IEF RFF Outlooks Comparison Report

Key Findings

IEA IEF OPEC Symposium on Energy Outlooks

IEF

RESOURCES *for the* FUTURE

Richard Newell, President and CEO Resources for the Future | 16 February 2022

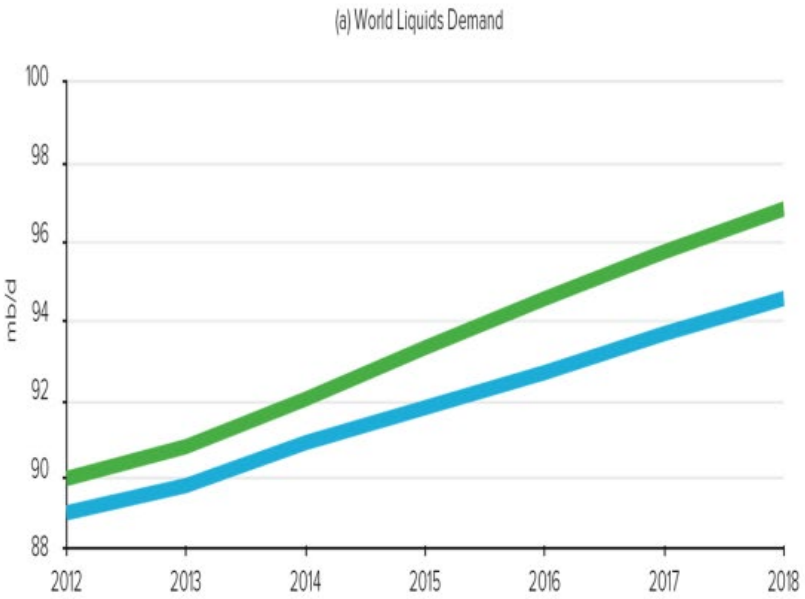
Overview

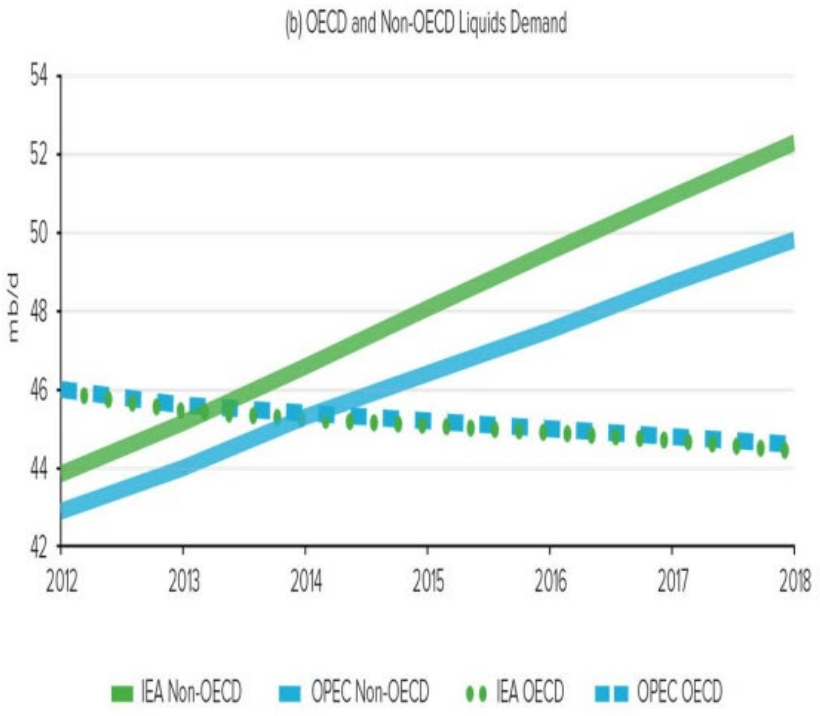
- Short-term Outlooks (see report)
- Medium-Term Outlooks
- Long-Term Outlooks in Context

Medium-Term Outlooks

A retrospective from the 4th Outlook Symposium in January 2014

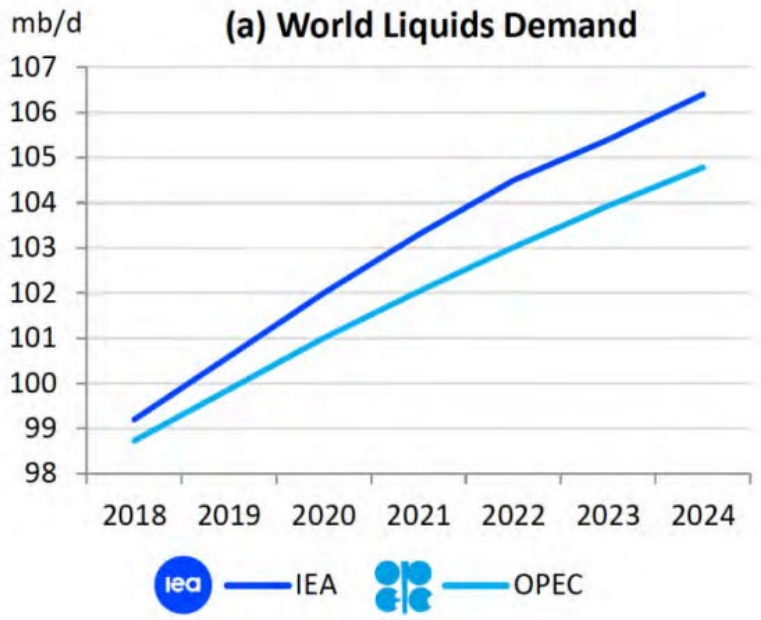
Non-OECD baseline & growth comprise virtually all of IEA-OPEC medium-term liquids demand difference

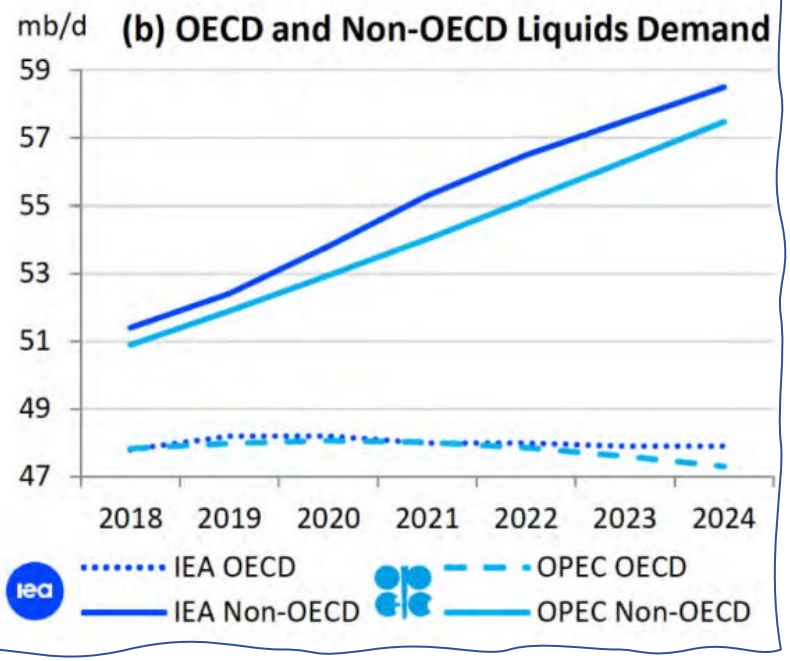




A retrospective from the 10th Outlook Symposium in February 2020

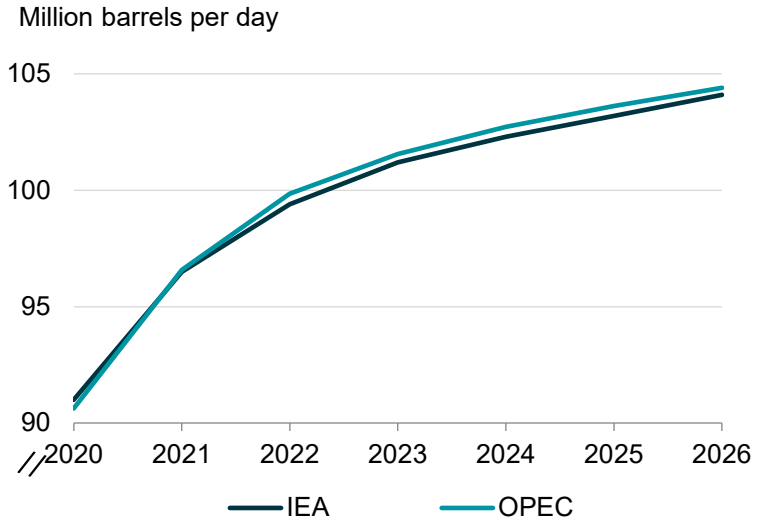
In the medium term, global liquids demand growth of about 1 mb/d annually is driven entirely by the non-OECD, led by developing Asia



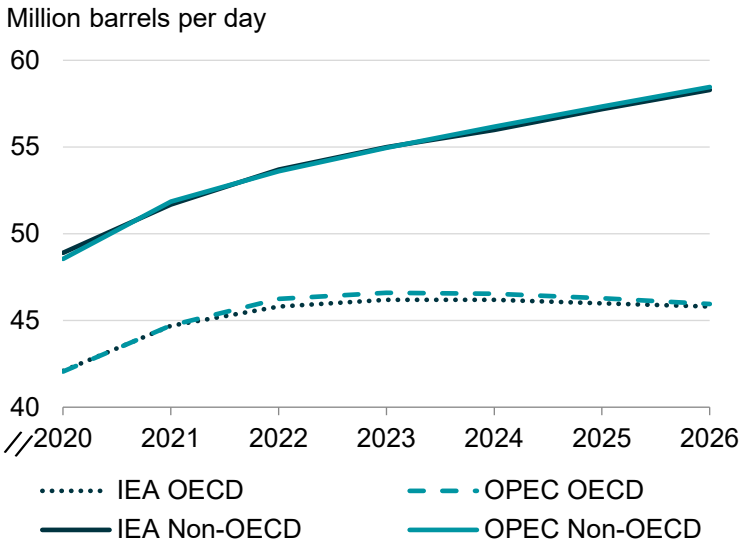


IEA and OPEC medium-term liquids demand outlooks agree closely on continued non-OECD growth and flat OECD demand after recovery

Medium-term World Liquids Demand



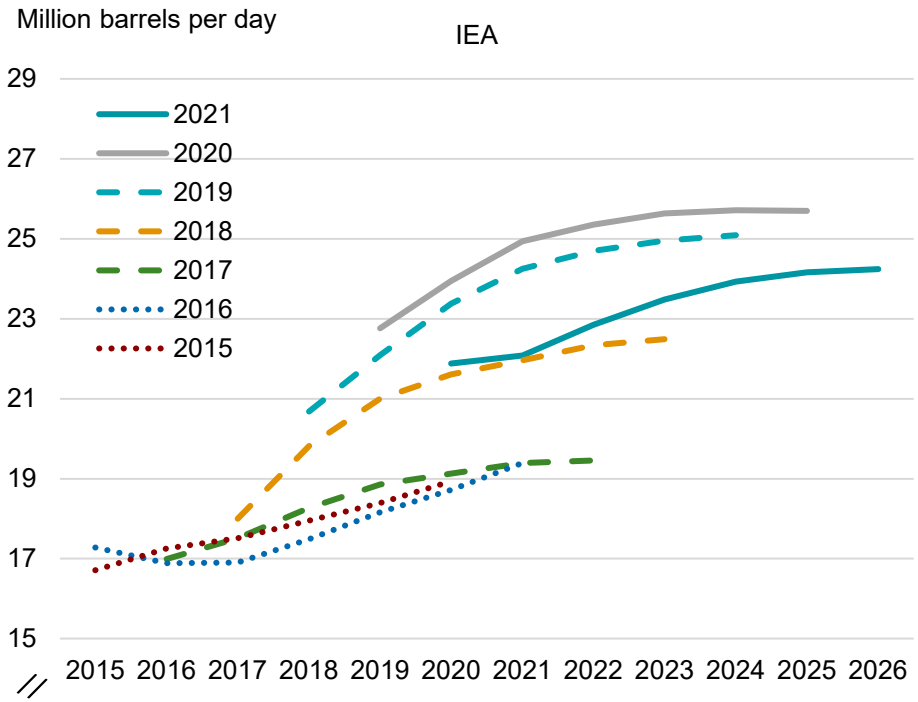
Medium-term OECD and Non-OECD Liquids Demand

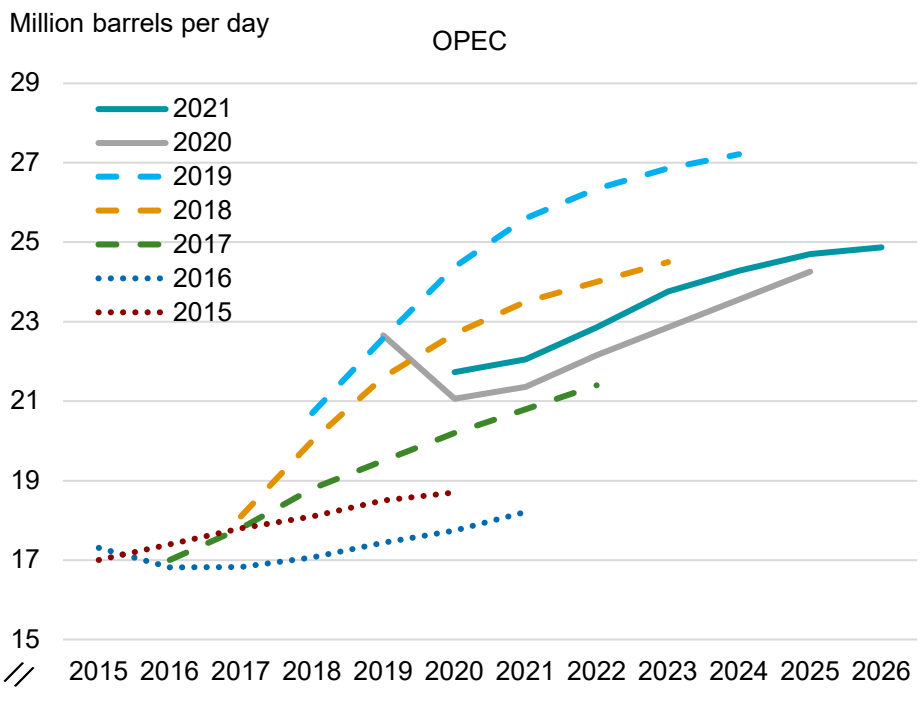


Source: IEA Oil 2021, Table 2; OPEC WOO 2021, Table 3.1

Differences in projected US and Canadian supply shrink to 0.6 mb/d in 2026. Most of this growth is driven by U.S. tight oil.

Medium-term US and Canadian Oil Supply (excluding biofuels)





Source: IEA Oil 2021, Table 3, Table 5, Table 5a; OPEC WOO 2021, Table 4.1. Sums may differ due rounding. Figure 10 notes: Other OECD is the sum of data from OECD Europe and Asia Oceania; Other Non-OECD is the sum of data from Middle East & Africa and Non-OECD Asia.

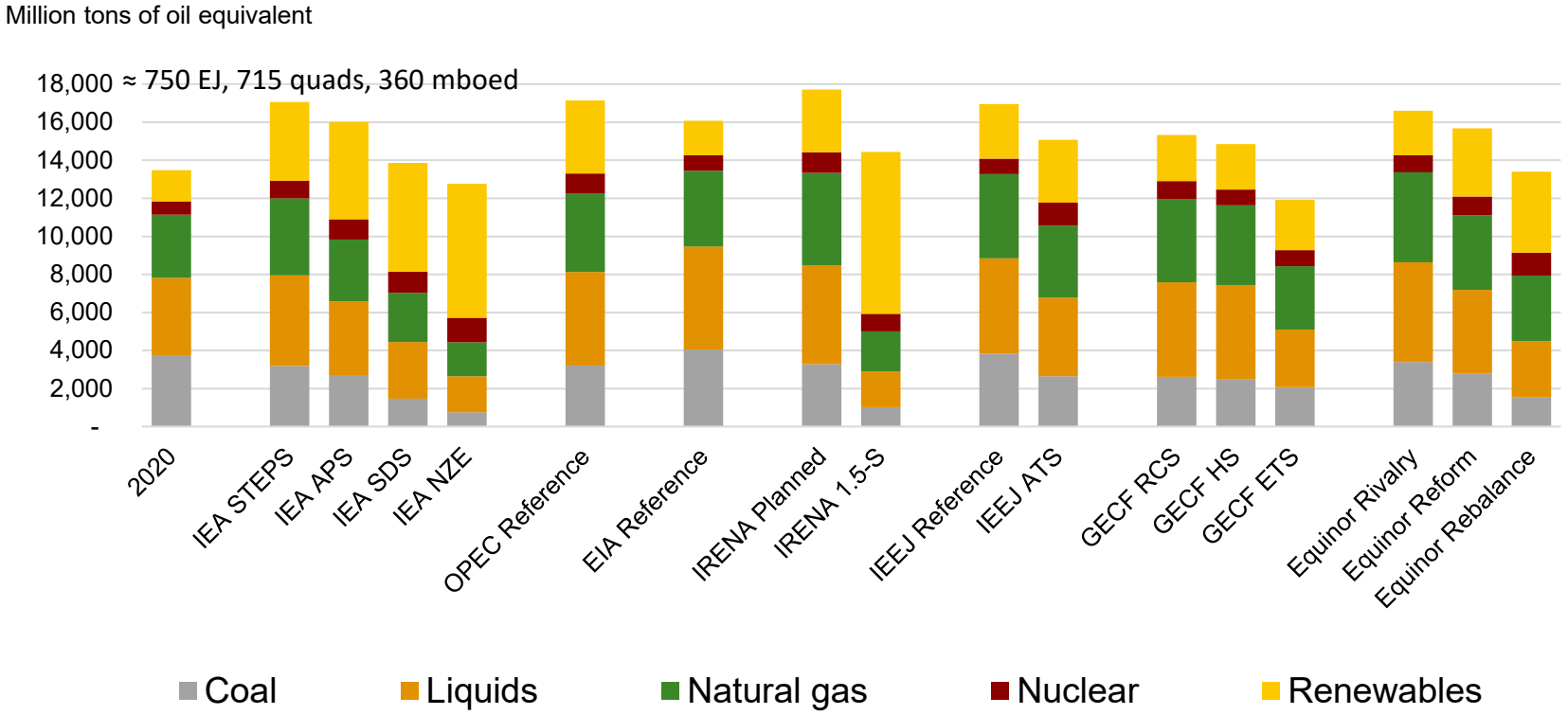
Long-Term Scenarios in Context

Long-term scenarios from IEA, OPEC, and others differ in the objectives and key sensitivities they explore: climate goals, technology, GDP, supply

IEA WEO Scenarios	OPEC WOO Scenarios
Stated Policies Scenario (STEPS)	**Reference Case**
Considers both policies in place and announced targets	Considers policies that have been enacted as well as viable evolution of these policies guided by announced targets
Announced Pledges Scenario (APS)	**Accelerated Policy and Technology Case (APT)**
Assumes that currently in place climate targets and commitments from countries, such as nationally determined contributions (NDCs) and long-term net zero targets, are completed on time	Additional energy policies are adopted across all major sectors, resulting in faster adoption of energy efficiency technologies
Sustainable Development Scenario (SDS)	**Higher and Lower GDP Cases**
Ensures universal energy access by 2030; sharply reduces air pollution; aligns with Paris Agreement goals to limit global warming "well below 2°C"	Sensitivity cases that assume greater and lower GDP growth rates relative to the Reference case, reflecting different pandemic recovery speeds
Net Zero by 2050 Scenario (NZE)	**Higher and Lower Supply Cases**
Lays out additional measures that would need to be adopted over the next 10 years to put the world on track to reach net zero emissions by mid-century	Sensitivity cases that consider greater and lower non-OPEC oil supply, with US tight oil production particularly variable

Long-term energy demand and energy mix varies widely across scenarios, primarily as a function of the degree of projected climate action

Primary Energy Demand in 2020 and 2045 Scenarios



Source: IEA WEO2021 Annex Tables, OPEC WOO2021 Table 2.1, EIA International Energy Outlook 2021; IEEJ Outlook 2022, IRENA World Energy Transitions Outlook: 1.5°C Pathway and 2021 edition GECF Global Gas Outlook 2050 data provided via internal communication, Equinor Energy Perspectives 2021 Data Appendix.
Figure 22 notes: "Renewables" include hydro, biomass, and other renewables such as wind, solar, and geothermal.

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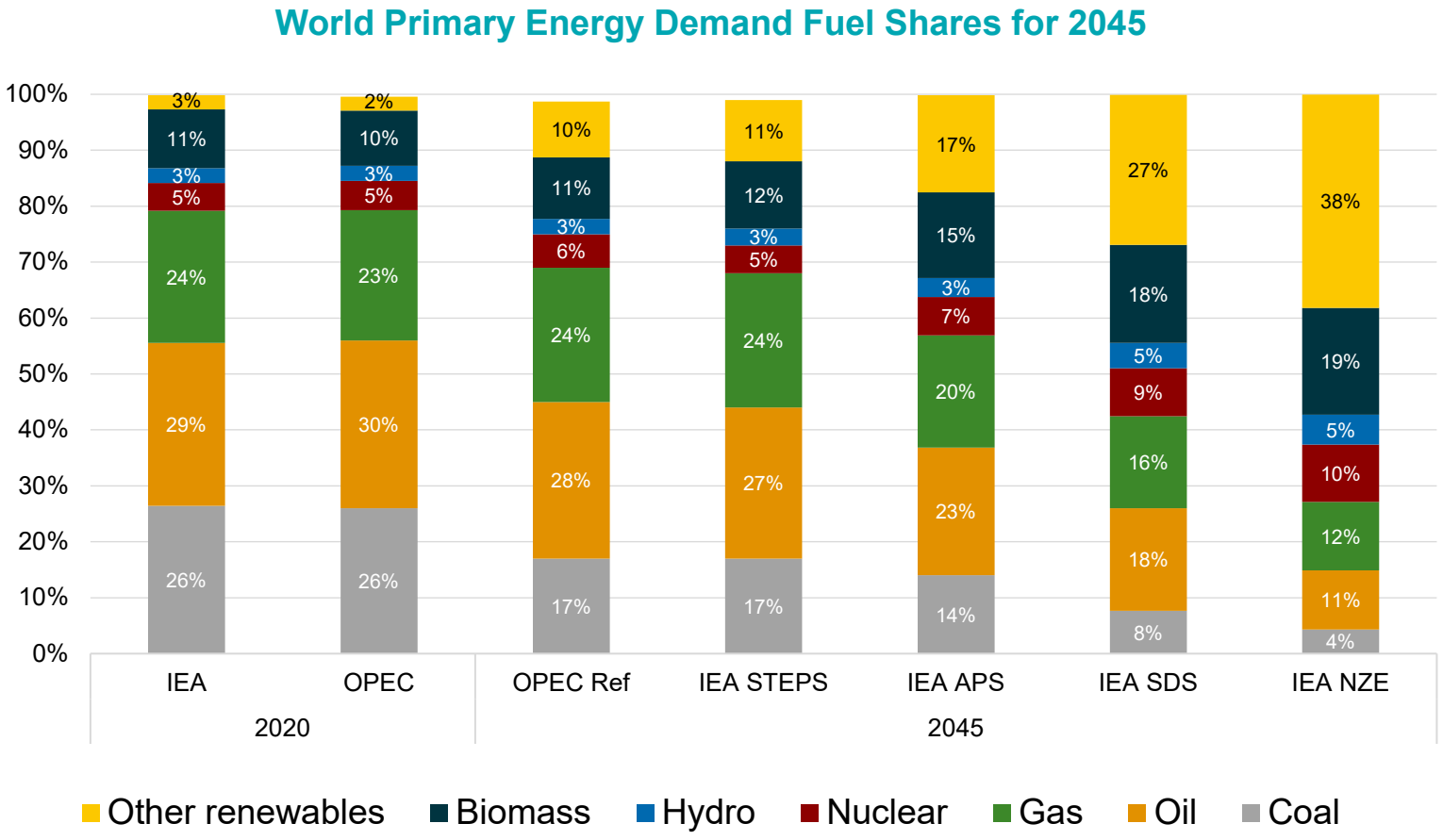
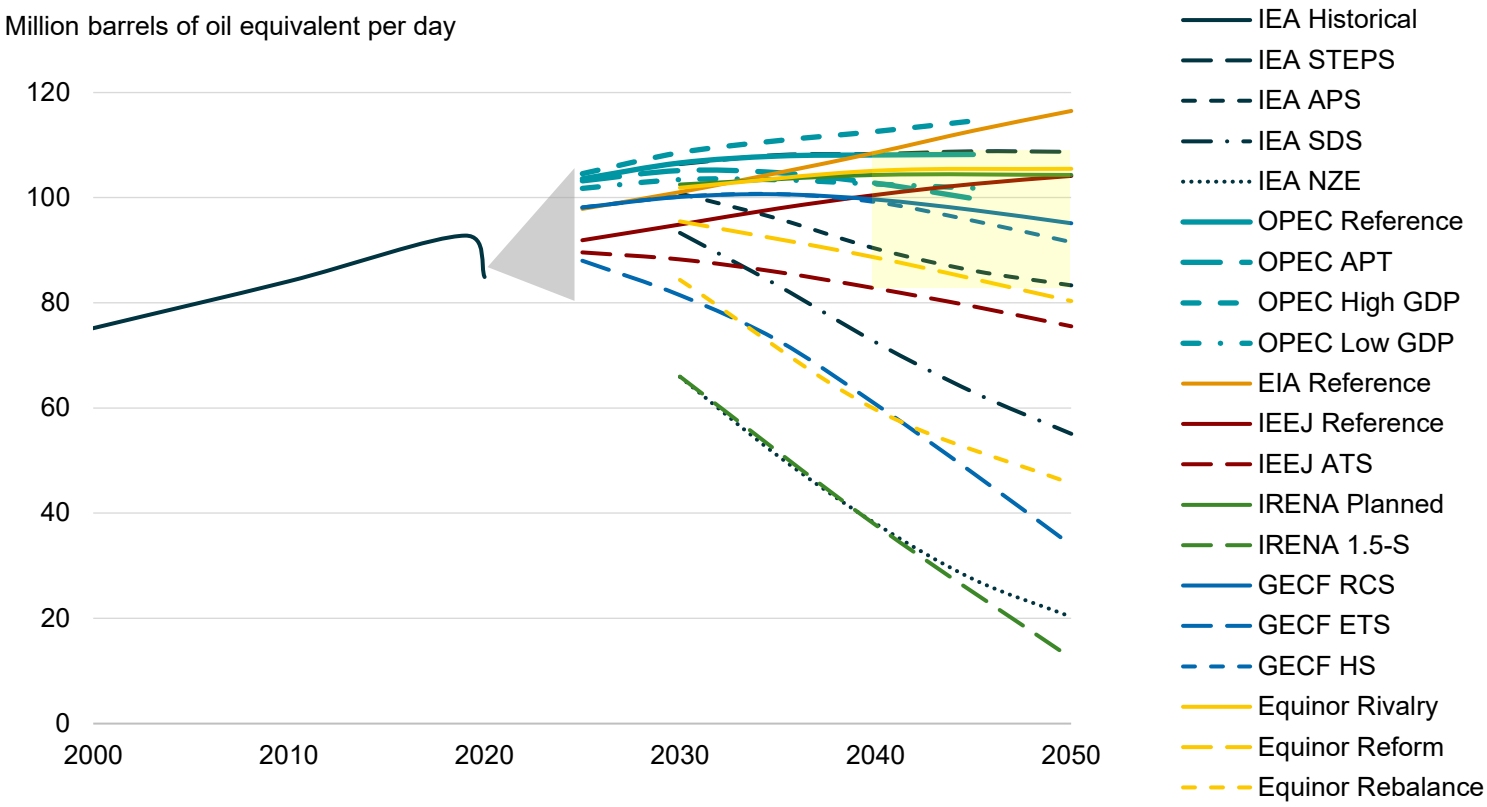
The fossil share declines from 80% in 2020 to 68-70% under the IEA-STEPS and OPEC-Ref scenarios, and 27-57% with higher levels of climate action



Source: See Figure 14. Sums in the data callouts may not total due to rounding

Long-term liquids demand scenarios range from modest growth to rapid decline; IEA-STEPS and OPEC-Ref have 2045 demand of 108-109 mboed

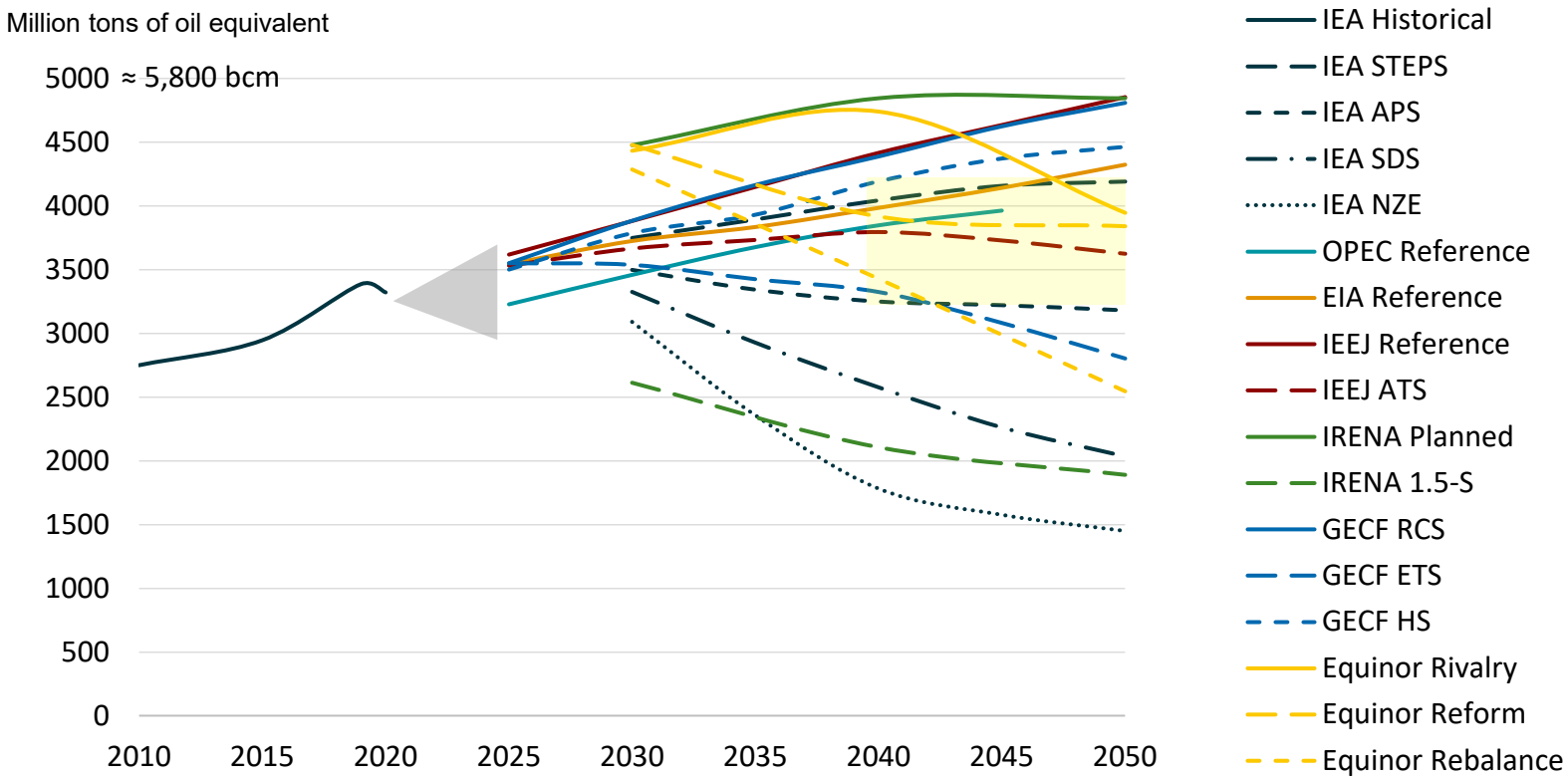
Liquids Demand Scenarios through 2050



Source: IEA WEO2021 Annex Tables, OPEC WOO2021 Table 3.2, EIA International Energy Outlook 2021; IEEJ Outlook 2022, IRENA World Energy Transitions Outlook: 1.5°C Pathway and 2021 edition GECF Global Gas Outlook 2050 data provided via internal communication, Equinor Energy Perspectives 2021 Data Appendix. Because most outlooks do not provide projections from 2020 through 2025, the grey shaded area represents the range of implied natural gas demand during this period.

Long-term natural gas scenarios also differ widely, reflecting a range that includes greater growth and more modest decline than oil

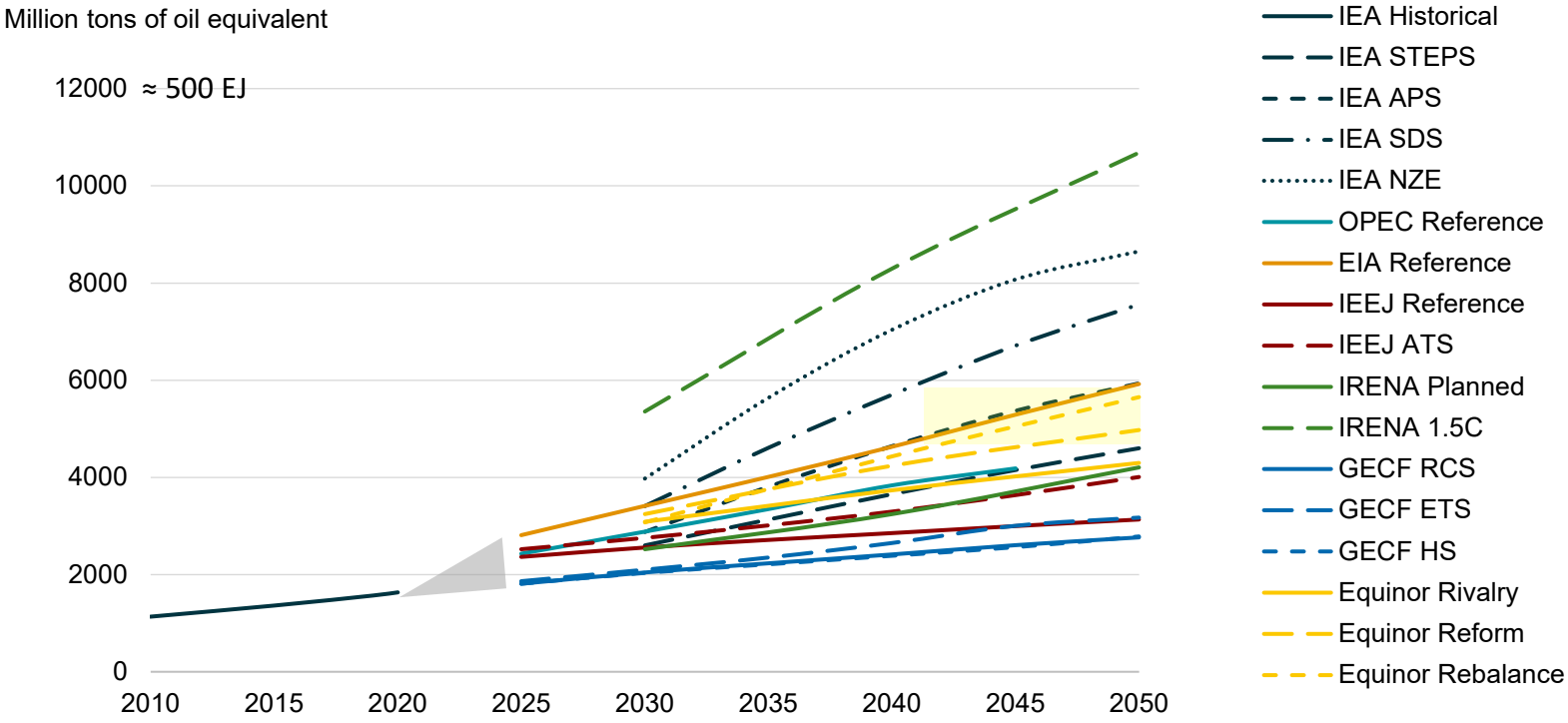
Natural Gas Demand Scenarios through 2050



Source: IEA WEO2021 Annex Tables, OPEC WOO2021 Table 2.1, EIA International Energy Outlook 2021; IEEJ Outlook 2022, IRENA World Energy Transitions Outlook: 1.5°C Pathway and 2021 edition GECF Global Gas Outlook 2050 data provided via internal communication, Equinor Energy Perspectives 2021 Data Appendix. Because most outlooks do not provide projections from 2020 through 2025, the grey shaded area represents the range of implied liquids demand during this period.

Renewables grow fastest across all scenarios, with the divergence of views being how fast. Most scenarios project growth of 2.5-3.5X by 2050

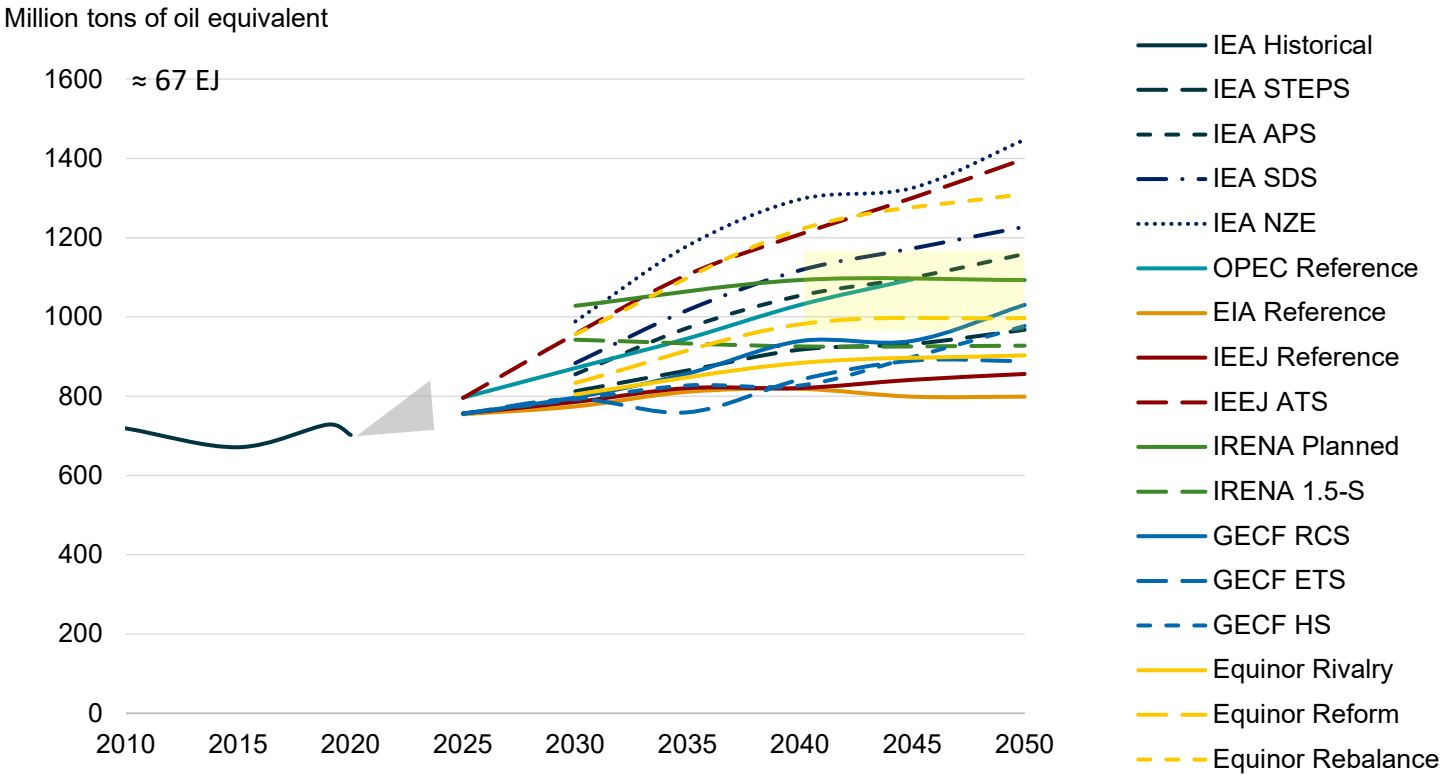
Renewable Demand Scenarios through 2050



Source: IEA WEO2021 Annex Tables, OPEC WOO2021 Table 2.1, EIA International Energy Outlook 2021; IEEJ Outlook 2022, IRENA World Energy Transitions Outlook: 1.5°C Pathway and 2021 edition GECF Global Gas Outlook 2050 data provided via internal communication, Equinor Energy Perspectives 2021 Data Appendix. Because most outlooks do not provide projections from 2020 through 2025, the grey shaded area represents the range of implied liquids demand during this period.

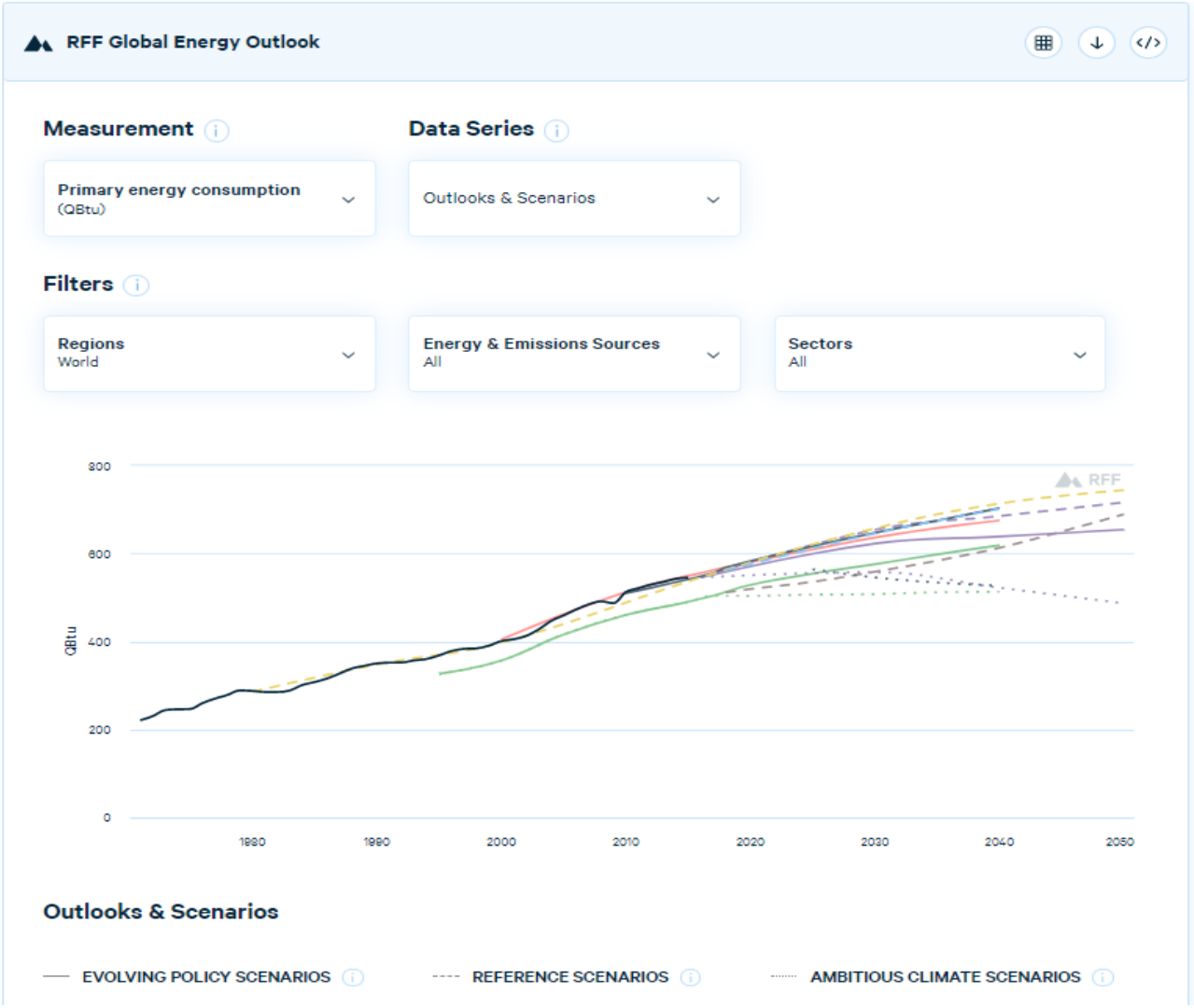
Long-term nuclear demand also grows across all scenarios, from a slight increase to 2X growth, with 40-65% growth under IEA STEPS-APS scenarios

Nuclear Demand Scenarios through 2050



Source: IEA WEO2021 Annex Tables, OPEC WOO2021 Table 2.1, EIA International Energy Outlook 2021; IEEJ Outlook 2022, IRENA World Energy Transitions Outlook: 1.5°C Pathway and 2021 edition GECF Global Gas Outlook 2050 data provided via internal communication, Equinor Energy Perspectives 2021 Data Appendix. Because most outlooks do not provide projections from 2020 through 2025, the grey shaded area represents the range of implied liquids demand during this period.

A wide range of outlooks and scenarios is included in the report and in RFF's Global Energy Outlook data tool at www.rff.org/geo



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