

August 11, 2017

MEMORANDUM FOR: Ian Mead
Assistant Administrator for Energy Analysis

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

SUBJECT: Summary of AEO2018 Electricity Working Group held on August 10, 2017

This memorandum provides an overview of the presentation given during the first AEO2018 Electricity Working Group meeting and a summary of the resulting discussion that took place. The presentation materials are available in a separate document.

Model updates

EIA staff discussed how AEO2018 would handle a number of key issues. Topics included the treatment of current laws and regulations; enhancements to the NEMS Electricity Market Module (EMM); reported changes in electric generating capacity, and the analytic agenda for EMM improvements beyond the current cycle.

Laws and regulations

EIA staff discussed changes in federal, regional, and state programs. Due to continued uncertainty regarding the future of the Clean Power Plan (CPP), EIA intends to pursue a parallel development path, modeling cases that include the CPP, as well as No CPP cases. Regional-level programs include California's recent extension of its carbon cap-and-trade program to 2030 (AB 398) as well as the continuing Regional Greenhouse Gas Initiative.

At the state level, EIA staff described our intent to model state programs providing subsidies to non-emitting generation (zero emission credit) programs, including Illinois' "Future Energy Jobs" bill and New York's "Clean Energy Standard" legislation.

EMM Enhancements

In the AEO2017 Reference Case, EIA did not project the retirement of any nuclear plants in either New York or Illinois. Thus, for the AEO2018 cycle, EIA staff indicated that they would be running cases to characterize different conditions under which projections of generation-at-risk differ from current market conditions.

EIA staff indicated that four new generating technologies would be modeled for AEO2018. In AEO2018, EIA staff plan to improve the representation of renewables, assess parameters critical to non-dispatchable generating sources, and facilitate state-level implementation of renewable portfolio

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standards. In addition, work is being done to improve the modeling of the financial impact associated with the increases in distributed generation on utility rate structures. Further, results of a recent contractor analysis to distinguish differences in financing costs for different types of owners in different types of markets will likely be used to update the model.

Other key changes

EIA staff also mentioned that they have updated parameters based on reported capacity. These updates will be reflected in the baseline for expected retirements (or coal-fired generator conversions to natural gas-fired generators), announced closings, and expected uprates of nuclear plants. Work is also being performed to model four new generating technologies in AEO2018: battery storage, an advanced solar technology, an advanced wind technology, and an internal combustion engine (ICE).

Discussion

The main discussion centered on new technologies, nuclear power, and transmission.

New Technologies

One participant asked which storage technologies were under consideration. EIA staff indicated that we are modeling 4-hour battery storage systems with lithium-ion batteries, allowing for load shifts hourly. Battery storage technologies compete in NEMS for spinning reserve requirements and load shifting over 864 time slices annually. Another participant asked whether we were considering modeling flywheels and compressed air energy storage as storage technologies. EIA staff indicated that we are not considering those storage technologies for this AEO but may do so in the future.

Another participant questioned why we would model ICE if it is not economically viable given its cost relative to other technologies. EIA staff indicated that we were considering the addition of several new technologies, with their ultimate disposition dependent upon the availability of cost data and their growing deployment. There has been some interest in modeling ICE and EIA is considering some novel approaches in representing it, including potentially pairing it with a renewable technology to give it additional flexibility.

Nuclear Power

There was a discussion of a variety of issues related to nuclear power. Given the extension of the projections to 2050, there was some discussion of long term nuclear relicensing. In AEO2017, EIA assumed that 25% of plants would retire after 60 years. EIA staff indicated that we are reinvestigating this assumption for AEO2018 and soliciting comments on alternative approaches.

Another participant questioned if EIA included small modular reactors (SMR) as a new technology choice option. EIA staff noted that with the early stages of this new technology there is still not reliable cost information to include it as an endogenous technology choice. The participant offered to provide a recent study including some cost information on SMRs.

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One participant asked about the methodology for developing our uprate estimate (*e.g.*, whether or not it includes projected uprates or just those which are officially announced). EIA staff indicated that uprate estimates are based on analyst's judgment. One participant offered new data on uprates and license renewal.

Another participant asked about how EIA handles the status of units which are currently being debated (*e.g.*, how we handle Summer in that its closing announcement has been called into question by affected government officials). EIA staff indicated that we are monitoring unit status on an ongoing basis and will respond if it changes prior to the closing of forecast assumptions.

A final participant asked if we are looking at tax reform as an issue with respect to nuclear generation (*e.g.*, whether or not we are considering extension of the production tax credit to 2020). EIA staff acknowledged that we must also review the state of tax policy legislation.

Transmission

One participant asked how EIA models transmission buildout endogenously, including the potential investments in long-range DC transmission projects. EIA staff responded that EMM accounts for the need for additional transmission capacity to be built to accommodate renewables additions on an intra-regional basis. However, on an interregional basis, EMM does not model transmission projects that could be considered to allow incremental renewables dedicated to out-of-region power sales.

Another participant asked in follow up whether our approach meant that renewable additions were not limited by transmission line capacity limitations and how adding storage to the model would affect those limits. EIA staff responded that battery storage will be represented as a time shifting option, rather than a capacity expansion option. In addition, we noted that there is an explicit constraint in EMM on the total amount of renewables generation as a share of generation mix.

Additional issues

Even though most of the discussion focused on the material that was presented, additional questions related to distributed generation, electric vehicles (EVs), and natural gas prices arose.

Distributed generation

One participant asked how EIA is modeling net metering. EIA staff explained that rooftop solar and DG solar is modeled as end-use demand. NEMS represents the value of net metering where residential solar PV customers receive the retail rate for all generation and commercial solar PV customers receive the retail rate for own-use generation.

Another participant asked if we were modeling the possible impact of a tariff on imported solar panels. EIA staff acknowledged that we are tracking legislative developments, and will consider how to represent a tariff based on further developments.

Electric vehicles

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One participant asked about how electric vehicle (EV) demand is determined. EIA staff indicated that projections of electric vehicle demand in our transportation model are lower than projections from other models. EMM accounts for the load profile from charging behavior based upon a contractor analysis and demand from EVs is then aggregated for inclusion in total load. At present, EVs are not considered a storage opportunity.

Natural gas prices

One participant asked where the natural gas prices used in EMM were developed. EIA staff responded that projected natural gas prices are endogenously determined in NEMS by the natural gas supply module and are the product of an iterative process in which electric sector gas demand is optimized against the dynamic response of prices reflecting the natural gas supply response.

Attendees

Guests (in person)

Aaron Bergman	DOE EPSA
Harsh Desai	Nuclear Energy Institute (NEI)
Carla Frisch	DOE EPSA
Ronald Hagen	DOE Nuclear
Elke Hodson	DOE EPSA
Lauren Khair	National Rural Electric Cooperative Association (NRECA)
Kelly Lefler	DOE EPSA
Caitlin Murphy	DOE EPSA
Ann Satsangi	DOE
Bob Schmidt	DOE EPSA
Celeste Wanner	American Wind Energy Association (AWEA)
Brad Williams	DOE Nuclear
Frances Wood	OnLocation

Guests (WebEx/phone)

Carrie Annand	Biomass Power Association
Justin Baca	Solar Energy Industries Association (SEIA)
Erin Boyd	DOE
Matthew Cerrone	Westinghouse
Wesley Cole	National Renewable Energy Laboratory (NREL)
Leslie Coleman	National Mining Association
Jerry Eyster	GE Capital
Brian Fisher	US EPA

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Steve Frauenheim	Edison Electric Institute
Molly Garcia	Edison Electric Institute
Gurcan Gulen	University of Texas
Mike Hough	Ohio Consumer Counsel
Andrea Hubbard	GE Capital
Rick Johnson	Entergy
Serpil Kayin	US EPA
Andy Kellen	WPPI Energy
Marcus Koblitz	American Petroleum Institute
Michael Leff	Con Edison
Yanghe Liu	Entergy
Tom McNevin	New Jersey Department of Environmental Protection (NJDEP)
William Meroney	US EPA
John Meyer	Leidos
Elliott Nethercutt	North American Electric Reliability Corporation
Karen Obenshain	Edison Electric Institute
J. Gregg O'Brien	Westinghouse
Jorge Reyes	New Jersey Department of Environmental Protection (NJDEP)
Chris Salmi	New Jersey Department of Environmental Protection (NJDEP)
Sandra Sattler	Union of Concerned Scientists
David Shin	American Petroleum Institute
Sharon Showalter	OnLocation
Ryan Sims	US EPA
Alexander Smith	Federal Energy Regulatory Commission (FERC)
Kevin Steinberger	Natural Resources Defense Council
Mark Strohfus	Great River Energy
Lynsey Tibbs	Southern Company
Chenhao Tsai	University of Texas
David White	Synapse Energy
Alison Williams	Edison Electric Institute
Evelyn Wright	SEE Inc.

EIA attendees (in person)

Greg Adams	EIA
Lori Aniti	EIA
Erin Boedecker	EIA
Richard Bowers	EIA
Michelle Bowman	EIA
John Conti	EIA
Jim Diefenderfer	EIA
Kenneth Dubin	EIA

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Marta Gospodarczyk	EIA
Howard Gruenspecht	EIA
Tyler Hodge	EIA
Thaddeus Huetteman	EIA
Scott Jell	EIA
Augustine Kwon	EIA
Cara Marcy	EIA
Laura Martin	EIA
Fred Mayes	EIA
Ian Mead	EIA
Shirley Neff	EIA
Manussawee Sukunta	EIA

EIA attendees (WebEx/phone)

Nilay Manzagol	EIA
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