

June 4, 2018

MEMORANDUM FOR: Ian Mead
Assistant Administrator for Energy Analysis

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

SUBJECT: Summary of AEO2019 Renewable Electricity Working Group Meeting held on May 15, 2018

This memorandum summarizes the working group presentation on the Annual Energy Outlook 2018 (AEO2018) updates and the expected data and modeling updates for renewables in AEO2019. The related presentation materials are provided in a separate document on EIA's website.

Background

At the outset, EIA staff mentioned that AEO2019 will be a short AEO cycle and will include the 6 core side cases (High/Low Macro, High/Low Oil Price, High/Low Oil and Gas Resource and Technology cases), along with the Reference case.

EIA staff explained that the first working group meeting earlier in the development cycle than in the past to discuss the results in the recently released AEO2018 and solicit stakeholder feedback for consideration in future modeling efforts earlier in the process. In addition, the first working group meetings provide an opportunity to identify issues or topics that may be more effectively addressed through smaller, more targeted working group discussions.

Model updates (AEO2019)

The meeting began with EIA staff presenting an overview of the updates that were included in AEO2018:

- Improved representation of renewable generation sources
- Assessment of parameters that are impacted by increased generation variable generation
- Integration of energy storage as a capacity expansion option
- Reassessment of data sources for potential hydro builds
- Enhanced representation of Renewable Portfolio Standards
- Reconsideration of the electric power price structure representation in the context of increasing deployment of distributed generation
- Revaluation of the cost of capital to finance new generating capacity by owner type

The meeting then proceeded to outline possible updates to AEO2019, divided into three categories "likely to get done projects" "possible projects," and "long-term projects."

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The following projects are likely to be completed for inclusion in AEO2019:

- Update the methodology for modeling battery storage technologies in order to capture the revenue estimates and interactions with other generating technologies.
- Reevaluate the approach for estimating the capacity value for wind and solar technologies to account for declining marginal values.
- Update to the spinning reserves requirement as a result of the addition of non-dispatchable renewable generation.
- Changes to the short-term elasticity bound used by NEMS for determining the short-term capacity expansion limit.
- Updates to the methods used for renewable energy conversion from kWh to BTUs for purposes of energy comparison

The following projects may be completed in time for inclusion in AEO2019:

- Addition of new solar or wind technologies
- Updates to the solar thermal technology profile
- Assessment of the impacts of distributed PV on retail price structure
- Replacement of the outdated LFG model with one that account for new capacity additions based primarily on factors exogenous to electricity markets
- Update biomass feedstock data to reflect the most recent DOE's *Billion-Ton Report*

The following projects will likely not be completed for AEO2019, but they were discussed during the meeting:

- Changes to the solar and wind resource supply curves based on the new regional structure EIA is moving towards
- Incorporation of retirement and repowering decisions for wind (and other renewables) into the projections from new capacity installations
- Update of the capacity factor learning function for wind technologies

Participants were also informed that the details surrounding possible updates have yet to be determined, and EIA is currently welcoming input for consideration.

Discussion

The discussion following the presentation focused on offshore wind, possible side cases, wind repowering, and alternative technologies.

Onshore wind

EIA staff presented the impacts of the solar tariffs on the timing of projected renewable power plant deployment. One audience member commented on the lack of change in the onshore wind projections, suggesting that as solar deployment declines, they would expect wind deployment to increase more. EIA staff explained that both wind and natural gas generation increase to offset the solar generation lost from the inclusion of the tariffs. Another participant confirmed that they see similar results in their studies of the solar tariffs.

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Alternative side cases

One participant suggested that EIA include side cases that investigate more aggressive cost declines in renewable technologies. EIA staff noted that these were side cases that have been implemented in the past and could be considered in the future, however AEO2019 will only include the core set of side cases, consisting of the high and low macro-economic cases, the high and low oil price cases, and the high and low oil and gas resource and technology cases.

Wind repowering

Another participant asked how EIA was incorporating repowering decisions into the model. EIA staff responded by saying that this was an ongoing area of interest and study; however, it is not likely to be addressed in time for the next AEO report. Some participants expressed an interest in collaboration on this topic.

Alternative technologies

EIA staff presented request for additional generating technology types to consider for AEO2019 and beyond. While several participants suggested including additional storage technologies, such as shorter and longer duration battery storage, no participant suggested any possible new wind technology for consideration. Furthermore, when pressed on whether the decision by EIA to consider taller-towers with larger blades as an additional technology type, participants suggested that perhaps changing the current wind technology type parameters to better fit current actual builds was the better answer.

One member of the audience suggested looking into the performance and cost impacts of using advanced inverters on solar photovoltaic systems to provide ancillary services. Another participant asked if EIA would model battery storage for use as spinning reserve, frequency regulation, or ancillary service. EIA staff indicated that it currently models spinning reserves and accounts for the interaction of wind and solar with the provision of this service and the ability of battery storage to provide this service. However, other ancillary services such as frequency regulation are beyond the resolution and scope of the NEMS model.

Another participant suggested that EIA analyze the impact of various battery storage durations by perhaps looking at loss of load or rate of change, and 4/6/8 hour-battery vs. 1 or 2 hour-battery to see how they change with changing penetration.

Attendees

Guests (WebEX/Phone unless otherwise noted)

First Name	Last Name	Affiliation
Youngsun	Baek	Union of Concerned Scientists
Paul	Spitsen	US Department of Energy Office of Energy Efficiency & Renewable Energy (in person)
Amanda	Levin	Natural Resource Defense Council
Sandra	Sattler	Union of Concerned Scientists
Andrew	Nicholls	Pacific NW National Laboratory
Jason	Burwen	Energy Storage Association
Kaita	Albanese	GE Energy Consulting

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Torrey	Beek	Department of Energy & Environment
Justin	Baca	Solar Energy Industries Association
David	White	Synapse Energy
Wesley	Cole	National Renewable Energy Laboratory
Daisy	Chung	Smart Electric Power Alliance
Marissa	Gillett	Energy Storage Association
Chad	Augustine	National Renewable Energy Laboratory
John	Hensley	American Wind Energy Association
Whitney	Herndon	Rhodium Group
Michael	Leitman	National Rural Electric Cooperative Association
Sharon	Showalter	OnLocation, Inc.
Jim	Moore	Spire
Evelyn	Wright	Sustainable Energy Economics
Brian	Walker	US Department of Energy Office of Energy Efficiency & Renewable Energy
Jim	VandePutte	AST
Michael	Leff	Con Edison
Shawn	Rumery	Solar Energy industries Association

EIA staff attendees (in person)

First Name	Last Name	Affiliation
Richard	Bowers	U.S. Energy Information Administration
Michelle	Bowman	U.S. Energy Information Administration
Lisa	Cabral	U.S. Energy Information Administration
Michael	Cole	U.S. Energy Information Administration
John	Conti	U.S. Energy Information Administration
David	Daniels	U.S. Energy Information Administration
Jim	Diefenderfer	U.S. Energy Information Administration
Kenny	Durbin	U.S. Energy Information Administration
Tyler	Hodge	U.S. Energy Information Administration
Thaddeus	Huetteman	U.S. Energy Information Administration
Kevin	Jarzomski	U.S. Energy Information Administration
Scott	Jell	U.S. Energy Information Administration
Augustine	Kwon	U.S. Energy Information Administration
Angelina	LaRose	U.S. Energy Information Administration
Perry	Lindstrom	U.S. Energy Information Administration
Cara	Marcy	U.S. Energy Information Administration
Laura	Martin	U.S. Energy Information Administration
Chris	Namovicz	U.S. Energy Information Administration
Manussawee	Sukunta	U.S. Energy Information Administration

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EIA staff attendees (WebEx/phone)

First Name	Last Name	Affiliation
Jeff	Jones	U.S. Energy Information Administration
Stacy	Angel	U.S. Energy Information Administration
April	Lee	U.S. Energy Information Administration