2019

OUTLOOK FOR ENERGY: A PERSPECTIVE TO 2040

October 2019

The Outlook for Energy includes Exxon Mobil Corporation's internal estimates of both historical levels and projections of challenging topics such as energy demand, supply, and trends through 2040 based upon internal data and analyses as well as publicly available information from many external sources including the International Energy Agency. Separate from ExxonMobil's analysis, we include a number of third party scenarios such as the EMF 27 scenarios and the IEA's Sustainable Development Scenario. Third-party scenarios discussed in this report reflect the modeling assumptions and outputs of their respective authors, not ExxonMobil, and their use and inclusion herein is not an endorsement by ExxonMobil of their likelihood or probability. Work on the Outlook and report was conducted during 2018 and the first half of 2019. The report contains forward looking statements, including projections, targets, expectations, estimates and assumptions of future behaviors. Actual future conditions and results (including energy demand, energy supply, the growth of energy demand and supply, the impact of new technologies, the relative mix of energy across sources, economic sectors and geographic regions, imports and exports of energy) could differ materially due to changes in economic conditions, the ability to scale new technologies on a cost-effective basis, unexpected technological developments, the development of new supply sources, changes in law or government policy, political events, demographic changes and migration patterns, trade patterns, the development and enforcement of global, regional or national mandates, and other factors discussed herein and under the heading "Factors Affecting Future Results" in the Investors section of our website at www.exxonmobil.com.

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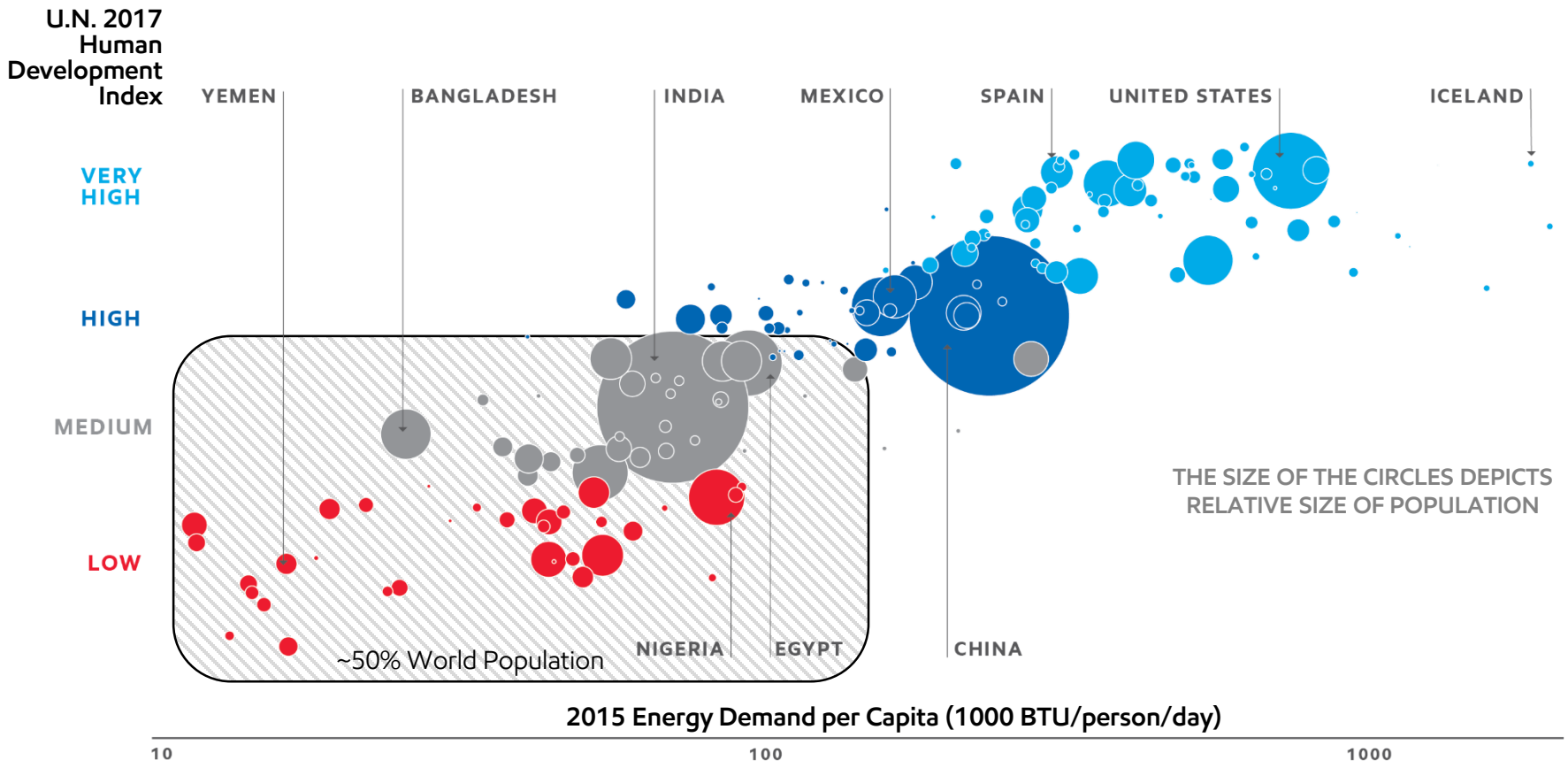
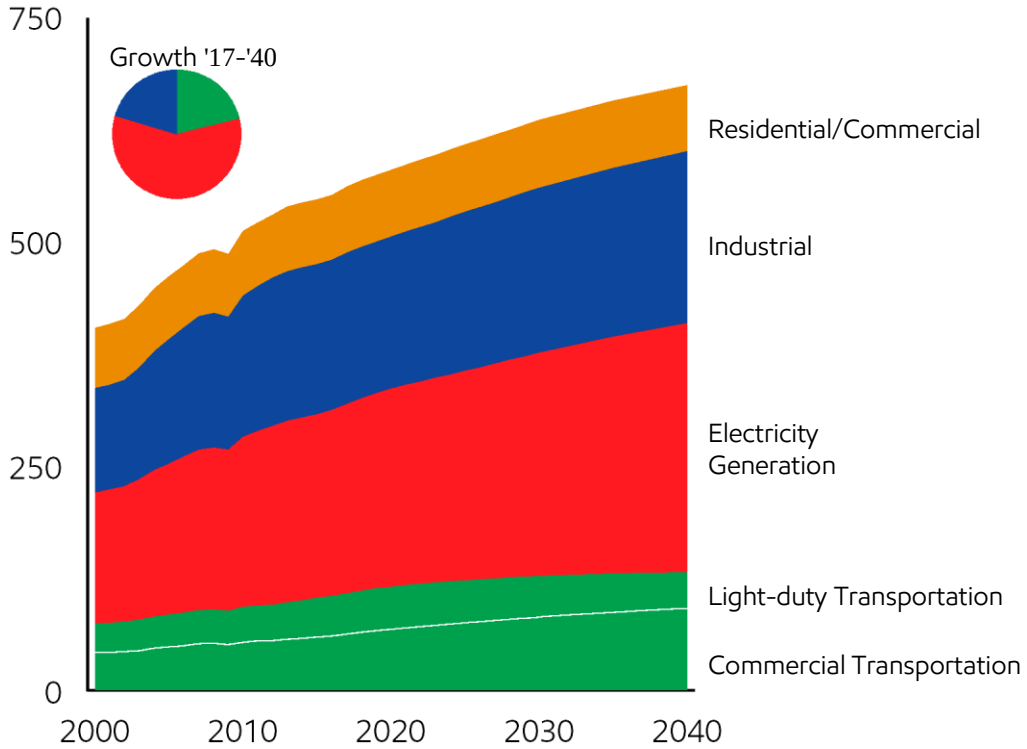
Energy is essential for society's progress



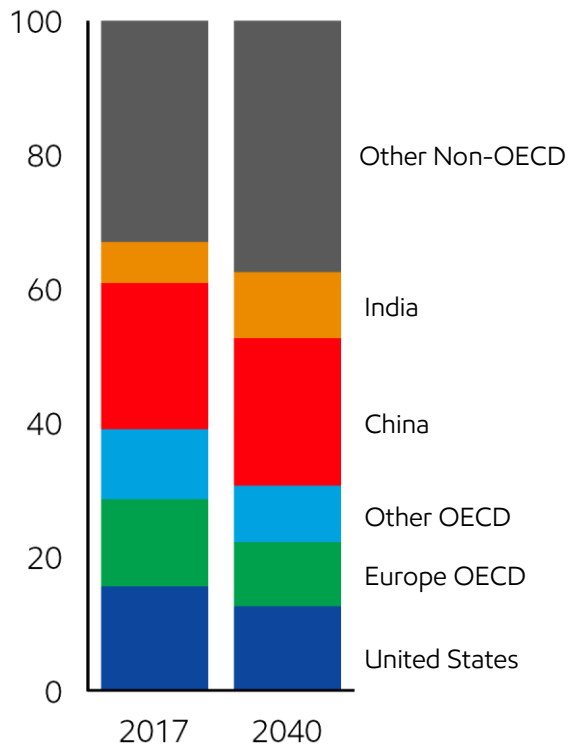
Source U.N. Human Development Reports 2018, World Bank DataBank 2019, EM analyses, updated 9/11/2019

Energy trends vary by sector and geography

Global energy demand by sector
Primary energy – Quadrillion BTUs



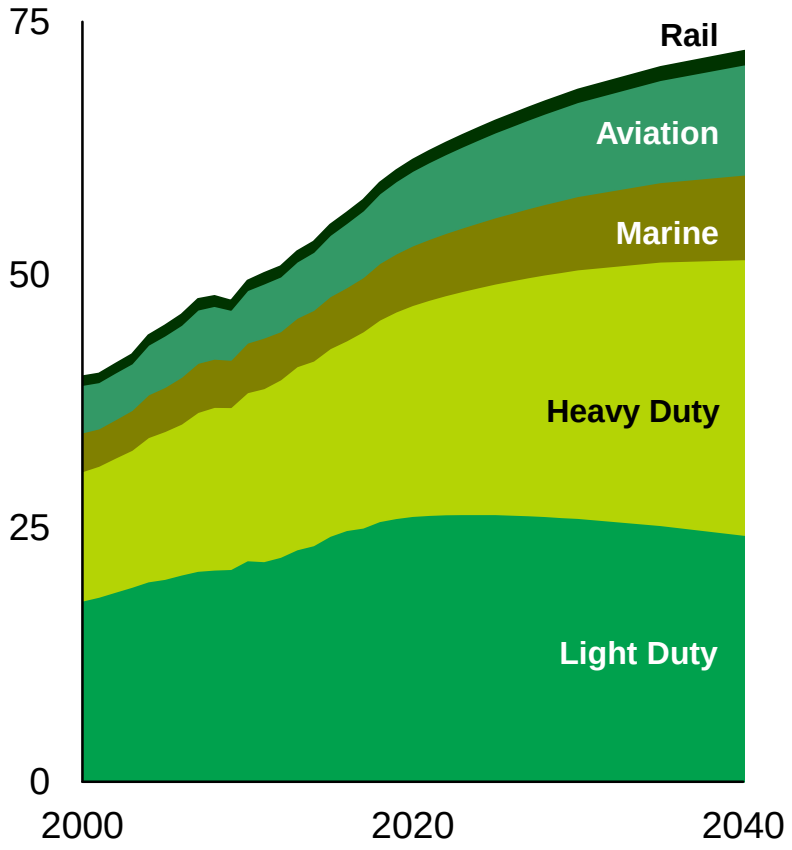
Relative energy demand by region
Percent of primary energy (%)



Transportation Demand Driven by Non-OECD

By Sector

MBDOE



Growth 2017-2040

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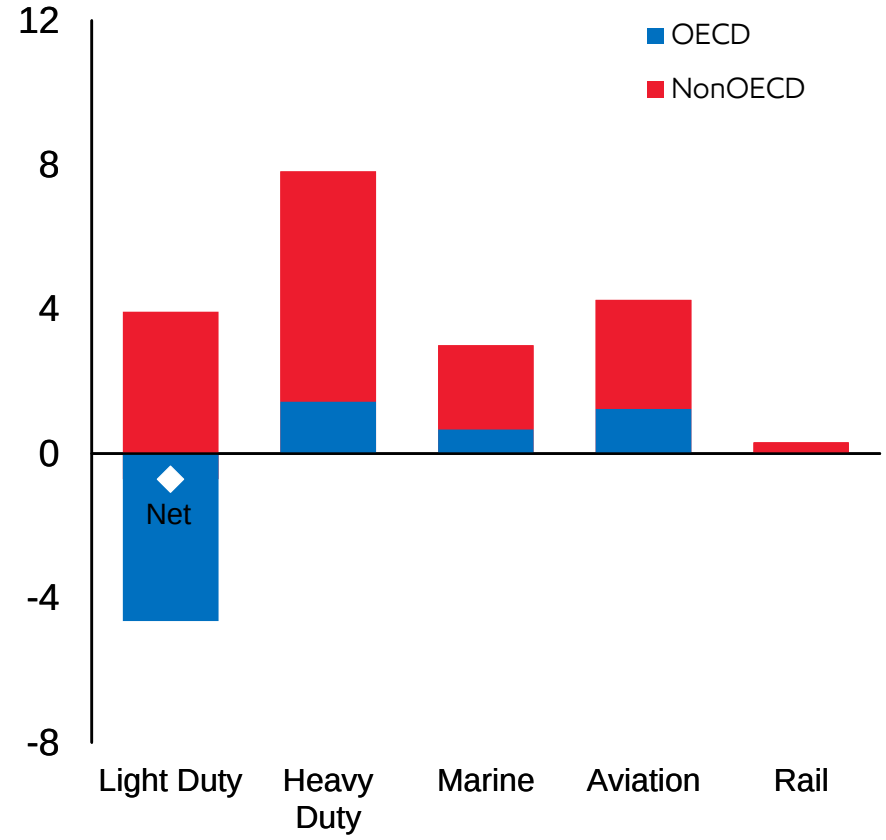
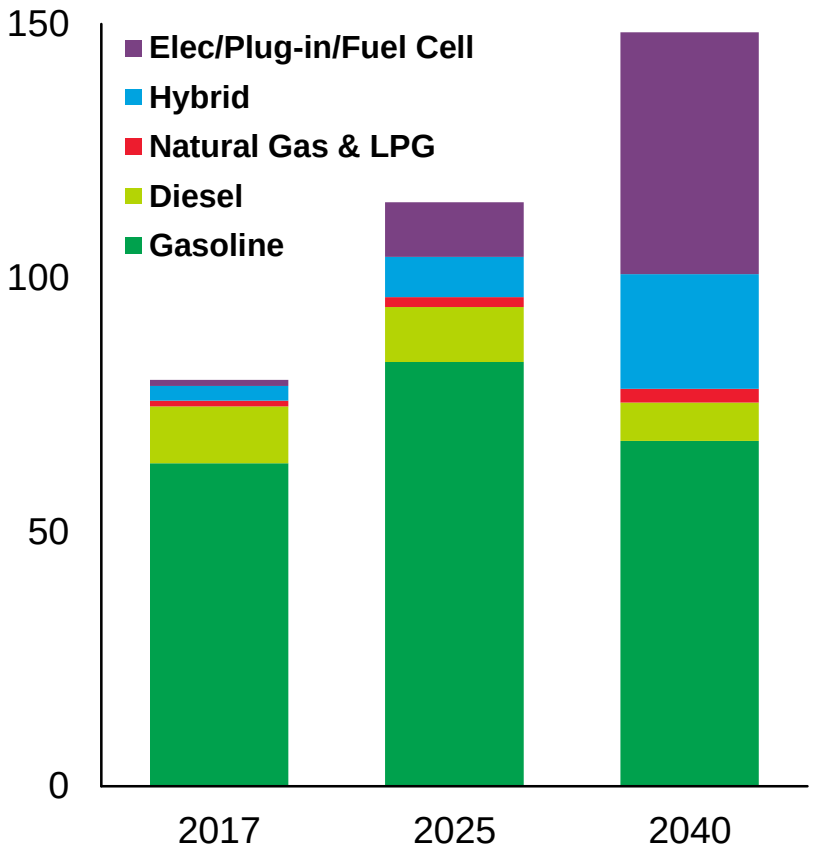


New Light Duty Vehicle Fuel Consumption

New Vehicles by Type

Million



Light Duty Vehicle Demand

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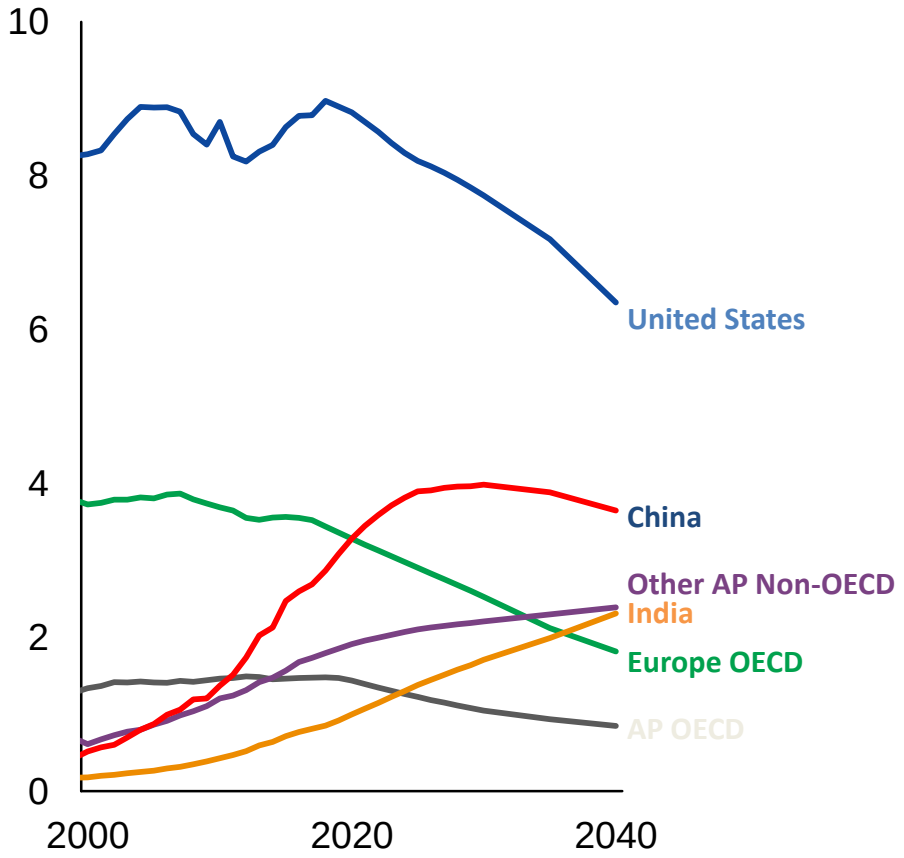
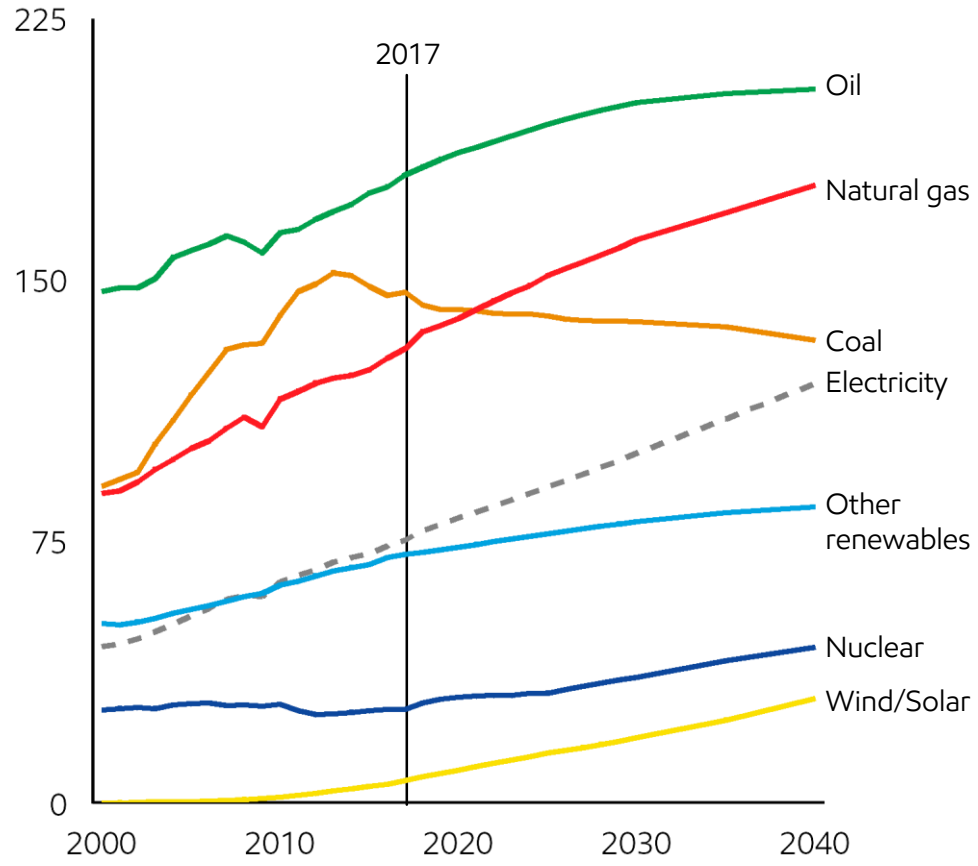
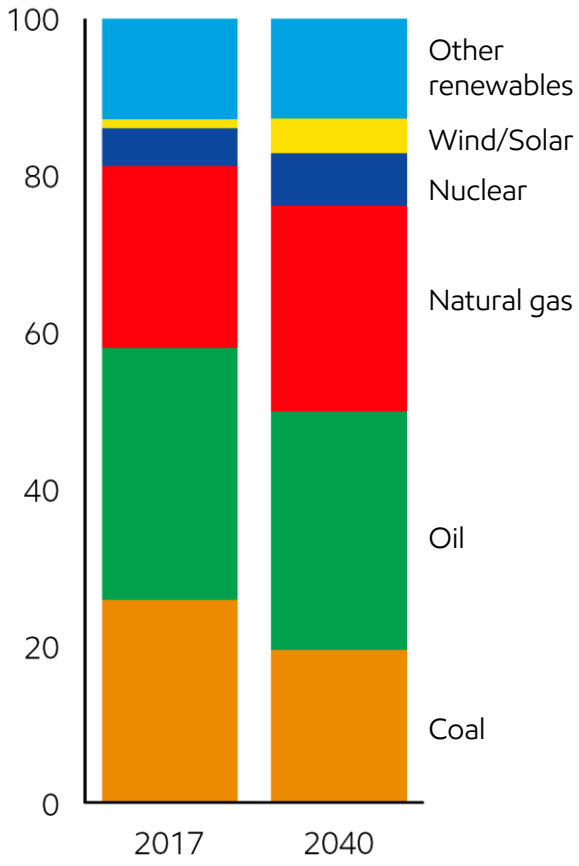


Global energy mix shifts to lower-carbon fuels

Global energy mix
Quadrillion BTUs

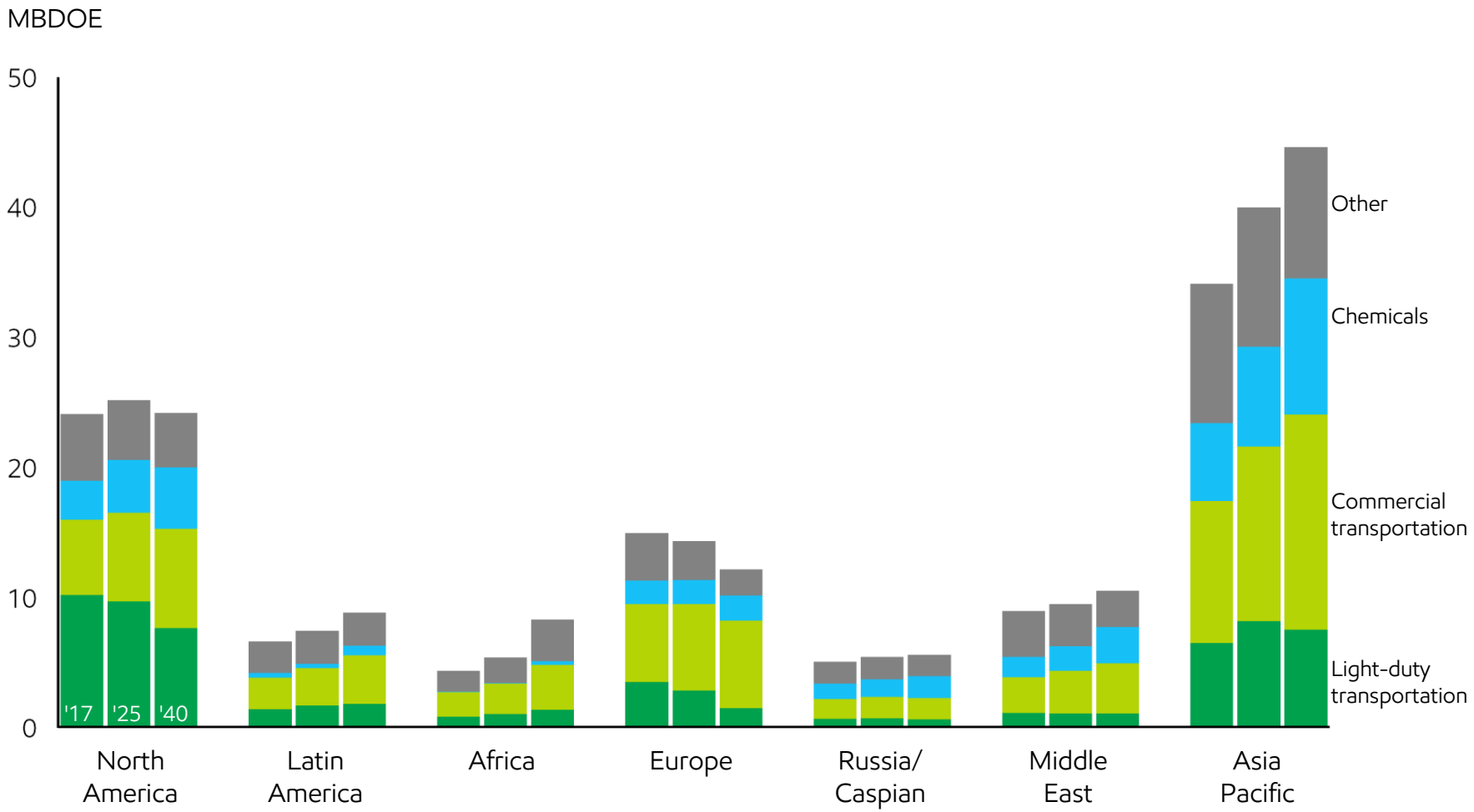


Percent of primary energy (%)



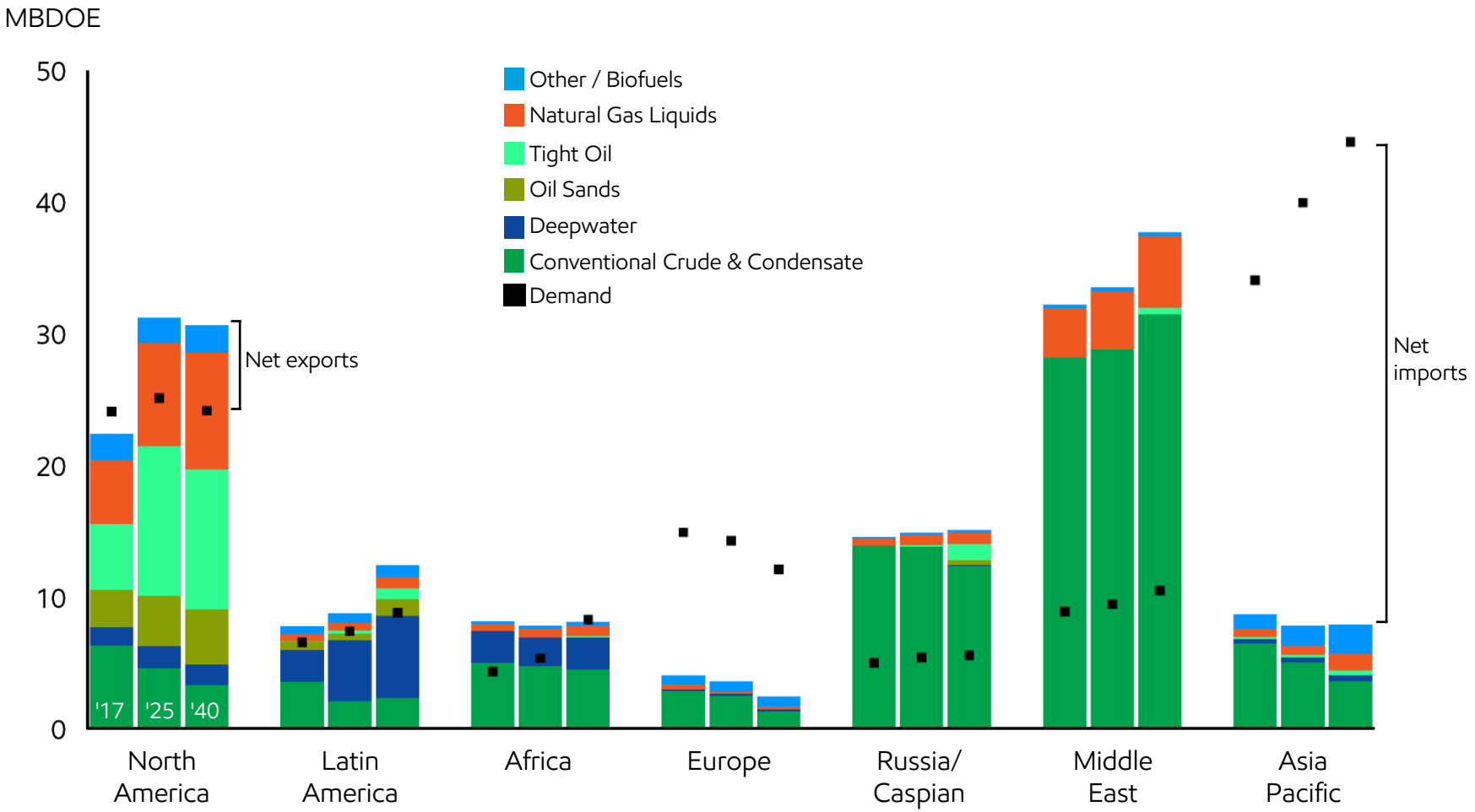
Liquids demand driven by transportation & chemicals

Global liquids by region and sector

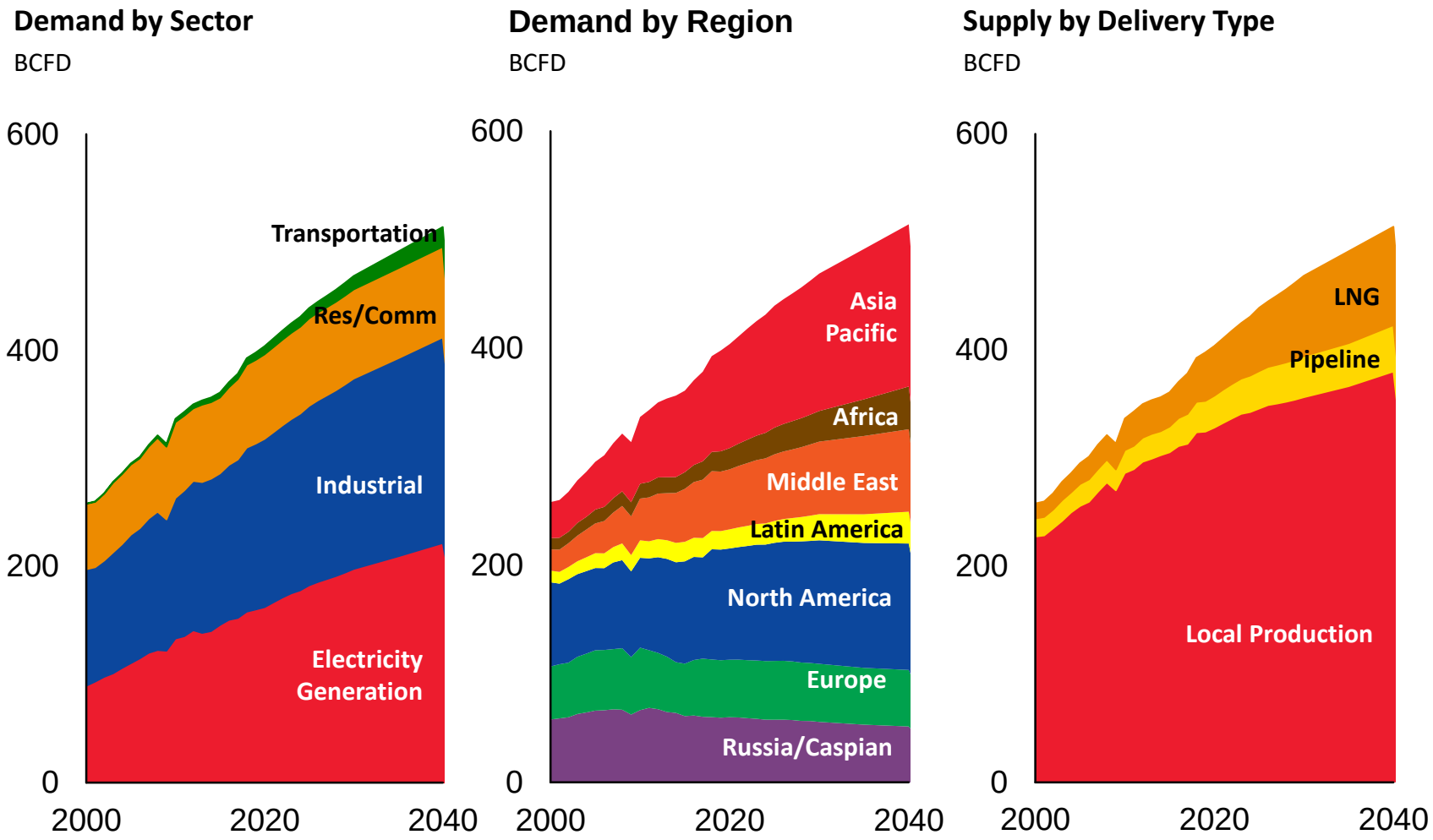


Liquids supply highlights regional diversity

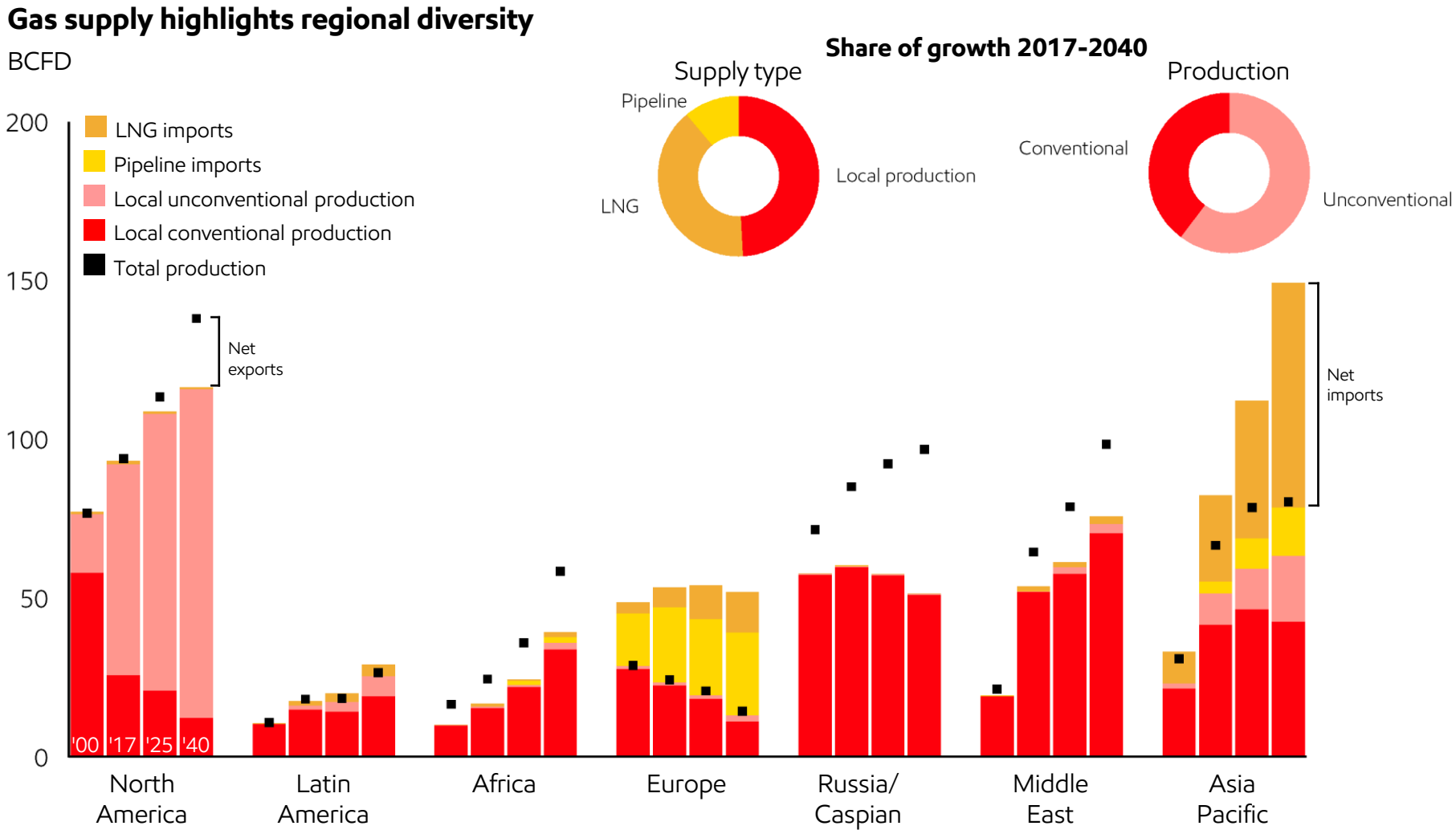
By region and type



Global Natural Gas Demand and Supply



Gas supply highlights regional diversity



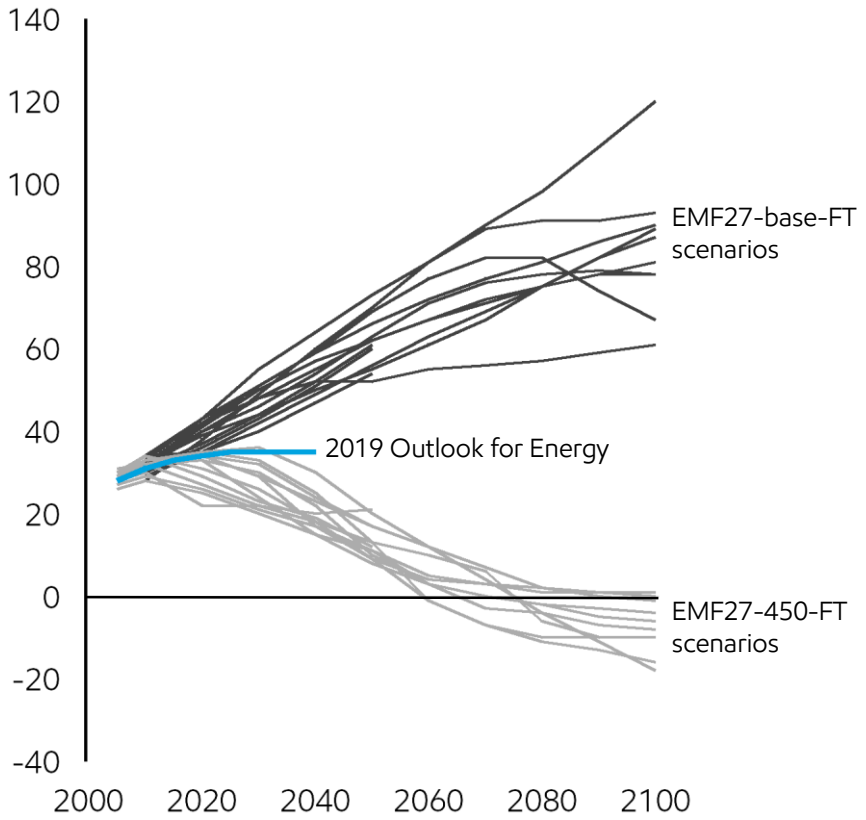
PURSUING A 2°C PATHWAY

A perspective on the role of oil and natural gas and the importance of technology in a decarbonizing world

Emissions vary with policy and technology assumptions

Global energy-related CO_2 emissions

Billion tonnes



EMF27-FT cases include CO_2 emissions from energy and industrial processes

EMF27 full technology scenarios data downloaded from: https://secure.iiasa.ac.at/web-apps/ene/AR5DB

Assessed 2°C scenarios: 2040 global energy mix

2040 global demand by energy type from assessed 2°C scenarios

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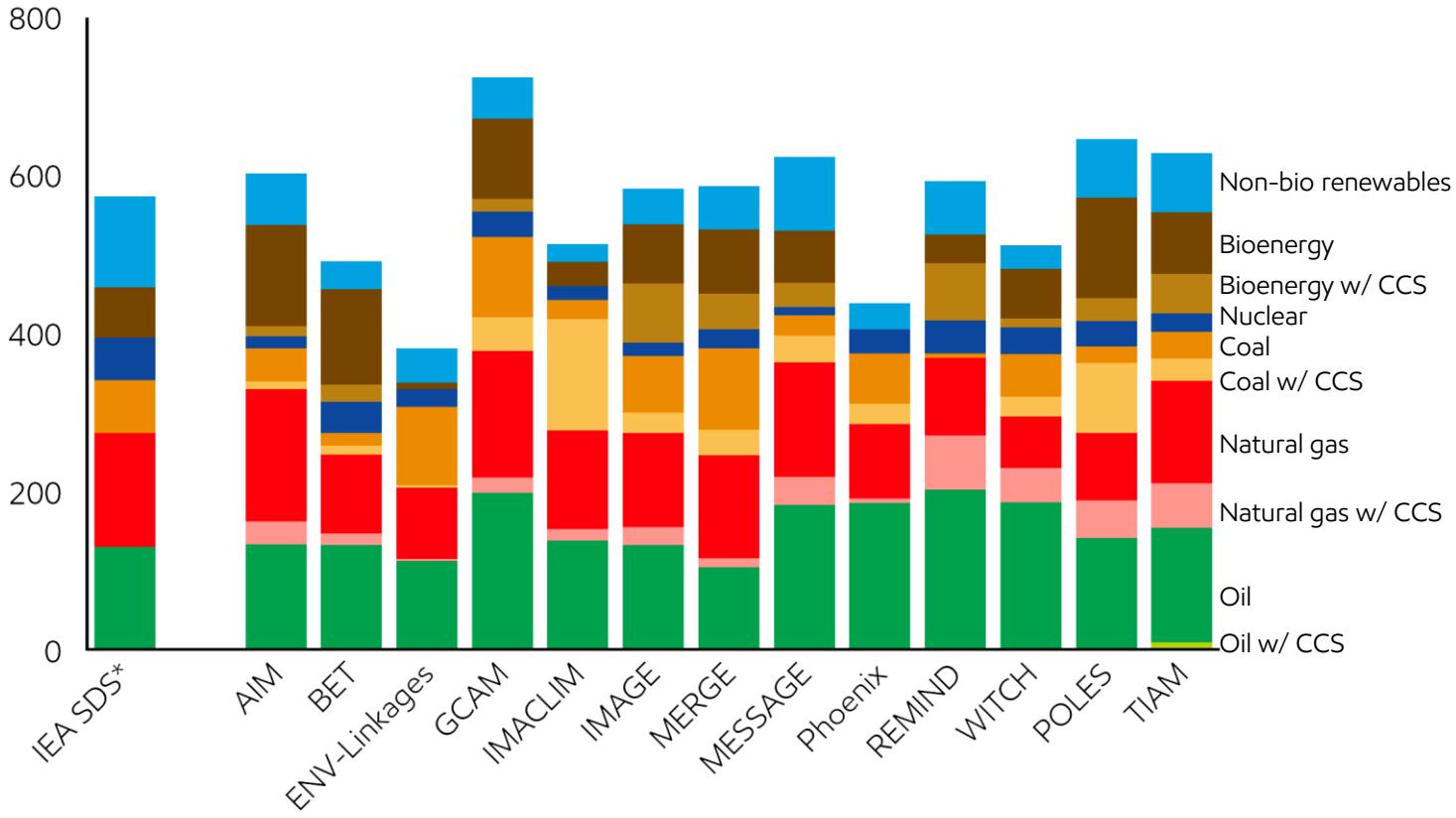

EMF27 full technology scenarios data downloaded from: https://secure.iiasa.ac.at/web-apps/ene/AR5DB

*IEA WEO 2018 SDS includes CCS but breakdown by energy type is not readily identifiable

Supply / demand gap warrant investment

Global oil supply and demand

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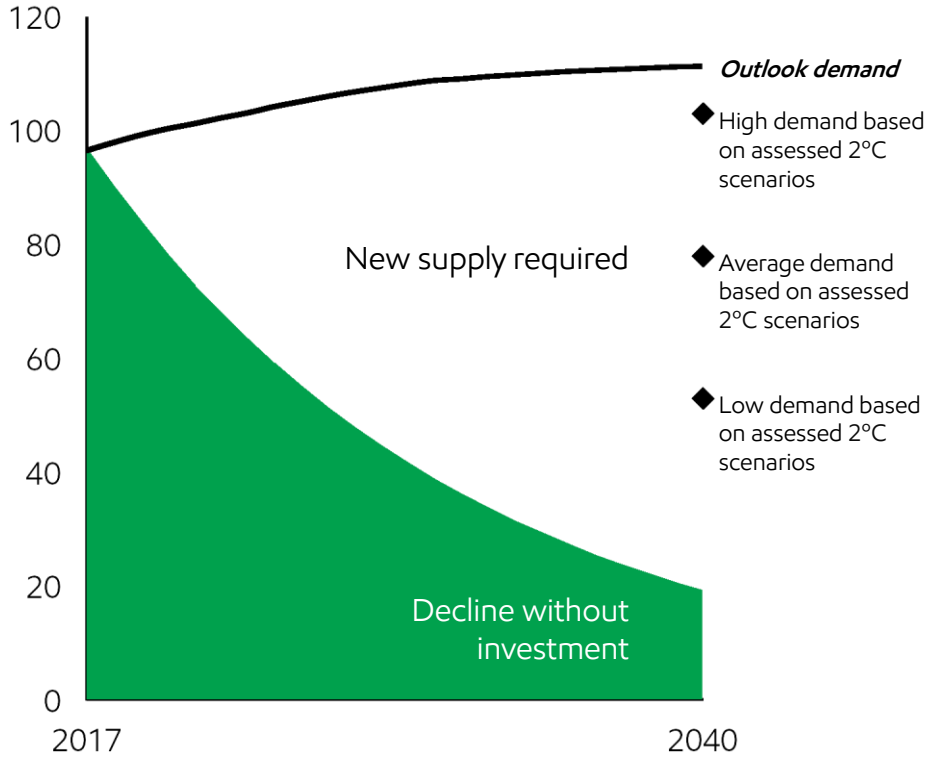
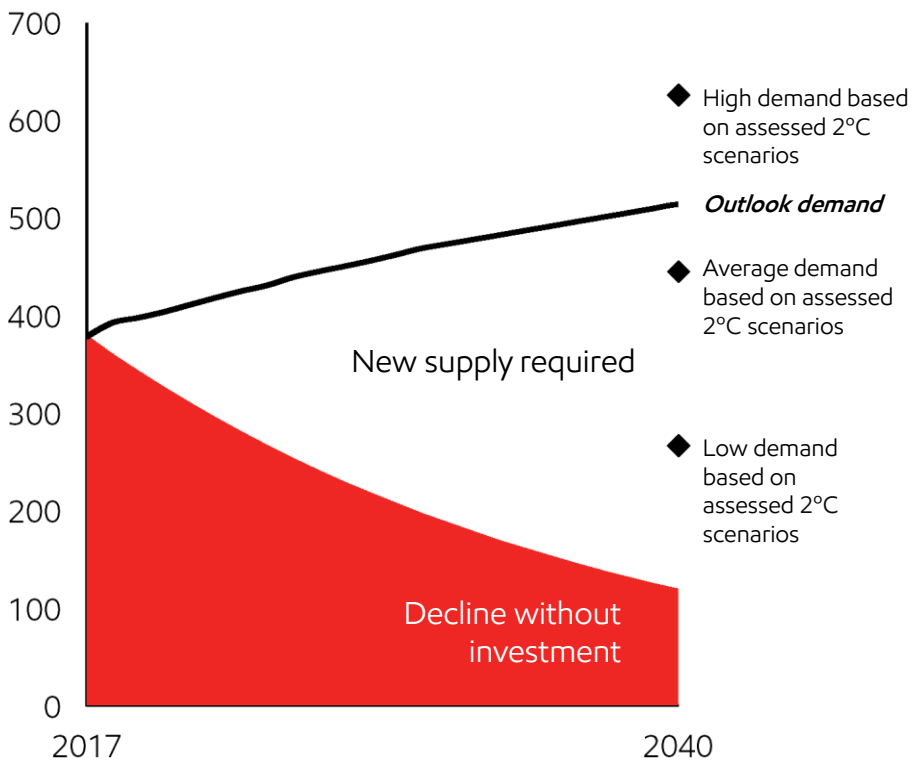


Excludes biofuels; Source: IEA, EM analyses
Assessed 2°C scenarios based on EMF27 full technology/450ppm cases targeting a 2°C pathway

Global natural gas supply and demand

BCFD



Source: IHS, EM analyses
Assessed 2°C scenarios based on EMF27 full technology/450ppm cases targeting a 2°C pathway

Supply / demand gap warrant investment

Global oil supply and demand

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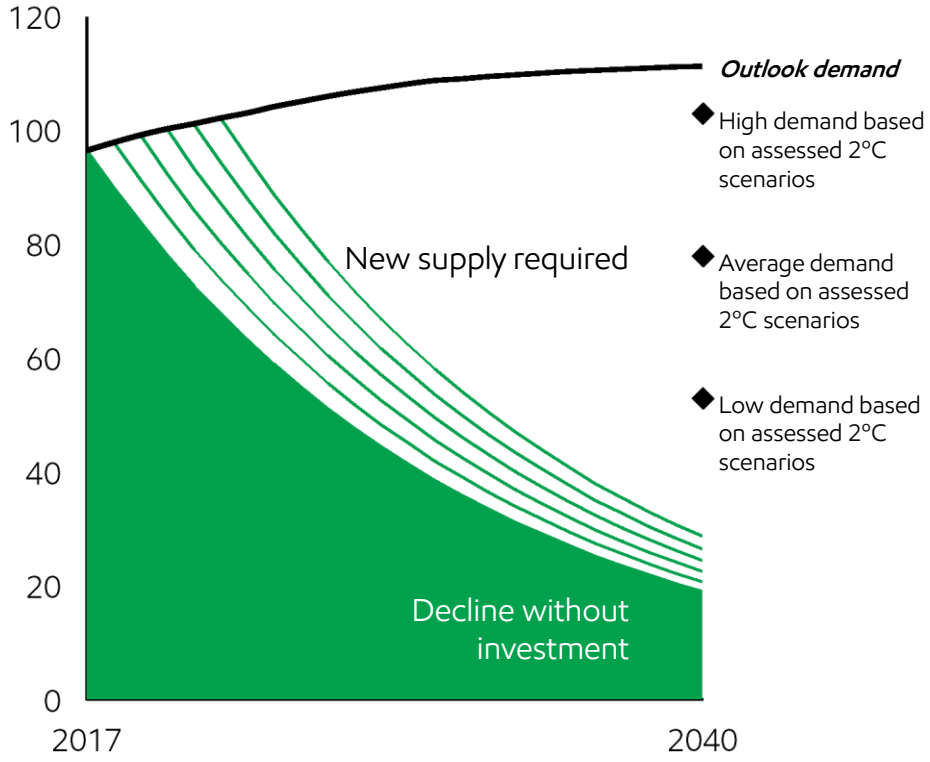

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Global natural gas supply and demand

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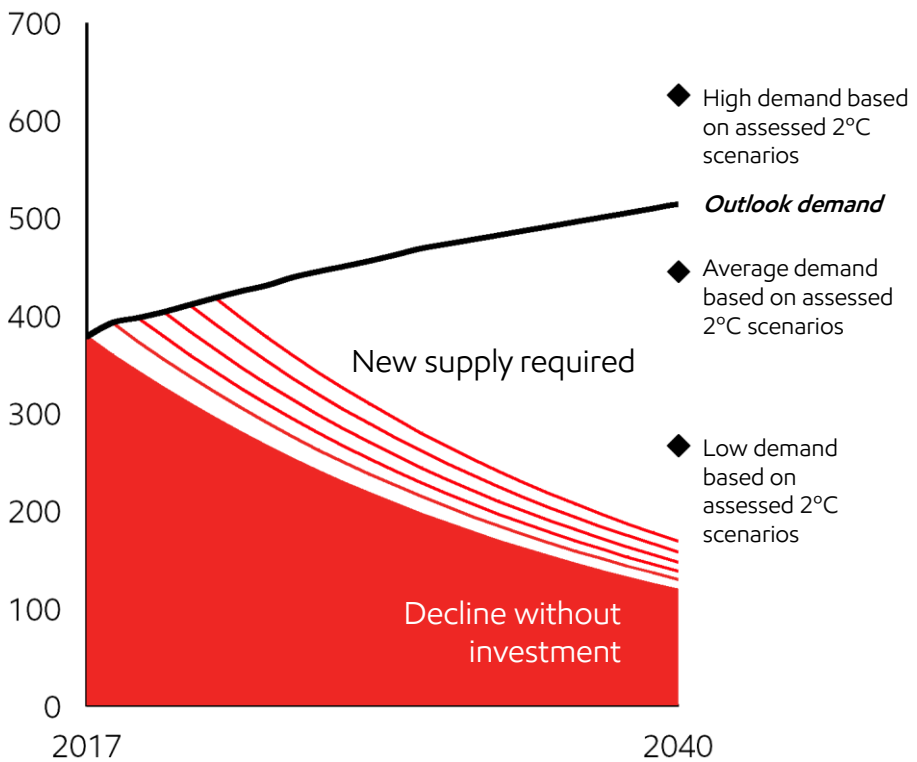
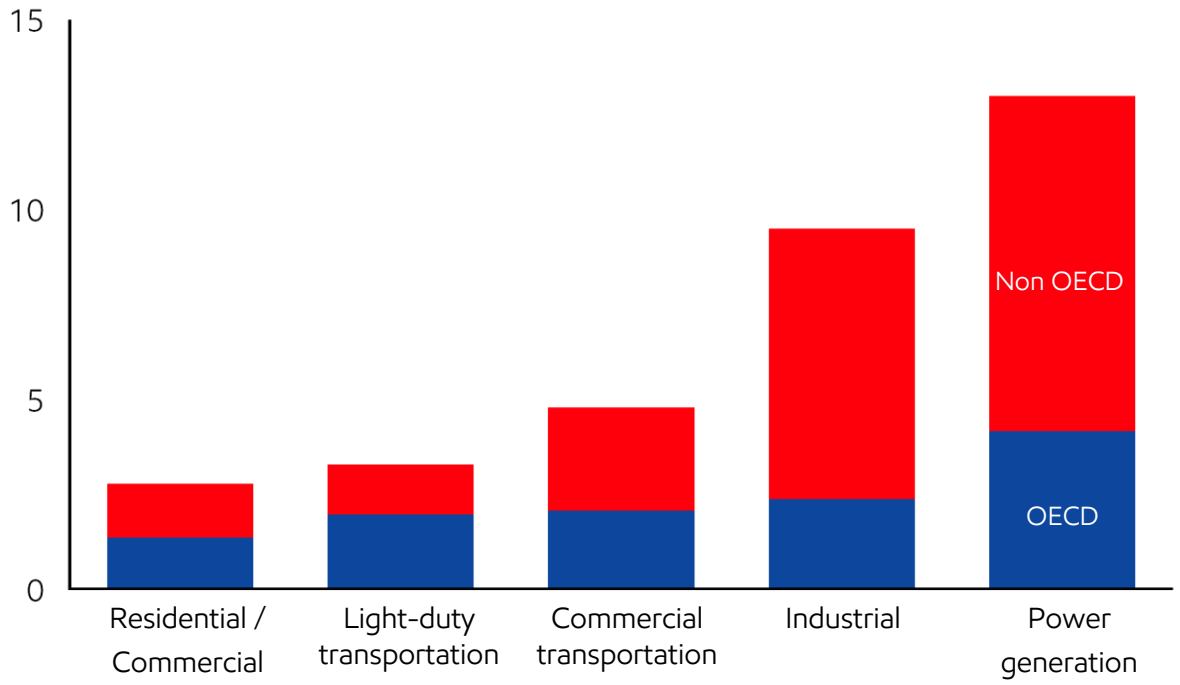


Source: IHS, EM analyses
Assessed 2°C scenarios based on EMF27 full technology/450ppm cases targeting a 2°C pathway

Technology key to reducing societal costs of 2°C pathway

2017 energy-related direct CO_2 emissions by sector

Billion Tons



Technology Breakthrough Opportunities
Power grid reliability & long-duration storage: Batteries, chemical storage, hydrogen
Lower-carbon commercial transport: algae & cellulosic biofuels, fuel cells, batteries
Lower-carbon industrial processes: carbon capture, hydrogen, process intensification
Advanced, less carbon-intensive materials for efficient buildings and infrastructure
Negative emissions: bioenergy with carbon capture, direct air capture, CO_2 utilization

Key takeaways from 2040 projections

Energy is fundamental for modern life

Access to modern energy is intrinsically linked with improvements in quality of life. Over the next few decades, increasing populations and rising prosperity will increase demand for homes, businesses and transportation - and the energy that powers them.

Global energy demand rises by 20 percent; demand trends differ for OECD and non-OECD

Continued innovation will help OECD economies expand while reducing their energy demand by about 5 percent and energy-related CO_2 emissions by nearly 25 percent. In the non-OECD countries, energy use and emissions will rise along with population growth, increased access to modern energy and improving living standards.

Global electricity demand rises 60 percent

The trend to electrify buildings, factories, cars and buses, along with smart appliances and greater automation, spurs the need for more electricity everywhere. Solar, wind, and natural gas contribute the most to meeting growth in electricity demand.

Almost half of the world's energy is dedicated to industrial activity

New homes and roads will be constructed and household appliances produced as a result of rising population and urbanization. Steel, cement and chemicals are essential materials to satisfy these needs which, today, are energy-intensive products.

Commerce and trade drive transportation energy consumption up more than 25 percent

Increased on-road efficiency and more EVs will lead to a decline in light duty vehicle fuel demand. Overall transportation fuel demand growth is driven by increased commercial activity - moving more people and products by bus, rail, plane, truck and marine vessel. Energy-dense, affordable and widely available oil will remain the predominant transportation fuel.

Global energy related CO_2 emissions peak, but remain above assessed 2°C scenarios

Increased energy efficiency and a shift to lower carbon energy sources will help curb CO_2 emissions, but not sufficiently to reach a 2°C pathway. Creative technology solutions are still needed to achieve society's climate aspirations.

Oil and Natural Gas remain important energy sources and require significant investment

Oil and natural gas make up about 55 percent of global energy use today. By 2040, 10 of the 13 assessed 2°C scenarios project that oil and gas will continue to supply more than 50 percent of global energy. Investment in oil and natural gas is required to replace natural decline from existing production and to meet future demand under all assessed 2°C scenarios.