Buildings Working Group Meeting

AEO2017 Model Updates

Office of Energy Consumption and Efficiency Analysis
August 30,2016 | Washington, DC

By
Buildings Energy Analysis Team

Overview

- AEO release: this year versus last
- Current policy assumptions and updates
  - federal standards, ENERGY STAR specifications, and building codes
  - Clean Power Plan
- Major model updates
  - extension to 2050
  - residential solar photovoltaic capacity
  - technology characterizations
  - 2012 CBECS incorporation
- Historical updates
- Discussion

AEO2017 is a ‘shorter’ year

- Fewer side cases this year
- Shorter publication
- Hoping to get back ‘on schedule’

Policy assumptions – regulations

- Federal equipment standards
  - DOE rulemakings from this year to be incorporated
    - dehumidifiers
    - commercial pre-rinse spray valves
- Investigate new ENERGY STAR specifications as they affect major end-use equipment and miscellaneous electric loads (MELs)
- Building codes
  - States assumed to meet goals defined in ARRA, then continue trends in code adoption
    - Residential: IECC 2009 or better by 2017
    - Commercial: ASHRAE 90.1-2007 or better by 2016; ASHRAE 90.1-2013 or better by 2024 (near-term adoption rate may be adjusted for AEO2017 based on updated information)

Policy assumptions – tax credits

- Tax credits
  - Already includes American Taxpayer Relief Act of 2012 enacted January 2013
    - residential equipment/ envelope credits included for 2012 and 2013
  - 2016 expiration of investment tax credit for small wind, fuel cells, geothermal heat pumps,
    - EPACT 2005, EIEA: 30% of cost with no upper limit (except fuel cells)
  - 2016 expiration of investment tax credit for microturbines, CHP
    - EPACT 2005 (microturbines only), EIEA : 10% of installed cost
  - Consolidated Appropriations Act, 2016
    - phased expiration of solar investment tax credit
    - 30% through 2019; 26% for installations in 2020; 22% for installations in 2021
    - 2022 and beyond: no residential tax credit; commercial solar tax credit reverts to 10%

Policy assumptions – Clean Power Plan (CPP)

- Modeling of major end-use equipment and residential shell rebates by Census division to represent utility programs
  - CPP rebates at the end-use technology level range from 10%-15% of the installed cost of energy efficient equipment; timing varies by Census division
  - model calculates efficiency program administration costs and savings relative to baseline case – values are available for electricity sector to use in compliance/ price calculations
  - capability to represent regional incentives for renewable distributed generation and combined heat and power technologies in place but no added incentives planned for AEO2017

Major model updates

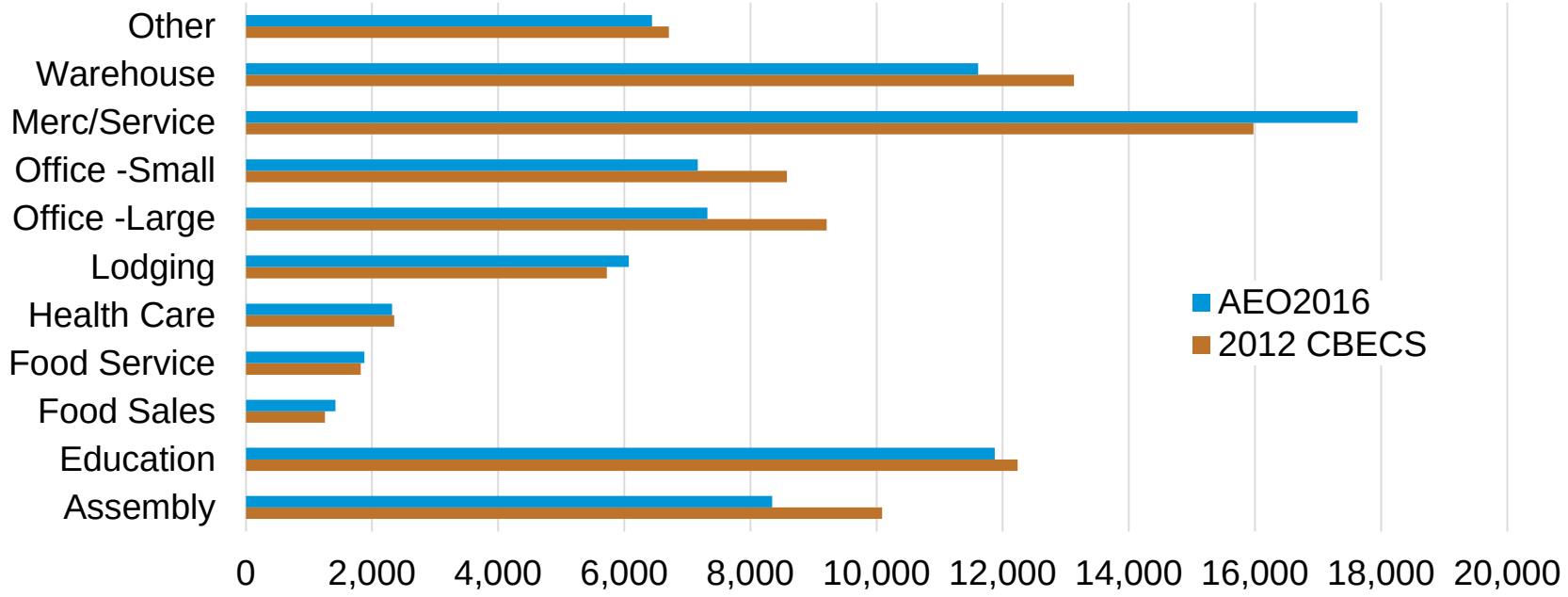
- Extension to 2050
  - mechanically complete; some assumptions still in progress
- Alternate modeling option for residential solar PV capacity penetration
  - econometric penetration model with logit function coefficients and ZIP code-level data instead of niche/ payback model oriented more toward customer-owned systems
  - incorporation of updated data model and calibration to historical installations in progress
- Major end-use technology menu updates
  - residential and commercial lighting
  - commercial ventilation and refrigeration

Major model updates (continued)

- 2012 CBECS update
  - floorspace, technology market shares, end-use energy intensity, etc.
  - model base year updated to 2012; first model year to 2013
  - some updates delayed until AEO2018 (full AEO):
    - building shell efficiency of new construction relative to existing stock
    - update of niches for DG/ CHP cash flow analysis
- Analysis to explicitly include current energy efficiency programs in progress

Floorspace higher in 2012 than previously projected in AEO2016

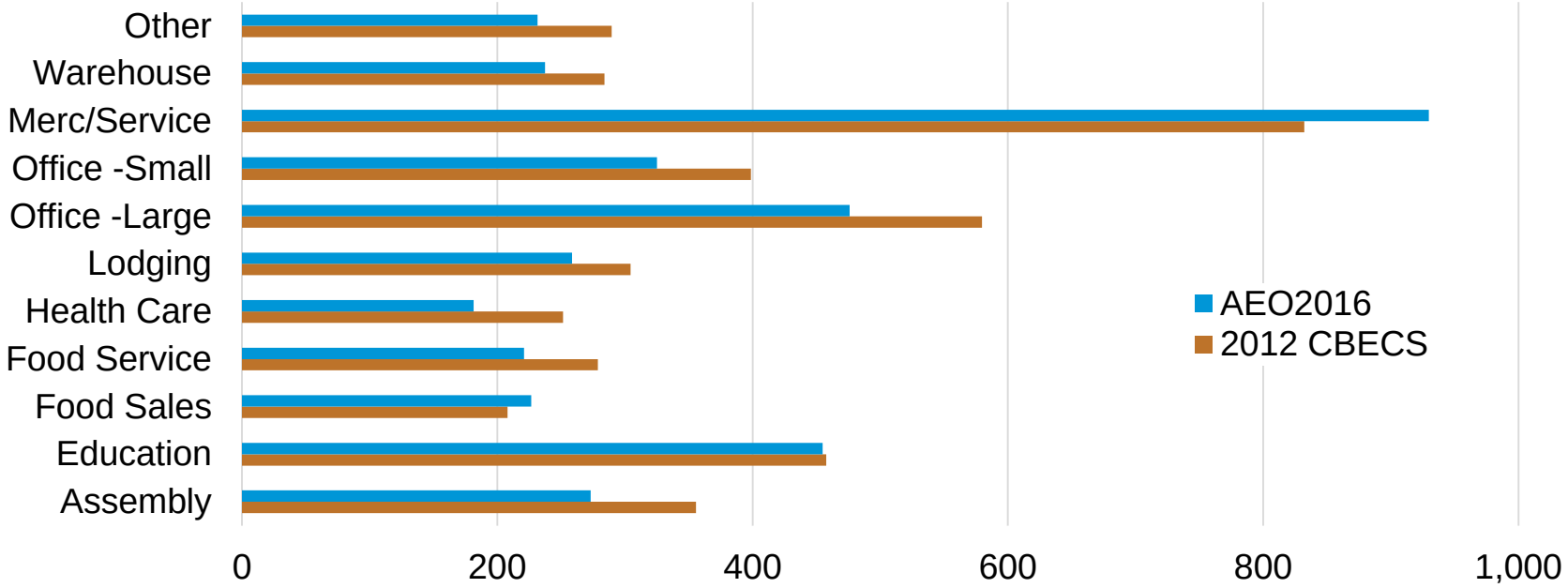
million square feet, 2012



Source: U.S. Energy Information Administration, Commercial Buildings Energy Consumption Survey (CBECS), AEO2016

Delivered electricity consumption higher in most building types in 2012 than projected in AEO2016 from 2003 CBECS

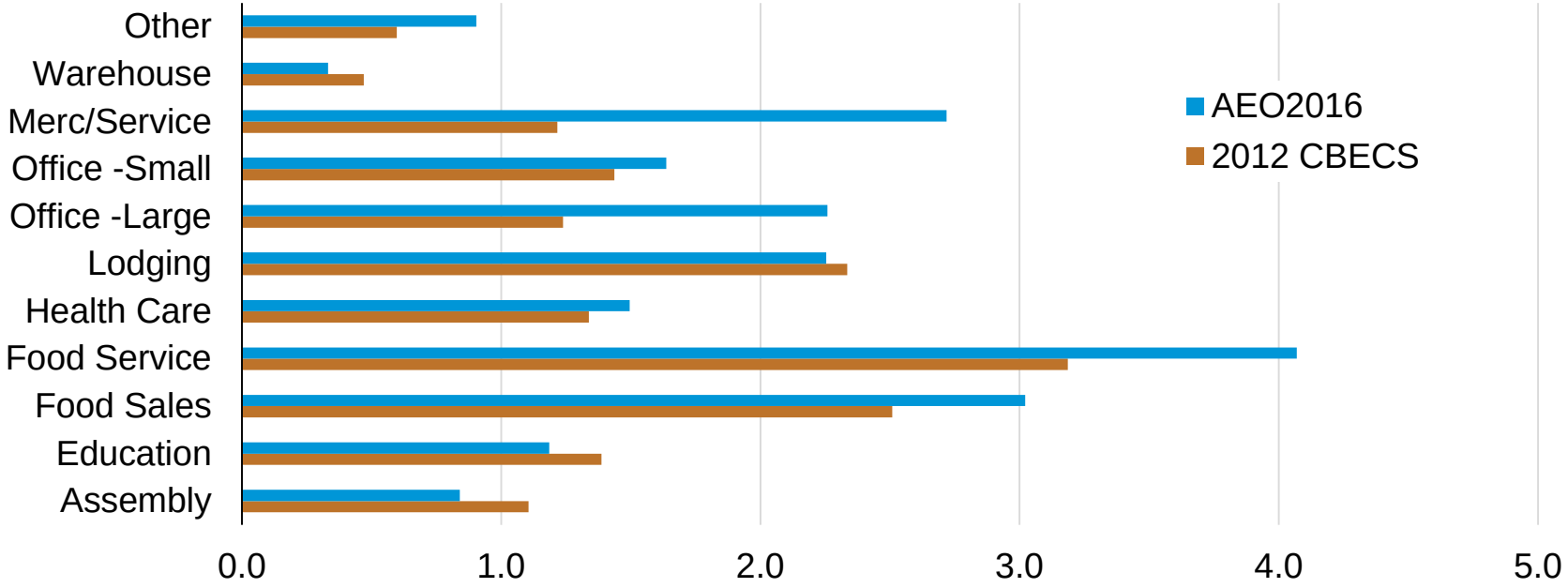
trillion Btu, 2012



Source: U.S. Energy Information Administration, Commercial Buildings Energy Consumption Survey (CBECS), AEO2016

Electric space heating energy intensity lower for many building types in 2012 CBECS than AEO2016 Reference case

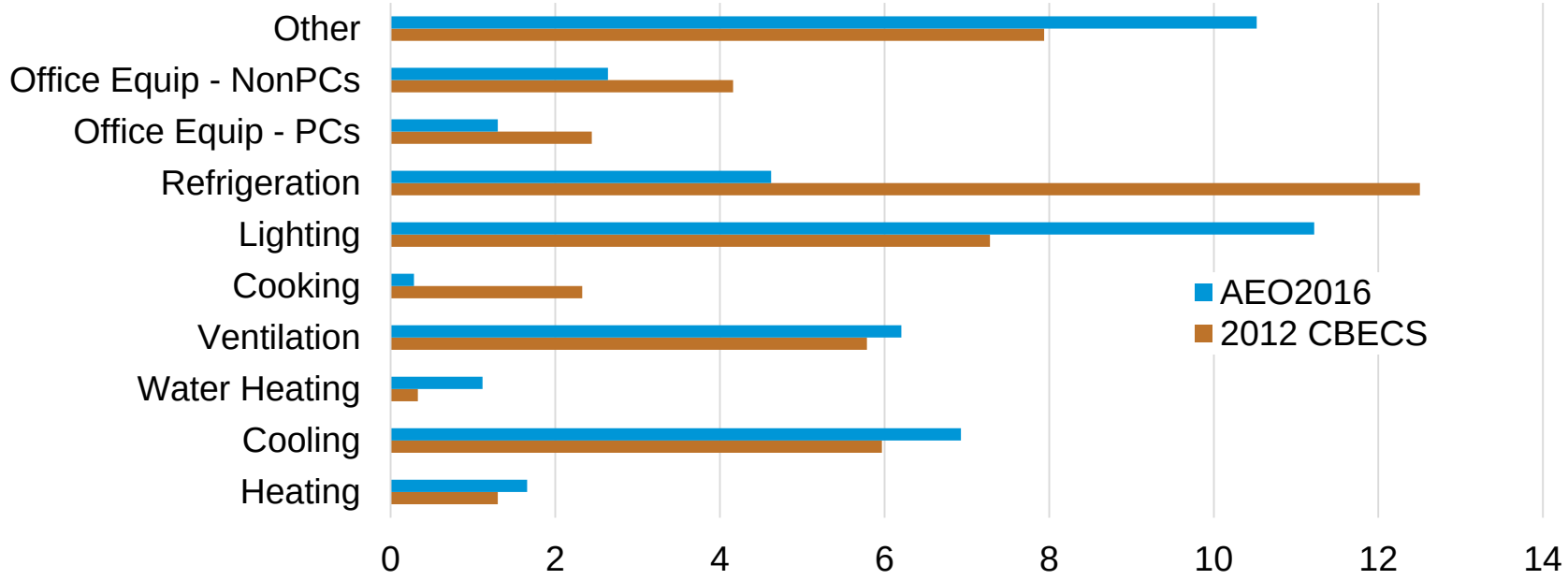
thousand Btu per square foot, 2012



Source: U.S. Energy Information Administration, Commercial Buildings Energy Consumption Survey (CBECS), AEO2016

Electricity intensity varies by end use

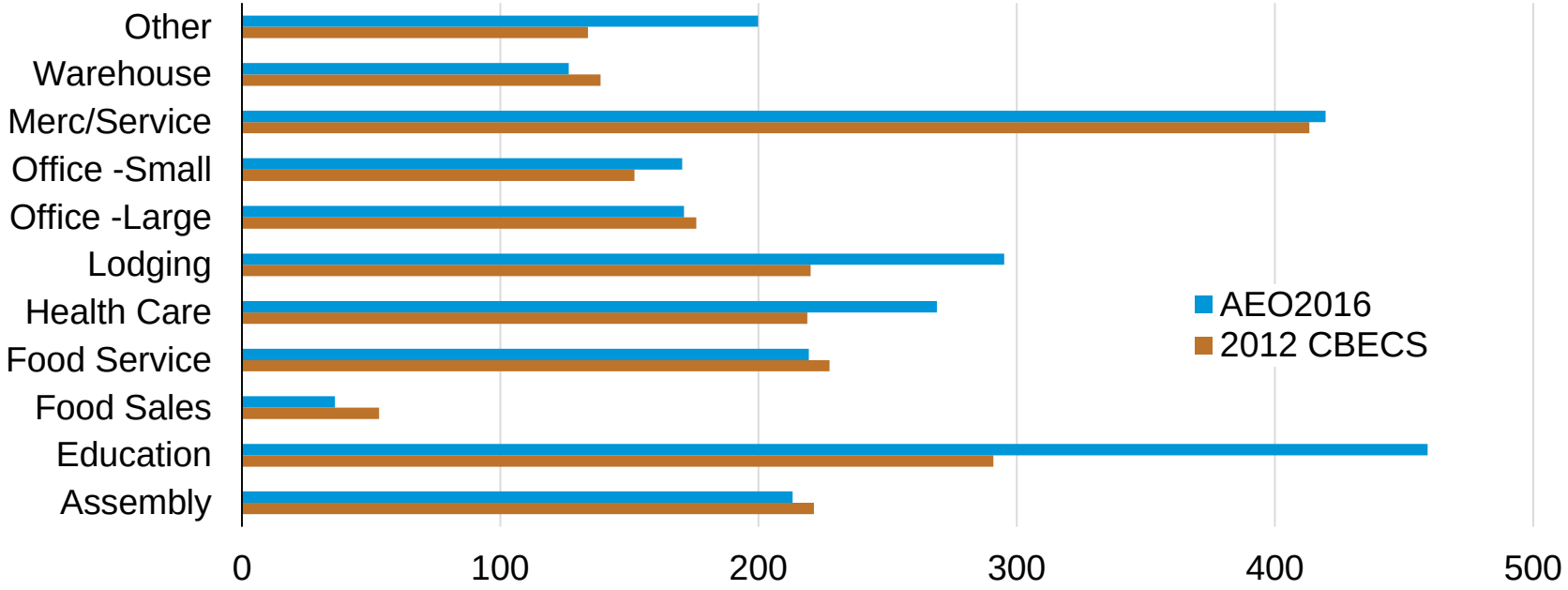
thousand Btu per square foot, 2012



Source: U.S. Energy Information Administration, Commercial Buildings Energy Consumption Survey (CBECS), AEO2016

Natural gas consumption varies by building type

trillion Btu, 2012



Source: U.S. Energy Information Administration, Commercial Buildings Energy Consumption Survey (CBECS), AEO2016

Historical updates

- Sectoral energy consumption by fuel
  - Monthly Energy Review (MER)
  - Short-Term Energy Outlook (STEO)

- Usual annual updates
  - NOAA weather data and forecast
  - distributed generation capacity
  - annual “look” at photovoltaic costs
  - interconnection limitations based on Database of State Incentives for Renewables & Efficiency

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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

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

International Energy Portal | http://www.eia.gov/beta/international/

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/