

Key AEO2017 Renewable Electricity Key Model Updates



For

EIA Renewables Working Group

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By

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Summary of key changes from AEO2016

- AEO 2017 will be a limited release year
 - Very few side cases and limited analytic write-up (similar to AEO 2015)
- We plan on extending the projections to 2050
- Pending any relevant court rulings, the Clean Power Plan will continue to be in the Reference case.
- This presentation will focus on the changes to Renewable and Electric Power sector portions of the model

Renewables has an ambitious schedule, given “short-year”, extension to 2050, and limited development time

- PV load shapes
- Renewables Integration
 - Energy Storage
 - Address Solar curtailments
- Solar resource data update
- Regional solar costs
- State RPS policy updates

PV Load Shape Development is in Progress

- Contractor report will allow for more accurate modeling of impacts of distributed PV on demand for electricity by end-use service category
- We have decided to continue to pursue model changes originally attempted for AEO 2016
 - 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

Energy Storage may be delayed by contract issues

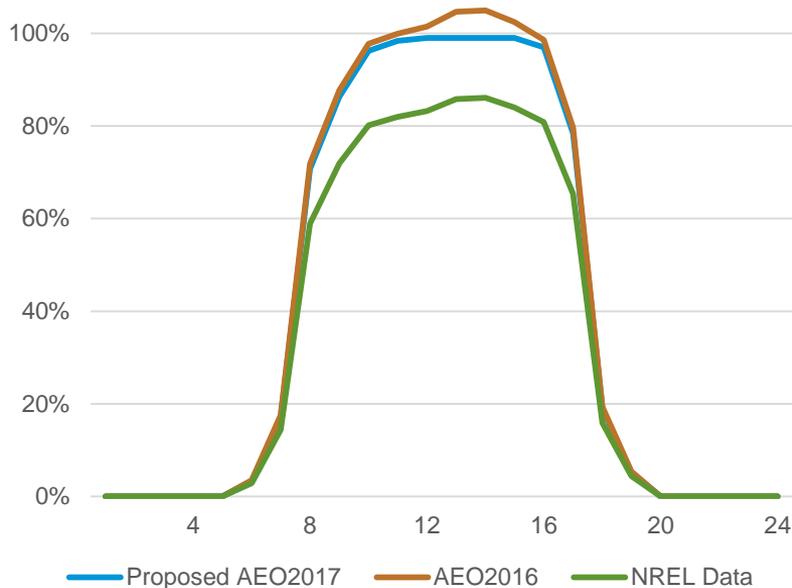
- EIA has a contract task to develop an algorithm to endogenously account for the value of energy storage
 - The fundamental temporal resolution of the EMM is too coarse to see significant arbitrage value for energy storage
 - The proposed approach estimates model parameters outside of the EMM LP at high temporal resolution, then feeds results into the LP
- Coding was put on hold pending resolution of contract option funding
- Time to complete task is limited

Solar Curtailments Work Anticipated

- EPSA has developed a PV curtailments algorithm for NEMS similar to the Energy Storage approach (that is, compute higher-temporal resolution parameters outside of the LP, then feed to the LP)
 - Some additional work is needed to update this into the AEO 2016 code set
 - This is queued to our contractor behind the Energy Storage task
- The same approach could be used to improve the current EIA algorithm for handling wind curtailments
 - The current approach was developed 10 years ago and may have been unintentionally impacted by interim model changes
 - However, implementation into AEO 2016 will not be feasible given limited time available other development activities

EIA is completing an update of solar resources to ensure consistency between cost and performance assumptions

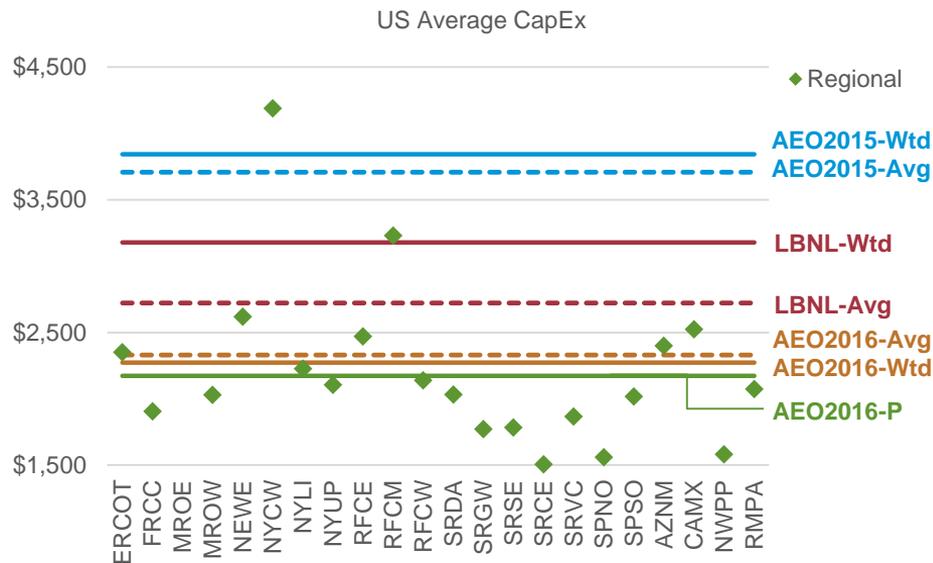
Hourly solar PV output, single day in April, San Francisco, CA
capacity factor



- Solar resource assumptions need to be made consistent with other aspects of NEMS inputs, e.g. cost assumptions
- EIA is updating the solar resource data to represent a photovoltaic system with an inverter loading ratio of 1.20

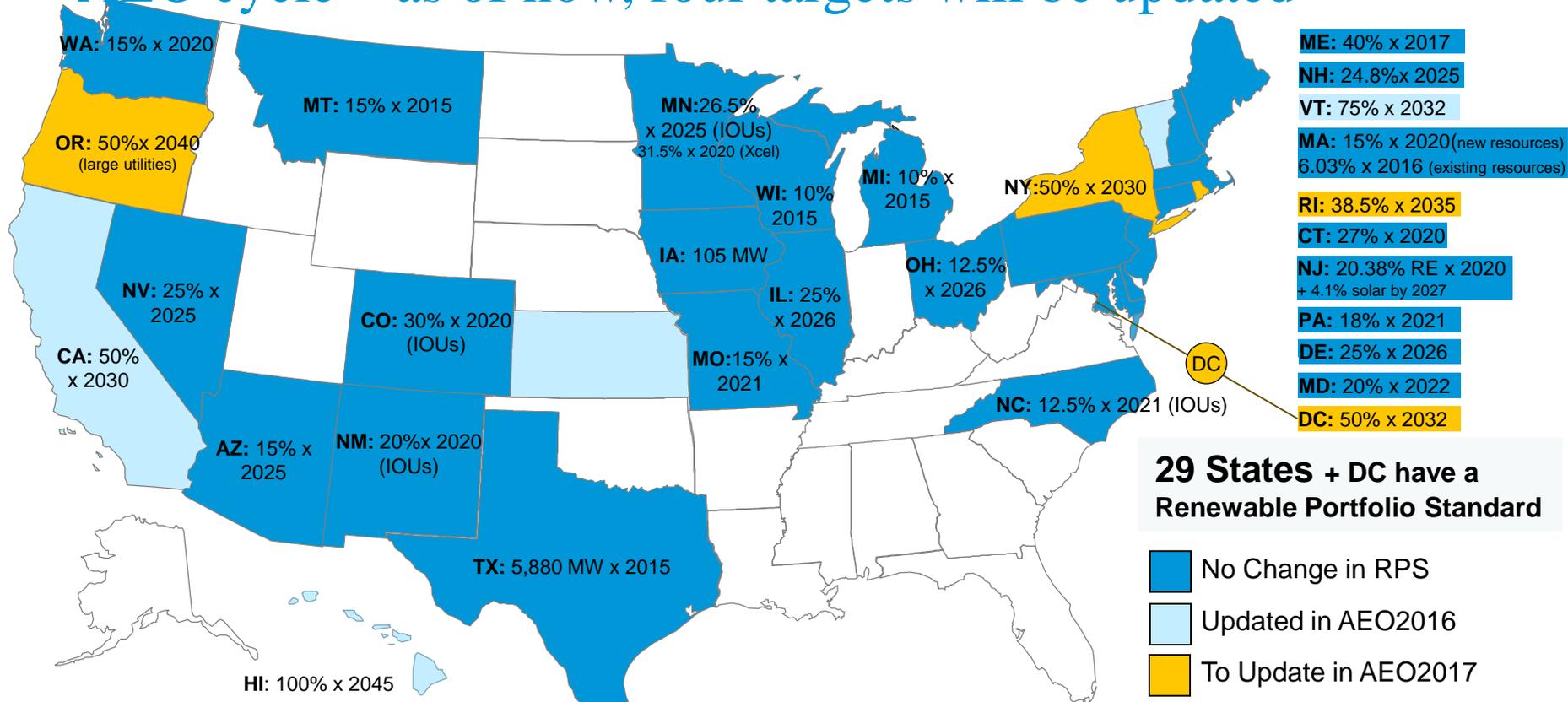
| | AEO2017 | AEO2016 | AEO2011 |
|------------------------------|---------|---------|---------|
| Capacity (MW _{DC}) | 180 | 183 | 165 |
| Capacity (MW _{AC}) | 150 | 150 | 150 |
| Inverter Loading Ratio (ILR) | 1.20 | 1.22 | 1.10 |

EIA is exploring applying as-observed regional factors to PV projects



- PV cost updates from AEO2016 will also be re-examined, but with limited additional new information
- LBNL numbers are as shown in the recently-released *2015 Utility-Scale Solar* report

State RPS policies will be finalized toward the end of the AEO cycle – as of now, four targets will be updated



29 States + DC have a Renewable Portfolio Standard

Other key electric power sector efforts for AEO2017

- Introducing detailed breakout of generator cost and performance by operating level
- Modifying plant configuration to more closely correspond to MATS compliant controls
- Additional analysis of near-term and long-term retirements for nuclear capacity

“Higher resolution” in modeling generation

- Status: currently completing contract analysis and testing/programming in NEMS
- Key elements:
 - Realistic heat rates based on 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

Impact of installing MATS-compliant controls

- Status: finishing internal analysis of 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 of units with unspecified control technology

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.

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.

Contact Information

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