June 14, 2018

MEMORANDUM FOR: Ian Mead

                       Assistant Administrator for Energy Analysis

FROM: Jim Turnure

                       Director, Office of Energy Consumption and Efficiency Analysis

SUBJECT: Summary of AEO2019 Buildings Working Group 1 held on May 31, 2018

This memorandum provides an overview of the presentation given at the first Annual Energy Outlook 2019 (AEO2019) Buildings Working Group meeting and summarizes the ensuing discussion. The meeting covered possible AEO2019 updates, including near-term modeling changes and long-term projects that may affect results in subsequent AEOs, and concluded with a WebEx survey of participants. The presentation for this meeting is available in a separate document.

Model updates (AEO2019)

Major updates anticipated for AEO2019 include accounting for the impacts of California's mandate for solar PV on new residential buildings and updating major end-use technology menus based on 2017 data. AEO2019 will also incorporate residential energy consumption, building characteristics, and technology data from the 2015 Residential Energy Consumption Survey (RECS).

New federal energy efficiency standards, including those related to portable air conditioners, uninterruptible power supplies, and commercial boilers, may not be included in the results. These new standards have yet to be published in the Federal Register. Nevertheless, if these new standards are promulgated before the Reference case is finalized, AEO2019 will reflect the new specifications as they affect major end-use equipment and miscellaneous electric loads.

In addition to any changes in energy efficiency standards, it is anticipated that AEO2019 will include updates to historical data on sectoral energy consumption, weather, heating equipment shares, and utility energy efficiency incentives.

Long-term research

The EIA Buildings Analysis Team is currently conducting research that may affect the results of AEOs subsequent to the 2019 release. Certain research projects, including a research initiative on energy efficiency practices in other countries, will also inform forthcoming International Energy Outlooks (IEOs). In particular, EIA currently plans to update distributed generation and combined heat and power characteristics (CHP), collect battery storage system costs and characteristics, investigate impacts of low-income energy efficiency and weatherization projects, and characterize whole-building sensor and

control technologies. A project with Northeast Energy Efficiency Partnerships to improve data collection and better understand utility energy efficiency programs is also slated to finish in August 2018.

EIA also currently plans to research alternate distributed generation electricity rate policies (i.e., retail versus wholesale rate for sales back to the grid), investigate modeling of battery storage technologies for buildings, research use of district services in China, and research energy efficiency and renewable energy policies affecting buildings in Indonesia and the Middle East.

Discussion

The discussion that followed the presentation focused on three main topics: distributed generation, electrification, and building energy codes.

Distributed Generation

A participant asked whether EIA models new and retrofit solar photovoltaic (PV) separately. Although EIA does not currently differentiate between new and retrofit PV in its models, the participant noted recent research on cost differences between new and retrofit PV markets. Participants were also interested in whether net metering policies are incorporated into economic PV calculations. EIA staff clarified that when considering PV adoption, NEMS incorporates simplified assumptions regarding the rate at which excess generation may be sold to the grid. In particular, excess generation is sold at the retail rate in the residential model and at the wholesale rate in the commercial model. EIA staff also explained that NEMS includes interconnection limitations that scale PV adoption by census division based on a suite of state policies, including net metering. Interconnection limitations are phased out over the projection period.

Electrification

One participant asked why projected long-term trends differ between the residential and commercial sectors. In particular, natural gas consumption is projected to remain flat in the residential sector, whereas it is projected to increase in the commercial sector. EIA staff responded that commercial natural gas growth reflects increased use of CHP, as well as growth in floorspace. Further, energy efficiency incentives do induce some building managers to switch from natural gas space heating appliances to air-source heat pumps, but this effect is small relative to overall natural gas consumption.

Another participant asked whether electric vehicles (EVs) were included in RECS; EIA staff clarified that EVs are currently included in the "not elsewhere classified" category but could be incorporated in future consumption surveys. EIA staff also explained that the "not elsewhere classified" category in RECS includes modeled end uses that were not published, known end uses that were not modeled, and residual consumption.

Building Energy Codes

One attendee asked how building energy codes and code compliance are modeled. EIA noted that the residential model accounts for non-compliant, code-compliant, and above-code building envelope options with associated costs, and that the commercial model indexes improvements over time through adoption of ASHRAE 90.1 for building envelope improvements.

WebEx Poll

At the end of the meeting, EIA conducted a WebEx-based poll to get targeted feedback from web attendees, and the same questions were posed to in-person attendees (without response options). No in-person attendees responded, but 15 call-in attendees did provide feedback through the WebEx poll. The questions and responses are summarized below.

1. How do you use AEO building energy projections?
    a. Research how energy is currently used in buildings   7/15 (47%)
    b. See how much energy will be used by buildings in the future   13/15 (87%)
    c. Create custom projections based on EIA's projections   10/15 (67%)
    d. Learn more about distributed energy generation in buildings   5/15 (33%)
    e. Other   2/15 (13%)
       No Answer   0/15 (0%)

2. What AEO scenarios do you use most frequently?
    a. Reference case   12/15 (80%)
    b. High/low economic growth cases   0/15 (0%)
    c. High/ low oil and gas resource cases   1/15 (7%)
    d. Alternative distributed generation policies cases   2/15 (13%)
    e. Alternative energy efficiency policies cases   10/15 (67%)
    f. Other   3/15 (20%)
       No Answer   1/15 (7%)

3. How frequently do you refer to the AEO?
    a. Daily   2/15 (13%)
    b. Weekly   2/15 (13%)
    c. Monthly   7/15 (47%)
    d. Yearly   4/15 (27%)
    e. Never   0/15 (0%)
       No Answer   0/15 (0%)

4. What suggestions do you have for us? (short-answer response)
    a. Integration of DG + batteries with the electric power sector
        1/15 (7%)
    b. It would be helpful to know more about EVs, decisions about breakouts of end uses are handled (as were brought up by others today).   1/15 (7%)
    c. Availability of more granular data over time would be very useful. Often the data are per census division, but more granular data is often needed for various uses.   1/15 (7%)
    d. Keep up the good work. We need programmatic versus natural conservation to remove energy efficiency from the base case.   1/15 (7%)
    e. Setting the right assumptions may actually be more important than the forecasts they're used for. Many stakeholders rely on EIA assumptions for their own analyses. 1/15 (7%)
    f. Still hard to see how utility programs affect projections--rebates seem only partial, but how interact with calibration to actual energy use.   1/15 (7%)

Attendees

Guests (in person)	Affiliation
Paul Donohoo-Vallett	DOE
Robert Fares	DOE
Jared Langevin	DOE
Valerie Nubbe	DOE
Amir Roth	DOE

Guests (WebEx/phone)

Justin Baca	SEIA
Jon Black	ISO-NE
Matthew Cleaver	Leidos
Carol Cox	Lakeland Electric
Robyn DeYoung	EPA
Eric Fox	Itron
Chioke Harris	NREL
Whitney Herndon	Rhodium Group
Chris Holmes	EPRI
Szuhua Jen	Southern California Edison
Arthur Maniaci	NYISO
John Meyer	Leidos
Abdul Razack	NV Energy
Victoria Rojo	ISO-NE
Mike Russo	Itron
Max Sculer	NYISO
Robert Schutz	LEENA Laboratories
Erick Tucker	Leidos
Lowell Ungar	ACEEE
Evelyn Wright	Sustainable Energy Economics

EIA Attendees (in person)

Chip Berry

David Daniels

Greg Lawson

Perry Lindstrom

Fred Mayes

Bill McNary

Joelle Michaels

Eileen O'Brien

Manussawee Sukunta

Maggie Woodward

Team Members:

Erin Boedecker

Meera Fickling

Behjat Hojjati

Kevin Jarzomski

EIA Attendees (WebEx/phone)

Danni Mayclin