September 20, 2016

MEMORANDUM FOR: Ian Mead
Assistant Administrator for Energy Analysis

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

Paul Holtberg
Team Leader
Analysis Integration Team

FROM: Chris Namovicz
Team Leader for Renewable Electricity Analysis Team

SUBJECT: Summary of AEO2017 Renewables Working Group Meeting held on
September 1, 2016

PRESENTERS: Chris Namovicz

ATTENDEES: 12 EIA, 30 external (list provided following meeting summary)

Presentation topics included a discussion of key updates to model assumptions for the upcoming Annual Energy Outlook (AEO). A separate working group will be held at a later date to present preliminary AEO2017 model results.

Solar PV Load Shapes
After EIA presented solar PV load shapes as one of the key changes for the upcoming AEO2017, a participant asked if the consultant report in which the solar PV load shapes are based on will be made available. EIA staff replied that the consultant had only recently submitted the final report which will need to be reviewed by EIA. In addition, the consultant report will be used to help EIA to better understand how to net out distributed PV generation from specific end-use demands. The plan is to at least have a table showing the breakout.

Another participant asked if this revision would impact penetration of solar PV. EIA responded that it may affect distributed generation side a little bit, but it doesn't expect sizeable changes for utility-scale solar PV.

Energy Storage
A participant asked if EIA was planning to treat energy storage in the model similarly to pumped storage. EIA clarified that NEMS only models the dispatch of existing pumped storage, and does not model it as a capacity expansion option. EIA noted that pumped storage is primarily used to level system loads on a diurnal basis. While the energy storage characteristics contemplated for NEMS could be used to level system loads, the representation is intended to be much more flexible in providing different value streams. In addition, pumped hydro is limited to areas with favorable geography, but EIA needs to

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represent something that is more widely available. The same participant indicated that there was renewed interest in pumped storage that EIA should consider. In representing specific storage technologies, EIA is limited by NEMS capabilities and needs to model the technology and/or parameters that have the most broadly representative storage technology characteristics. EIA is currently planning to model energy storage like a "black box," while pumped storage could be considered beyond AEO2017.

Another participant asked if there has been a cost study performed for energy storage. EIA informed the working group that Leidos has recently provided a cost study on additional technologies, including energy storage. A learning factor, as applied for all power-sector technologies, would be applied to represent cost reduction of energy storage technology. The participant asked about potential co-learning with batteries in the transportation sector. The current implementation being developed by EIA does not consider EV battery learning impacts, but this is something that EIA could examine in the future.

The third participant asked how energy storage would be operated in NEMS and how EIA would value energy storage. EIA replied that there are different types of market for energy storage, some of which are not well represented in NEMS. Markets represented in NEMS that address storage include planning reserve, operating reserve (i.e. spinning reserve), and diurnal energy arbitrage.

Regional Multipliers for Solar Projects
A participant asked if there was a report on 2014 EIA-860 cost numbers that we had used as a part of our basis for the new regional multipliers. EIA staff explained that the numbers were still under a quality assurance review process. EIA expects a summary report of the 2014 cost data to be released in the near future; however, EIA cannot release detailed data for cost because of data confidentiality concerns.

State RPS Policies
A participant suggested that EIA evaluate the RPS requirements for Massachusetts, including a new offshore wind provision. EIA responded that we would evaluate the new Massachusetts provisions along with any other RPS changes identified.

Another participant inquired about the timeline for implementing REC trading within NEMS. EIA noted that REC trading occurs within model regions and across regional boundaries based on historic trade capability, but the model design limits how these trades are represented. EIA stated that a reexamination of REC trading would most likely be on hold until AEO2018, when NEMS regions may be redefined.

The third participant asked how NEMS accounted for a potential wind buildout in the Upper Midwest region in light of the Clean Power Plan (CPP). EIA staff clarified that the CPP is different from RPS policies and explained that NEMS will build out where it is most economical to do so given both state and federal policies.

The fourth participant wondered how NEMS is currently handling hydro power from Canada, especially pertaining to the New York RPS. EIA responded that the generation is either fixed (based on past values), or it has a supply curve of potential Canadian imports [Post meeting note: NEMS has a supply curve of potential imports]. NEMS cannot distinguish imported electricity by energy source, and cannot build new capacity in Canada to serve domestic loads.

Load-Carrying Capacity
A participant asked how effective load-carrying capacity (ELCC) for wind and solar capacity additions is currently calculated. EIA explained that ELCC calculation is currently included in the model and described in the model's documentation. Though it's a rough calculation, it does consider the decline in capacity value of these resources as market penetration increases. While NEMS effectively represents a capacity market, it does not provide a capacity price as part of the model's output. EIA does not publish the capacity values for wind or solar and does not compute or publish capacity prices.

PARTICIPANTS   (+ denotes online participant)

+Nana Ayensu (General Electric)

+Justin Baca (SEIA)

Torrey Beek (Oceana)

Aaron Bergman (DOE)

Erin Boedecker (EIA)

Dan Boff (DOE)

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+Jerry Eyster (General Electric)

David Feldman (NREL)

+Joe Goodenbery (National Rural Electric Cooperative Association)

+John Hensley (AWEA)

+Whitney Herndon (Rhodium Group)

+Jonathan Ho (NREL)

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+Ryan Katofsky (Advanced Energy Perspectives)

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