IEF Thought Leader's Roundtable
20 February 2025

Transportation and Mobility Energy Demand Trends and Sustainable Fuels

Presented by:

OPEC Secretariat

Global long-term oil demand projected to increase by almost 18 mb/d, rising to 120 mb/d in 2050

- Oil demand in the **transportation sector** is expected to increase by **10 mb/d** over the long term to reach **68.5 mb/d** in 2050
- Projections for **road transportation** indicate strong growth over the current decade before **stabilizing at levels above 50 mb/d**
- Demand in the **aviation sector** will grow throughout the outlook period reaching **10.9 mb/d in 2050**

Long-term oil demand by sector (mb/d)

	2023	2030	2035	2040	2045	2050	Growth 2023-2050
Road	45.6	49.2	49.8	50.0	50.2	50.2	4.6
Aviation	6.8	8.4	9.2	9.8	10.5	10.9	4.2
Rail & Domestic Waterways	2.0	2.2	2.3	2.3	2.3	2.3	0.3
Marine bunkers	4.2	4.8	5.0	5.0	5.0	5.1	0.8
Transportation	**58.5**	**64.7**	**66.3**	**67.2**	**68.0**	**68.5**	**10.0**
Petrochemicals	14.8	17.3	18.0	18.7	19.3	19.7	4.9
Other industry	12.9	14.2	14.8	14.6	14.6	14.7	1.8
Industry	**27.7**	**31.5**	**32.8**	**33.2**	**33.9**	**34.3**	**6.6**
Res./Comm./Agric.	11.4	12.6	13.0	13.1	13.2	13.4	2.1
Electricity generation	4.6	4.6	4.4	4.3	3.9	3.8	-0.8
Other uses	**16.0**	**17.2**	**17.4**	**17.4**	**17.0**	**17.3**	**1.3**
World	**102.2**	**113.3**	**116.4**	**117.8**	**118.9**	**120.1**	**17.9**

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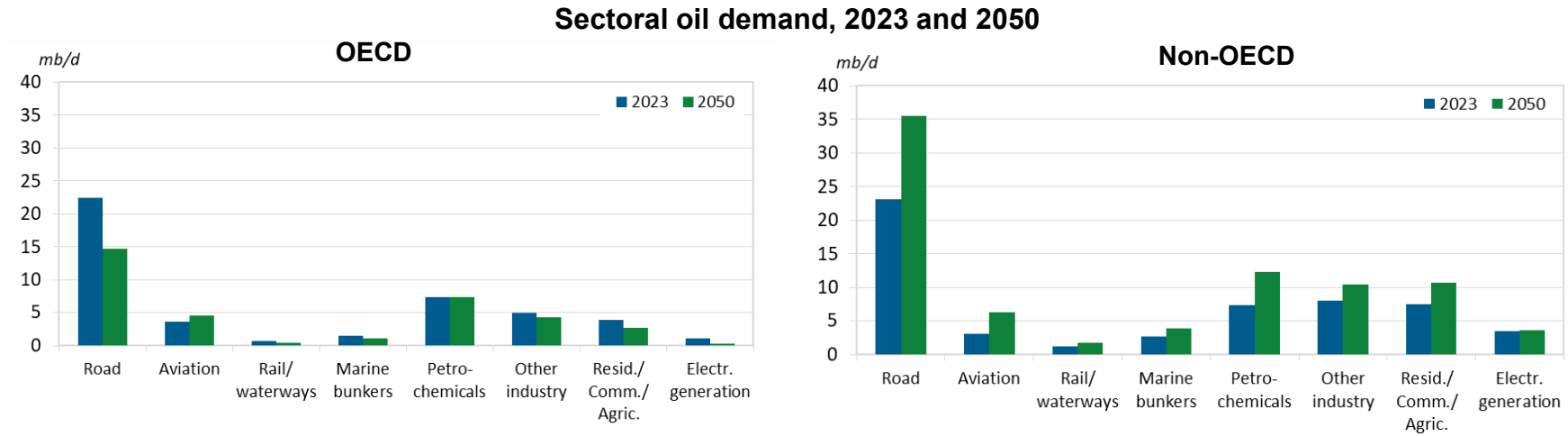
Diverging trends between OECD and non-OECD are clearly present in demand prospects



- Oil demand in **Non-OECD** is expected to increase by **28 mb/d** over the outlook period on the back of increased urbanization, industrialization and **expansion of the vehicle fleet**
- Oil demand in the **OECD** will decline by **10 mb/d**
- **Aviation demand** driven by the propensity to travel and a rise in the middle class, especially in developing Asia and the Middle East.

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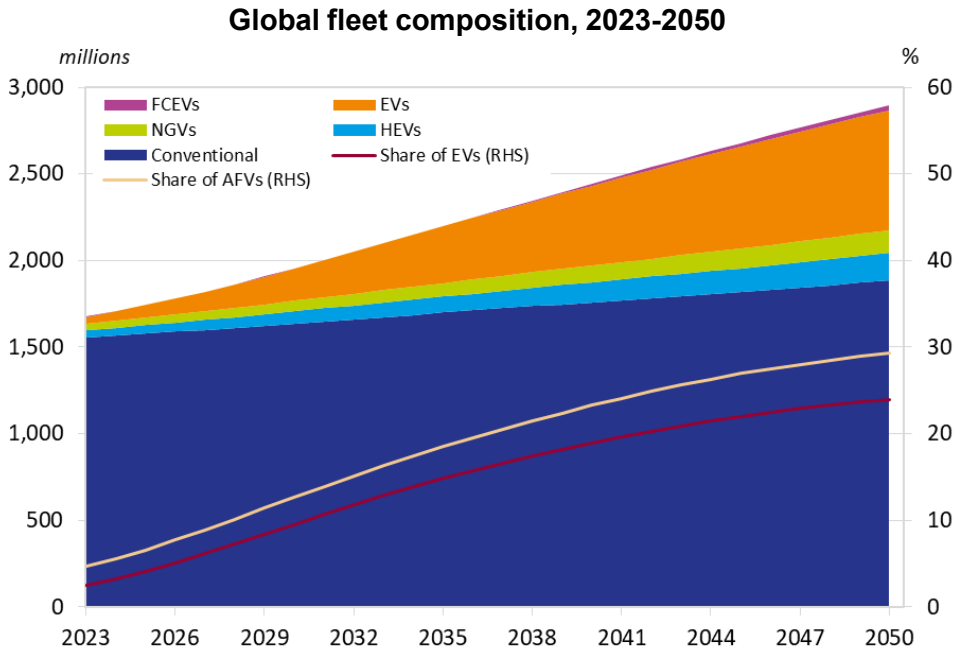
Technology impacts the global vehicle fleet composition

- The **global vehicle fleet** is projected to increase from **1.7 billion in 2023** to **2.9 billion in 2050** with the fastest growth expected in the EVs segment
- Nevertheless, **ICE-based vehicles** are expected to continue to dominate the global fleet and still account for **more than 70% in 2050**
- **NGVs** are expected to expand but at a far lower rate, rising to **130 million in 2050**
- **FCEVs** could number **20-30 million by 2050** but the market will remain rather niche.



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Aviation sector technology

- The increase in aviation oil demand **could potentially be even higher** given the projected rise in air traffic in terms of passenger kilometres. However, improved **energy efficiency** and the **gradual penetration of alternative fuels** will likely offset part of this potential
- While it is expected that small **electric aircraft** could start entering the market in the current decade, it is **unlikely that this type of aircraft will play a significant role** in displacing future oil demand
- Limited substitution options exist, with **biojet** and different versions of **SAFs** remaining far away from the required scale and cost to meet the ambition of eliminating a majority of the sector's emissions
- Taking into consideration the associated uncertainties, current estimates suggest that **oil demand in this sector is set to rise** from **6.8 mb/d in 2023** to **10.9 mb/d by 2050.**

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Demand additions in other transportation sub-sectors

- Expanding **maritime** trade will drive demand for **marine bunkers**, especially in Asia and the Middle East. Globally the increase will be around **0.8 mb/d** over the outlook period.
- Oil used for **marine bunkers** is expected to be exposed to **strong competition** over the long term from **natural gas**, as well as other potential options
- The **rail and domestic waterways** sector adds another **0.3 mb/d** globally by 2050, which is primarily linked to waterways traffic in China.
- Planned waterway **network expansions** are expected to increase related oil demand while, further **railway electrification** would limit demand growth

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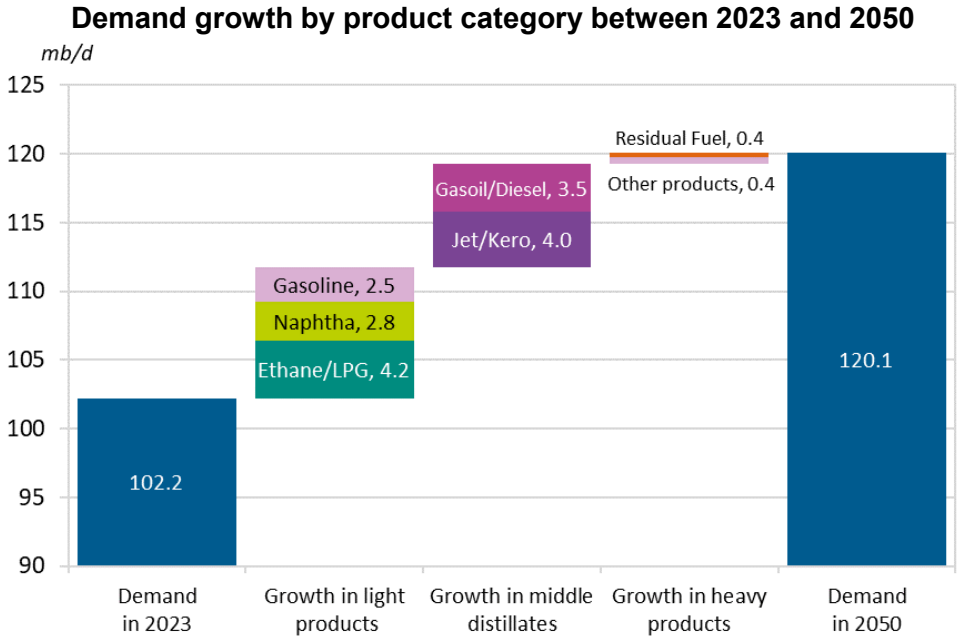
Refined products show major long-term demand growth

- The largest demand increase among all major products is projected for **ethane/LPG**
- **Gasoline** demand is expected to increase by 2.5 mb/d to **29.6 mb/d in 2050** – largely in the medium term
- The aviation sector drives a **4 mb/d increase** in **Jet/kerosene** demand
- **Diesel/gasoil** demand will increase by **3.5 mb/d**, with the largest demand base in road transportation and commercial vehicles.



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While Non-DOC crude supply declines, biofuels and Other Liquids grow in the long term

Long-term Non-DoC biofuels & others liquids supply outlook

	2023	2030	2035	2040	2045	2050	Change 2023-2050
Fuel ethanol	1.9	2.2	2.4	2.7	2.7	2.8	0.9
Biodiesel	1.2	1.5	1.8	2.0	2.2	2.4	1.2
Global biofuels	**3.1**	**3.7**	**4.2**	**4.7**	**5.0**	**5.3**	**2.2**
Canadian oil sands	3.2	3.6	3.8	4.1	4.5	5.0	1.7
Gas-to-liquids (GTL)	0.3	0.3	0.3	0.3	0.3	0.3	0.0
Coal-to-liquids (CTL)	0.3	0.3	0.3	0.3	0.3	0.3	0.1
Synthetic aviation fuel	0.0	0.1	0.3	0.5	0.7	1.0	1.0
Other*	0.4	0.4	0.4	0.3	0.3	0.3	-0.1
Total 'Other liquids'	**4.2**	**4.7**	**5.1**	**5.5**	**6.1**	**6.8**	**2.7**
Non-DoC total	**7.3**	**8.4**	**9.3**	**10.2**	**11.1**	**12.1**	**4.8**

** Including kerogen, extra-heavy crude, MTBE and other refinery additives.*

- Non-DoC **biofuels** are projected to increase from 3.1 mb/d in 2023 to **5.2 mb/d in 2050**, driven by blending mandates, but would only represent around **4% of global oil demand**
- **Synthetic aviation fuels** are expected to rise from very modest volumes to **1 mb/d by 2050**, with considerable upside potential.

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Two alternative scenarios were developed

The Technology-Driven Mitigation Scenario (TMS)

Alternative scenario to reach well below 2C:

- consistent with long-term goals of the Paris Agreement
- avoids adverse economic impacts and ensures a high degree of energy security

Scenario key elements:

- faster energy efficiency improvements
- faster expansion of renewable energy and nuclear
- greater diffusion of CCUS, DAC and hydrogen technologies within the CCE framework

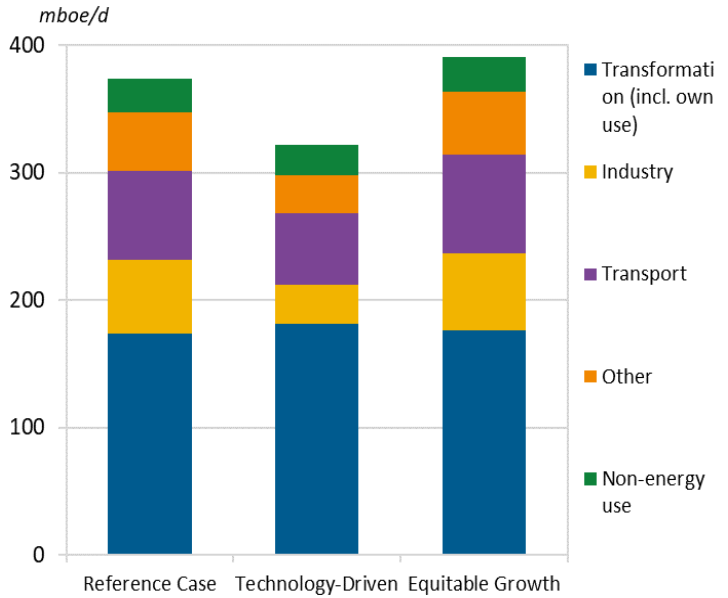
Equitable Growth Scenario (EGS)

Scenario enabling improved energy access and further eradication of energy poverty

Scenario key elements:

- higher economic growth, especially in developing countries
- policies will continue tightening but in the absence of a coordinated move to reduce emissions
- local development needs are prioritized over global issues

Global energy demand by sector in the Reference Case and alternative scenarios, 2050



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Alternative scenarios indicate range of uncertainty for future oil demand

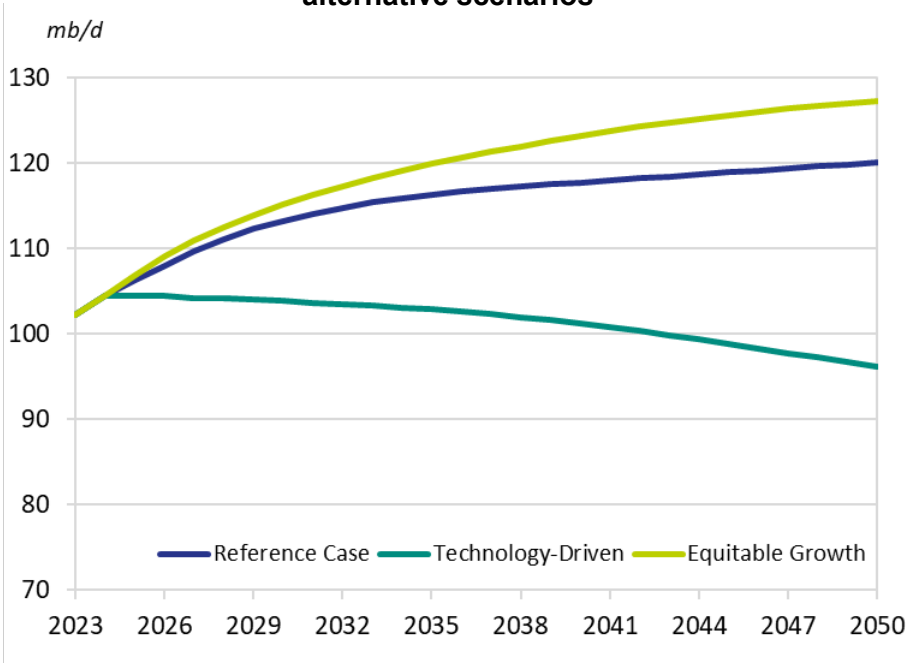
Technology-Driven Scenario

- oil demand will **stabilize at levels above 100 mb/d** in the period to around 2040
- demand moderately declines towards **96 mb/d** during the last decade of the forecast period

Equitable Growth Scenario

- oil demand projected to move **consistently above** the Reference Case levels
- oil demand tops **115 mb/d by 2030** and continues growing to **127 mb/d in 2050**

Global oil demand in the Reference Case and in alternative scenarios



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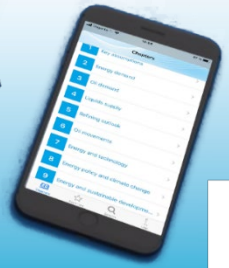

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