

AEO2021 Macro-Industrial Working Group: *Updates and preliminary results*



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By

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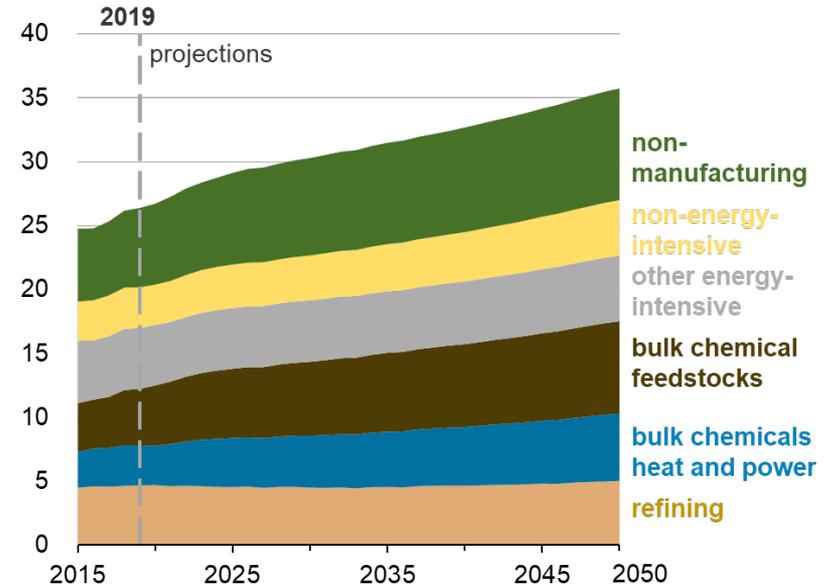
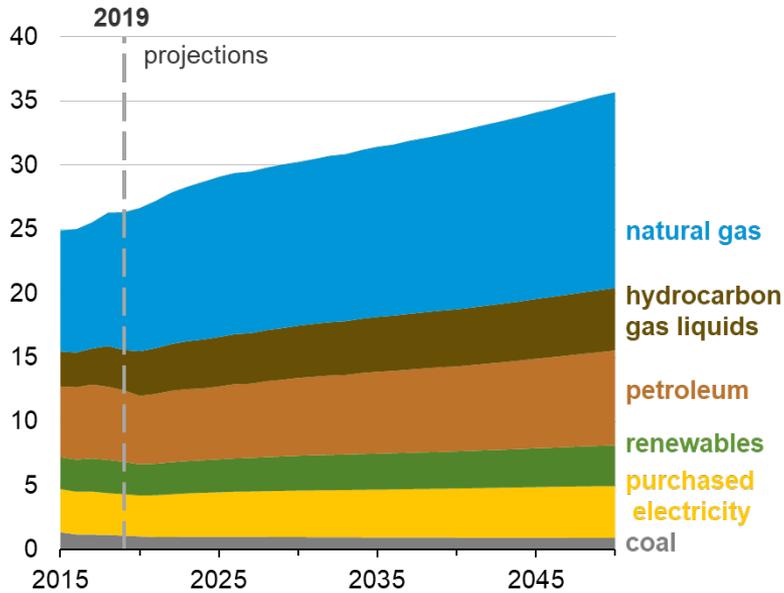
AEO2021 Macro-Industrial Working Group: Overview

- Review of AEO2020
- AEO2021 macro updates and preliminary results
- AEO2021 industrial updates and preliminary results
- Longer-term plans for industrial modeling
- Discussion & questions

Review of Industrial AEO2020 results

Industrial sector energy consumption increases fastest for natural gas and hydrocarbon gas liquids in the AEO2020 Reference case, and bulk chemicals and nonmanufacturing are the fastest-growing industries in the sector

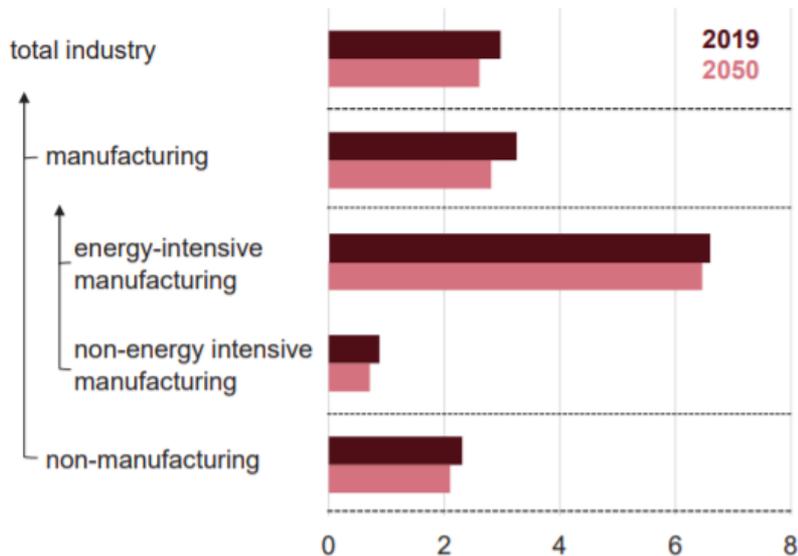
Industrial energy consumption by energy source and subsector (AEO2020 Reference case)
quadrillion British thermal units



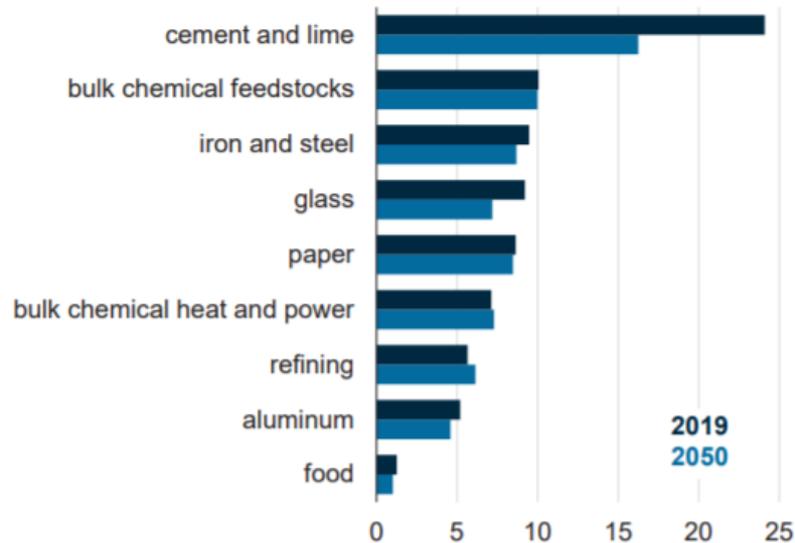
Source: U.S. Energy Information Administration, Annual Energy Outlook 2020

In the AEO2020 Reference case, energy intensities decline in most heavy industries, reflecting industrial capital stock turnover and adoption of new, more energy-efficient technologies

Energy intensity by subsector (AEO2020 Reference case)
trillion British thermal units per billion 2012 dollar shipments



Energy-intensive manufacturing (AEO2020 Reference case)
trillion British thermal units per billion 2012 dollar shipments

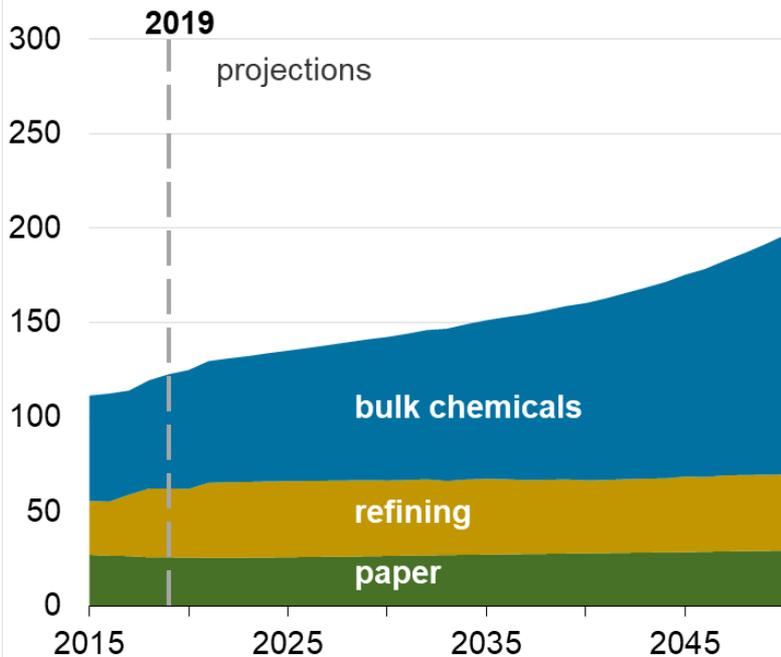


Source: U.S. Energy Information Administration, Annual Energy Outlook 2020

Self-generation from combined heat and power (CHP), especially for bulk chemicals, accounts for most AEO2020 Reference case growth in industrial sector electricity consumption as quantities of purchased electricity remain fairly flat

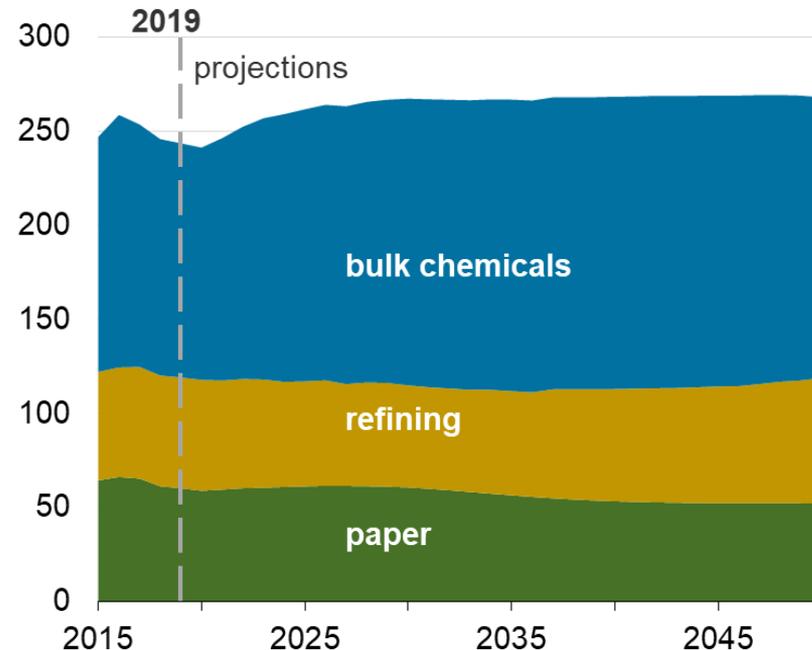
CHP generation

billion kilowatthours



Purchased electricity consumption

billion kilowatthours



Source: U.S. Energy Information Administration, Annual Energy Outlook 2020

AEO2021 updates and preliminary results

AEO2021 and COVID-19

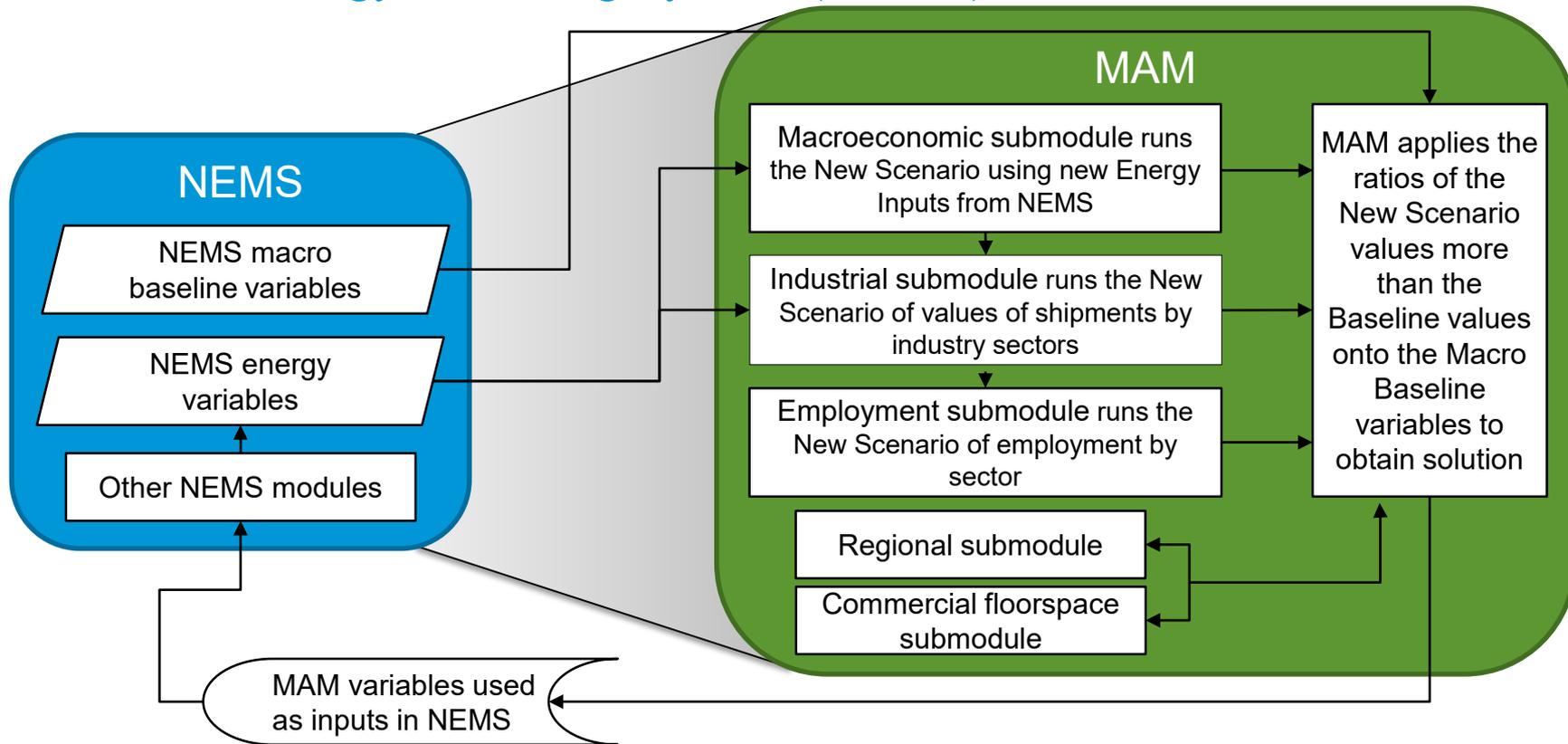
- AEO2021 will reflect updated macroeconomic projections (GDP and industrial shipments) that underlie industrial energy consumption
- STEO forecast incorporates short-term impacts of COVID-19 on broad industrial energy consumption for coal, natural gas, and purchased electricity.
- EIA released a *Trends and Expectations Report* which describes the impact of the pandemic on the energy sector and identifies key issues that are being considered in the development of AEO2021:
https://www.eia.gov/outlooks/aeo/trends_expectations.php
- EIA will host a series of workshops on the near- and long-term impacts on energy markets, with the macro and demand workshop on September 25 at 1:00 PM EST. See: https://www.eia.gov/outlooks/aeo/workshop/energy_markets/

Key preliminary macro results

- Preliminary AEO2021 real GDP grows an average of 2.1% per year from 2020 to 2050, up two tenths of a percent from AEO2020.
- Average growth of consumption is 2.4% over the projection period in AEO 2021 as compared to 2.0% in AEO2020.
- Business investment is projected to grow 3.0% per year from 2020 to 2050 in the AEO2021, up five tenths from AEO2020.
- Growth of nonfarm business productivity averages 1.6% over the projection period as compared to 1.5% in the AEO2020.

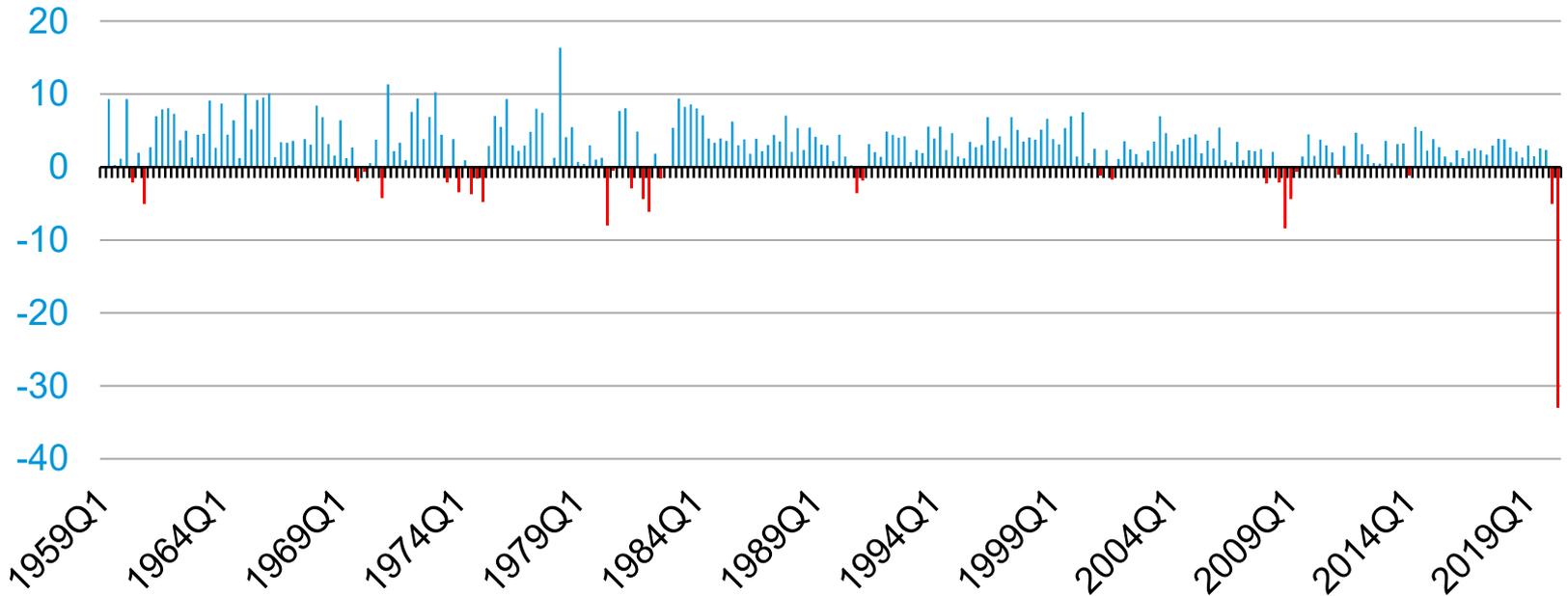
Source: AEO2021 Preliminary run and AEO2020 Reference run

Summary of the Macroeconomic Activity Module (MAM) in the National Energy Modeling System (NEMS)



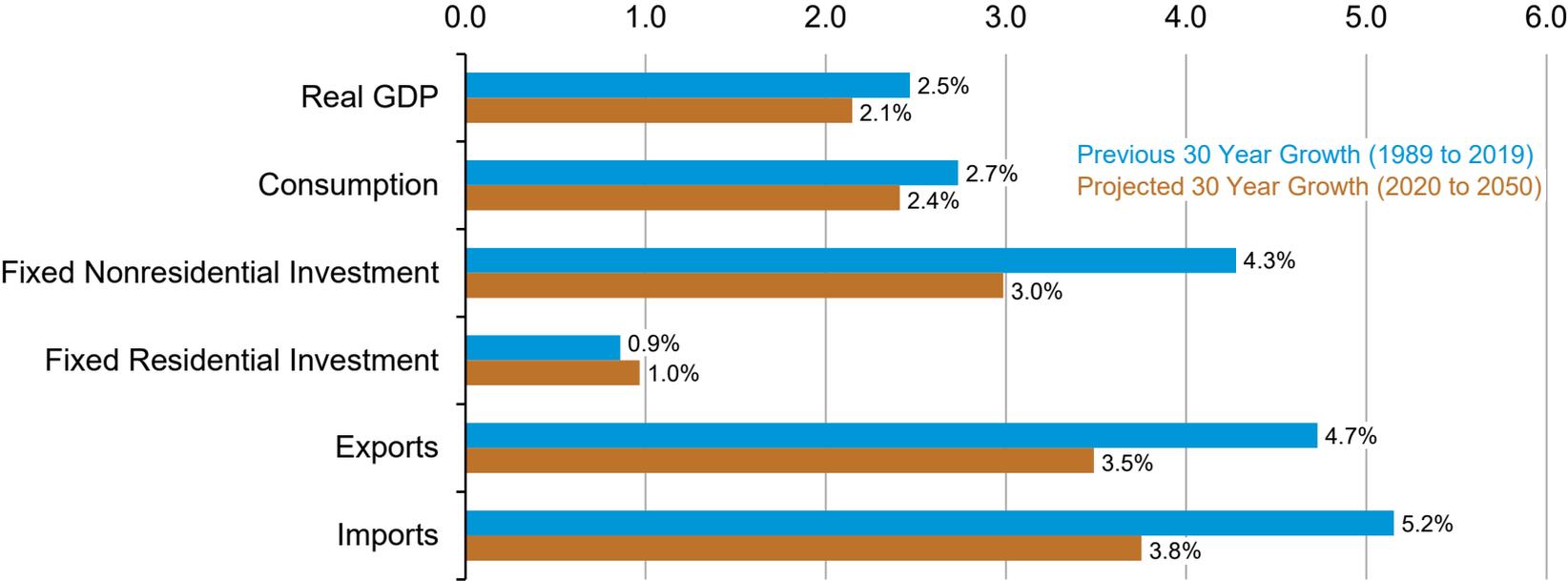
Worst ever real GDP in US history with the economy contracting 32.9% in the 2nd quarter of 2020

average annual percent growth



Growth in GDP and most of its components is slower in the preliminary AEO2021 projection than history

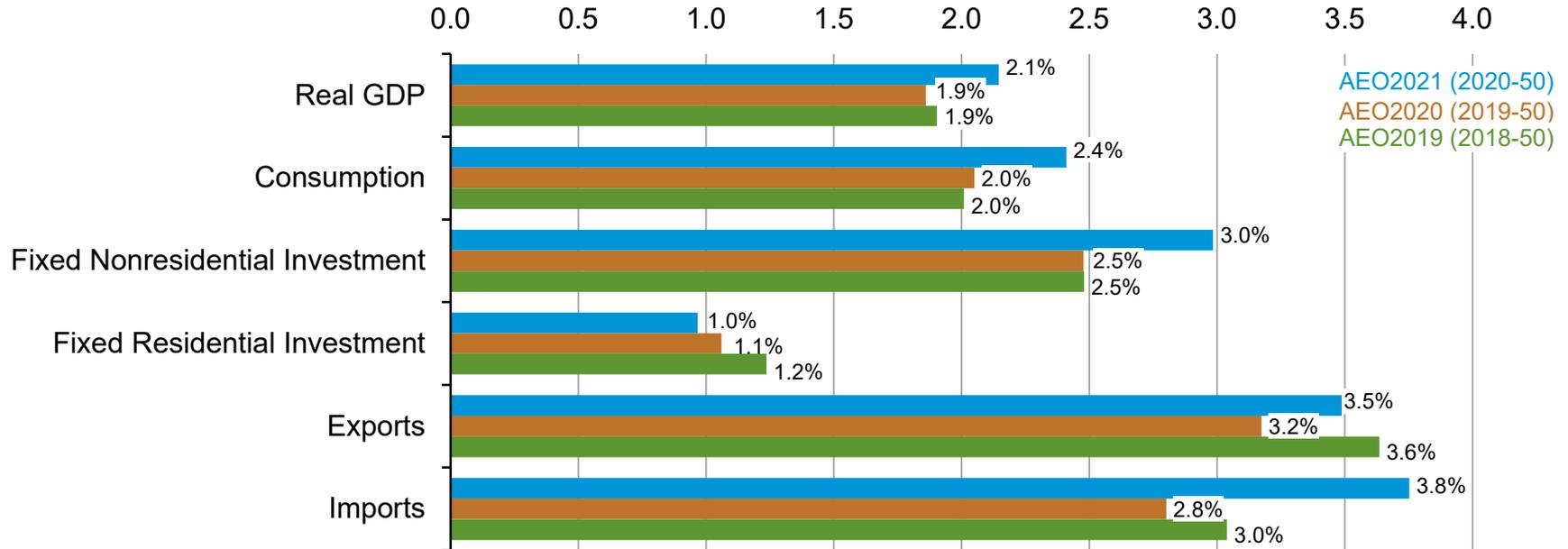
average annual percent growth



Source: AEO2021 Preliminary run

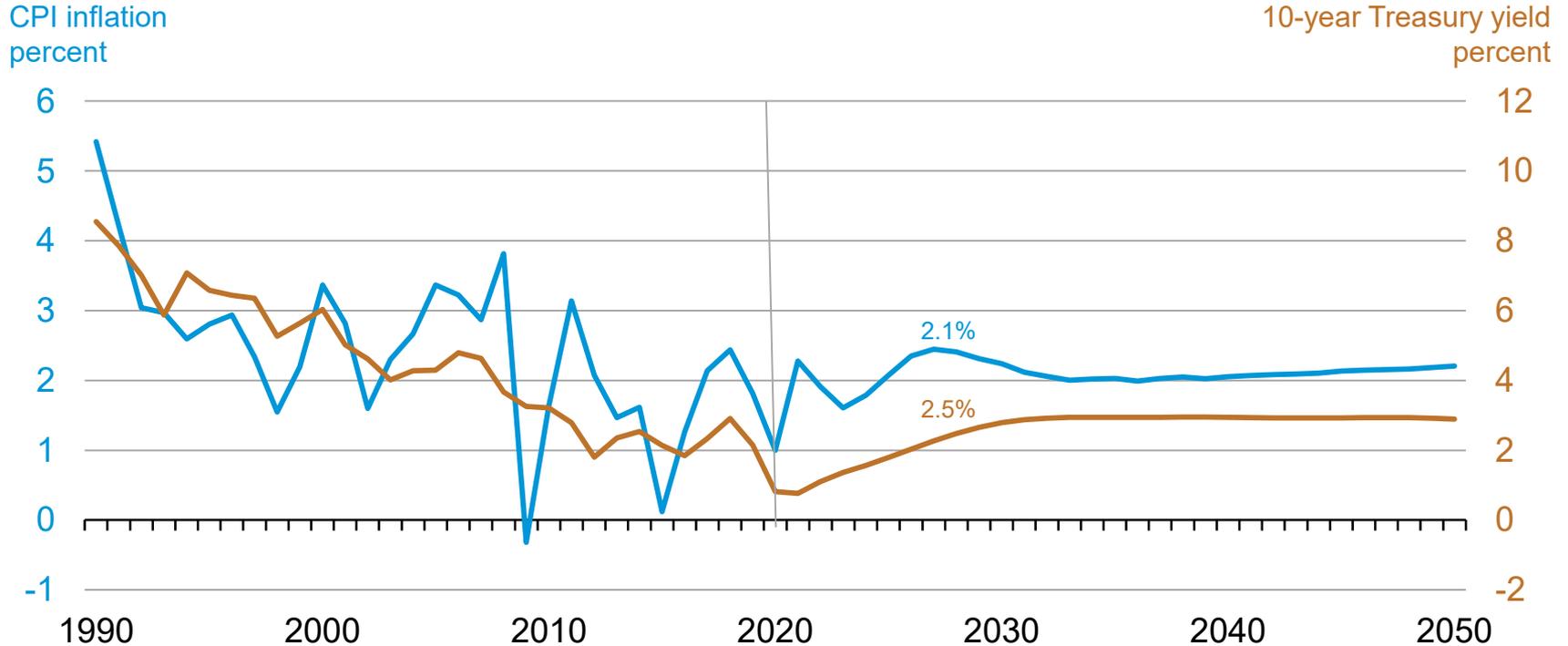
The preliminary AEO2021 projection for GDP and most of its components is quicker than recent projections

average annual percent growth



Source: AEO2021 Preliminary run

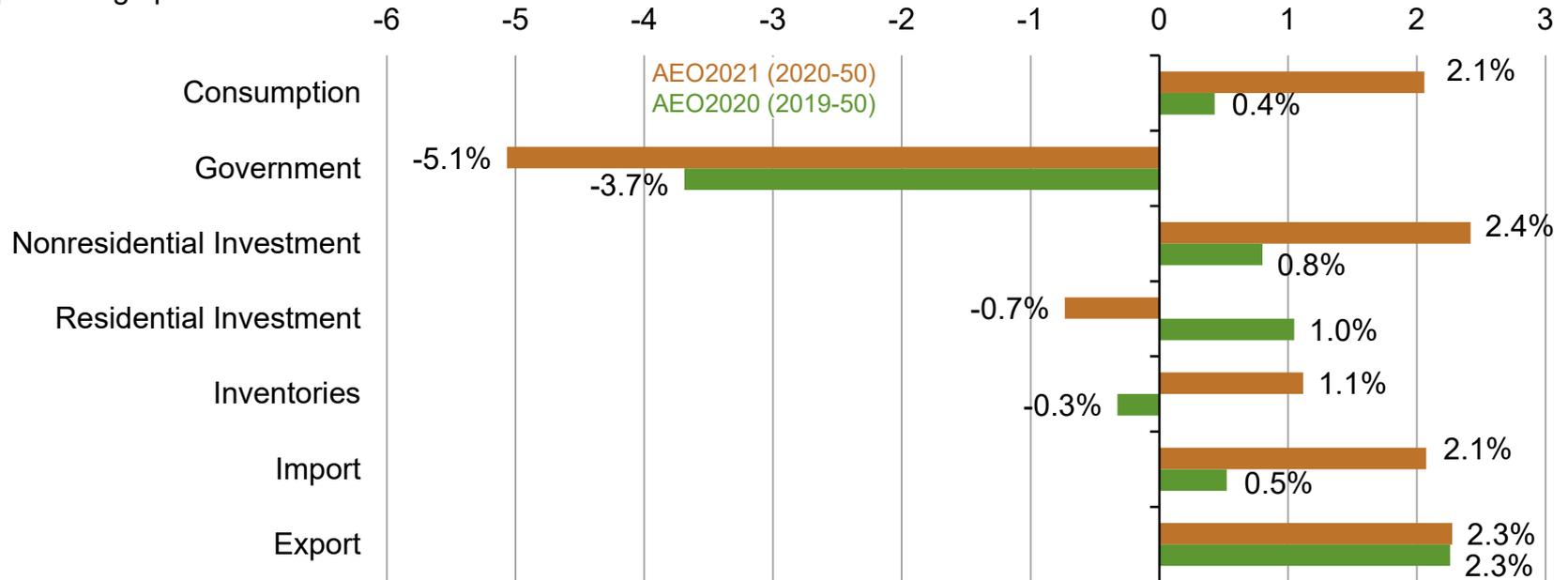
Inflation remains moderate throughout the projection and bond yields gradually rise from historic lows



Source: AEO2021 Preliminary run

Consumption, nonresidential investment and imports increase in share of demand mix while government fades

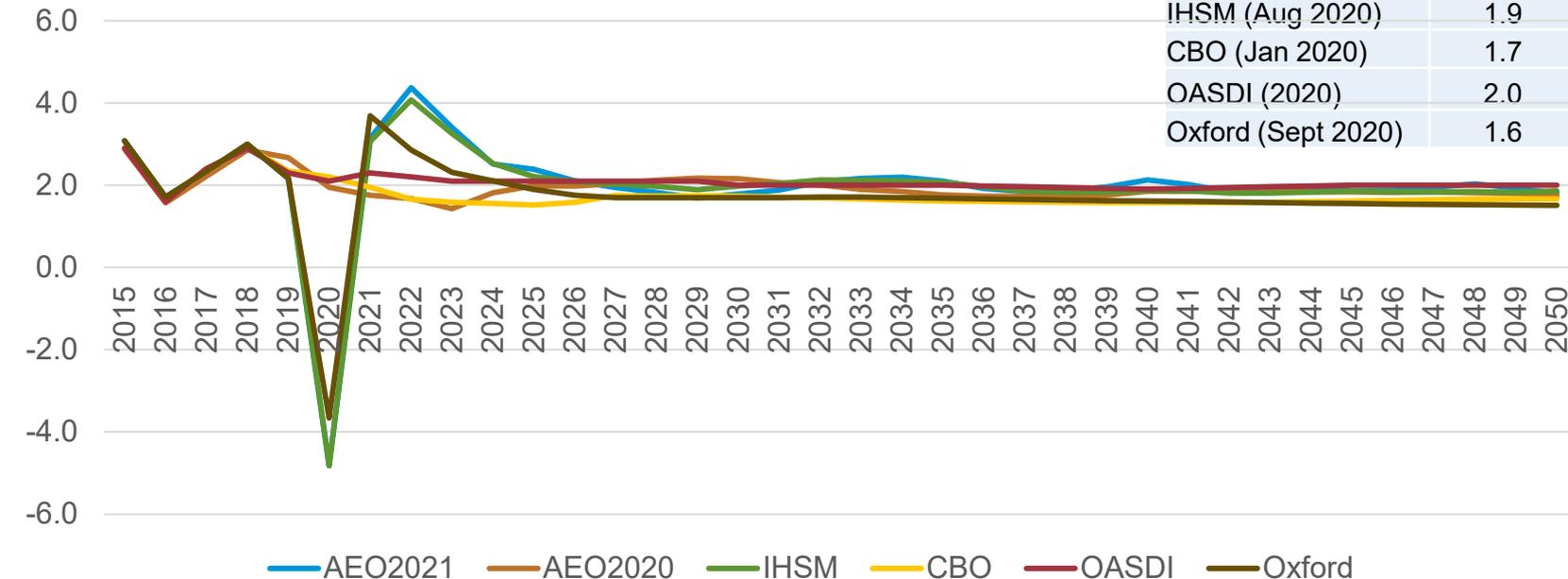
change in GDP share over projection period
percentage points



Source: AEO2021 Preliminary run

Preliminary AEO2021 real GDP growth is similar to other projections

annual average growth in real GDP



Sources: as listed

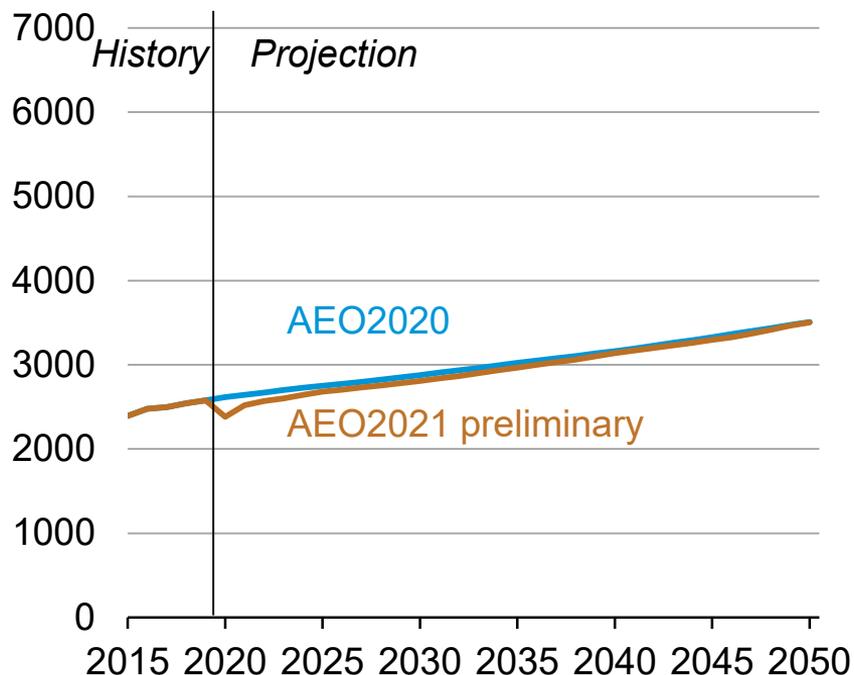
AEO2021 major updates for industrial

- Implementation of MECS benchmarking to process flow industries
- Update in Relative Energy Intensities for equipment in food, metal-based durables, and chemicals industries
- Implementation of Technology Possibility Curves for process flow industry technologies
- Better alignment of petroleum coke consumption with refinery industry

Value of shipments

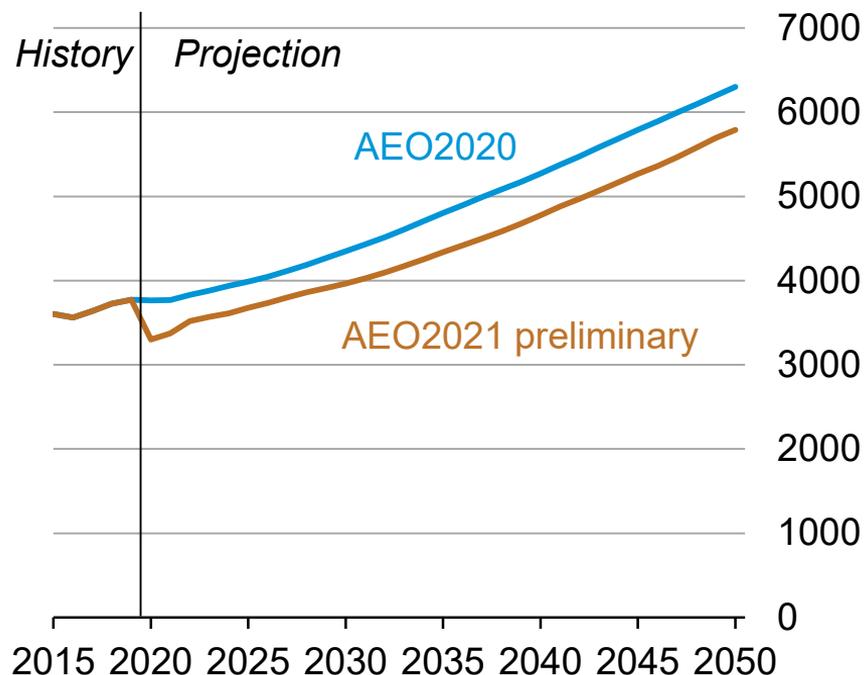
Energy-intensive industries

billion 2012 dollars



Non-energy-intensive industries

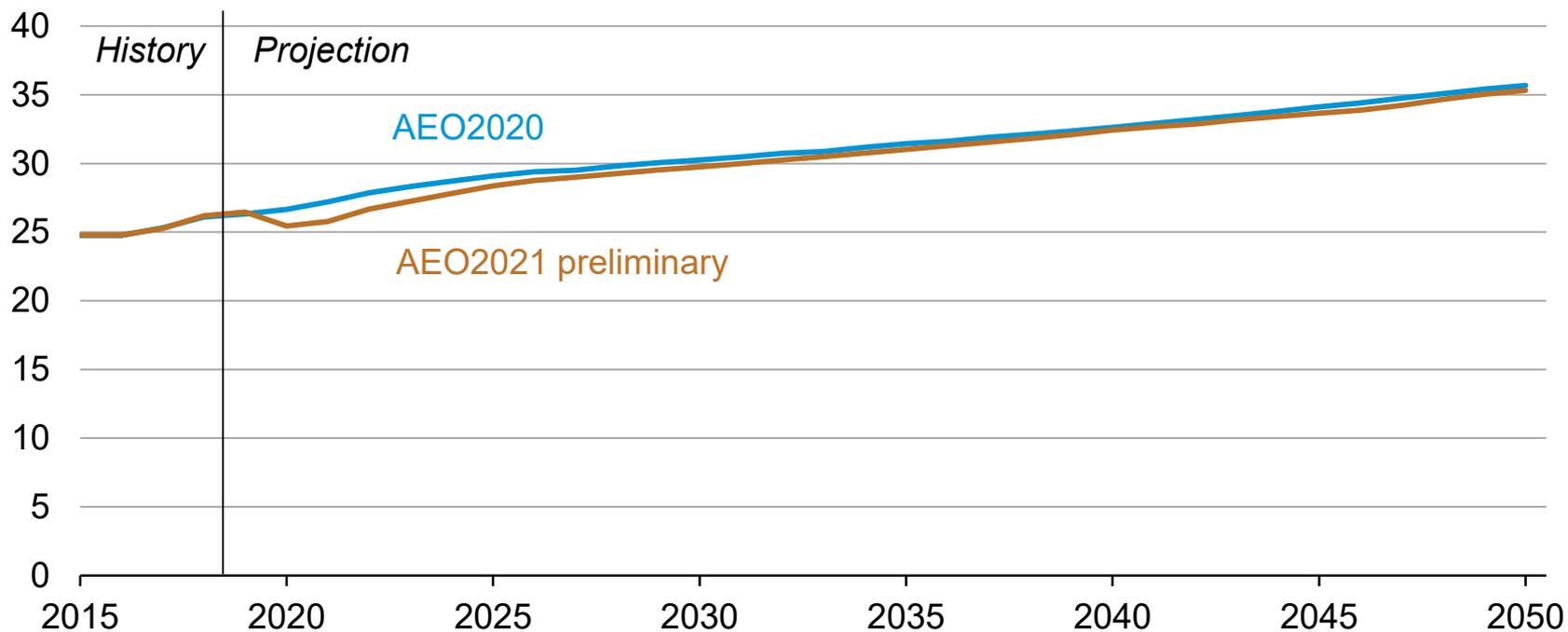
billion 2012 dollars



Sources: AEO2020, AEO20201 preliminary run

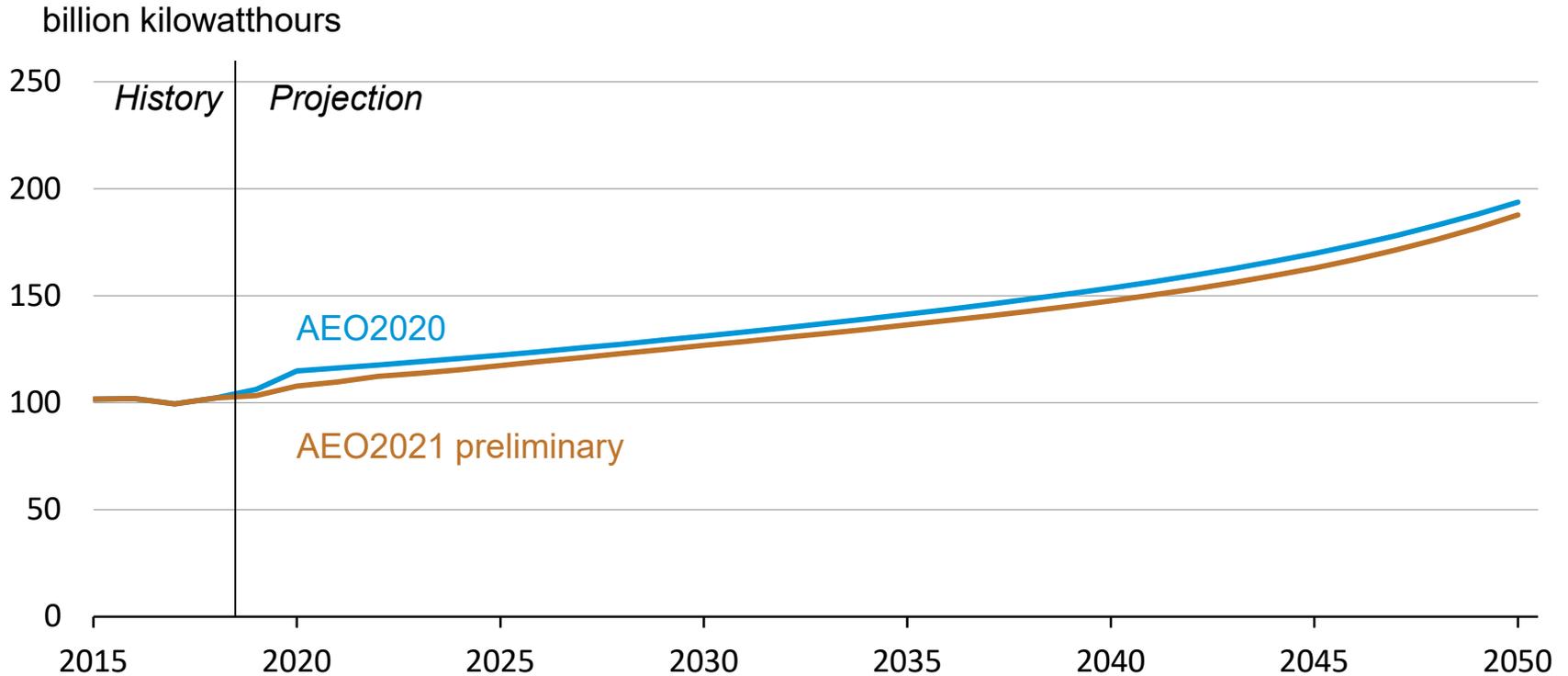
Total industrial delivered energy

quadrillion British thermal units



Sources: AEO2020, AEO20201 preliminary run

Combined heat and power electricity generation



Sources: AEO2020, AEO20201 preliminary run

Longer-term modeling and data enhancements

- Integrate more effective fuel price sensitivity in process flow models
- Enhance sensitivity of industrial energy intensity to changes in capacity utilization
- MECS 2018 to be published early next year and will be incorporated into AEO2022
- Benchmark non-manufacturing industries to 2017 Economic Census
- Investigate the source of the “extra” natural gas left for the non-manufacturing sectors
- Proposal for 3-year MECS cycle later this year

Questions/Comments?

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