

Buildings Working Group Meeting II



Office of Energy Consumption and Efficiency Analysis

October 4, 2018 | Washington, DC

By

Buildings Energy Analysis Team

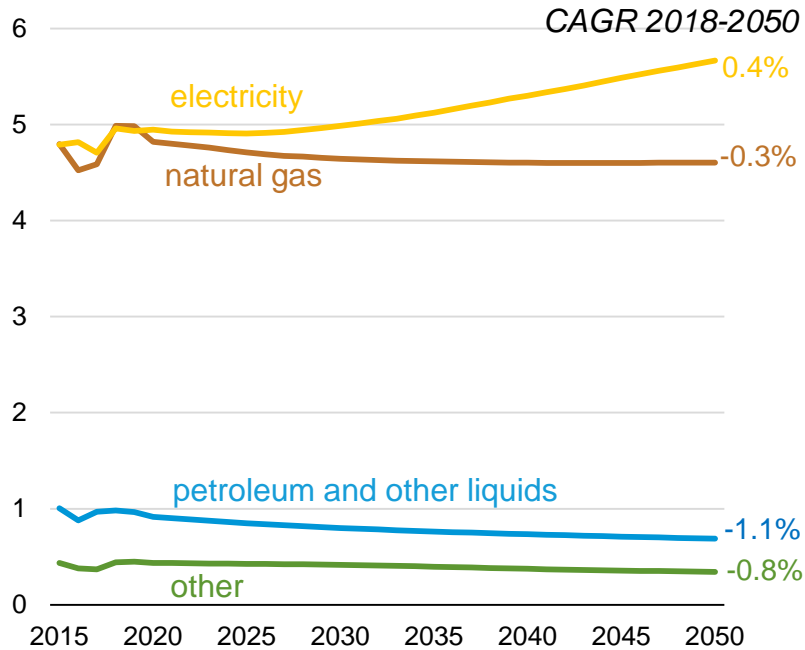
Overview

- AEO2019 results overview
 - Delivered energy by fuel
- Comparison with AEO2018
 - Model drivers
 - Residential and commercial electricity and natural gas
 - Distributed generation: solar photovoltaic (PV)
 - Commercial district space heating
 - Commercial technology update
- Residential Energy Consumption Survey (RECS) and technology updates

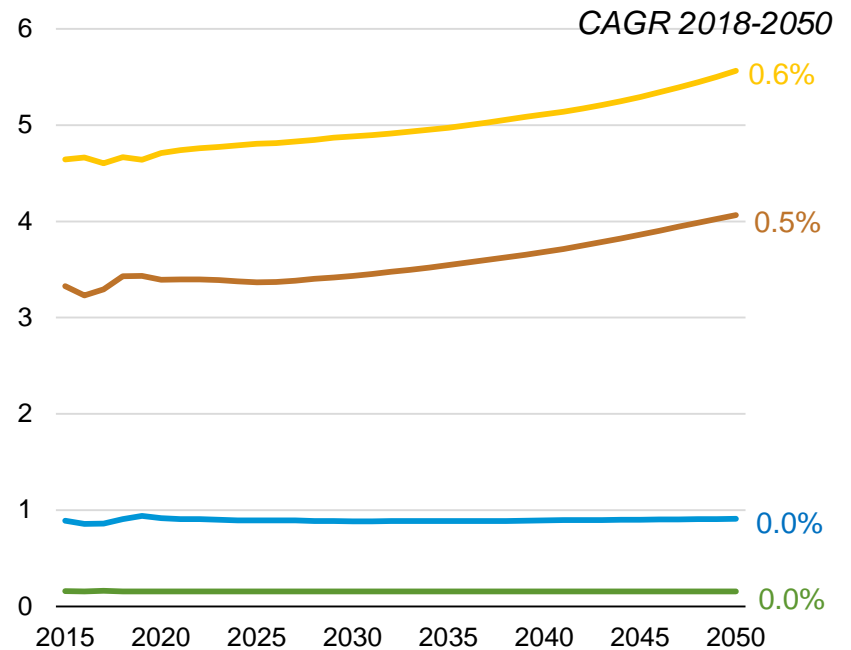
AEO2019 Results Overview

Electricity continues to be the fastest growing energy source for buildings use in AEO2019

residential sector delivered energy consumption
quadrillion British thermal units



commercial sector delivered energy consumption
quadrillion British thermal units



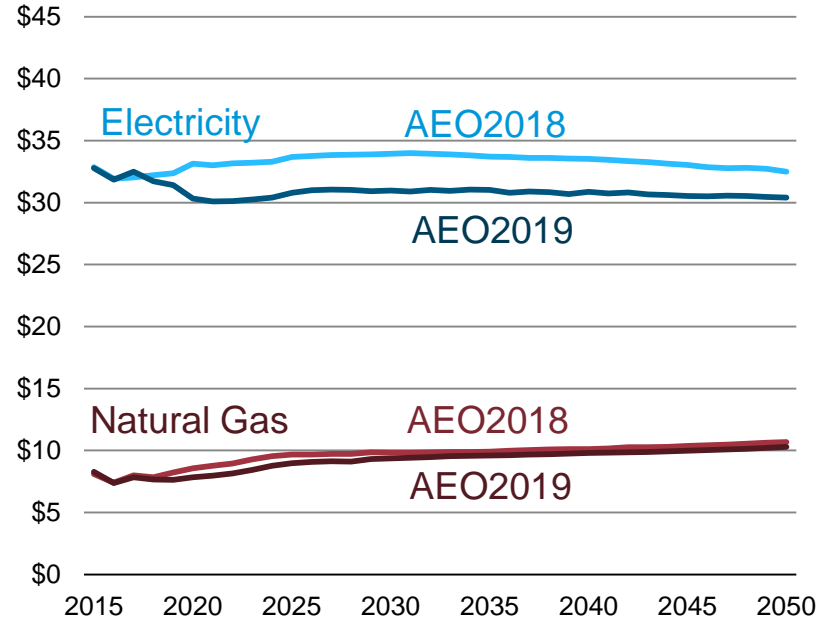
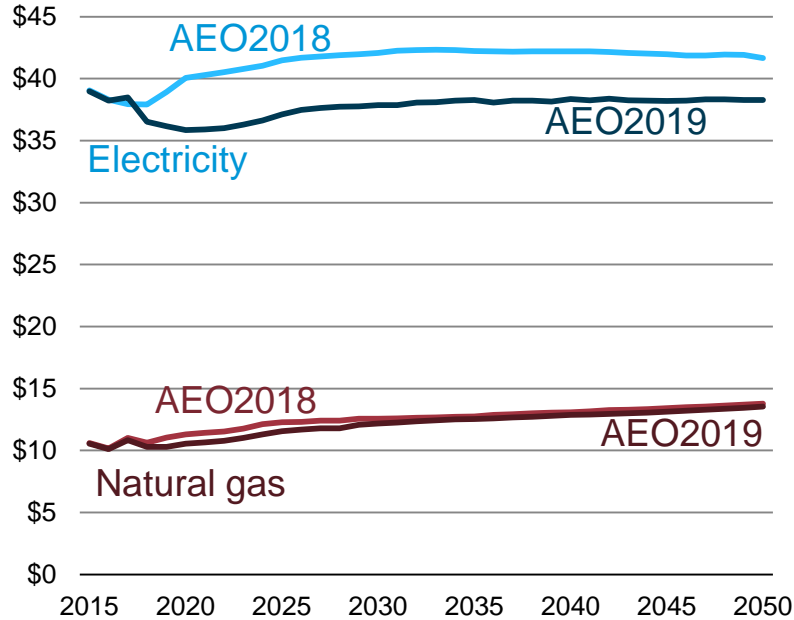
Source: AEO2019 preliminary

Comparison with AEO2018

End-use fuel prices are lower in AEO2019 than AEO2018

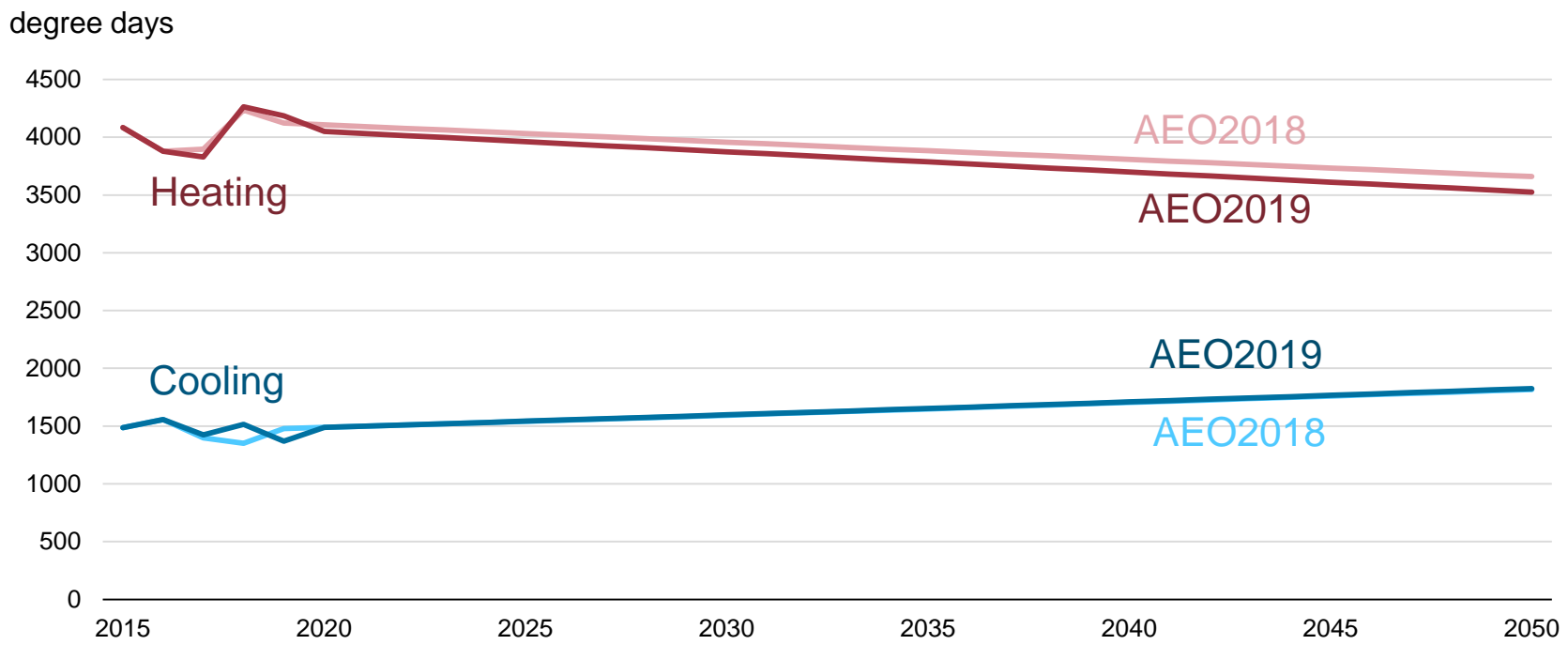
residential fuel prices
2018 \$/MMBtu

commercial fuel prices
2018 \$/MMBtu



Sources: AEO2019 preliminary, AEO2018

Heating and cooling degree days include NOAA historical data and short-term forecast, along with 30-year trend through projection period

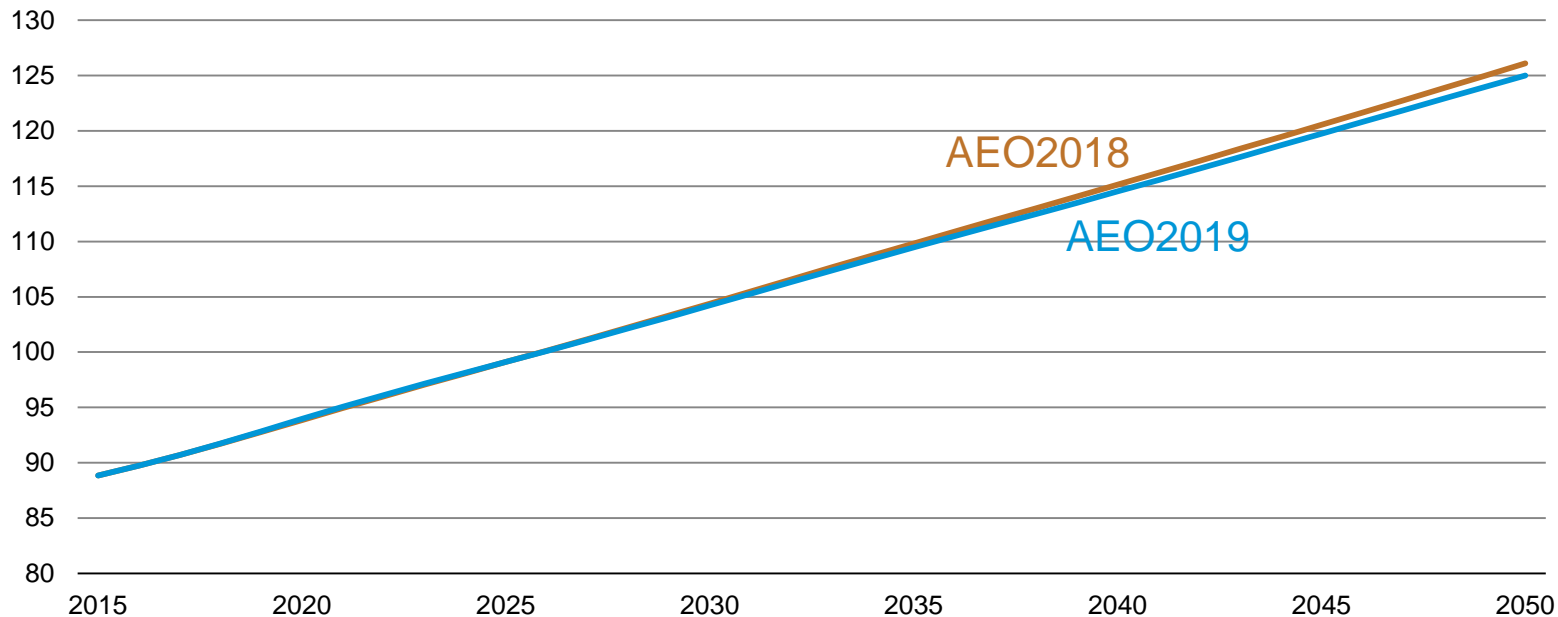


Sources: AEO2019 preliminary, AEO2018



Commercial floorspace growth decreases slightly from AEO2018 to AEO2019; AEO2019 floorspace is approximately 1% lower in 2050

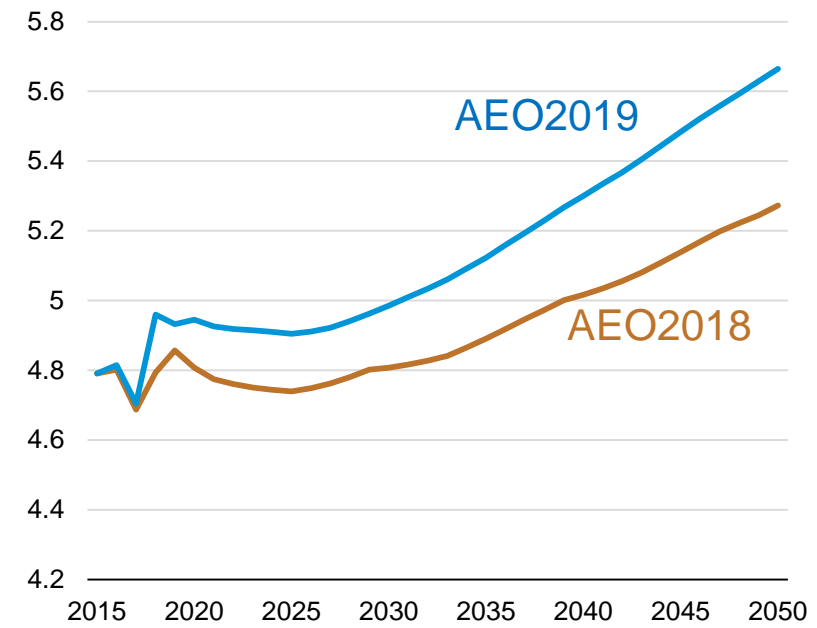
commercial floorspace
billion square feet



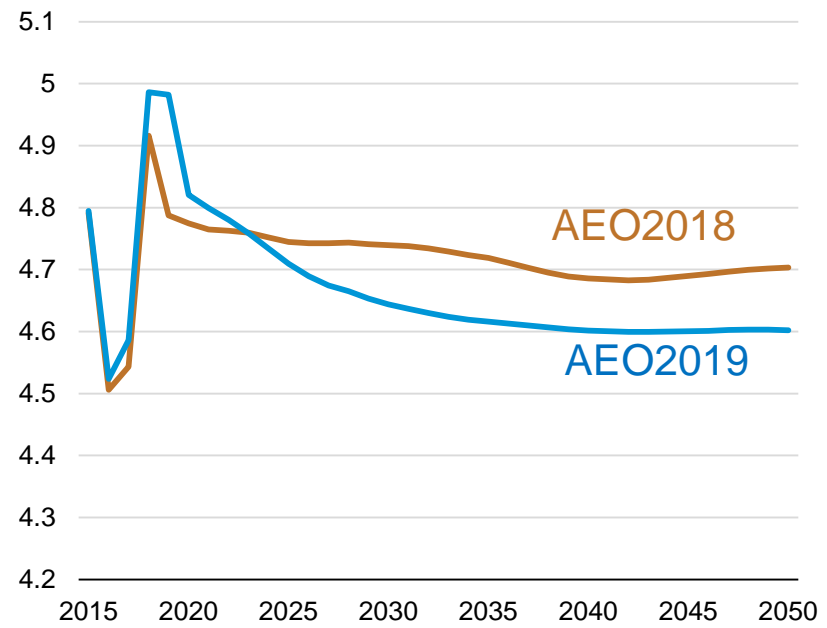
Sources: AEO2019 (preliminary), AEO2018

Lower electricity prices and updated sector and technology characteristics drive changes in residential consumption

residential purchased electricity consumption
quadrillion British thermal units



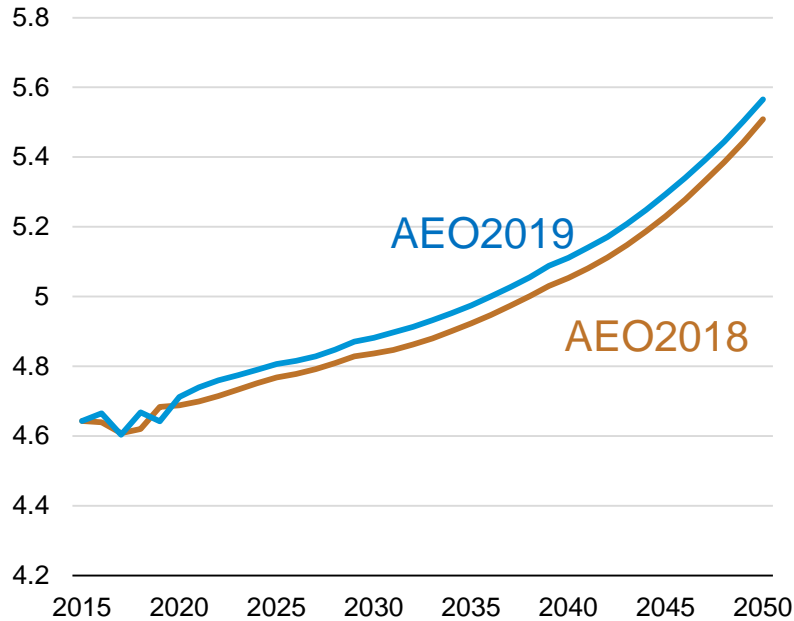
residential natural gas consumption
quadrillion British thermal units



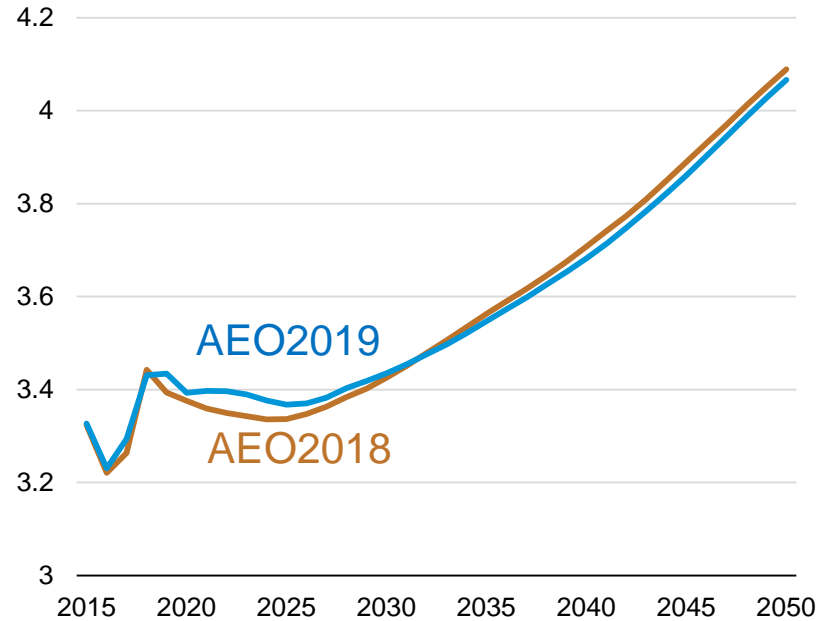
Sources: AEO2019 preliminary, AEO2018

Total commercial purchased electricity and natural gas consumption change only slightly from AEO2018 to AEO2019

commercial purchased electricity consumption
quadrillion British thermal units



commercial natural gas consumption
quadrillion British thermal units



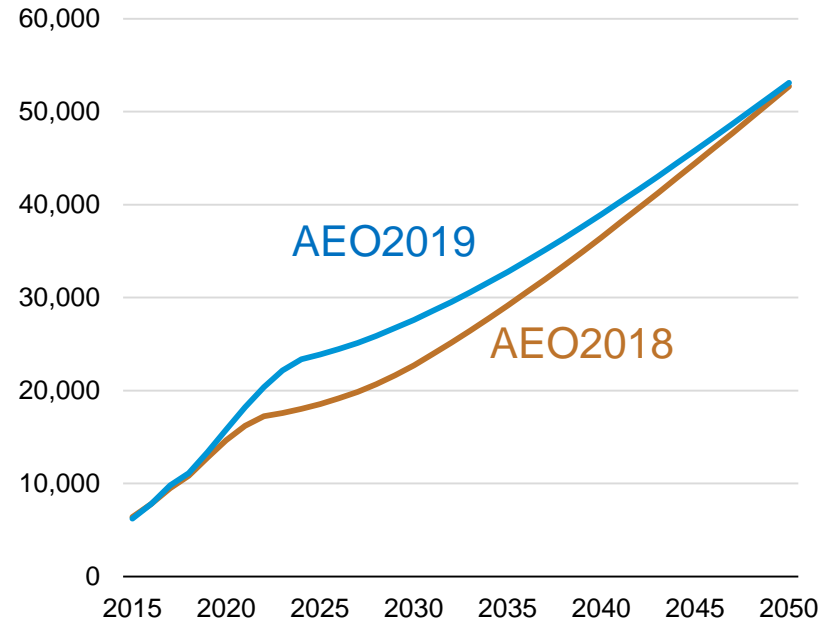
Sources: AEO2019 preliminary, AEO2018

Residential PV projections are lower in AEO2019, based on more state data; commercial projections increase slightly due to lower projected installed costs

residential PV capacity
MW-DC



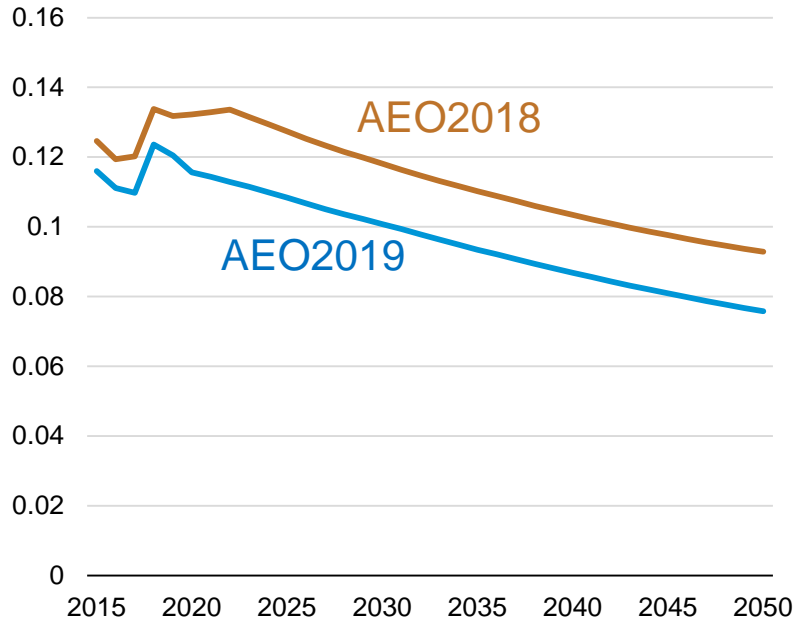
commercial PV capacity
MW-DC



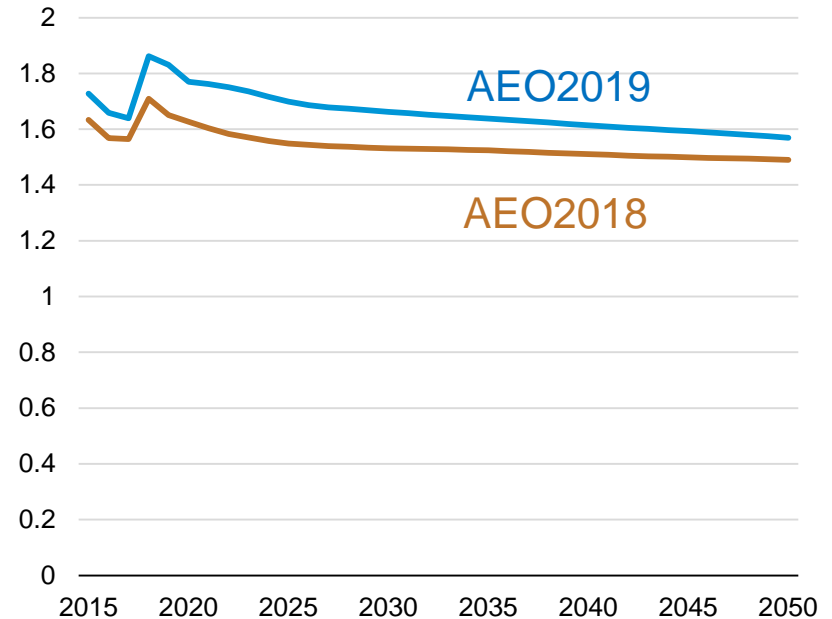
Sources: AEO2019 preliminary, AEO2018

After commercial district services update, more delivered natural gas and less electricity are consumed for space and water heating

commercial purchased electricity for space heating
quadrillion British thermal units



commercial natural gas for space heating
quadrillion British thermal units



Sources: AEO2019 preliminary, AEO2018

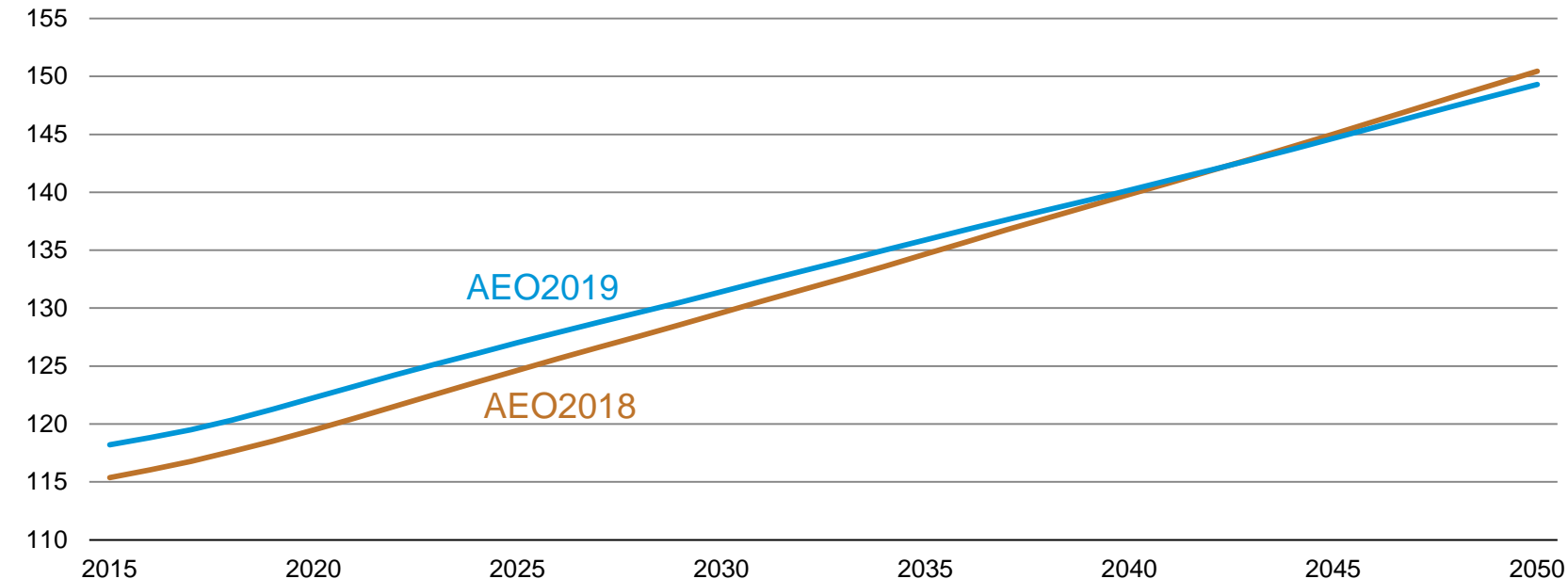
Commercial technology characteristics for AEO2019 were updated based on 2018 report

- Technology characteristics were updated for commercial space heating, space cooling, water heating, and cooking appliances.
 - Estimated air-source heat pump costs now incorporate the effects of 2018 and 2023 standards. They also now include cost declines over time in line with NREL projections.
 - Increased efficiency of “typical efficiency” natural gas water heater and lower cost of “high efficiency” natural gas water heater. Both trends cause natural gas water heating consumption to rise more slowly over the projection period.
 - New data on commercial cooking technologies leads to increased consumption in cooking, particularly for electricity.
 - Report can be found on the web at <https://www.eia.gov/analysis/studies/buildings/equipcosts/>

Residential Energy Consumption Survey (RECS) and technology updates

2015 RECS shows more households in 2015 than had been projected in AEO2018 based on prior 2009 RECS and housing starts

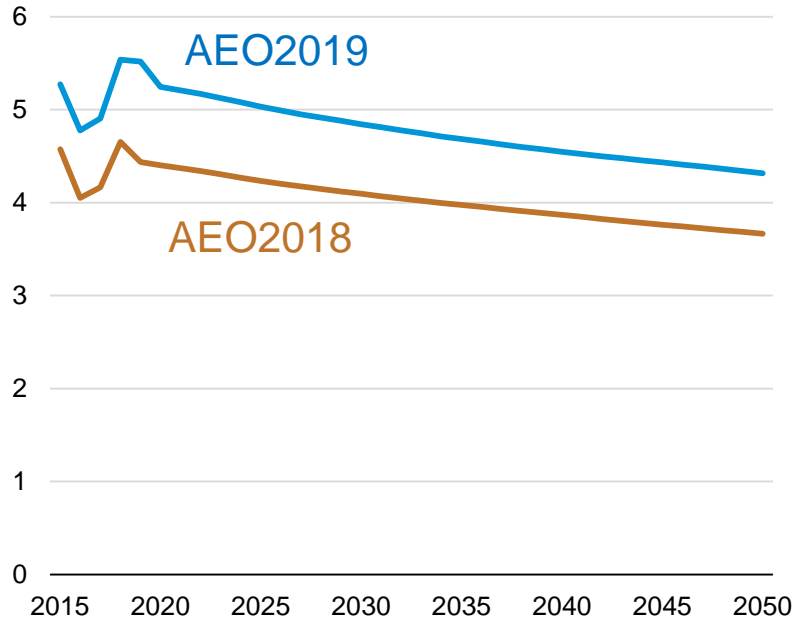
total households
millions



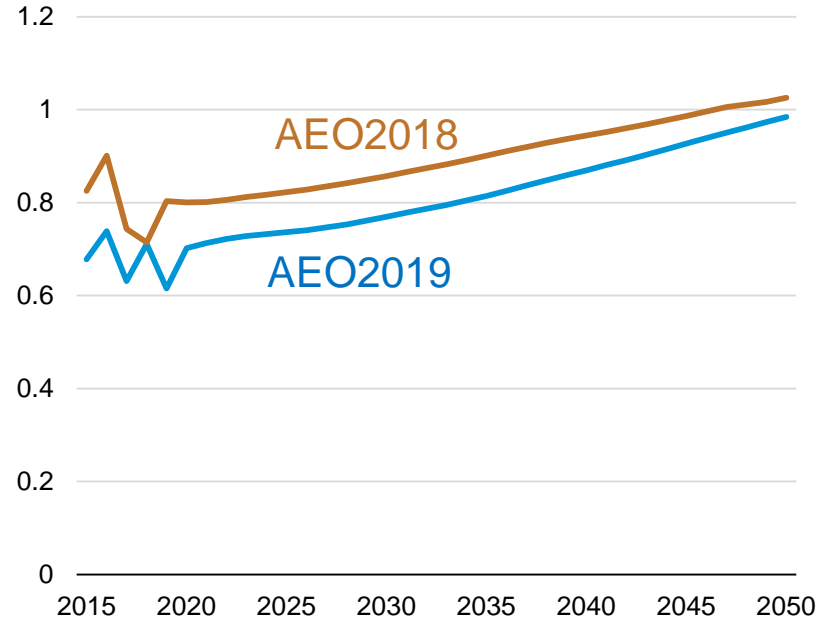
Sources: AEO2019 preliminary, AEO2018

Space heating and space cooling

delivered space heating energy consumption
quadrillion British thermal units



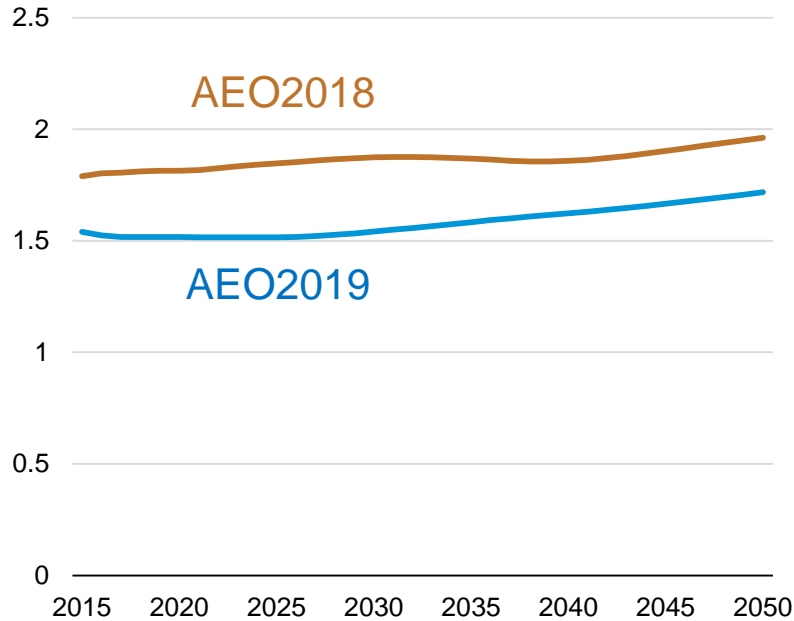
delivered space cooling energy consumption
quadrillion British thermal units



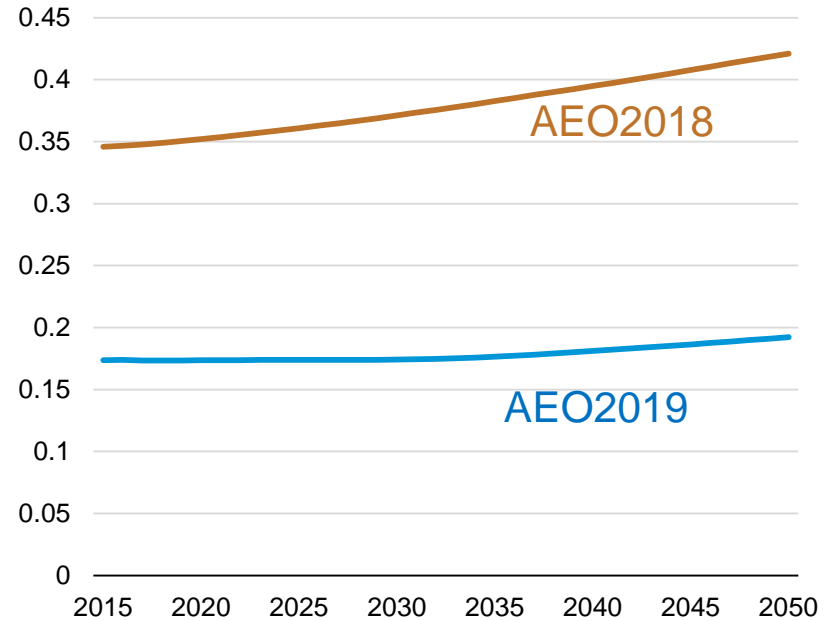
Sources: AEO2019 preliminary, AEO2018

Water heating/ cooking

delivered water heating energy consumption
quadrillion British thermal units



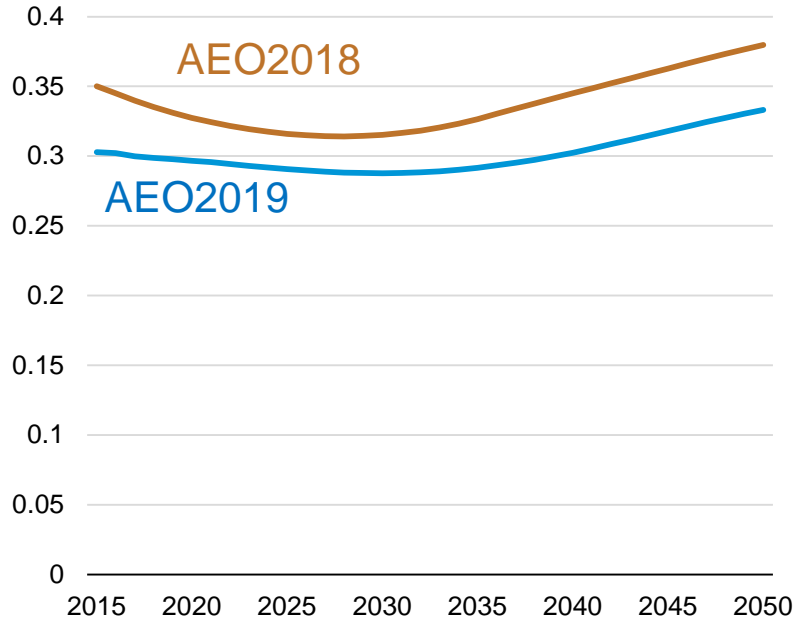
delivered cooking energy consumption
quadrillion British thermal units



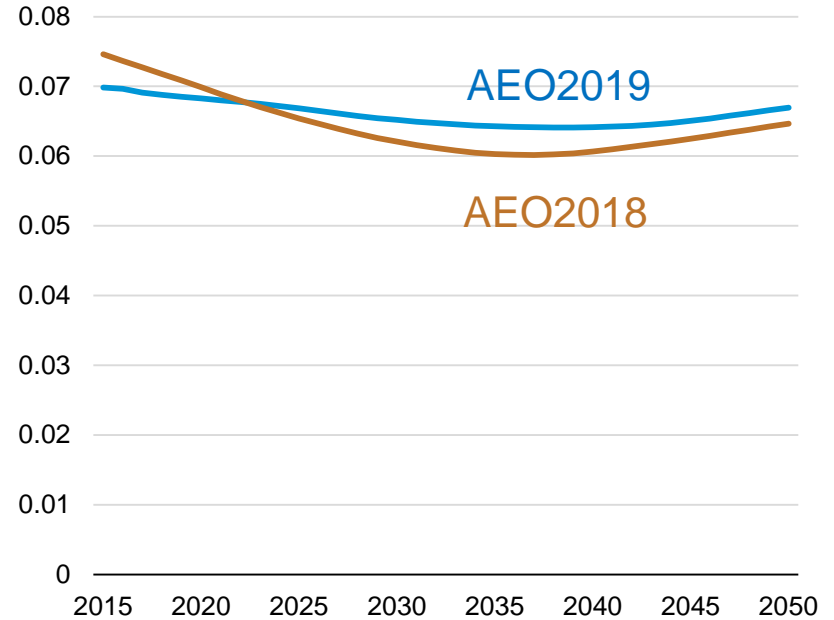
Sources: AEO2019 preliminary, AEO2018

Refrigeration/ freezing

delivered refrigeration energy consumption
quadrillion British thermal units



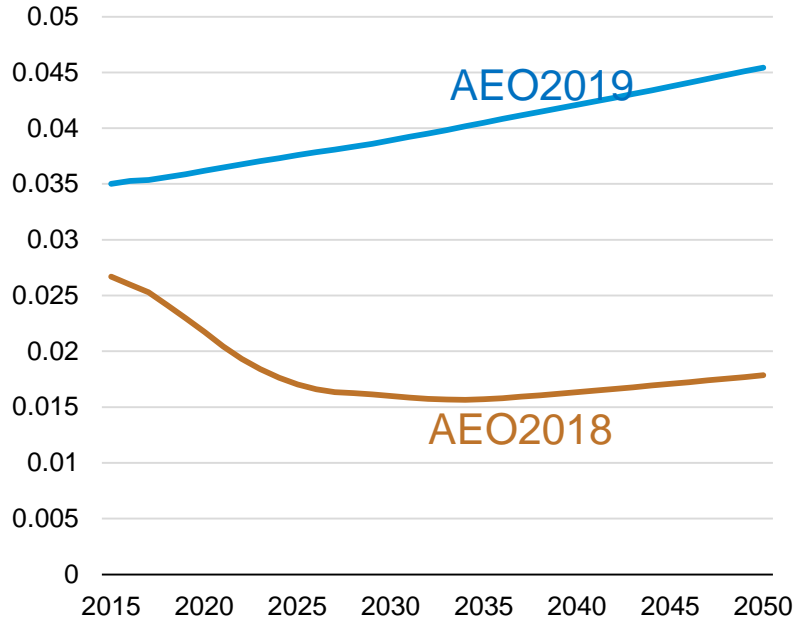
delivered freezer energy consumption
quadrillion British thermal units



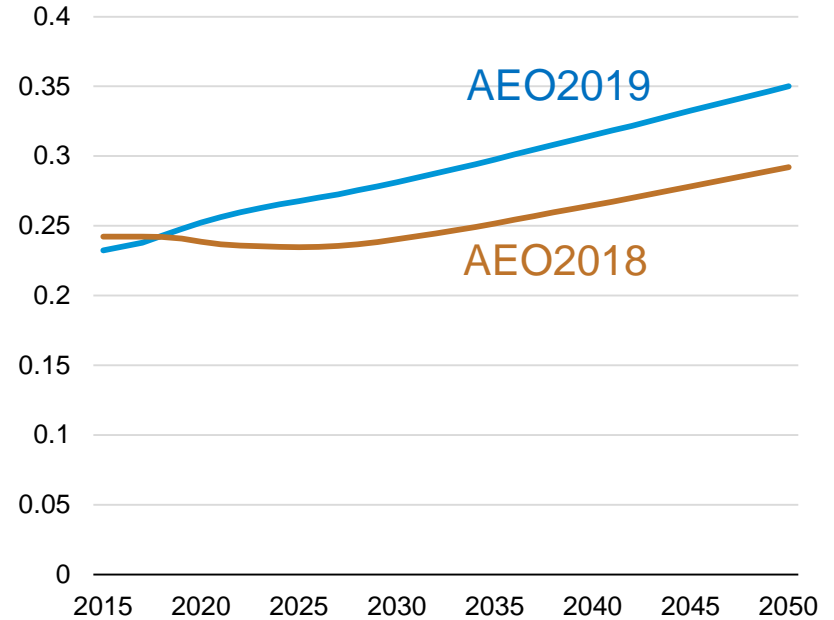
Sources: AEO2019 preliminary, AEO2018

Clothes washers represent expanded modeling to include both top- and front-loading washer configurations

delivered clothes washer energy consumption
quadrillion British thermal units



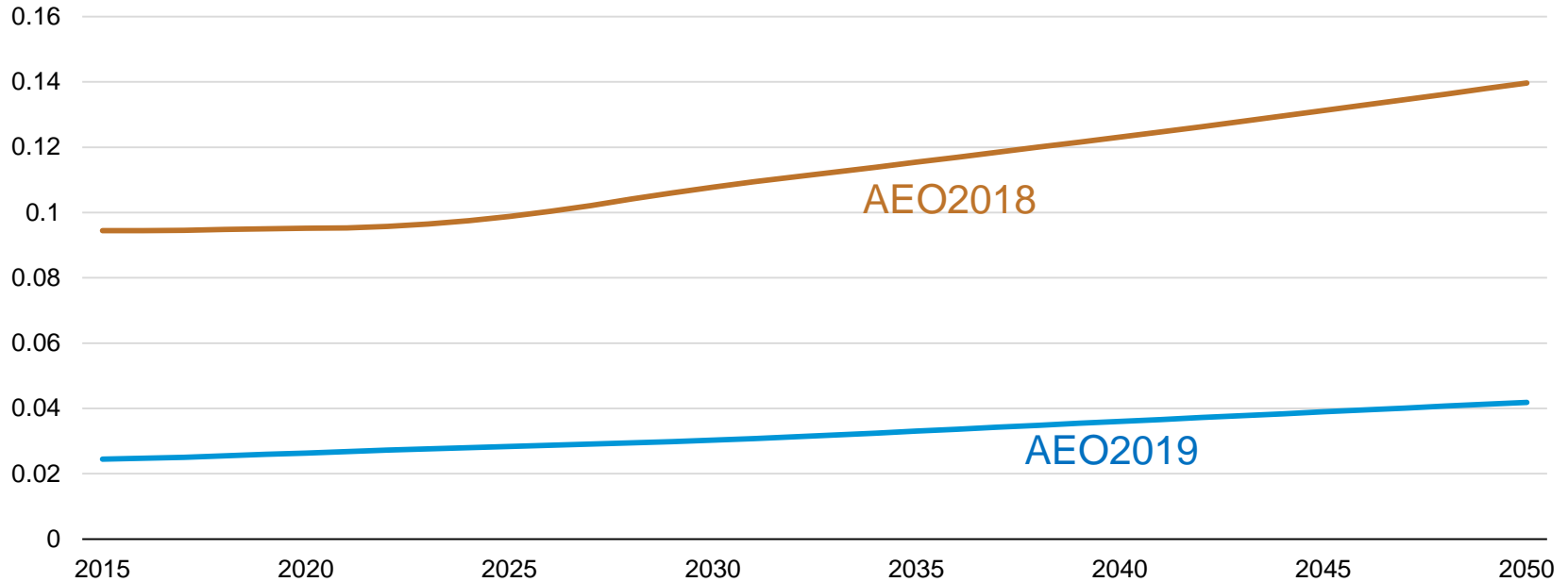
delivered clothes dryer energy consumption
quadrillion British thermal units



Sources: AEO2019 preliminary, AEO2018

Dishwashers

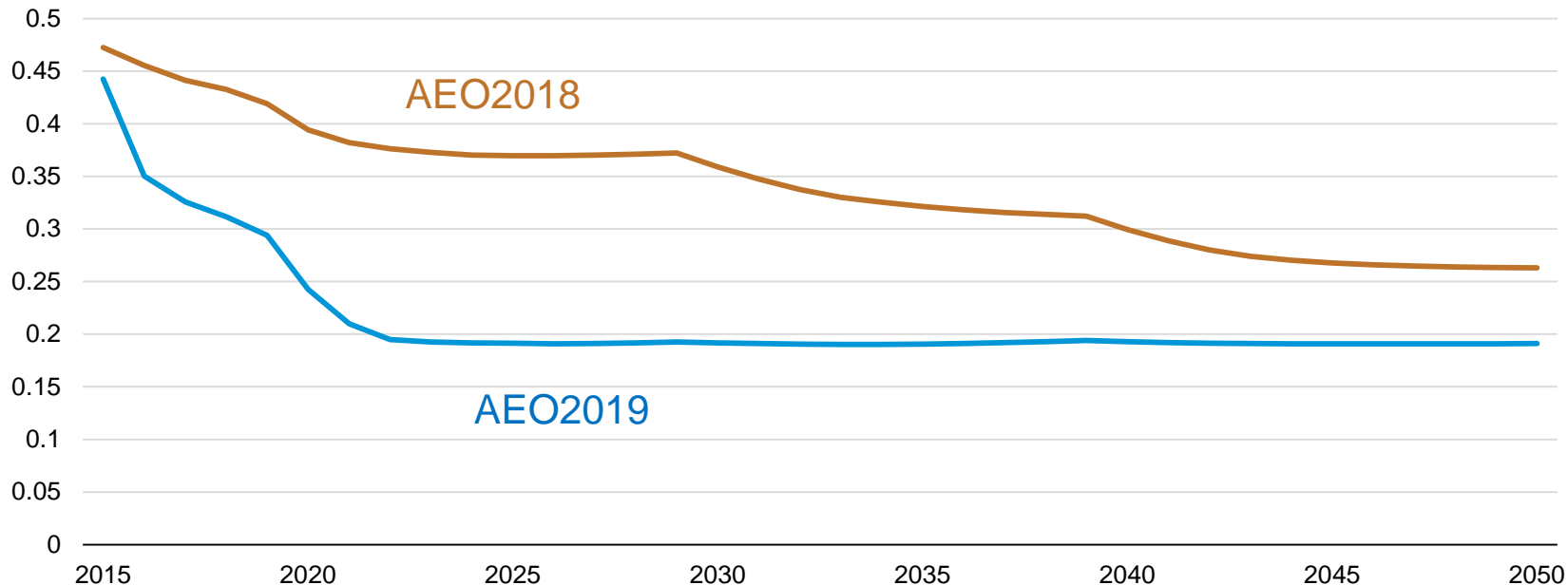
delivered dishwasher energy consumption
quadrillion British thermal units



Sources: AEO2019 preliminary, AEO2018

Definition of *General Service Lighting* expanded to cover more technology types such as reflector lamps

delivered lighting energy consumption
quadrillion British thermal units



Sources: AEO2019 preliminary, AEO2018

For more buildings information

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For more information

U.S. Energy Information Administration home page | www.eia.gov

Today in Energy | www.eia.gov/todayinenergy

Annual Energy Outlook | www.eia.gov/aeo

Short-Term Energy Outlook | www.eia.gov/steo

International Energy Outlook | <https://www.eia.gov/outlooks/ieo/>

State Energy Data System | <http://www.eia.gov/state/seds/>

Monthly Energy Review | www.eia.gov/mer

Residential Energy Consumption Survey | <http://www.eia.gov/consumption/residential/>

Commercial Building Energy Consumption Survey | <http://www.eia.gov/consumption/commercial/>