

International Energy Outlook 2019 (IEO2019)



for

Center for Strategic and International Studies

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by

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U.S. Energy Information Administration

IEO2019 cases examine a range of conditions through 2050

Reference case

- Assumes implementation of current laws and regulations
- Reflects current views of economic and demographic trends, and improvements in known technology
- Macroeconomic projections from Oxford Economics, 3.0% global GDP growth per year, 0.7% global population growth per year
- Assumes Brent \$100 per barrel crude price in 2018 dollars by 2050

High and Low Economic Growth cases

- 3.7%/year GDP growth, High Economic Growth case
- 2.4%/year GDP growth, Low Economic Growth case

High and Low Oil Price cases (Brent crude prices by 2050 in 2018 dollars)

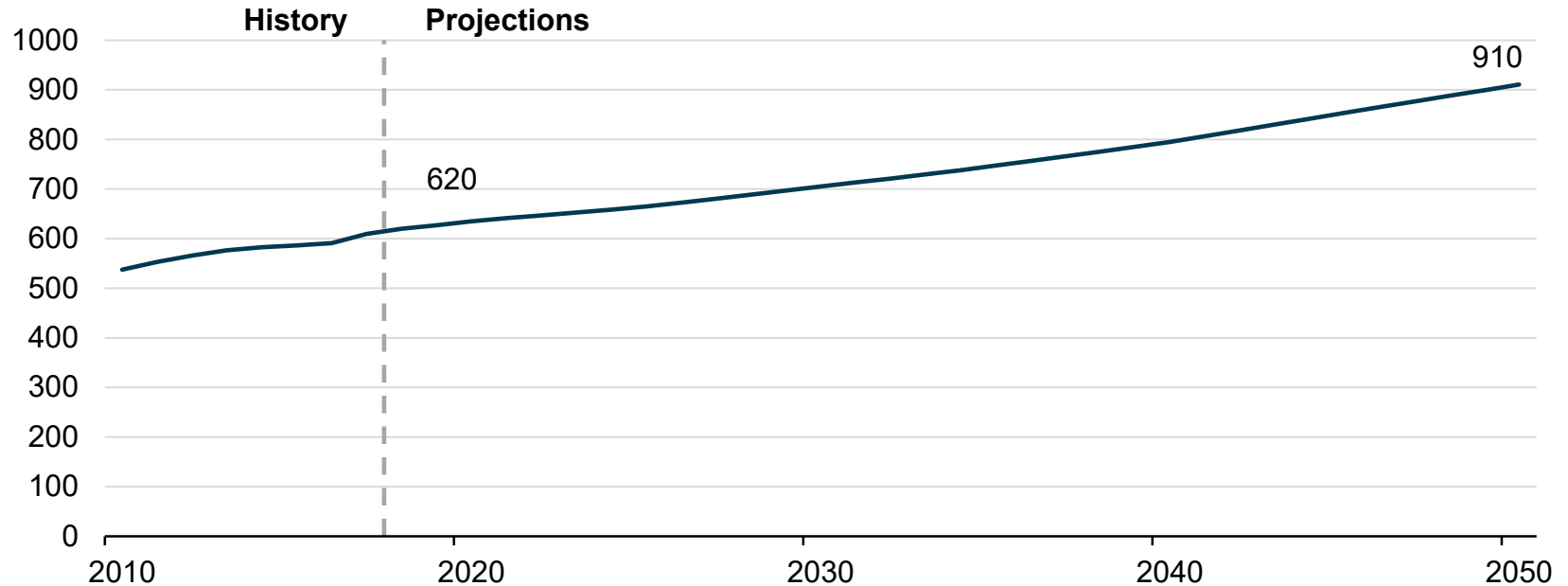
- \$185/barrel, High Oil Price case, driven by higher economic growth and less oil supply
- \$45/barrel, Low Oil Price case, driven by lower economic growth and more oil supply

The IEO2019 Reference case reflects important shifts in the global energy system

- Manufacturing centers are shifting toward Africa and South Asia, especially India, resulting in energy consumption growth
- Natural gas and petroleum product consumption is rising in Asia faster than supply is growing, potentially shifting trade patterns and infrastructure investments
- End-use consumption is increasingly shifting toward electricity
- Falling costs, demand growth, and policy all work together to shift the electricity generation mix
- Renewables displace petroleum as the most used energy source.

World energy consumption rises nearly 50% from 620 quadrillion Btu in 2018 to 910 quadrillion Btu in 2050

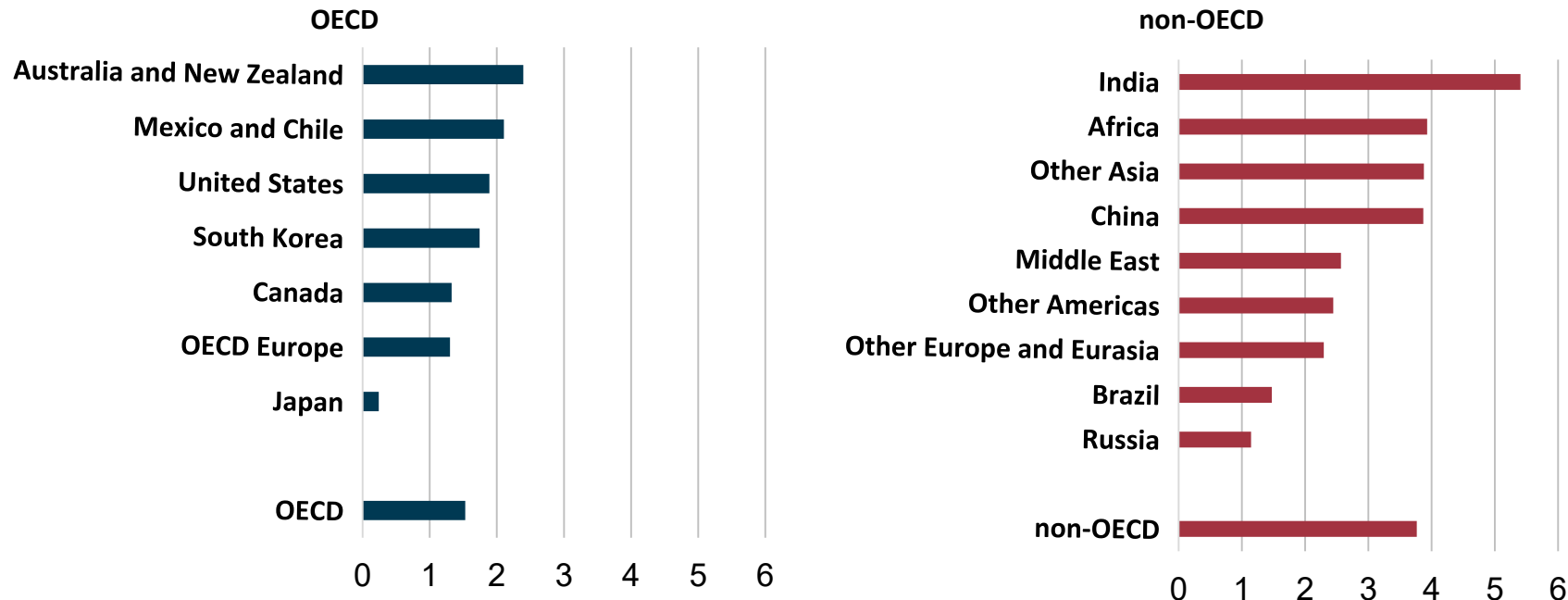
Primary energy consumption, World
quadrillion British thermal units



Source: Energy Information Administration, *International Energy Outlook 2019*

The fastest GDP growth is found in Asia and Africa, but Africa remains a relatively small percentage of the overall world economy

Average annual percent change in GDP, 2018-2050
percent per year

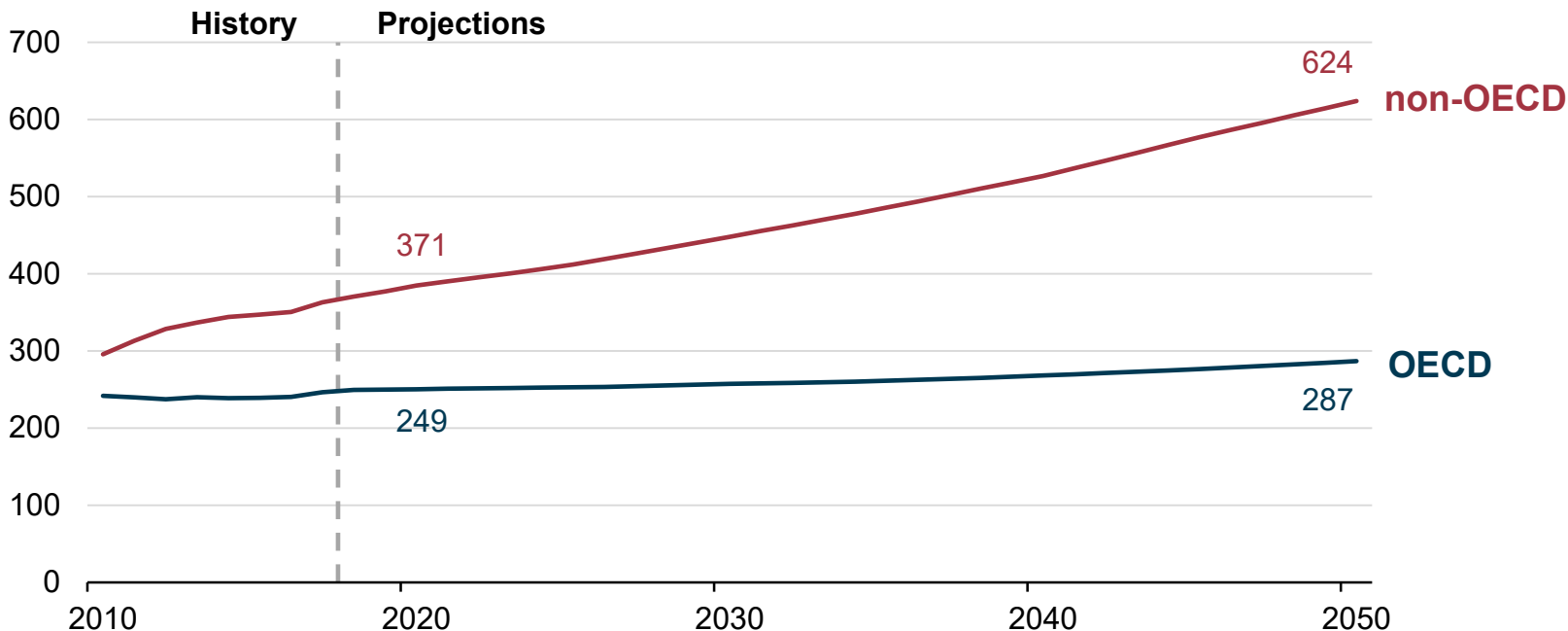


Source: Energy Information Administration, International Energy Outlook 2019

Non-OECD regions account for most of the growth and the majority of the uncertainty

Energy consumption

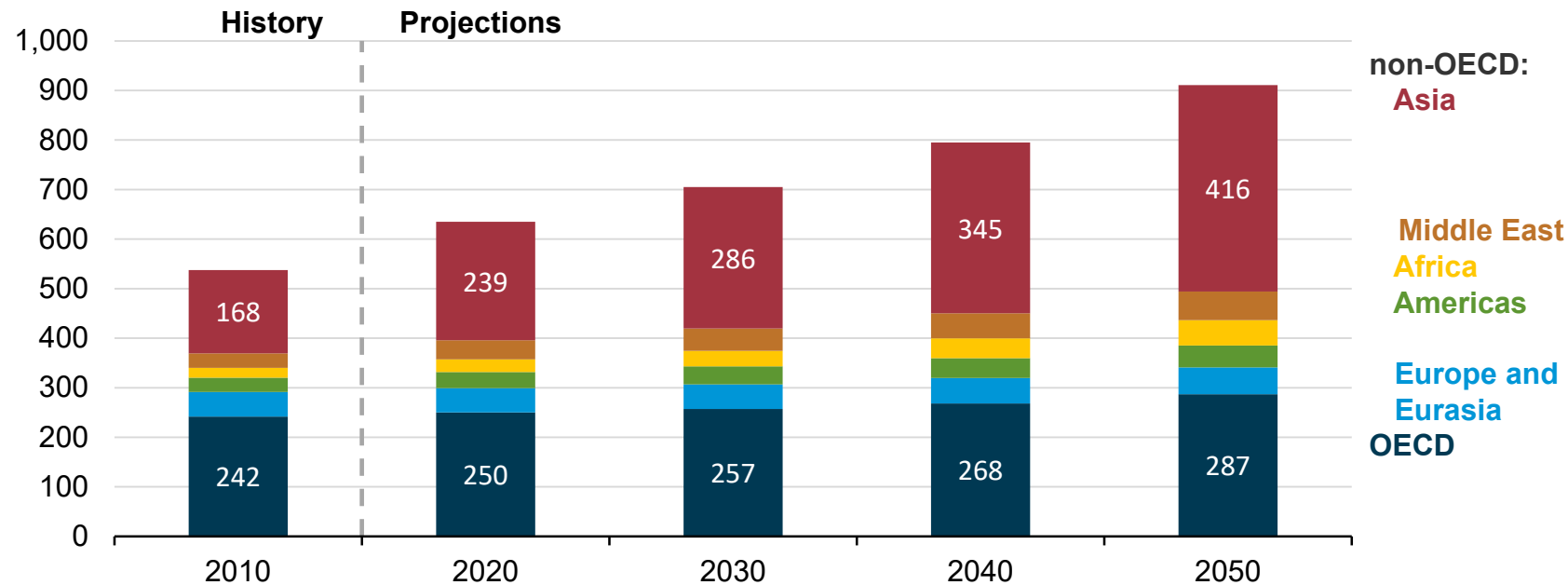
quadrillion British thermal units



Source: Energy Information Administration, International Energy Outlook 2019

Non-OECD Asia is the largest source of growth in global energy consumption

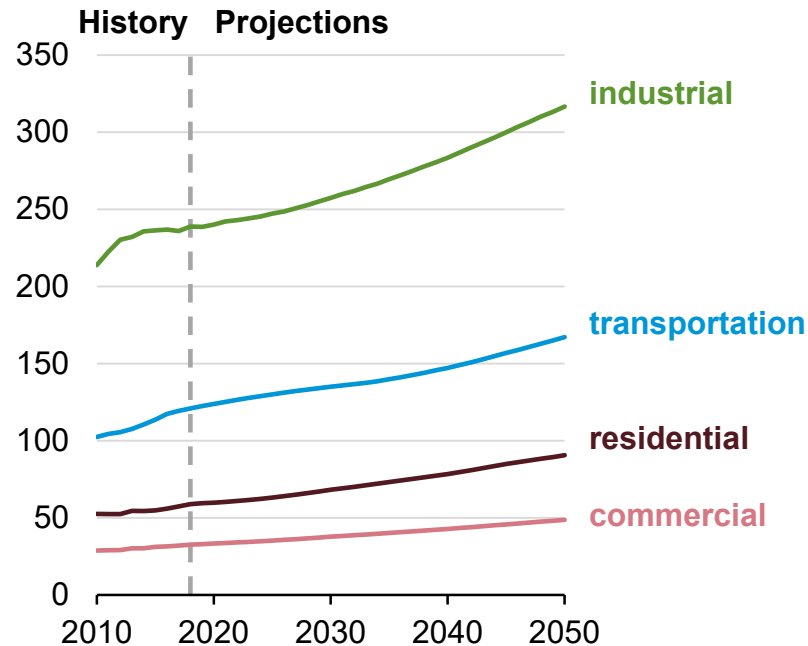
Primary energy consumption by region
quadrillion Btu



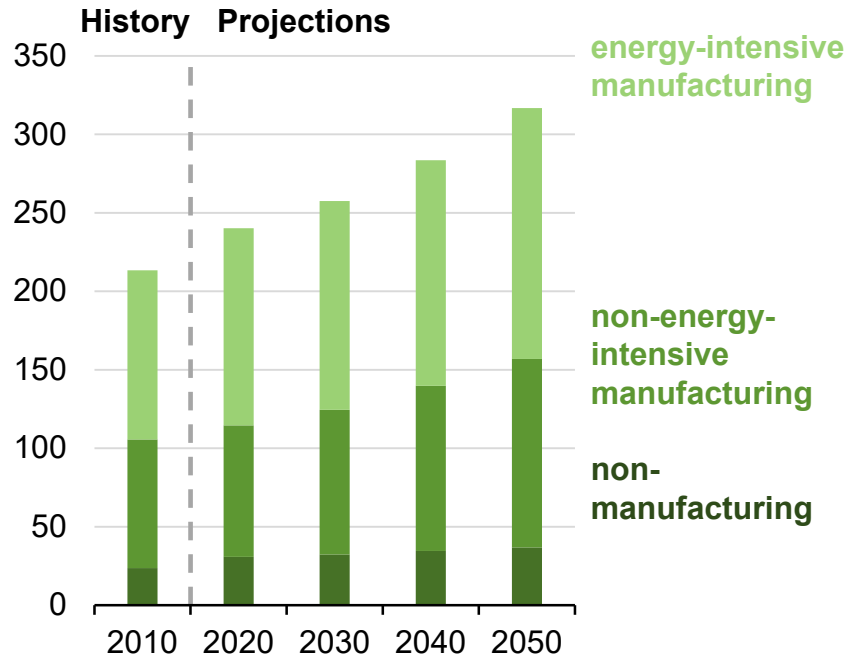
Source: Energy Information Administration, International Energy Outlook 2019

The industrial sector is the largest consumer of energy, with energy-intensive manufacturing the largest component

End-use energy consumption by sector, world
quadrillion British thermal units



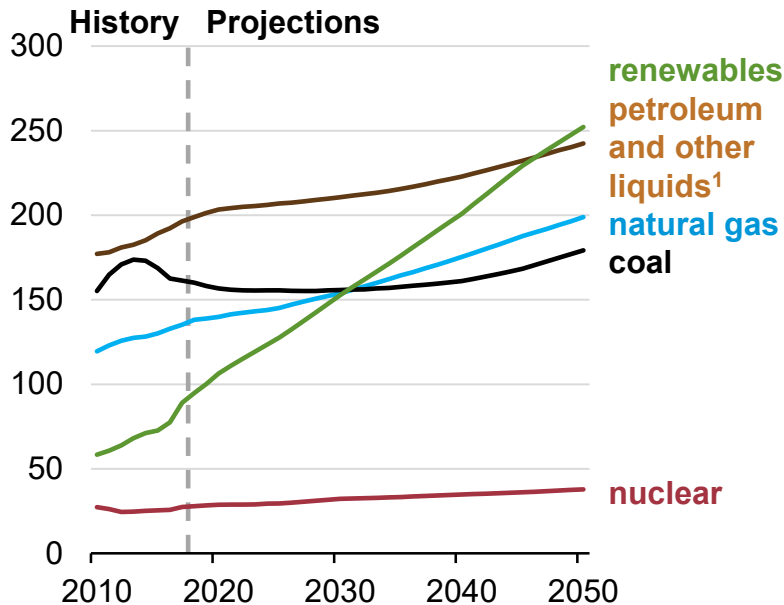
Energy consumption by sub-sector, world
quadrillion British thermal units



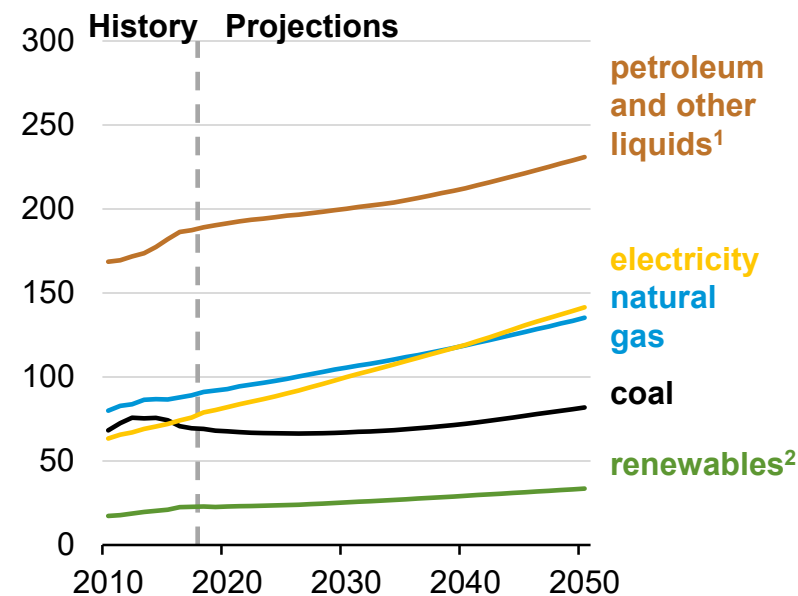
Source: Energy Information Administration, International Energy Outlook 2019

Renewables displace petroleum as the most used energy source, as electricity use grows faster than any other end-use fuel

Primary energy consumption by fuel, world
quadrillion British thermal units



End-use energy consumption by fuel, world
quadrillion Btu

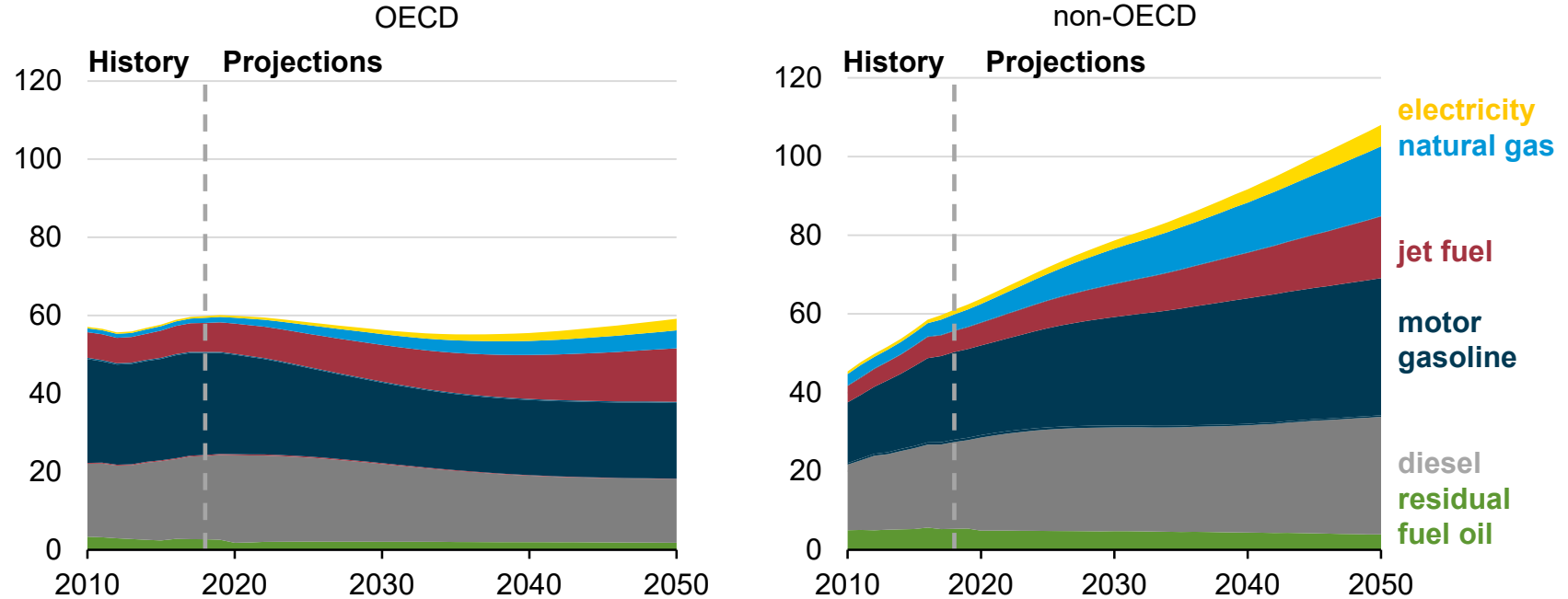


Note: 1 = Includes biofuels. 2 = Largely biomass

Source: Energy Information Administration, International Energy Outlook 2019

Motor gasoline and diesel continue to be predominant transportation fuels, but growth comes in jet fuel, natural gas, and electricity

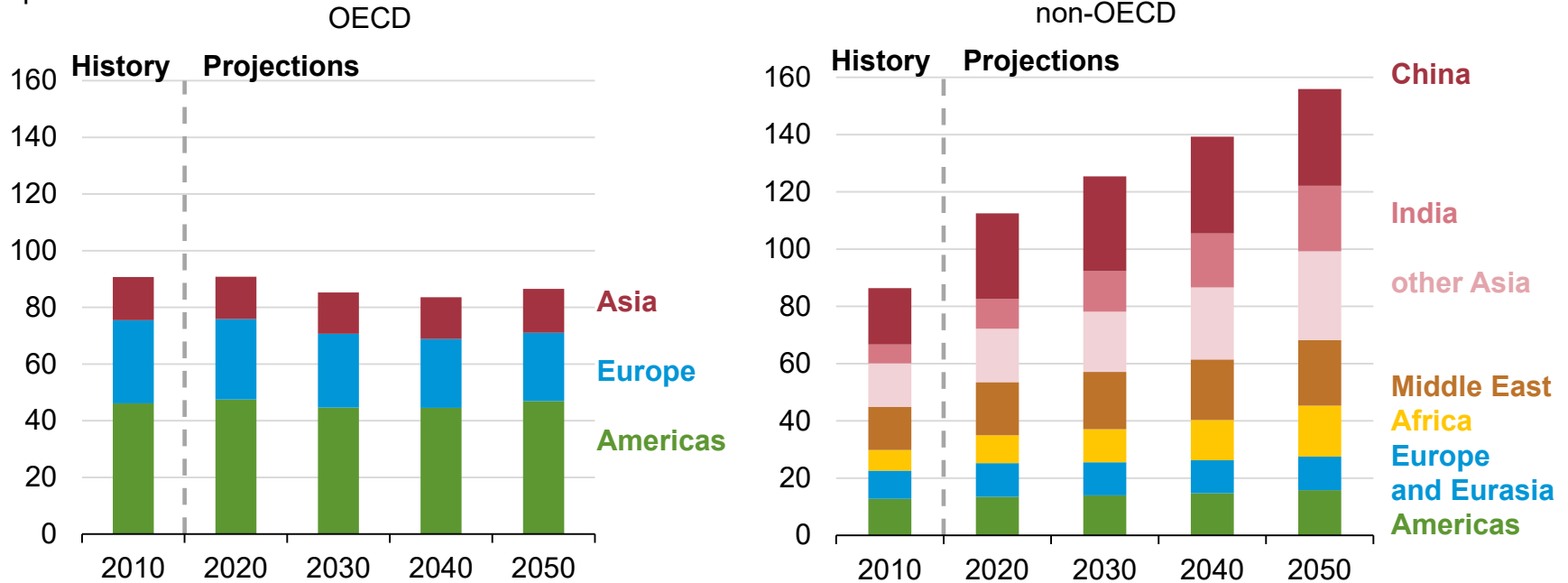
Transportation energy consumption
quadrillion Btu



Source: Energy Information Administration, International Energy Outlook 2019

OECD liquid fuel consumption slows, but growth continues in non-OECD Asia and Africa

Liquid fuels consumption
quadrillion Btu

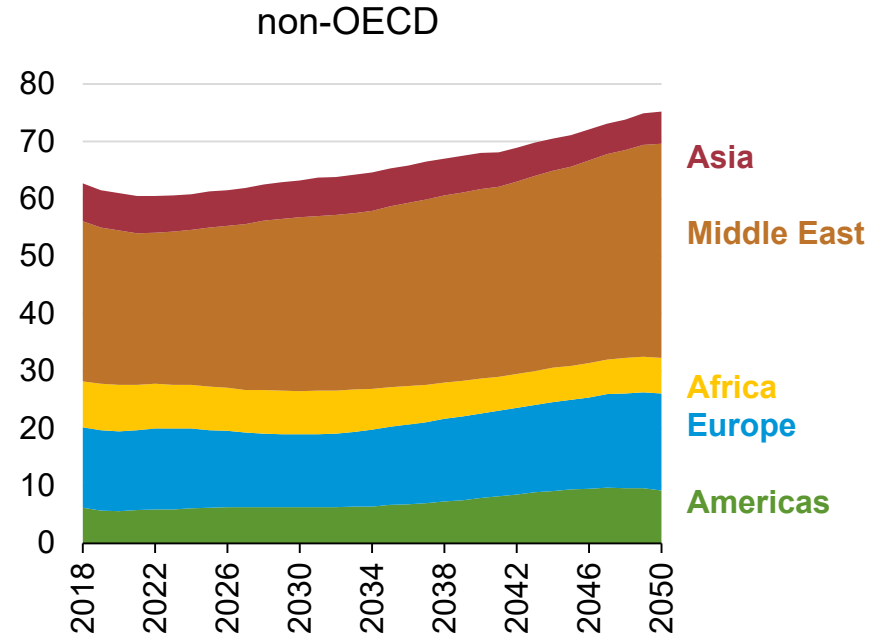
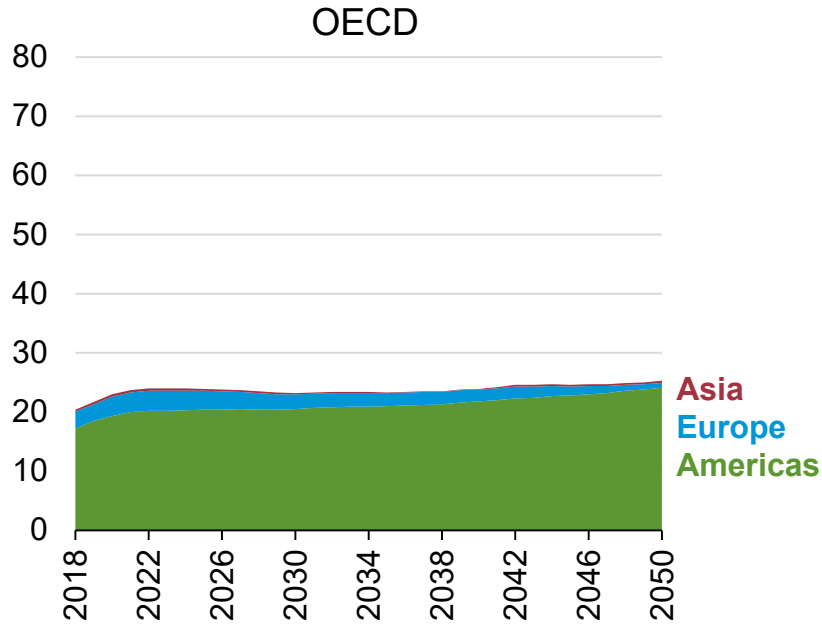


Source: Energy Information Administration, International Energy Outlook 2019

While petroleum product demand is growing in Asia, crude oil production grows in the Middle East, Americas, and Russia

Crude oil and lease condensate production

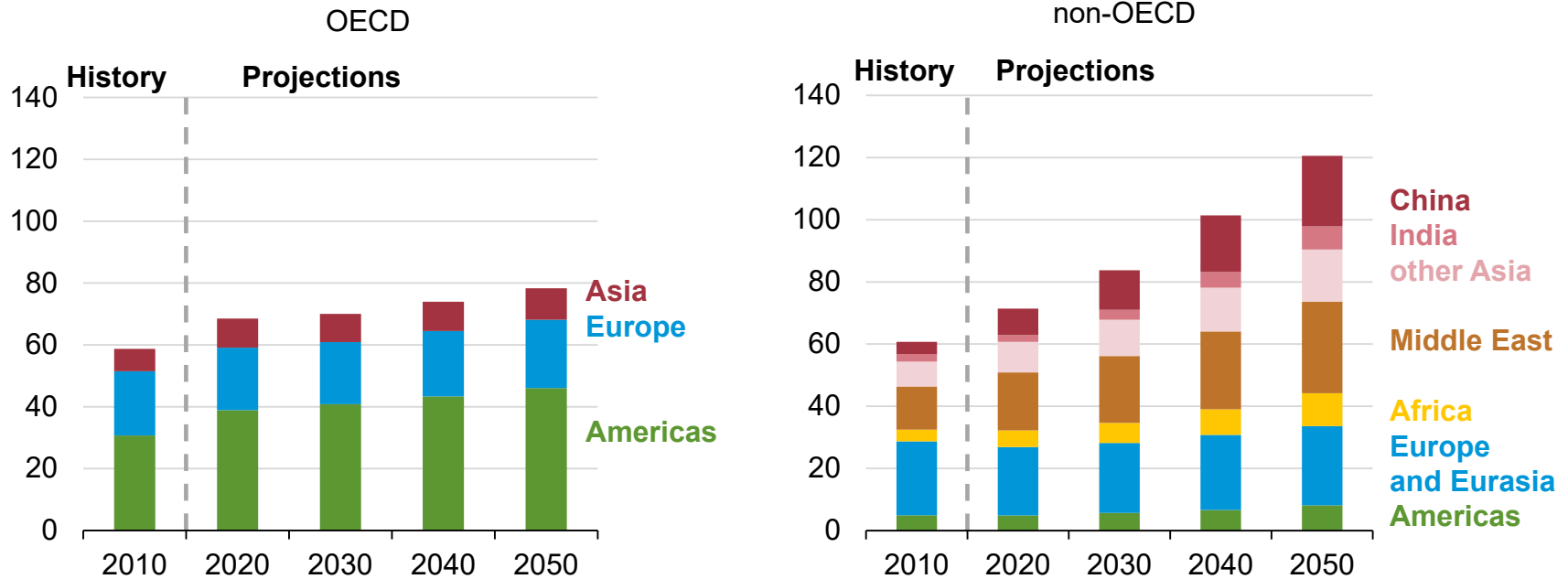
million barrels per day



Source: Energy Information Administration, International Energy Outlook 2019

Natural gas demand grows in the OECD, but more rapidly in non-OECD Asia, the Middle East and Africa

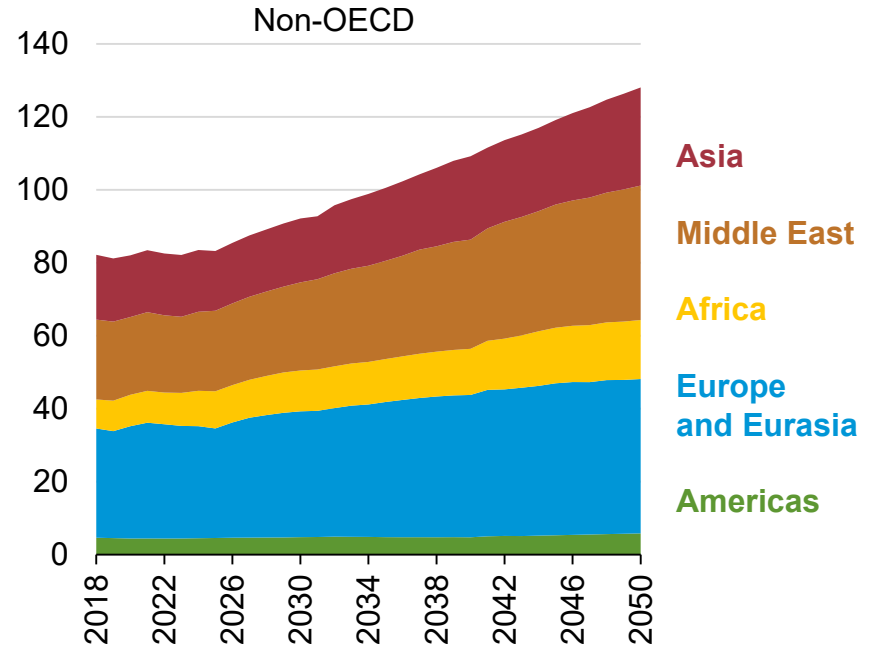
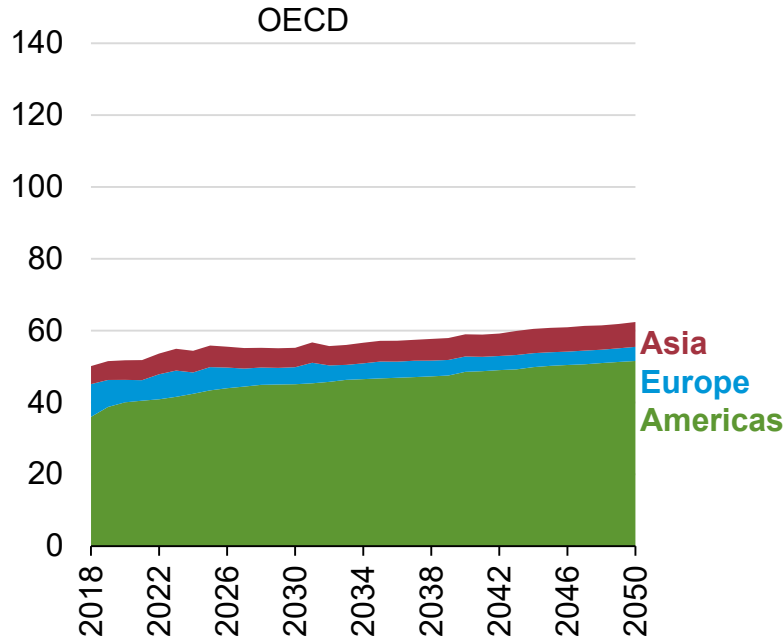
Natural gas consumption
quadrillion Btu



Source: Energy Information Administration, International Energy Outlook 2019

Natural gas production is concentrated in the OECD Americas, Middle East, and non-OECD Europe and Eurasia

Natural gas production
trillion cubic feet

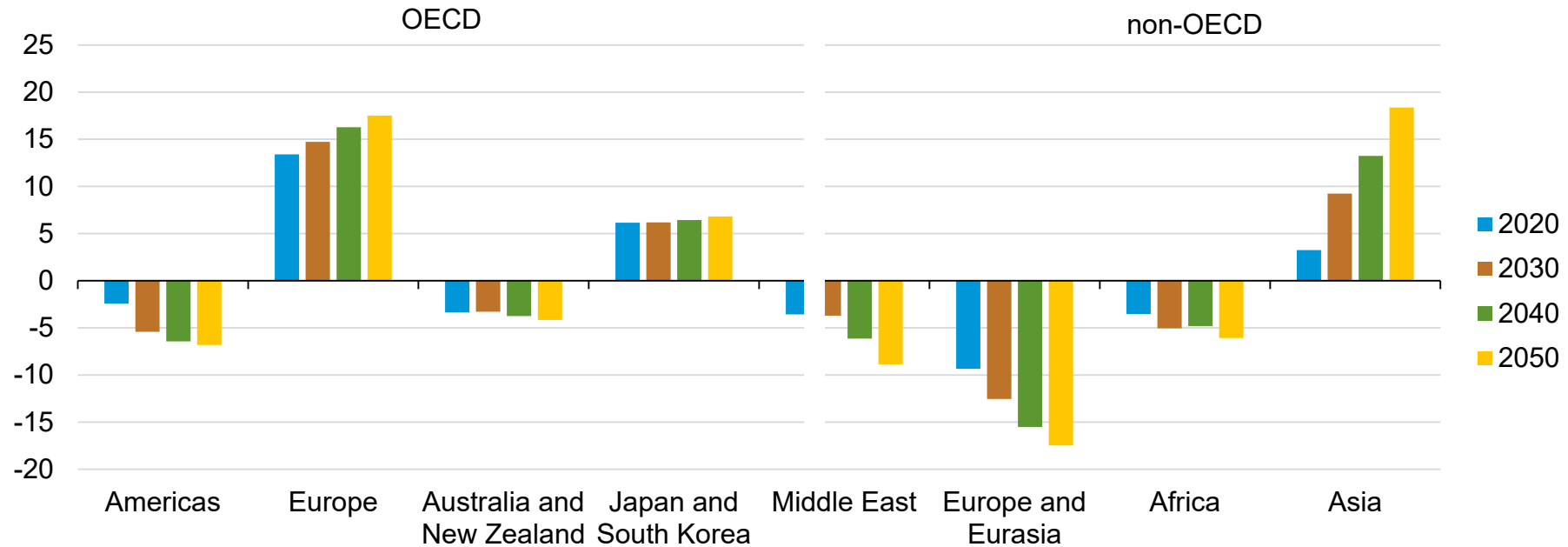


Source: Energy Information Administration, International Energy Outlook 2019

Trade of natural gas expands significantly through 2050 in all regions

Net imports of natural gas

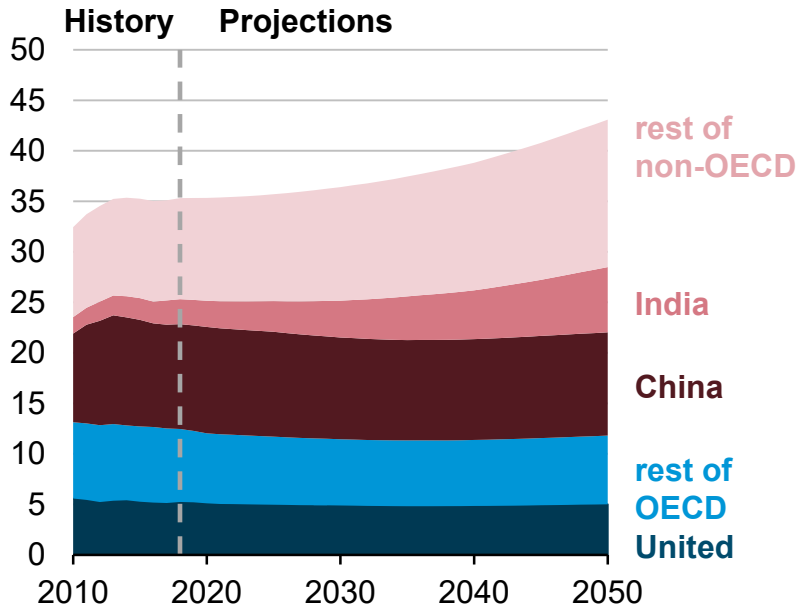
trillion cubic feet



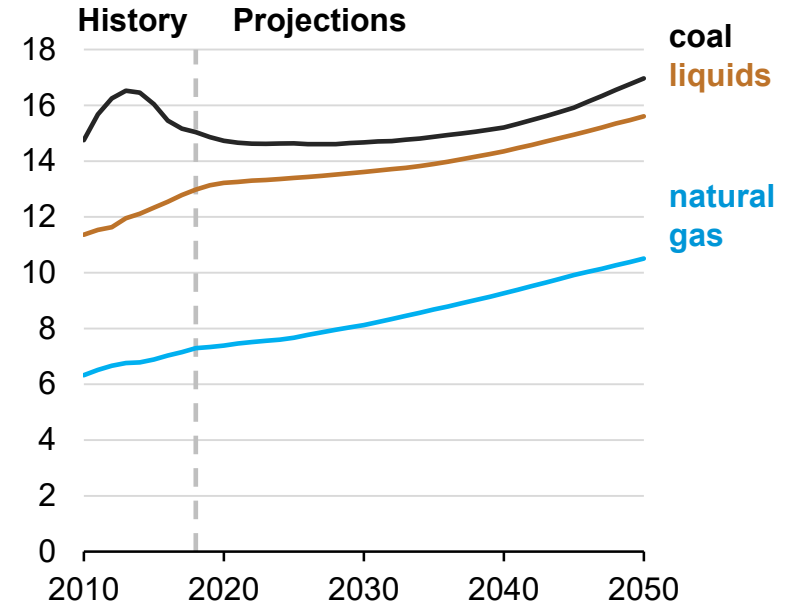
Source: Energy Information Administration, International Energy Outlook 2019

Despite a less carbon intensive fuel mix, growth in energy consumption results in a continuing rise in emissions

Energy-related carbon dioxide emissions
billion metric tons

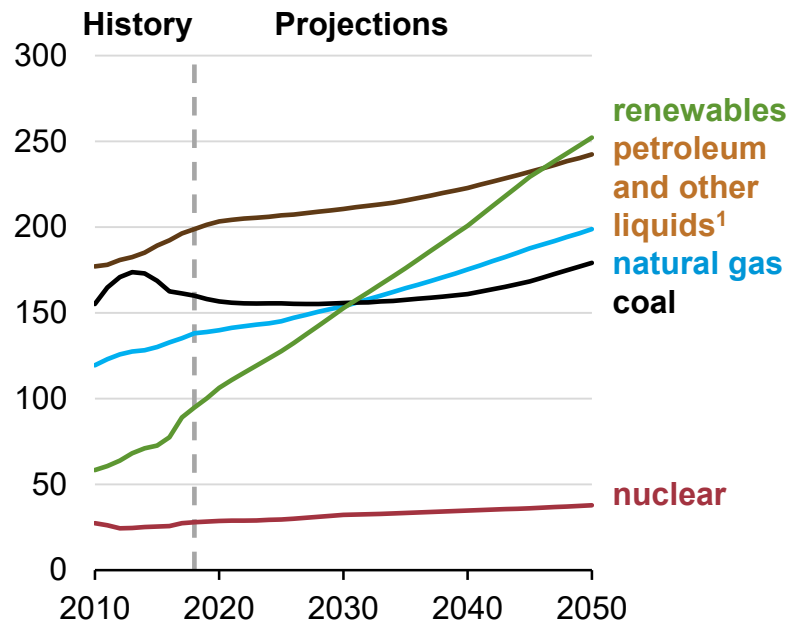


Energy-related carbon dioxide emissions
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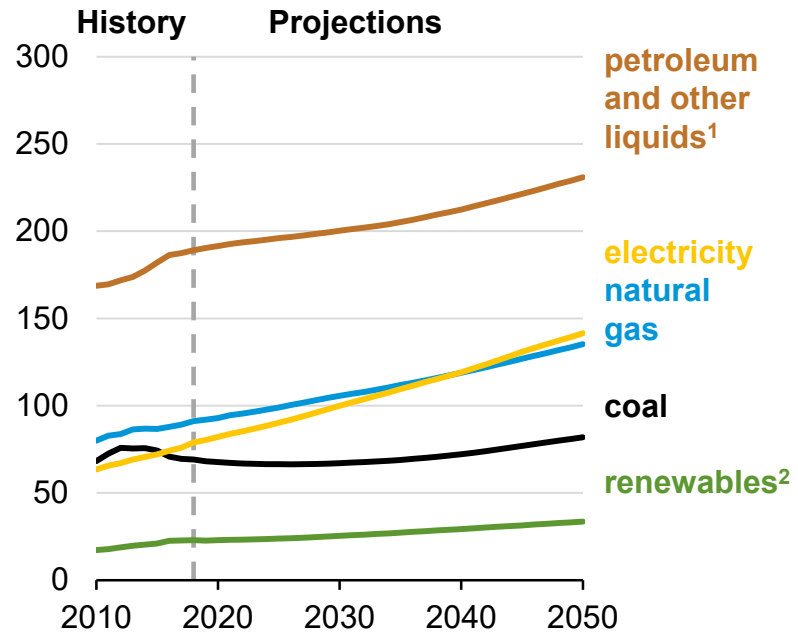


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End-use energy consumption by fuel, world
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Source: Energy Information Administration, International Energy Outlook 2019

For more information

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