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The Industrial Renaissance: Digital Infrastructure, Energy Transition, and Power

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Unless otherwise noted, information as of December 2024

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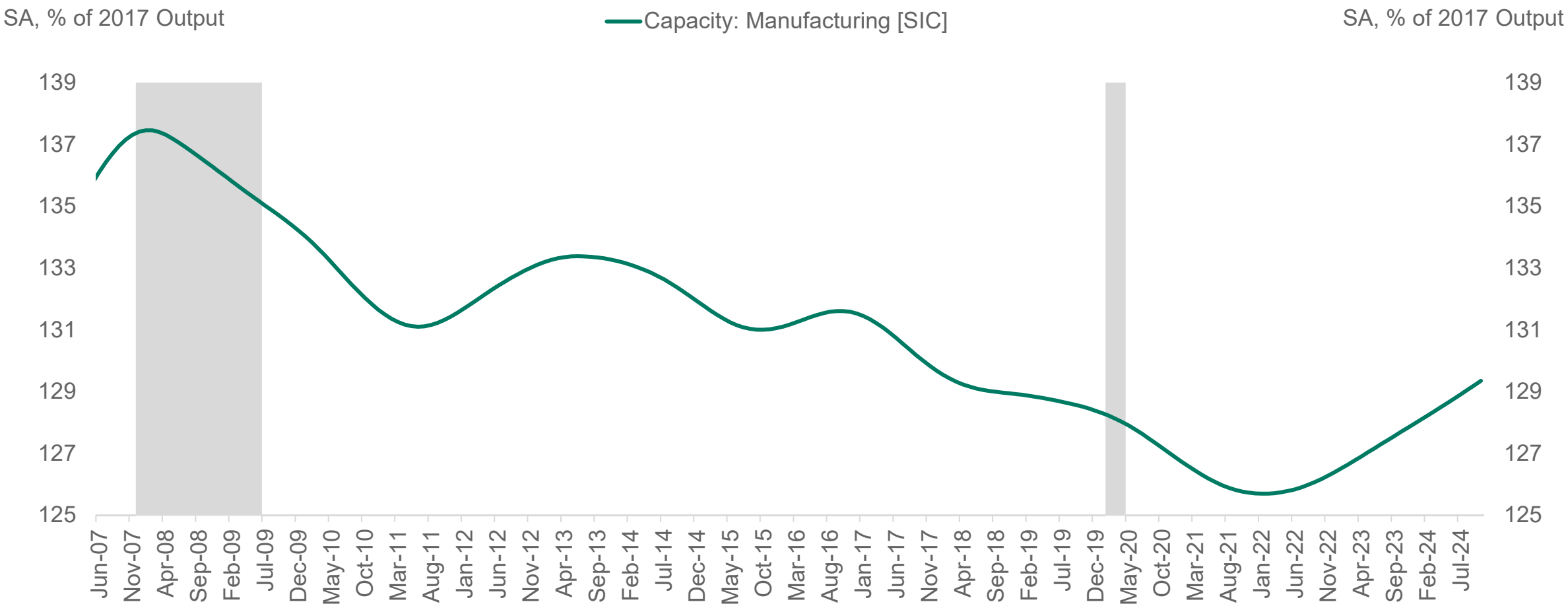
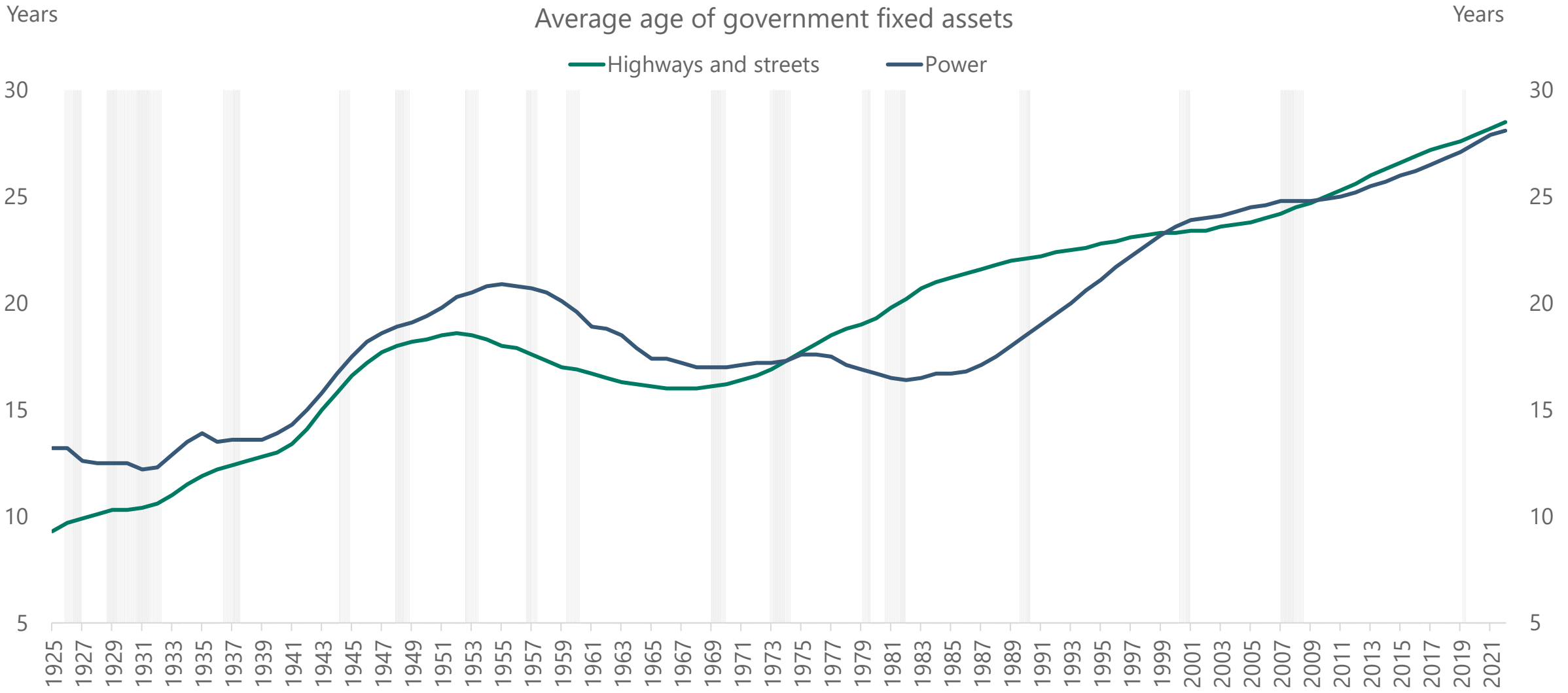
Overview:
The coming industrial renaissance

US manufacturing capacity increasing



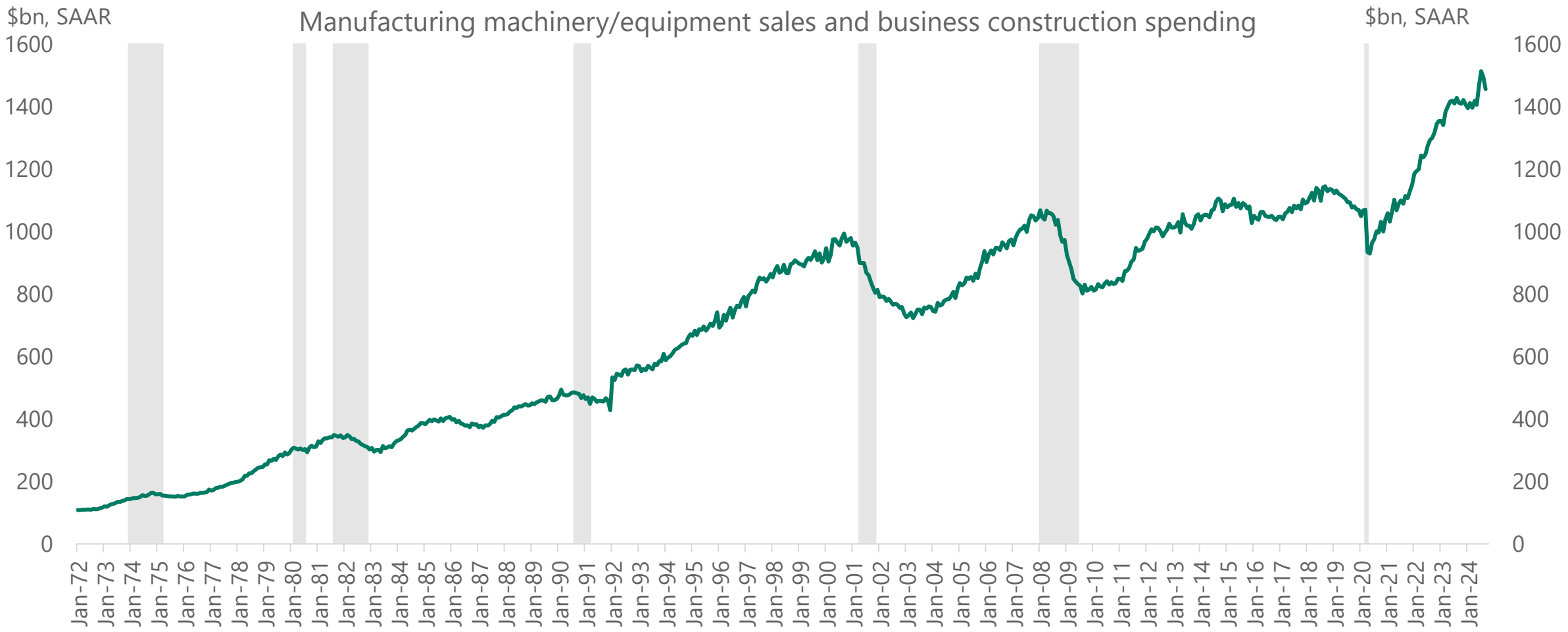
Note: SIC = Standard Industrial Classification. Source: Federal Reserve Board, National Bureau of Economic Research, Haver Analytics, Apollo Chief Economist

New investments are needed



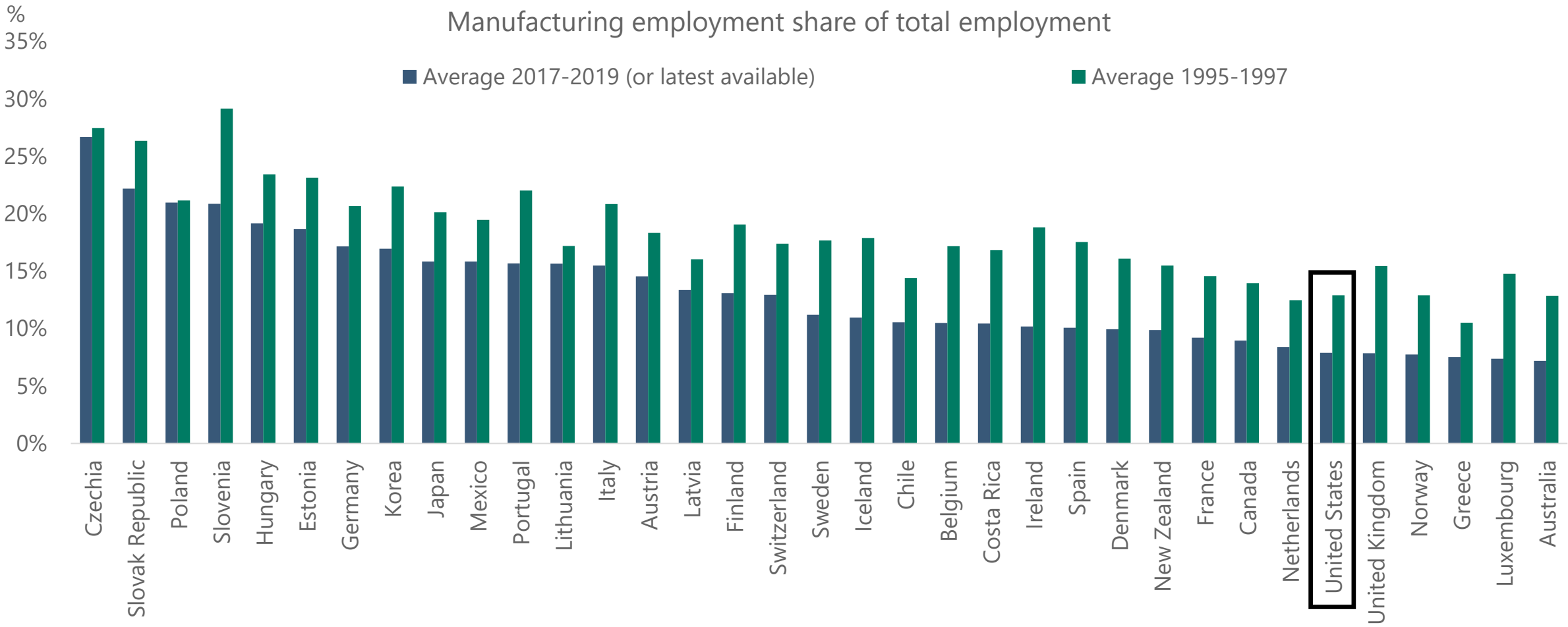
Source: BEA, Apollo Chief Economist

Manufacturing machinery and equipment sales and business construction spending



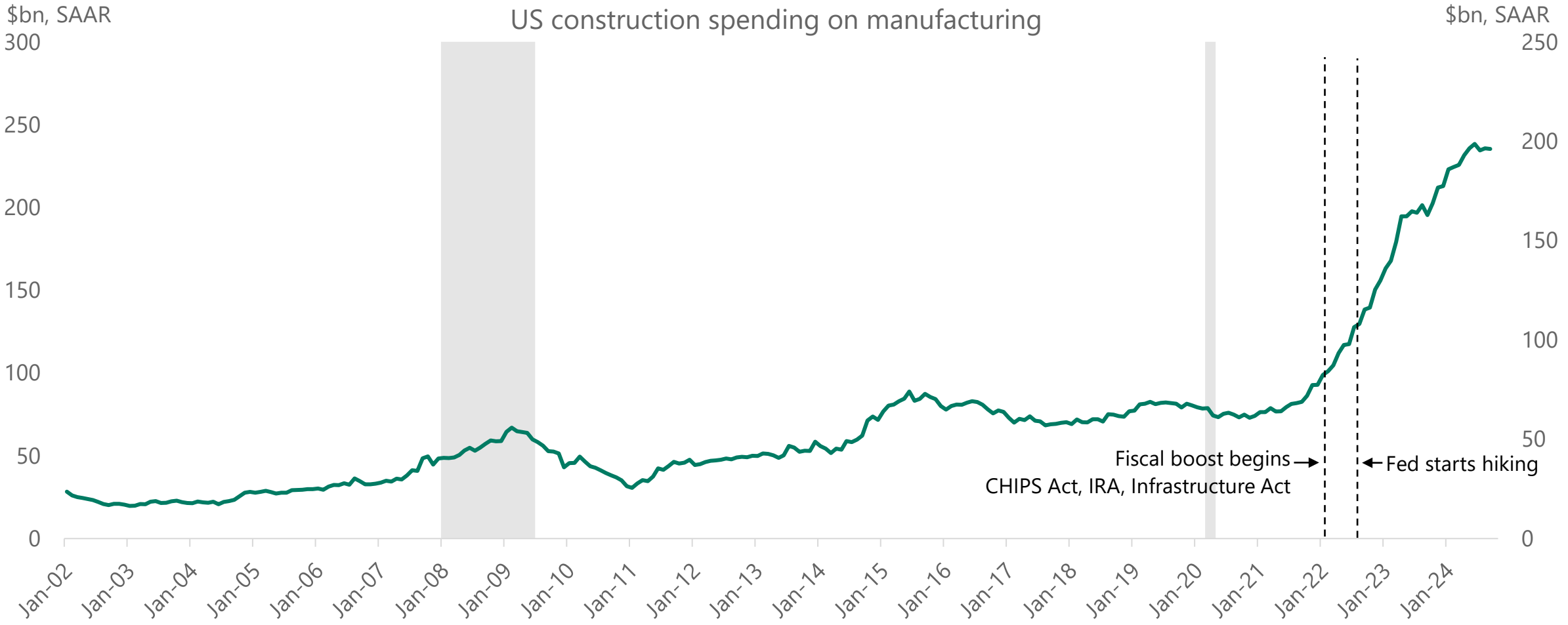
Source: Census Bureau, Haver Analytics, Apollo Chief Economist

US: Manufacturing employment makes up a small share of total employment



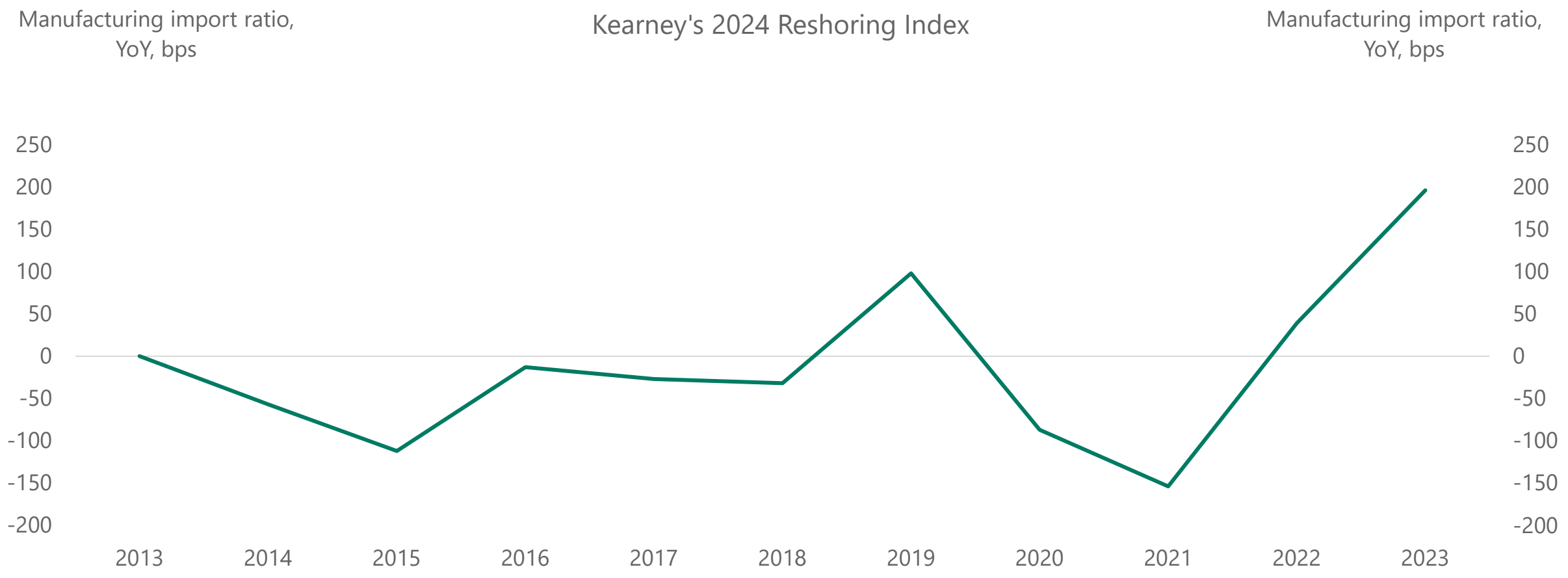
Source: OECD STAN database, Apollo Chief Economist

Positive effects of fiscal policy dominating negative effects of Fed hikes



Source: Census Bureau, Haver Analytics, Apollo Chief Economist

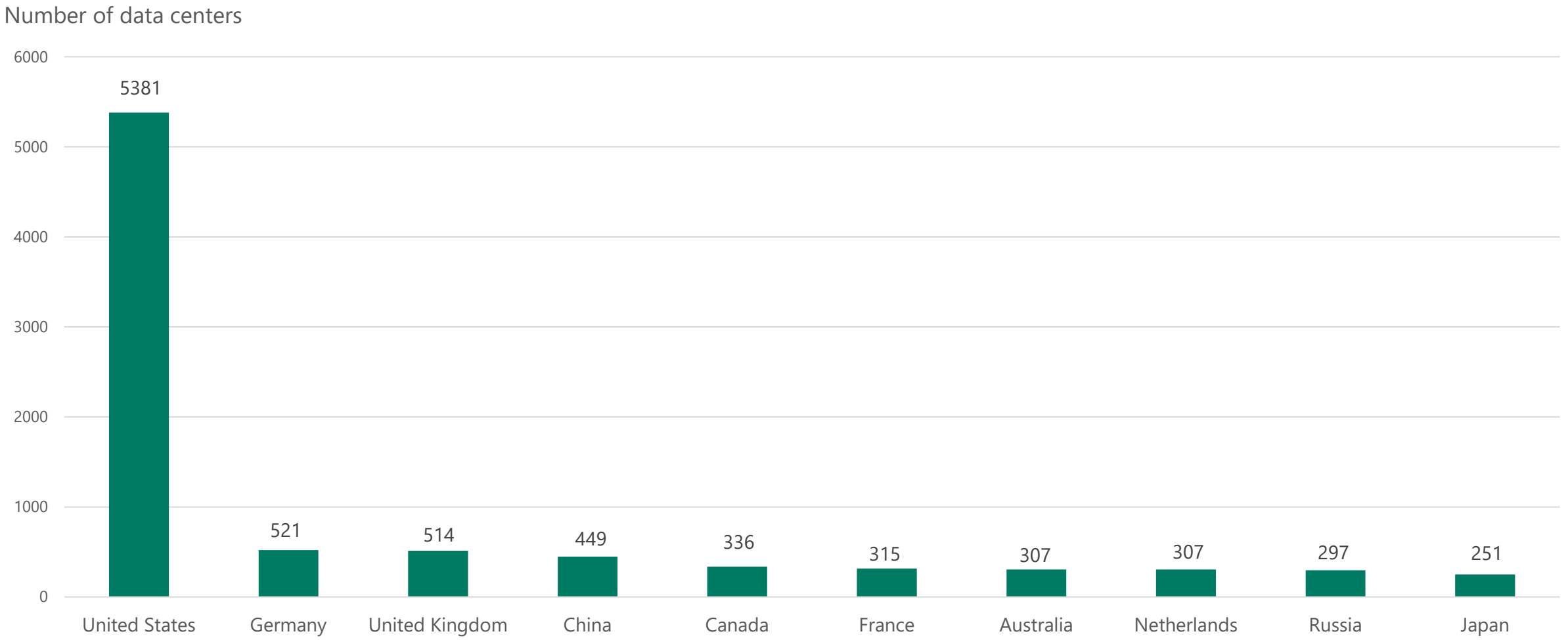
Reshoring index at highest level



Source: Kearney Made in America: Here to stay? 2024 Reshoring Index, Apollo Chief Economist. Note: Manufacturing import ratio = total manufactured goods import from 14 Asian low-cost countries and regions as a % of domestic output.

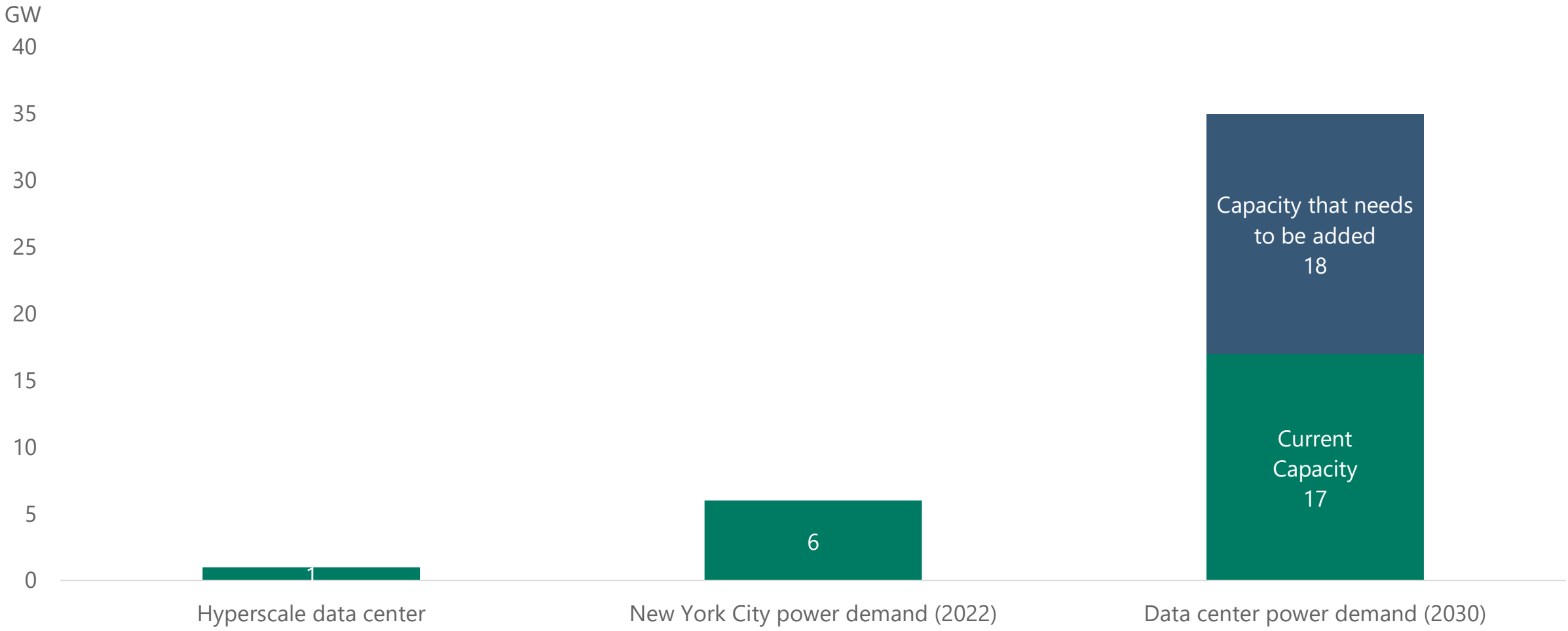
Digital infrastructure

There are more data centers in the US than in all other major countries combined



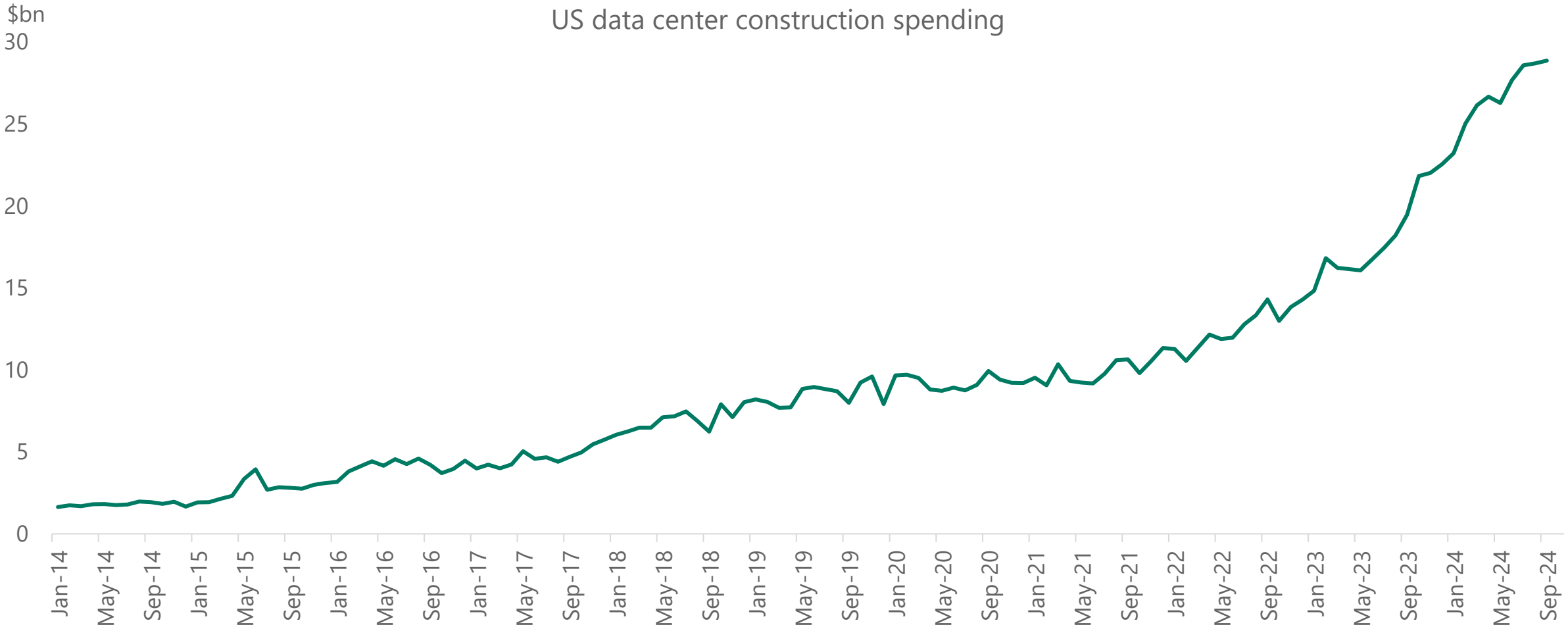
Source: Statista, Cloudscene, Apollo Chief Economist. Note: Data as of March 2024.

US data center energy demand: Need to add three NYCs to the power grid by 2030



Source: NYISO 2022, McKinsey, Nextgen, datacenterknowledge.com, Apollo Chief Economist. Note: Current capacity as of 2022, Why invest in the data center economy | McKinsey, Systems - NYC Mayor's Office of Climate and Environmental Justice, Data Center Power: Fueling the Digital Revolution, US data center power consumption to double by 2030 - DCD

Positive effects of fiscal policy dominating negative effects of Fed hikes



Source: Census Bureau, Haver Analytics, Apollo Chief Economist

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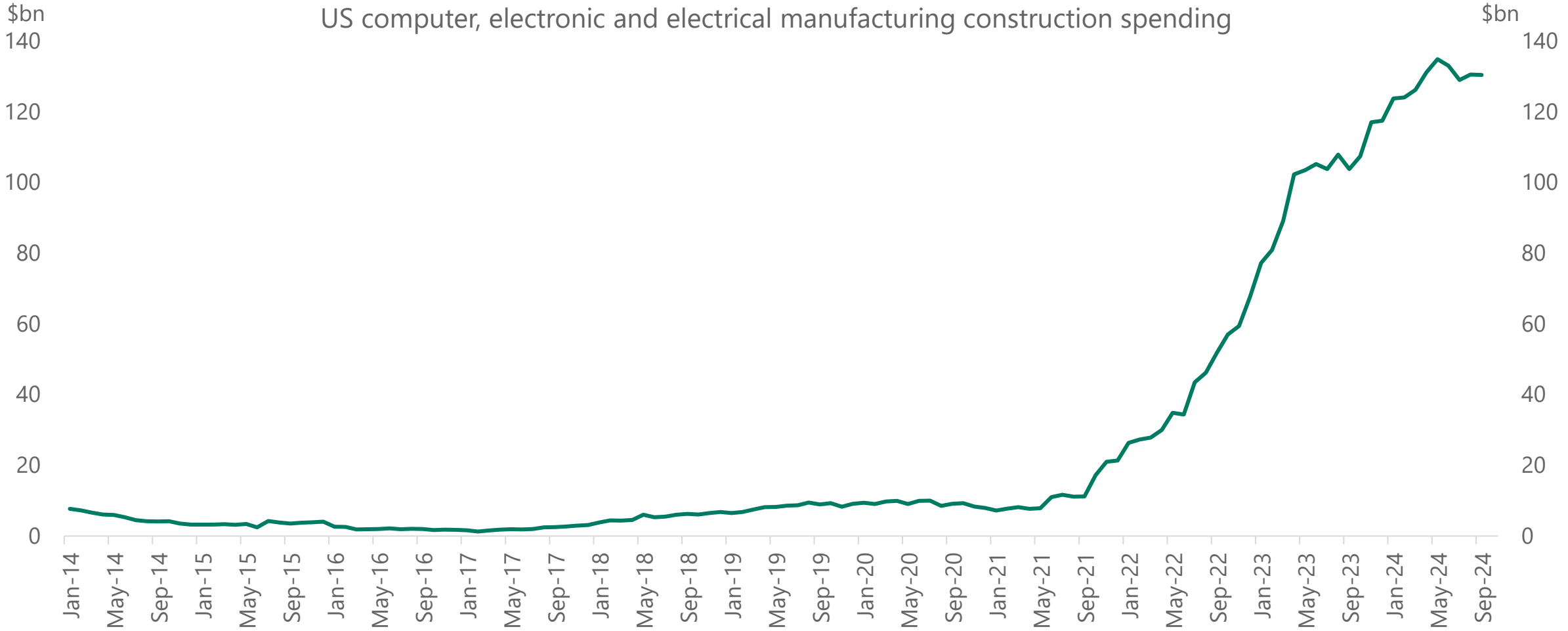
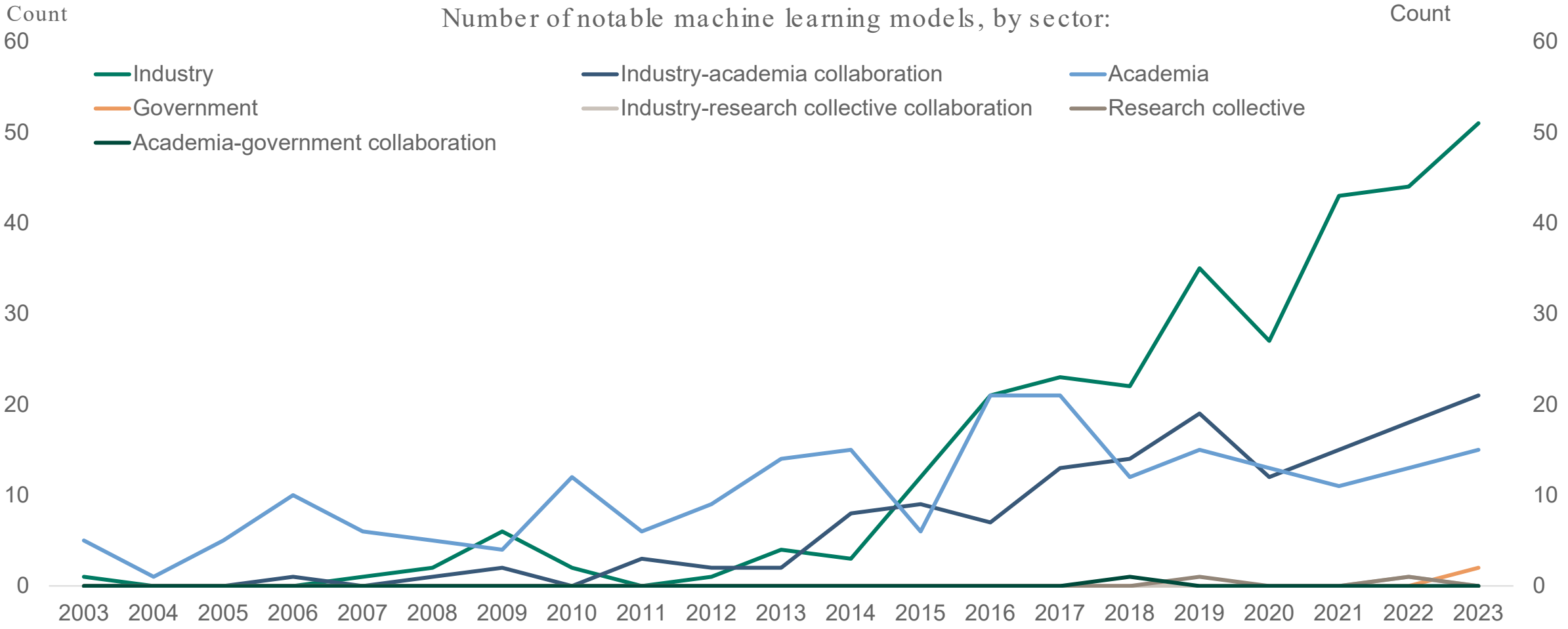


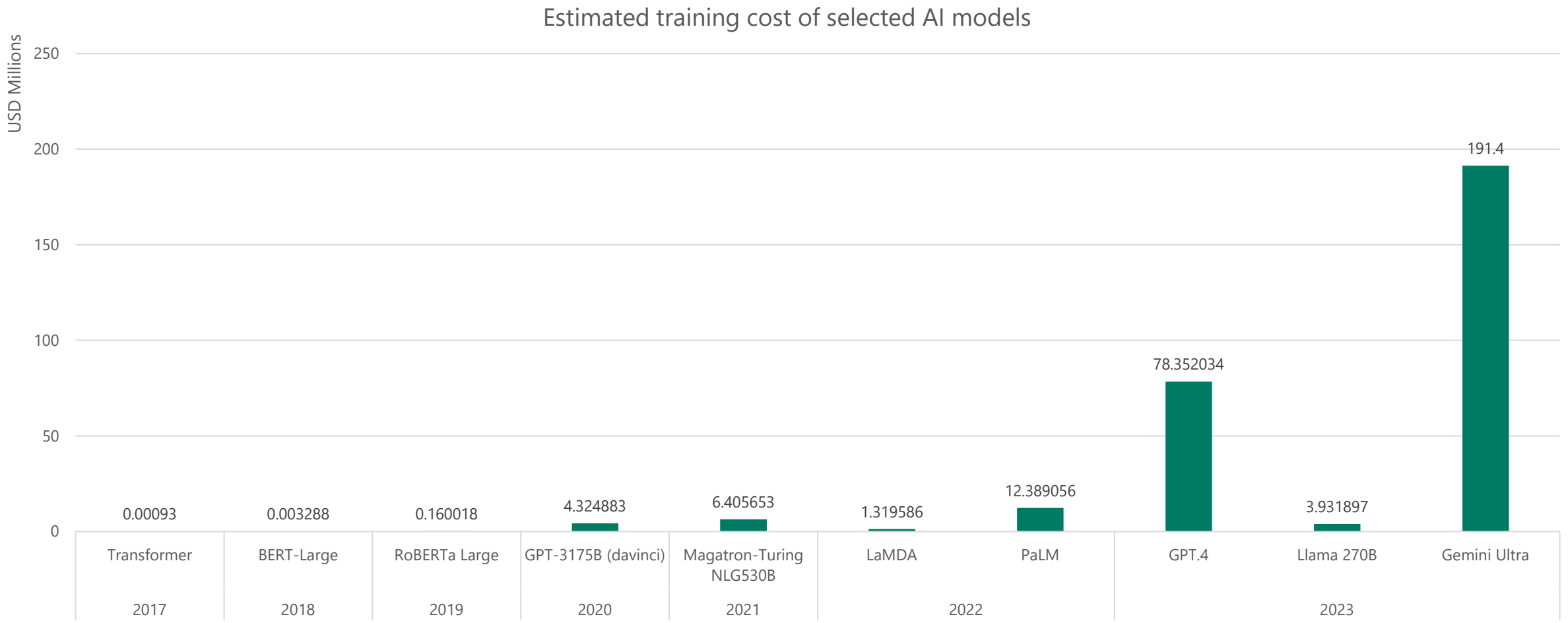
Source: Census Bureau, Haver Analytics, Apollo Chief Economist

Number of notable machine learning models, by sector



Source: Source: Epoch, 2023, https://aiindex.stanford.edu/report/, Apollo Chief Economist

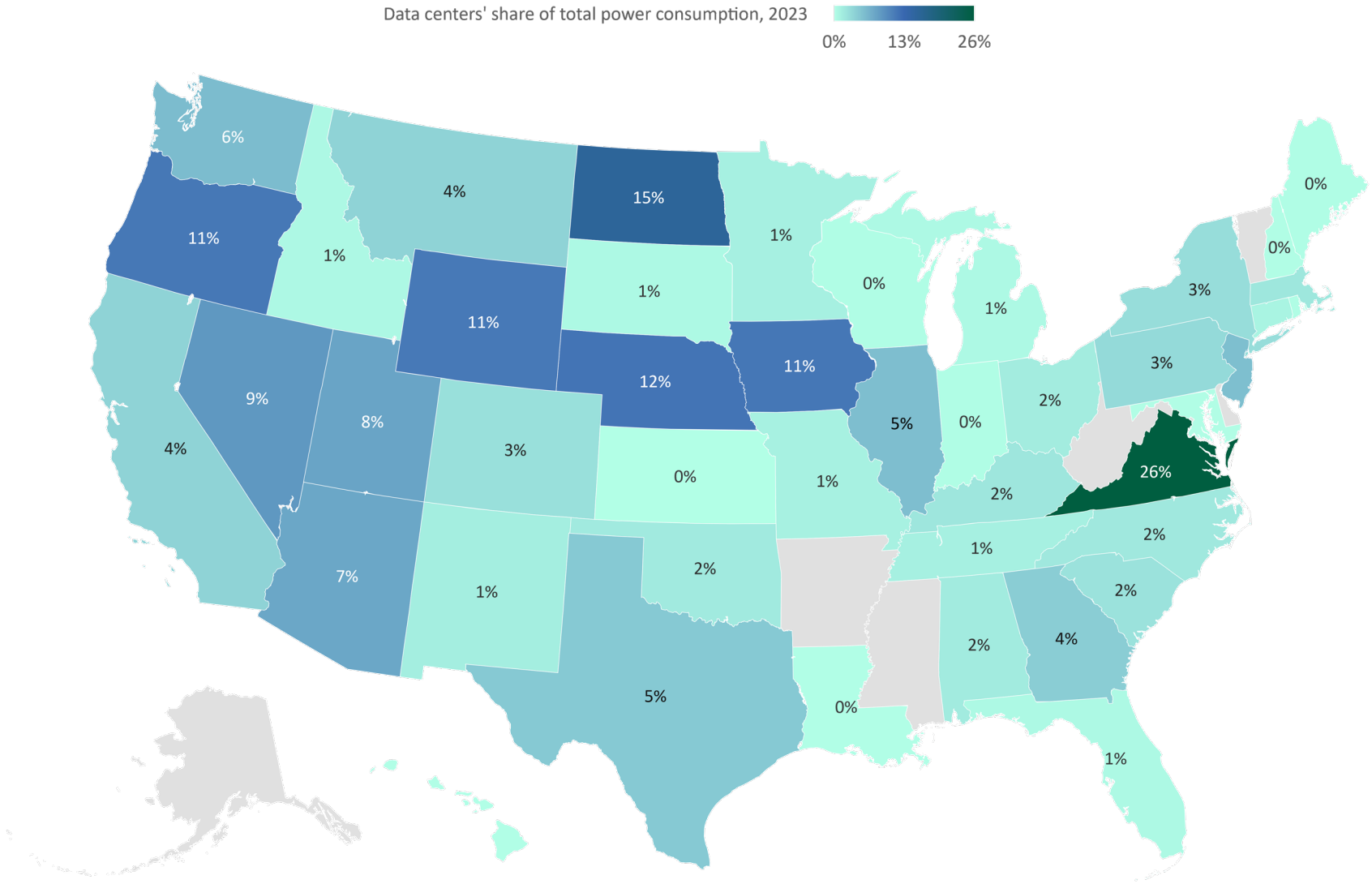
Estimated training costs of selected AI models



Source: Source: Epoch, 2023, https://aiindex.stanford.edu/report/, Apollo Chief Economist

Energy transition and power

Data centers' share of total power consumption



Source: Electric Power Research Institute (EPRI), Apollo Chief Economist. Note: There is no data available for states shaded in grey.

Share of primary energy consumption from renewable sources, 2023

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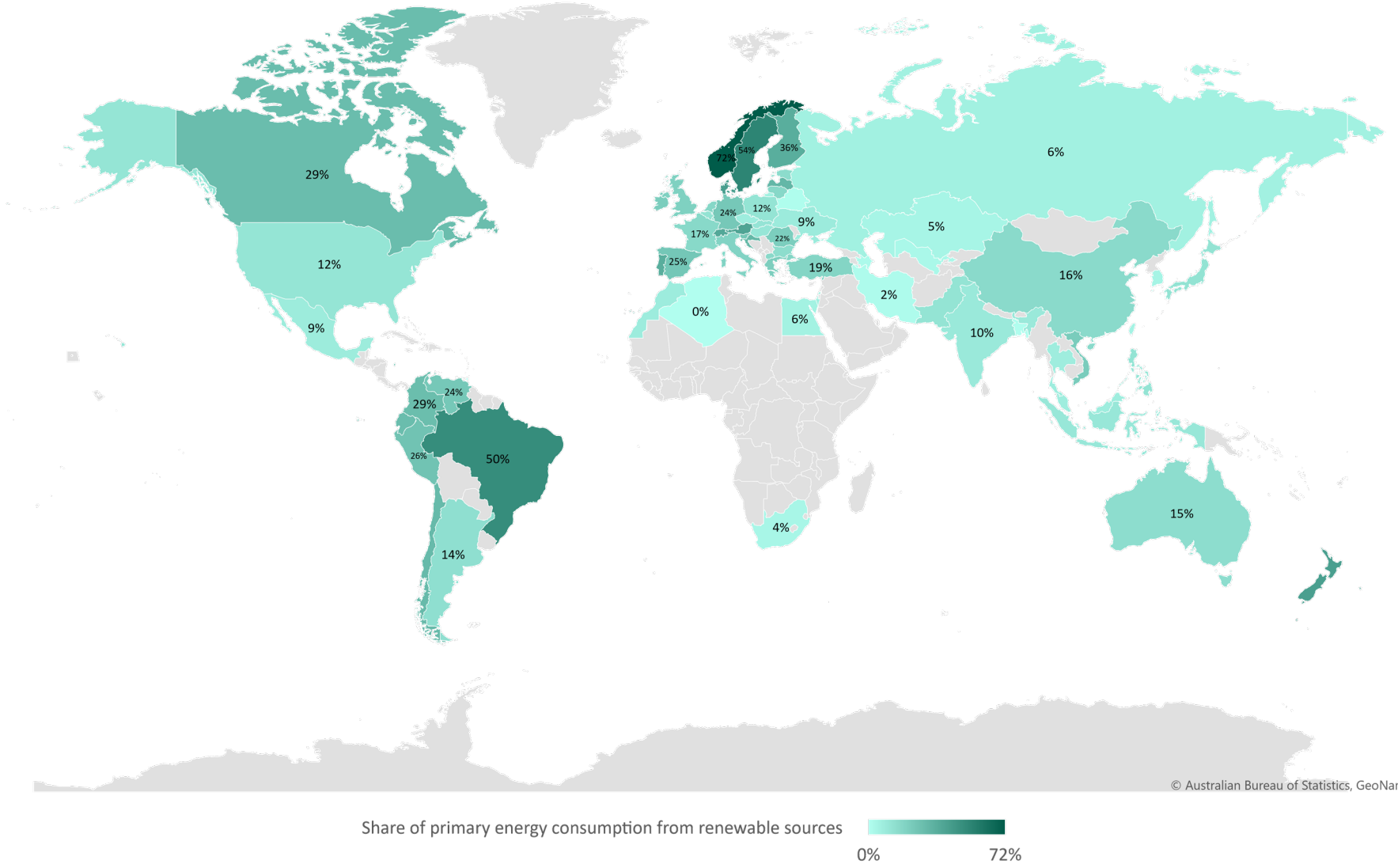
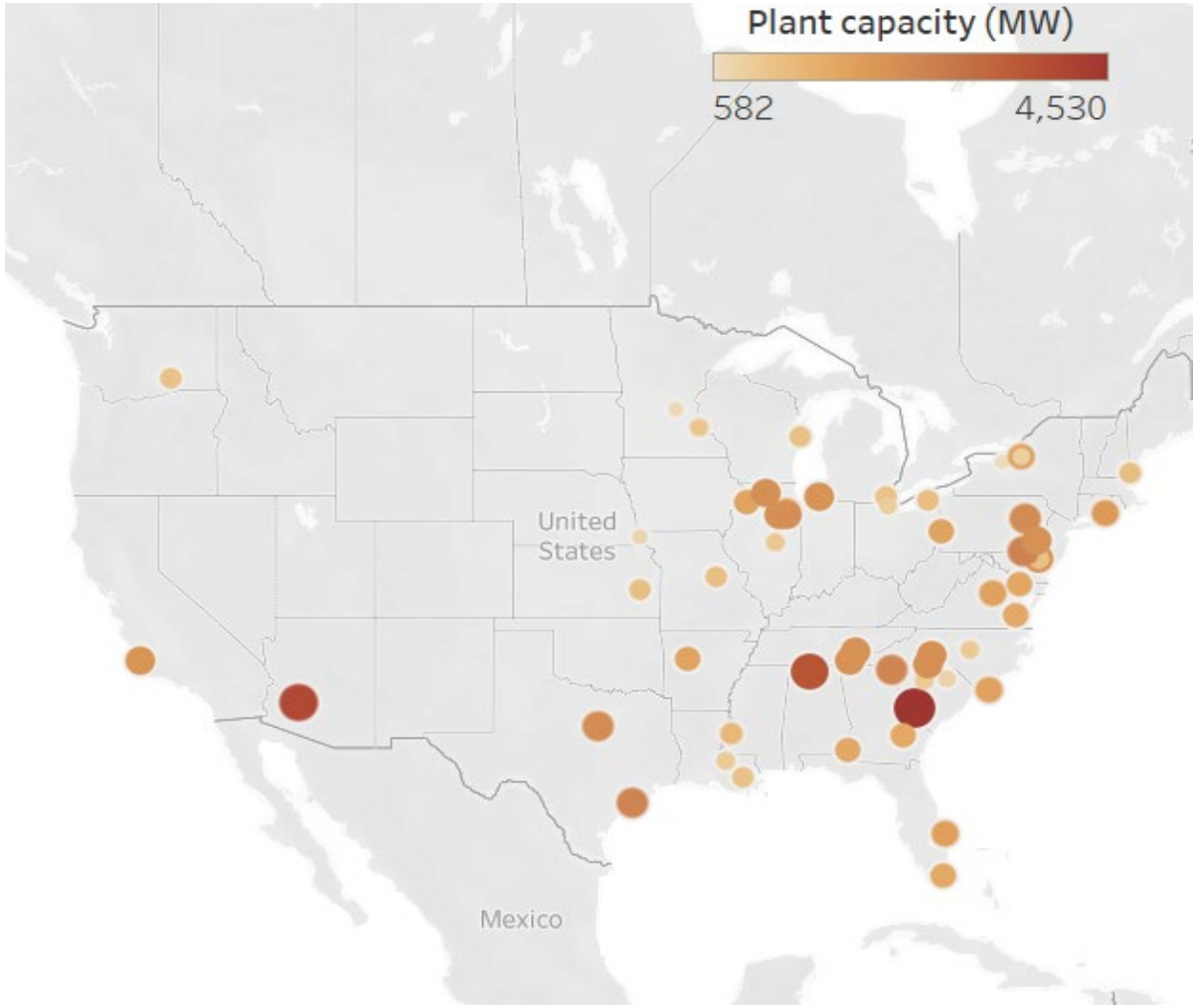


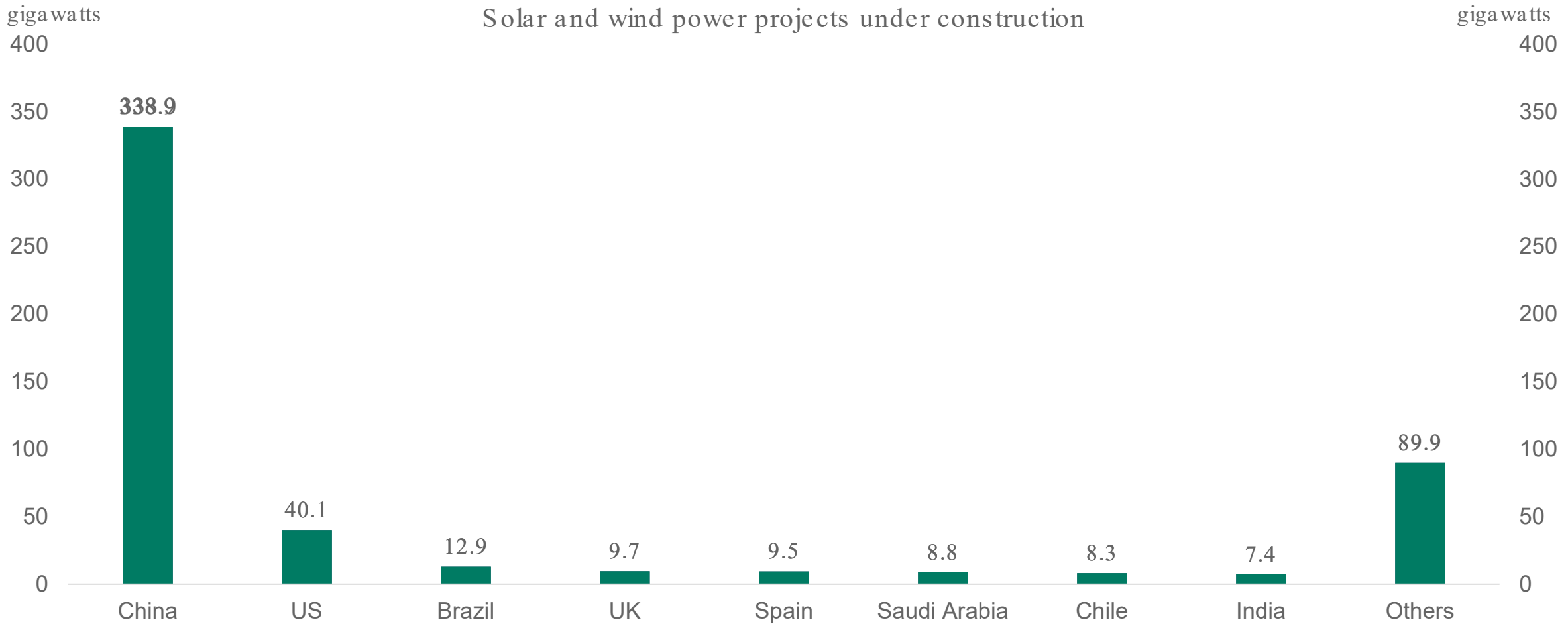
Source: Energy Institute - Statistical Review of World Energy (2024), OurWorldInData.org/energy, Apollo Chief Economist.

54 nuclear power plants in 28 states



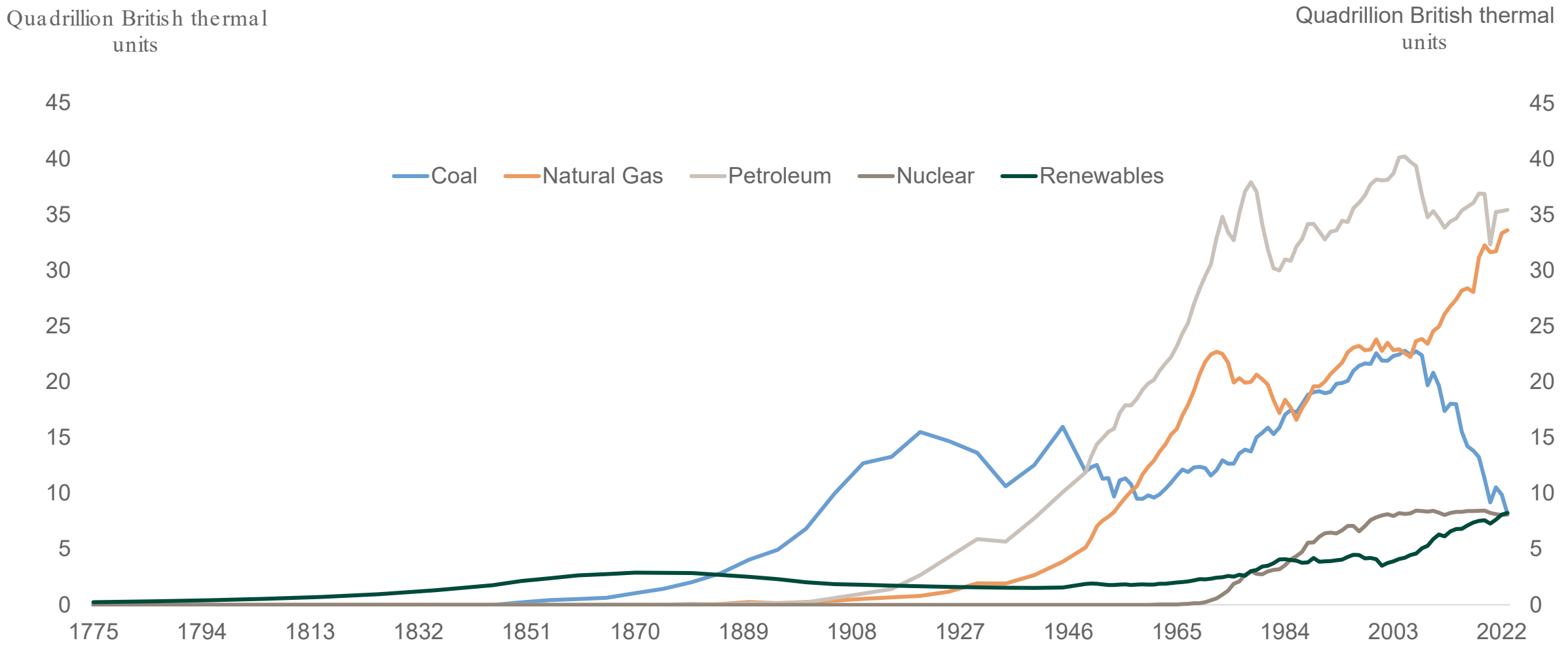
Source: EIA, Apollo Chief Economist

More wind and solar projects under construction in China than the rest of the world combined



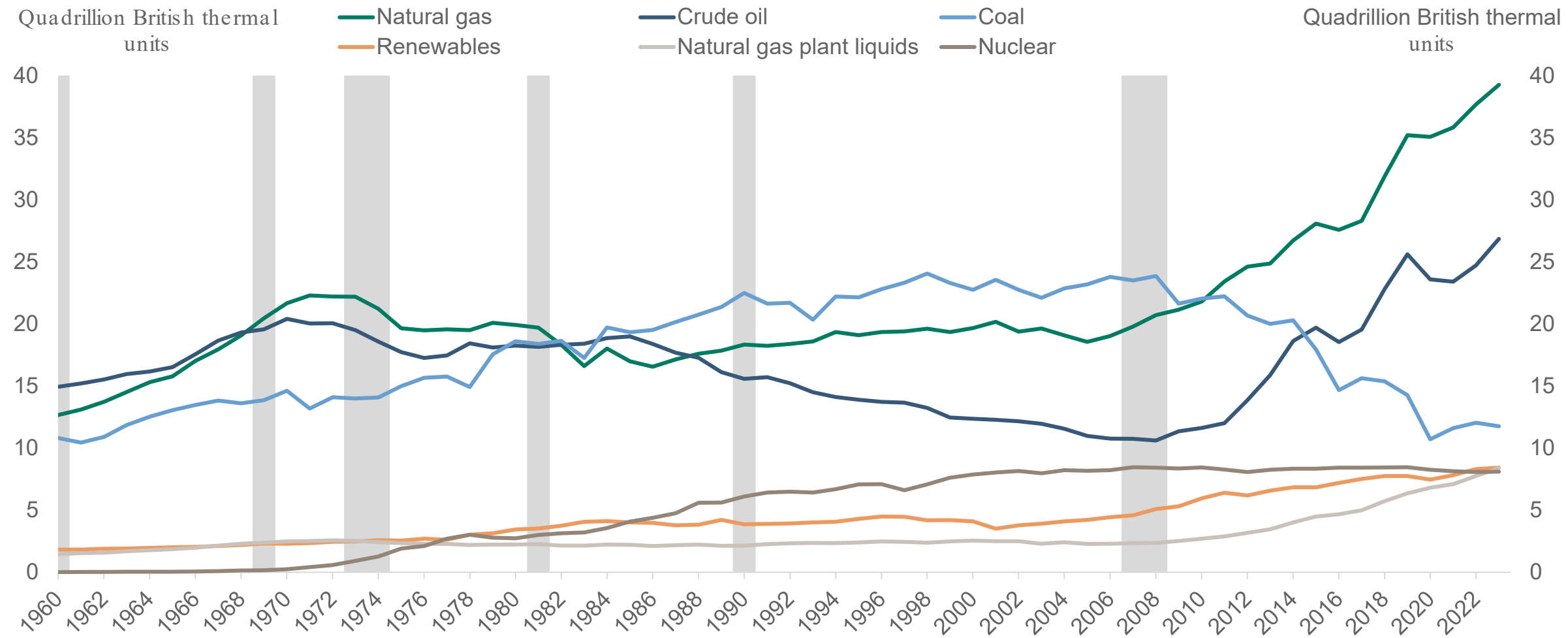
Source: Global Energy Monitor, Apollo Chief Economist. Data for China and European countries to June 2024. All other countries to December 2023.

Annual US energy consumption



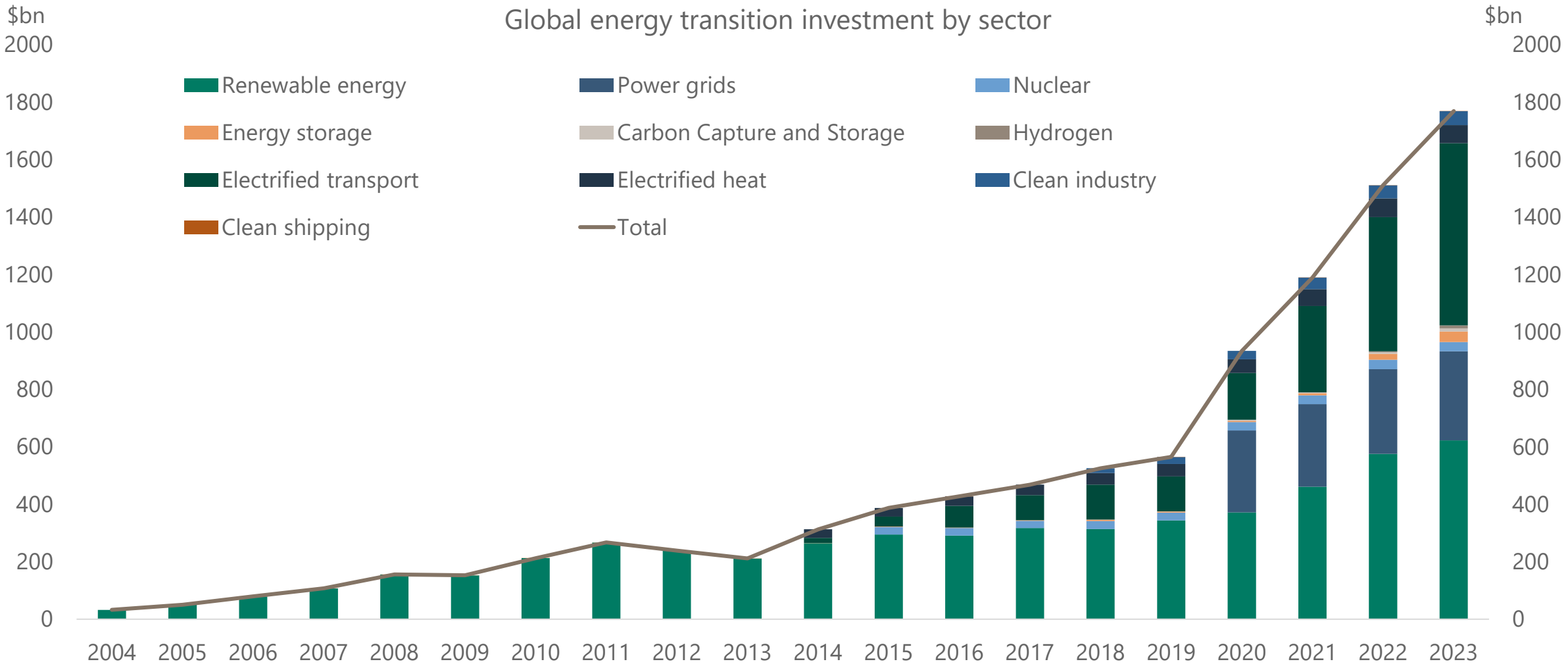
Source: U.S. Energy Information Administration, Apollo Chief Economist

Annual US energy production



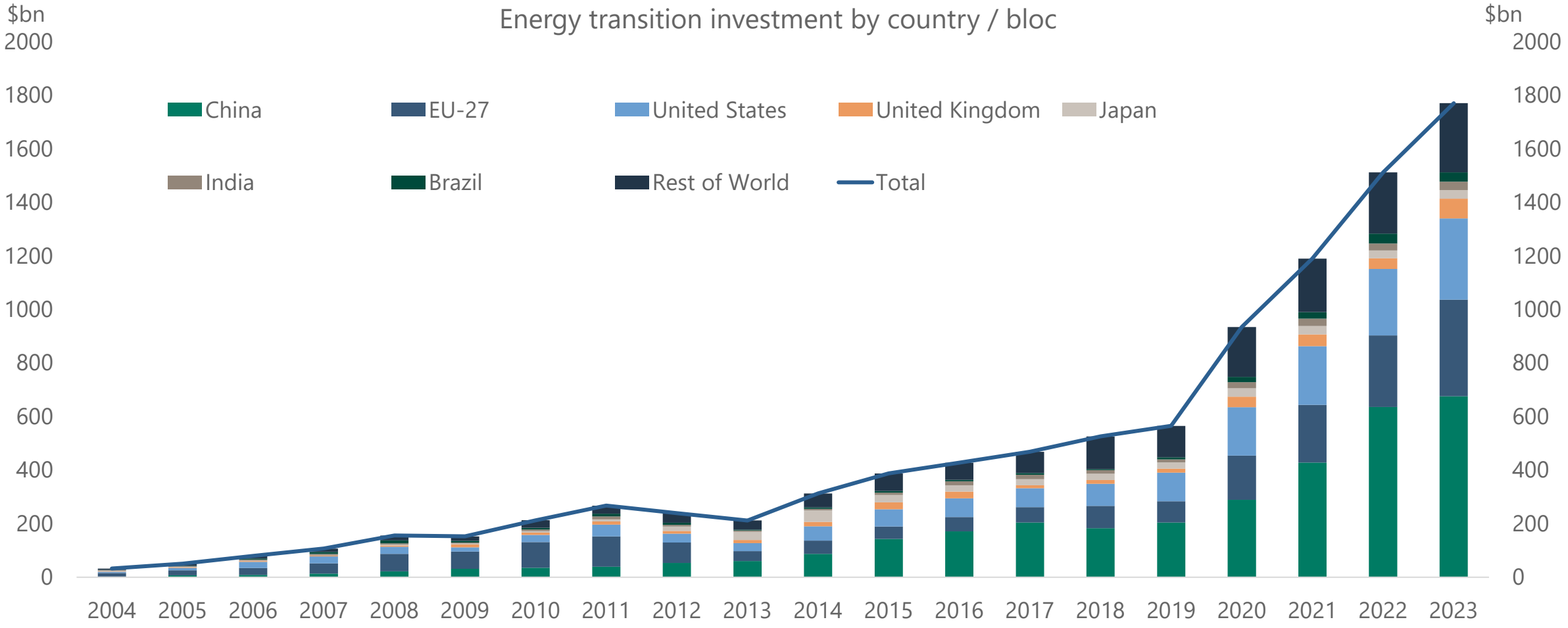
Source: U.S. Energy Information Administration, Federal Reserve Bank of St. Louis, Apollo Chief Economist

Global energy transition investment, by sector



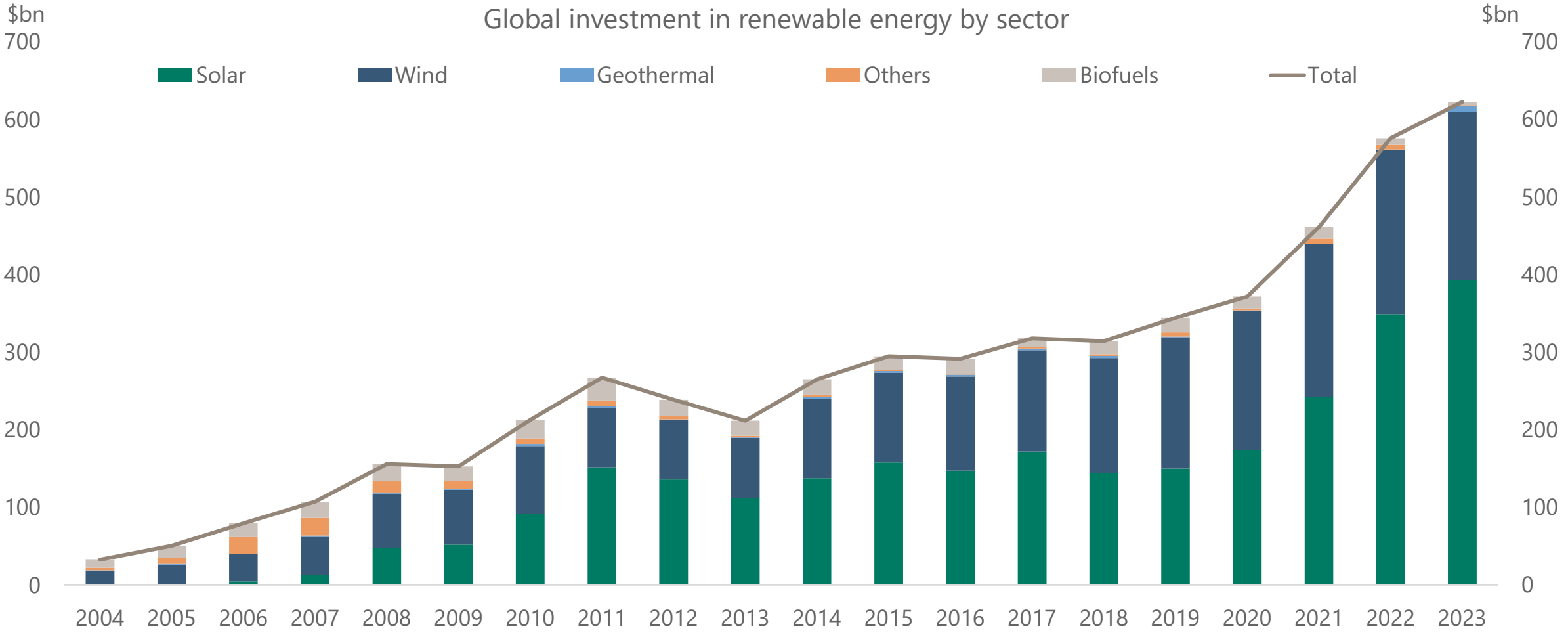
Source: Bloomberg NEF Energy Transition Investment Trends 2024, Apollo Chief Economist

Global energy transition investment, by country



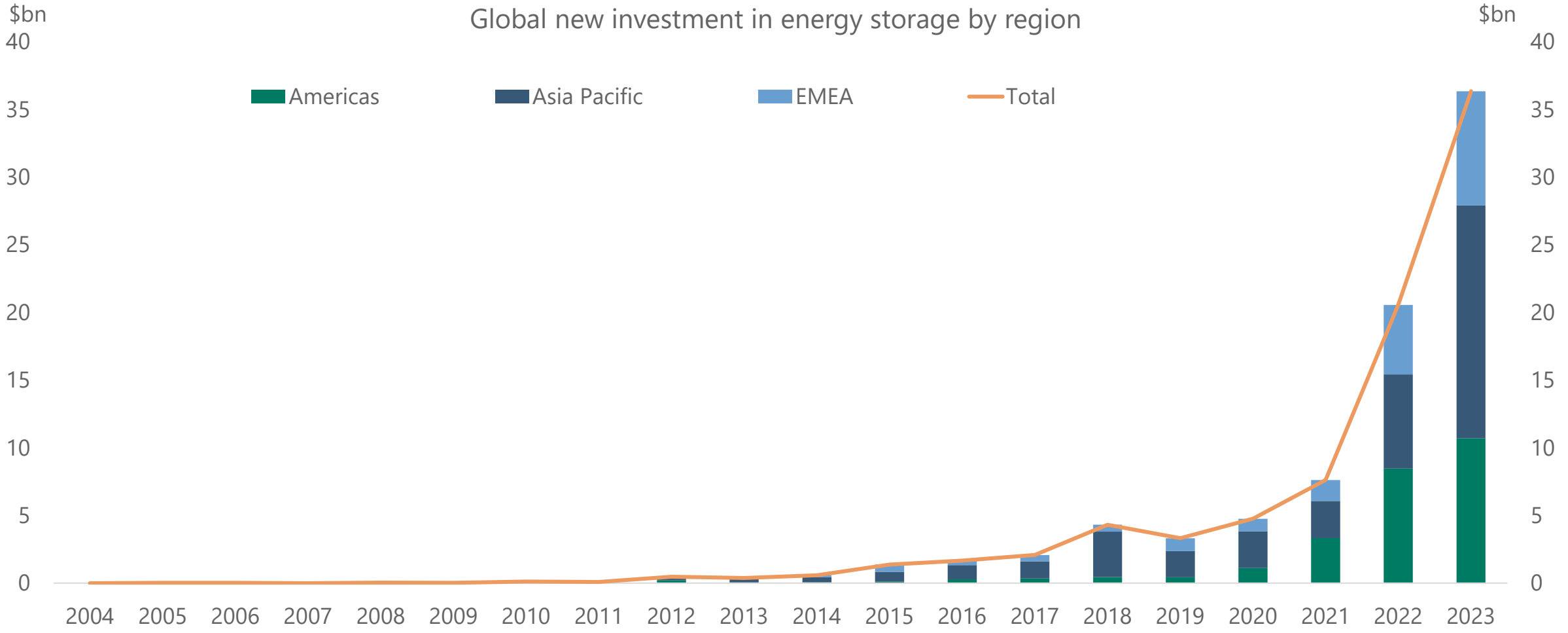
Source: Bloomberg NEF Energy Transition Investment Trends 2024, Apollo Chief Economist

Global investment in renewable energy, by sector



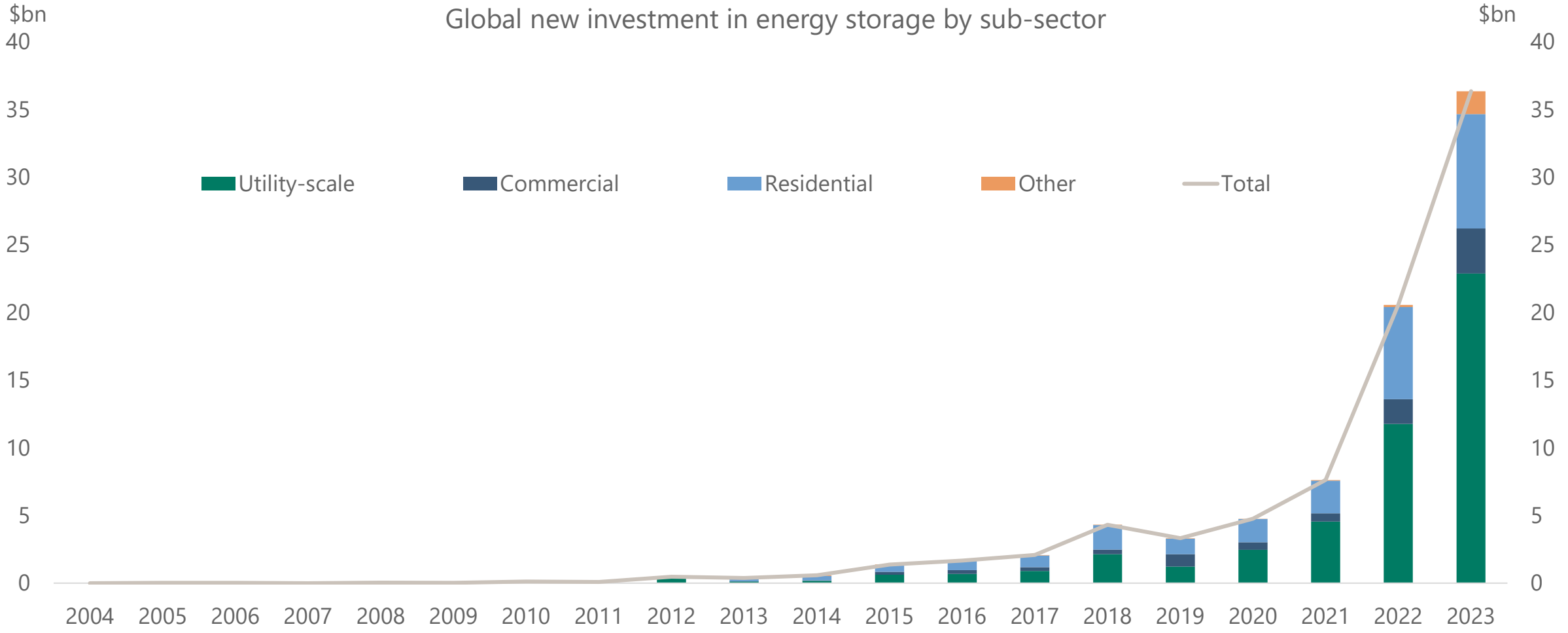
Source: Bloomberg NEF Energy Transition Investment Trends 2024, Apollo Chief Economist

Global new investment in energy storage, by region



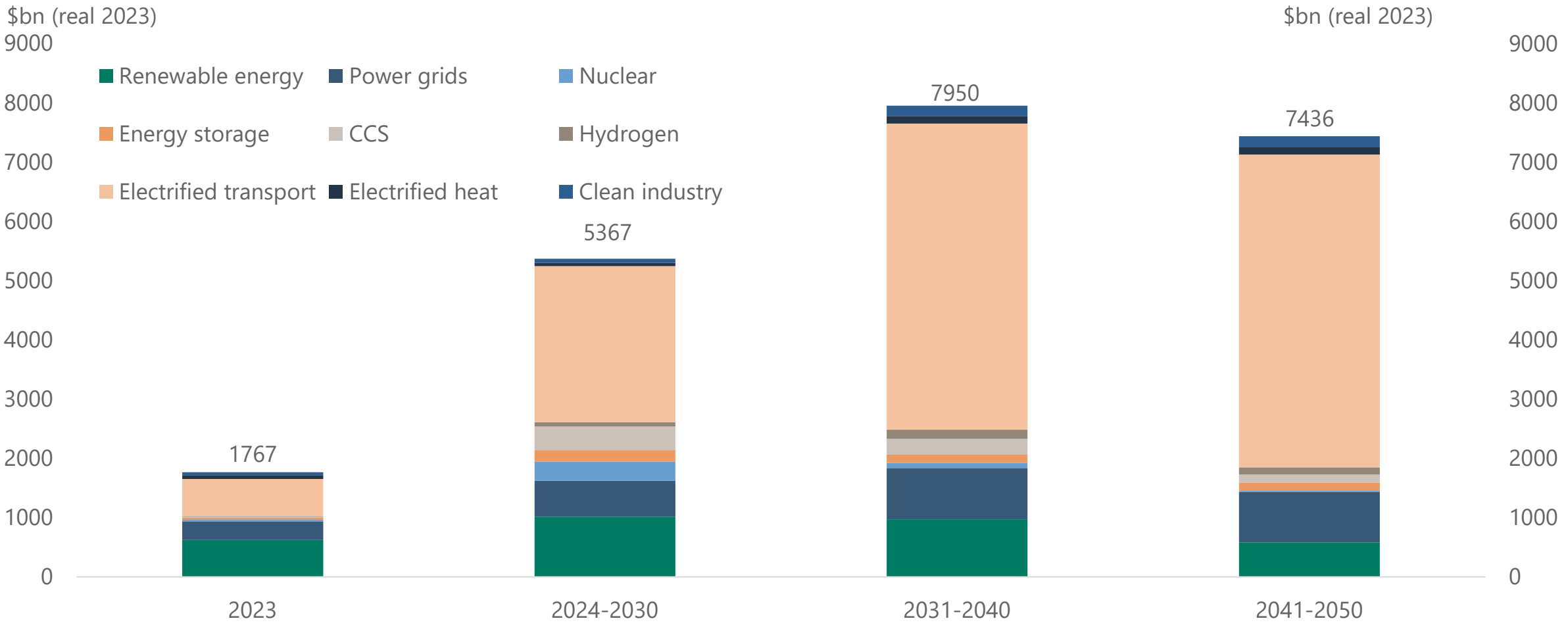
Source: Bloomberg NEF Energy Transition Investment Trends 2024, Apollo Chief Economist

Global new investment in energy storage, by sub sector



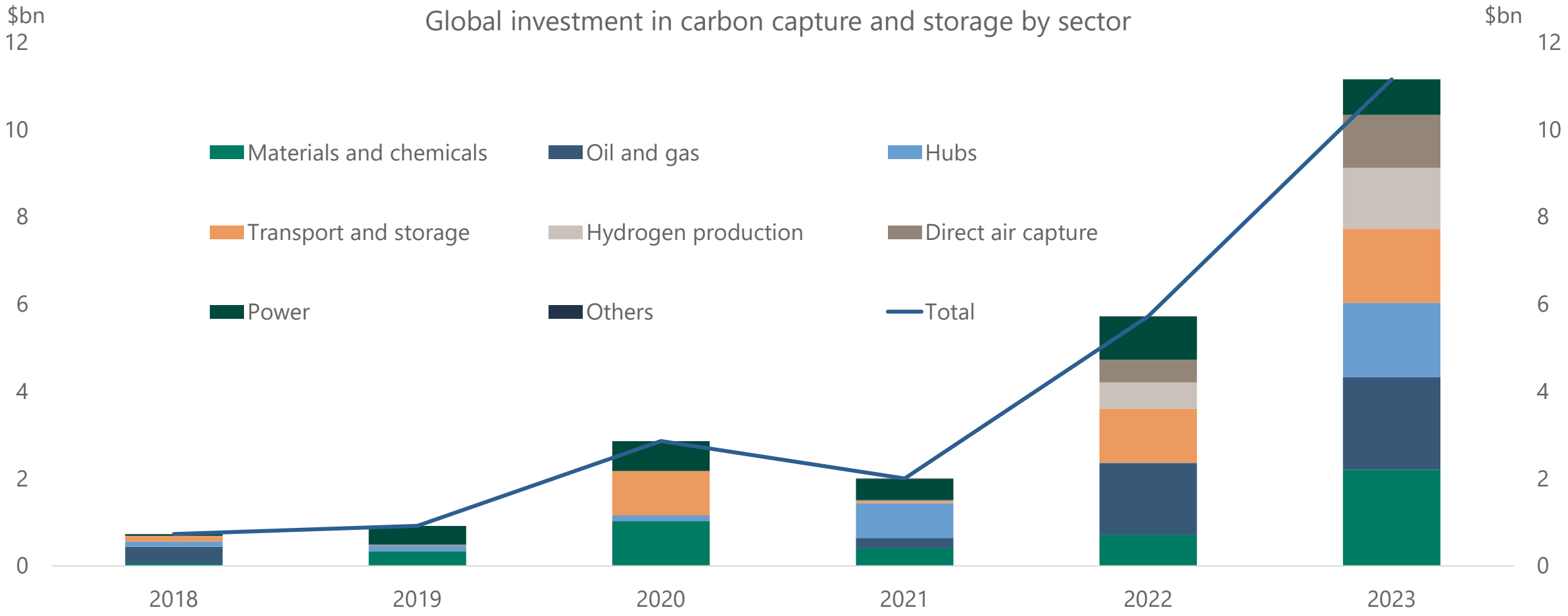
Source: Bloomberg NEF Energy Transition Investment Trends 2024, Apollo Chief Economist

Energy transition investment: Actuals versus required annualized levels across 2023-2050, Net Zero Scenario



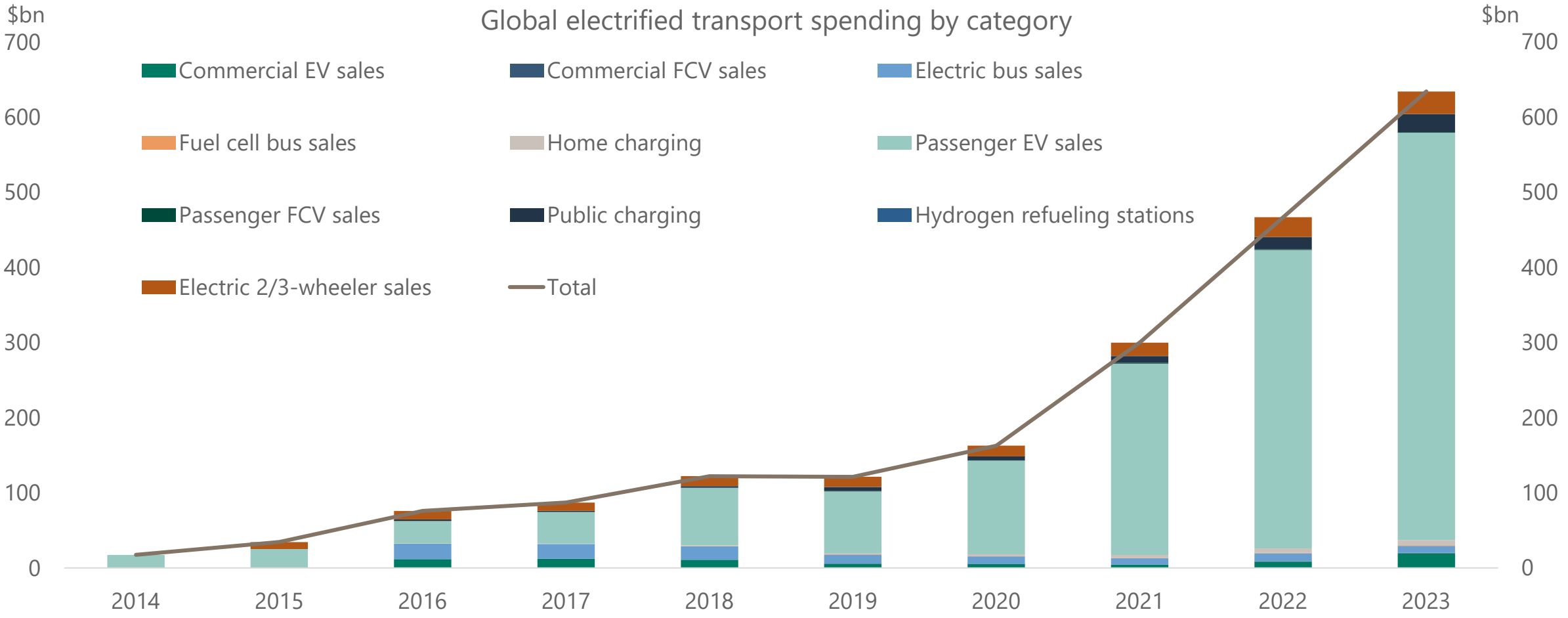
Source: Bloomberg NEF New Energy Outlook 2024, Apollo Chief Economist.

Global investment in carbon capture and storage, by sector



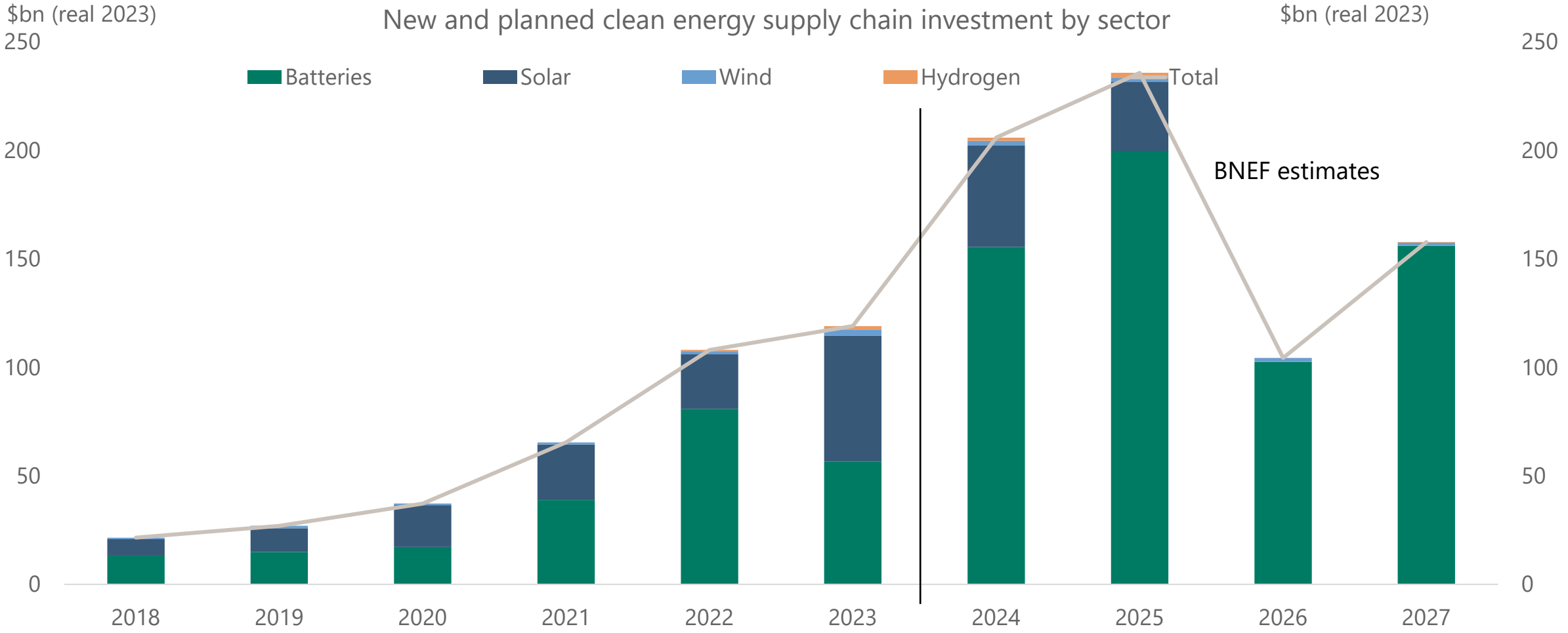
Source: Bloomberg NEF Energy Transition Investment Trends 2024, Apollo Chief Economist

Global investment in carbon capture and storage, by sector



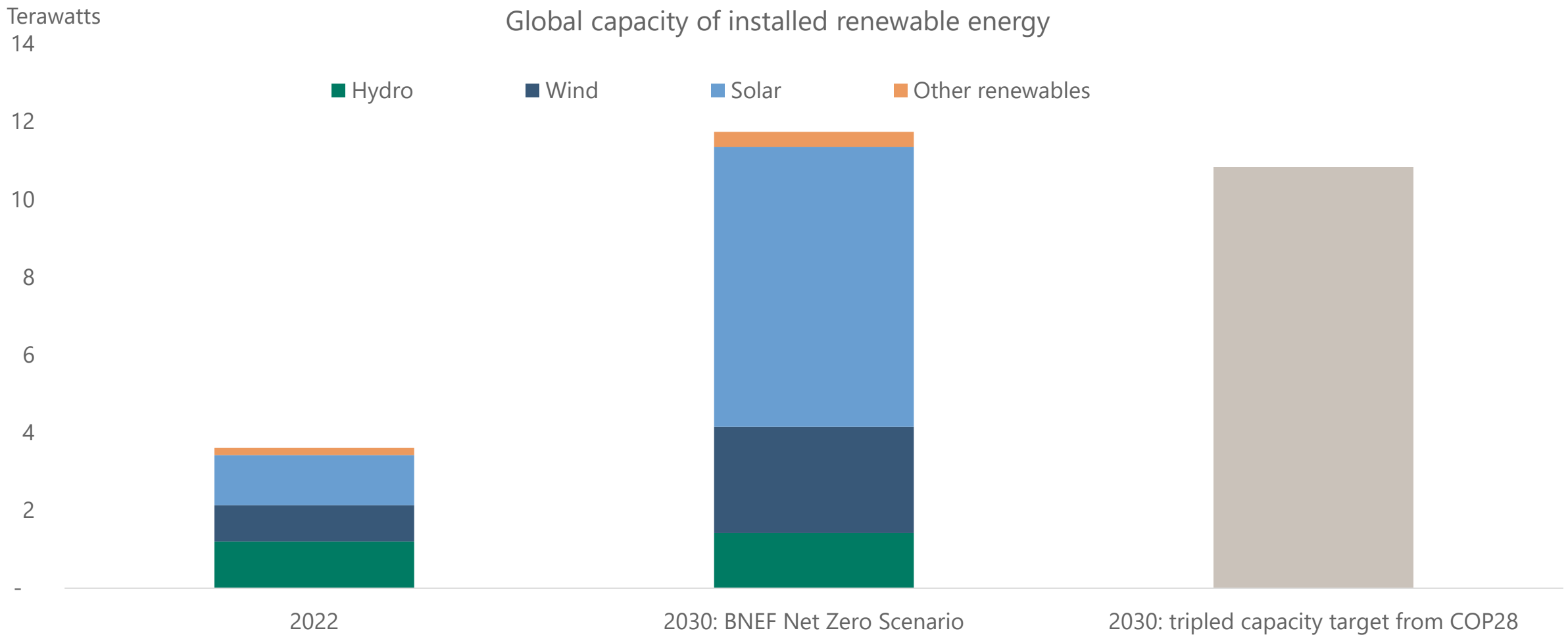
Source: Bloomberg NEF Energy Transition Investment Trends 2024, Apollo Chief Economist

New and planned clean energy supply chain investment, by sector



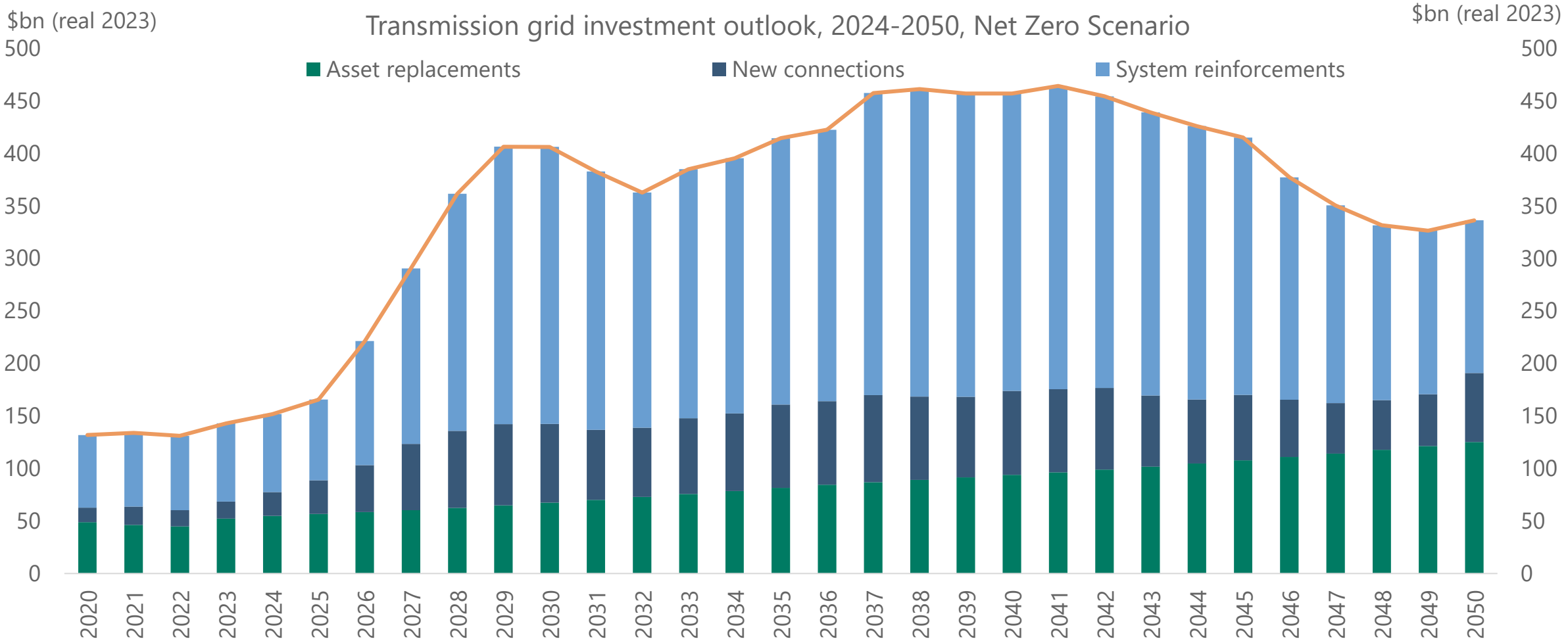
Source: Bloomberg NEF Energy Transition Investment Trends 2024, Apollo Chief Economist. Note:Includes upstream factories for solar and batteries, electrolyzer assembly for hydrogen and nacelles for wind.

Global capacity of installed renewable energy, 2022 and 2030 under different scenarios



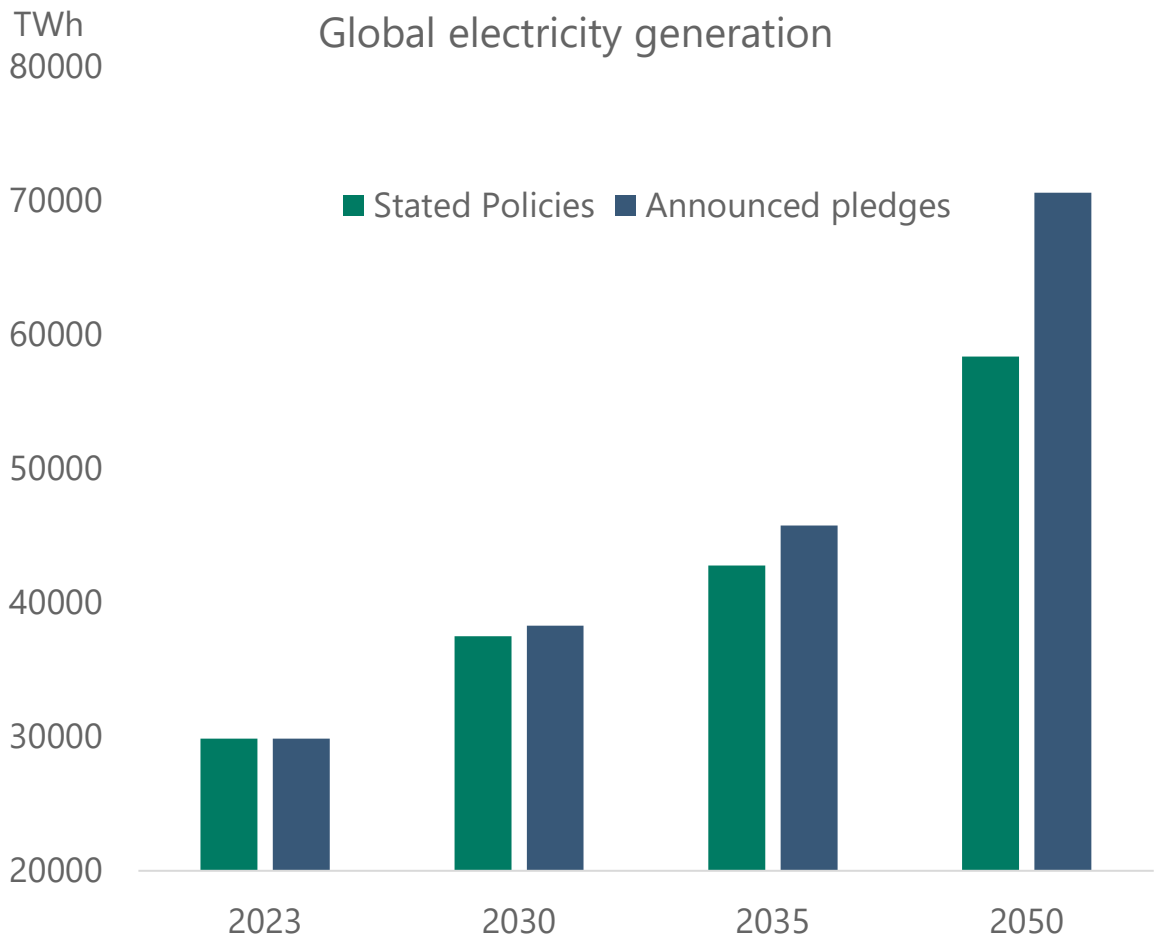
Source: Bloomberg NEF New Energy Outlook 2024, Apollo Chief Economist.

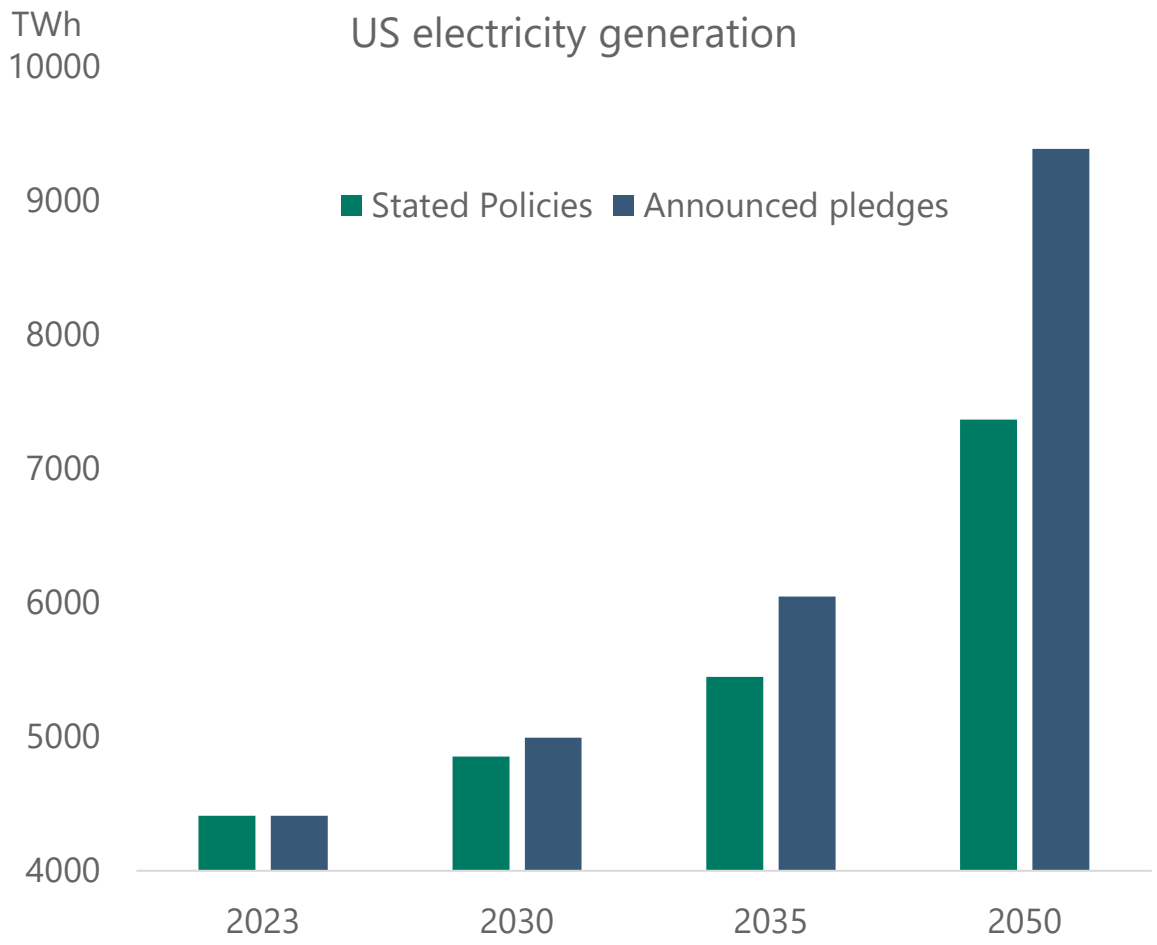
Transmission grid investment outlook, 2024-2050, ETS and NZS



Source: Bloomberg NEF New Energy Outlook 2024, Apollo Chief Economist.

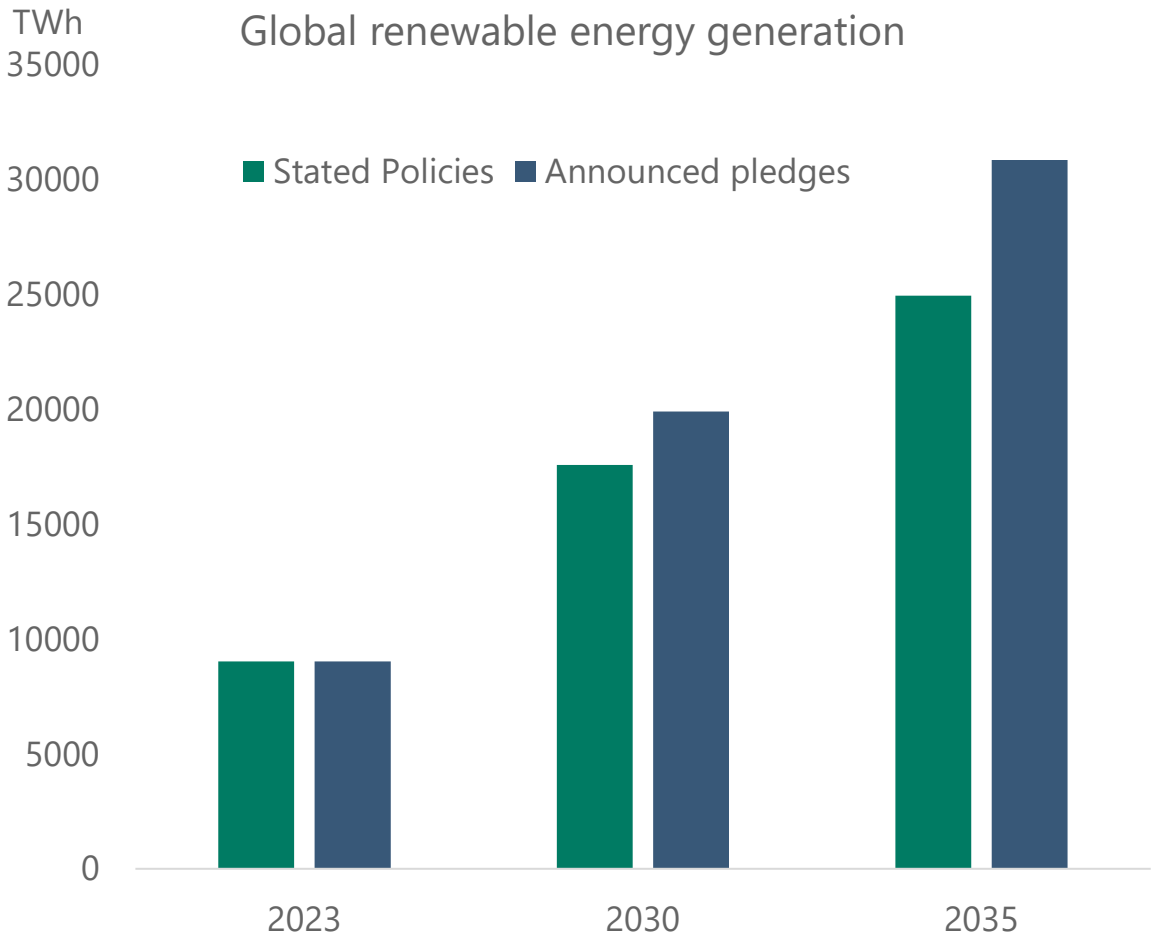
IEA forecasts of electricity generation

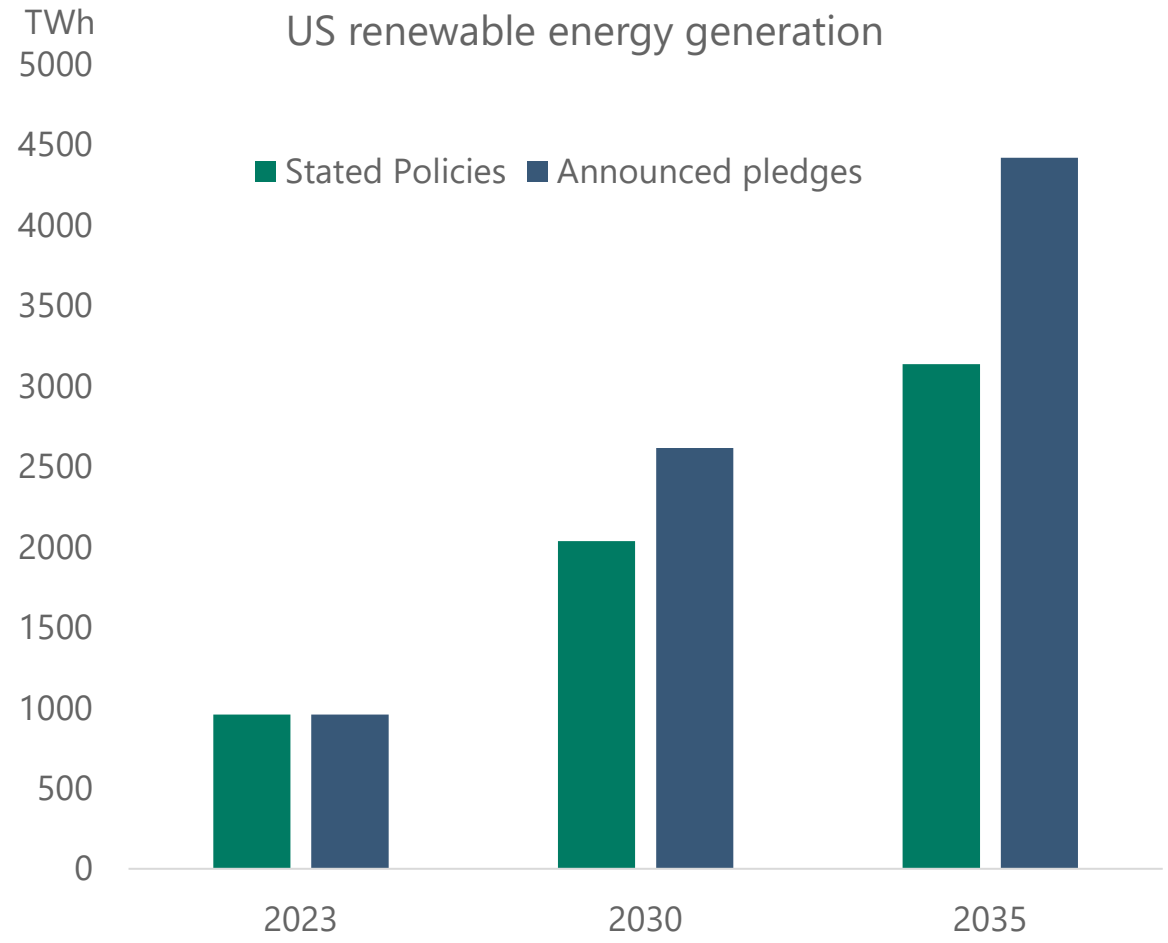




Source: IEA World Energy Outlook 2024, Apollo Chief Economist. Note: The Stated Policies Scenario is designed to provide a sense of the prevailing direction of energy system progression, based on a detailed review of the current policy landscape. The Announced Pledges Scenario illustrates the extent to which announced ambitions and targets can deliver the emissions reductions needed to achieve net zero emissions by 2050. It includes all recent major national announcements as of the end of August 2024

IEA forecasts of renewable energy generation





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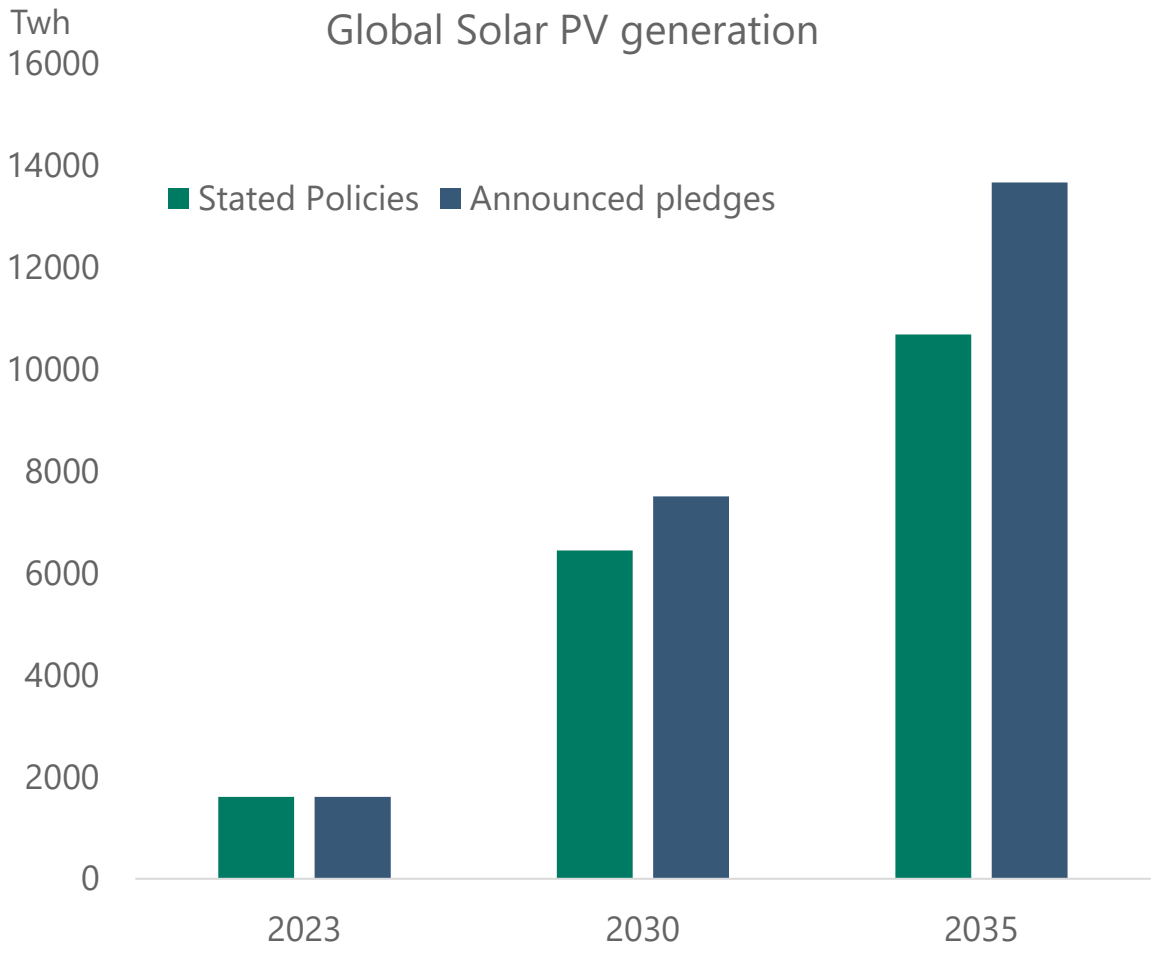
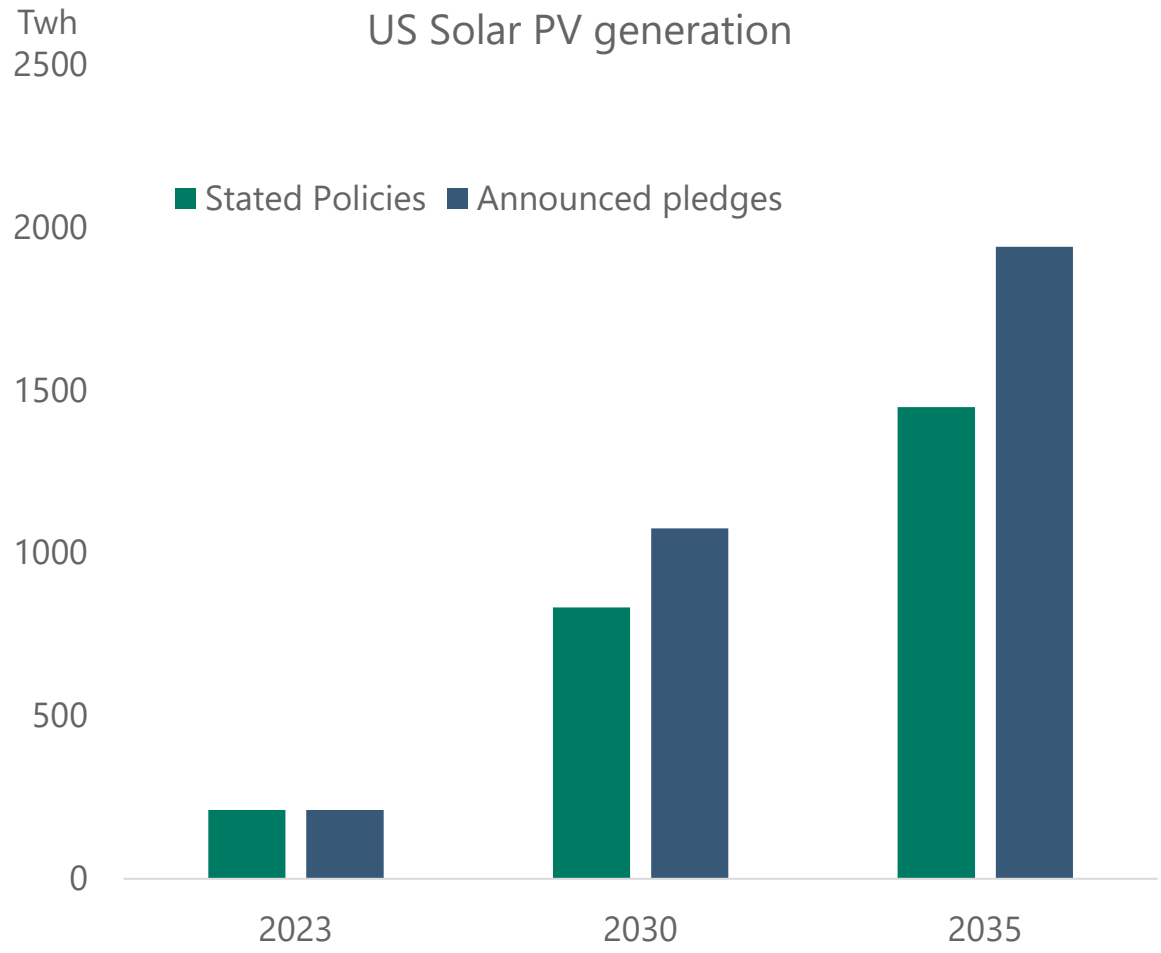
IEA forecasts of solar PV generation





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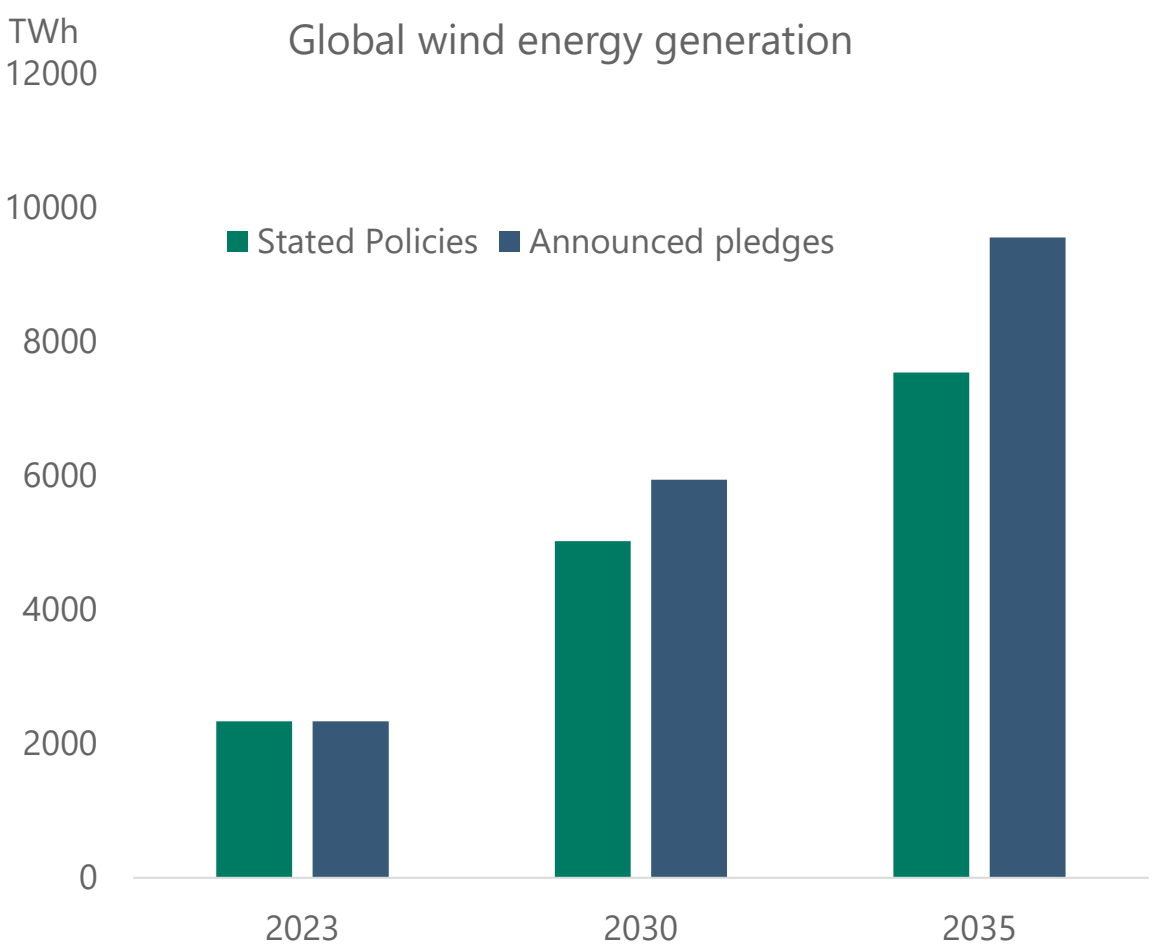
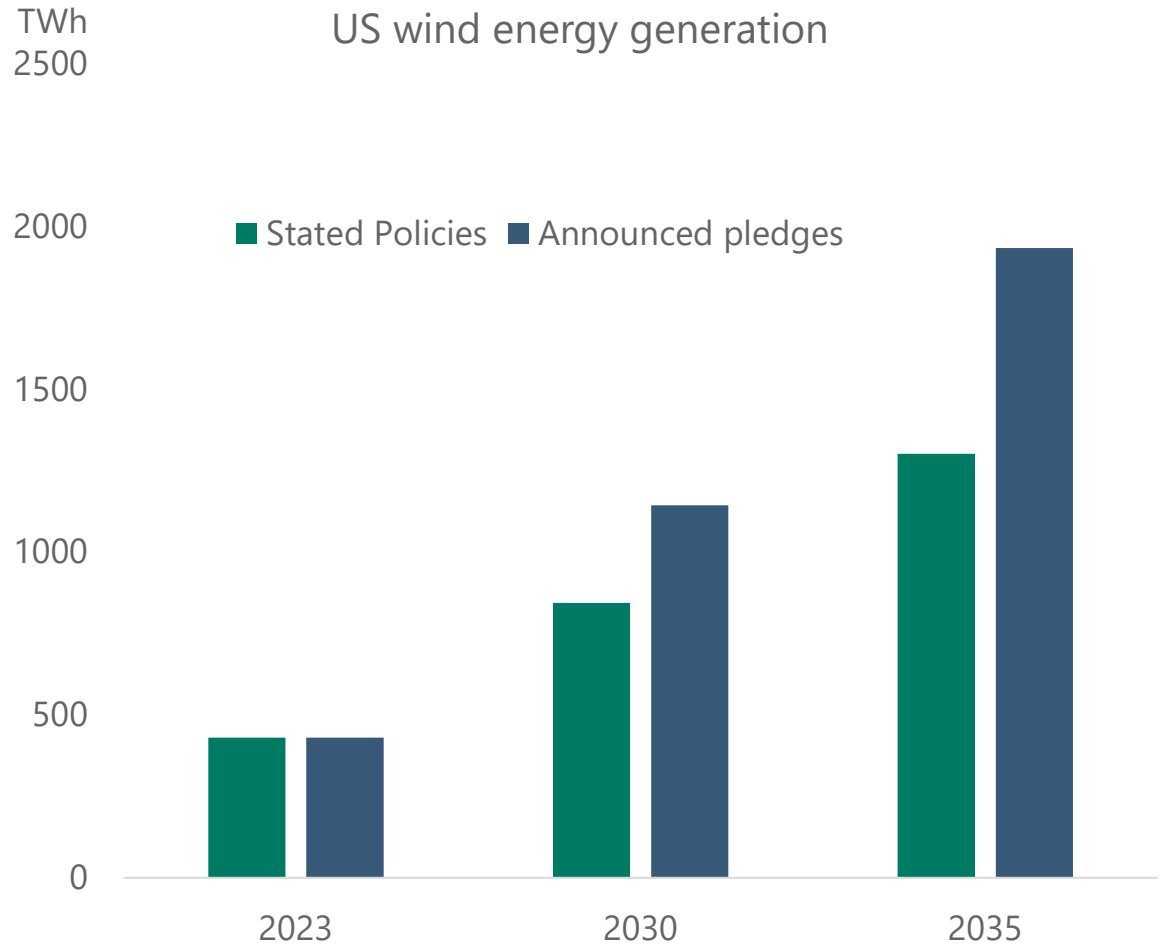
IEA forecasts of wind generation





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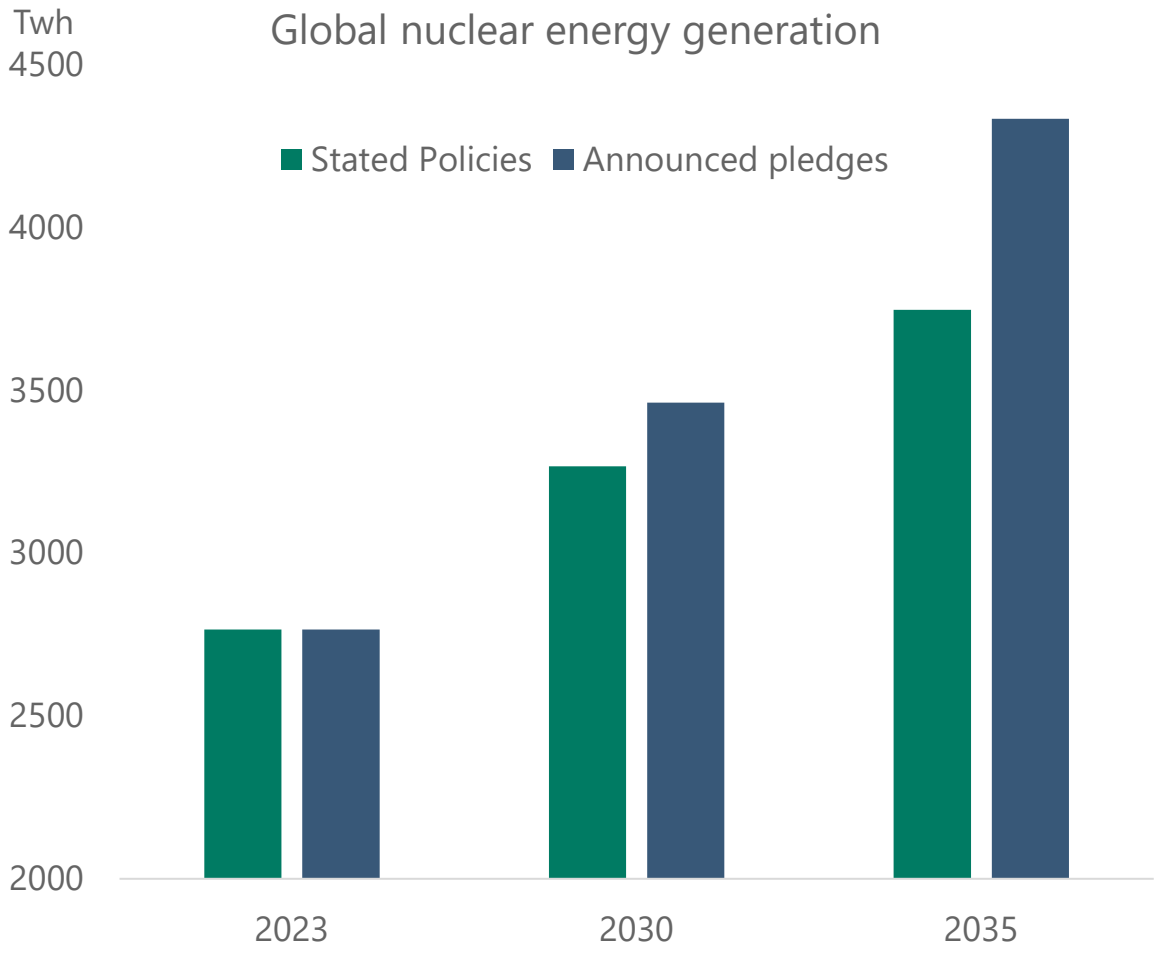

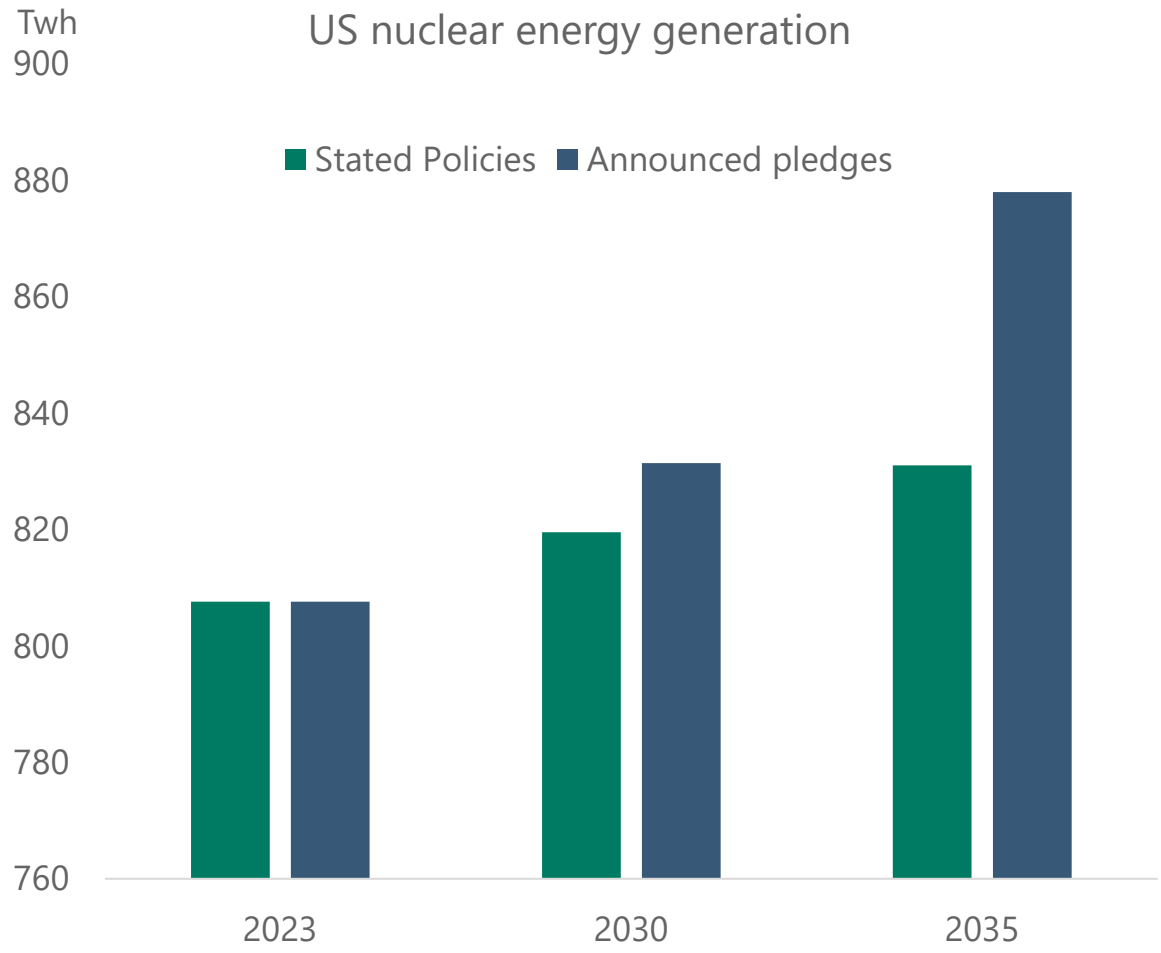

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Types of industrial policies:

1) Place-based industrial policies, to help people in low-income regions where manufacturing jobs may have been lost

2) National security-motivated industrial policies, to make sure that important technology and semiconductors are produced domestically

3) Green industrial policies, to support the energy transition

OECD (2024): "*Industrial policies can play a role in addressing important economic, social and environmental challenges that markets cannot deal with on their own. When they are successful, industrial policies can bring large benefits for the nation concerned.*"

Source: Apollo Chief Economist, OECD

References:

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The New Economics of Industrial Policy
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Trade Spillovers of Domestic Subsidies
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Source: Apollo Chief Economist

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Torsten Slok joined Apollo in August 2020 as Chief Economist and he leads Apollo's macroeconomic and market analysis across the platform.

Prior to joining, Mr. Slok worked for 15 years as Chief Economist at Deutsche Bank where his team was top ranked in the annual Institutional Investor survey for a decade. Prior to joining Deutsche Bank Mr. Slok worked at the IMF in Washington, DC and at the OECD in Paris.

Mr. Slok has a Ph.D in Economics and has studied at the University of Copenhagen and Princeton University.