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# AEO2017 Electricity Sector Working Group Policy Assumptions and Key Model Updates



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*For*

*Electricity Working Group*

*September 1, 2016*

*By*

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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)

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## 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

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## 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

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## Ongoing efforts at updating electric sector modeling

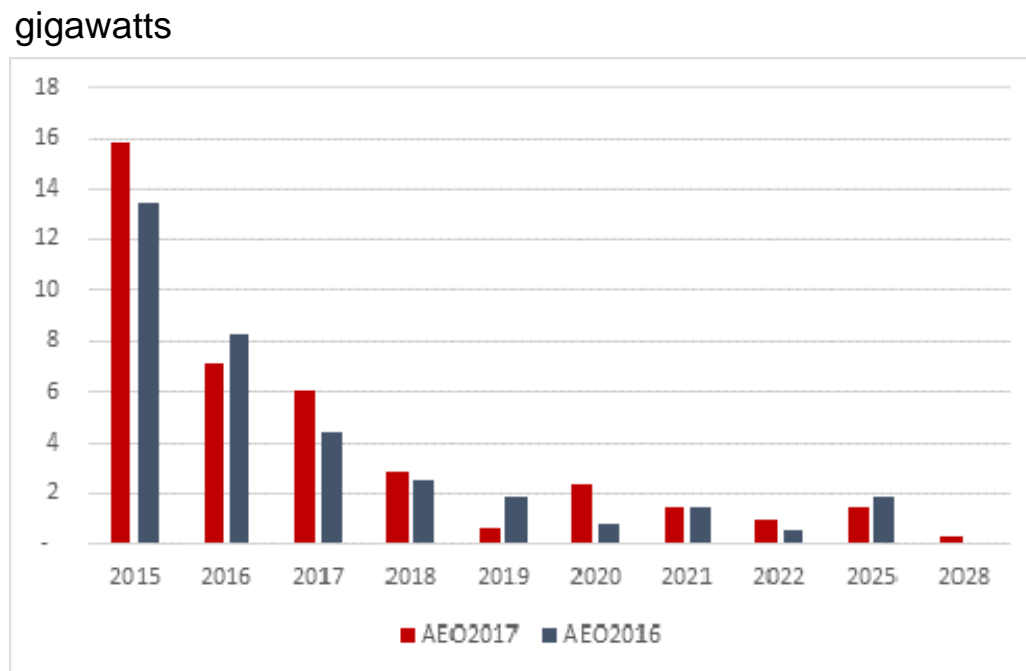
- Accounting for shifts in regional power market structure
  - Contract to evaluate EMM region composition
- Improved understanding of transmission & distribution costs
  - Contract for T&D pricing enhancements
- Evaluation of changes in electric sector plant financing
  - Contract to study renewables (and other generator type) financing parameters

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## 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



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## 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



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## 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

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## “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

- Financial uncertainty and regulatory issues prompted retirement announcements 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.

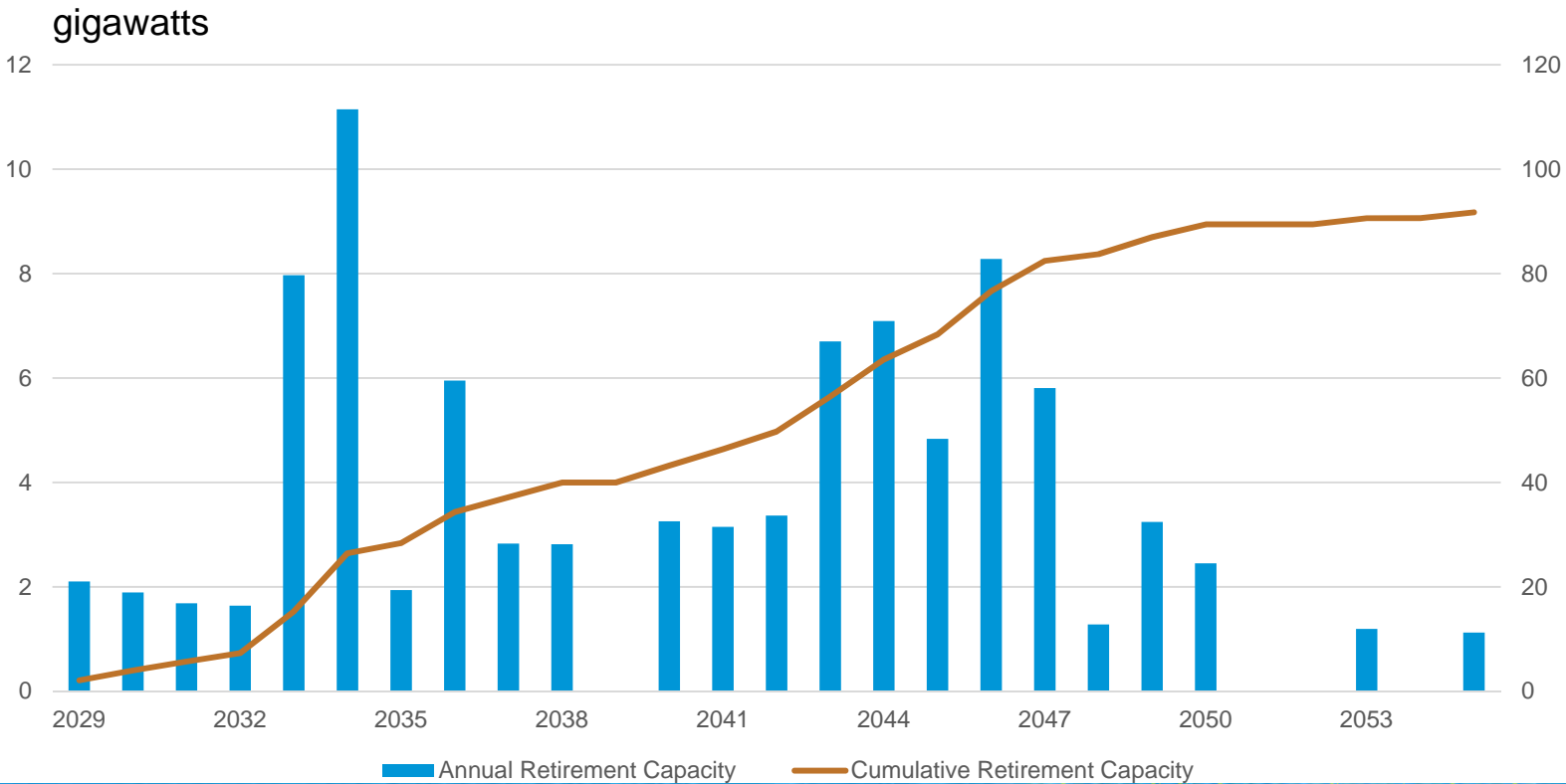
## AEO2017 assumptions will consider additional accelerated retirements

- 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



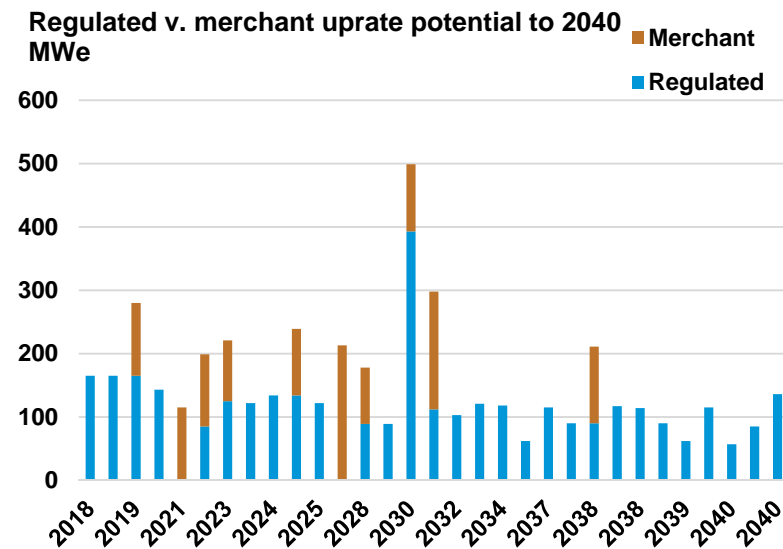
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## Nuclear new build assumptions will be reflected in the AEO2017

- 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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