AEO2022 Buildings Working Group Meeting II

Office of Energy Consumption and Efficiency Analysis
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By
Buildings Energy Analysis group
Overview

• AEO2022 results overview—delivered energy by fuel

• Comparison with AEO2021
  – Model drivers
  – Residential and commercial electricity and natural gas consumption
  – Miscellaneous Electric Loads (MELs)
  – Distributed generation

• EIA consumption survey updates
AEO2022 Results Overview
Electricity continues to be the fastest-growing energy source for building use in AEO2022

Residential sector delivered energy consumption
quadrillion British thermal units

- Electricity: CAGR 2021-2050 = 0.7%
- Natural gas: CAGR 2021-2050 = -0.1%
- Petroleum and other liquids:
  - CAGR 2021-2050 = -1.1%
  - CAGR 2021-2050 = -1.5%
- Other:
  - CAGR 2021-2050 = 0.0%

Commercial sector delivered energy consumption
quadrillion British thermal units

- Electricity:
  - CAGR 2021-2050 = 0.6%
- Natural gas:
  - CAGR 2021-2050 = 0.2%
- Petroleum and other liquids:
  - CAGR 2021-2050 = 0.2%
- Other:
  - CAGR 2021-2050 = 0.0%

Source: AEO2022 preliminary
Comparison with AEO2021
End-use fuel prices trends vary by sector

**Residential fuel prices**
- 2020 $/MMBtu

**Commercial fuel prices**
- 2020 $/MMBtu

Sources: AEO2022 preliminary, AEO2021
Heating and cooling degree days include NOAA historical data and short-term forecast, along with 30-year trend through projection period.

Sources: AEO2022 preliminary, AEO2021

Note: NOAA refers to the National Oceanic and Atmospheric Administration.
Residential housing starts projected to increase after 2021

Sources: AEO2022 preliminary, AEO2021
Projected commercial floorspace grows at 1% per year as pandemic mitigation efforts ease

commercial floorspace
billion square feet

Sources: AEO2022 preliminary, AEO2021
Recent and near-term consumption changes and more housing units drive residential energy use

residential purchased electricity consumption
quadrillion British thermal units

Sources: AEO2022 preliminary, AEO2021
Recent and near-term consumption changes and revised miscellaneous electric loads drive commercial energy

- **commercial purchased electricity consumption**
  - Quadrillion British thermal units

- **commercial natural gas consumption**
  - Quadrillion British thermal units

**Sources:** AEO2022 preliminary, AEO2021
Television, computer, and related equipment trends have changed a lot since 2013.

Sources: AEO2022 preliminary, AEO2021
MELs report shows increased use of data center servers, while efficient video displays drive down non-PC office equipment energy use

Sources: AEO2022 preliminary, AEO2021
Differences in electricity prices and historical system characteristics affect buildings PV projections.

**residential PV capacity**
gigawatts-direct current (GW-DC)

**commercial PV capacity**
gigawatts-direct current (GW-DC)

Sources: AEO2022 preliminary, AEO2021
EIA Energy Consumption Survey updates

• 2018 Commercial Buildings Energy Consumption Survey (CBECS)
  – Building characteristics data tables released last week; characteristics microdata will be released in November; consumption and expenditure data will be released in Spring/Summer 2022
  – 2018 CBECS data will make it into AEO2023 at the earliest
  – 2018 CBECS will not capture long-term changes in commercial consumption caused by the pandemic (e.g., remote work, ventilation consumption); the AEO will capture such effects at the sector level from historical data and Short Term Energy Outlook forecasts

• 2020 Residential Energy Consumption Survey (RECS)
  – Some estimates will be available in all 50 states (for example, number of homes with AC in each state)
  – Household characteristics data will be available in early 2022
Buildings-related reports

- Updated Buildings Sector Appliance and Equipment Costs and Efficiency
- Analysis and Representation of Miscellaneous Electric Loads (MELs) in NEMS
- Distributed Generation System Characteristics and Costs in the Buildings Sector
- Modeling Distributed Generation in the Buildings Sectors
- Price Elasticities for Energy Use in Buildings of the United States
- Trends in Commercial Whole-Building Sensors and Controls
- Development of Commercial Building Shell Heating and Cooling Load Factors
- Residential and Commercial sector Energy Code Adoption and Compliance Rates
For more buildings information

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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
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