **50%** of the total capacity additions required in the long-term to **2040**.

In terms of trade, the global crude oil and condensate trade is estimated to remain relatively static at around **38 mb/d** between **2018 and 2025**, before increasing thereafter to around **42 mb/d** by **2040**. While the US & Canada are expected to increase crude and condensate exports in the medium-term, in the long-term the major trade route remains the Middle East to the Asia-Pacific.

Given this outlook, there is clearly the requirement for major oil industry investment. In the period to **2040**, the WOO sees the need for around **\$10.6 trillion of investment** across the upstream, midstream and downstream sectors. OPEC Member Countries are fully committed to making the necessary investments to keep consumers well supplied, and the issue of returning global investments is a core focus of the '**Declaration**' and '**Charter**'.

On the policy front, however, the industry is now concerned about policies that may detrimentally impact investments; for example, those related to climate-related financial disclosures. It is important to stress that **OPEC is fully engaged and supportive of the Paris Agreement**. As responsible citizens, we believe that **there is no Planet B**, and our Member Countries are making significant efforts to diversify their economies and make investments in renewables and energy efficiency measures.

We also believe that the **oil industry** must be **part of the solution** to the **climate change challenge**. The science tells us that we need to reduce emissions; it does not tell us that we need choose one energy over another. Thus, we need to continually look to develop, evolve and adopt cleaner energy technologies across the board; ones that enable us to meet expected future energy demand, in a sustainable and ever more efficient manner and where no-one is left behind.

With OPEC's landmark **60th Anniversary** taking place in 2020, the **WOO 2019** helps establish a platform for discussion in the coming year by laying out possible future oil and energy paths. This year's WOO once again highlights the industry's challenges, as well as its opportunities, and underscores the vital requirement for a



serious and thorough evaluation of all the factors, drivers and risks to our common long-term energy future.

We look forward to further broadening our cooperation and dialogues with all industry stakeholders. It is a never-ending process, but one OPEC is fully committed to, in the **interests of producers, consumers**, the **global economy**, and **the world as a whole**.

A handwritten signature in black ink, appearing to read 'Mohammad Sanusi Barkindo', is centered on the page. The signature is stylized and fluid.

Mohammad Sanusi Barkindo
Secretary General



Executive Summary

The World Oil Outlook (WOO) presents the OPEC Secretariat’s medium- to long-term analysis and projections for the global economy, oil and energy demand, liquids supply and oil refining, as well as related matters, such as policies and technology. This includes analysis of the energy industry’s various linkages and its shifting dynamics. The detailed review in this Outlook includes breakdowns by region, sector and timeframe and is consistent with the July edition of OPEC’s Monthly Oil Market Report (MOMR).

Non-OECD countries to drive global population above 9 billion people by 2040

The global population is expected to increase by around 1.6 billion, from an estimated 7.6 billion in 2018 to 9.2 billion in 2040. The majority of this growth is projected to come from developing countries, particularly from the Middle East & Africa. The population of the Organisation for Economic Co-operation and Development (OECD) countries is forecast to increase by 78 million, mostly in OECD Americas. The overall population growth is set to decelerate throughout the forecast period. While the global working-age population (aged 15–64) is projected to grow by just under 900 million over the long-term, its share of the global population is expected to remain relatively constant, dropping slightly from 65% in 2018 to 64% in 2040. Moreover, the global urbanization rate will increase from 56% in 2018 to 64% in 2040.

Population by region

millions

	2018	2020	2025	2030	2035	2040	2018–2040
OECD	1,306	1,317	1,339	1,357	1,372	1,383	78
Non-OECD	6,326	6,477	6,846	7,192	7,515	7,816	1,490
World	7,631	7,795	8,184	8,548	8,888	9,199	1,568

* Figures may not add up due to rounding.

Source: United Nations, OPEC.

Global GDP growth between 2018 and 2040 is projected to average 3.3% p.a., driven primarily by developing countries

Global Gross Domestic Product (GDP) growth will be mainly driven by developing countries, largely due to improving labour productivity. The GDP of non-OECD countries is expected to grow by 4.5% per annum (p.a.) on average in the medium-term, while projected economic growth for the OECD averages 1.8% p.a. In the long-term, this



becomes 4.2% and 1.7%, respectively. Global GDP between 2018 and 2040 is expected to increase at a rate of 3.3% on average, with the pace of GDP growth slowing during the forecast period. The projected figures are lower compared to the WOO 2018 due to a drop in expected economic growth in the near- and medium-term, as well as the longer-term trend of emerging economies such as China and India beginning to reach maturity in the latter years of the forecast period.

Long-term annual real GDP growth rate

% p.a.

	2018–2024	2024–2035	2035–2040	2018–2040
OECD	1.7	1.8	1.7	1.7
Non-OECD	4.5	4.2	3.7	4.2
World	3.3	3.3	3.0	3.3

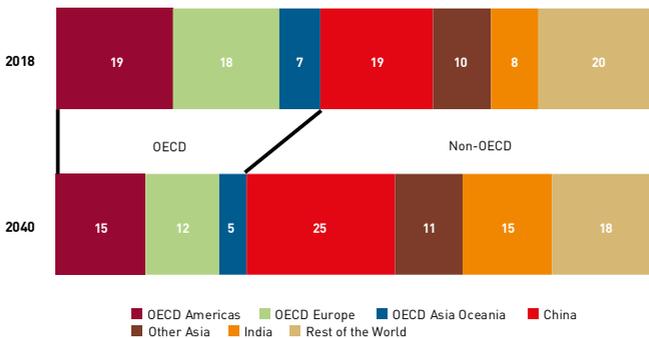
Source: OPEC.

Continued high GDP growth in Asian countries will shift the centre of economic gravity further east

Based on 2011 purchasing power parity (2011 PPP), global GDP is projected to rise from \$117.4 trillion in 2018 to more than \$237 trillion in 2040. Together, China and India are

Disribution of the global economy

%



Source: OPEC.



forecast to account for 40% of global GDP in 2040, whereas the OECD is expected to account for only 32%, a striking reversal of the current distribution pattern. Despite large regional shifts in terms of the global economic picture, average income per capita is not envisaged to witness significant changes. OECD Americas is anticipated to remain the region with the highest GDP per capita over the entire forecast period, followed by OECD Asia Oceania and OECD Europe. The Middle East & Africa region is likely to have the lowest GDP per capita, and it is expected to be the only region where the average income remains less than \$10,000 per capita in 2040.

Energy policies continue to focus on emission reductions despite some divergent signals from policymakers

The Outlook takes into account existing energy policies, whilst recognizing their transitory nature and potential evolution over time. Recently enacted energy policies focus primarily on measures aimed at emission reductions. The substitution of coal by natural gas and renewables in the power generation sector will continue to be at the centre of policy discussions. Several policies are aimed at limiting oil use, especially in the transportation sector. Examples include tightening standards for Corporate Average Fuel Economy (CAFE), carbon dioxide (CO₂) emission performance standards for road transportation vehicles, emissions and efficiency regulations in the maritime and aviation sectors, fuel substitution in the rail sector and taxation policies in many countries.

Technological progress will provide additional options for the global energy system

The rapid evolution of electric mobility technology will lead to a substantial increase in its usage, but internal combustion engines (ICEs) are expected to see further efficiency improvements and remain the main powertrain for the majority of passenger and commercial vehicles during the forecast period. Substantial innovation is expected in the aviation industry, including efficiency leaps for aircraft engines. The increased use of liquefied natural gas (LNG) in maritime transportation will allow for substantially higher fuel efficiency and cleaner emissions. Remarkable progress has been achieved in renewable power generation technology, but photovoltaics (PV) and wind power are likely to continue to suffer low capacity factors. On the supply side, the tight oil boom is making heavy use of rapidly advancing information technology (IT). Moreover, Industry 4.0, combined with highly innovative concepts in data processing and data interpretation via artificial intelligence (AI), will significantly enhance oil industry efficiencies.

Global primary energy demand is forecast to increase by 72 mboe/d in the period to 2040

Global demand for energy is forecast to increase from nearly 286 million barrels of oil equivalent a day (mboe/d) in 2018 to more than 357 mboe/d in 2040, with average growth of about 1% p.a. In this period, energy demand in non-OECD countries is expected to increase by almost 75 mboe/d, while demand in the OECD is estimated to drop by around 3 mboe/d. These regional demand growth differences relate to variances in demographics, efficiency levels, climate change policies and other factors that shape the energy mix in various countries and regions. Energy demand growth in India and China alone is expected to account for almost 50% of the energy demand growth in the non-OECD region.

Total primary energy demand by region, 2018–2040

	Levels mboe/d				Growth mboe/d	Growth % p.a.	Share of global energy demand %			
	2018	2020	2030	2040			2018– 2040	2018– 2040	2018	2020
OECD Americas	56.0	56.7	56.6	55.3	-0.7	-0.1	19.6	19.3	17.2	15.5
OECD Europe	36.4	36.4	35.7	34.3	-2.1	-0.3	12.7	12.4	10.9	9.6
OECD Asia Oceania	18.2	18.1	18.1	17.9	-0.4	-0.1	6.4	6.2	5.5	5.0
OECD	110.6	111.2	110.5	107.5	-3.1	-0.1	38.7	37.9	33.6	30.1
China	63.6	66.1	75.5	81.8	18.1	1.1	22.3	22.5	22.9	22.9
India	18.8	20.2	28.7	37.5	18.8	3.2	6.6	6.9	8.7	10.5
OPEC	20.0	20.4	25.5	29.8	9.9	1.8	7.0	6.9	7.8	8.3
Other non-OECD	49.9	52.0	63.8	74.8	24.9	1.9	17.5	17.7	19.4	20.9
Russia	14.8	15.0	15.5	15.8	1.0	0.3	5.2	5.1	4.7	4.4
Other Eurasia	8.2	8.5	9.5	10.3	2.1	1.1	2.9	2.9	2.9	2.9
Non-OECD	175.3	182.2	218.4	250.1	74.8	1.6	61.3	62.1	66.4	69.9
World	285.9	293.4	328.9	357.5	71.7	1.0	100.0	100.0	100.0	100.0

Source: OPEC.

Oil will retain the highest share in the energy mix in the period to 2040

In 2018, oil accounted for more than 31% of global energy demand, ahead of coal (27%) and gas (23%). Oil is forecast to remain the largest contributor to the energy mix by

2040, accounting for more than 28%. Between 2018 and 2040, global gas demand is anticipated to rise from 65.5 mboe/d to just above 90 mboe/d. Consequently, natural gas is expected to become the second-largest energy source, reaching a share of 25% in the total primary energy mix in 2040. Demand increases for gas will come primarily from Asia, led by China and India, as well as OPEC Member Countries.

Total primary energy demand by fuel type, 2018–2040

	Levels <i>mboe/d</i>				Growth <i>mboe/d</i>	Growth <i>% p.a.</i>	Share of global energy demand %			
	2018	2020	2030	2040	2018– 2040	2018– 2040	2018	2020	2030	2040
Oil	90.1	92.1	98.6	100.7	0.5	10.6	31.5	31.4	30.0	28.2
Coal	75.9	76.2	77.3	76.8	0.1	0.9	26.6	26.0	23.5	21.5
Gas	65.5	67.4	79.7	90.3	1.5	24.7	22.9	23.0	24.2	25.2
Nuclear	14.3	15.1	18.5	21.8	1.9	7.5	5.0	5.2	5.6	6.1
Hydro	7.3	7.5	8.9	10.2	1.6	3.0	2.5	2.6	2.7	2.9
Biomass	27.5	28.3	31.7	34.5	1.0	7.0	9.6	9.7	9.7	9.6
Other renewables	5.3	6.6	14.1	23.2	6.9	17.9	1.9	2.3	4.3	6.5
Total	285.8	293.3	328.8	357.5	1.0	71.7	100.0	100.0	100.0	100.0

Source: OPEC.

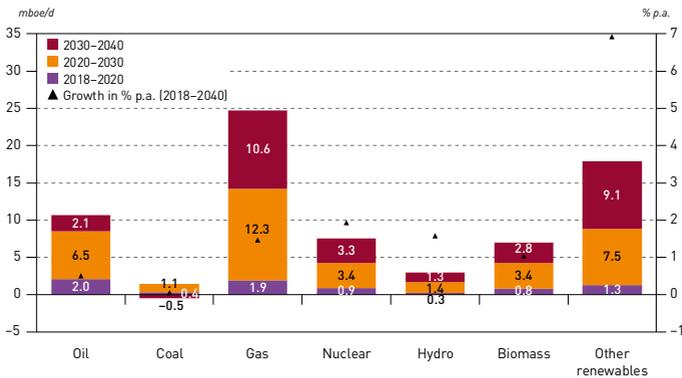
Coal will remain the largest source of global CO₂ emissions despite falling demand after 2030

Despite a declining coal demand trend after 2030, coal is still expected to be the largest source of CO₂ emissions. It is estimated to account for almost 40%, or 14.9 billion tonnes (bt), of total energy-related emissions in 2040. Energy-related emissions will continue to increase to more than 38 bt by 2040, which is more than 4 bt higher than the observed level in 2018. However, the pace of growth is forecast to decelerate significantly over his period.

'Other renewables' will be the fastest growing source of energy in relative terms, while demand for natural gas rises the most in absolute terms

'Other renewables', which includes solar, wind and geothermal power, is expected to be the fastest growing source of energy, expanding on average by 6.9%. Demand for 'other renewables' is seen rising by nearly 18 mboe/d between 2018 and 2040. Nuclear and biomass are expected to see demand growth of approximately 7 mboe/d each, while additional demand for hydropower will be around 3 mboe/d.

Growth in primary energy demand by fuel type, 2018–2040



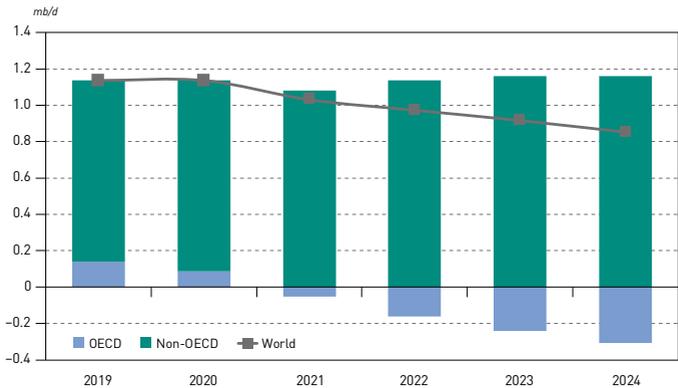
Source: OPEC.

Medium-term global oil demand is expected to reach 104.8 mb/d by 2024

Global oil demand is expected to continue growing at relatively healthy rates in the medium-term reaching 104.8 million barrels a day (mb/d) by 2024. This represents an increase of 6.1 mb/d above the 2018 level. The average growth will be about 1 mb/d over the medium-term period, declining from a projected 1.1 mb/d in 2019 to 0.9 mb/d in 2024. Incremental demand is forecast to come primarily from non-OECD countries (+6.6 mb/d). Annual average oil demand growth from non-OECD countries is projected to remain within a relatively narrow range of 1–1.2 mb/d over this period. Oil demand in the OECD is projected to gradually shift from slight growth during the initial years of the medium-term to declining demand after 2020, partially offsetting growth in the non-OECD region.



Annual oil demand increments by region, 2019–2024

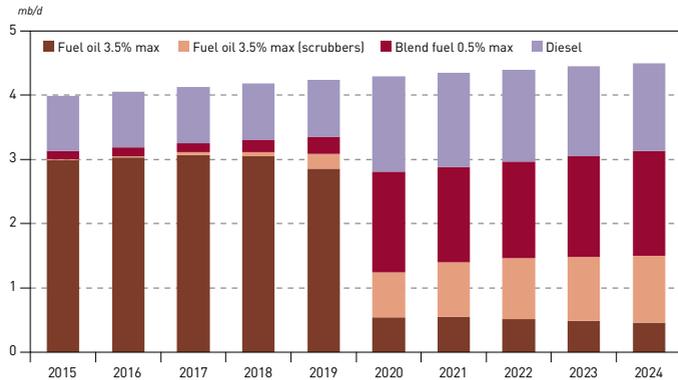


Source: OPEC.

Impact of IMO regulations is forecast to be less severe than previously expected

The new International Maritime Organization (IMO) regulation limiting sulphur content in marine fuels (0.5% maximum on a weight basis), effective from 1 January 2020, is

Marine bunker demand by fuel type



Source: OPEC.

expected to be a disruptive event, not only for the shipping sector, but also for the global refining system and related refined product supply. However, evolving market conditions and projections in terms of oil demand, liquids supply and oil refining, as well as developments within the shipping industry, have led to slight adjustments to previous IMO-related projections. Recent assessments indicate that the global refining system will have sufficient flexibility to address the changes in the maritime sector's fuel mix. Nevertheless, the impact on high sulphur fuel oil (HSFO) prices, the gasoil/HSFO spread, as well as HSFO-rich crude oil prices, will still be significant, although less severe than previously expected.

Long-term oil demand to rise to 110.6 mb/d in 2040

Long-term global oil demand is expected to increase by about 12 mb/d, rising from 98.7 mb/d in 2018 to 110.6 mb/d in 2040. From a regional perspective, there is a contrast between declining OECD demand and expanding demand in the non-OECD. Driven by an expanding middle class, high population growth rates and stronger economic growth potential, non-OECD oil demand is expected to increase by 21.4 mb/d between 2018 and 2040. India is projected to be the country with the fastest

Long-term oil demand by region, 2018–2040

mb/d

	2018	2020	2025	2030	2035	2040	Growth 2018–2040
OECD Americas	25.5	25.9	25.6	24.3	22.8	21.1	–4.5
OECD Europe	14.3	14.3	13.9	13.1	12.2	11.3	–3.0
OECD Asia Oceania	8.0	7.9	7.5	7.0	6.4	5.9	–2.1
OECD	47.8	48.1	46.9	44.4	41.5	38.3	–9.6
Latin America	5.9	6.0	6.4	6.8	7.0	7.3	1.4
Middle East & Africa	4.2	4.4	5.0	5.6	6.2	6.8	2.6
India	4.7	5.1	6.2	7.4	8.8	10.2	5.4
China	12.7	13.4	14.7	15.7	16.5	17.1	4.4
Other Asia	9.0	9.3	10.3	11.2	12.1	12.8	3.8
OPEC	8.8	9.0	10.0	10.9	11.5	11.8	3.0
Russia	3.6	3.7	3.9	3.9	3.9	3.8	0.3
Other Eurasia	2.0	2.1	2.3	2.4	2.4	2.5	0.5
Non-OECD	50.9	52.9	58.6	63.9	68.5	72.3	21.4
World	98.7	101.0	105.6	108.3	109.9	110.6	11.9

Source: OPEC.

oil demand growth and the largest additional demand. OECD demand is expected to plateau at around 48 mb/d for the next few years, before declining to around 38 mb/d by 2040. At the global level, growth is forecast to slow from a level of 1.4 mb/d in 2018 to around 0.5 mb/d towards the end of the next decade.

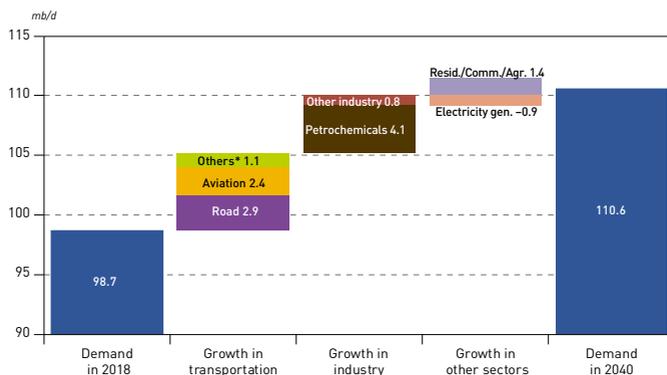
Petrochemical sector will be the leading long-term source of incremental demand

The largest incremental demand growth (+4.1 mb/d) is expected to come from the petrochemical sector, although road transportation will remain the largest demand sector in terms of absolute volumes. For road transportation, despite an overall increase of close to 3 mb/d, its overall share is forecast to drop by 2%. Significant demand growth is also expected in the aviation sector, which is projected to be the fastest growing sector, with oil demand expanding on average by 1.5% p.a. Some growth is also projected in the marine sector, as well as in rail and domestic waterways.

Oil demand in road transportation is set to plateau in the 2030–2040 forecast period

Road transportation is estimated to account for 43% of total demand by 2040. However, this sector is forecast to witness a strong decoupling between oil demand, transport

Oil demand growth by sector, 2018–2040



* Marine bunkers, rail and domestic waterways.

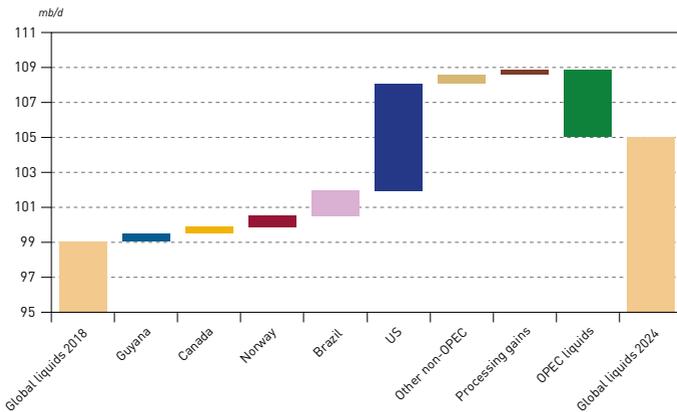
Source: OPEC.

services and the number of vehicles on the road. This will primarily be a result of efficiency improvements driven by technological developments, a tightening of energy policies, and the increasing penetration of alternative fuelled vehicles (electric vehicles (EVs), natural gas and to some extent hydrogen). The total vehicle fleet is estimated to grow by more than 1 billion between 2018 and 2040, reaching 2.4 billion. The large majority of this increase (953 million) comes from non-OECD countries. EVs (including battery electric vehicles (BEVs) and plug-in hybrids) are estimated to reach around 320 million units in 2040, equivalent to a share of 13% of the global fleet. The majority of EVs are expected to be passenger cars (305 million). In relative terms, this represents 15% of all passenger cars in 2040.

Strong medium-term non-OPEC supply growth driven mainly by US tight oil

Non-OPEC total liquids supply is projected to grow by 9.9 mb/d between 2018 and 2024, reaching 72.2 mb/d. This is mainly driven by the return of modest increases in upstream investment and healthy demand. US tight oil is forecast to continue to expand at a strong pace, contributing just over 60% of this medium-term non-OPEC supply growth. In addition, a cyclical recovery elsewhere sees meaningful contributions from Brazil, Norway and Canada, in addition to expected barrels from newcomer Guyana.

Composition of medium-term global liquids supply growth, 2018–2024



Source: OPEC.



Long-term non-OPEC supply prospects are more modest

US tight oil supply will expand sharply by 6.7 mb/d in the medium-term, before slowing thereafter, showing only modest increases. US tight oil supply is expected to peak at 17.4 mb/d in 2029. Tight oil production elsewhere has potential, but it is estimated to remain at relatively modest volumes. US total liquids are forecast to peak at 22.8 mb/d in the mid-2020s. Total non-OPEC supply is forecast to reach 72.6 mb/d in 2026, but gradually decline thereafter to a level of 66.4 mb/d by 2040. Beyond the mid-2020s, only two non-OPEC countries are expected to show meaningful output growth, namely Brazil and Kazakhstan. Virtually all other non-OPEC producers are anticipated to see a decline in long-term liquids production.

Long-term global liquids supply outlook

mb/d

	2018	2019	2020	2025	2030	2035	2040	Change 2018– 2040
US	16.7	18.6	20.3	22.8	22.2	20.5	18.5	1.8
<i>of which: tight oil</i>	10.2	12.0	13.8	17.0	17.3	16.3	14.5	4.4
OECD	28.2	30.0	31.9	35.3	34.1	32.1	29.7	1.4
Latin America	5.2	5.4	5.8	7.2	7.6	7.7	7.5	2.3
Middle East	3.2	3.2	3.2	3.6	4.0	4.1	4.1	0.9
Africa	1.5	1.6	1.6	1.7	1.5	1.4	1.3	-0.2
China	4.0	4.1	4.1	4.0	3.9	3.7	3.6	-0.4
Non-OECD, excl. OPEC	31.9	32.2	32.7	34.6	34.8	34.4	33.8	1.9
Processing gains	2.3	2.3	2.4	2.5	2.7	2.8	3.0	0.7
Non-OPEC	62.4	64.4	66.9	72.4	71.5	69.3	66.4	4.0
<i>Crude</i>	44.0	45.5	47.2	50.6	48.0	44.7	41.0	-3.0
<i>NGLs</i>	9.9	10.4	10.9	11.9	12.8	13.2	13.3	3.4
<i>Global biofuels</i>	2.5	2.5	2.6	2.9	3.3	3.5	3.8	1.3
<i>Other liquids</i>	3.7	3.7	3.8	4.4	4.8	5.1	5.3	1.6
Total OPEC liquids	36.6	35.0	34.4	33.4	37.0	40.8	44.4	7.8
Stock change	0.3	-0.5	0.3	0.2	0.2	0.2	0.2	
World	99.0	99.4	101.3	105.8	108.5	110.2	110.8	11.8

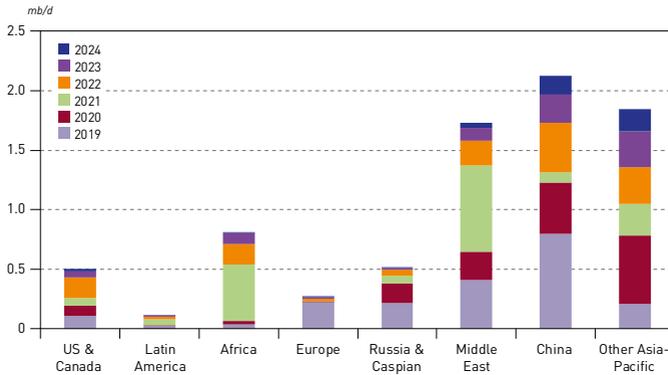
Source: OPEC.



Medium-term distillation capacity additions are estimated at almost 8 mb/d, mostly in the Middle East and Asia-Pacific

Almost 70% of distillation capacity additions are projected to occur in the first three years of the forecast period, with an average annual additions estimated at around 1.8 mb/d

Distillation capacity additions from existing projects, 2019–2024



Source: OPEC.

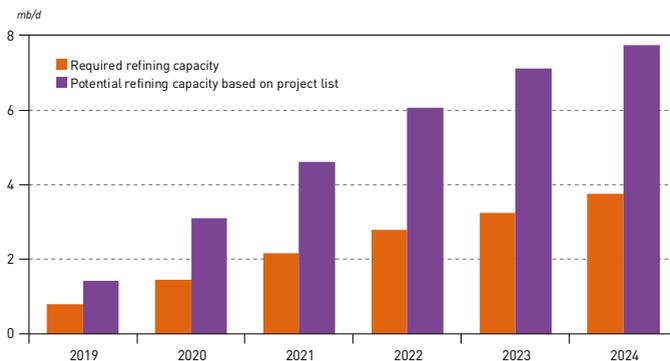
in the period 2019–2021. However, the rate of capacity additions is expected to level off in the years thereafter, dropping to only 0.4 mb/d. The majority of expansions are seen in the Asia-Pacific and the Middle East (5.7 mb/d or more than 70% of global additions) driven predominantly by oil demand growth, but also efforts to increase refined product exports, mostly in the Middle East. Significant additions (0.8 mb/d) are also expected in Africa with one large project in Nigeria accounting for the largest share.

Medium-term outlook points at significant excess refining capacity

Potential incremental medium-term crude throughput is estimated at a surplus of almost 4 mb/d relative to the incremental refined product demand by 2024. While the gap is still moderate in 2019, it widens gradually from 2020 onwards, illustrating a rising surplus of distillation capacity at the global level. The largest surplus is

expected for the Middle East, US & Canada, Europe and China. This may lead to more downstream competition post-2020 and potentially refinery closures. Refinery closures amounting to 2.1 mb/d are expected in the medium-term due to lower demand in several regions, as well as additions of highly competitive new refinery units. Consequently, the majority of closures are expected for the US & Canada and Europe, with limited closures in other regions. The only region with a projected medium-term deficit is Latin America.

Additional cumulative refinery crude runs, potential* and required**



* Potential: based on expected distillation capacity expansion; assuming no closures.

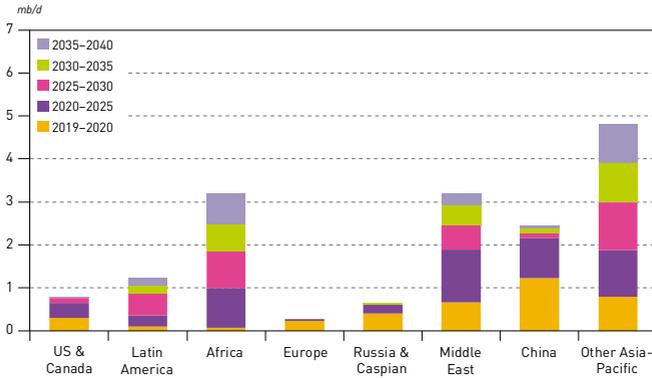
** Required: based on projected demand increases assuming no change in refined products trade pattern.

Source: OPEC.

Long-term distillation capacity additions projected at around 16.5 mb/d

Total crude distillation capacity additions are projected to reach 16.5 mb/d by 2040, mostly in developing countries (Asia-Pacific, Middle East, Africa and Latin America). Refinery additions required through 2040 are heavily 'front-loaded' with major implications for a slowdown in projects and investment after the medium-term period. Projections for secondary capacity additions indicate the need to add some 8.8 mb/d of conversion units, 18 mb/d for desulphurization and 5 mb/d of octane units in the period to 2040. The majority of these additions are expected to materialize before 2030, in line with demand growth and the implementation of stricter product specifications.

Crude distillation capacity additions, 2019–2040



Source: OPEC.

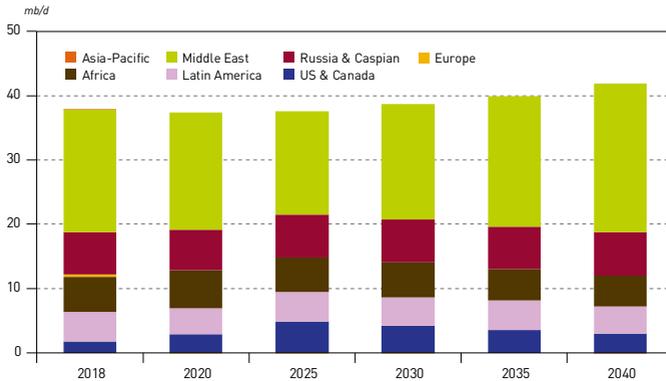
Required long-term investments are estimated at around \$10.6 trillion

Projected global upstream investments required to sustain production according to this Outlook are estimated to be \$8.1 trillion (\$2019) over the period to 2019–2040. Another \$1 trillion is seen as required in the midstream sector. Global downstream investments are estimated at around or slightly above \$1.4 trillion. Combined, this indicates that nearly \$10.6 trillion of investment will be needed globally over the long-term to sustain projected oil supply requirements.

After a medium-term dip, global crude exports are expected to grow in the long-term, driven by additional Middle East exports to the Asia-Pacific

In the medium-term, overall crude trade is seen relatively stable near 38 mb/d. In terms of regional exports, the biggest change is the significant increase in crude exports from the US & Canada, which are expected to climb to a level just under 5 mb/d in 2025, up by around 3 mb/d from 2018. In the long-term, the outlook changes fundamentally, with exports rising by 4.5 mb/d from 2025–2040 to reach almost 42 mb/d. Export flows from the US & Canada are projected to drop to around 3 mb/d by 2040. Total Middle East exports are set to increase by around 7 mb/d between 2025 and 2040 to reach levels of around 23 mb/d.

Global crude oil exports by origin*, 2018–2040



* Only trade between major regions is considered.

Source: OPEC.

Energy-exporting developing countries disproportionately affected by the impact of implementation measures taken in response to climate change

For energy-exporting developing countries the imperative to re-orient their economies is due to a stringent regulatory framework on climate change action and the associated adverse impacts of response measures. Achieving diversification is considered vital for their long-term socio-economic sustainability. A diversified portfolio could help such economies to increase their resilience, while taking into consideration the importance of local and regional contexts in policymaking. Energy-exporting developing countries could use their comparative advantage and diversify even within the energy sector. Policymakers could also pursue actions and measures that extend existing capabilities into industries of higher value added and complexity. Governments could play a vital role in the economic and structural reforms needed to achieve diversification. International cooperation could contribute to the identification and sharing of not only best practices but also ways in which the international community could facilitate increased trade, foreign investment, and support in the form of technology transfer and finance.



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