

January 7, 2016

**MEMORANDUM FOR:** John Conti  
Assistant Administrator for Energy Analysis

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

Paul Holtberg  
Team Leader  
Analysis Integration Team  
Office of Integrated and International Energy Analysis

**FROM:** Chris Namovicz  
Team Leader for Electricity Analysis (acting)  
And  
Thad Huetteman, Electricity Analysis Team

**SUBJECT:** Summary of AEO2016 Electricity Working Group  
Meeting held on December 8, 2015

**Presenters:** Chris Namovicz, Thad Huetteman, Jeff Jones

*Topics included AEO2016 model and data updates, key regulatory developments affecting the AEO2016 electricity outlook, and a brief overview of planned changes for the AEO2016. Data updates included required modeling development efforts to include the final Clean Power Plan rule, as well as generating technology capital cost updates, compliance deadline update for mercury and air toxics (MATS) retrofits/or retirements and RPS developments. Additional regulatory issues under consideration cover proposed EPA regulations affecting coal ash handling, cooling water intake, and effluent guidelines. Model changes in other areas include preliminary macro-economic updates, lower near-term natural gas costs, and a possible slow-down in demand growth.*

**Participants Present:** (alpha by outside organization)

Goggin, Michael	AWEA
Hensley, John	AWEA
Hunt, Hannah	AWEA
McGuinness, Meghan	Bipartisan Policy Center
Fisher, Emily	Edison Electric Institute
Obenshain, Karen	Edison Electric Institute

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Holm, Aaron	SEIA
Donohoo-Vallett, Paul	DOE, Office of Energy Efficiency and Renewable Energy
Adams, Greg	EIA
Boedecker, Erin	EIA
Bowman, Michelle	EIA
Diefenderfer, Jim	EIA
Hodge, Tyler	EIA
Huetteman, Thad	EIA
Jarzomski, Kevin	EIA
Jell, Scott	EIA
Jones, Jeff	EIA
Kwon, Augustine	EIA
Lowenthal-Savy, Danielle	EIA
Manzagol, Nilay	EIA
Martin, Laura	EIA
Mayes, Fred	EIA
Mellish, Michael	EIA
Moses, Carolyn	EIA
Neff, Shirley	EIA
White, Carol	EIA

**Participants Via Webex:** *(alpha by outside organization)*

Nowak, Steve	American Council for an Energy Efficient Economy
Katofsky, Ryan	Advanced Energy Economy
Van Brunt, Michael	Covanta
Young, David	EPRI
Eyster, Jerry	GE Capital
Whitaker, Everett	GE Capital
Neimeyer, Michael	GE Capital
Reilly, Michalene	Hoosier Energy
Erpenbeck, Donald	MWH Global
Coleman, Leslie	National Mining Association
Roche, Madelyn	NRECA
Wood, Frances	OnLocation
Wright, Evelyn	Sustainable Energy Economics
Luckow, Patrick	Synapse Energy
Biewald, Bruce	Synapse Energy
Wright, David	Synapse Energy
Sattler, Sandra	Union of Concerned Scientists
Gulen, Gurcan	University of Texas
Tsai, Chenhao	University of Texas

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Lopez, Robert	Wisconsin, State of
Rollison, Eric	DOE, Office of Electricity Delivery and Energy Reliability
Brown, Austin	Executive Office of the President- OSTP
Erwin, Noah	Executive Office of the President- OSTP
Gospodarczyk, Marta	EIA
Holtberg, Paul	EIA
Johnson, Elias	EIA
Marcy, Cara	EIA
Napolitano, Sam	EIA
Slater-Thompson, Nancy	EIA
Hagen, Ronald	DOE, Office of Nuclear Energy
Haskell, Russell	Nuclear Regulatory Commission
Stevens, William	U.S. EPA
Kayin, Serpil	U.S. EPA
Gerdes, Kristin	DOE, National Energy Technology Laboratory
Benitez, Jose	DOE, National Energy Technology Laboratory
Zelek, Charles	DOE, National Energy Technology Laboratory

## Issues Discussed

- Compliance with Clean Power Plan (CPP)-flexibility mechanisms** (slide 9 EWG handout): A participant inquired as to whether trading under the Clean Power Plan would be modeled at the national or interconnect level. Response: EIA acknowledged that no final decision had been made with respect to trading for modeling the final Clean Power Plan (CPP) for AEO 2016. For the analysis of the proposed CPP rule, trading was modeled at both the national and EMM-regional level.
- Compliance with CPP-generation technology options:** A participant asked whether in light of EPA's Section 111(b) proposal new generation technology would be revised to include coal with partial carbon capture. Response: EIA sought revisions to generation technology costs for the 2016 cycle which did not currently include partial carbon capture, but is seeking comment on how best to model 111(b)-compliant technologies (e.g., IGCC co-fired with natural gas, pulverized coal co-firing natural gas at higher --40-60%-- rates.).
- Compliance with Cross State Air Pollution rule (CSAPR):** A participant asked if EIA planned to model scenarios for the CSAPR rule, specifically mentioning the EPA's recent CSAPR Update rule, accounting for the 2008 Ozone national ambient air quality standards. Response: EIA is modeling the CSAPR rule budgets as reinstated by the Court, and incorporating any timely changes (NOTE: the CSAPR Update rule was released on Nov 15<sup>th</sup>.) Specifically, the Court

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remanded the CSAPR SO2 budgets for four states (AL, GA, SC, and TX) and CSAPR seasonal NOx budgets for eleven states (FL, MD, NJ, NY, NC, OH, PA, SC, TX, VA, and WV) and since those revised budgets have yet to be released they will not be included in the AEO 2016 Reference Case.

- **Compliance with Mercury and Air Toxics Standards (MATS) rule- compliance year** (slide 11 EWG handout): A participant queried what criteria were used to determine generating unit retirements in NEMS, whether attributable to the MATS rule or other factors. Response: NEMS retires a unit the costs of continuing operation (including environmental) exceed revenues and replacing the unit with new capacity is a more economic option over a 30 year forecast interval. NOTE: Slide 11 has been revised in the posted version of the Electricity Working Group hand-out to switch the basis of the compliance determination from reported date of compliance to reported technology in place.
- **Tighter RPS targets** (slide 14 EWG handout): A participant raised the issue of whether NEMS automatically built back-up capacity when new renewable capacity was added. Response: In the capacity planning module NEMS assesses the need for capacity and the contribution to capacity reserves by type (peaking, intermediate, baseload, and intermittent) and will add the appropriate capacity type to ensure modeled planning reserve requirements are met.
- **Achievement of RPS targets** (slide 14 EWG handout): A questioner asked if EIA's Reference Case assumed full achievement of state RPS standards. Response: EIA models regional aggregations of state RPS policies, not state-specific policies. Where possible EIA evaluates results to ensure that known limits to state policies are not violated, EIA cannot endogenously represent most state-specific "off-ramps" for RPS compliance. However, EIA generally finds that regional RPS targets are not binding (that is, the model tends to build renewable resources in excess of regional requirements). In specific cases:
  - **100% RPS in Vermont:** a participant asked how the fact that Vermont imports a significant amount of Canadian hydro would ease its ability to achieve a 100% RPS standard. EIA is aware of the current renewable generation situation in Vermont and will try to account for it as it aggregates targets for the New England region;
  - **Western RPS:** another participant recommended a DOE Argonne National Lab study of pumped storage in the west.
- **Intermittent generation:** The question was raised whether NEMS modeled energy storage. Response: There is no capacity expansion option for storage in the current version of the model, but EIA is examining adding this capability in future versions of the model (after AEO 2016).

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- **Generation technology capital cost update** (slide 16 EWG handout): the specific questions regarding updated generation technology costs included:
  - **Solar PV Costs:** A participant wondered how the proposed capital costs for fixed-tilt PV systems could cost more than single-axis tracking systems. Response: The effective cost-equivalence between fixed-tilt and tracking PV systems results from deliberate design decisions by developers to optimize the output of each type of system. The fixed-tilt system characterized by Leidos has a higher inverter loading ratio than the tracking system, thus more DC solar panels are used per unit of AC capacity, but annual capacity factors and diurnal energy production is improved relative to systems with lower inverter loading ratios.
  - **Cost basis:** A participant asked if the updated costs included fuel and transmission costs. Response: The reported costs are overnight capital costs.