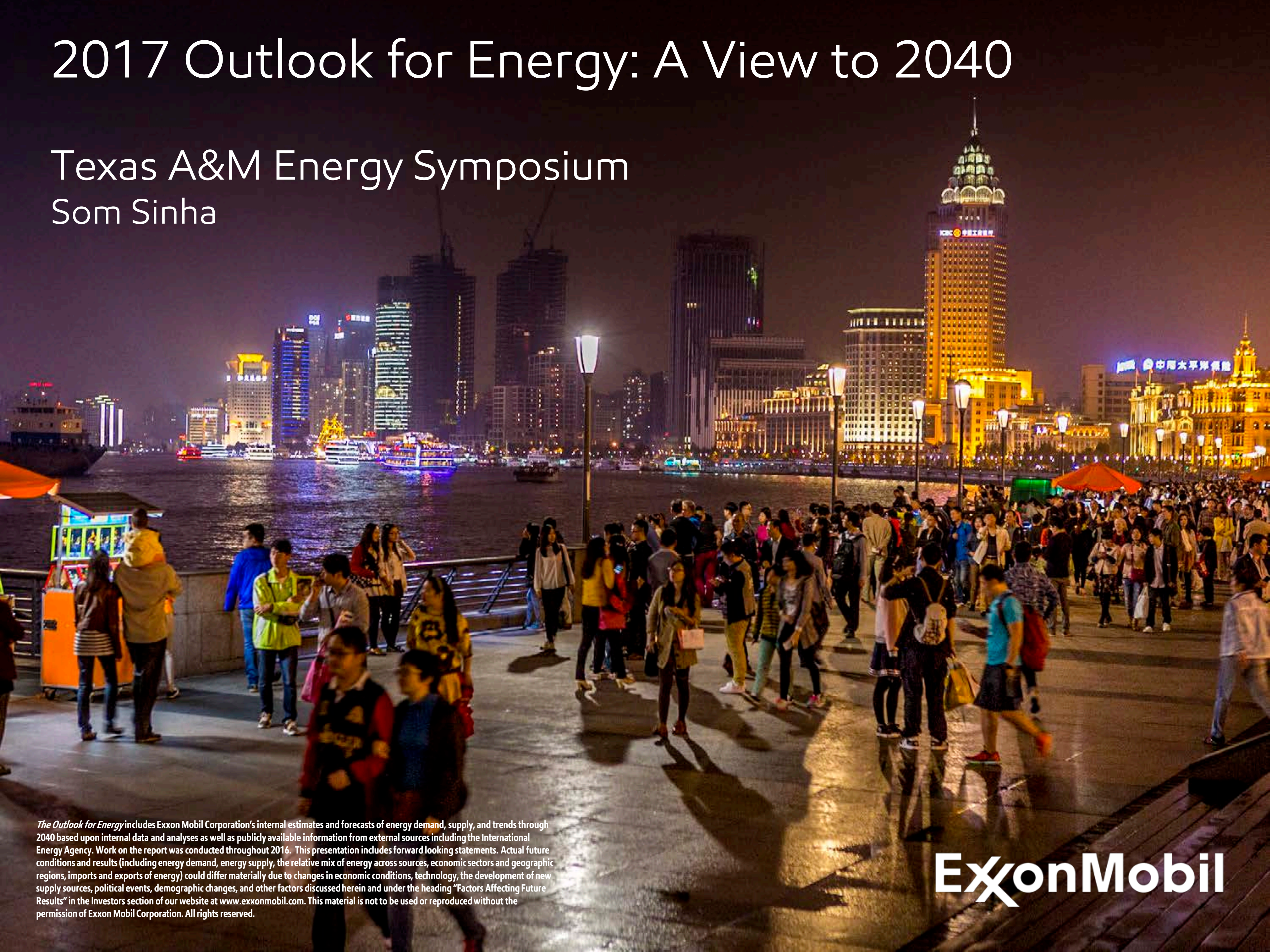
2017 Outlook for Energy: A View to 2040

Texas A&M Energy Symposium

Som Sinha



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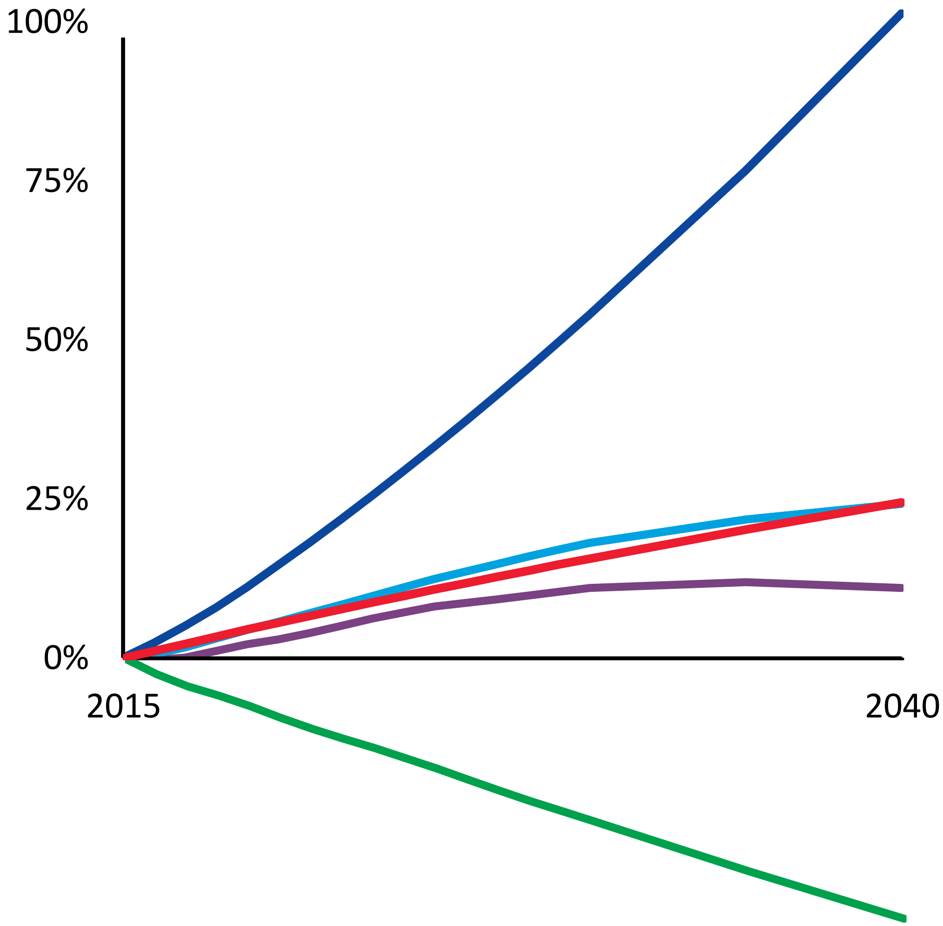
Global Trends Continue to Evolve

Growth from 2015 Level

Percent



2x
GDP

+25%
demand

+1.8 billion
people

+10%
CO_2 emissions

-45%
CO_2 intensity

Key Energy Outlook Themes

Energy is fundamental to **standards of living**

Economics and **policies** impact the energy mix

Natural gas grows more than any other energy source

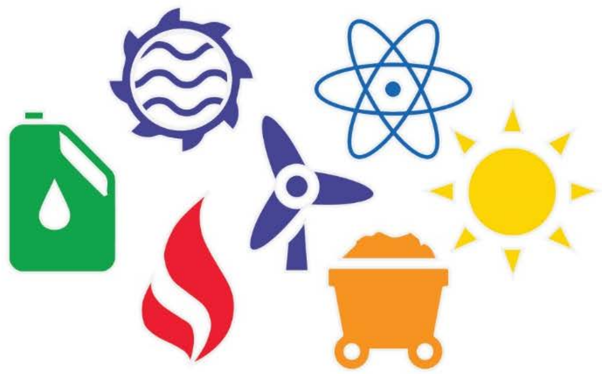
Developing nations lead gains in GDP and living standards

Oil remains the world's primary fuel through 2040

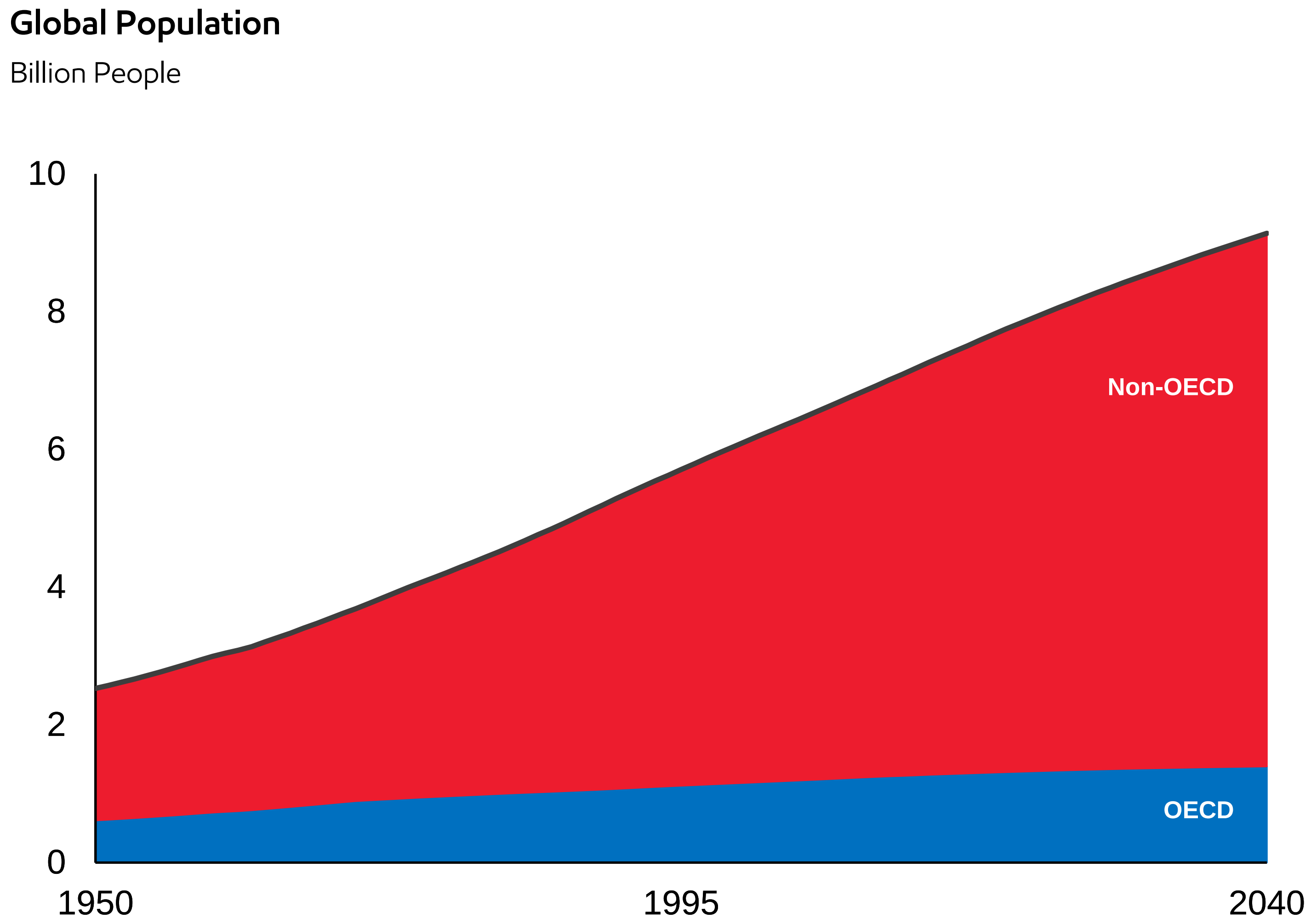
Technology has the highest potential and greatest uncertainty

The energy equation

People × living standards = energy needs



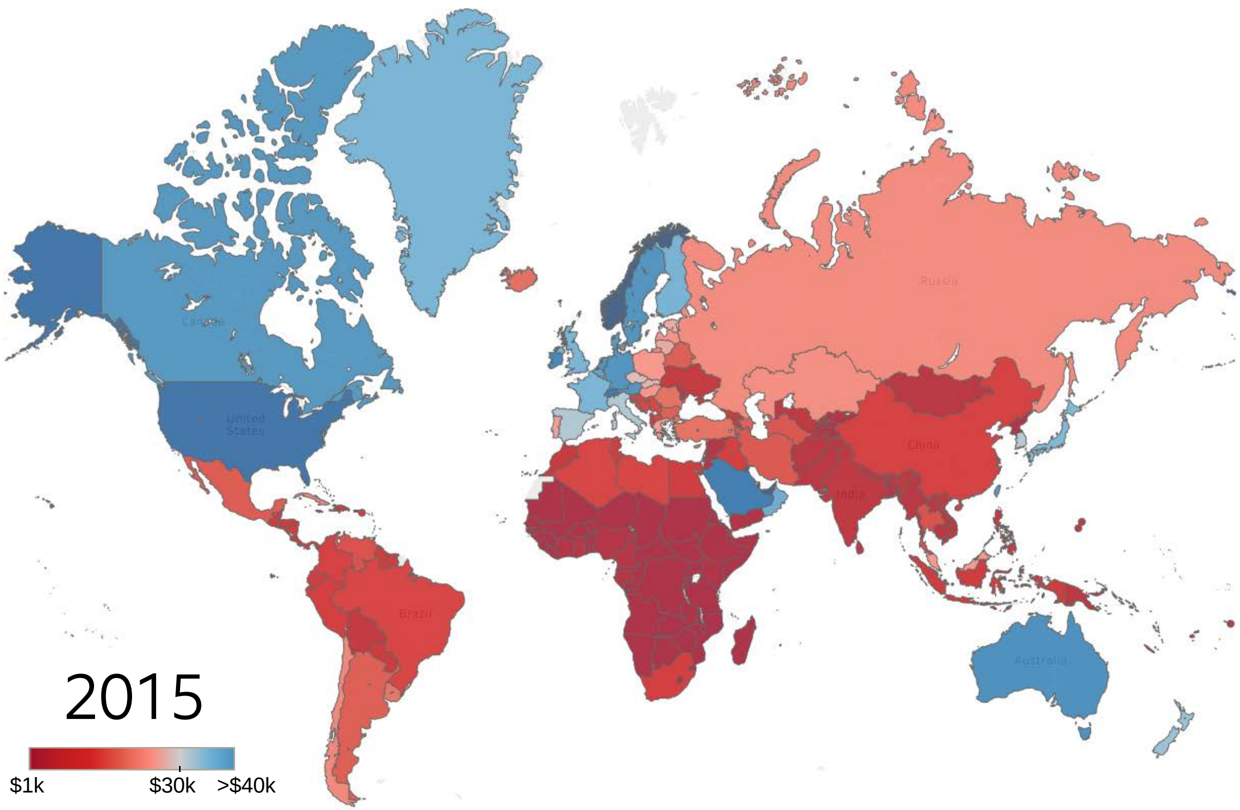
Developing Nations Lead Population Growth



Purchasing Power and Middle Class Grow

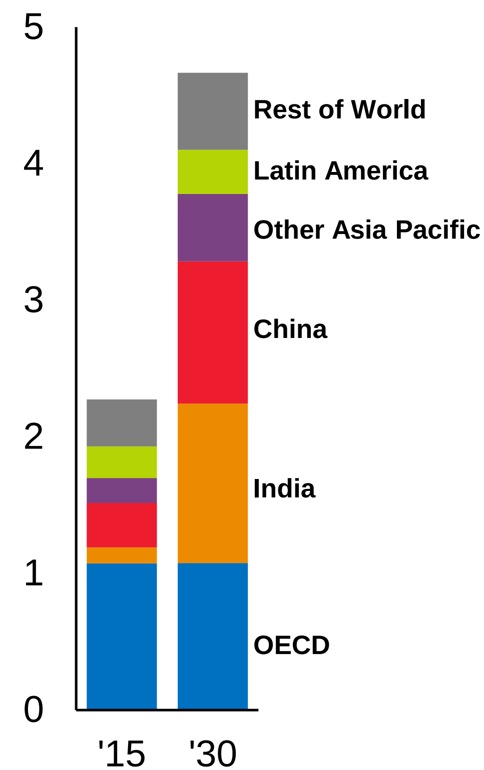
GDP Per Capita

Thousand PPP Dollars



Global Middle Class

Billion People



Source: The Brookings Institution

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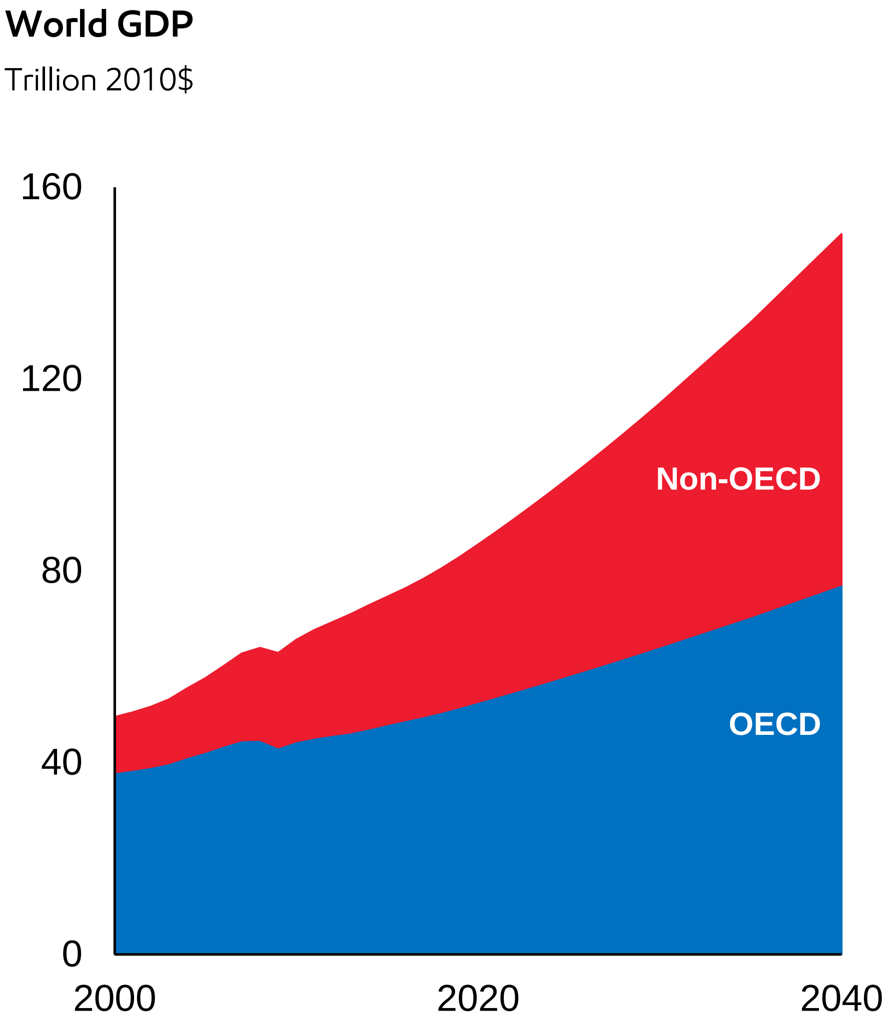
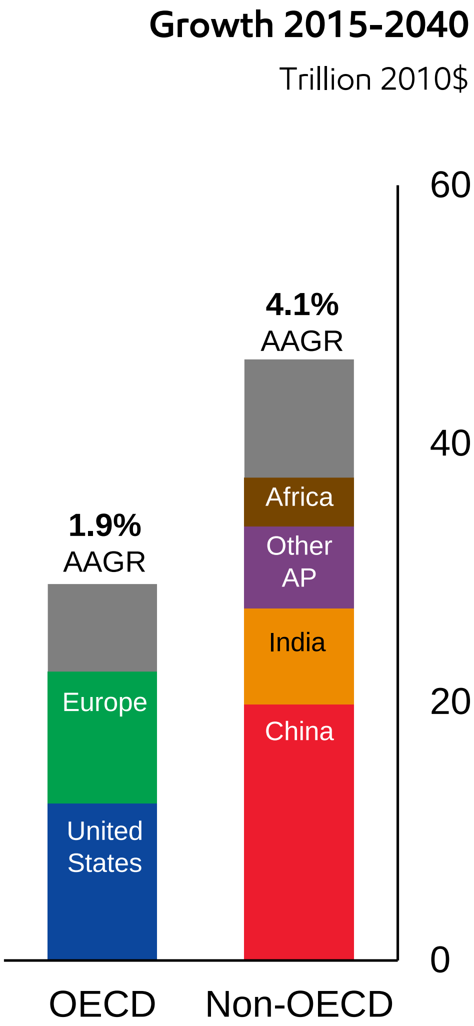
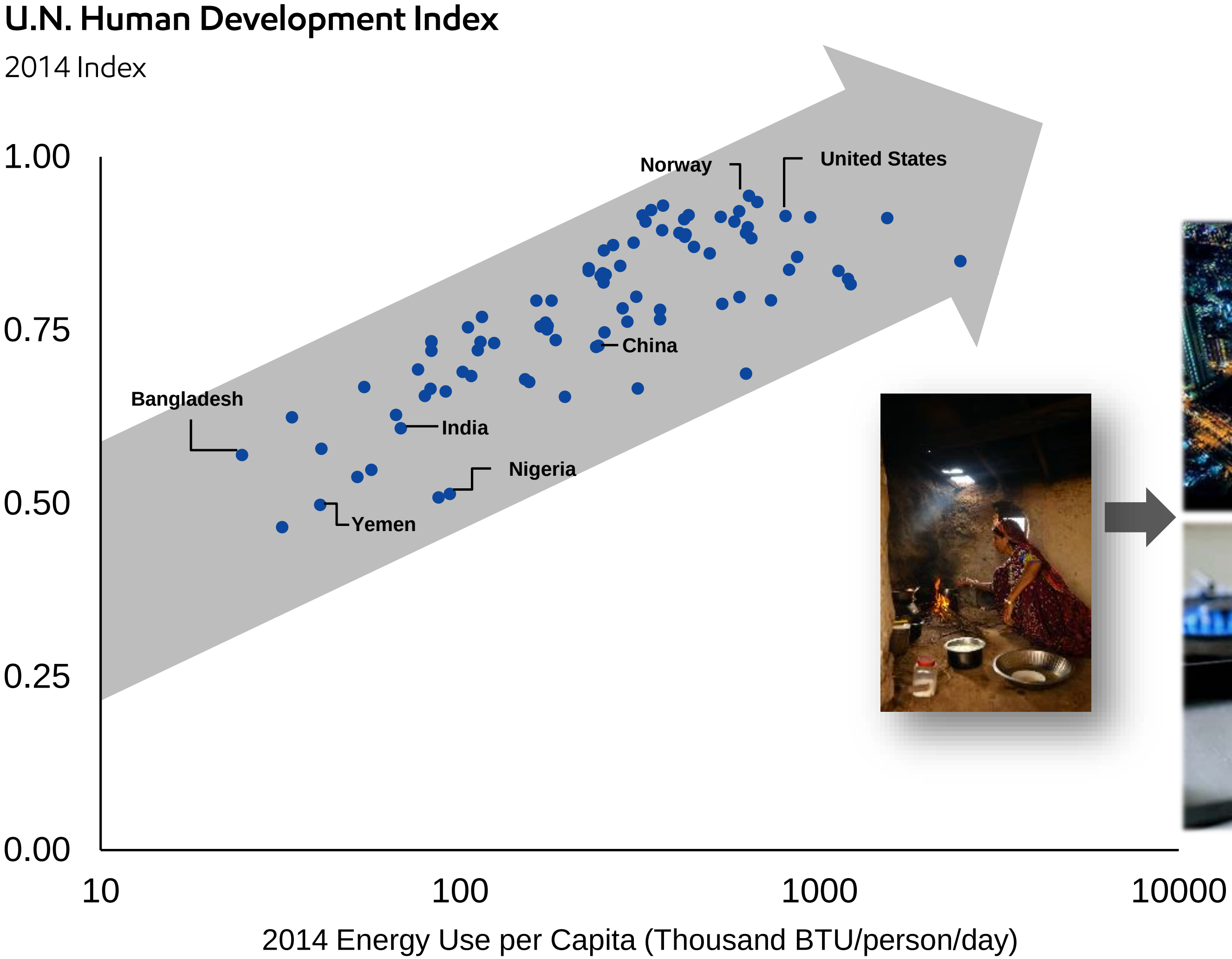
Non-OECD Leads Economic Growth





Energy Fuels Human Development



Source: United Nations, ExxonMobil estimates

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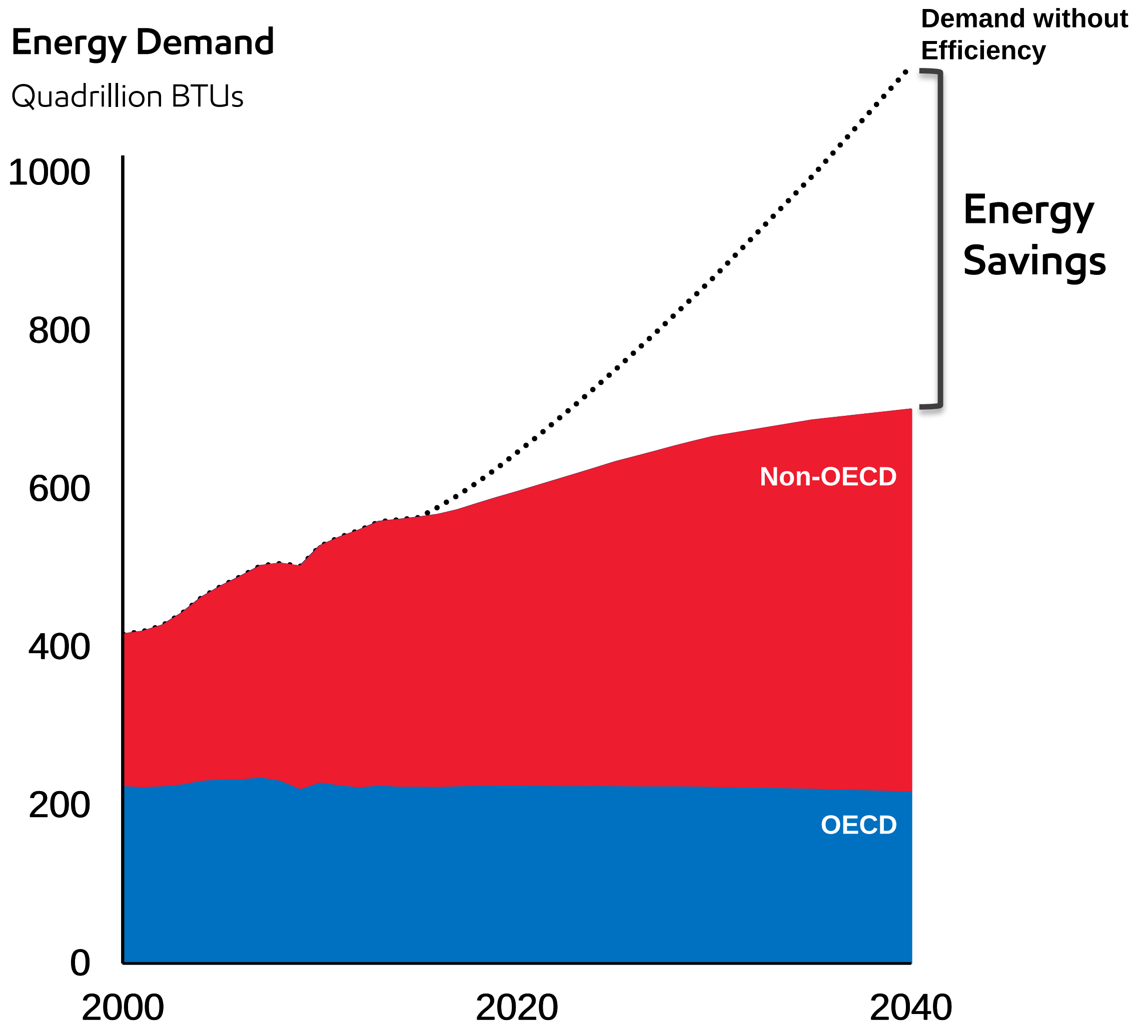
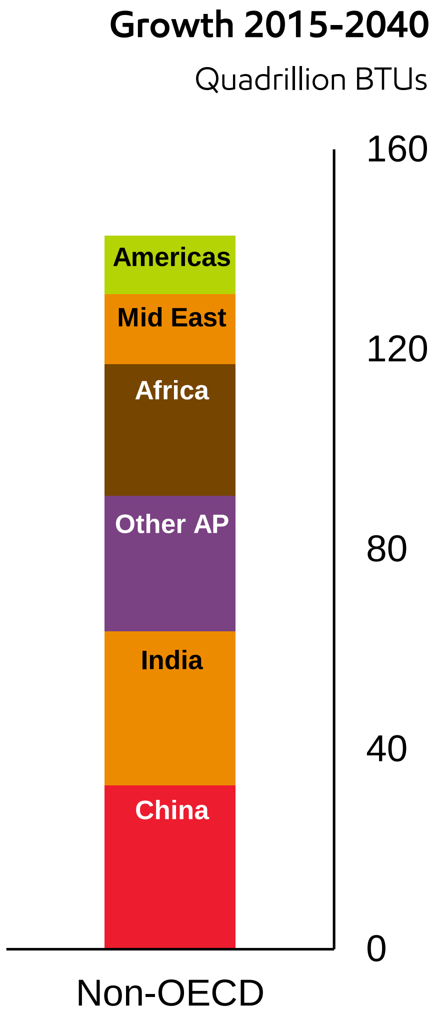
Demand Growth From Developing Nations





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Economics and **policies** impact the energy mix.

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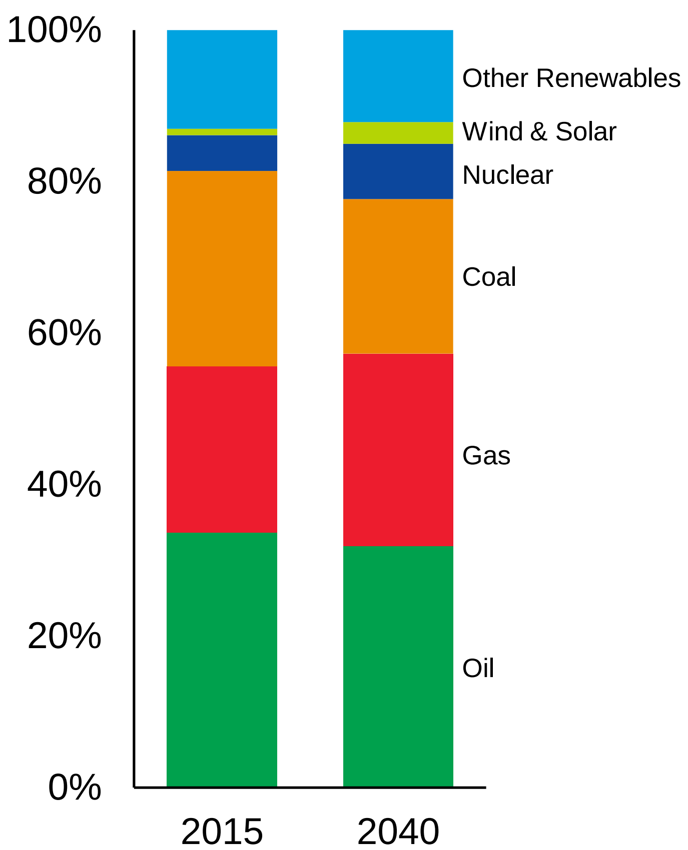
Energy Mix Shifts to Lower-Carbon Fuels

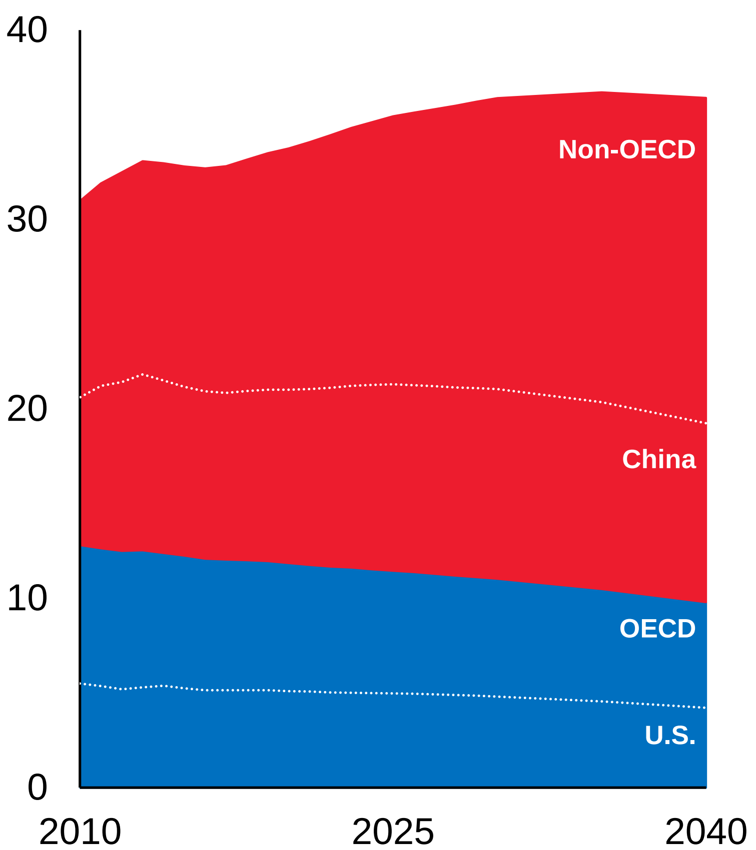
Global Energy Mix

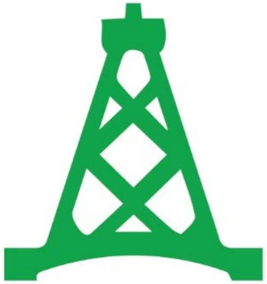
Percent



Energy-Related CO_2 Emissions by Region

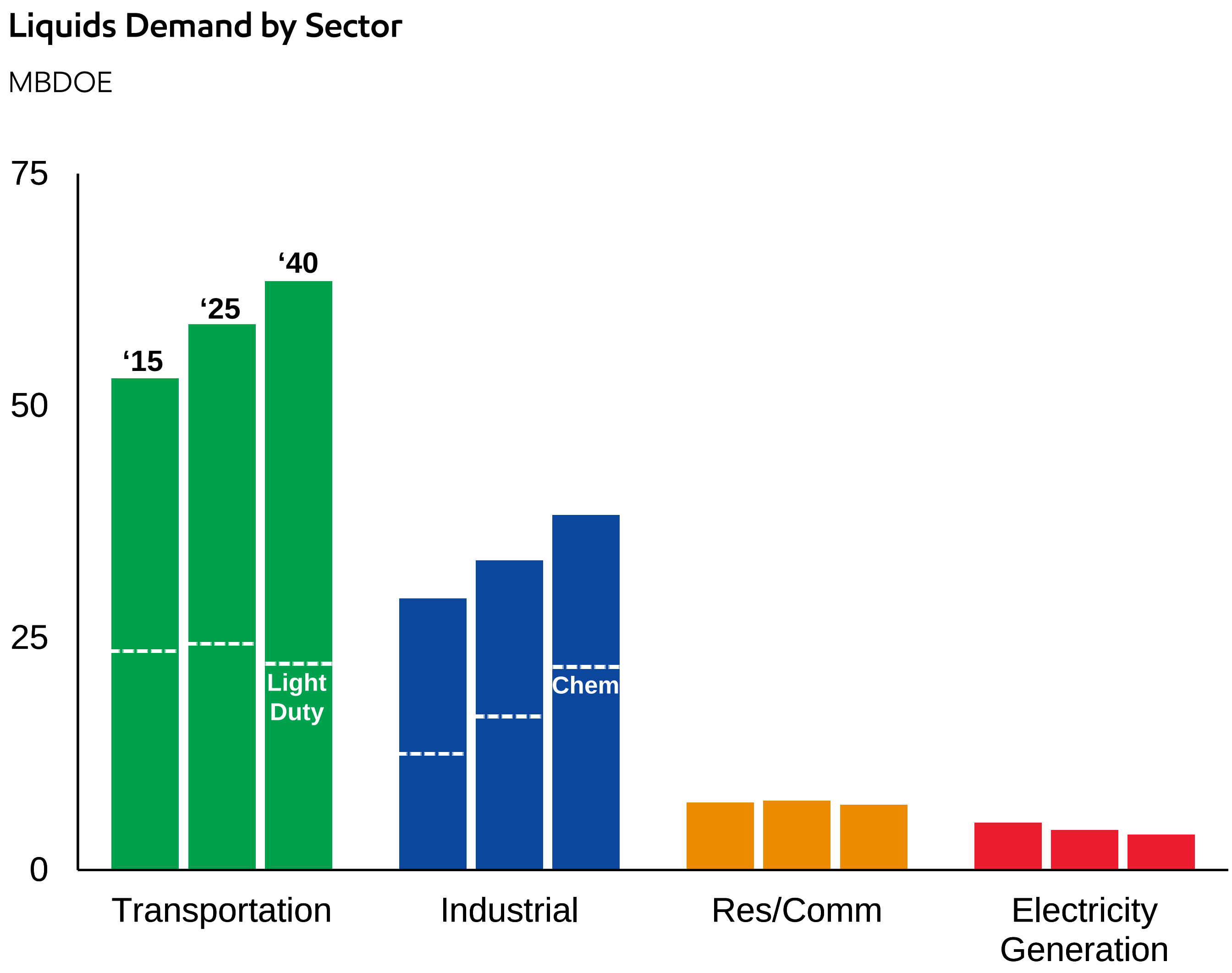
Billion Tonnes





Oil remains the world's primary fuel through 2040.

Transportation and Chemicals Drive Growth



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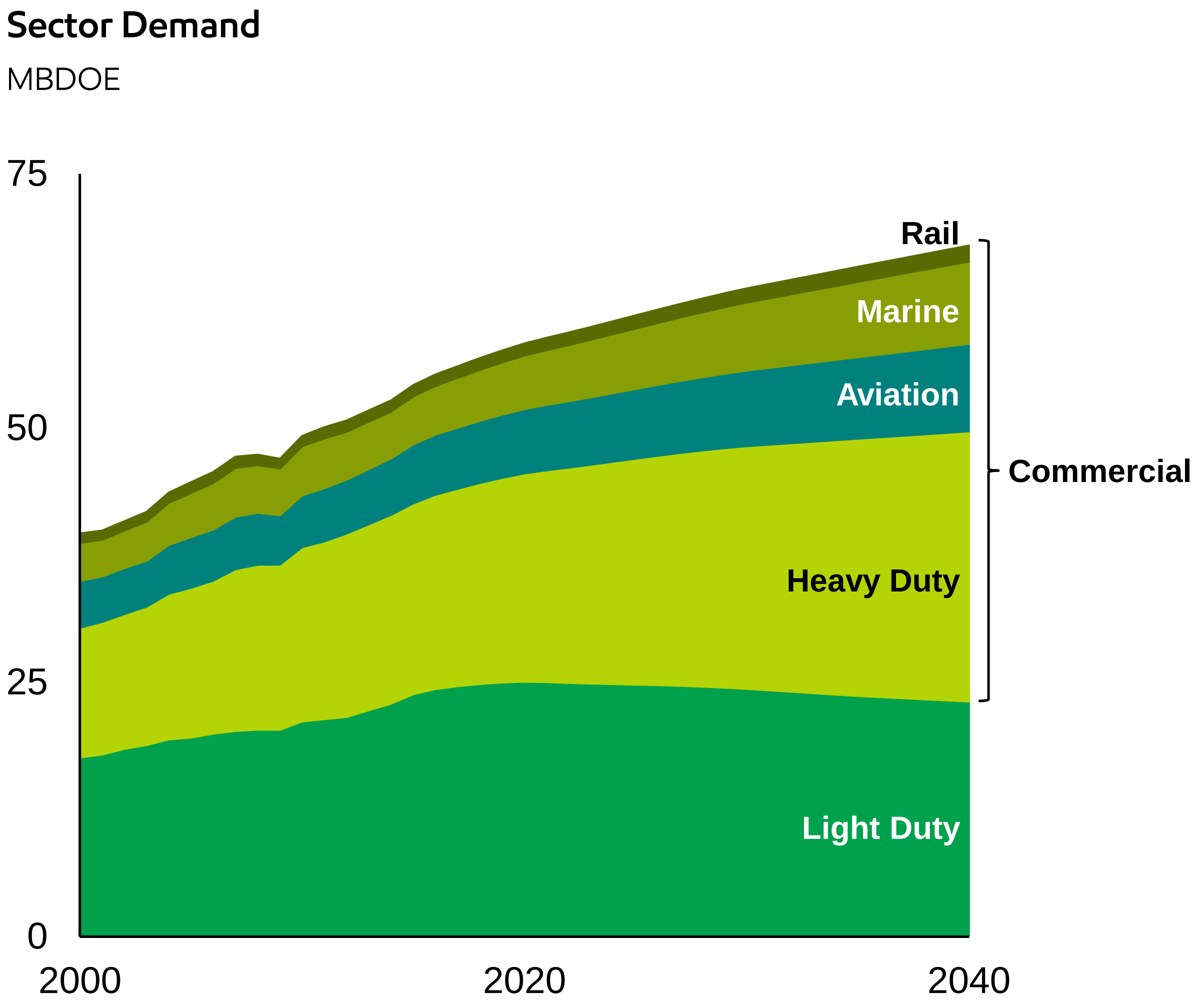
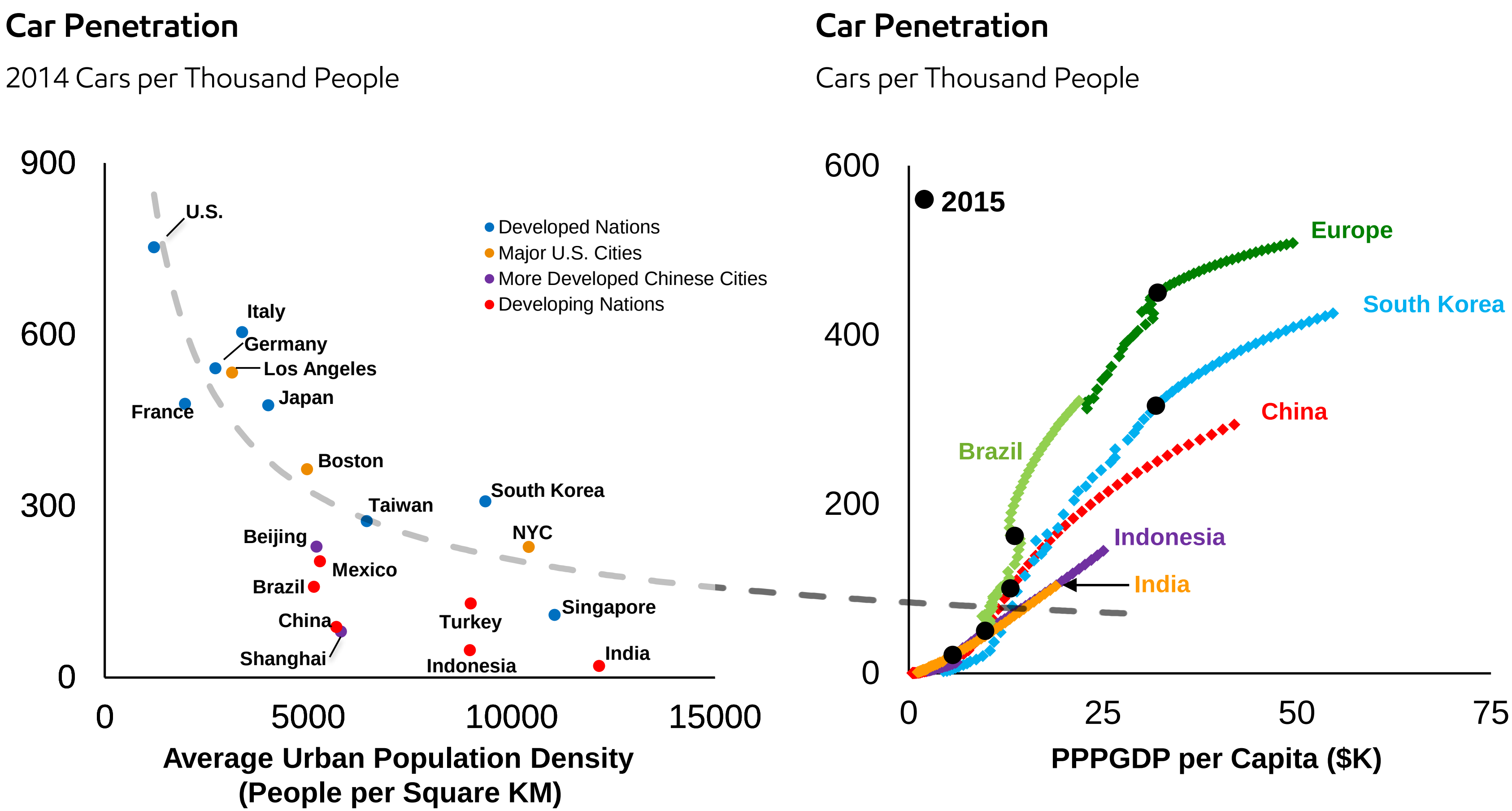
Transportation Demand Driven by Commerce



Car Penetration Rises



Source: demographia.com, ExxonMobil estimates

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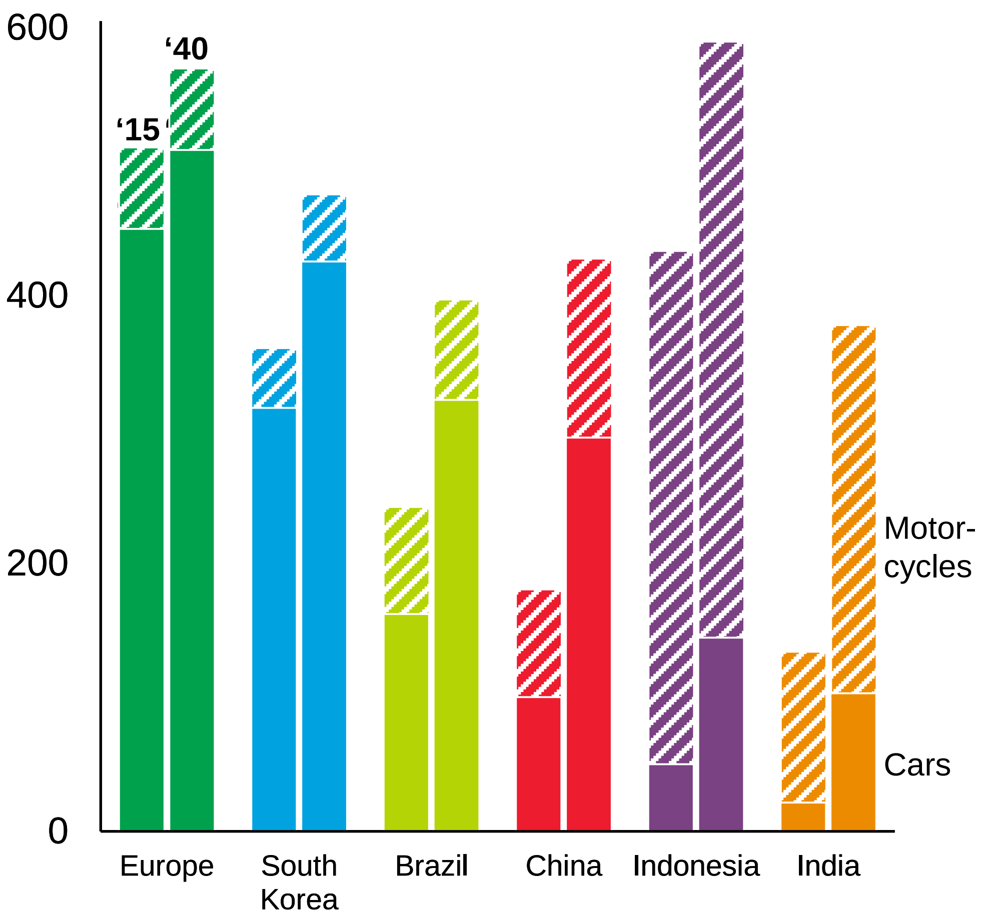
Personal Mobility Increases

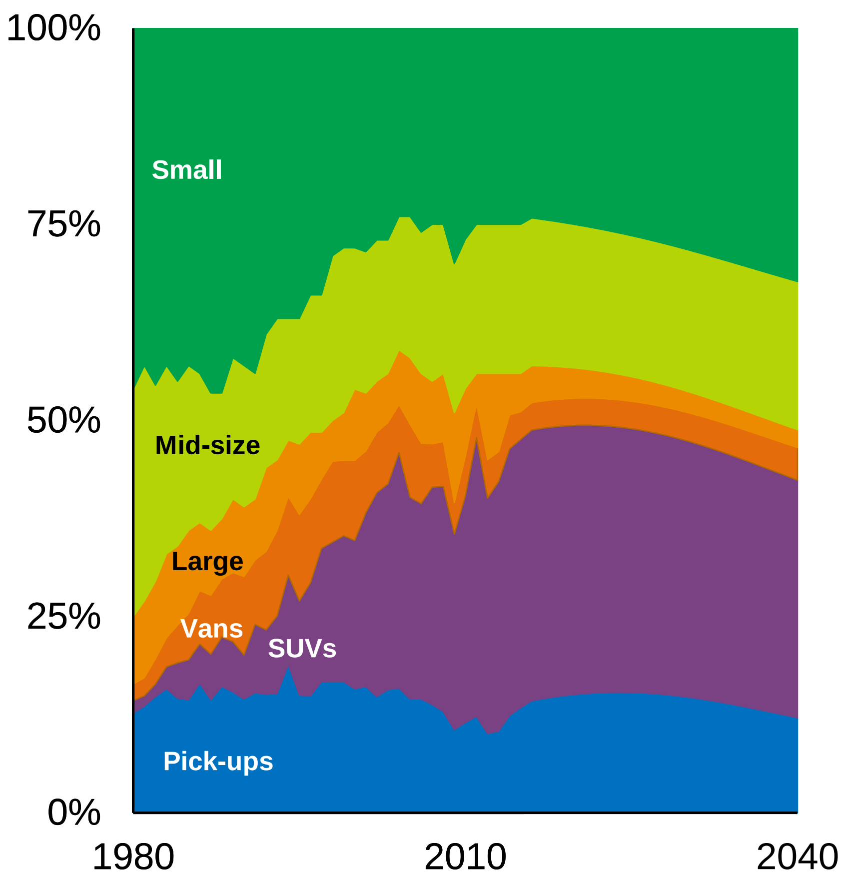
Penetration

Vehicles Per Thousand People

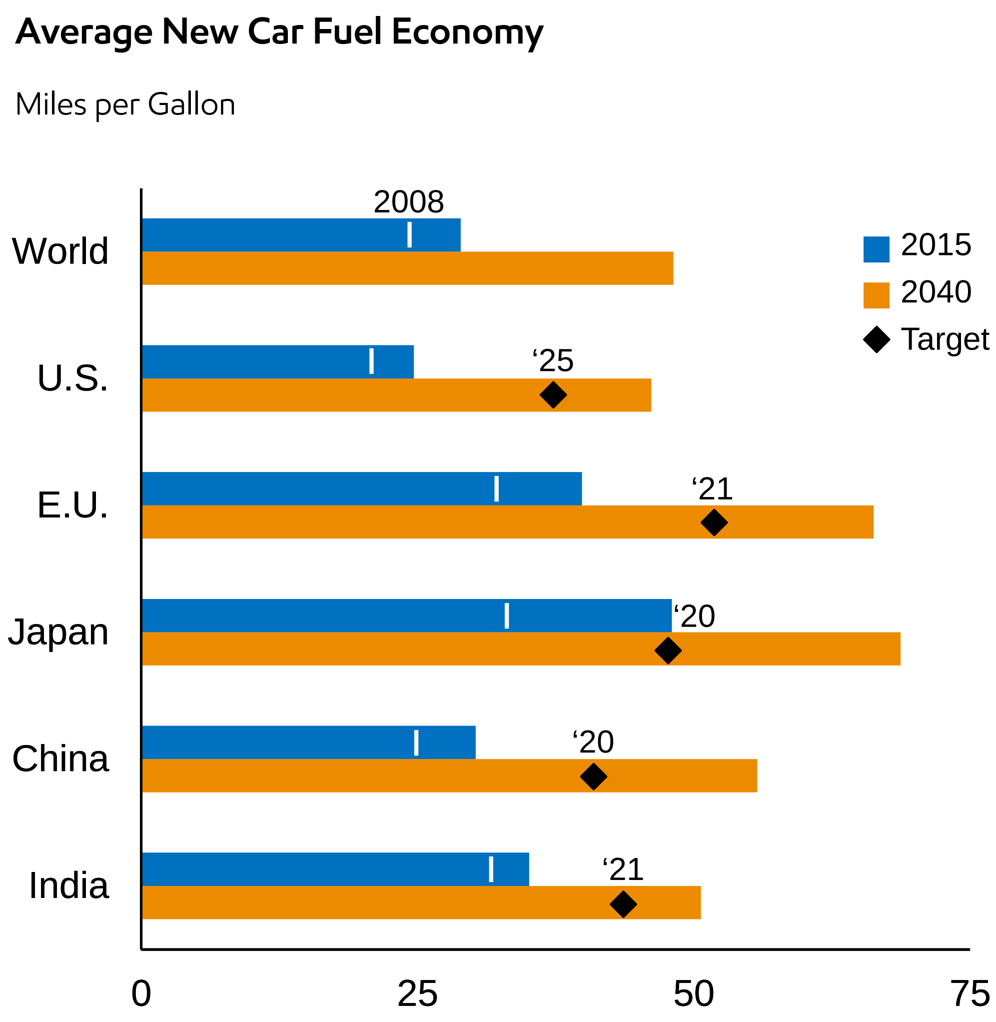


U.S. Car Sales by Class

Percent



New Car Fuel Economy Improves Rapidly



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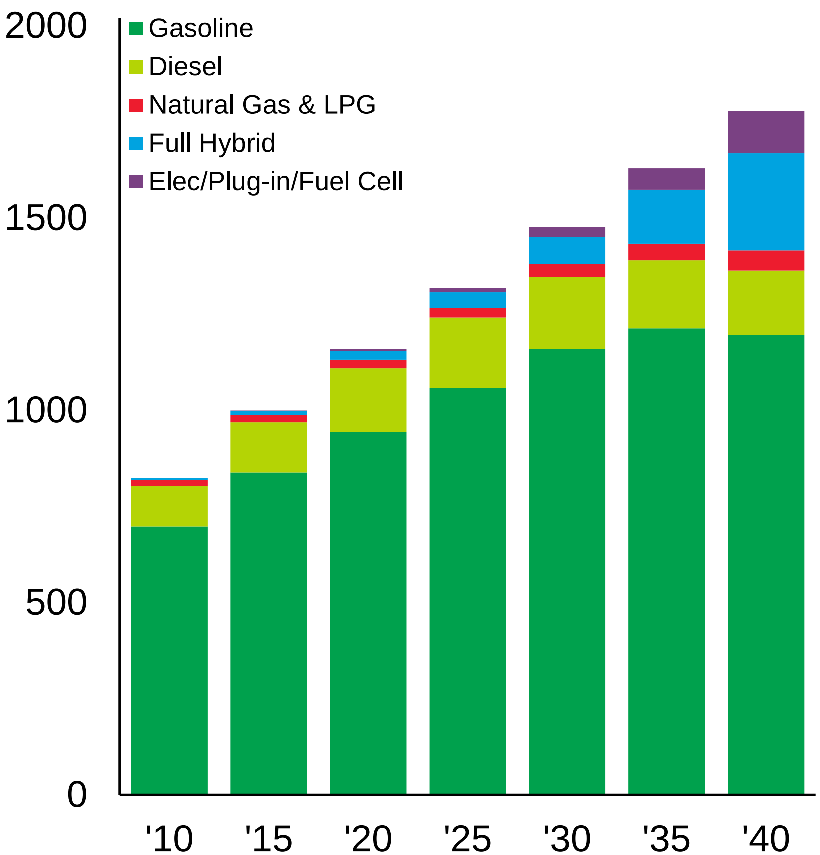
Consumer Preference and Policy Determine Fleet Mix

Fleet by Type

Million Cars

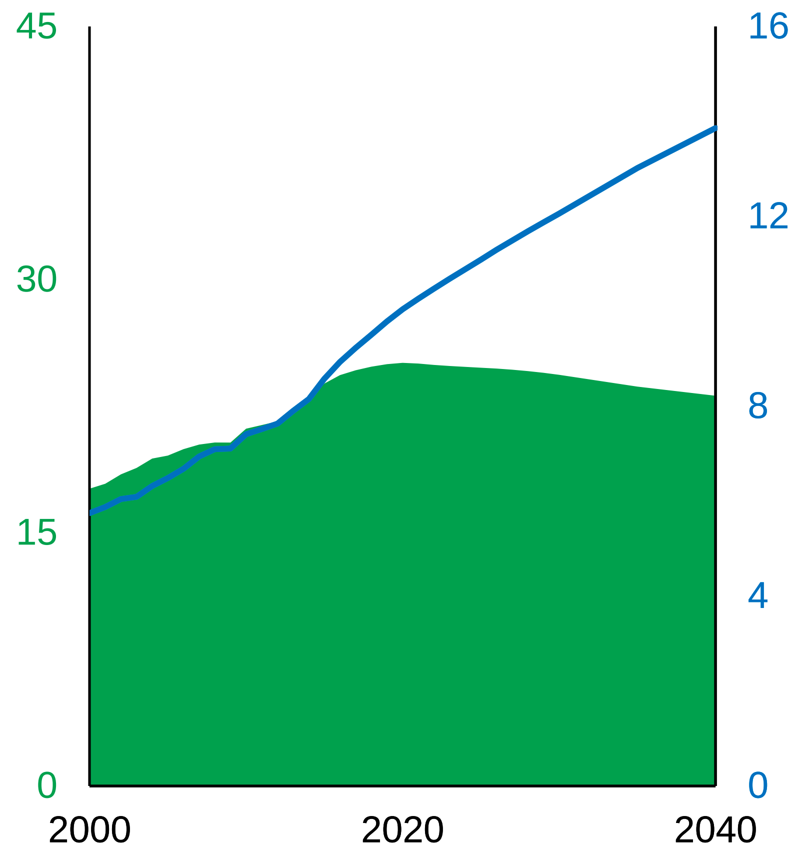


Light Duty Vehicle Demand

MBDOE

Vehicle Miles Traveled

Trillion Miles



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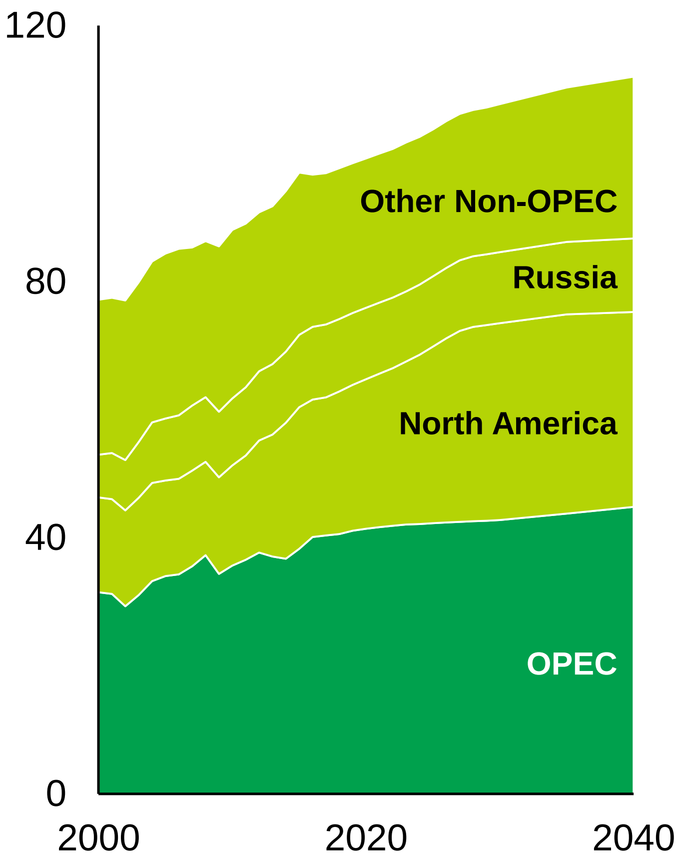
Liquids Supply Highlights Technology Gains

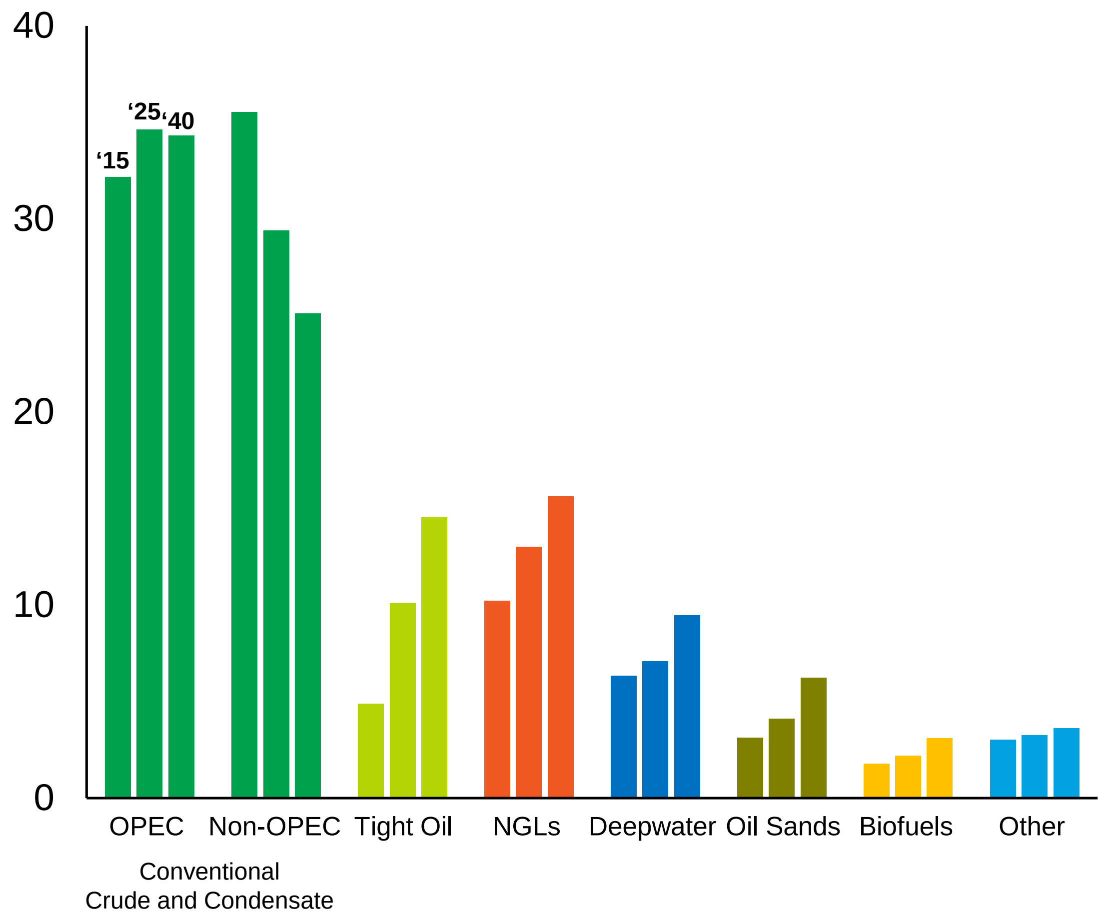
By Region

MBDOE



By Type

MBDOE



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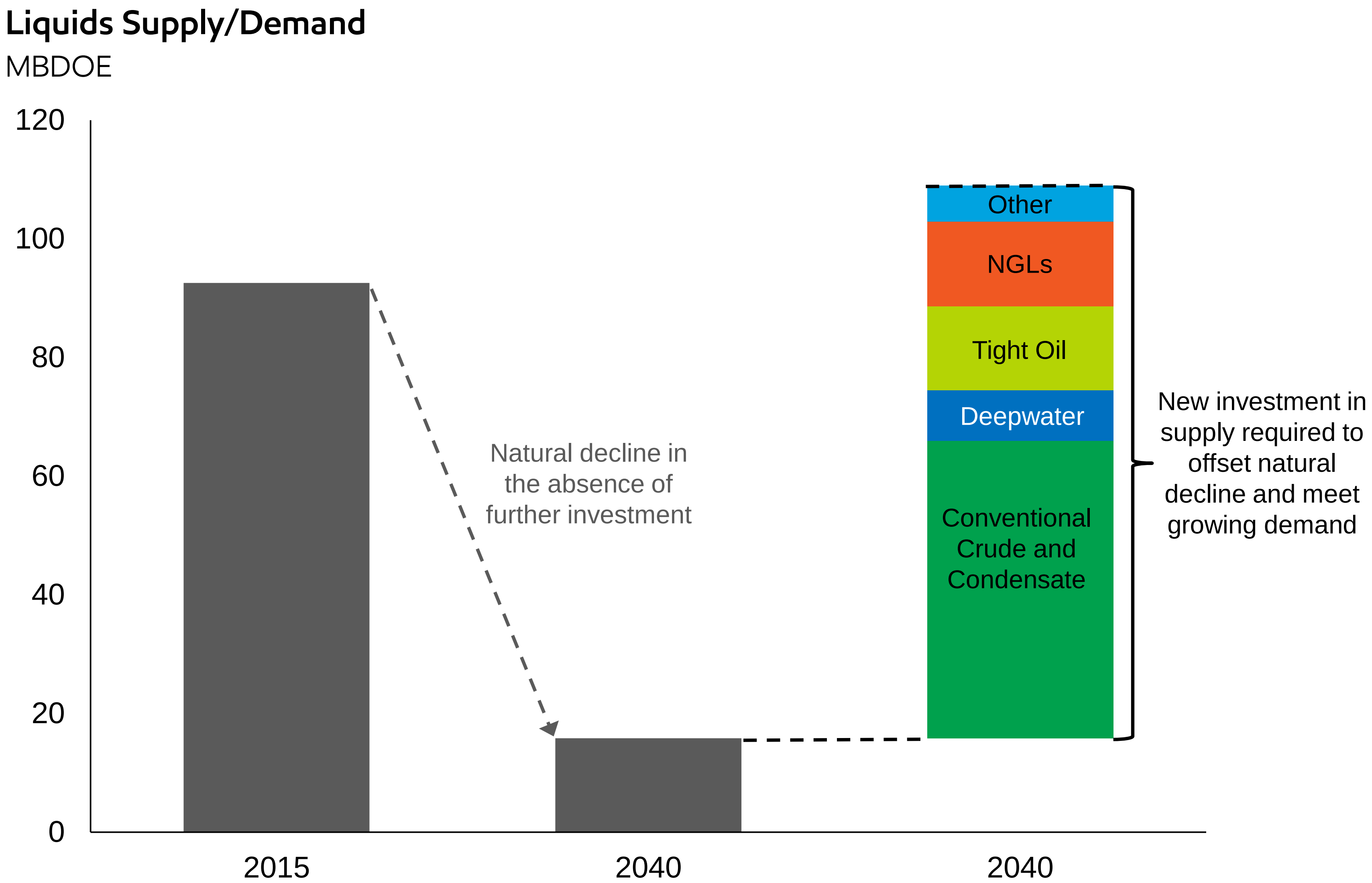
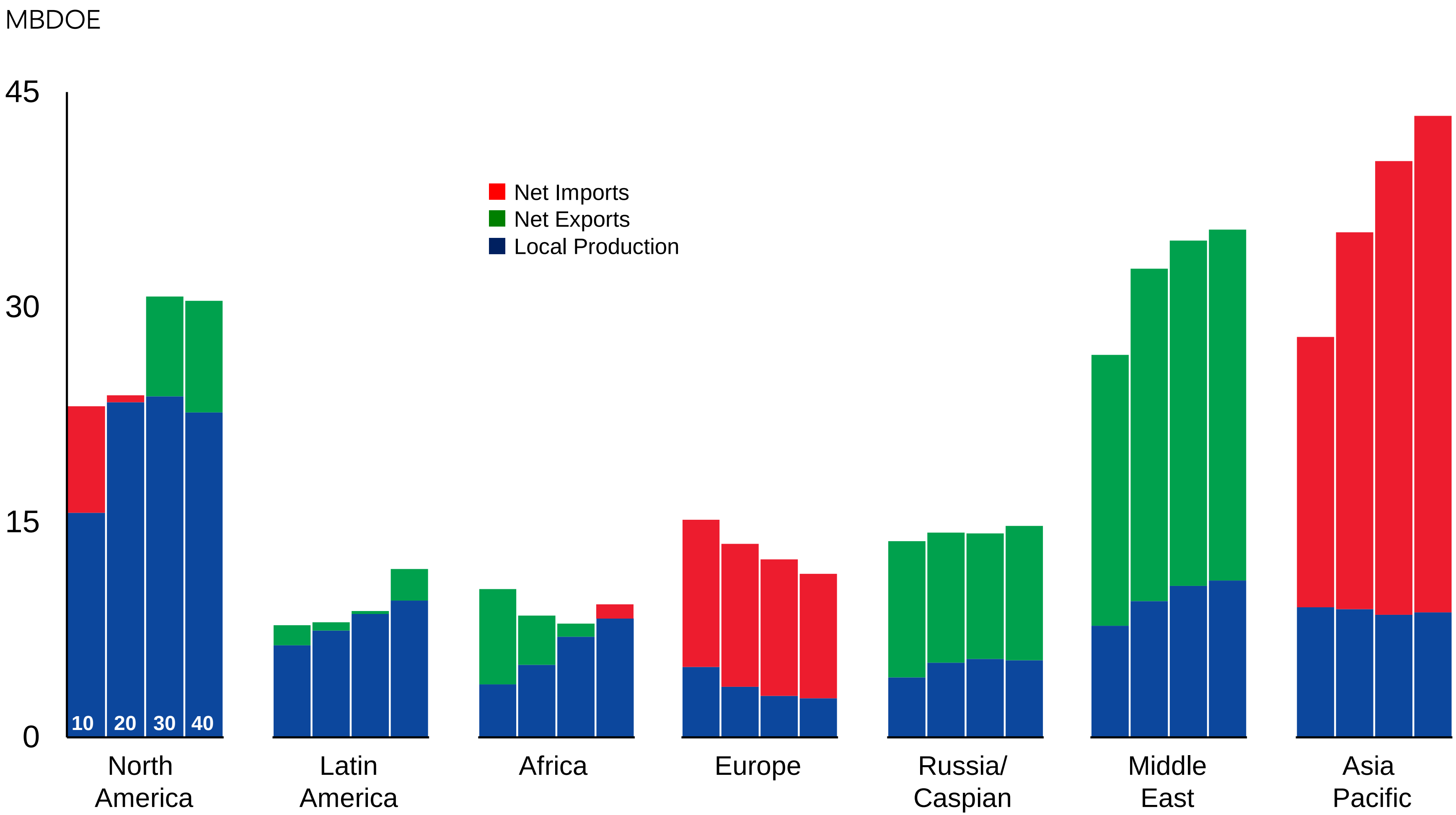
All Scenarios Require Ongoing Development



**Based on IEA sources; excludes biofuels*

Liquids Trade Balance by Region



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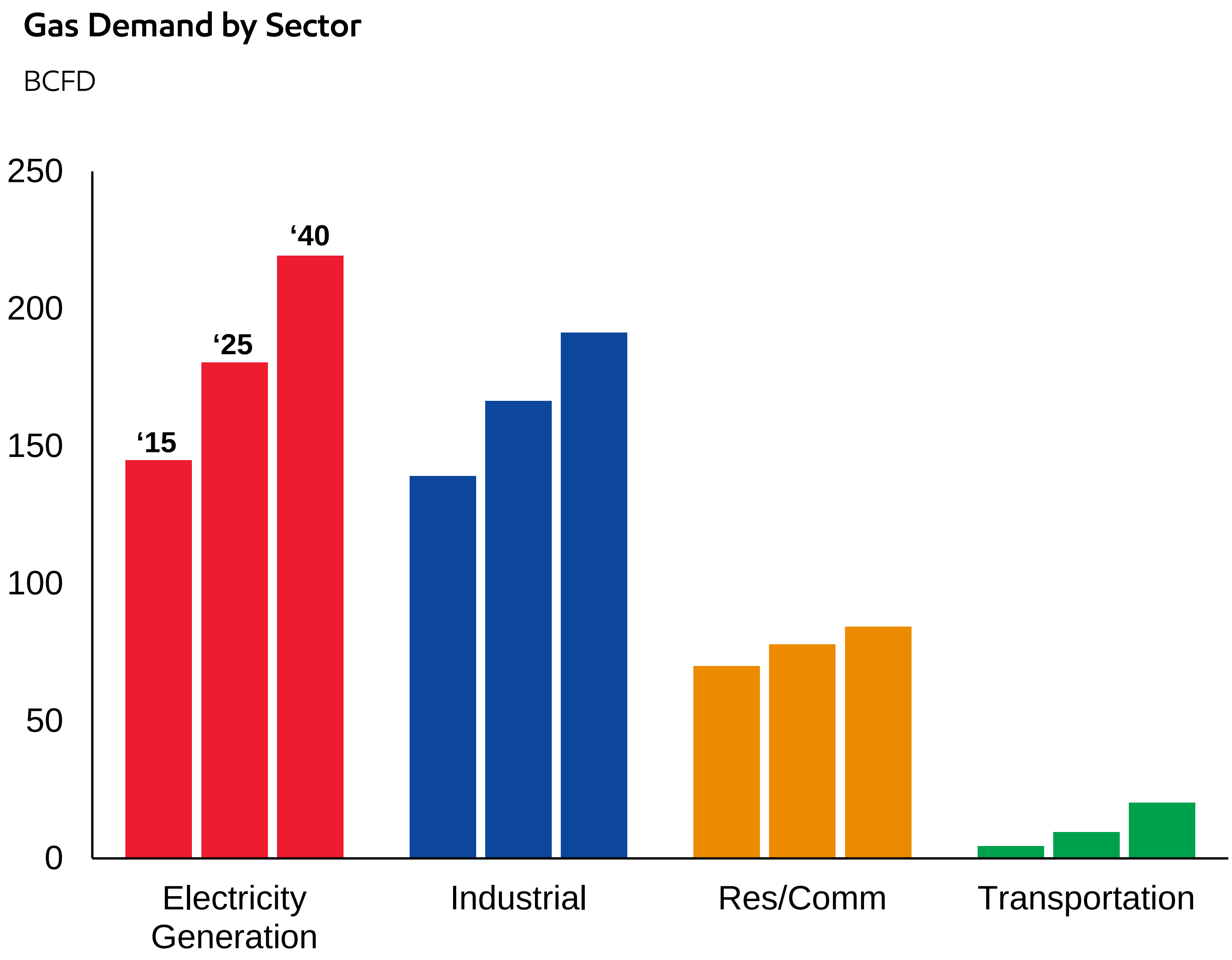
Natural gas grows more than any other energy source.

Gas Demand Grows in All Sectors



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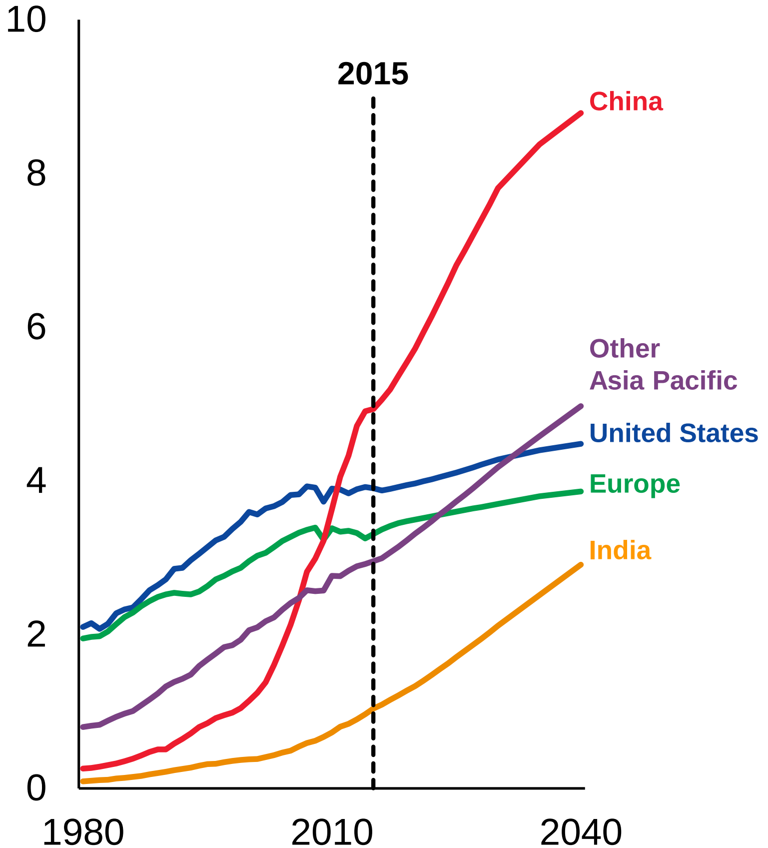
Electricity Demand Continues to Surge

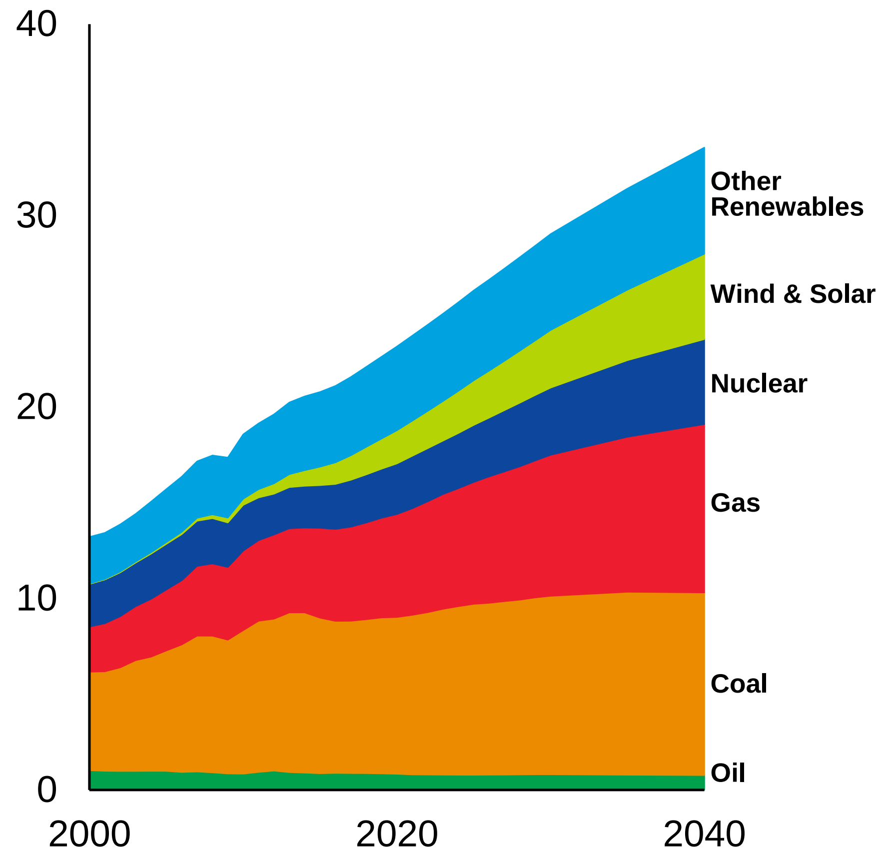
Electricity Demand by Region

Thousand TWh



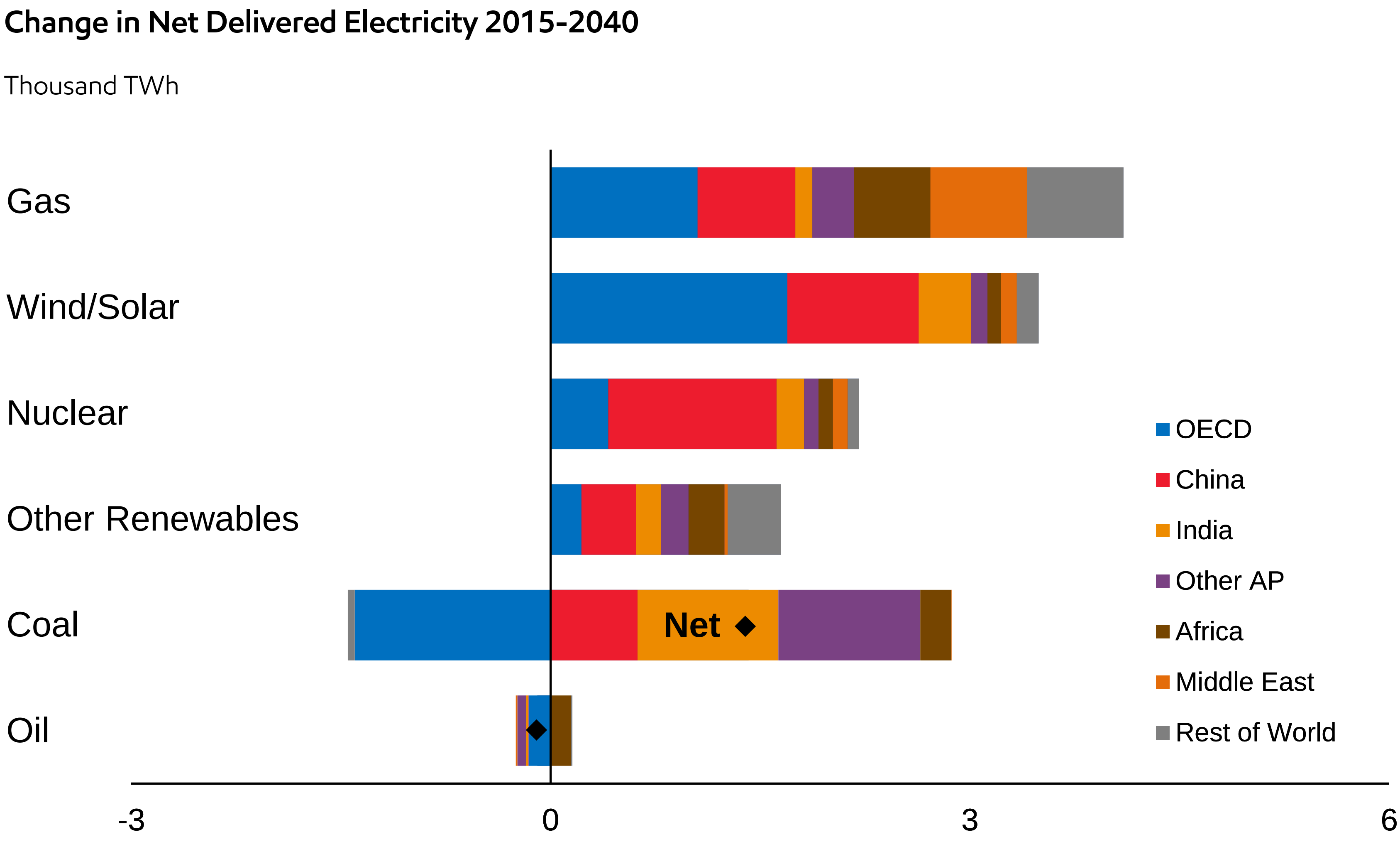
Electricity Net Delivered by Type

Thousand TWh



ExxonMobil 2017 Outlook for Energy

Electricity Sources Shift Regionally



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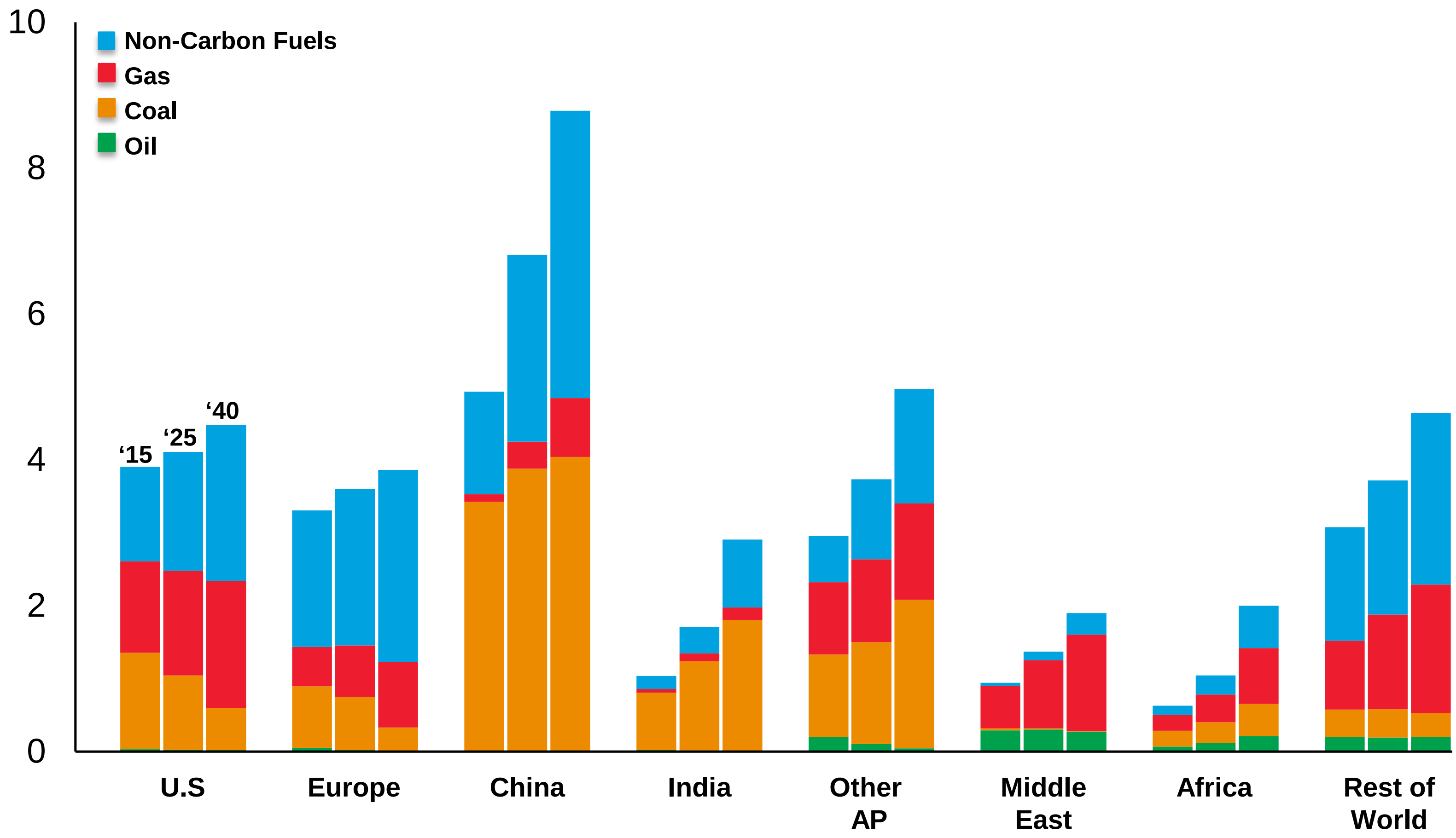
Fuel for Electricity Transitions

Net Delivered Electricity 2015-2040

Thousand TWh



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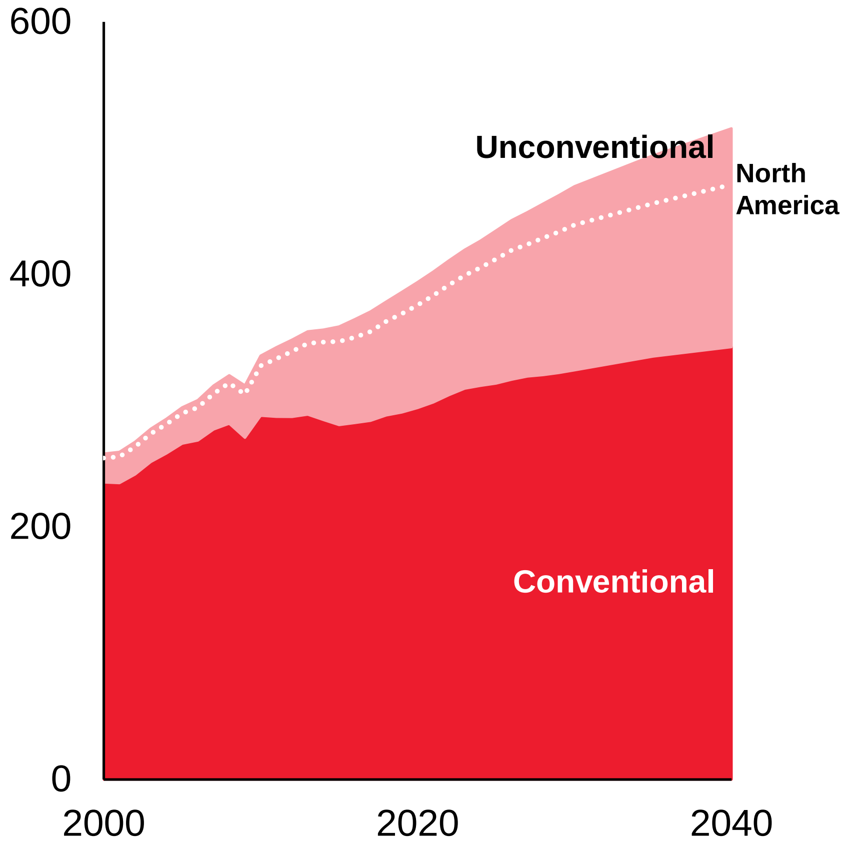
Natural Gas Supply

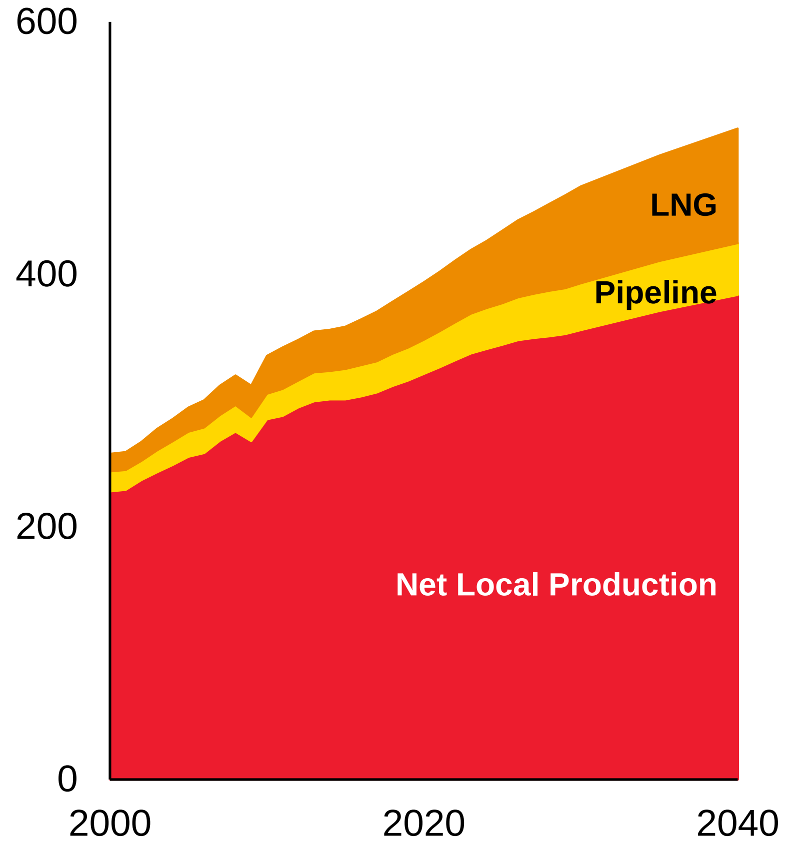
By Production Type

BCFD



By Delivery Type

BCFD



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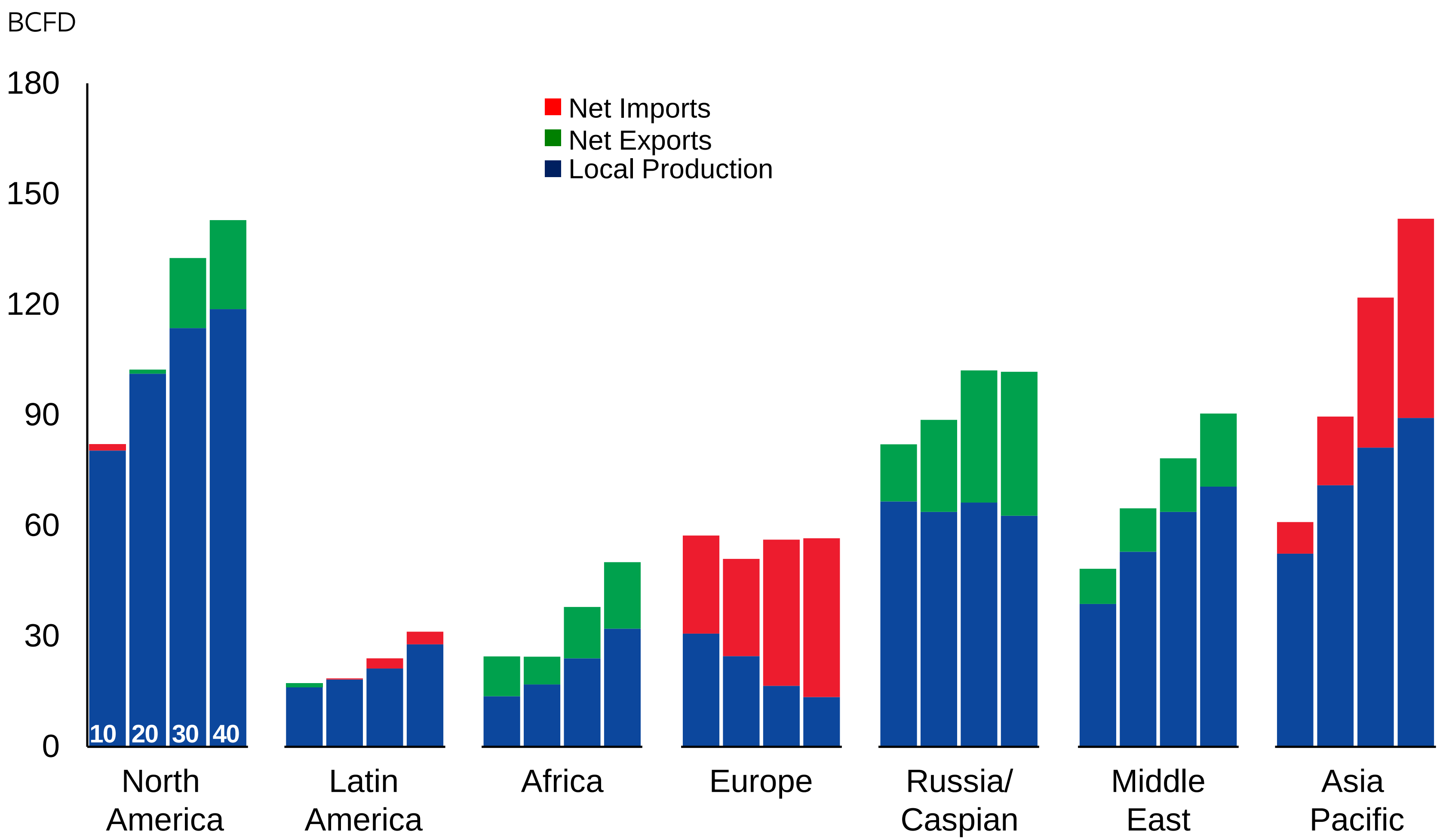
Gas Trade Balance by Region



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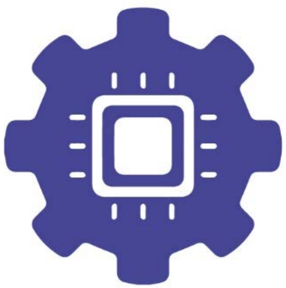
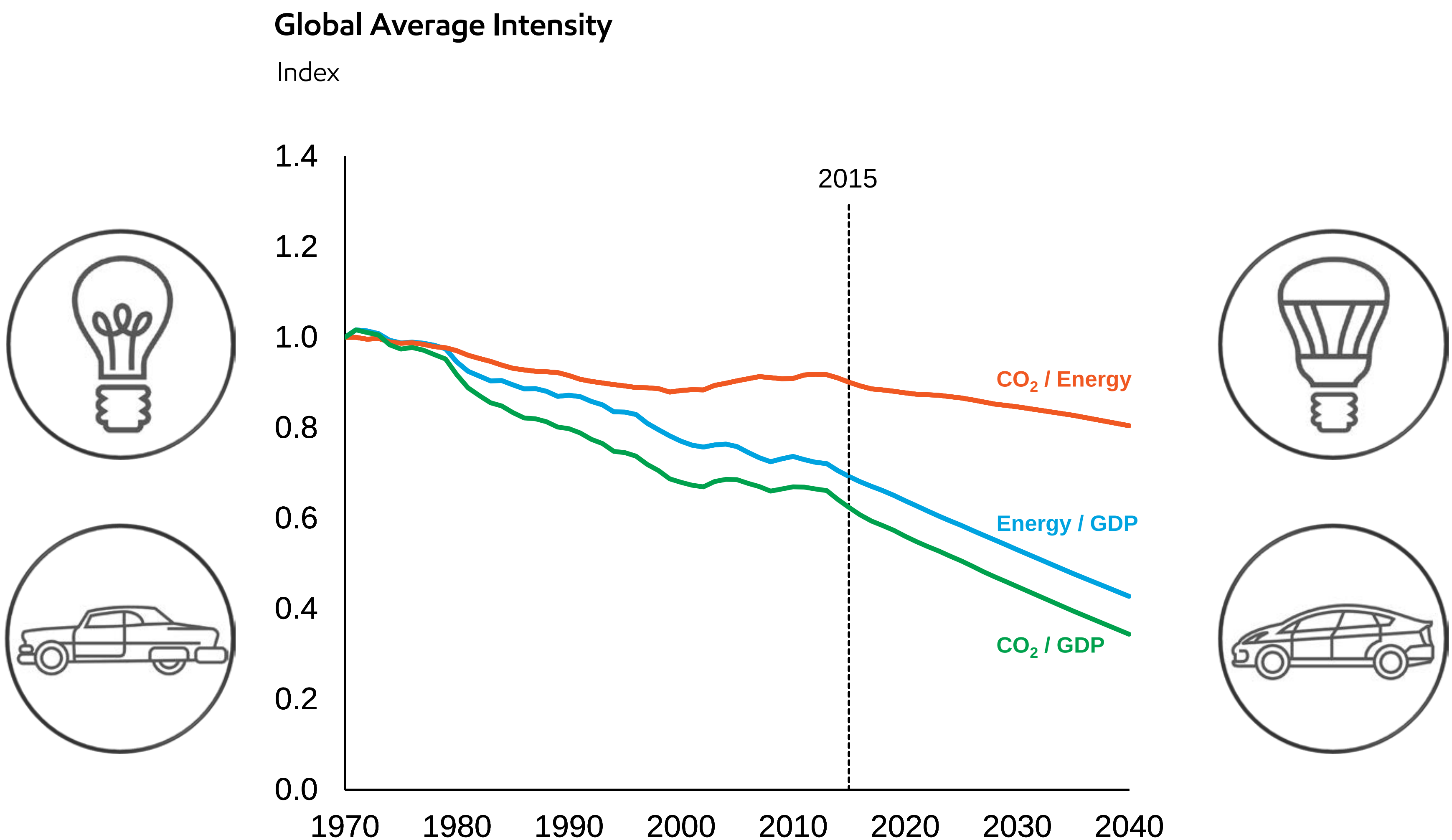


Technology has the highest potential and greatest uncertainty.

Technology Helps Us Do More With Less



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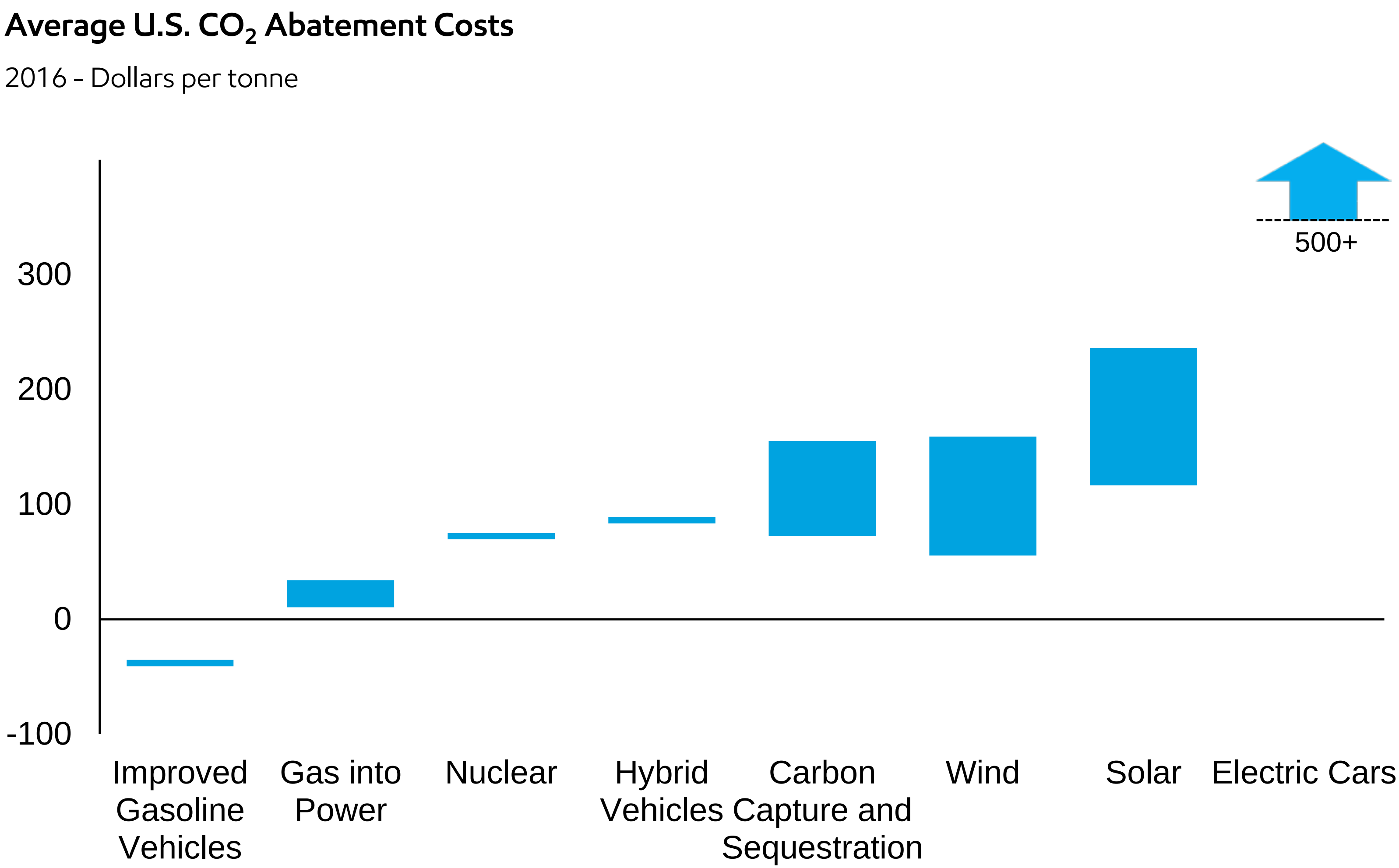
CO_2 Abatement Costs

CO_2 Abated

$$\text{Abatement Cost} = \frac{\text{Dollars}}{\text{Tonne}}$$

- Capital
- Operating Costs

Clarifying Options to Reduce CO_2 Emissions



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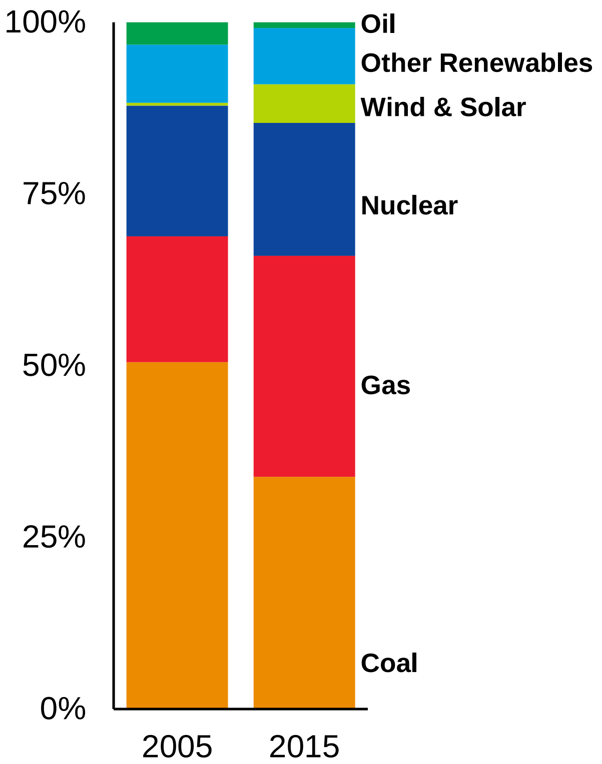
Two Paths to CO_2 Reduction

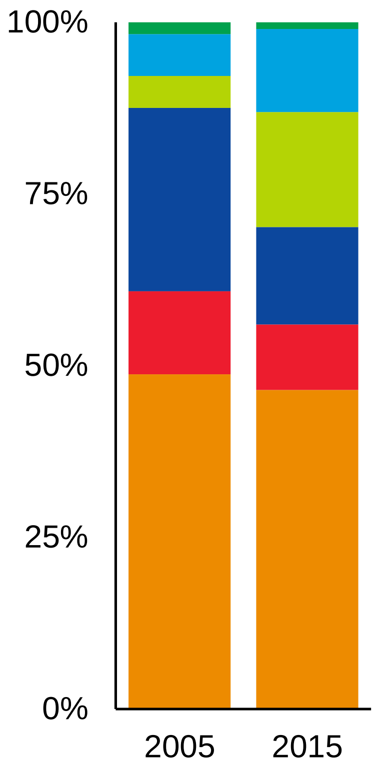
United States Generation Share

Percent



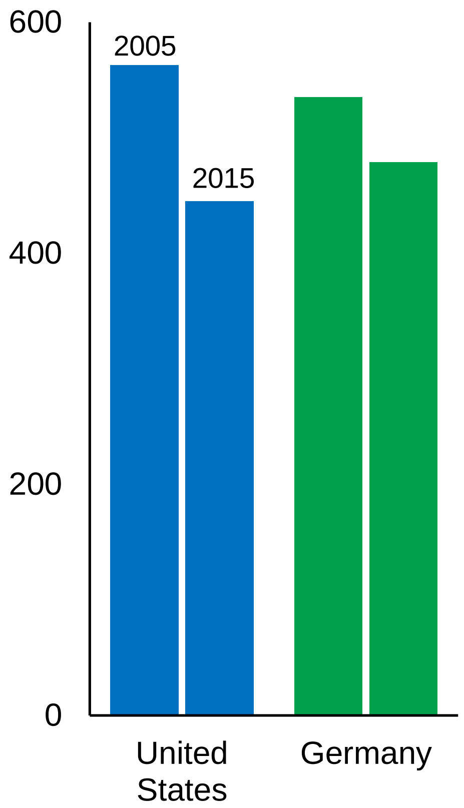
Germany Generation Share

Percent



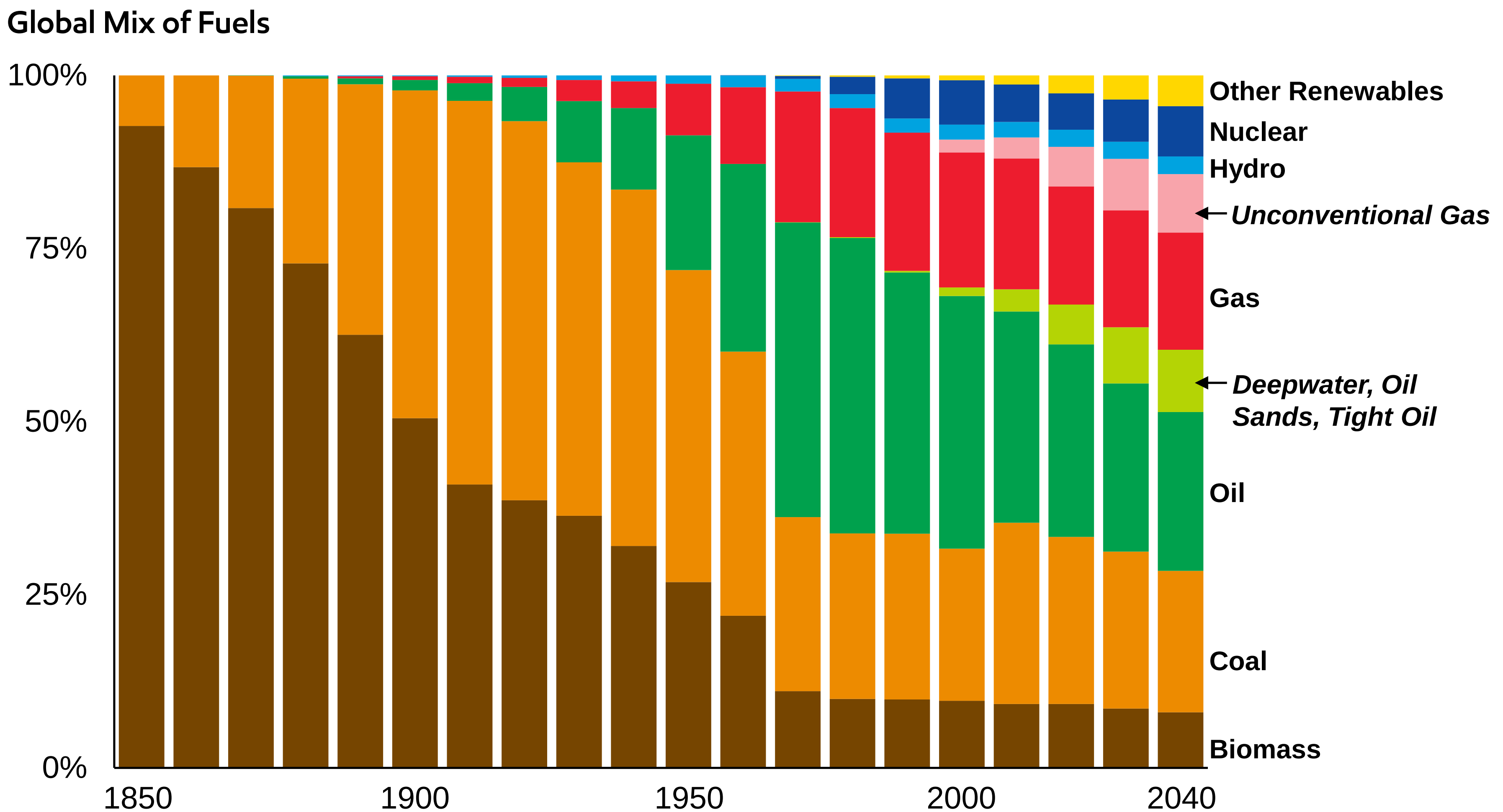
CO_2 Intensity of Generation

g CO_2/kWh generation



Sources: EIA, UBA

Technology Contributes to the Fuel Mix



Source: Smil, Energy Transitions (1800-1960)

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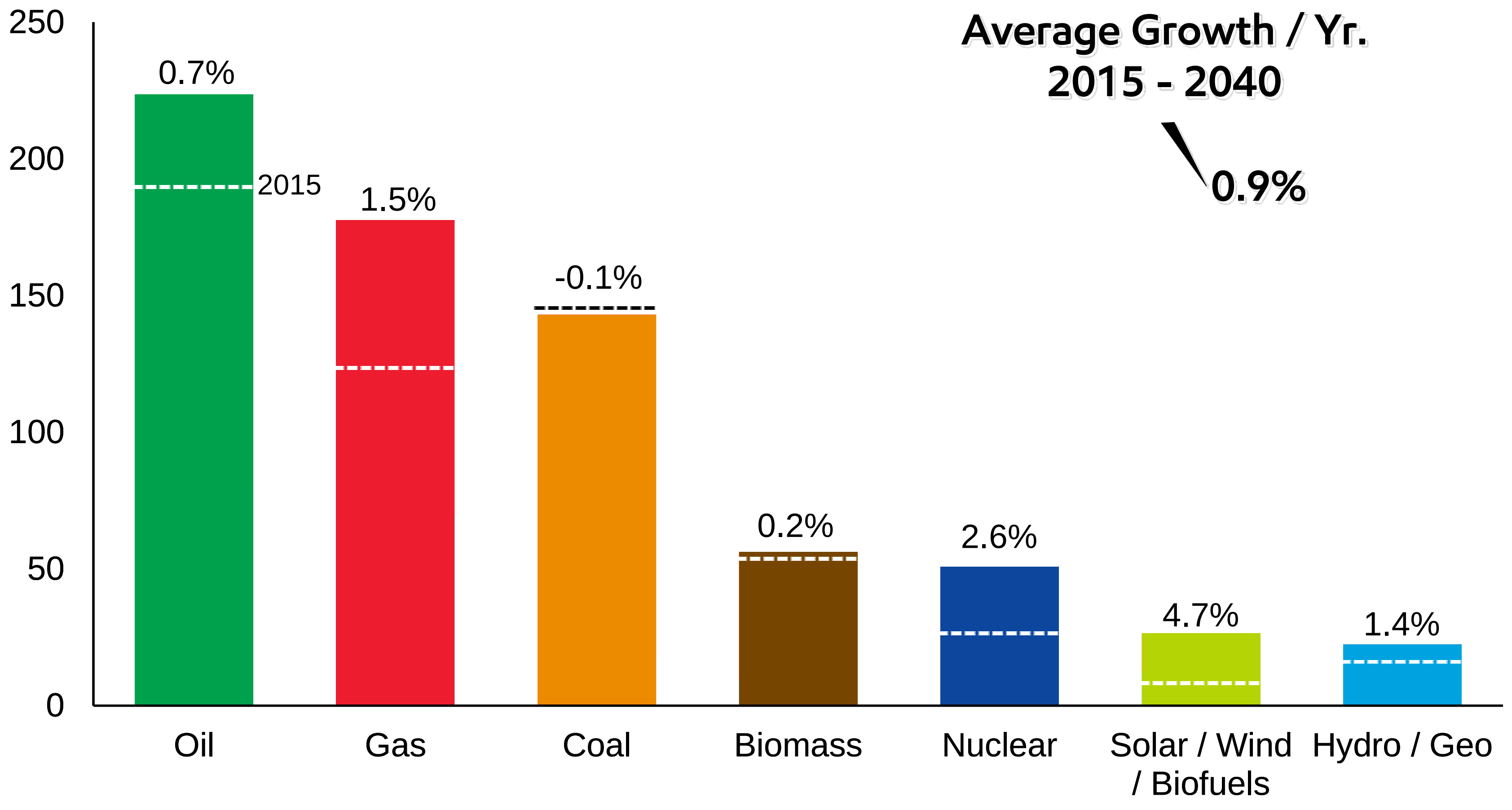
Global Demand

2040 By Fuel
Quadrillion BTUs



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