

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)

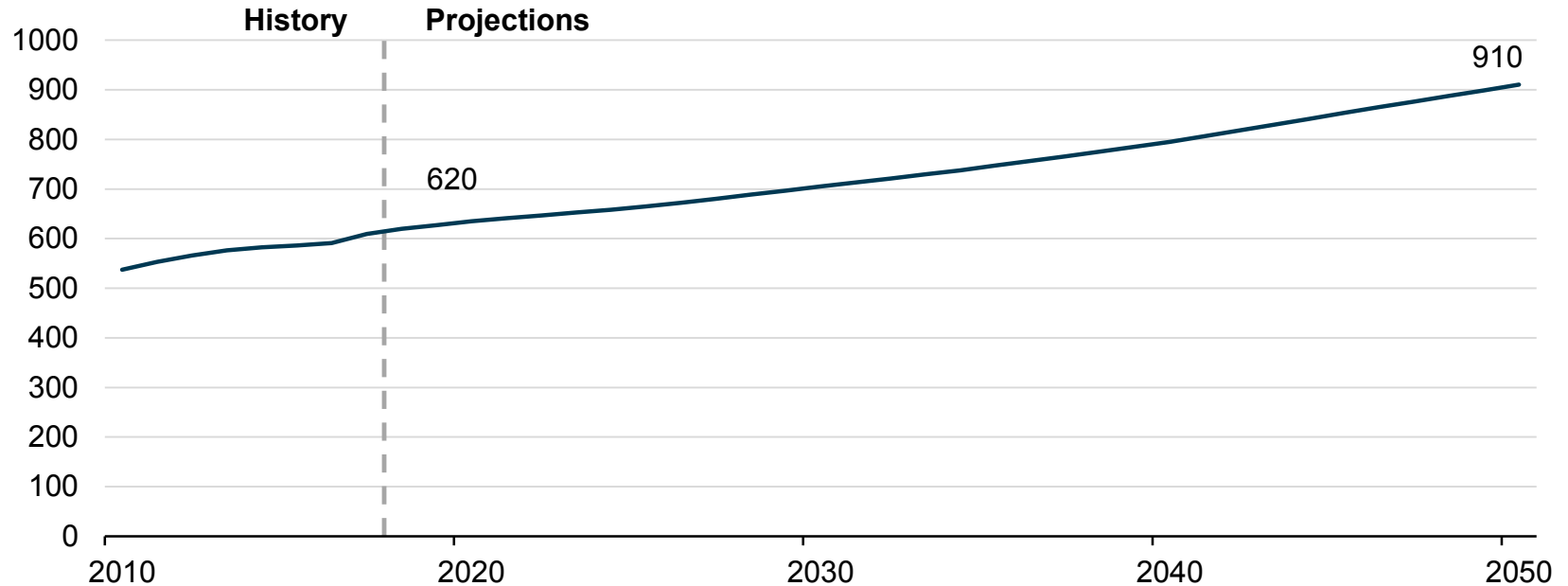
- \$185/barrel, High Oil Price case, driven by higher economic growth and less oil supply
- \$45/barrel, Low Oil Price case, driven by lower economic growth and more oil supply

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

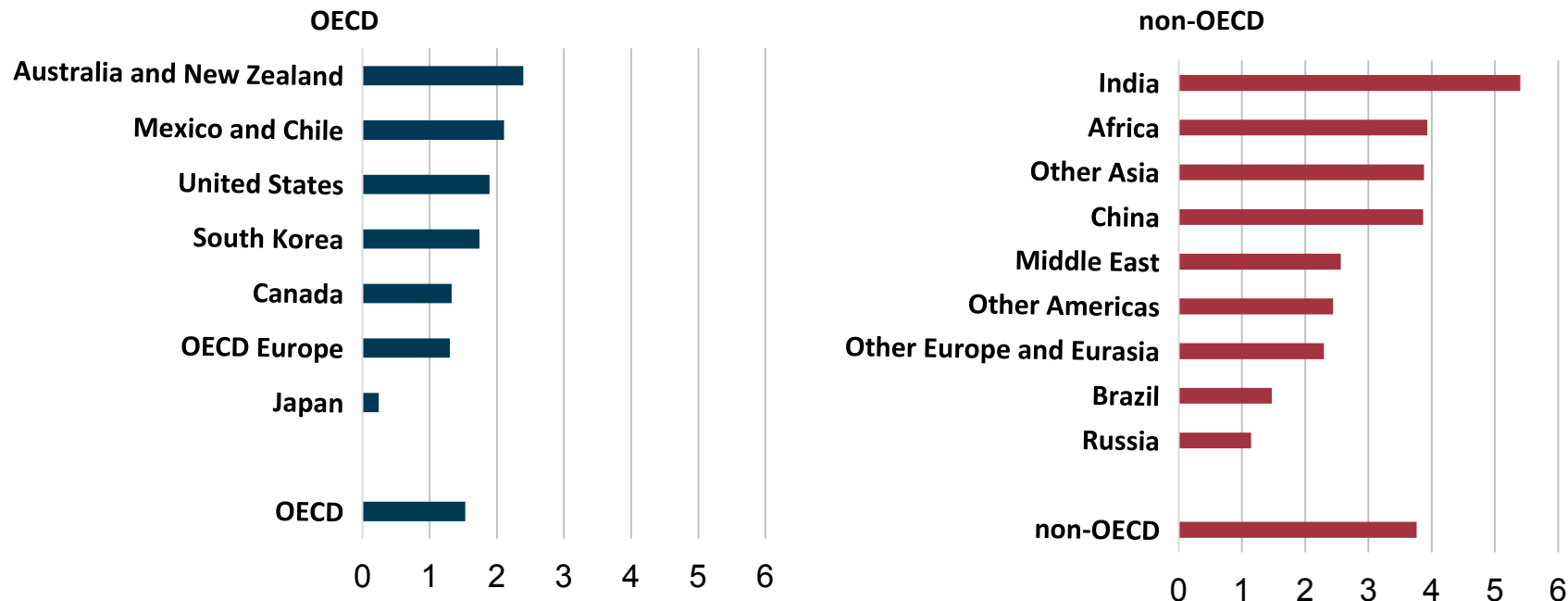
Primary energy consumption, World
quadrillion British thermal units



Source: U.S. 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

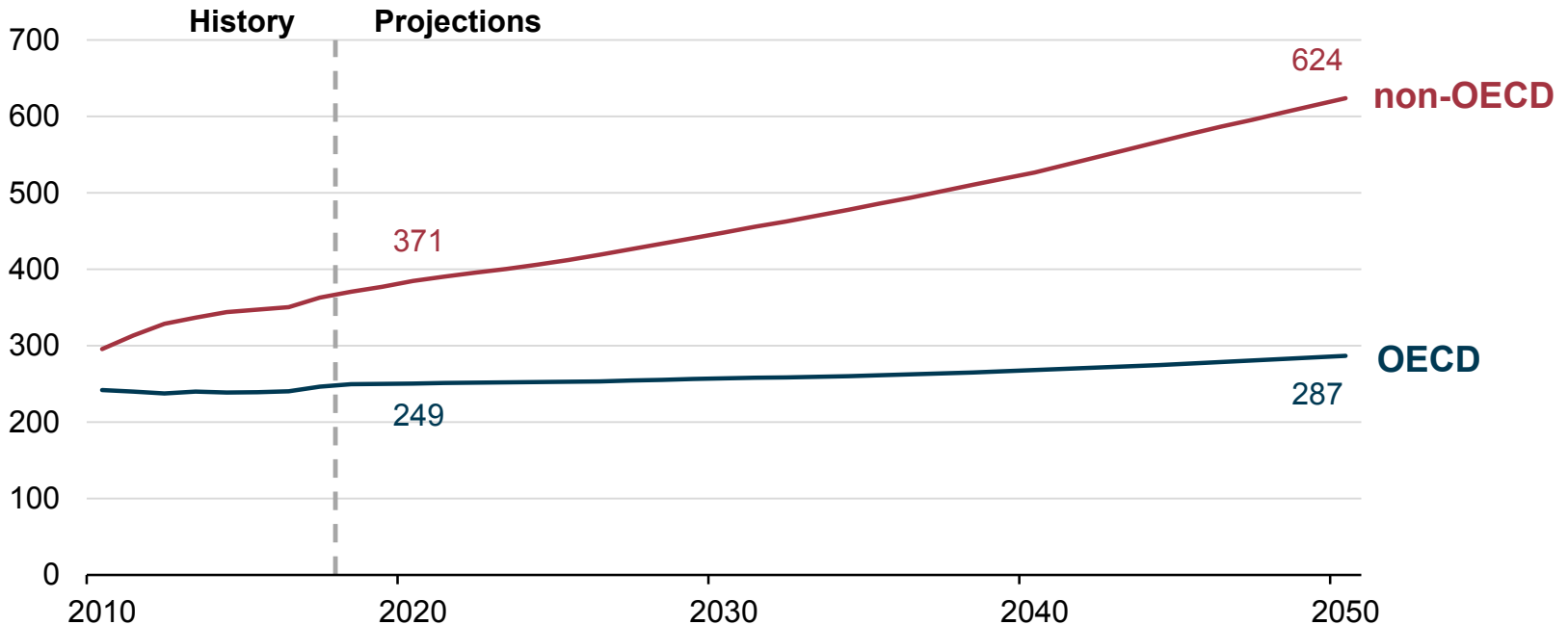


Source: U.S. Energy Information Administration, *International Energy Outlook 2019*

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

Energy consumption

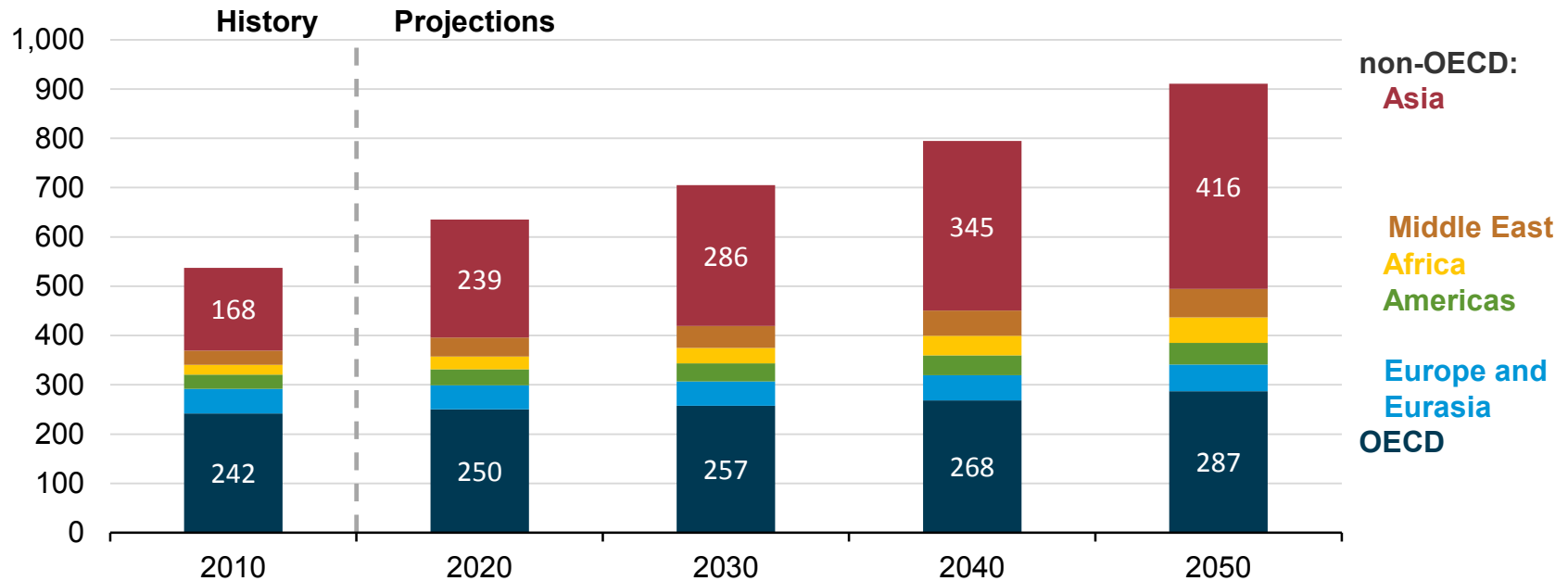
quadrillion British thermal units



Source: U.S. Energy Information Administration, *International Energy Outlook 2019*

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

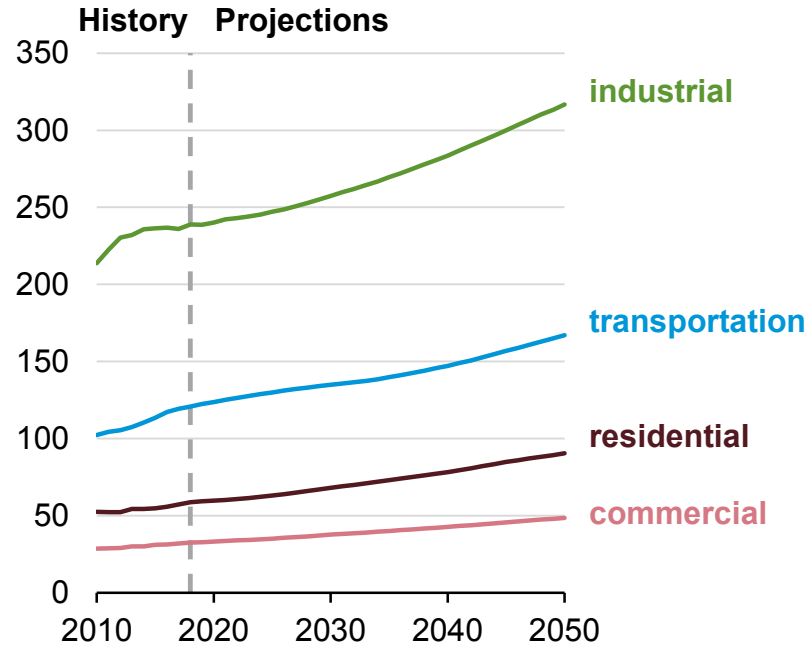
Primary energy consumption by region
quadrillion Btu



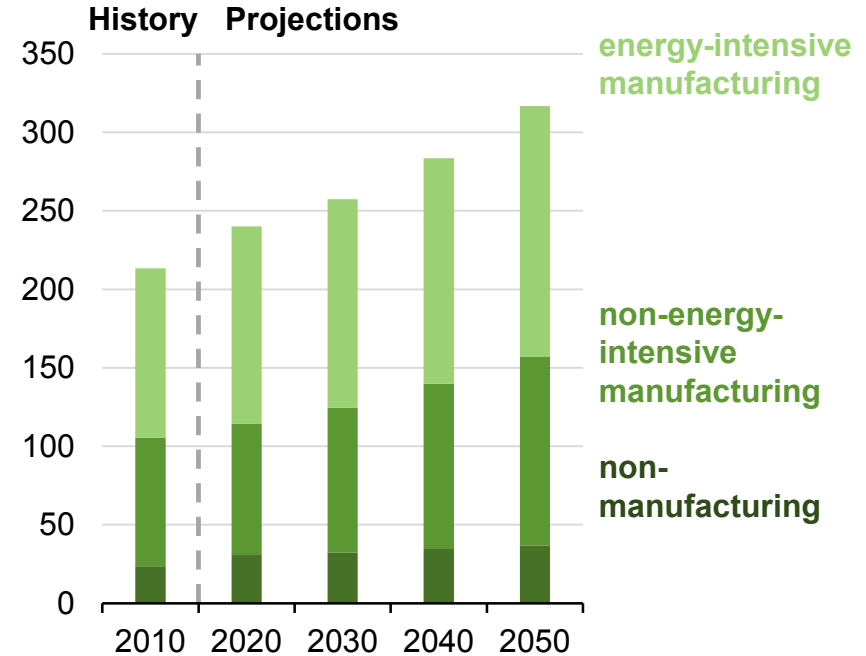
Source: U.S. Energy Information Administration, *International Energy Outlook 2019*

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



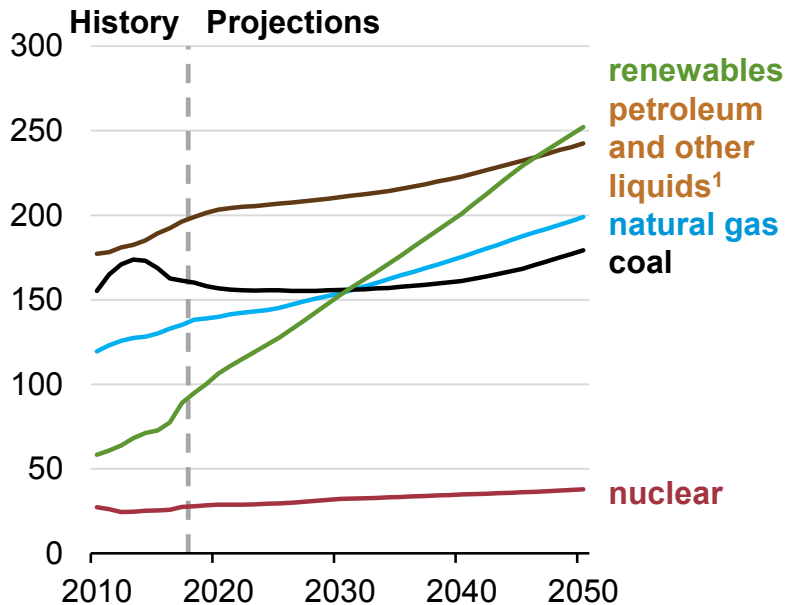
Energy consumption by sub-sector, world
quadrillion British thermal units



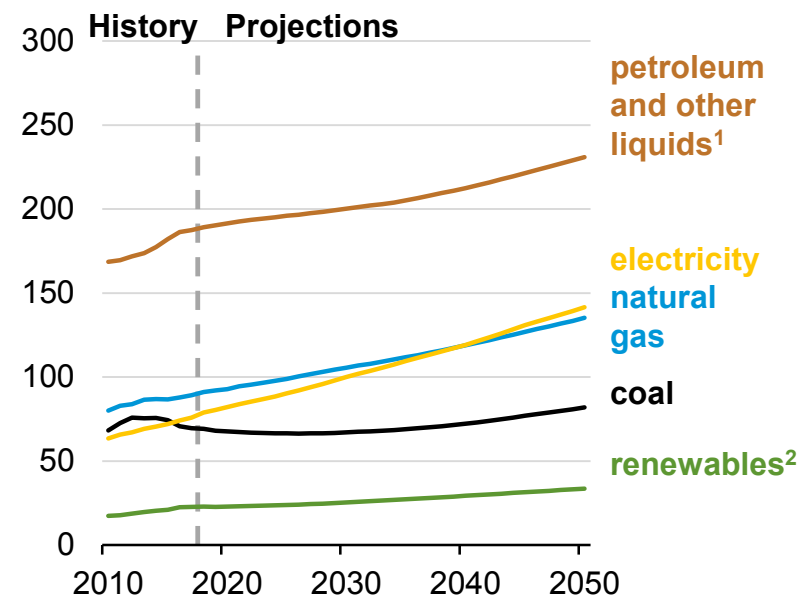
Source: U.S. Energy Information Administration, *International Energy Outlook 2019*

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

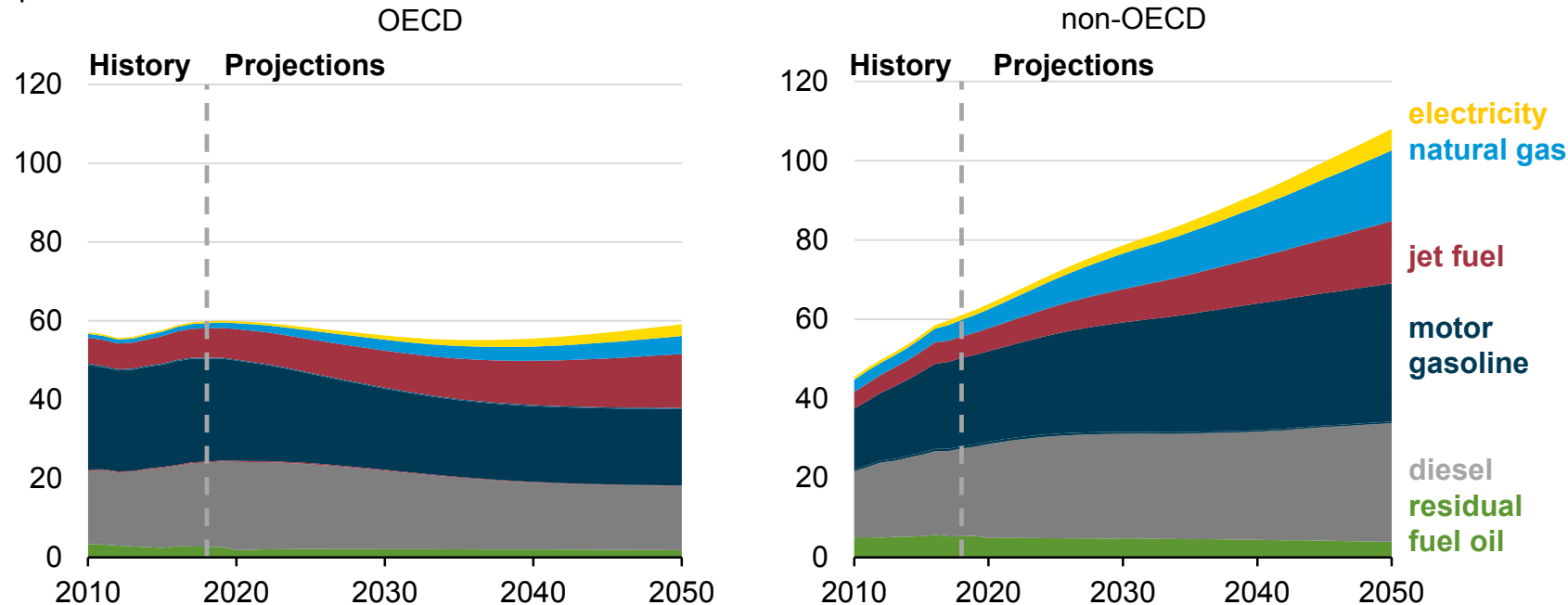


Note: 1 = Includes biofuels. 2 = Largely biomass

Source: U.S. 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

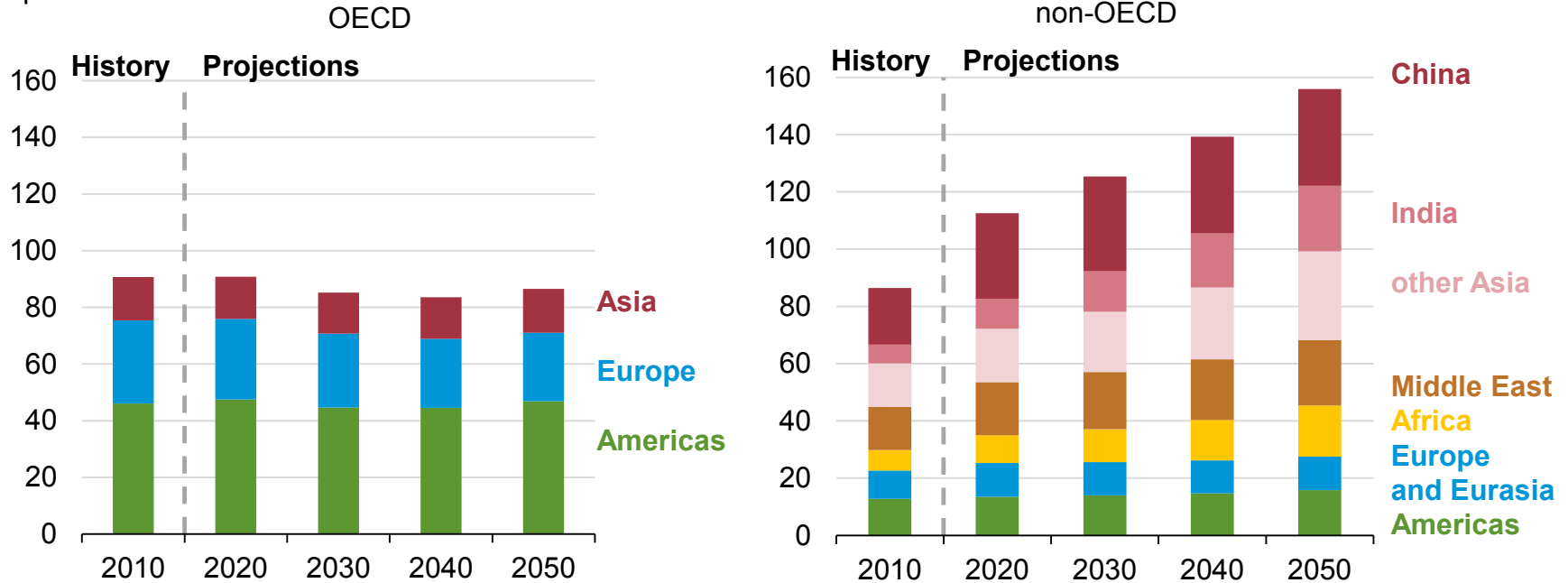
Transportation energy consumption
quadrillion Btu



Source: U.S. Energy Information Administration, *International Energy Outlook 2019*

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

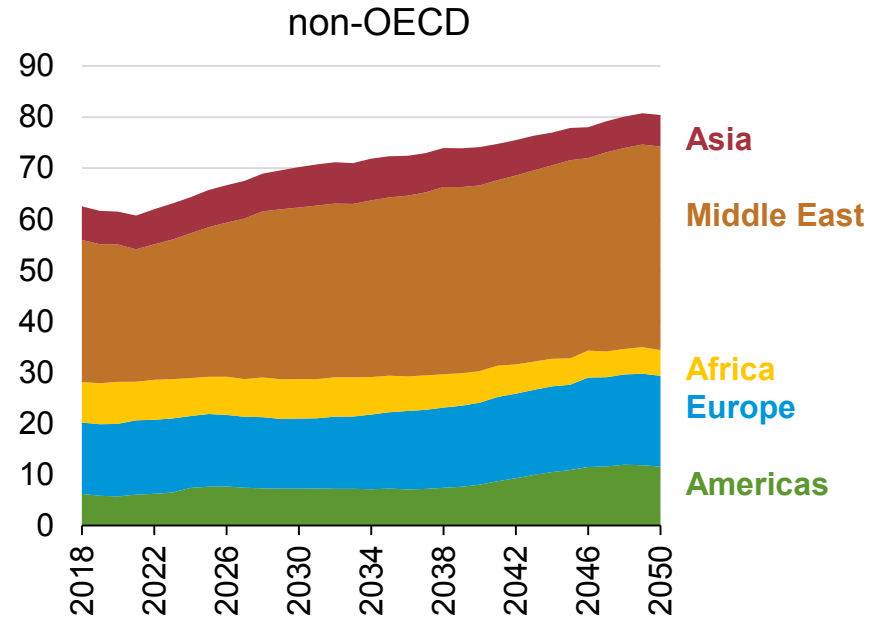
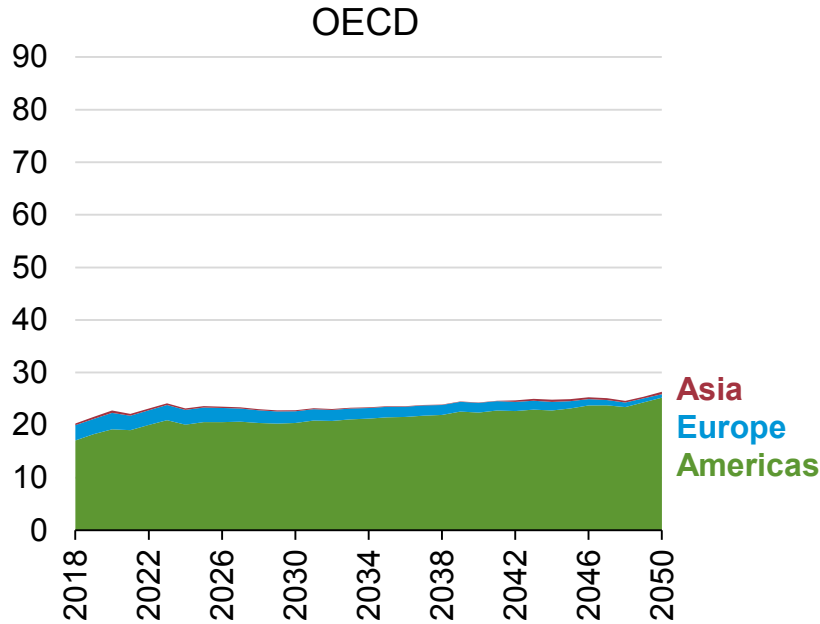
Liquid fuels consumption
quadrillion Btu



Source: U.S. 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

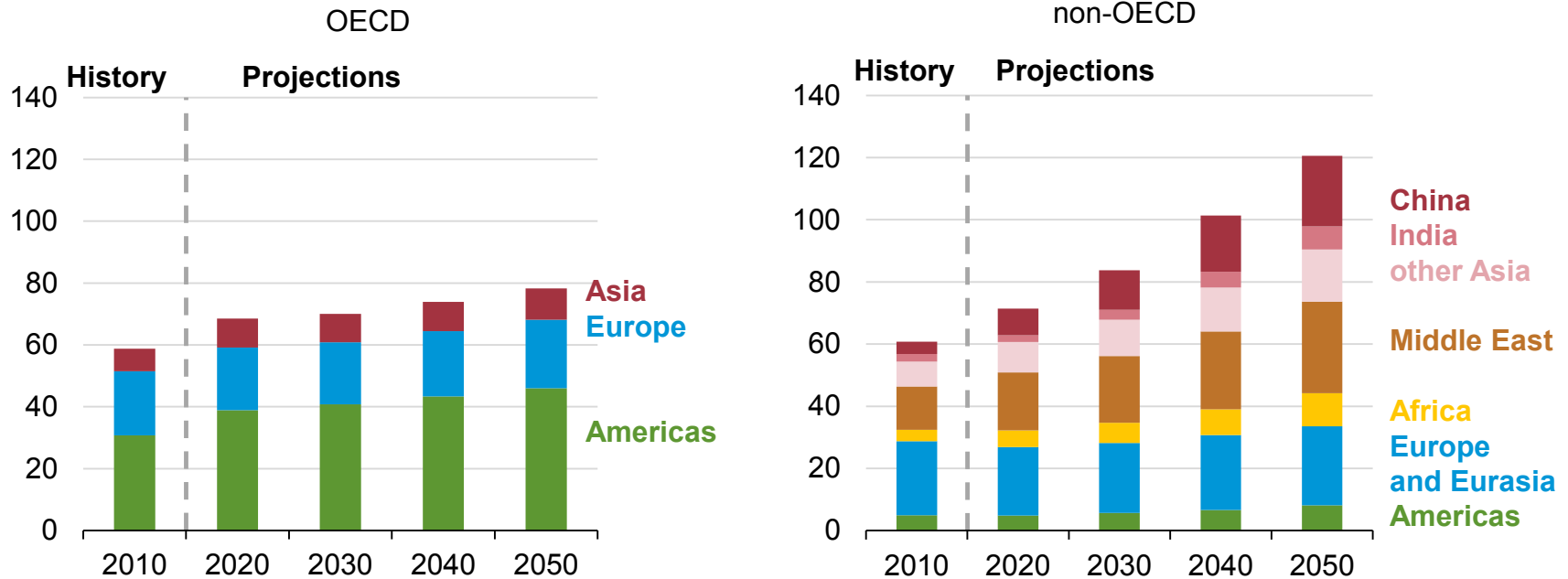
Crude oil and lease condensate production
million barrels per day



Source: U.S. 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

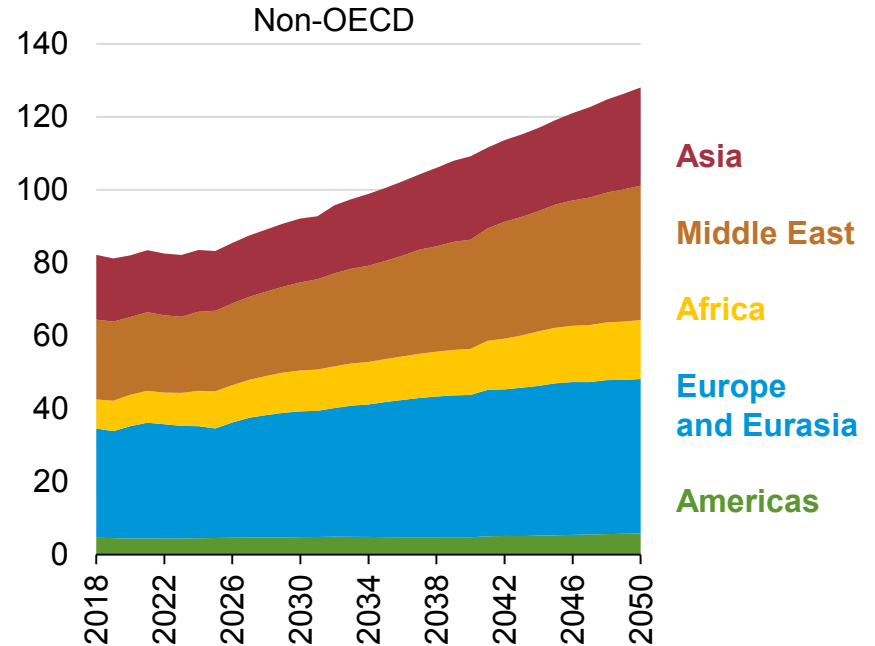
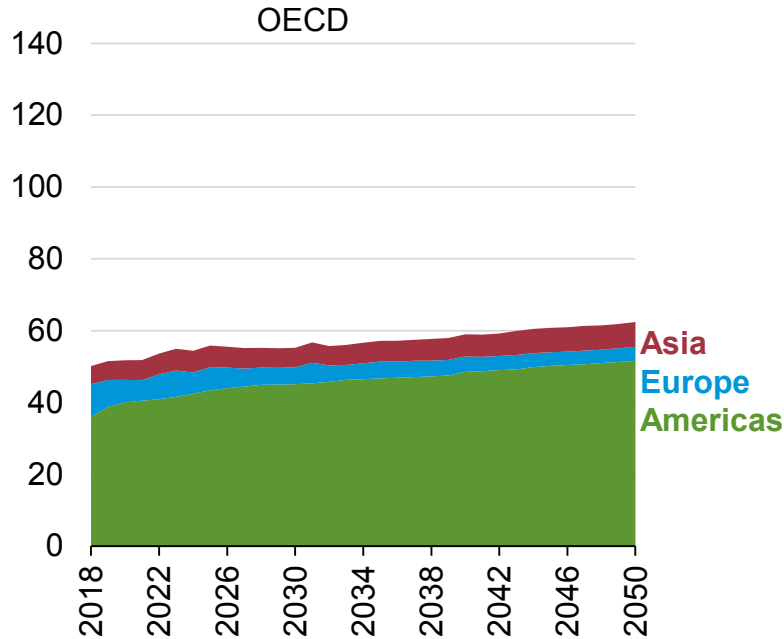
Natural gas consumption
quadrillion Btu



Source: U.S. 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

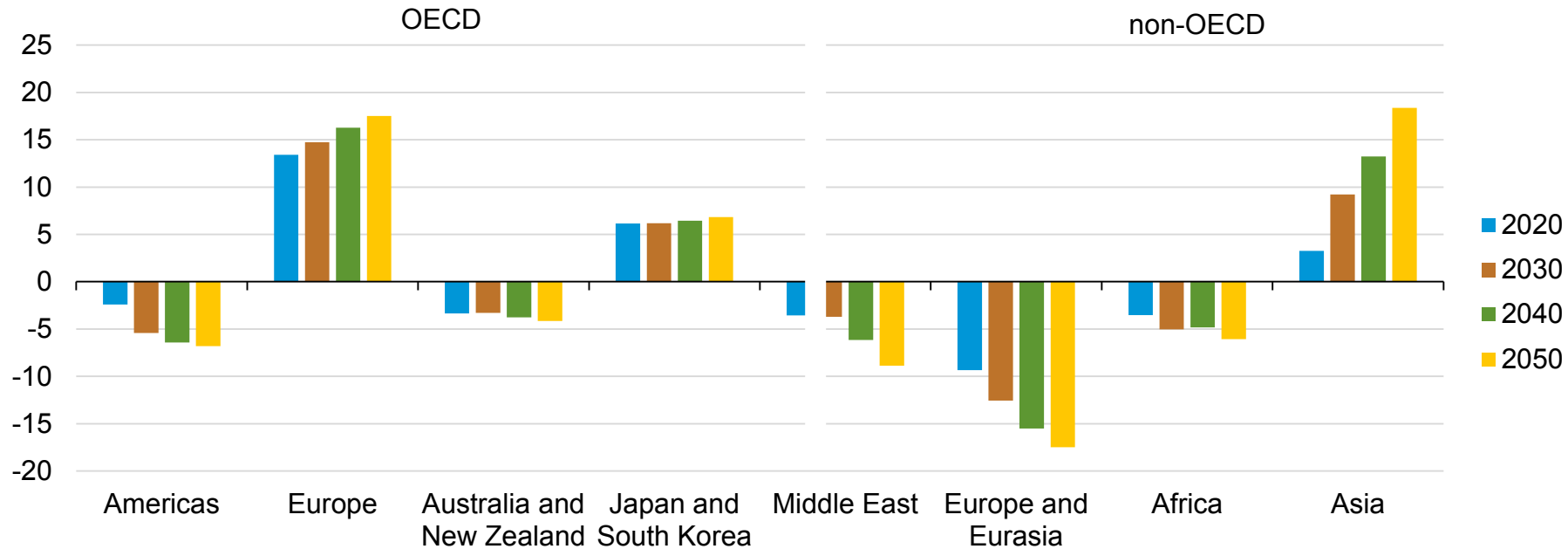


Source: U.S. Energy Information Administration, *International Energy Outlook 2019*

Trade of natural gas expands significantly through 2050 in all regions

Net imports of natural gas

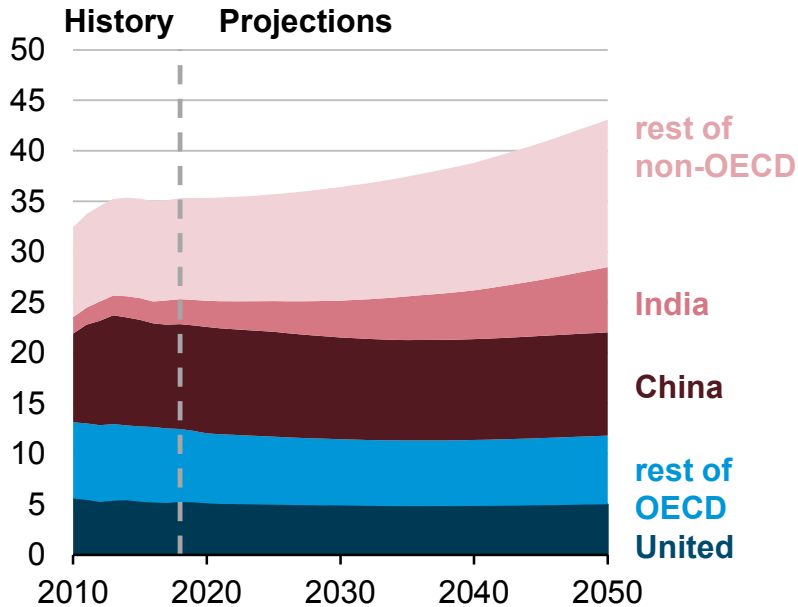
trillion cubic feet



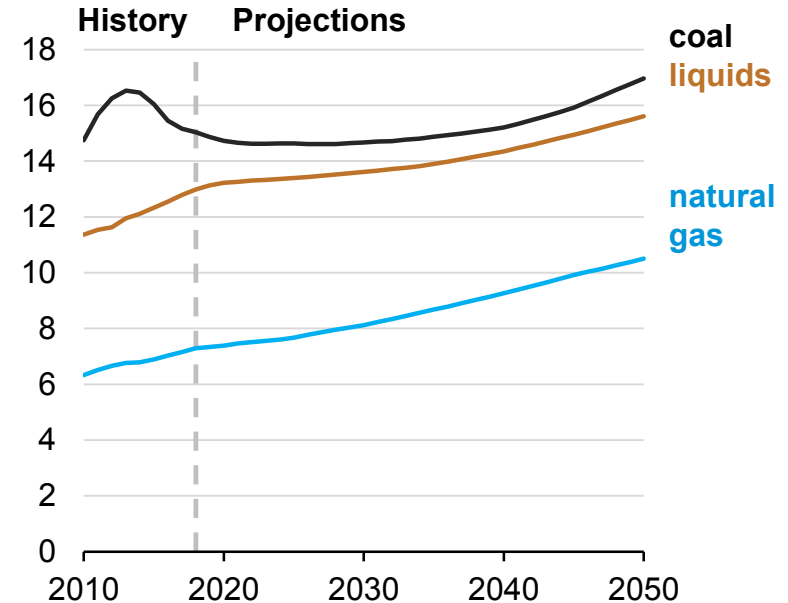
Source: U.S. Energy Information Administration, *International Energy Outlook 2019*

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



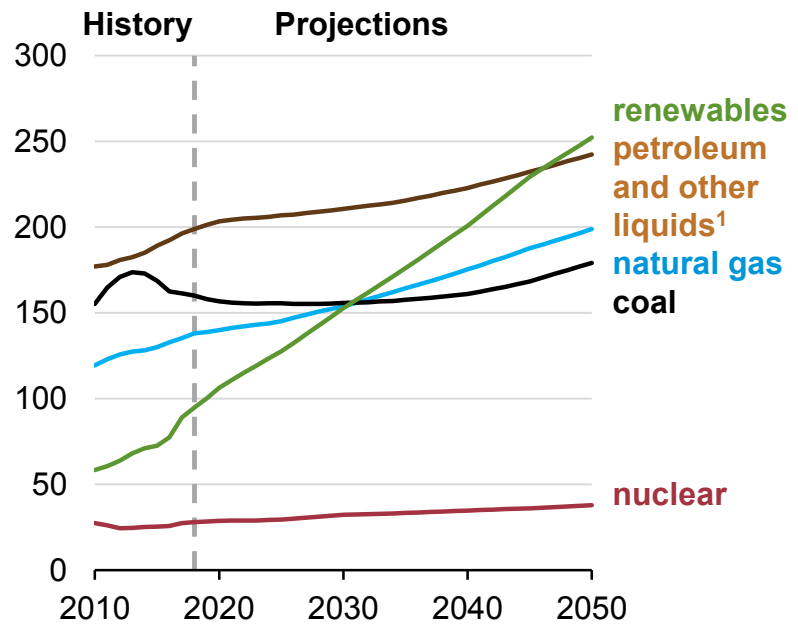
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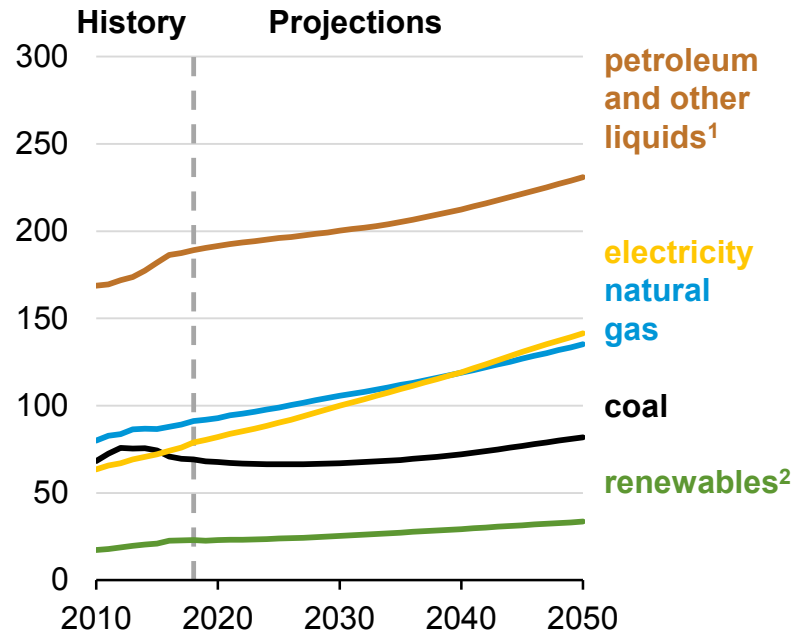
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For more information

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