AEO2017 Electricity Sector Working Group
Policy Assumptions and Key Model Updates

For
Electricity Working Group
September 1, 2016

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What to look for re: Electricity in AEO2017

• Evolution of new longer-term forecast horizon (extend Reference Case to 2050) including:
  – Renewables: integration/ distributed generation
  – Nuclear: retirements/uprates/plant life extension
  – Continued updates: generating technology costs

• Retain key elements of 2016 Reference Case
  – Coal: resolution of coal unit reporting issues
  – Maintain Clean Power Plan (as part of current laws & regulations in Reference Case)
What to look for re: Electricity in AEO2017 (cont’.)

• Key changes in modeling generation
  – Coal: more detailed representation of coal unit performance/potential for coal retirements
  – Renewables: more accurate modeling of distributed generation/regional capital cost differences

• Changes in other areas which may affect electric sector outlook
  – Macro: expected lower interest rates; reduced federal spending
  – Natural gas: changing expectations with regard to U.S. natural gas exporter role

• Caveat: 2017 is a shorter forecast cycle year
Updates/improvements for electric sector in AEO2017

- Improving level of resolution in modeling generation
  - Introducing detailed breakout of generator cost and performance by operating level

- Better reflection of impacts of latest pollution control equipment installations
  - Modifying plant configuration to more closely correspond to MATS compliant controls

- Tracking continued improvements in generation technology costs
  - Updating capital cost assumptions as needed
Ongoing efforts at updating electric sector modeling

• Accounting for shifts in regional power market structure
  – Contract to evaluate EMM region composition

• Improved understanding of transmission & distribution costs
  – Contract for T&D pricing enhancements

• Evaluation of changes in electric sector plant financing
  – Contract to study renewables (and other generator type) financing parameters
Impact of installing MATS-compliant controls

- **Status**: finishing internal analysis on recently released 2015 Form EIA-860 control equipment updates

- **Key elements**:
  - Comprehensive re-assessment of MATS compliance status for all operating coal units
  - Redefined compliance configurations to include characteristics of key MATS technology (DSI)

- **Expected benefits of clearly specifying MATS-compliant controls**
  - Lower levels of endogenous coal retirements for units with previously unspecified control technology
AEO2017 reported coal retirements

Gigawatts

This chart shows the projected coal retirements from 2015 to 2028. The dark red bars represent AEO2017 projections, and the grey bars represent AEO2016 projections. The projections indicate a significant decline in coal retirements over the forecast period, with most retirements occurring in the earlier years.
Issues in treatment of Clean Power Plan in AEO2017

- Mass-based vs. rate-based allowance allocation: selected mass-based as apparent preferred option based on familiarity of states

- Patchwork vs. uniform state program selection: all states assumed to follow same program type

- Existing vs. all fossil source coverage: applied budgets covering existing units and new source complement (no “leakage”)

- Minimize rate impacts: assumes allocation to load-serving entities
Improving modeling of distributed generation

• Results of new study will allow for more accurate modeling of impacts of distributed PV on demand for electricity by end-use service category

• Shift from modeling of PV in AEO2016
  – On the EMM side, we are treating end-use PV generation as if it were from utility generators
  – This allows PV impacts on grid planning and operating constraints to be fully seen by EMM
  – With more time for development, the reporting issues that prevented use of this algorithm are being addressed
“Higher resolution” in modeling generation

• Status: currently completing contract analysis and testing/programming in NEMS

• Key elements:
  – Heat rates based on different operating modes calculated using EPA CEMS data
  – Input heat rate adjustments into NEMS for use at different operating levels

• Preliminary results of higher resolution for generation
  – Seeing greater variability in coal generation in response to CPP constraints
  – Additional 3-4 GW of coal retirements
Accelerated nuclear retirements continued in 2016


- June 2016 saw retirement announcements for 6 reactors (5.6 GW)
  - Clinton (IL) (1,065 MW) – June 1, 2017 (captured in AEO2016)
  - Quad Cities Units 1 and 2 (IL) (1,819 MW) - June 1, 2018 (captured in AEO2016)
  - Fort Calhoun (NE) (479 MW) – late 2016
  - Diablo Canyon Units 1 and 2 (CA) (2,240 MW) – late 2025

- These retirements account for a net additional nuclear capacity loss of 2.6 GW that was not reflected in the AEO2016. The Diablo Canyon retirement was not the result of financial uncertainty.

- AEO2017 will include these retirements.
AEO2017 assumptions will consider additional accelerated retirements

• AEO 2017 still includes 1,288 MW of announced (planned) retirements at 2 plants, both of which were also included in AEO2016.
  – 2019 Pilgrim (MA) (678 MW)
  – 2019 Oyster Creek (NJ) (610 MW)

• Although costs have decreased from 2013 through 2015, financial uncertainty related to revenues is still an issue.

• To address financial uncertainty, EIA is considering 3 GW of generic retirements in addition to those above and in the previous slide.
Extension of projection horizon to 2050 will require closer examination of license extension issues

- Two utilities have announced plans to pursue subsequent license renewal to 80 years:
  - Dominion for Surry Units 1 and 2 (1.7 GW)
  - Exelon for Peach Bottom Units 2 and 3 (2.5 GW).

- However, retirements prior to 80 years are likely for a variety of reasons that have capital and O&M cost implications.

- Sensitivity studies for retirements of capacity prior to SLR are underway.

- AEO2018 will address long-term operations (SLR) in more detail. Project is underway.
Annual and cumulative nuclear retirements assuming 60 years of operation
Nuclear new build assumptions will be reflected in the AEO2017

• AEO2017 continue to reflect the new builds for Vogtle Units 3 and 4 and Summer Units 2 and 3 – (4.8 GW in total)

• Although COLs were issued for 3 reactors in 2015 and 2016, these reactors will not be included in the AEO2017. Utilities have not announced plans to initiate construction.
  – South Texas Units 3 and 4 (TX), AP1000, approved 2016 (2.2 GW)
  – Fermi Unit 3 (MI), AP1000, approved 2015 (1.5 GW)
Potential for nuclear uprate assumptions will be evaluated for AEO2017

- Although there are >6,100 MW of potential nuclear fleet uprates, not all of these are realistic based on uprate experience.

- Initial assessment of uprate potential is ~4,700 MW.
  - Merchant market plants: ~1,300 MW
  - Regulated plants: ~3,400 MW

- Generally, these uprates are in excess of 100 MW each.
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