Buildings Working Group Meeting

AEO2020 debrief and AEO2021 updates

Office of Energy Consumption and Efficiency Analysis
September 10, 2020 | Washington, DC

By
Buildings Energy Analysis Team

Overview

- AEO2020 debrief
- AEO2021
  - COVID-19
  - Major model updates
  - Policy assumptions
  - Historical updates
- Upcoming projects
- Discussion

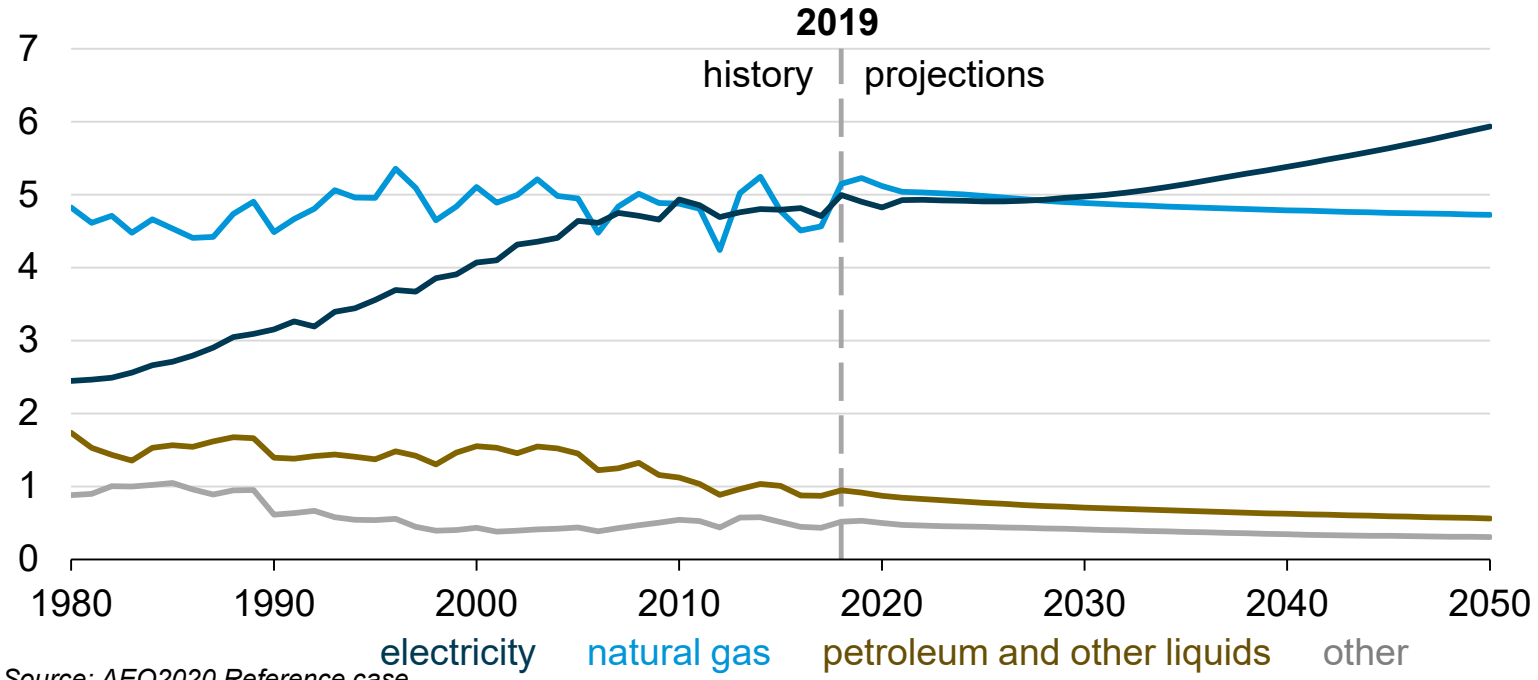
AEO2020 debrief

AEO2020 debrief

- Updated distributed generation menus
  - Residential and commercial cost and performance characteristics for renewables and combined heat and power (CHP) distributed generation systems
  - Updated report data posted to the web: https://www.eia.gov/analysis/studies/buildings/dg_storage_chp/
  - Summary of inputs used can be found in the *Assumptions to AEO2020*: https://www.eia.gov/outlooks/aeo/assumptions/
- Revised modeling of commercial distributed generation using Bass diffusion parameters
- Rollback of general service lighting definition

AEO2020 Reference case residential sector energy consumption

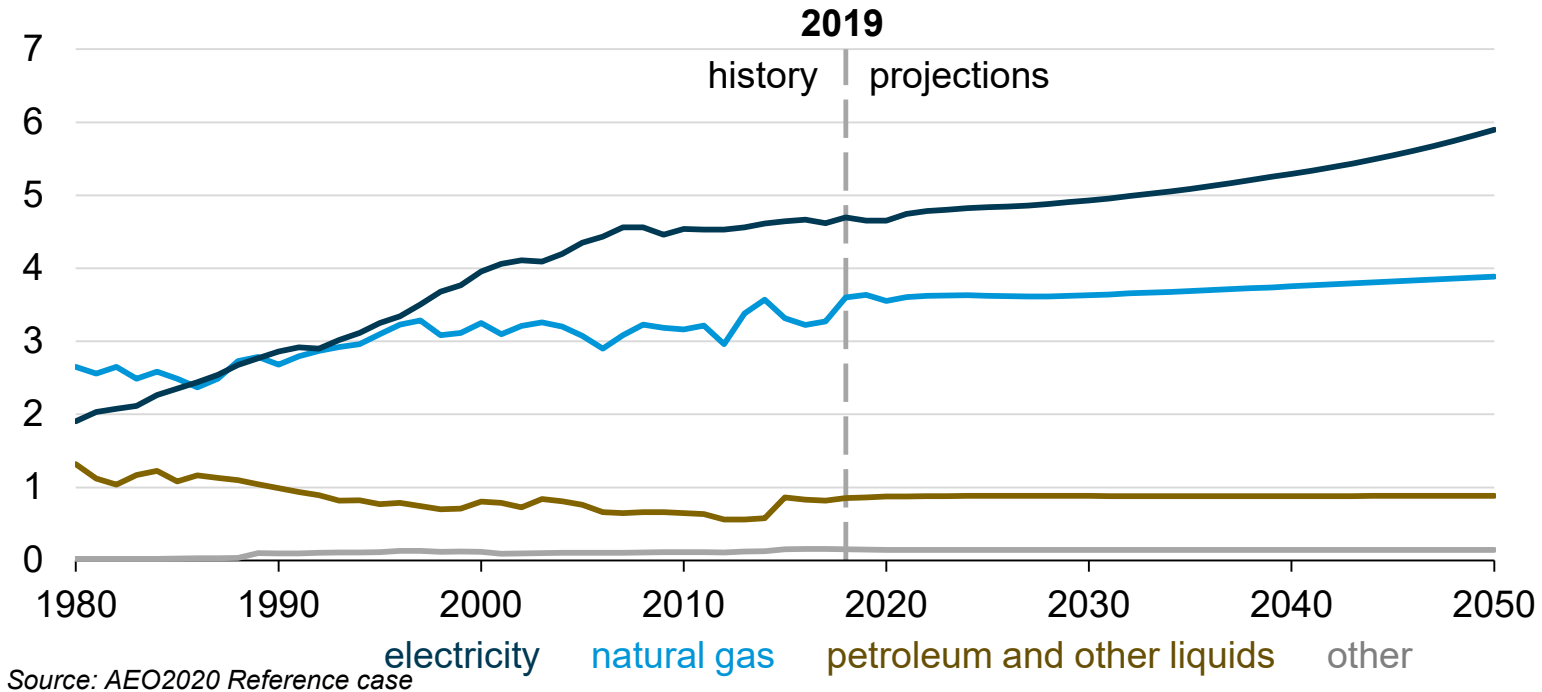
quadrillion British thermal units



Source: AEO2020 Reference case

AEO2020 Reference case commercial sector energy consumption

quadrillion British thermal units



Source: AEO2020 Reference case

AEO2021 (and beyond)

AEO2021 and COVID-19

- *AEO2021* reflects updated macroeconomic projections from IHS Markit (including housing starts and commercial floorspace builds)

- Short-term impacts of COVID-19 and its mitigation efforts are reflected in *Short-Term Energy Outlook* (STEO) forecasts

- EIA released an *Annual Energy Outlook Trends and Expectations* report that discusses some of the early impacts of COVID-19 on different energy sectors: https://www.eia.gov/outlooks/aeo/trends_expectations.php

AEO2021 major model updates

- Revise reporting of residential and commercial end-use electricity consumption and distributed generation
- Update representation of building codes and sensors and controls in the Commercial Demand Module
- Revise residential housing decay rate using latest housing start and stock data from Macroeconomic Activity Module and IHS-Markit
- Develop new solar photovoltaic cost estimates based on latest National Renewable Energy Laboratory *Annual Technology Baseline*
- Update representation of LED lighting and eliminate EISA 2020 backstop lighting standard

Starting with AEO2021, EIA will *not* deduct distributed generation consumed onsite from specific end uses

- Why will it be different?
  - Our residential and commercial models project *annual* consumption. Distributed generation—especially variable renewable energy—can differ from minute to minute. This change allows stakeholders to make their own assumptions for how onsite generation is applied at the end use level.
  - End-use equipment doesn't care where electricity comes from, whether from the grid or from onsite generation

- Affected end uses:
  - Residential space cooling and *other* electricity consumption
  - Commercial space cooling, ventilation, lighting, and *other* electricity consumption

- How it will appear:
  - *Gross* end-use consumption will include full consumption regardless of generation source
  - *Purchased* end-use consumption continues to represent electricity that is delivered from the grid to buildings
  - *Generation for Own Use*—generation consumed onsite—will now appear next to consumption subtotals

Poll

Electricity *from the grid* that is consumed by buildings is best described as:

Delivered electricity

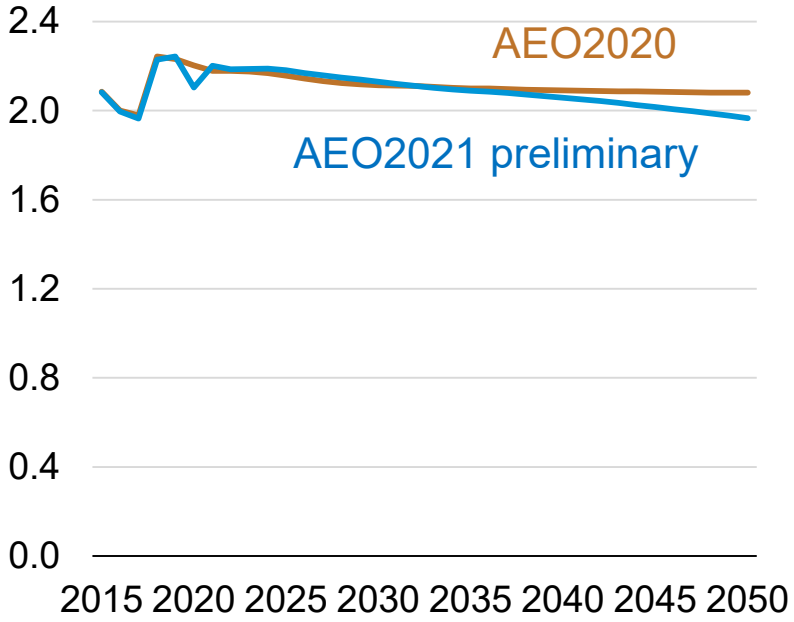
or

Purchased electricity

Updated representation of building codes, sensors and controls shifts commercial space conditioning energy in 2050

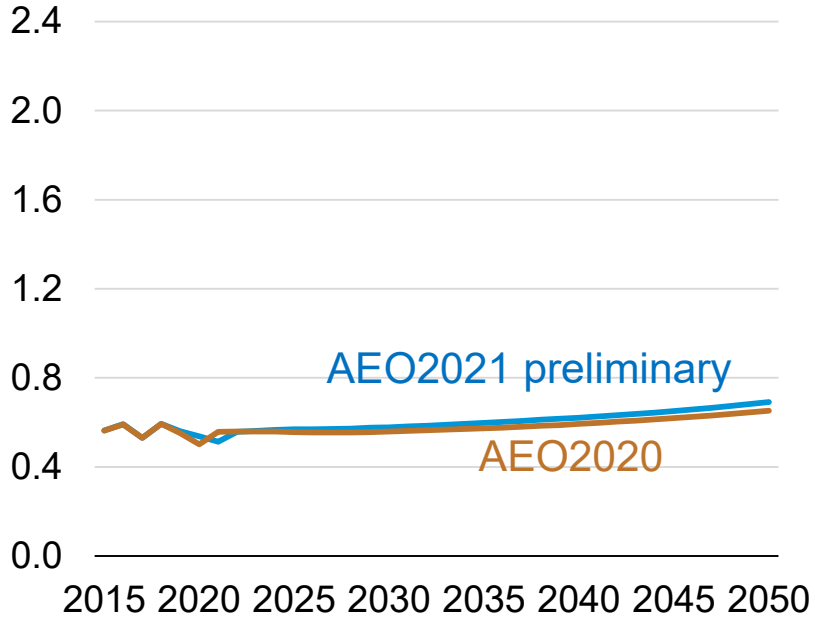
commercial delivered energy for space heating

quadrillion British thermal units



commercial delivered energy for space cooling

quadrillion British thermal units

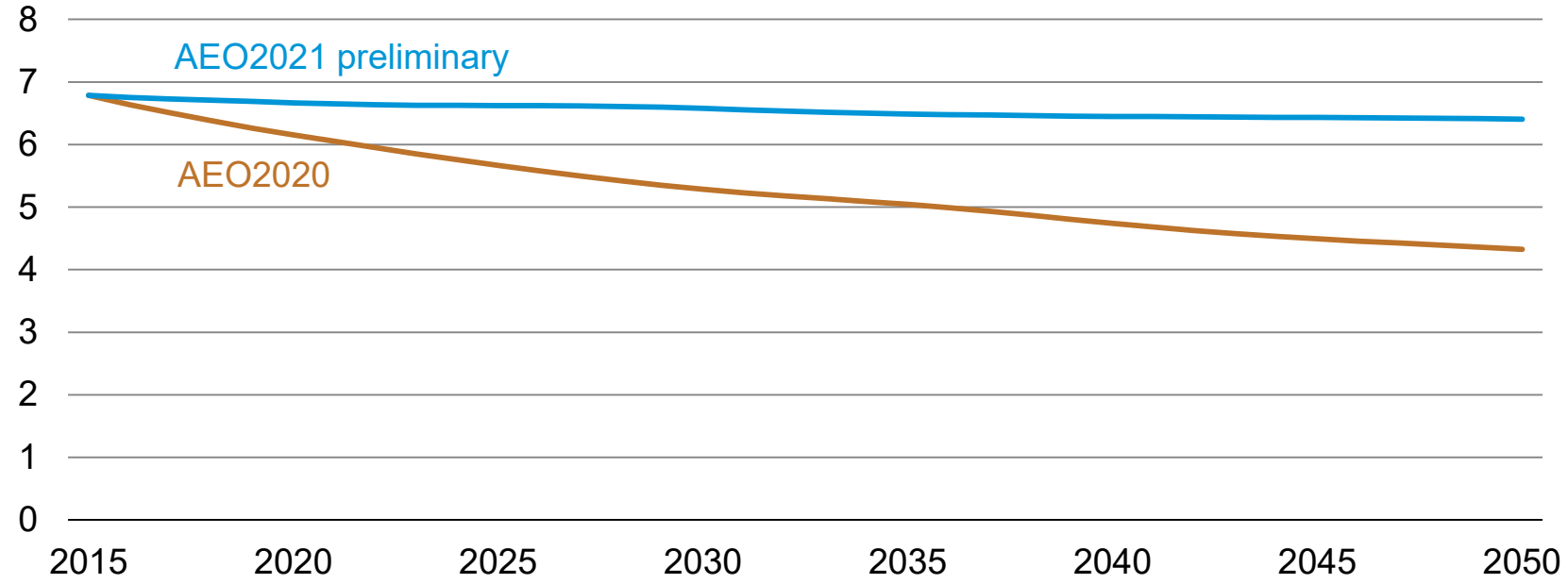


Source: AEO2021 preliminary Reference case, AEO2020 Reference case

Analysis of updated housing starts and stock data shows mobile homes may be removed from stock less quickly than previously projected

mobile home stocks

millions

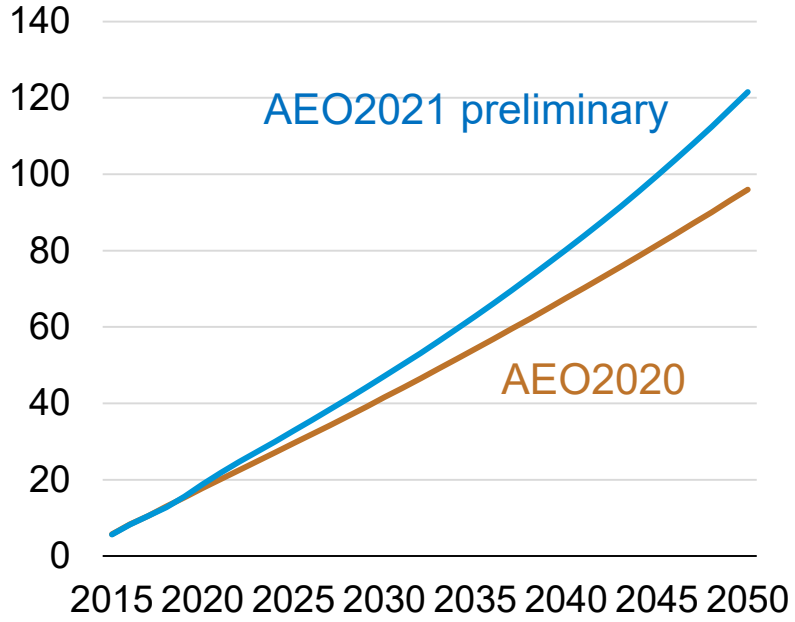


Source: AEO2021 preliminary Reference case, AEO2020 Reference case

Lower cost projections for residential and commercial solar lead to greater projected capacity in AEO2021

residential solar photovoltaic capacity

direct-current gigawatts



commercial solar photovoltaic capacity

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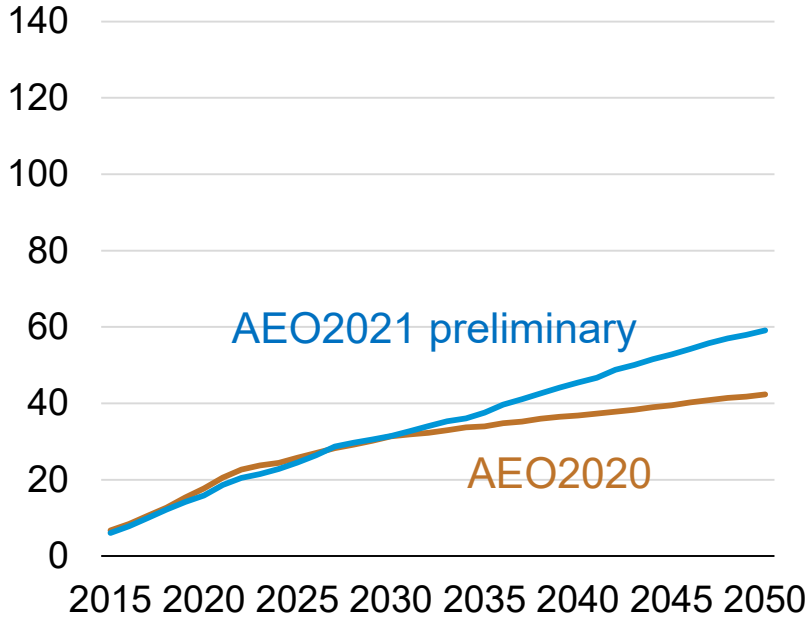

Source: AEO2021 preliminary Reference case, AEO2020 Reference case

AEO2021 policy assumptions

- Identify any new ENERGY STAR specifications as they affect major end-use equipment and miscellaneous electric loads (MELs)

- Incorporate new federal rulemakings if/when finalized, including eliminating the EISA 2020 backstop standard for general service lighting

AEO2021 historical updates

- Update sectoral energy consumption by fuel
  - *Monthly Energy Review* (MER)
  - *Short-Term Energy Outlook* (STEO)
- Include the National Oceanic and Atmospheric Administration's (NOAA) updated weather data and forecast
- Calibrate new residential heating equipment shares based on the U.S. Census Bureau's *Survey of Construction*
- Continue to refine historical (and projected) impacts of utility energy efficiency incentives

Upcoming projects

- Update base-year and projected miscellaneous electric load equipment stocks and energy consumption

- Update characterization of residential and commercial lighting, commercial refrigeration, and commercial ventilation technologies

- Investigate modeling of storage technologies for buildings

Some reminders

- Interactive graphs are available as part of our online data table browser
  - www.eia.gov/outlooks/aeo/data/browser
- AEO and other select EIA data are available as part of our Application Programming Interface (API) tools
  - www.eia.gov/opendata

Questions or comments

For more buildings information

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For more information

U.S. Energy Information Administration homepage | www.eia.gov

Buildings Working Group materials | www.eia.gov/outlooks/aeo/workinggroup/buildings

Today in Energy | www.eia.gov/todayinenergy

Annual Energy Outlook | www.eia.gov/aeo

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

State Energy Data System | www.eia.gov/state/seds

Monthly Energy Review | www.eia.gov/mer

Residential Energy Consumption Survey | www.eia.gov/consumption/residential

Commercial Building Energy Consumption Survey | www.eia.gov/consumption/commercial

International Energy Portal | www.eia.gov/international

Bonus Slides

Buildings-related reports

- Updated Buildings Sector Appliance and Equipment Costs and Efficiency: www.eia.gov/analysis/studies/buildings/equipcosts
- Analysis and Representation of Miscellaneous Electric Loads (MELs) in NEMS: www.eia.gov/analysis/studies/demand/miscelectric
- Distributed Generation System Characteristics and Costs in the Buildings Sector: https://www.eia.gov/analysis/studies/buildings/dg_storage_chp/
- Modeling Distributed Generation in the Buildings Sectors: www.eia.gov/outlooks/aeo/nems/2017/buildings (update in progress)
- Price Elasticities for Energy Use in Buildings of the United States: www.eia.gov/analysis/studies/buildings/energyuse (update in progress)