



*Independent Statistics & Analysis*

U.S. Energy Information  
Administration

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**MEMORANDUM FOR:** **Stephen K. Nalley**  
Acting Assistant Administrator for Energy Analysis

**FROM:** Jim Diefenderfer  
Director, Office of Electricity, Coal, Nuclear, and Renewables Analysis

**SUBJECT:** Summary of AEO2020 Electricity Working Group meeting held on April 10, 2019

This memorandum provides an overview of the presentation given during the first AEO2020 Electricity Working Group meeting and a summary of the discussion that took place.

### **Overview**

At the beginning of the meeting, EIA stated that AEO2020 will be a short AEO cycle and will include the six core side cases (High/Low Macro, High/Low Oil Price, and High/Low Oil and Gas Resource and Technology cases), along with the Reference case.

EIA held the first working group meeting in the development cycle to

- Respond to feedback/frequently asked questions on AEO2019 and the underlying assumptions
- Provide an opportunity to solicit modeling improvement suggestions for AEO2020 or for consideration for EIA's budgeting process and implementation for AEO2021 or beyond
- Identify issues or topics that might be better addressed through targeted working group discussions.

The presentation materials are available in a separate document. The meeting covered three separate topics:

- Review of AEO2019 results: solicitation of comments/responses
- Review of current laws and regulations expected to be incorporated into AEO2020
- Overview of long-term Electricity Market Module (EMM) enhancements

### **Model updates**

The meeting began with a summary of AEO2019 results followed by discussion of issues that were raised in the early coverage of the release. Some issues discussed include

- The divergence between the projected decline in coal generation and coal retirements
  - Why are coal retirements not projected in the later years of the forecast even though many units would reach 60 years of age during this timeframe?
  - EIA noted that coal retirements represented in EMM are driven by economics rather than age and that the noneconomic plants are retired earlier in the projection period.
- The rise in electricity prices despite flat or slow natural gas growth.
  - Generation costs decrease 15% by 2050 and account for a 60% share of the price of electricity in 2018 in the Reference case.
  - Transmission costs increase by 18%, and distribution costs increase by 24% because of the need to replace aging infrastructure and upgrade the grid to integrate wind and solar capacity.
- The significant reduction in overnight capital cost assumption for new natural gas advanced combined-cycle technology
  - New, larger combined-cycle designs result in substantial economies of scale for this technology. According to the April 2018 report, [PJM Cost of New Entry](#), PJM's next generating capacity auction cost per unit of installed capacity for the advanced combined-cycle design will be 25% to 30% lower compared with older combined-cycle units.
- The decline in average emissions intensity relative to AEO2018 levels
  - Relative to AEO2018, in the Reference case, EIA projects lower-emitting natural gas generation to grow while higher-emitting coal-fired generation is expected to decline through 2050.

#### **Pending AEO2020 laws and regulations updates**

EIA is monitoring the status of a number of proposed regulatory and legislative initiatives for AEO2020 and will incorporate into the Reference case all those that are finalized in time for inclusion in this cycle.

- EPA's Affordable Clean Energy (ACE) rule proposal to replace the Clean Power Plan revises the best system of emission reduction (BSER) finding to include only heat-rate efficiency improvements. ACE will be included if finalized on schedule by Spring 2019.
- EPA revisions to the new source performance standards (NSPS) to eliminate carbon capture and sequestration (CCS) requirements and apply specifications for technology type/size. Revised NSPS will be included if finalized by Spring 2019.
- Section 45Q tax credit for CCS technology will be included in AEO2020, including the \$50 per metric ton credit for secure geologic storage and the \$35 per metric ton credit for enhanced oil or gas recovery (EOR).
- EIA staff intends to model updates to state carbon emission policies and renewable portfolio standard (RPS) programs, as well as updates to state participation in the Regional Greenhouse Gas Initiative (RGGI) program.

## Pending AEO2020 modeling enhancements

- Redefining EMM regional boundaries to account for structural changes in independent system operators, regional transmission organizations, and regional power market developments— from 22 to 25 EMM regions
- Incorporating results of the study to update capital cost and performance characteristics for new generating technologies
- Adding short-term wholesale market price projections

## Long-term EMM enhancements

- Introduce the capability to alter EMM regional definitions as needed
- Analyze and update transmission and distribution spending projections to account for the potential long-term cyclical pattern in transmission and distribution spending (for more detail see next section.)
- Examine coal supply curves

## Discussion

The discussion following the presentation focused on a number of more detailed topics.

### *Changing approach to transmission and distribution modeling*

One participant questioned how EIA planned to revise changing transmission and distribution projections. EIA noted that currently capital investment in the transmission and distribution system is projected as a function of changes in peak demand, based on historical trends. Additional transmission capital investment is added with each new generating unit addition to account for grid interconnection costs. Regression equations have been developed to project the operating and maintenance costs for transmission and distribution as a function of peak demand and overall customer sales.

EIA plans to revise the current treatment of transmission and distribution spending to account for long-term cycles in investment patterns. To extend the data on historical investment for transmission and distribution (current databases have data only as far back as 1994), a contractor is currently scanning volumes from the Federal Power Commission on utility capital spending going back to 1938. After that project, which is not anticipated to be included in AEO2020, is completed, EIA will reevaluate the transmission and distribution projection equations in EMM.

### *Revision to cost of new advanced combined-cycle generation technology*

One participant noted EIA's change in AEO2019 to reduce the cost of advanced combined-cycle technology 25%–30% and asked whether the change was applicable only to units above a certain size. EIA responded that advanced combined cycle is defined consistent with the *Frame H* specifications, with the lowest threshold capacity level reported at 292 megawatts (MW) for a single unit. However, because EMM adds new builds as needed to suit the increment of capacity required to meet reserve margin

requirements, even when advanced combined cycle is the least cost technology, it is possible that the size of the projected new build could be below the Frame H minimum capacity size.

Another participant asked if EIA applied learning cost reductions to advanced combined cycle even though the cost of new advanced combined cycle was reduced in AEO2019. EIA indicated the learning parameters specified for advanced combined cycle still applied, even with the lower cost assumption.

#### *Treatment of CO2 targets from individual companies*

A participant asked whether EIA incorporated commitments to reduce CO2 made by specific utility companies, citing the examples of DTE Energy and Consumers Power in Michigan setting goals of 80% CO2 reductions by 2040 and Xcel committing to a 100% CO2 reduction. EIA noted that under the assumption of *current laws and regulations* the Reference case includes state actions backed by legal or regulatory requirements (e.g., states passing 100% RPS policies) but not corporate-level voluntary commitments.

#### *Federal tax treatment of utilities in AEO2019*

Another participant asked whether the December 2017 tax bill or the section 45Q tax credits were reflected in the AEO2019 financial assumptions. EIA responded that the Tax Cuts and Jobs Act of 2017 was modeled in AEO2019. The federal carbon storage (section 45Q) tax credit was not reflected in AEO2019 but will be incorporated in AEO2020.

#### *Offshore wind development*

A participant asked if offshore wind targets reflected in state assumptions will be modeled in AEO2020 or if EIA would include only offshore wind levels that are currently enacted into law.

EIA responded that offshore wind mandates are not included in state assumptions, but the offshore wind projects will eventually be included in Form EIA-860 reporting, along with the cost updates for offshore wind. EIA noted that with respect to mandates, in the past, target online years have been unclear, so they cannot be accurately represented.

#### *Other issues*

Another participant asked about EIA's approach to modeling distributed generation. EIA responded that distributed generation is covered in the buildings and industrial model portion of National Energy Modeling System (NEMS).

A participant urged EIA to expand its treatment of the renewable fuels standard, citing its importance to the use of biomass as a transportation fuel.

**Attendees***Guests (in person)*

<b>Name</b>	<b>Affiliation</b>
Bob Cleaves	Biomass Power Association
Rachel Goldstein	Solar Energy Industries Association

*Guests (WebEX/Phone)*

<b>Name</b>	<b>Affiliation</b>
Justin Baca	Solar Energy Industries Association
Youngsun Baek	Union of Concerned Scientists
Frank Benavides	Alliance Resource Partners
Anne Benson	Midcontinent Independent System Operator
Wesley Cole	National Renewable Energy Laboratory
Paul Donohoo-Vallett	U.S. Department Of Energy
Erich Eschman	Environmental Protection Agency
Sarah Forbes	U.S. Department Of Energy
Steve Frauenheim	Edison Electric Institute
John Hensley	American Wind Energy Association
Whitney Herndon	Rhodium Group
Serpil Kayin	Environmental Protection Agency
Jordan Kislear	U.S. Department Of Energy
Hannah Kolus	Rhodium Group
Michael Leitman	National Rural Electric Cooperative Association
Kevin Lucas	Solar Energy Industries Association
Jim Moore	Spire Energy
Aditya Jayam Prabhakar	Midcontinent Independent System Operator
Amit Rao	Midcontinent Independent System Operator
Jay Ratafia-Brown	Leidos
Chris Salmi	NJ Clean Air Council
David Schmalzer	Argonne National Laboratory

Sharon Showalter	OnLocation
Tom Simchak	Energy Storage Association
Mark Strohfus	Great River Energy
Tracy Terry	OnLocation
Chen-Hao Tsai	Midcontinent Independent System Operator
Celeste Wanner	American Wind Energy Association
David White	Synapse
Thomas Wilson	Electric Power Research Institute
Frances Wood	OnLocation

*EIA staff attendees (in-person)*

<b>Name</b>	<b>Affiliation</b>
Lori Aniti	U.S. Energy Information Administration
Erin Boedecker	U.S. Energy Information Administration
Richard Bowers	U.S. Energy Information Administration
David Daniels	U.S. Energy Information Administration
Jim Diefenderfer	U.S. Energy Information Administration
Kenneth Dubin	U.S. Energy Information Administration
David Fritsch	U.S. Energy Information Administration
Thad Huetteman	U.S. Energy Information Administration
Jeffrey Jones	U.S. Energy Information Administration
Augustine Kwon	U.S. Energy Information Administration
Angelina LaRose	U.S. Energy Information Administration
Cara Marcy	U.S. Energy Information Administration
Laura Martin	U.S. Energy Information Administration
Christopher Namovicz	U.S. Energy Information Administration
Michael Scott	U.S. Energy Information Administration
Manussawee Sukunta	U.S. Energy Information Administration
Terry Yen	U.S. Energy Information Administration

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Michelle Bowman	U.S. Energy Information Administration
Tyler Hodge	U.S. Energy Information Administration
Bonnie West	U.S. Energy Information Administration