Southeast-Western LAMPAC Fall Conference

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Nashville, Tennessee

National Energy Issues

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What do we want?

- Decarbonize our economy
- End our dependence on oil and gas
- Cheapest possible gasoline and heating oil
- No reliance on petrodictators
- No new oil and gas pipelines or transmission lines

Energy Transitions

- Biomass → coal → oil → renewables?
- Transitions take a long time
- Successor to the Age of Oil: Age of Natural Gas? Age of Renewables? Age of Nuclear?
- “All of the Above”?
- Back to the future?

“The Future is Electric”

> Prices on electric cars will continue to drop until they're within reach of the average family.

The Washington Post, 1915

Images: BMW, Detroit Electric, 2015, courtesy of EVASD

1912 EV Charging Station

Energy Trends and Uncertainties

- De-carbonization
- Electrification of everything
- Integrating intermittent resources into the grid
- Centralized power → customer-generated power
- Subsidize uneconomic power plants?
- No direct price on carbon
- Is gas the next coal?

Energy Trends and Uncertainties

(cont'd)

- Bans on natural gas
- Net zero by 2050
- Supply chain challenges
- Tariffs/trade issues; CBAM
- Domestic supply of critical minerals
- Cybersecurity threats
- ESG, DEI, EJ

Energy Trends and Uncertainties

(cont'd)

- Politics of climate change:
  - 1997: Hagel-Byrd resolution (95-0)
  - 1998: Clinton signs Kyoto Protocol
  - 2016: Obama signs Paris Agreement 2016
  - 2017: Trump withdraws U.S. from Paris Agreement
  - 2021: Biden rejoins Paris Agreement
  - 2025? Trump says he will withdraw

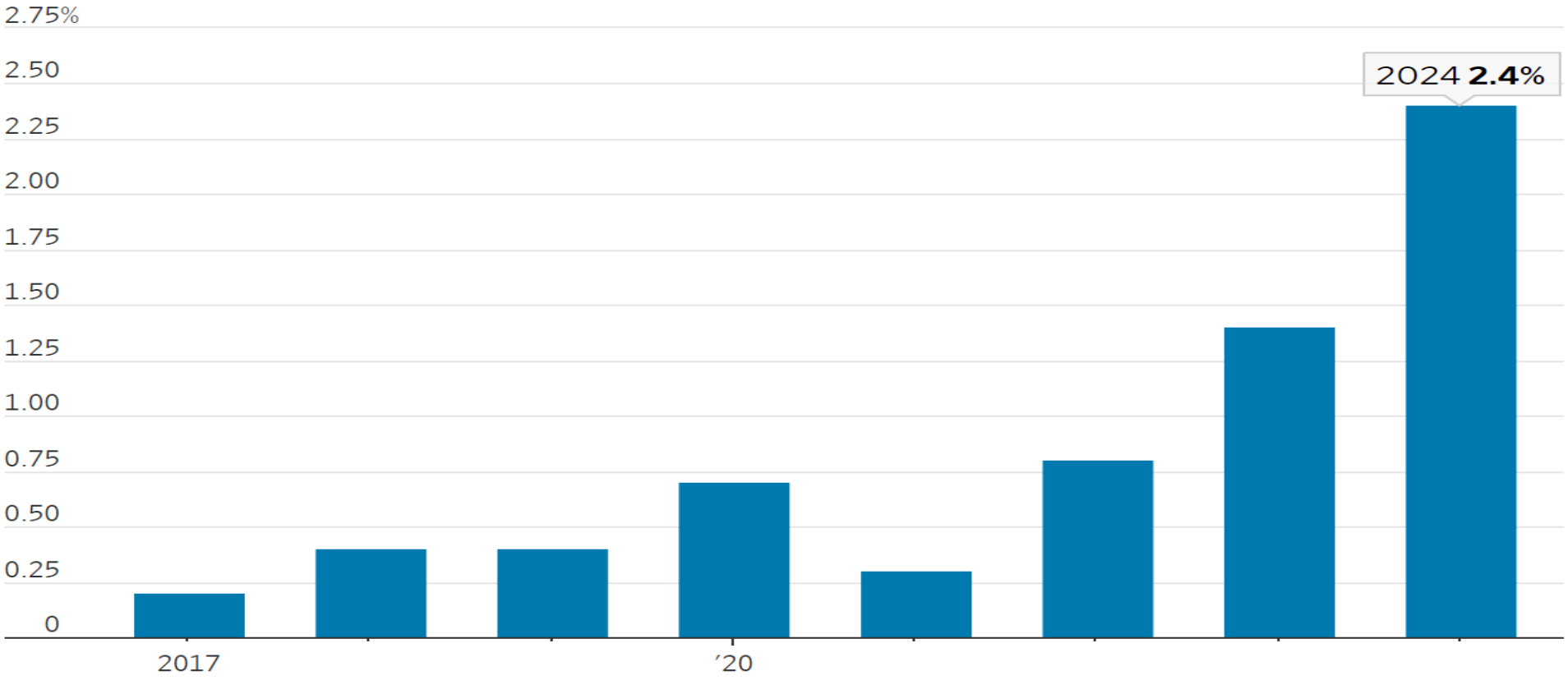
Energy Trends and Uncertainties

(cont'd)

- Surge in power demand
- Energy storage
- Role of A.I.
- Wildfires
- Impact of IIJA and IRA
- 2025 debate over the Tax Credit and Jobs Act
- Does the U.S. have a national energy policy?

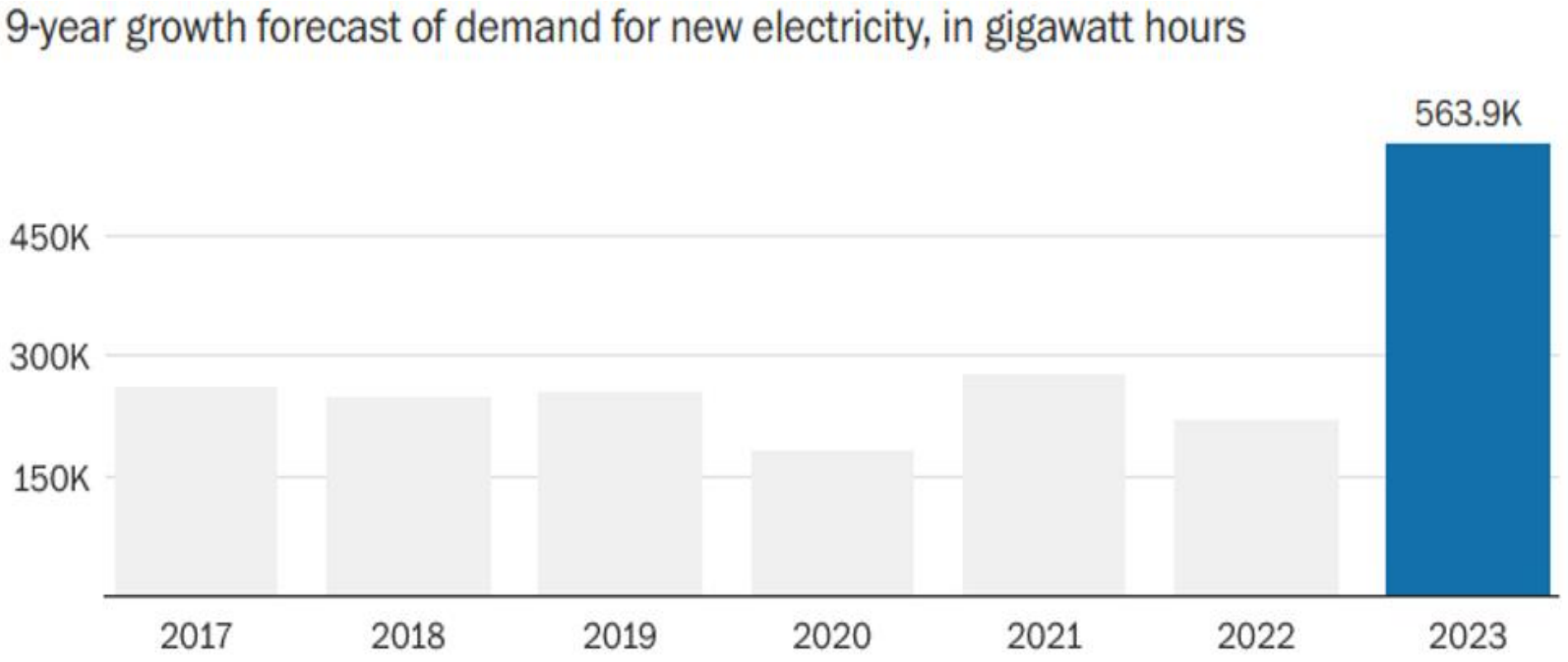
PJM 10-year Growth Forecast

PJM Interconnection's yearly forecast on how much electricity demand is expected to grow each year over the next 10 years

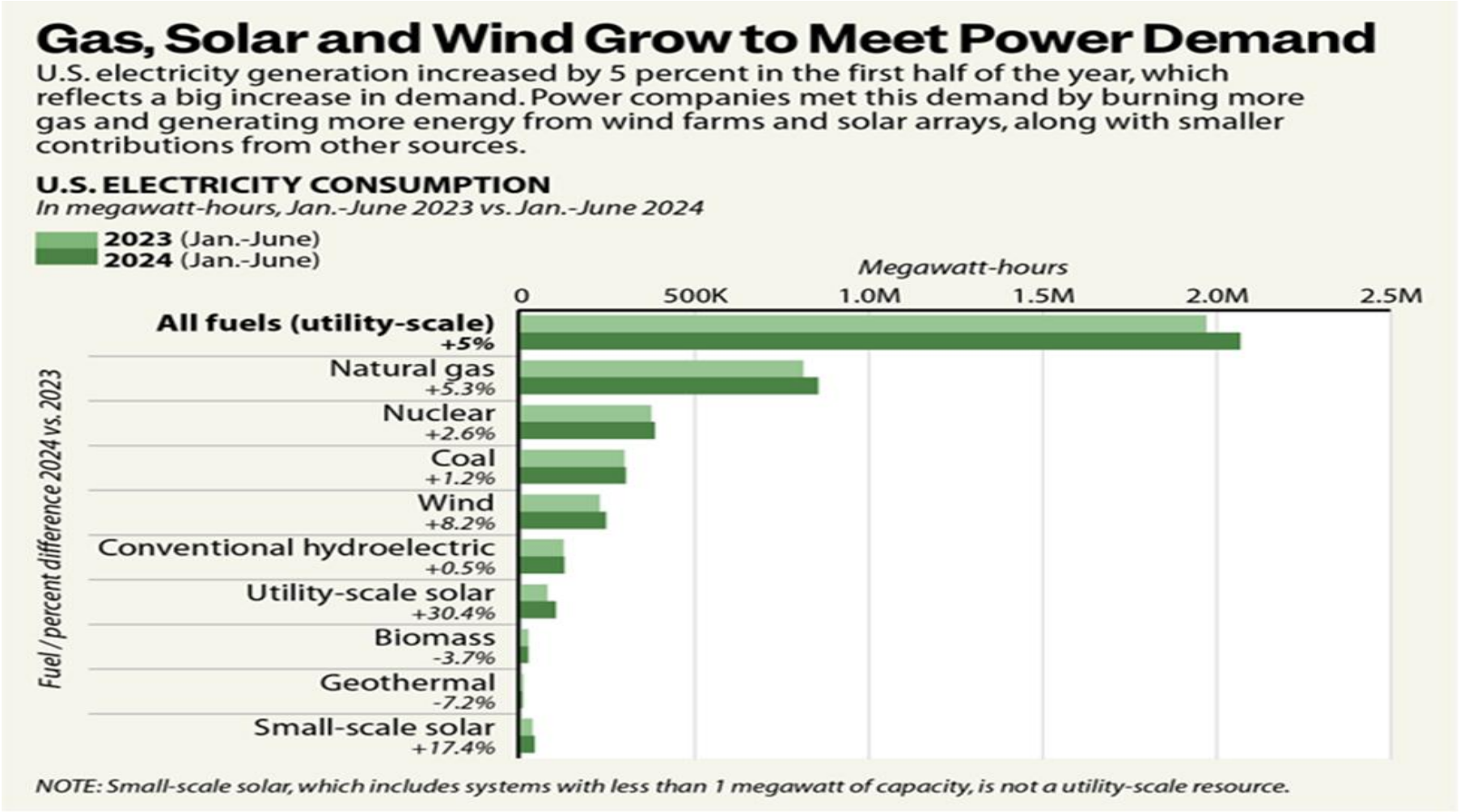


Source: PJM Interconnection

9-year North America Growth Forecast



Gas, solar and wind growth 2024



New power plants 2024

Solar, Batteries Dominate New Power Plants

Solar and battery storage systems lead in the number and generating capacity of new power plants that went online from January to July of this year.

U.S. POWER PLANTS

New generating units and capacity in megawatts, Jan.-July 2024

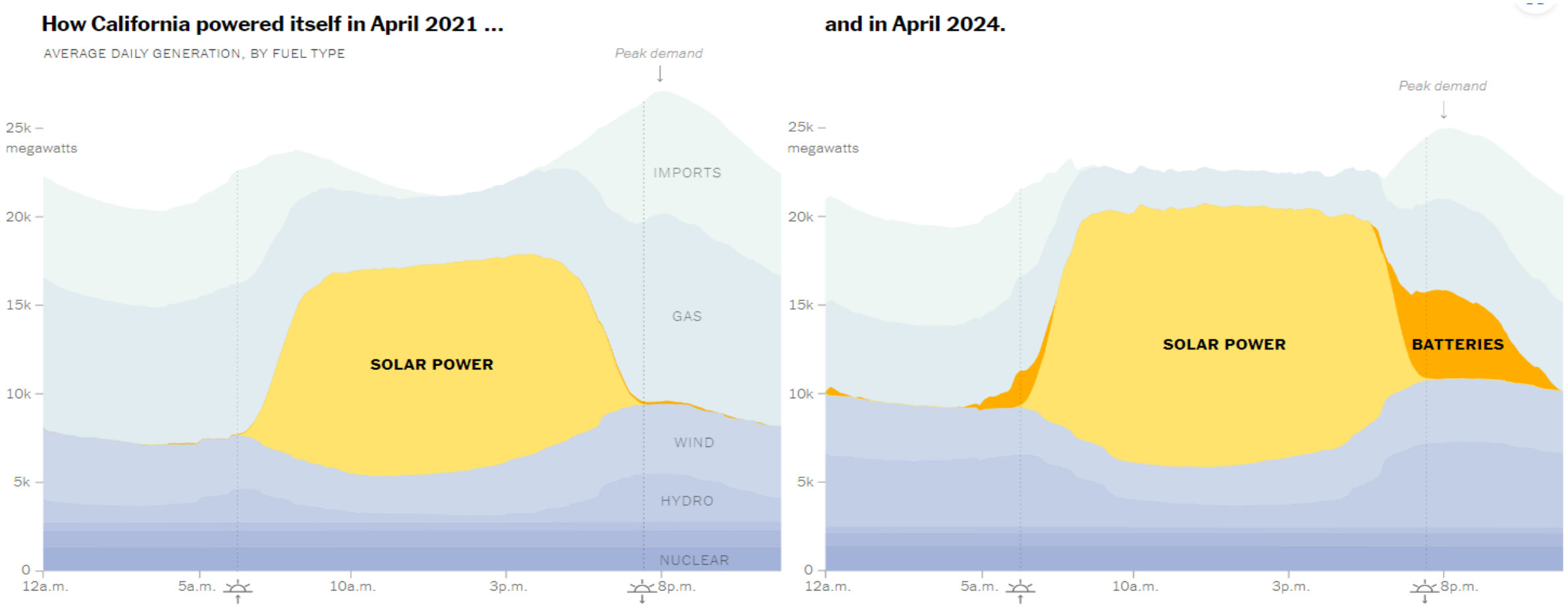
	Number of new generating units	Capacity (megawatts)
Solar photovoltaic	243	12,786.1
Batteries	75	4,996.9
Onshore wind turbine	17	3,034.6
Natural gas fired combustion turbine	13	1,121.8
Nuclear	1	1,114
Offshore wind turbine	1	130
Natural gas internal combustion engine	14	113.9
Petroleum liquids	6	14.7
Other natural gas	5	14
TOTAL	**375**	**23,326**

NOTE: Many power plants have more than one generating unit.

SOURCE: EIA

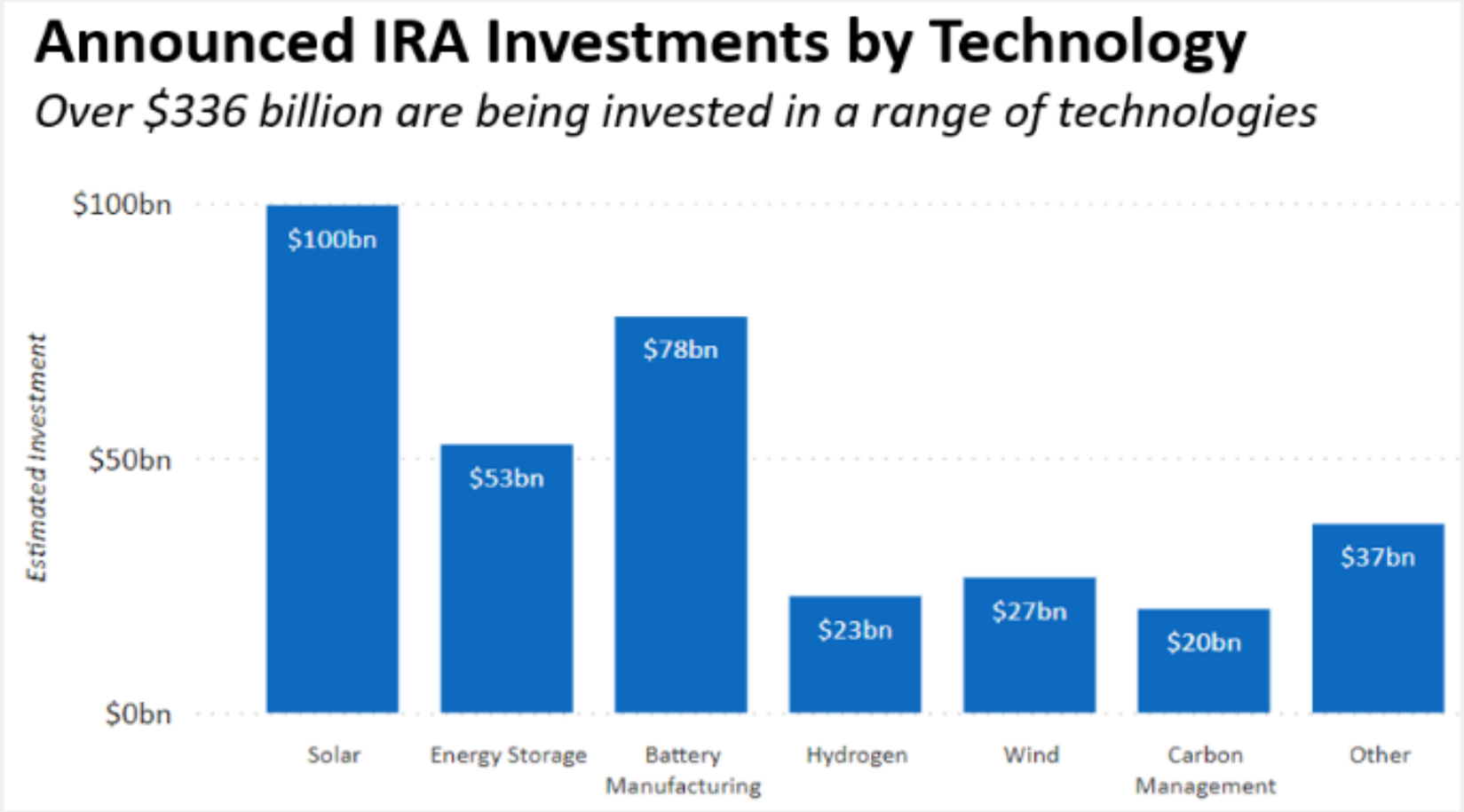
PAUL HORN / Inside Climate News

California Average Daily Generation by Fuel Type, 2021 vs. 2024



Source: California Independent System Operator via Grid Status · Please see the bottom of this page for notes. · By The New York Times

How has the IRA fared since enactment in 2022?



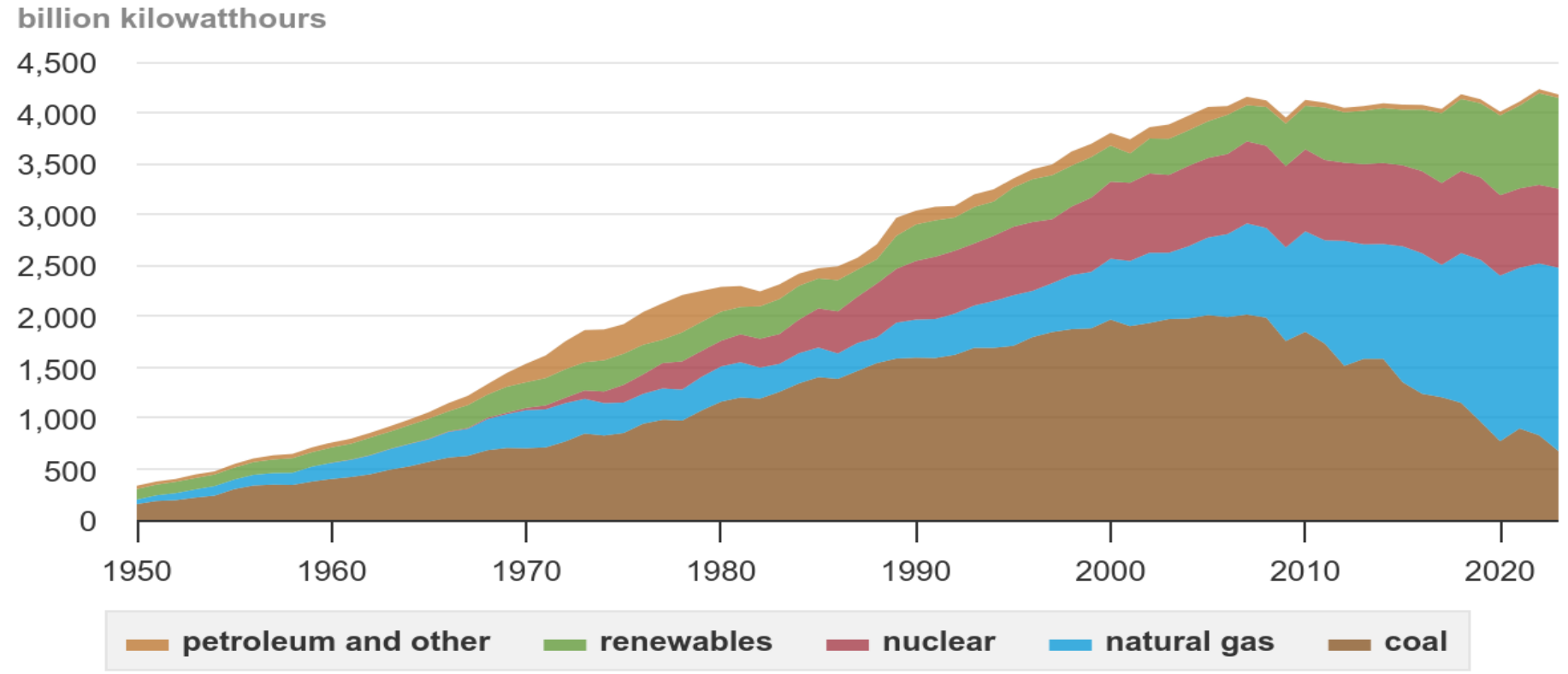
Source: Rhodium Group/Clean Investment Monitor (CIM)

Investment is Leading to Jobs

Dollars are flowing to these industries at all levels, including manufacturing, transportation, and sales.

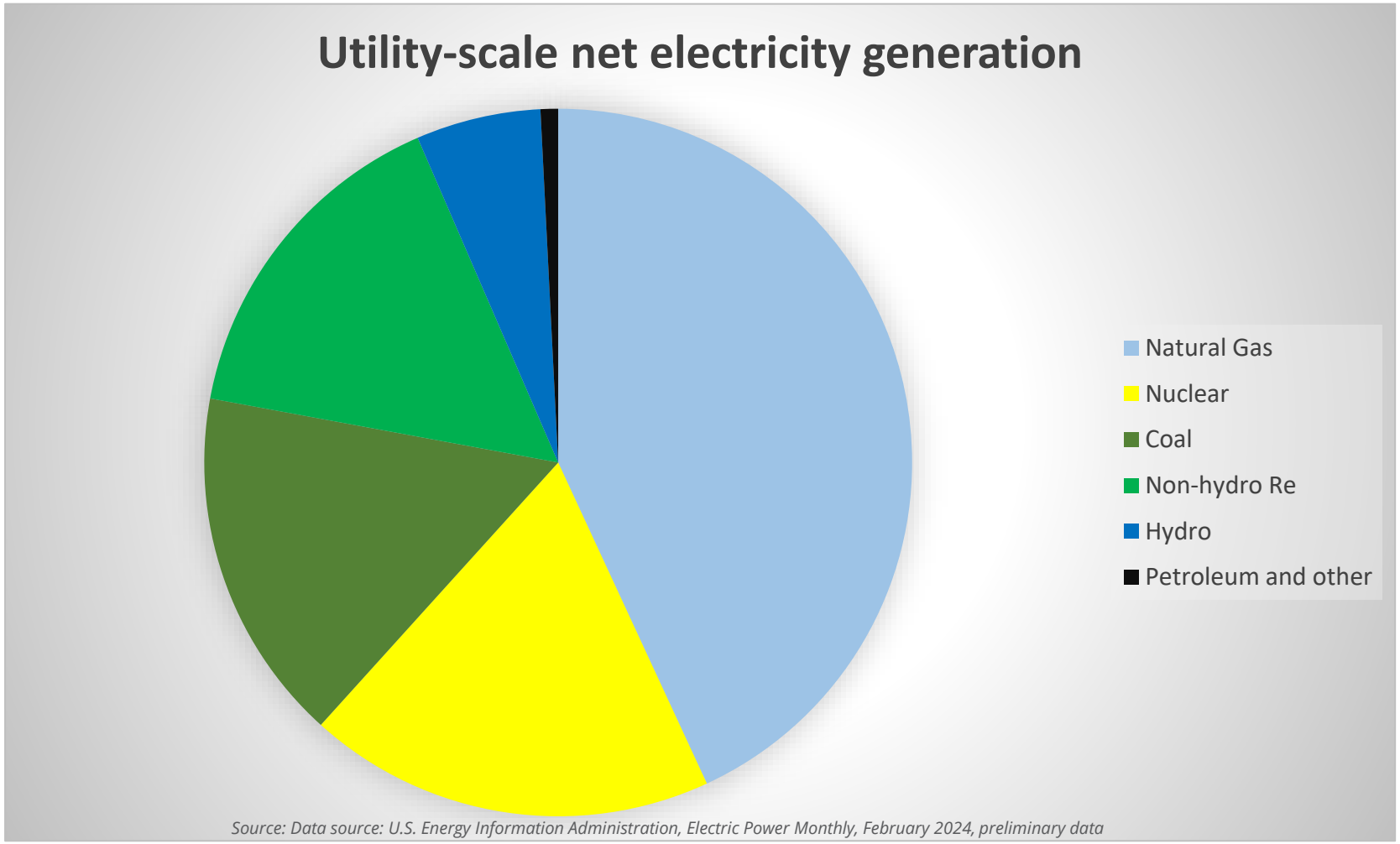
These investments are generating long-term economic growth for the whole country and creating jobs in underserved communities.

U.S. Electricity Generation 1950-2023

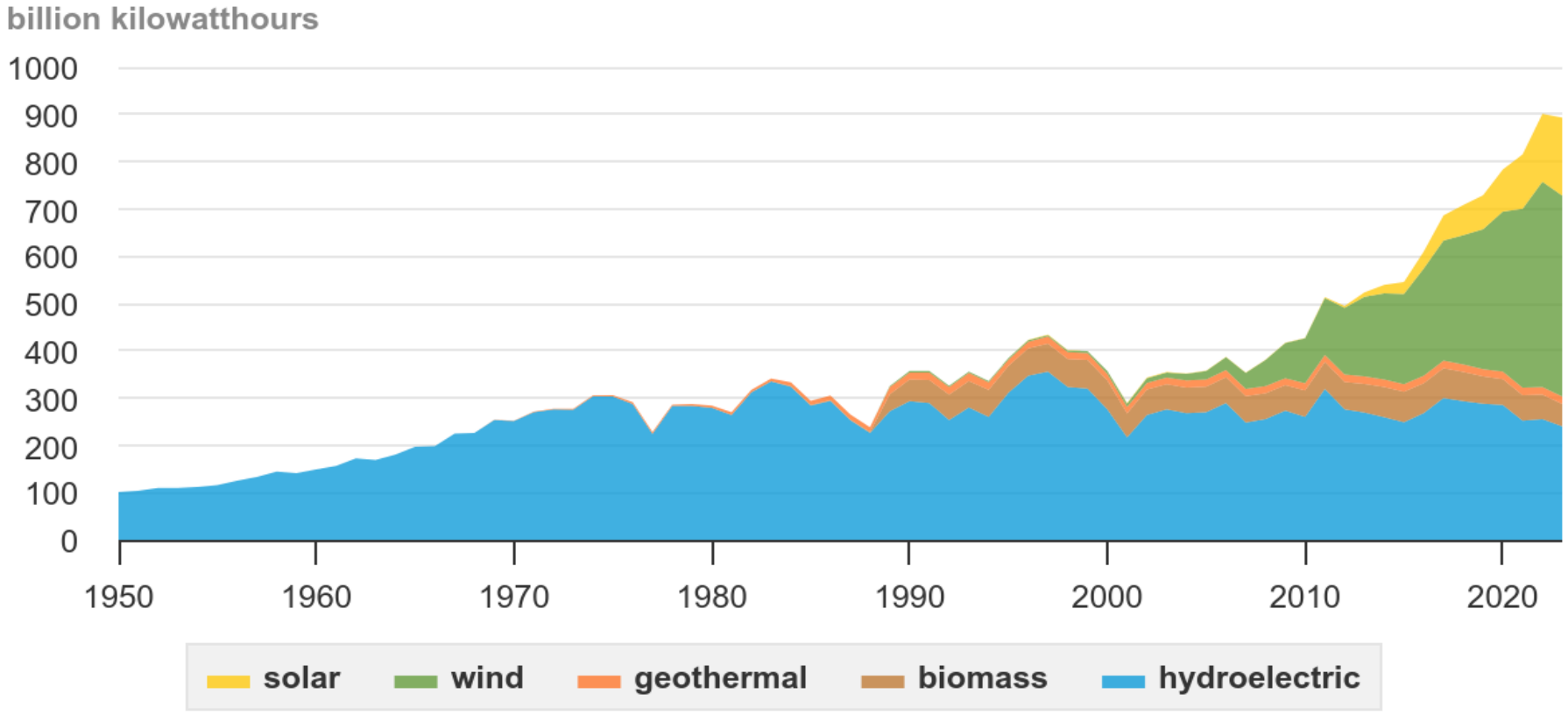


Data source: U.S. Energy Information Administration, *Monthly Energy Review* and *Electric Power Monthly*, February 2024, preliminary data for 2023
Note: Includes generation from power plants with at least 1 megawatt electric generation capacity.

Electricity Generation by Source 2023



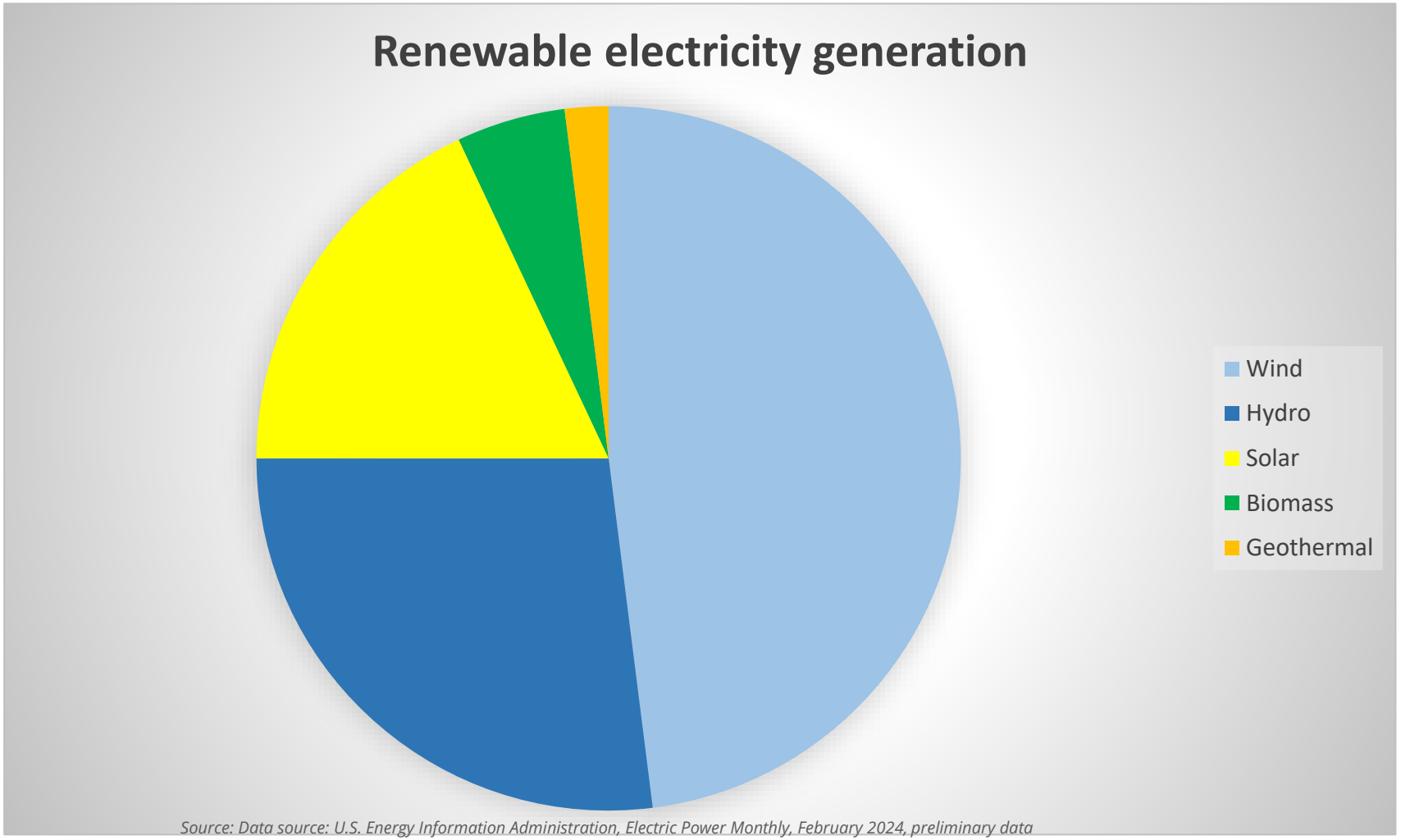
U.S. Renewable Generation 1950-2023



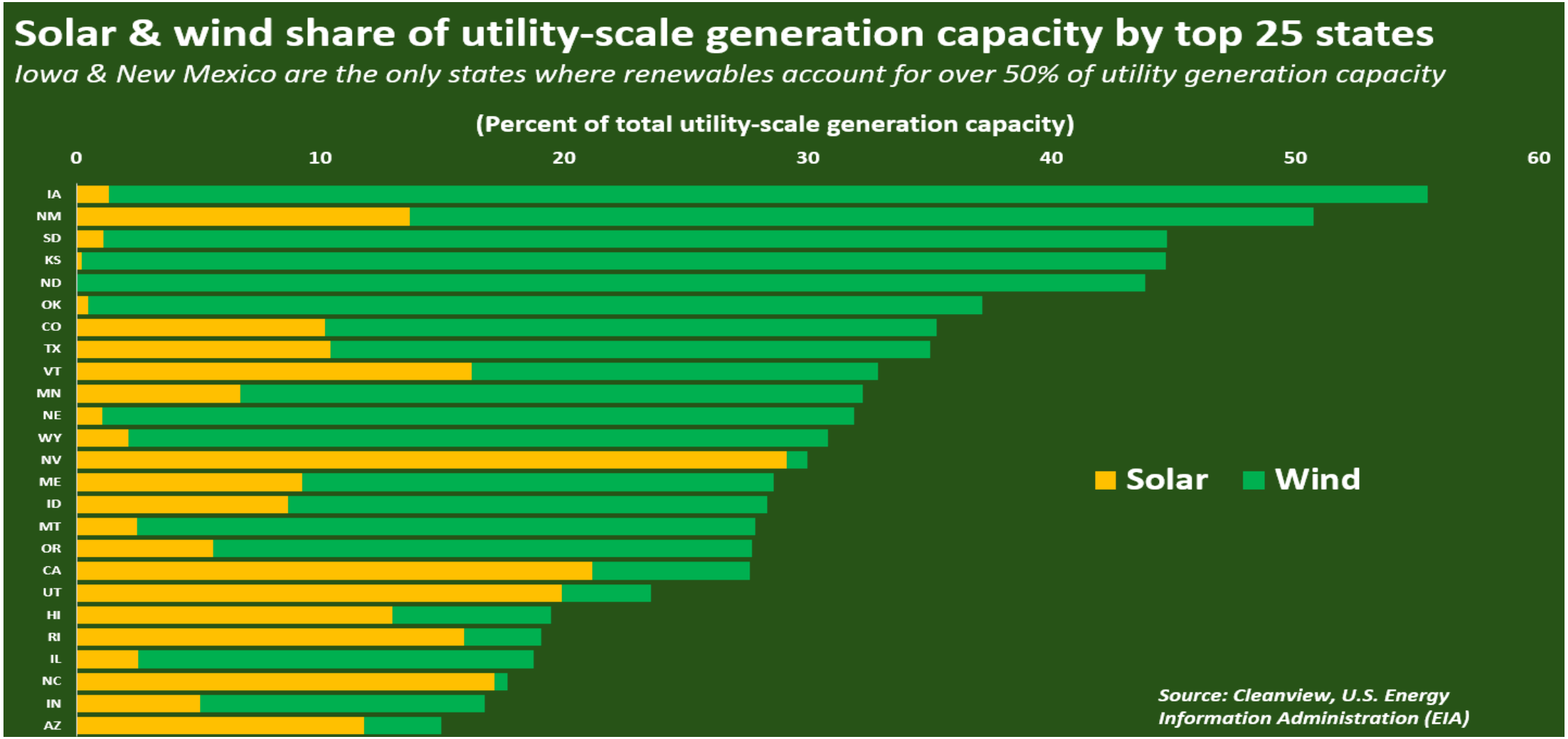
Data source: U.S. Energy Information Administration, *Monthly Energy Review* and *Electric Power Monthly*, February 2024, preliminary data for 2023

Note: Includes generation from power plants with at least 1 megawatt electric generation capacity. Hydroelectric is conventional hydropower.

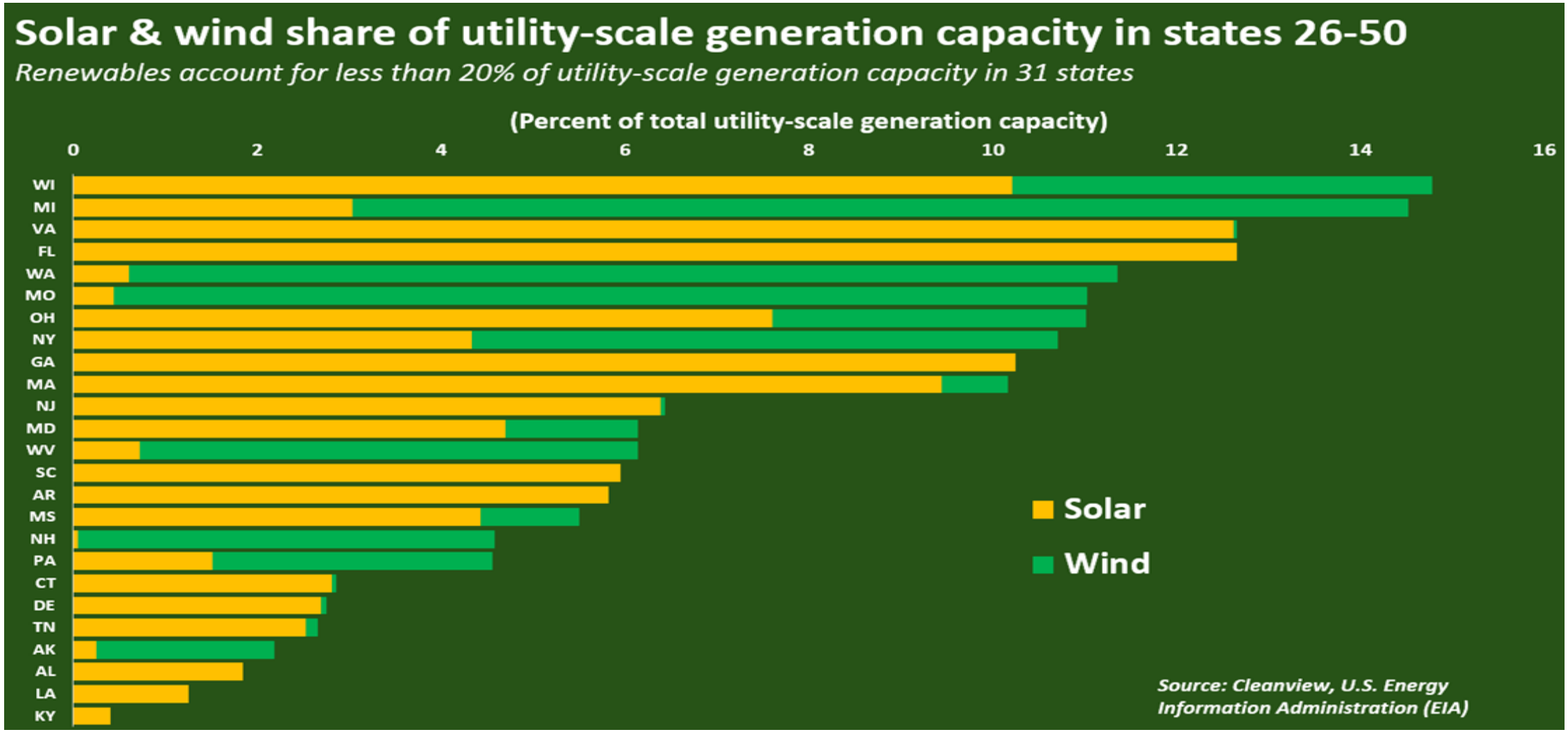
Renewable Generation by Source, 2023



Top 25 States – Wind and Solar Procurement



Bottom 25 States – Wind and Solar Procurement



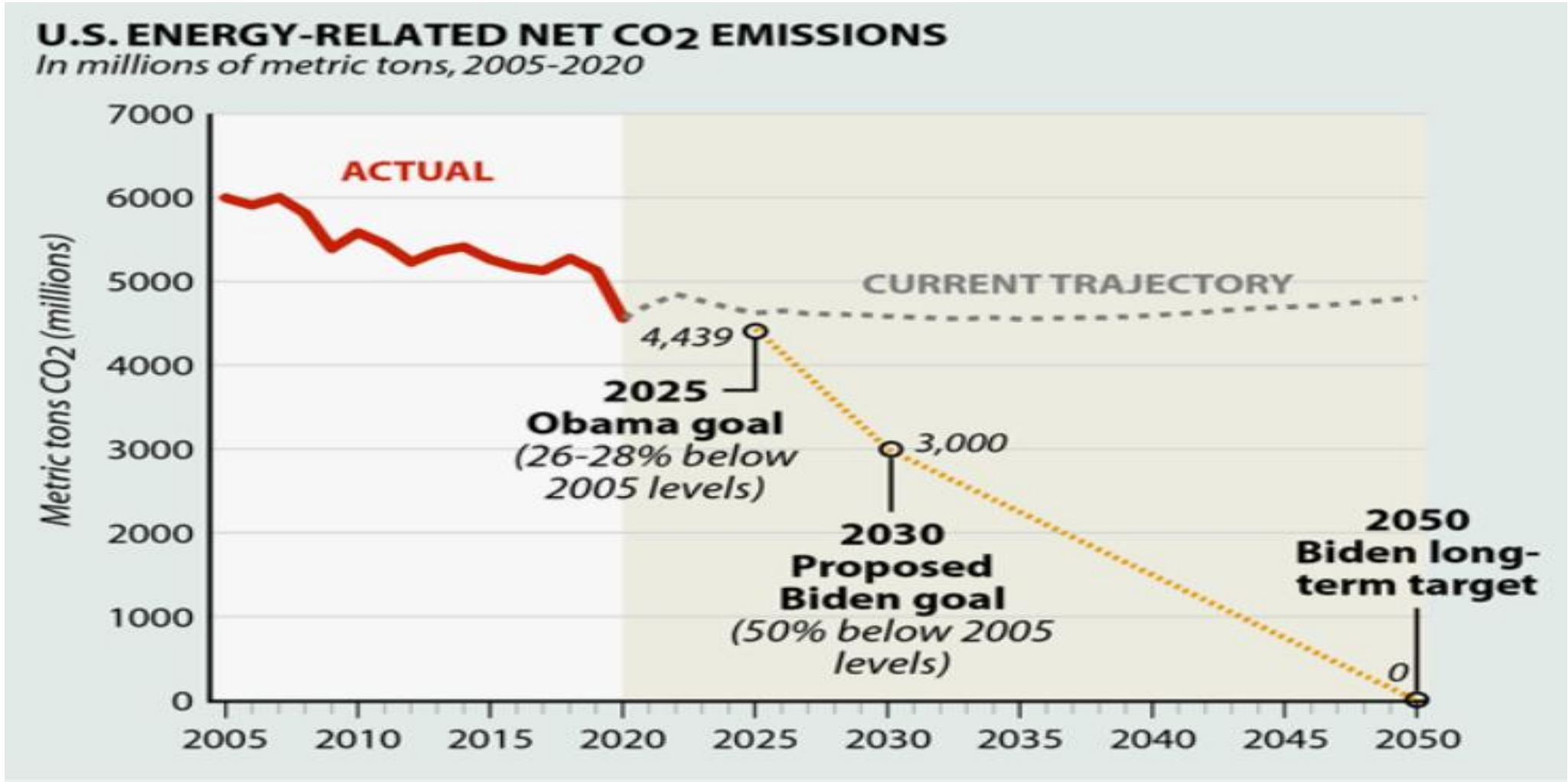
U.S. renewable energy growth - drivers

- Long-term improvements in cost-effectiveness
- Substantial and growing demand from residential customers and companies and increased deployment
- Aggressive state and local renewable portfolio standard
- Supportive tax policy

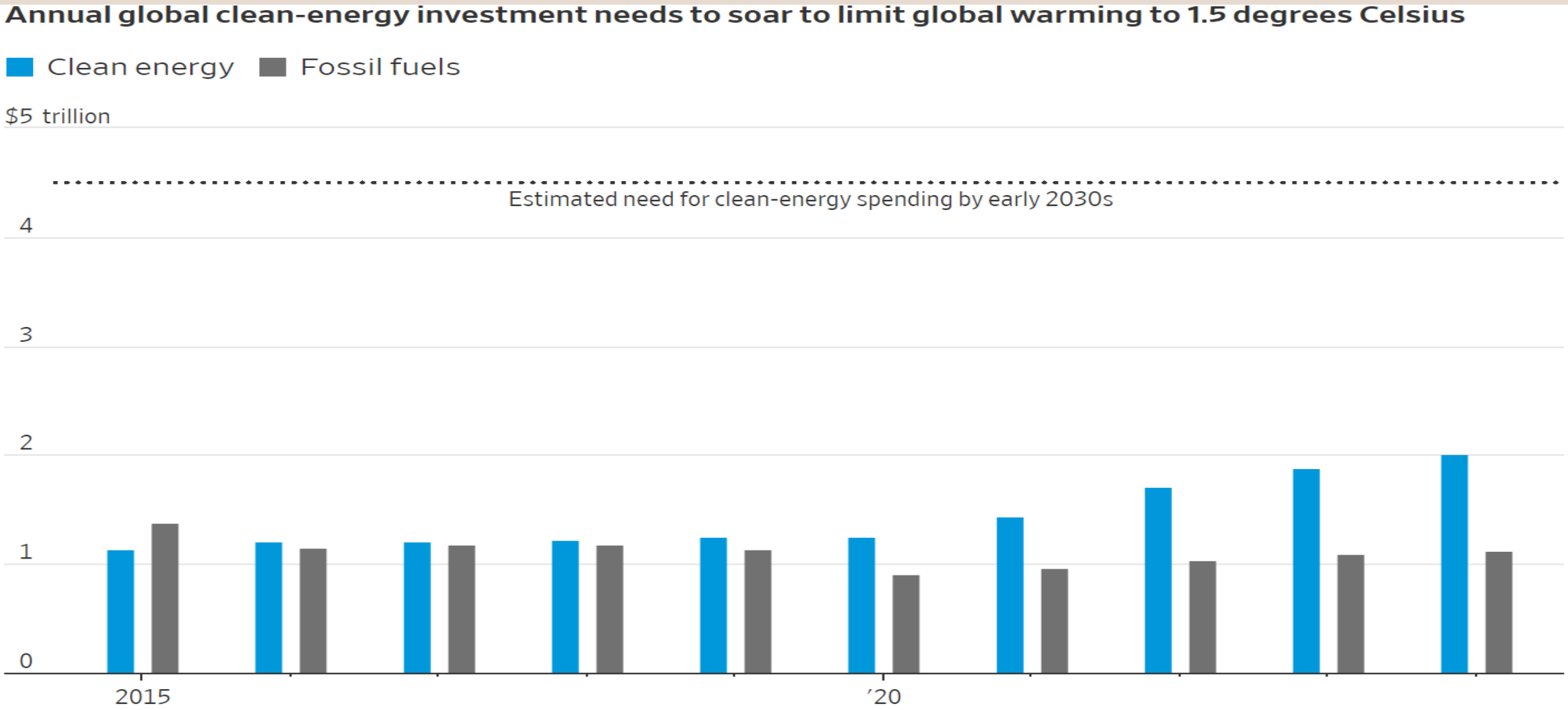
Headwinds impeding the pace of renewable energy growth

- Supply chain issues
- Trade policy – tariffs
- Growing interconnection backlog
- Transmission constraints and dysfunctional planning
- Siting and permitting obstacles
- Workforce limitations

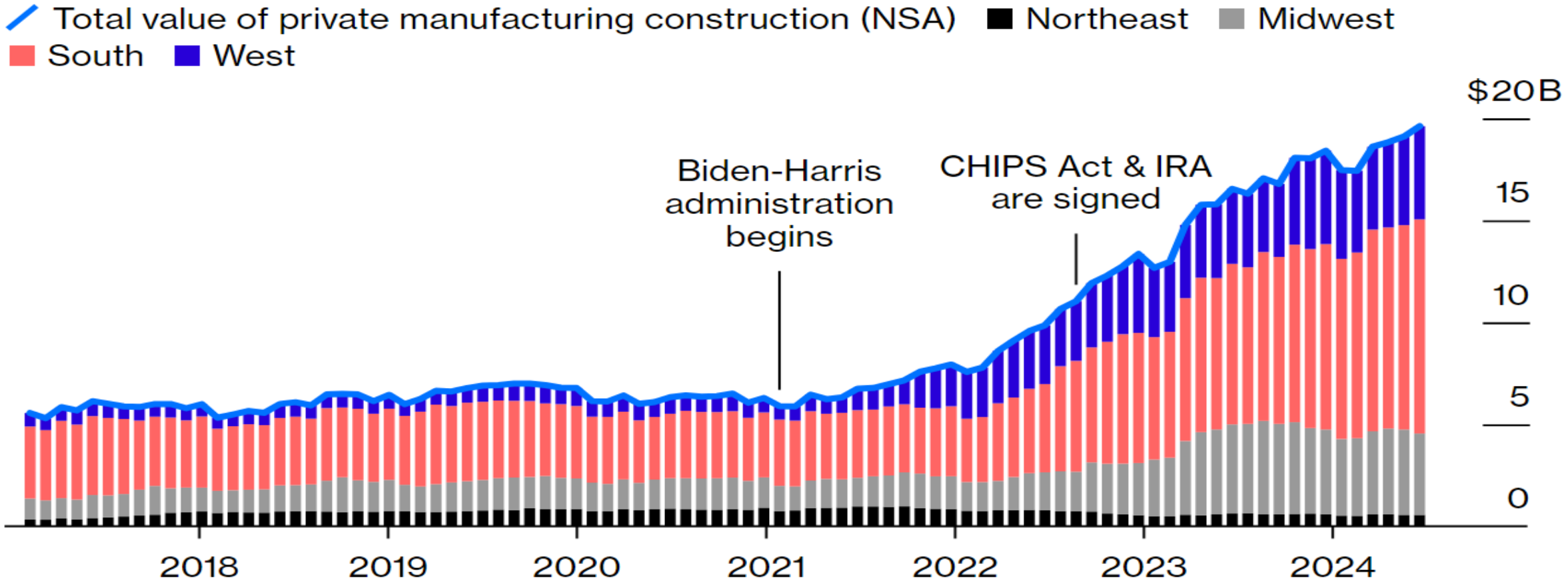
The Challenge



New clean energy investments

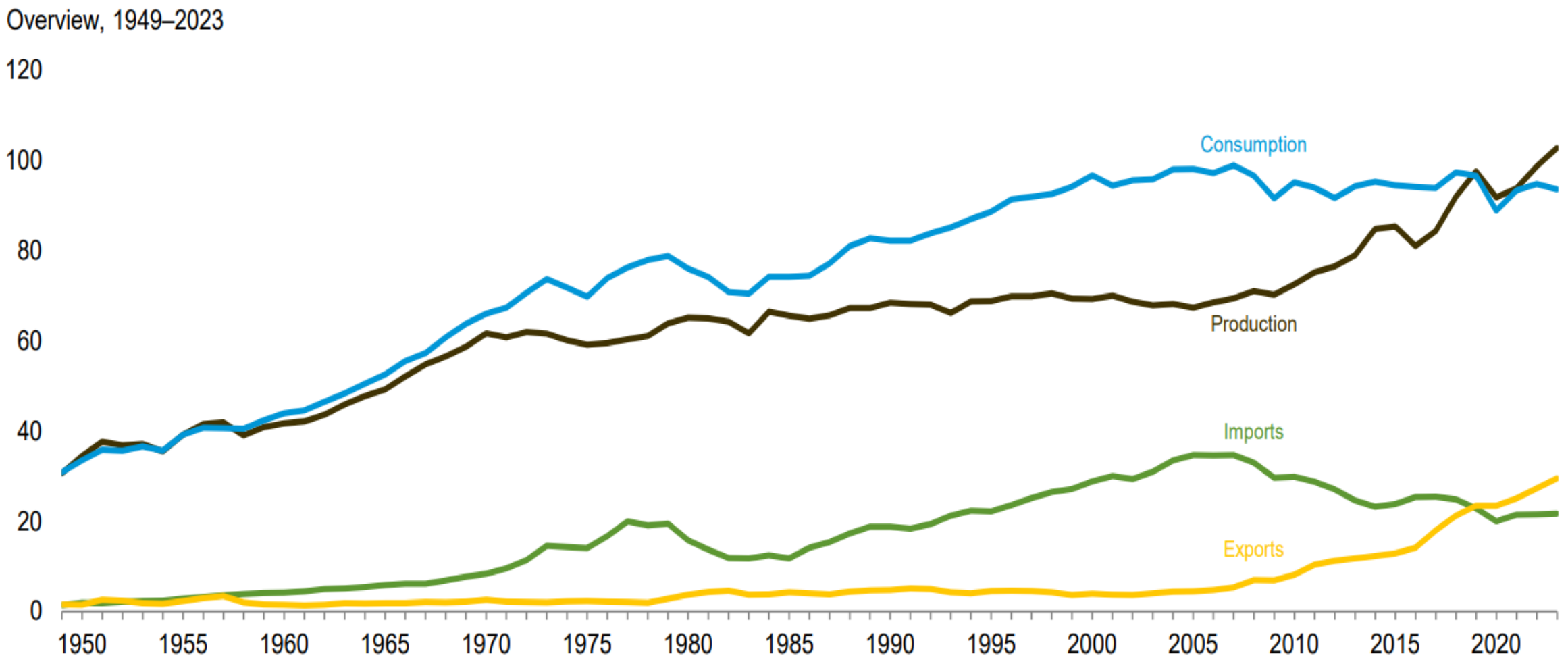


Manufacturing construction boom

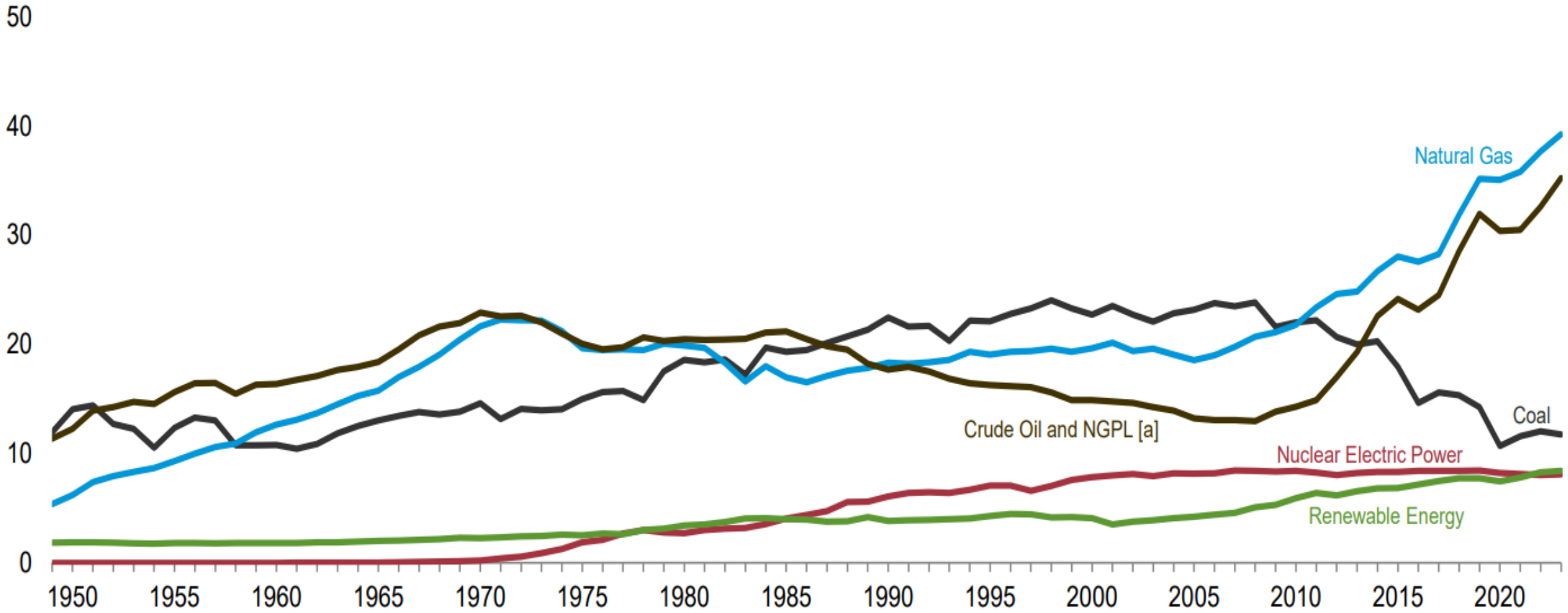


Source: US Census Bureau
Note: June 2024 figures are preliminary

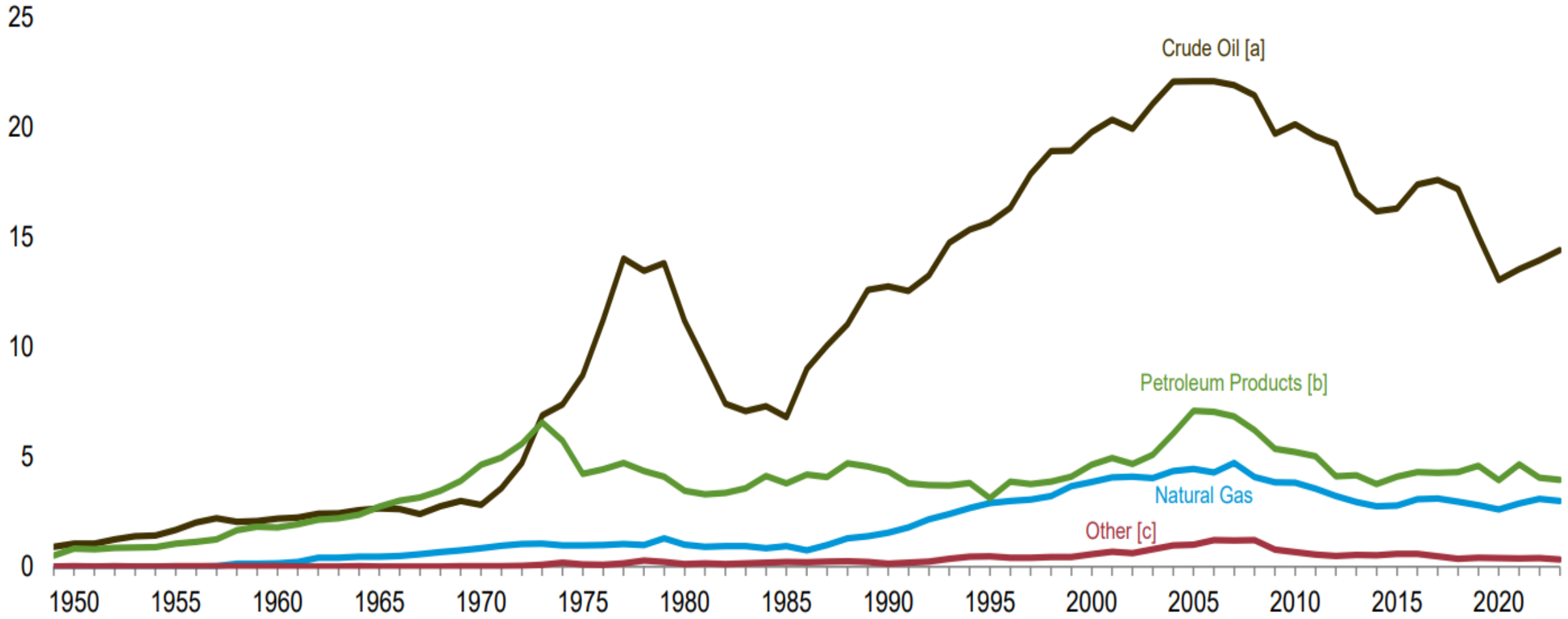
Energy overview 1949-2023 (quadrillion BTUs)



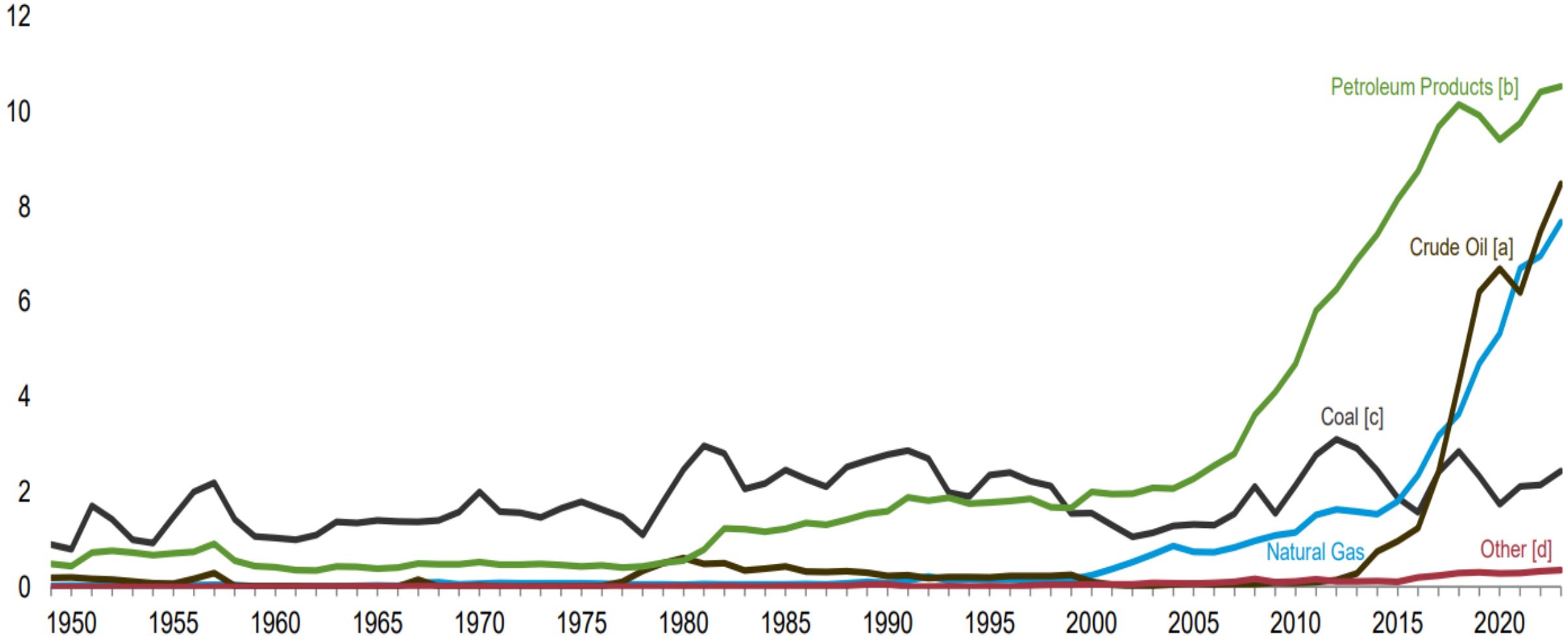
Overall energy production 1949=2023 (quadrillion BTUs)



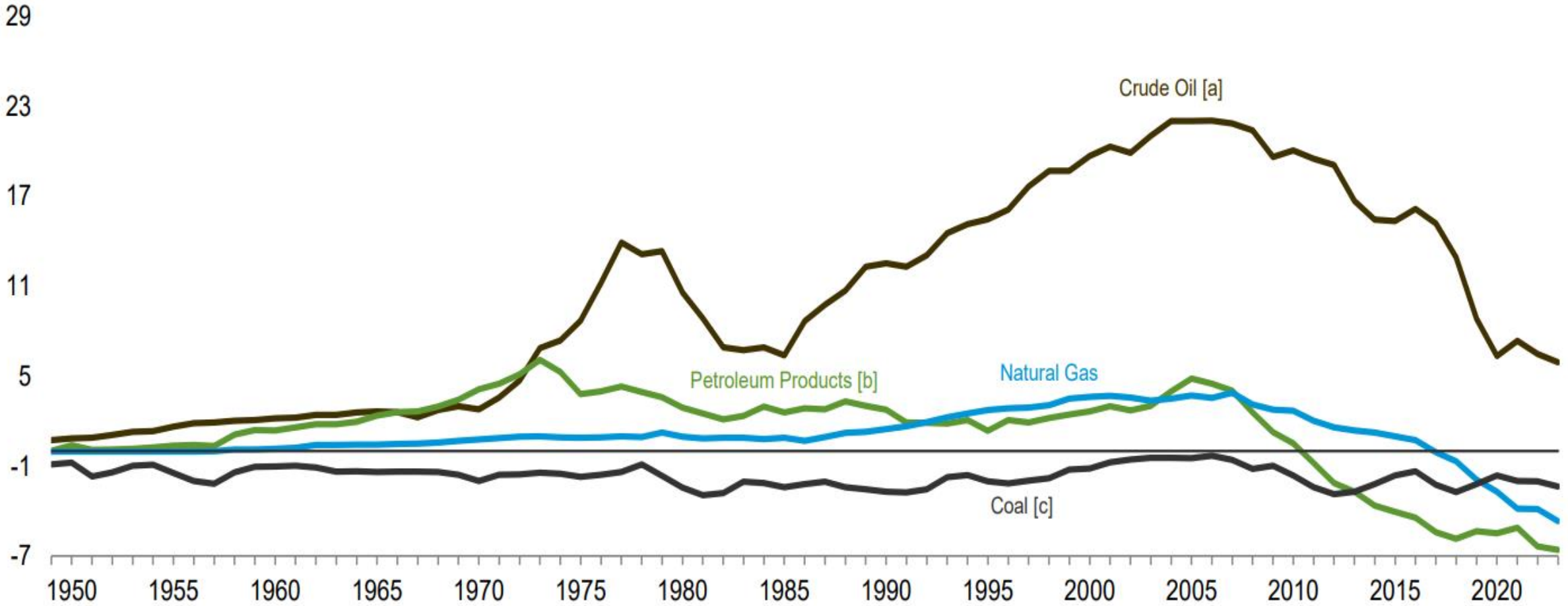
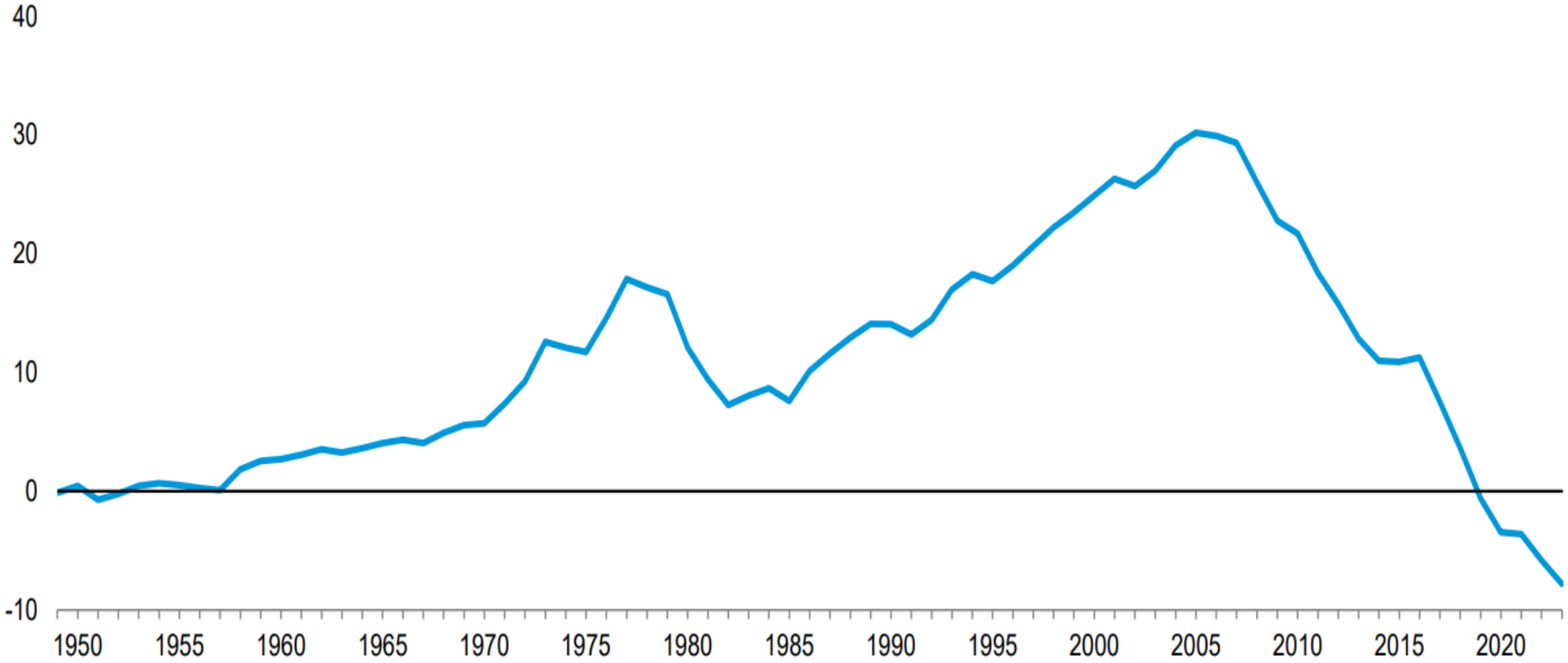
Energy imports 1949-2023 (quadrillion BTUs)



Energy exports 1949-2023 (quadrillion BTUs)



Net energy imports 1949-2023 (detail)



Net energy imports 1949-2023