Oil market outlook: A new era for oil

Crude oil: The key uncertainties shaping the global oil market
Refined products: The end of the platinum age of refining?

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Crude oil: The key uncertainties shaping the global oil market
### OPEC+ production and compliance

#### Difference between target and actual production of OPEC+ countries in June 2023

<table>
<thead>
<tr>
<th>Country</th>
<th>Difference</th>
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</thead>
<tbody>
<tr>
<td>Russia</td>
<td>810</td>
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<tr>
<td>Nigeria</td>
<td>420</td>
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<tr>
<td>Angola</td>
<td>230</td>
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<td>Malaysia</td>
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<td>Azerbaijan</td>
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<td>Iraq</td>
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<td>Equatorial Guinea</td>
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<td>Republic of the Congo</td>
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<td>Brunei</td>
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<td>Gabon</td>
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<td>United Arab Emirates</td>
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<td>Kazakhstan</td>
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<td>South Sudan</td>
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</tbody>
</table>

**Countries that produced below target level**

**Countries that produced above target level**

#### OPEC+ crude oil production vs. target (million b/d)

Data compiled July 24, 2023.
Source: S&P Global Commodity Insights.
Russian seaborne crude oil exports remain high, while product exports dipped in the first half of May because of refinery maintenance.

**Russian seaborne crude exports to selected regions (million b/d)**

- Post-invasion
- India
- Mainland China
- Turkey
- Northeast Asia
- Europe
- Unknown

**Russian seaborne refined product exports (loadings) to selected regions**

- Post-invasion
- Middle East
- Asia
- Africa
- Europe
- Unknown
- North America

Data compiled May 15, 2023.
Data are monthly averages. Crude data include condensate and exclude CPC and KEBCO blends. Exported products include gasoil, naphtha, liquefied petroleum gas, fuel oil, residues, jet kerosene and gasoline. May 2023 loadings data are until May 15, 2023.
Source: S&P Global Commodity Insights.
Global demand growth projected at 2.1 million b/d in 2023 owing mostly by mainland China, and China remains really important for oil markets through 2024.
Demand growth in 2023 is driven by jet fuel and gasoline, and global oil demand is only now getting back to pre-COVID level.

Data compiled July 24, 2023.
Source: S&P Global Commodity Insights.
Americas drive global liquids supply growth, and non-OPEC+ accounts for most of global oil demand growth. Oil stocks near historic average.

**Global liquids supply annual growth by OPEC+/non-OPEC+**

- OPEC+
- Non-OPEC+

**OECD industry total oil stocks (million barrels)**

- Industry total oil stocks
- Industry total oil stocks average for the preceding five-year period

Data compiled July 24, 2023.

*Libya, Iran and Venezuela do not participate in OPEC+ and have been excluded from the chart.

Source: S&P Global Commodity Insights.
Second half 2023 inventory draws will be followed by inventory builds in first half 2024

World oil (total liquids) demand and production (million b/d)

Data compiled July 24, 2023.
Demand shown is for total liquids, including petroleum-based refined products, NGLs from associated and non-associated gas from crude oil and gas fields, direct crude oil burn, biofuels, refinery processing gains, refinery additives, gas-to-liquids and coal-to-liquids. Production shown includes crude oil and condensate production, supply of NGLs, biofuels, refinery processing gains and other components that make up the “total liquids” barrel.
Source: S&P Global Commodity Insights.

S&P Global
Commodity Insights
The base case reflects non-OPEC+ growth that limits upward pressure. The weak demand scenario assumes much weaker demand growth.

Data compiled July 24, 2023.
Source: S&P Global Commodity Insights.
New discoveries will be needed, even as the energy transition limits oil demand, and upstream capital spending is starting to rise again.

World crude and condensate production outlook (million b/d)

- Base
- Sanctioned
- Unsanctioned
- Segregated condensate
- Tight oil
- Yet-to-find

Global energy spending (trillion US dollars)

- Upstream
- Transmission and Distribution
- Fossil fuel power generation
- Renewable power generation
- Downstream

Data compiled April 23, 2023.
Source: S&P Global Commodity Insights.
About 65% of the 30 million b/d global new crude production from selected areas in 2040 breaks even at $50/b Brent (in 2022 dollars) or less

Cost curve of new global crude oil supply in select areas in 2040

Cumulative crude oil production from new sources in 2040 (thousand b/d)

Data compiled April 26, 2023.
BEP = break-even price.
Source: S&P Global Commodity Insights.

S&P Global
Commodity Insights
Medium-term supply growth is highly leveraged to US shale, offshore Latin America and higher output from the Middle East Gulf

Evolution of world crude oil and condensate supply, 2022–40 (million b/d)
Near-term Brent price track (2023–24) lowered slightly, reflecting well-supplied markets and ongoing macroeconomic worries

Source: S&P Global Commodity Insights.
African output stabilizes in the near term but needs to sanction new projects to offset steep long-term base decline

Major African oil producers

- Nigeria
- Angola
- Algeria
- Libya
- Egypt
- Other

Africa crude and condensate production outlook (million b/d)

Source: S&P Global Commodity Insights.

S&P Global
Commodity Insights
Refined products: The end of the platinum age of refining?
Global demand growth projected at 2.1 million b/d in 2023 owing mostly by mainland China

Data compiled July 24, 2023.
Source: S&P Global Commodity Insights.
Refined product demand will decline 9.07 million barrels per day, to reach 77.2 million barrels per day by 2050.

Data compiled May 2023.
Includes biofuels, sustainable aviation fuels and Fischer-Tropsch liquids
Source: S&P Global Commodity Insights
Margins are expected to remain robust relative to historical data through the end of 2023 but decline in 2024 following new capacity ramp-ups.

Global net cash FCC refining margins ($/b)

<table>
<thead>
<tr>
<th>Year</th>
<th>2018–22 range</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
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Global net cash hydrocracking/coking refining margins ($/b)

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<th>Year</th>
<th>2018–22 range</th>
<th>2019</th>
<th>2020</th>
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Data compiled July 2023.
FCC = fluid catalytic cracking.
Global average includes USGC (LLS), Europe (Dated Brent) and Asia (Dubai), weighted by regional crude runs. Please note that owing to the current swings in the Urals differentials, we have adjusted our base margin calculations. Our standard Northwest Europe hydrocracking 50-50 composite benchmark previously used in the charts and report is now the sweet 100% Forties benchmark. The lack of liquidity in Urals crude has made us less confident in the price discovery and, therefore, in the relevance of these margins. We will reassess the situation during each month’s forecast.

Source: S&P Global Commodity Insights.
New project startups in the Middle East, Asia, the United States and Africa in 2023 and 2024 provide supply relief

Anticipated crude capacity additions and closures to 2026 (thousand b/d)

Data compiled April 2023.

Historical capacity additions represent global sum of new projects and incremental capacity creep at existing refineries. Closures of crude distillation unit (CDU) capacity include biorefinery conversions. Chart reflects initial startup of CDU capacity; please see the next slide for specific timing of production ramp-up.

ExxonMobil = Exxon Mobil Corp.
S&P Global = S&P Global Commodity Insights.

S&P Global
Commodity Insights
Refining margins exiting mini-golden age, as additional capacity comes onstream another round of rationalization in Europe/North America expected to start

Long-term benchmark margin outlook - USGC Margins include RIN Costs (Constant 2022 $/bbl)

Data compiled May 19, 2023.

RIN = renewable identification number; FCC = fluid catalytic cracker; LLS = Light Louisiana Sweet; NEW = Northwest Europe; HCU = hydrocracking unit.

Source: S&P Global Commodity Insights.

S&P Global
Commodity Insights
Strong population and economic growth in Africa expected, currently 8 countries account for about 65% of GDP and 38% of population in the region.

Africa GDP forecasts

Africa Population forecasts

Africa will be responsible for 60% of the world population growth through 2050.

Data compiled May 2023.
Africa sees low alternative vehicle penetration; growing population and strong GDP growth result in positive demand for refined products through 2050

**Africa — Light duty vehicle fleet**
- Gasoline
- Diesel
- Electric
- Hybrid
- Natural Gas
- Other

**Africa — CAGR by period**
- GDP
- Population
- LDV Fleet
- Gasoline and inland transportation diesel


Africa refined product demand and drivers

Africa — Refined product demand (Million barrels per day)

Africa refined product demand by country

Data compiled May 2023.
Source: S&P Global Commodity Insights.
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Streaming of Dangote refinery will add more than 500,000 b/d of additional crude processing and will bring total crude runs to levels not seen since the early 2000s.

**Nigeria product trade**

- Gasoline
- Naphtha
- Other
- Residual Fuel Oil

**Refinery crude runs by country**

- Others
- Morocco
- Algeria
- Egypt
- Nigeria
- South Africa

**Africa net oil product trade**

- Gasoline
- Gasoil / Diesel
- Jet / Kerosene
- Naphtha
- RFO
The “Great Refining Shakeout” to resume, and post-2030 Africa to be center of global battle for export market share

Refinery startups and closures (2017–26)
Only a few African countries have net zero announcements, not all of them have been converted into documented policies.

**Net-zero ambition versus climate action**

- **Nigeria** committed to achieve net-zero carbon emissions by 2060 during the COP26 while also indicating that it will exploit its large gas reserves to drive industrial development for as long as possible. Malawi committed to net zero by 2050.

- **South Africa** has an ambitious target to reach net-zero emissions by 2050 and has unveiled a roadmap to reach this objective, however, its ambitions are yet to be encoded in law.

- While only three countries have committed to net zero targets, several African nations have emission reduction targets and plans to increase their renewables capacities. For instance, Egypt, Morocco, and South Africa are advanced in their renewables plans.
Refinery decarbonization capital expenditure will focus on hydrogen and carbon capture at FCC units, with overall expenditure at just under $200 bn by 2050.

**Global low carbon fuels capex 2023-2050, Constant $ 2022 billion**

- Carbon-related efficiency improvements
- Hydrogen electrolysis
- Hydrogen from gas feed
- Carbon capture FCC
- Carbon capture hydrogen production units

- All refineries will be looking to improve efficiency as part of initial decarbonization efforts
- Green hydrogen expected to make up the largest share of investment, with existing SMRs replaced with electrolysis units using renewable energy sources over time
- Assumes installation of new SMR with carbon capture, based on gas feed. Typically for use where natural gas is cost effective versus green hydrogen
- FCC units will be targeted for carbon capture as units are among the most emission heavy, regenerating catalyst by burning coke, producing carbon dioxide released to the atmosphere
- Assumption based on selected refinery hydrogen units undergoing retrofit to capture carbon from existing gas-fed SMR

Data compiled May 2023.

Hydrogen conversion assumes only existing refinery own production units are converted; merchant hydrogen production or refineries expected to benefit from large scale hub-based hydrogen production are not included in results. Carbon capture investment does not include cost of CCUS hubs and infrastructure. Excludes impact from existing or potential government incentives.

Capex estimations based on selected pathways for refineries to undertake decarbonization to 2050.

FCC=Fluid Catalytic Cracker. SMR=Steam Methane Reforming.

Source: S&P Global Commodity Insights.
Oil market outlook: A new era for oil – key points

- Crude price likely to remain $70-90/bbl as OPEC+ continues to effectively stabilise the market
- Oil demand only just back to pre-COVID levels
- China continues to be important for global oil demand growth
- In short-term non-OPEC oil supply fulfilling oil demand growth
- Upstream investment increasing as new oil is needed, including from Africa
- Peak oil demand expected to be around 2030, but African oil demand growing to 2050 and beyond
- Refining margins below 2022, above 5-year average, but being squeezed by new refinery start-ups
- Dangote refinery commissioning this year will be the largest change to Atlantic basin crude/product markets since lifting of US crude export ban in 2014
- Despite Dangote start-up, African net import requirement of refined products expected to grow rapidly post 2030
- Africa to become the centre for global export market share, as all main refinery hubs become long gasoline/diesel
- $200 billion expected to be spent by 2050 on global refinery decarbonization, but firm “net-zero” commitments in Africa are so far limited