2026 RTEP – Capacity Expansion Scenarios for 8-year cases (2034)

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Agenda

- Background
- Additional stakeholder feedback and PJM considerations
- Final assumptions for capacity expansion (CapEx) scenarios and sensitivities
- Siting
- CapEx results
- Next steps

Background

2026 RTEP's 8-year Cases (2034)

- **2034 Planning Horizon**: 8-year assessments currently used to inform and right-size the 5-year horizon's needs/solutions.
- **Modification:** PJM cannot solve the 2034 reliability cases due to insufficient generation available to meet system demand (forecast 218,339 MW summer peak / 204,549 MW winter peak)
  - Consistent with industry best practices, PJM will use Capacity Expansion Modeling (CapEx) to supplement the generation assumptions in the planning models for the 2034 planning horizon
  - CapEx will consider Cycle 1 projects as candidate new generation, utilizing the most economic resources in alignment with public policy generation from it
  - In case states or developers observe potential for specific resources to develop within their footprint not captured by the CapEx scenarios, this indicates a higher level of confidence/certainty is required to enable those resources to be pulled through the CapEx model. This could be done through:
    - State commitments via the State Agreement Approach (SAA) (PJM is not aware of any SAA agreement expected to be executed and accepted by FERC in sufficient time to support inclusion in the assumptions for this window)
    - Award of a capacity contract (e.g., through BRA or Reliability Backstop)
- **Purpose of 2026 RTEP's 8-year case:** To be used as an exercise to demonstrate to stakeholders how assumptions: (1) impact the resulting CapEx scenarios and (2) how CapEx results align with previous RTEP cycles' baseline scenarios and (3) inform stakeholders including states of what the current market, policy and economics may be bringing forward which may inform further policy, commitment actions.
  - Not envisioned to be actionable but may inform right-sizing of 5-year solutions:
    - PJM not currently identifying broader system needs in the 5-year assessment that independently warrant right-sizing; however, proposers should submit solutions they believe appropriately address identified and anticipated system conditions
    - May inform some development in the Northwestern PJM (ComEd and neighboring zones).

Other Considerations

- The goal of the RTEP is to maintain system reliability using the most credible data (available to date)
- PJM's CapEx approach is aligned with the CapEx modeling that is planned for use as part of the Long-Term Regional Transmission Planning effort to comply with FERC Order 1920; will naturally align with that process as it develops.
- PJM will account for the Reliability Backstop selections and any base residual auction (BRA) results (if any and in consideration of 2026 RTEP timing) in making final selections of the 2026 RTEP W1 Solutions.
- States will be informed by the impacts of the developed scenarios and sensitivities and may elect to provide higher levels of confidence to the generation assumptions – such as through future SAA commitments.

Review of Additional Stakeholder Feedback and PJM Considerations

Entities That Provided Additional Feedback – Thank You!

- PJM sincerely thanks all entities participating and sharing their valuable feedback which helps develop the refined planning assumptions
- CapEx modeling is an ongoing effort and is expected to evolve and further enhance over successive cycles and as assumptions materialize/shift with time
- Entities that provided additional feedback:
    1. MD Department of Natural Resources (DNR) Power Plant Research Program (PPRP)
    2. PPL Electric Utilities (PPL)
    3. Public Interest Organizations: RMI, NRDC, Sierra Club

Stakeholder Feedback and PJM Considerations – 1/5

- *Use of 8-year cases and right-sizing definitions (or do not use 8-year cases for 5-year solutions)*
  - Will be clarified in window problem statement
- *Consider a 120 days window*
  - 60 days window for 2026 RTEP W1 to address 5-year reliability violations
- *Use of additional information as it becomes available*
  - Units committed into the coming the Reliability Backstop or BRA that significantly impact the transmission selection will be considered together with all other information in proposals' evaluation to make an informed selection
- *How states/developers can make commitments*
  - Participate in the Reliability Backstop or BRA

Stakeholder Feedback and PJM Considerations – 2/5

- *Resource adequacy (RA) modeling*
  - PJM models in the capacity expansion tool the relationship between a resource type penetration level as a fraction of peak load and its ELCC value
  - As a result, the ELCC values adjusts automatically *within* the model based on the amount built
  - This approach is meant to reflect PJM's actual RA process within the capacity expansion tool
  - Technically, PJM:
    - Runs the RA tool for a large number of resource mixes with varying degrees of renewables, batteries, and other resources penetration
    - Uses these runs to construct ELCC curves that are modeled in the capacity expansion tool – as piece-wise linear function, reported in the appendix
    - Models an ELCC-based RA constraint for *each* year of the expansion (not just 2034)
  - PJM is testing a new approach that models the complementarity between different technologies (by modeling the ELLC "surface" in the CapEx, i.e. the function between the resource mix and the load that can be served at 1-in-10 with that resource-mix)

Stakeholder Feedback and PJM Considerations – 3/5

- *Clarification on transmission representation and need to account for transmission expansion along with generation expansion*
  - The current model has no transmission consistent with industry practices
  - PJM will discuss the introduction of co-expansion features for generation, transmission, and gas as part of Order 1920 implementation stakeholder discussions later this year
- *Model chronology*
  - The model uses a distinct load duration curve for each month, each duration curve having 12 segments (partial chronology in PLEXOS, with one curve per month and 12 blocks per curve)
- *Retirements*
  - Scenario/sensitivities A.1, A2, A.3, A.5 include only announced retirements (none after 2031)
  - Sensitivity A.4 also models the retirement of the entire coal fleet (to illustrate the effects of modeling a larger amount of thermal retirements)
  - Scenario B models announced and policy-driven deactivations (see appendix for modeled amounts and TEAC 10/1/2024 for methodology)
- *Modeling of commercial probabilities/Attrition*
  - Use the capacity expansion model to select the most economic resources from TC2 and C1

Stakeholder Feedback and PJM Considerations – 4/5

- *Use Scenario B as the baseline*
  - Stakeholders requested PJM to use C1 data. PJM agrees that the RTEP should use the most credible data; Scenario B is inconsistent with C1 data
- *Include MD nuclear policy targets in Scenario B*
  - PJM considered the ISAC policy workbook for Scenario B; PJM will include new nuclear resources with commitments
- *Provide definition of PPL east and PPL west*
  - Susquehanna, 500 kV substation, approximately at the geographical center of PPL's footprint, was used as the baseline to define the PPL East and PPL West regions
- *Include all TC1, TC2, and Cycle 1 projects in the 8-year cases*
  - Based on historical trends in the interconnection process a large portion of those projects may not materialize
- *Develop powerflows for Scenario B*
  - In Scenario B the majority of capacity (particularly firm capacity) is added in the western portion of PJM consistent with bulk power transfer needs underscored in Scenario A.1

Stakeholder Feedback and PJM Considerations – 5/5

- *Siting and effect of siting on needs*
  - The purpose of the 8-year cases is to identify bulk power transfer needs. PJM will site generation at EHV buses considering the proximity to the existing and queue generation, as well as the gas infrastructure, while minimizing the loading on the inter-regional network facilities
- *Gas constraint and cost of additional gas infrastructure needed to support gas generation expansion*
  - PJM uses TC2 and C1 data on proposed gas generation to inform the capacity expansion
  - In response to stakeholder feedback PJM has proposed a sensitivity with high gas costs which shows results are relatively insensitive to changes in gas cost assumptions – see sensitivity A.5 below
  - PJM is developing a model that account for gas infrastructure limitations and the cost of expanding that gas infrastructure (inter-state pipelines and spur lines). Test runs of that model show that these model enhancements do not significantly affect results
- *Provide resource mix and retirements*
  - This information is in the appendix

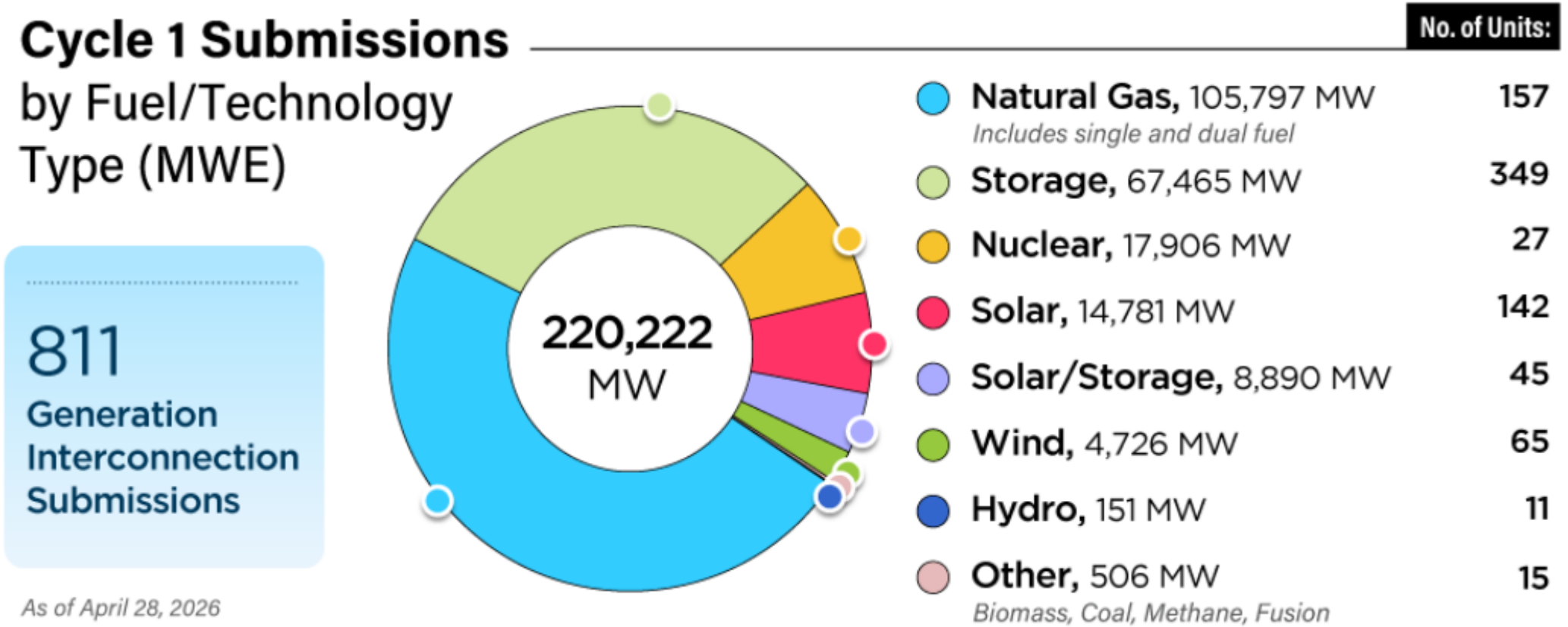
Final Assumptions For CapEx Scenarios and Sensitivities

CapEx Assumptions for the 2026 RTEP 8-year Base Cases)

- **<u>Scenario A.1</u> (Base 8-year cases – supplement current approach w/ CapEx+TC2+C1 to identify economic resource mix):**
  - 2026 PJM Load Forecast
  - Expansion candidates solar, onshore wind, offshore wind, hybrid, CC, CT, 4-6-8-10h battery, nuclear uprates
  - CAPEX, FOM, VOM, heat rate, and other financial assumptions from Quadrennial Review, NLR/NETL, EEEI (in this order)
  - Use CapEx to identify from TC2 and C1 the additional capacity needed to meet resource adequacy in 2034
  - Do not model offshore wind unless under construction or backed by a FERC-accepted SAA agreement, nor new gas in NJ, MD, DE, IL, and eastern PA* unless the project has ISA/GIA or it is backed by a FERC-accepted SAA agreement
    - Based on preliminary results, the CapEx model does not build gas in these areas even when allowed – sensitivity A.2 below
  - Do not model deactivations beyond those already announced
- The goal is to capture the impacts of scenario assumptions to inform 5-year project selection and right-sizing.
- Planning assumptions will evolve over time. PJM will adjust its plans as the assumptions materialize or change

*Eastern PA refers to PECO, Eastern PPL, and METED

Cycle 1 Submissions
(Preliminary Data, Subject to Change)



Source: https://insidelines.pjm.com/over-800-new-generation-projects-seek-to-connect-under-pjms-reformed-process/

Other Assumptions

- PJM will be utilizing Energy Exemplar's Eastern Interconnection Dataset (EEEI) with the changes listed in this deck
- Expansion horizon: 2032-2046
  - RTEP 2031 is the start for the expansion
- Henry hub gas price from PJM Market Efficiency
- Discount rate: United States 20-year treasury rate
- Build up to TC2+C1 by 2034 and up to 3x of existing generation + queue by 2045, accounting for land availability for solar and onshore based on the NLR Limiting Access scenario
- Model ELCC and 1-in-10 resource adequacy target

Sensitivities

- PJM will perform the following capacity expansion simulations as sensitivities relative to scenario A.1:
  - A.2, Allow new gas to be built anywhere in PJM
  - A.3, Model states' storage targets
  - A.4, Model retirement of entire coal fleet (to provide indicative results on the effect of additional retirements due to aging infrastructure and economics requested by stakeholders in their feedback)
  - A.5, High gas costs – 30% higher capital cost for new CT and CC, and 25% higher natural gas price
- Scenario B.1, PJM will also run a capacity expansion for a policy scenario with the following assumptions:
  - Do not include the remaining projects in the generation interconnection queue unless economic/consistent with state and federal policies
  - Model RPS and battery storage targets
  - Do not model offshore wind unless under construction or backed by SAA and allow new gas anywhere
  - Model policy-driven deactivations
  - Build up to 2x of existing generation + queue by 2034 and 3x by 2045 (for VA solar 3x, 10x respectively) accounting for land availability for solar and onshore based on the NLR Limiting Access scenario
- PJM will not develop power flows for A.2-A.5 and B.1 (these are intended to show the impact of varying assumptions on the resulting CapEx scenario)

CapEx Generation - Siting

New Generation Siting: Principle

- In power flow cases, the generation profile in confirmation with Capacity Expansion (CapEx) will be modelled based on Existing, TC1, TC2, and C1 (Existing and Queue) generators
- Following principles will apply in developing generation profile of power flow cases:
  - If Existing and Queue generation capacity exceeds CapEx capacity, the TC2 and C1 capacities will be scaled down
  - If Existing and Queue generation capacity is less than that of CapEx capacity:
    - New generators by amount of shortfall will be modelled at EHV buses ($\text{Bus } kV \geq 345\ kV$).
    - The EHV buses to model new generation will be selected based on their location and proximity to Existing and Queue capacity, and gas infrastructure (for such assets)
    - Capacity of new generation will be based on reference MW capacity of the fuel types, MW shortfall, and capacity MW of Existing and Queue generators in the proximity of the EHV bus.
- Additionally, PJM will explore the possibility of optimizing the size and location of new generation
- PJM invites stakeholders' feedback on these siting principles and will finalize a decision at the June TEAC given that feedback

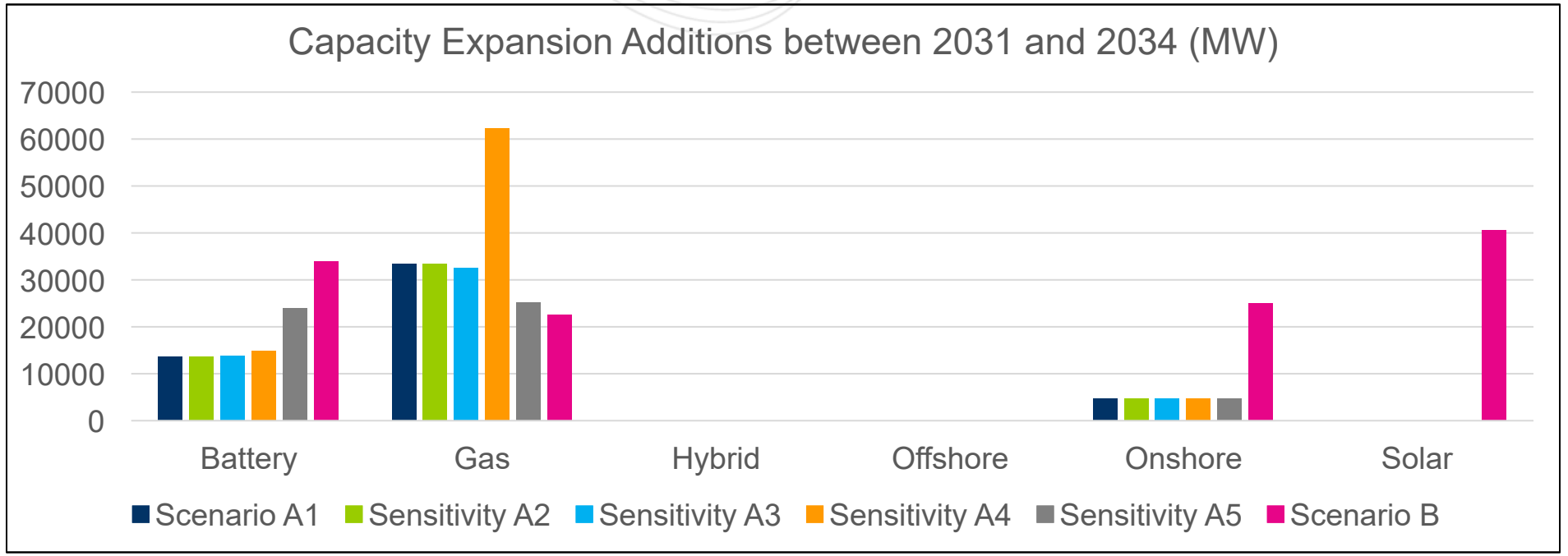
Siting Constraints

- Many regulations governing the siting of wind and solar projects are established at the county or township level. Local zoning ordinances might affect the availability of land for wind and solar development.
- The most common zoning ordinances include setbacks from structures, roads, and property lines; sound restrictions; height limitations; and an increasing number of moratoriums or bans.
- PJM will use NLR's Limited Access siting scenario for wind and solar[1].
  - The Limited Access scenario uses environmental constraints, and national defense concerns, as well as conservative wind and solar setbacks based on local ordinances surveyed in Lopez et al.[2]

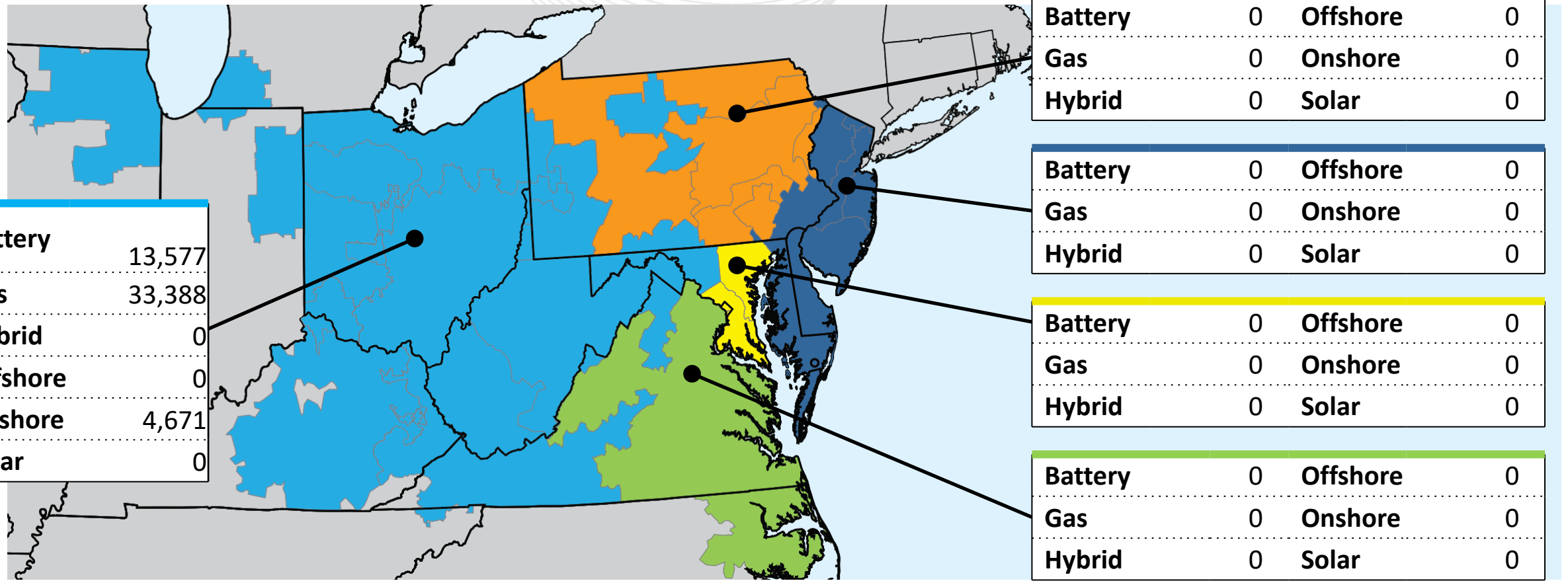
1 "Renewable Energy Technical Potential and Supply Curves for the Contiguous United States: 2024 Edition" https://docs.nlr.gov/docs/fy25osti/91900.pdf
2 "Impact of siting ordinances on land availability for wind and solar development" https://www.nature.com/articles/s41560-023-01319-3

Capacity Expansion Results

Summary



Scenario A1: Capacity Expansion Additions between 2031 and 2034 (MW)



Battery	13,577
Gas	33,388
Hybrid	0
Offshore	0
Onshore	4,671
Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

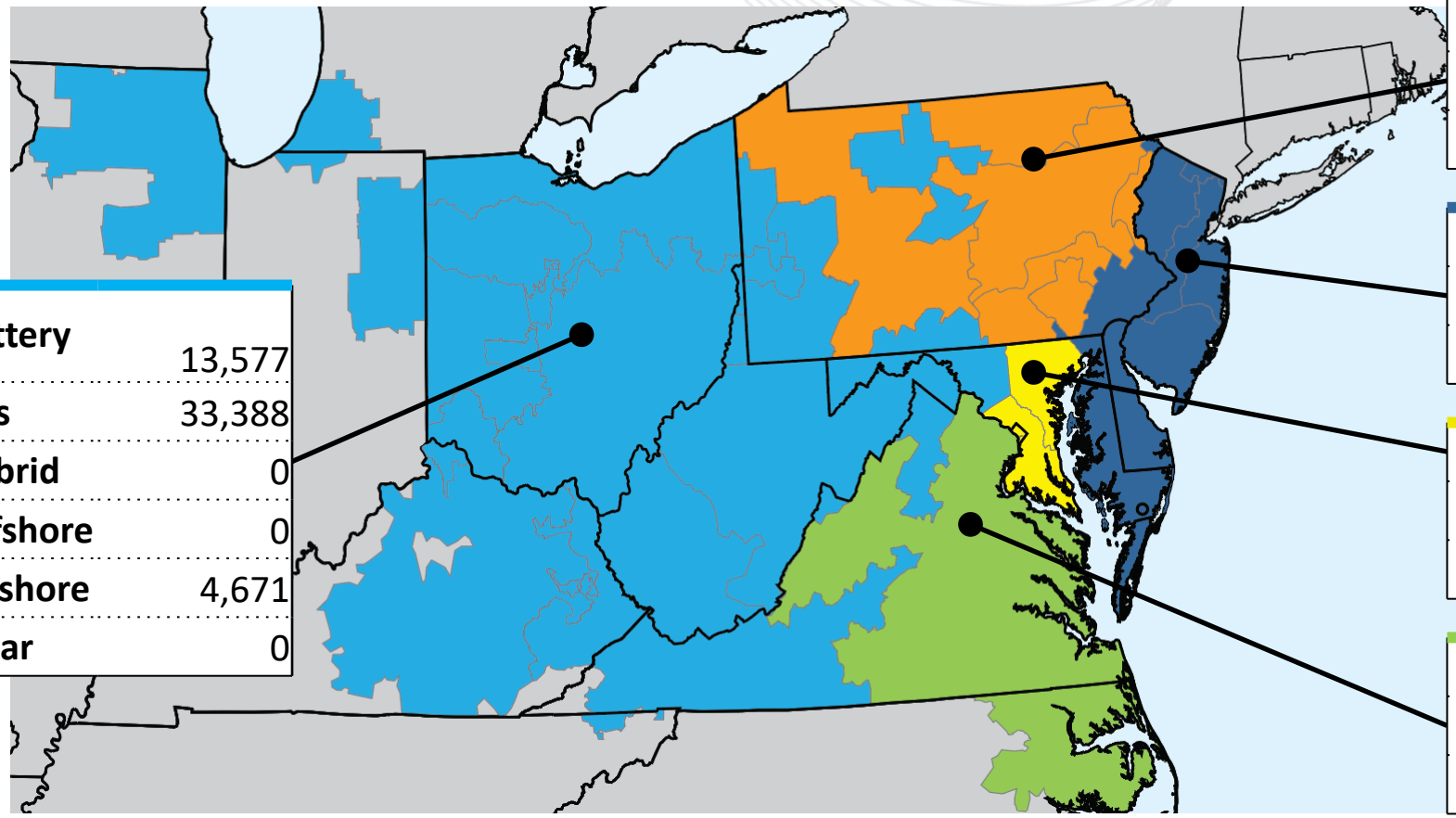
Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Eastern MAAC (EMAAC) Southwest MAAC (SWMAAC) Western MAAC (WMAAC) South West

Sensitivity A2: Capacity Expansion Additions between 2031 and 2034 (MW)



Battery	13,577
Gas	33,388
Hybrid	0
Offshore	0
Onshore	4,671
Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

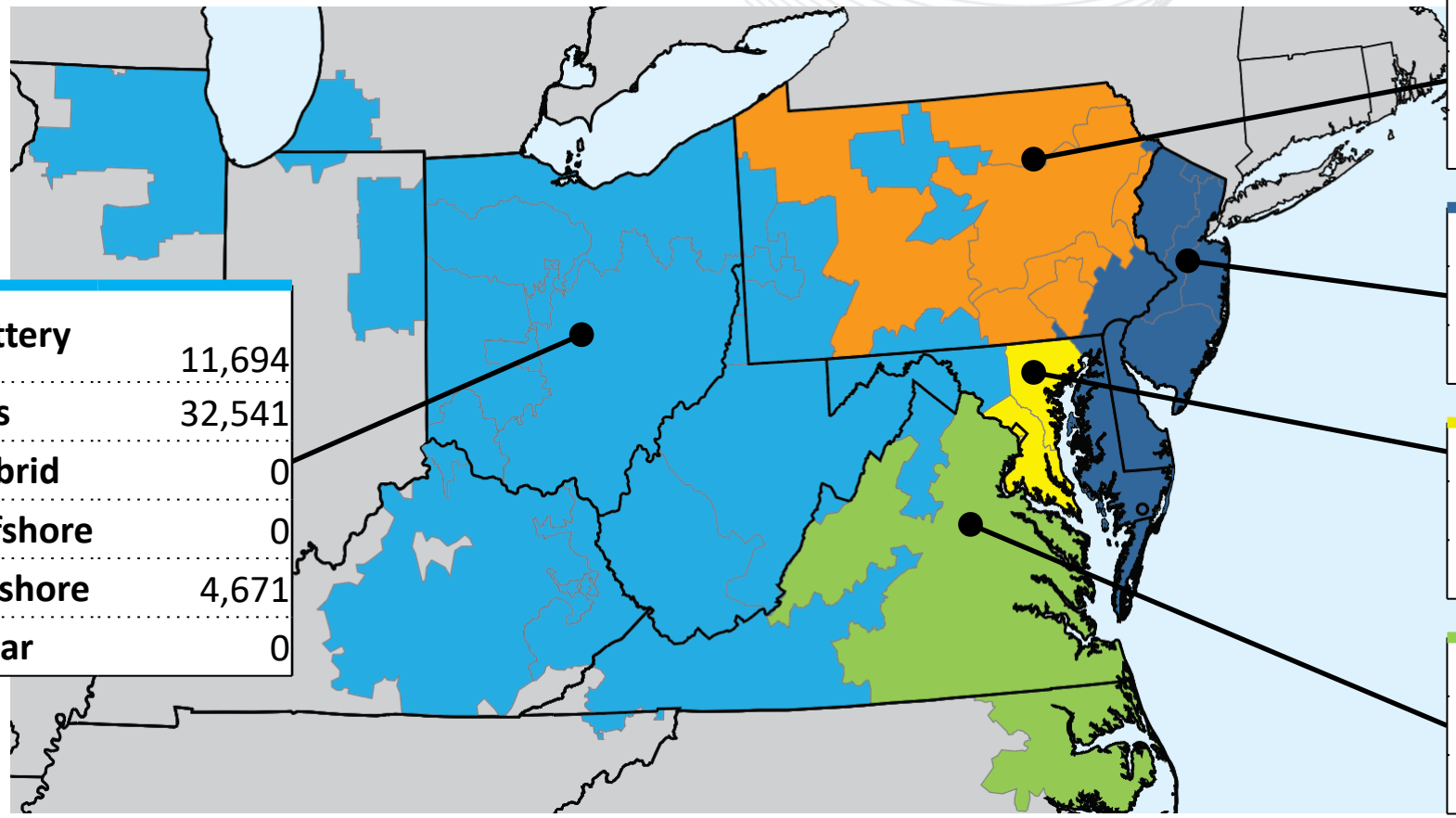
Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Eastern MAAC (EMAAC) Southwest MAAC (SWMAAC) Western MAAC (WMAAC) South West

Sensitivity A3: Capacity Expansion Additions between 2031 and 2034 (MW)



Battery	11,694
Gas	32,541
Hybrid	0
Offshore	0
Onshore	4,671
Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

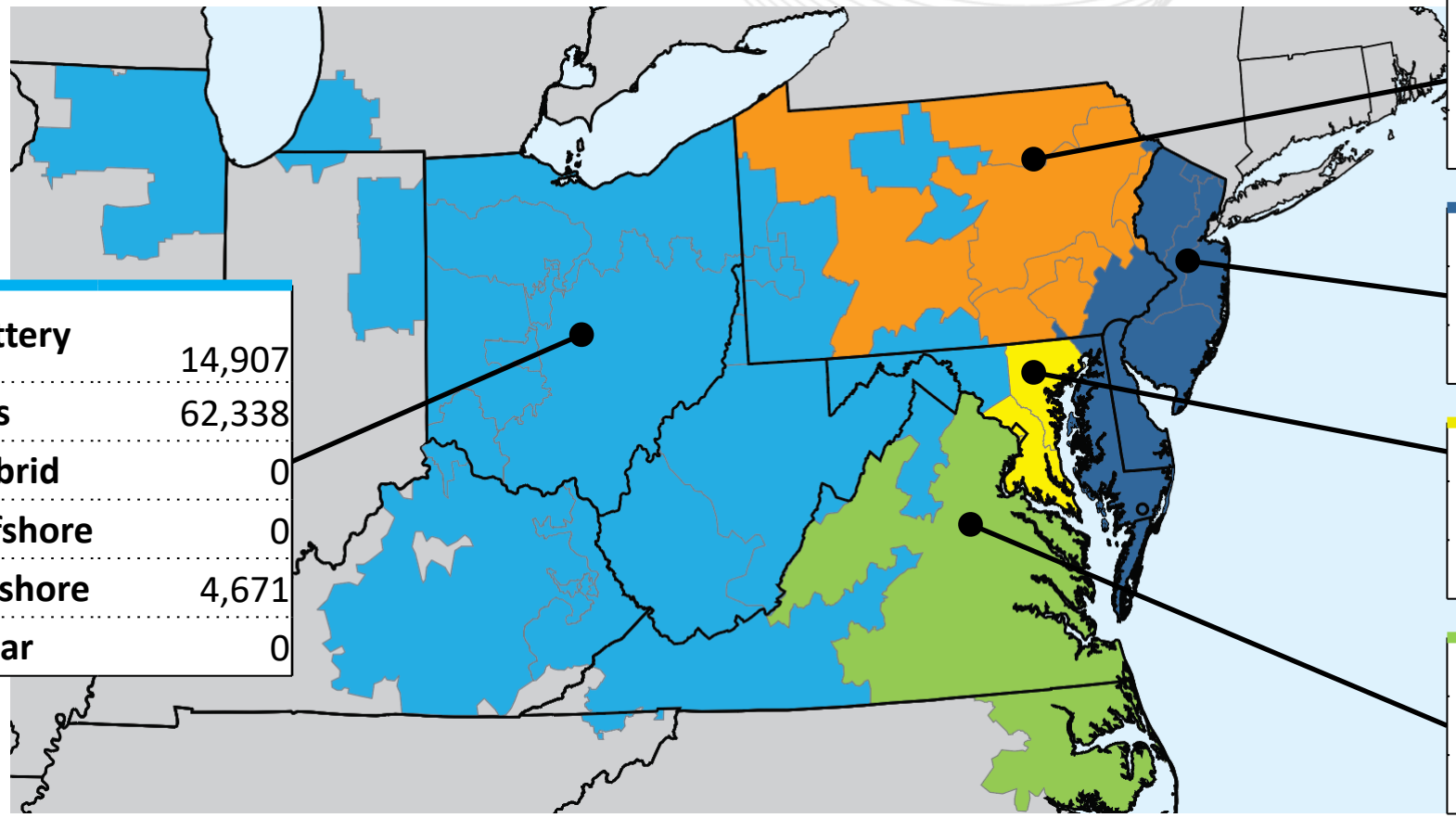
Battery	1520	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	625	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Eastern MAAC (EMAAC) Southwest MAAC (SWMAAC) Western MAAC (WMAAC) South West

Sensitivity A4: Capacity Expansion Additions between 2031 and 2034 (MW)



Battery	14,907
Gas	62,338
Hybrid	0
Offshore	0
Onshore	4,671
Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

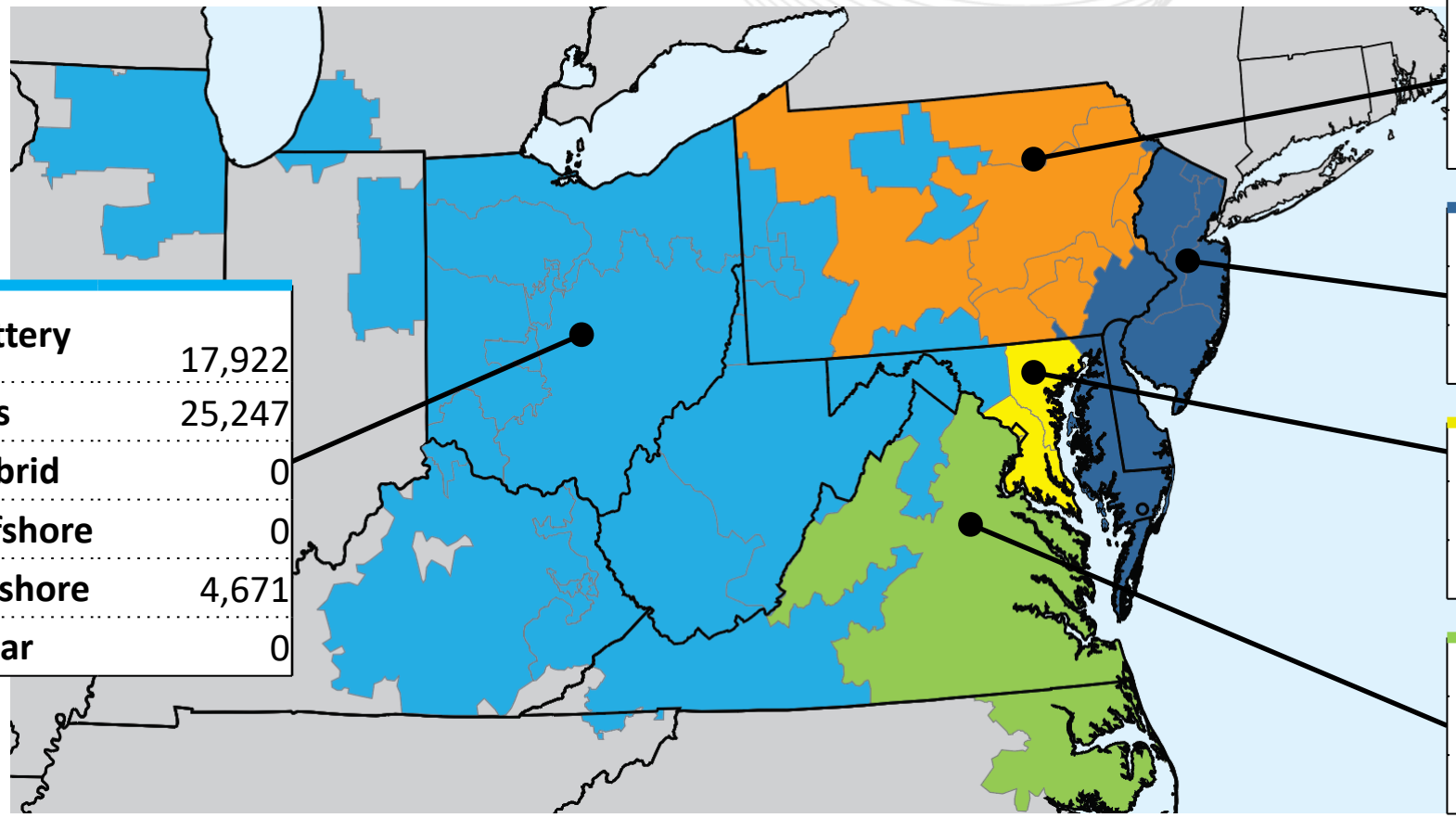
Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Eastern MAAC (EMAAC) Southwest MAAC (SWMAAC) Western MAAC (WMAAC) South West

Sensitivity A5: Capacity Expansion Additions between 2031 and 2034 (MW)



Battery	17,922
Gas	25,247
Hybrid	0
Offshore	0
Onshore	4,671
Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

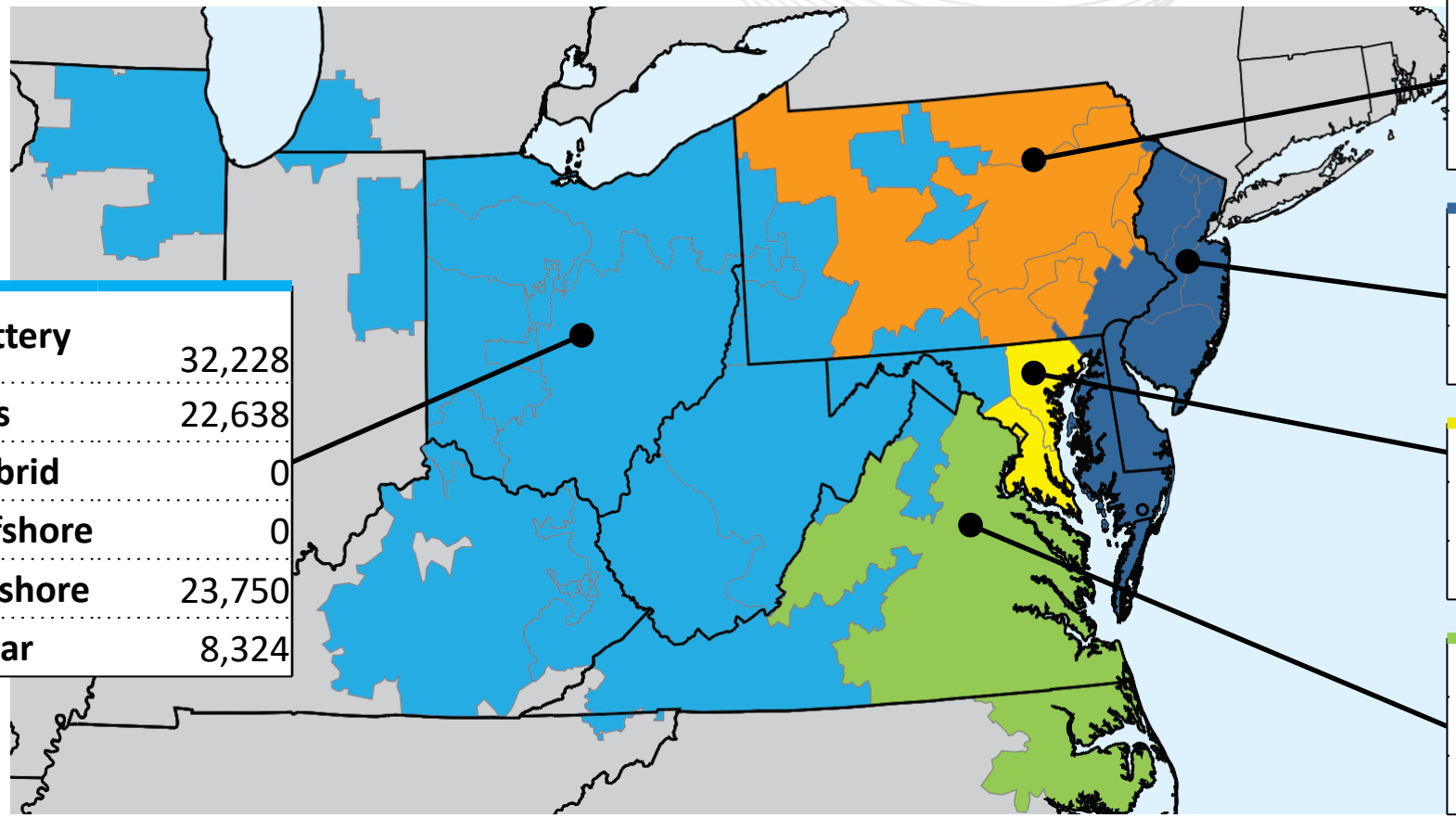
Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Battery	5,970	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	0

Eastern MAAC (EMAAC) Southwest MAAC (SWMAAC) Western MAAC (WMAAC) South West

Scenario B: Capacity Expansion Additions between 2031 and 2034 (MW)



Battery	32,228
Gas	22,638
Hybrid	0
Offshore	0
Onshore	23,750
Solar	8,324

Battery	0	Offshore	0
Gas	0	Onshore	1,131
Hybrid	0	Solar	0

Battery	1,067	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	692

Battery	0	Offshore	0
Gas	0	Onshore	0
Hybrid	0	Solar	841

Battery	625	Offshore	0
Gas	0	Onshore	90
Hybrid	0	Solar	30,813

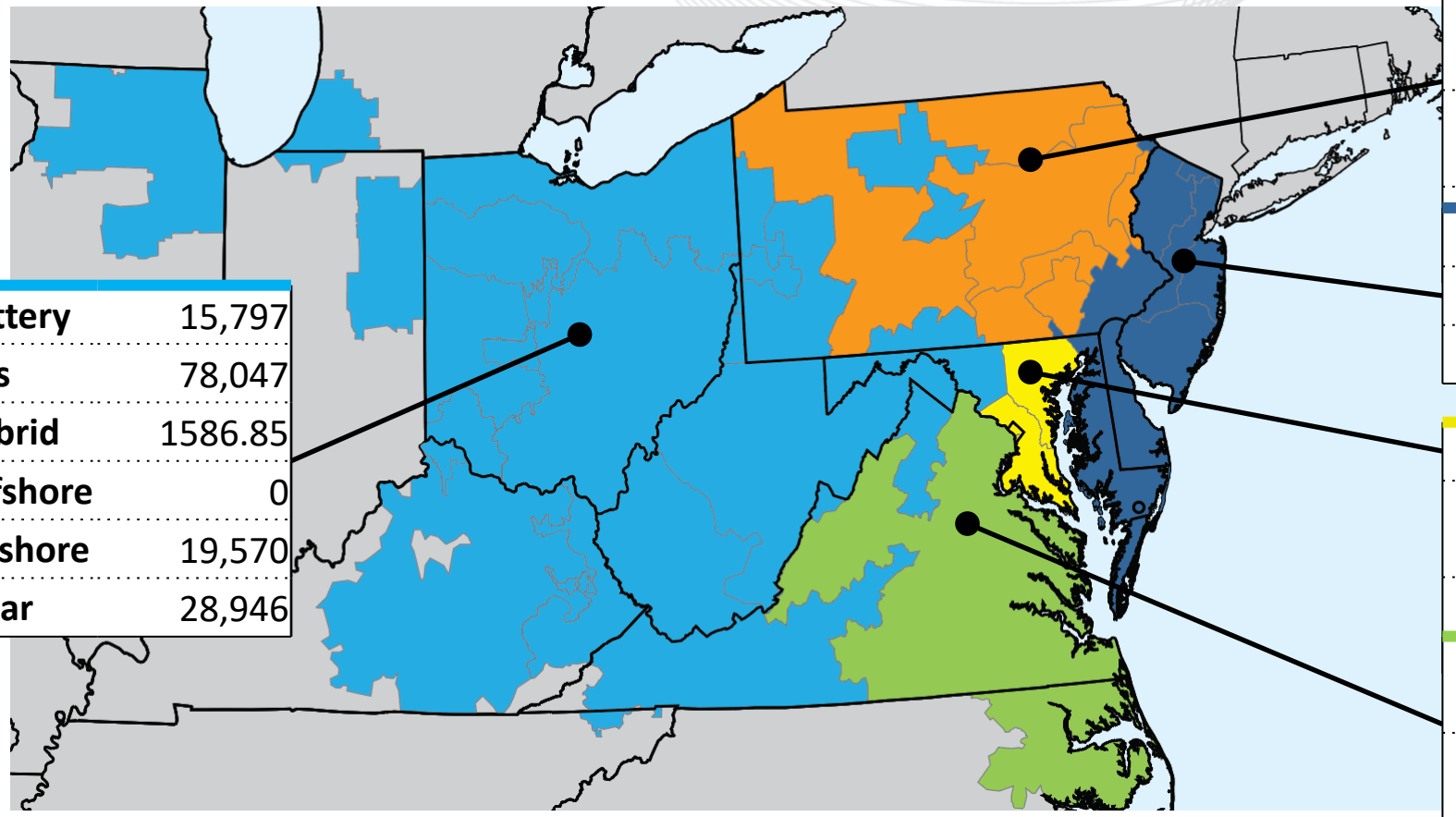
Eastern MAAC (EMAAC) Southwest MAAC (SWMAAC) Western MAAC (WMAAC) South West

Next Steps

- PJM will publicly post the final range of assumptions to be used in the 2026 RTEP Window 1 studies and scenario analyses, including an explanation of those Public Policy Requirements (PPR) and Public Policy Objectives (PPO) that are either included or not adopted
- PJM is currently reviewing data confidentiality aspects related to Cycle 1 information and will post the capacity expansion model when that data becomes publicly available. Meanwhile, PJM will post a variant of that model that preserves the confidentiality of that information
- PJM intends to further discuss PJM's capacity expansion approach for Order 1000 planning as opposed to Order 1920 planning within the stakeholder process for Order 1920 manual revisions later in 2026

Appendix

Scenario A1: Resource Mix 2034 (MW)



Battery	15,797
Gas	78,047
Hybrid	1586.85
Offshore	0
Onshore	19,570
Solar	28,946

Battery	350	Offshore	0
Gas	11,504	Onshore	1,353

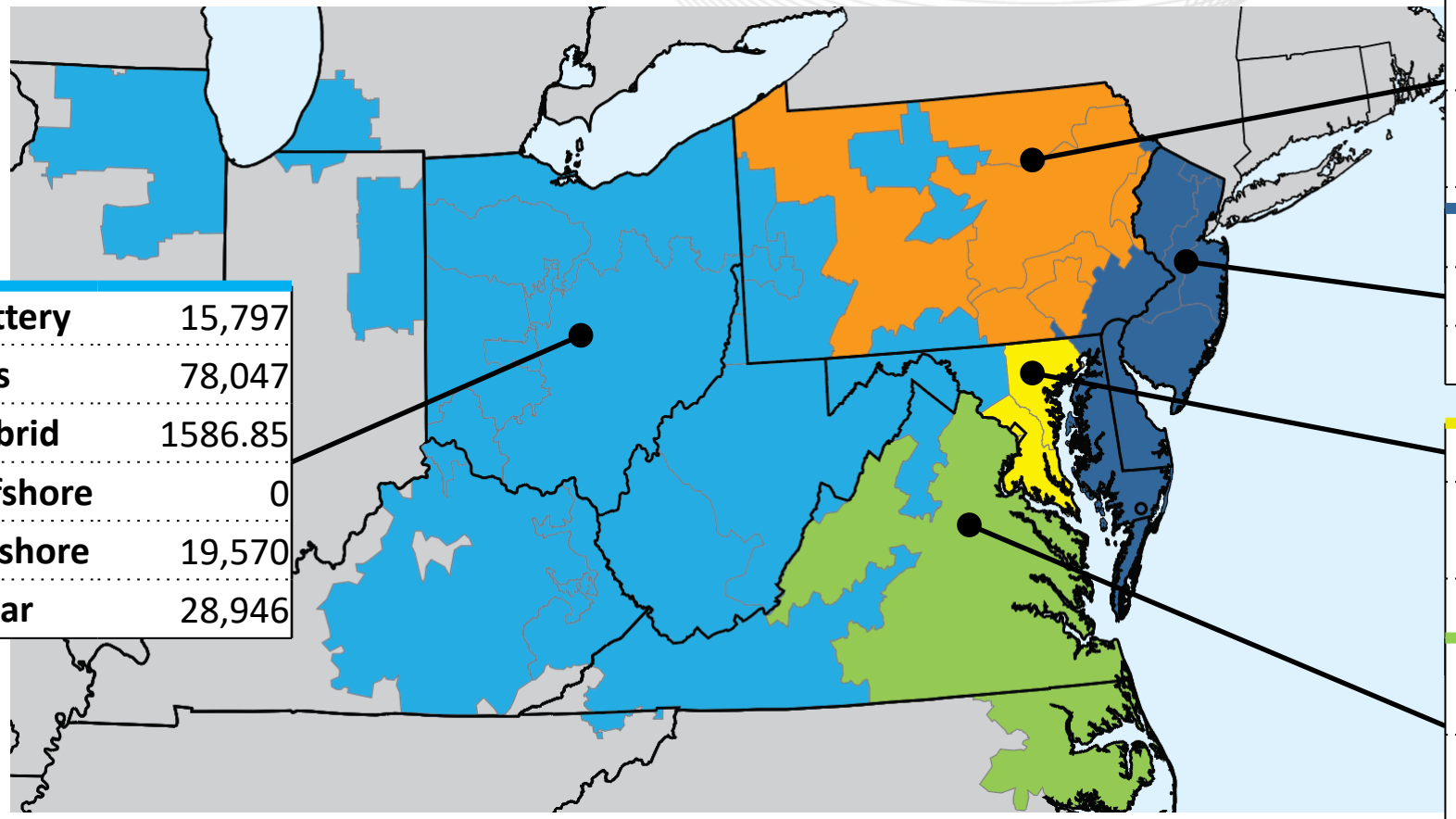
Battery	907	Offshore	0
Gas	16,356	Onshore	0
Hybrid	80	Solar	2,283

Battery	503	Offshore	0
Gas	2,739	Onshore	0
Hybrid	0	Solar	

Battery	1,960	Offshore	2,489
Gas	16,598	Onshore	590
Hybrid	436	Solar	11,309

	Eastern MAAC (EMAAC)	Southwest MAAC (SWMAAC)	Western MAAC (W		
Peak Load 2034:	**35,267 MW**	**13,525 MW**	**19,835 MW**	**39,061 MW**	**108,032 MW**

Sensitivity A2: Resource Mix 2034 (MW)



Battery	15,797
Gas	78,047
Hybrid	1586.85
Offshore	0
Onshore	19,570
Solar	28,946

Battery	350	Offshore	0
Gas	11,504	Onshore	1,353

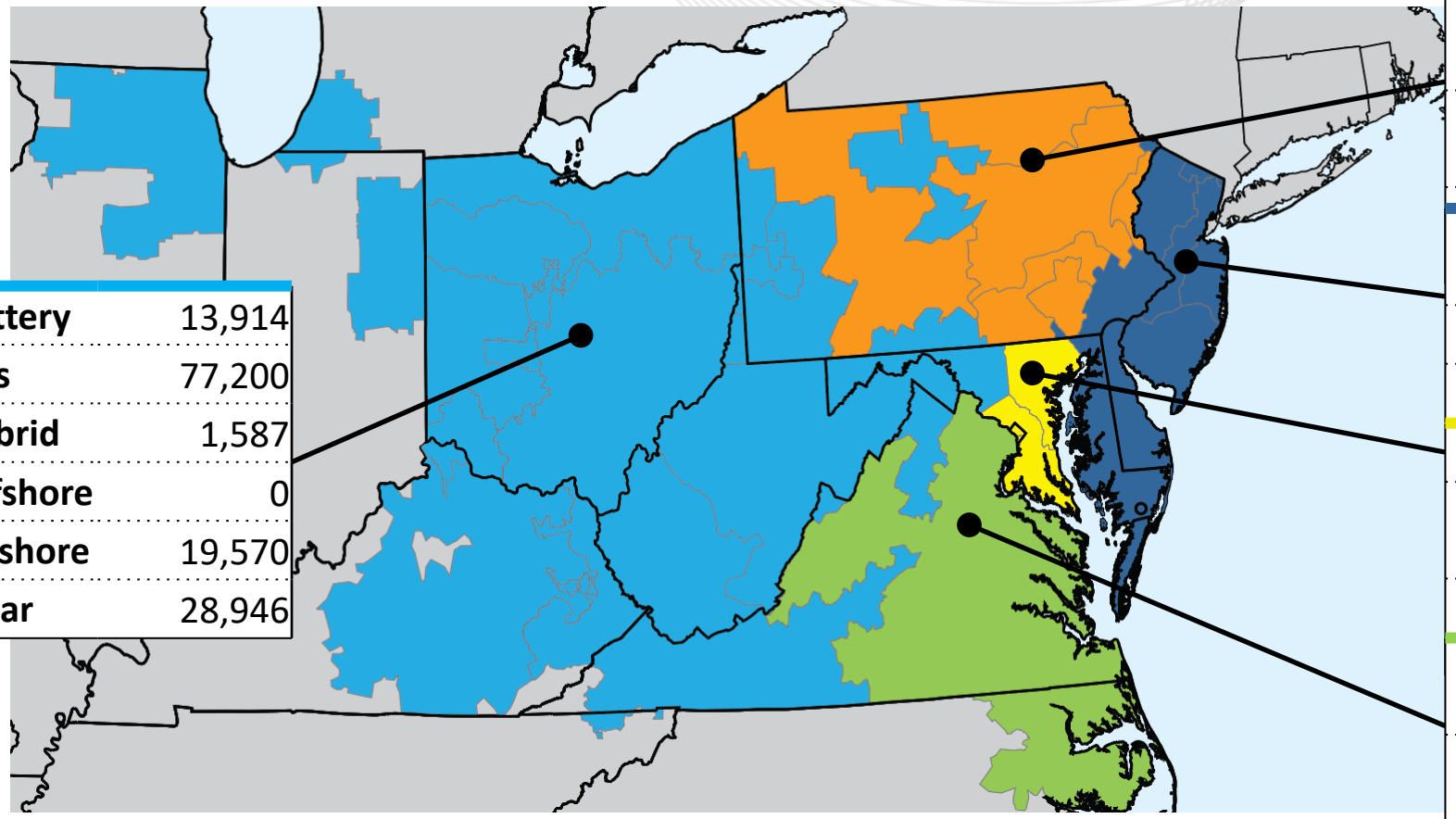
Battery	907	Offshore	0
Gas	16,356	Onshore	0
Hybrid	80	Solar	2,283

Battery	503	Offshore	0
Gas	2,739	Onshore	0
Hybrid	0	Solar	

Battery	1,960	Offshore	2,489
Gas	16,598	Onshore	590
Hybrid	436	Solar	11,309

	Eastern MAAC (EMAAC)	Southwest MAAC (SWMAAC)	Western MAAC (W		
Peak Load 2034:	**35,267 MW**	**13,525 MW**	**19,835 MW**	**39,061 MW**	**108,032 MW**

Sensitivity A3: Resource Mix 2034 (MW)



Battery	13,914
Gas	77,200
Hybrid	1,587
Offshore	0
Onshore	19,570
Solar	28,946

Battery	350	Offshore	0
Gas	11,504	Onshore	1,353

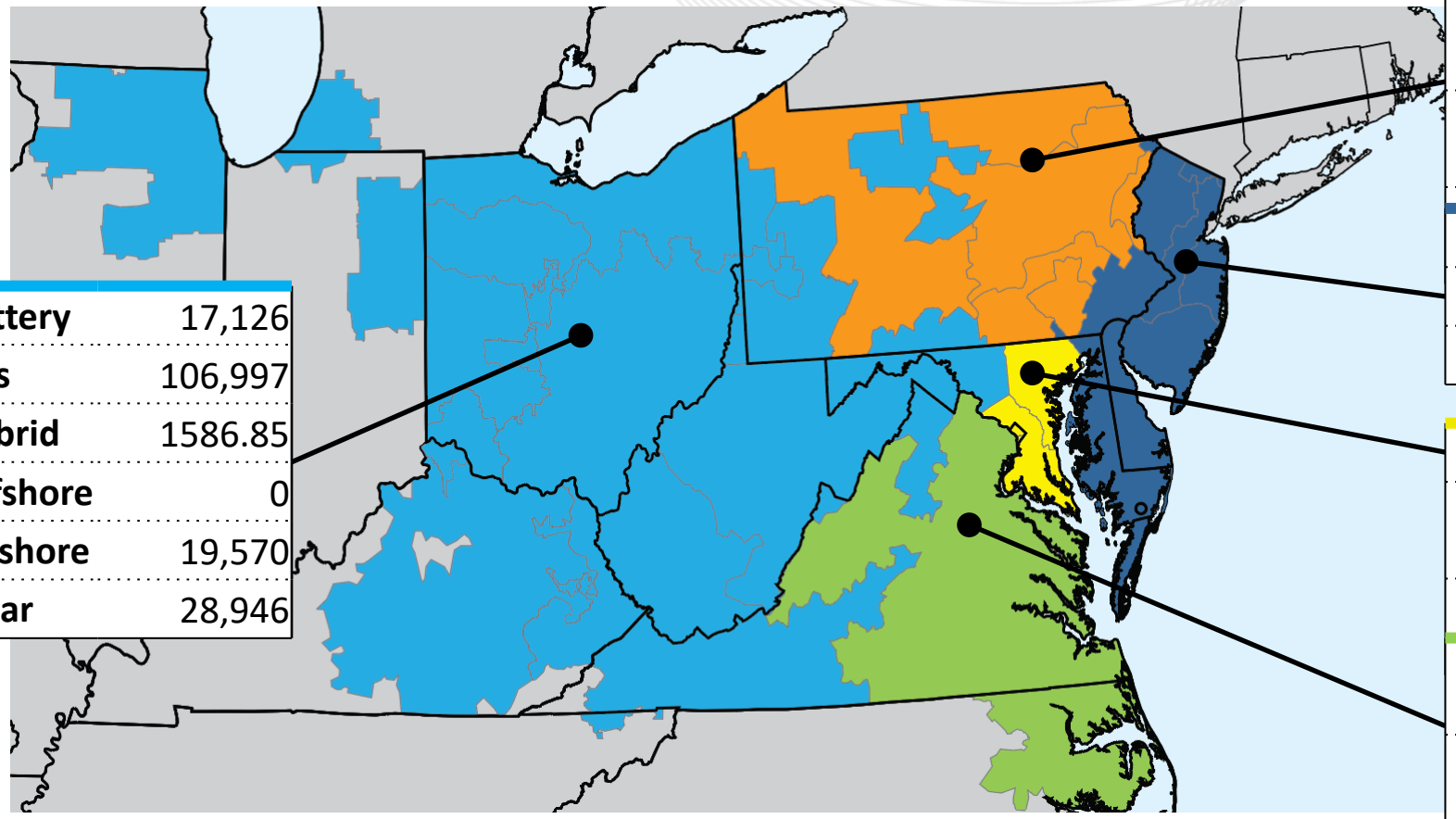
Battery	2,427	Offshore	0
Gas	16,356	Onshore	0
Hybrid	80	Solar	2,283

Battery	503	Offshore	0
Gas	2,739	Onshore	0
Hybrid	0	Solar	

Battery	2,585	Offshore	2,489
Gas	16,598	Onshore	590
Hybrid	436	Solar	11,309

	Eastern MAAC (EMAAC)	Southwest MAAC (SWMAAC)	Western MAAC (		
Peak Load 2034:	**35,267 MW**	**13,525 MW**	**19,835 MW**	**39,061 MW**	**108,032 MW**

Sensitivity A4: Resource Mix 2034 (MW)



Battery	17,126
Gas	106,997
Hybrid	1586.85
Offshore	0
Onshore	19,570
Solar	28,946

Battery	350	Offshore	0
Gas	11,504	Onshore	1,353

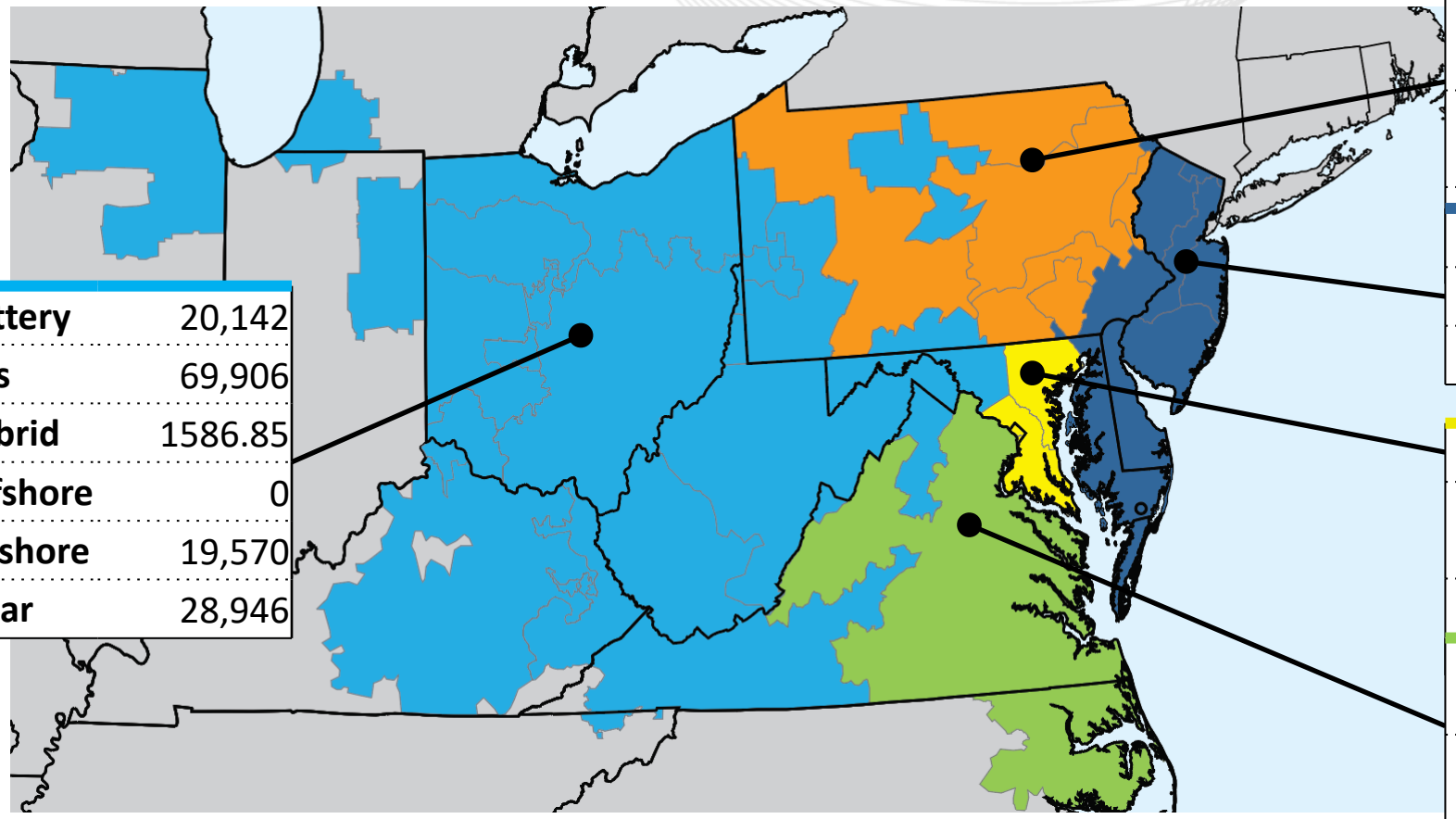
Battery	907	Offshore	0
Gas	16,356	Onshore	0
Hybrid	80	Solar	2,283

Battery	503	Offshore	0
Gas	2,739	Onshore	0
Hybrid	0	Solar	

Battery	1,960	Offshore	2,489
Gas	16,598	Onshore	590
Hybrid	436	Solar	11,309

	Eastern MAAC (EMAAC)	Southwest MAAC (SWMAAC)	Western MAAC (W		
Peak Load 2034:	**35,267 MW**	**13,525 MW**	**19,835 MW**	**39,061 MW**	**108,032 MW**

Sensitivity A5: Resource Mix 2034 (MW)



Battery	20,142
Gas	69,906
Hybrid	1586.85
Offshore	0
Onshore	19,570
Solar	28,946

Battery	350	Offshore	0
Gas	11,504	Onshore	1,353

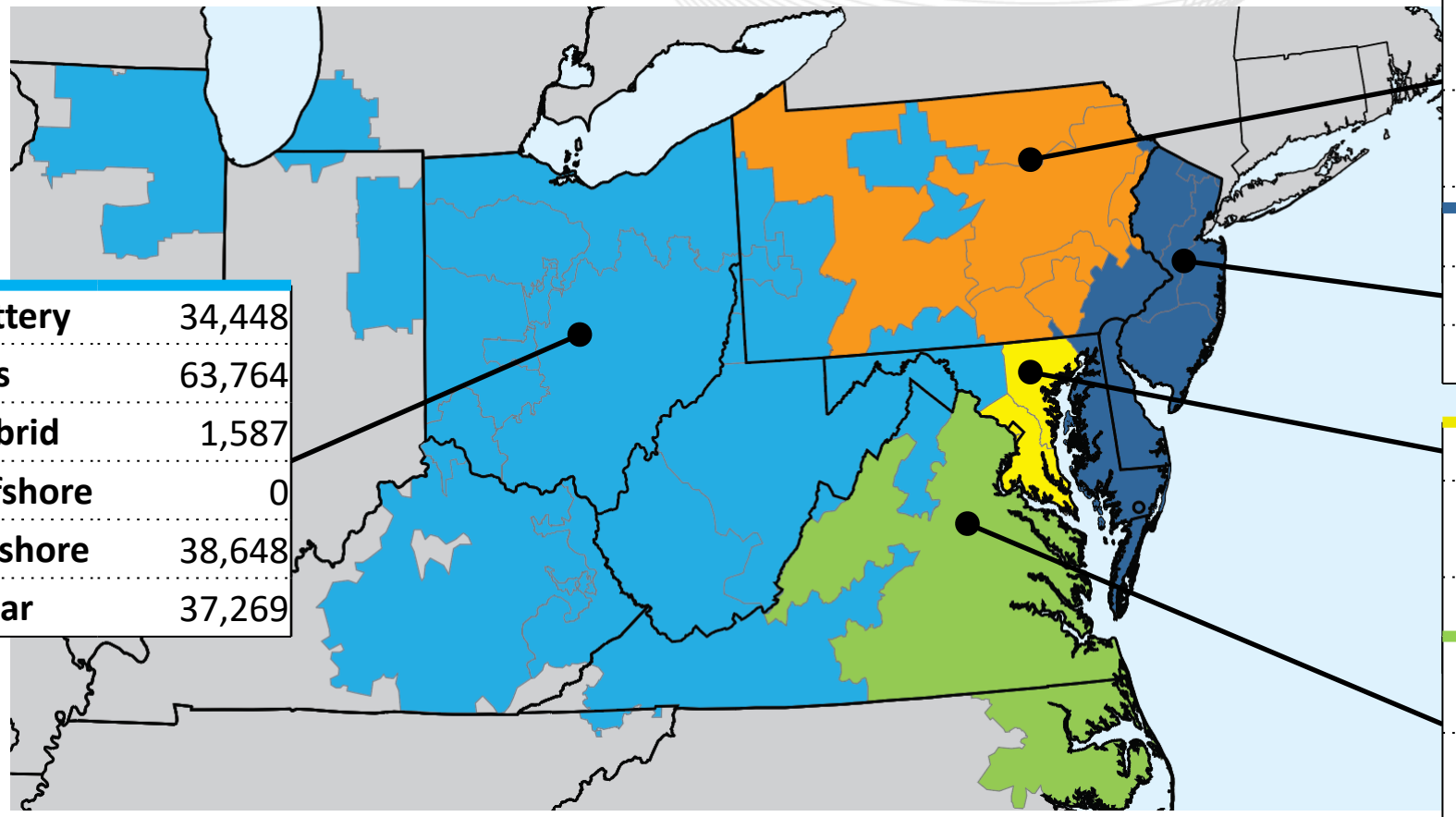
Battery	907	Offshore	0
Gas	16,356	Onshore	0
Hybrid	80	Solar	2,283

Battery	503	Offshore	0
Gas	2,739	Onshore	0
Hybrid	0	Solar	

Battery	7,930	Offshore	2,489
Gas	16,598	Onshore	590
Hybrid	436	Solar	11,309

	Eastern MAAC (EMAAC)	Southwest MAAC (SWMAAC)	Western MAAC (W		
Peak Load 2034:	**35,267 MW**	**13,525 MW**	**19,835 MW**	**39,061 MW**	**108,032 MW**

Scenario B: Resource Mix 2034



Battery	34,448
Gas	63,764
Hybrid	1,587
Offshore	0
Onshore	38,648
Solar	37,269

Battery	350	Offshore	0
Gas	11,504	Onshore	2,484

Battery	1974	Offshore	0
Gas	16,309	Onshore	0
Hybrid	80	Solar	2,975

Battery	503	Offshore	0
Gas	2,739	Onshore	0
Hybrid	0	Solar	

Battery	2,585	Offshore	2,489
Gas	16,598	Onshore	680
Hybrid	436	Solar	42,122

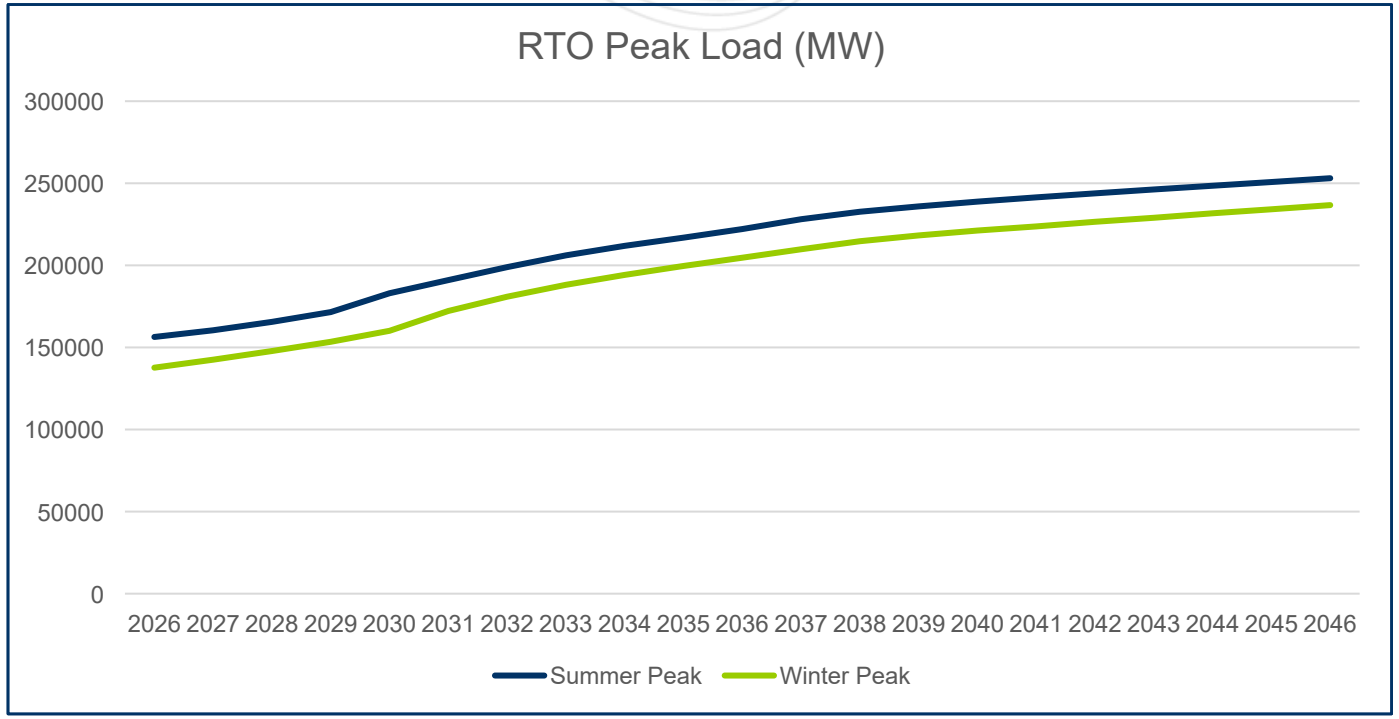
	Eastern MAAC (EMAAC)	Southwest MAAC (SWMAAC)	Western MAAC (W		
Peak Load 2034:	**35,267 MW**	**13,525 MW**	**19,835 MW**	**39,061 MW**	**108,032 MW**

Assumptions

- Load assumptions
- Generation and storage technologies
- Fixed and Variable costs components
  - Fixed: Capital, fixed O&M, geographic adjustments coefficients
  - Variable: Heat rates, fuel costs, variable O&M
- Financial assumptions (fixed charge rate and discount rate)
- Renewable capacity factors
- Policy assumptions (new generation and deactivations)
- Resource adequacy
- Starting resource mix
- Build limits for capacity expansion (Generation Interconnection data and siting opportunities)

Load Assumptions

- PJM's 2026 Demand forecast



Generation and storage technologies

- Solar PV
- Onshore Wind
- Offshore Wind
- Battery Energy Storage (4-, 6-, 8- and 10-hour)
- Hybrid (Solar + Battery in 2:1 configuration)
- Combustion Turbine
- Combined Cycle
- Nuclear uprates

Fixed Costs, Variable Costs, and Financial Assumptions

- Fixed Costs, Variable Costs, and Financial assumptions based on available resources in the following order:
  - 2025 PJM Quadrennial Review
  - NRL (Annual Technology Baseline) and NETL (Cost and Performance Baseline studies)
  - Energy Exemplar Eastern Interconnection data

- We model other legislation and policies, including One Big Beautiful Bill Act (OBBBA) and the Regional Greenhouse Gas Initiative (RGGI), through their effect on fixed and variable costs assumptions

Fixed Costs

	Overnight Capital Cost (2028$/kW)	*FOM (2028$/kW-year)*
Combined Cycle		
EMAAC	1517	41.0
SWMAAC	1411	61.0
Rest of RTO	1419	57.0
WMAAC	1476	48.0
COMED	1649	38.0
Combustion Turbine		
EMAAC	1395	21.0
SWMAAC	1339	33.0
Rest of RTO	1361	25.0
WMAAC	1390	21.0
COMED	1495	21.0
BESS 4-hr		
EMAAC	1832	57.0
SWMAAC	1753	62.0
Rest of RTO	1750	55.0
WMAAC	1784	57.0
COMED	1980	59.0

Brattle 2025 CONE Report for PJM (Quadrennial Review)
https://www.pjm.com/-/media/DotCom/committees-groups/committees/mic/2025/20250411-special/item-01-2-cone-report-final.pdf

Fixed Costs (cont.)

	Overnight Capital Cost (2022$/kW)	*FOM (2022$/kW-year)*
Solar	1378.9	21.6
Onshore	1481.3	31.6
Offshore	4582.6	86.2
BESS 6-hr	2481.4	62.0
BESS 8-hr	3192.9	79.8
BESS 10-hr	3904.4	97.6
Hybrid (Solar-plus-Battery)	2252.4	61.5

NLR (National Laboratory of the Rockies) 2024 Annual Technology Baseline

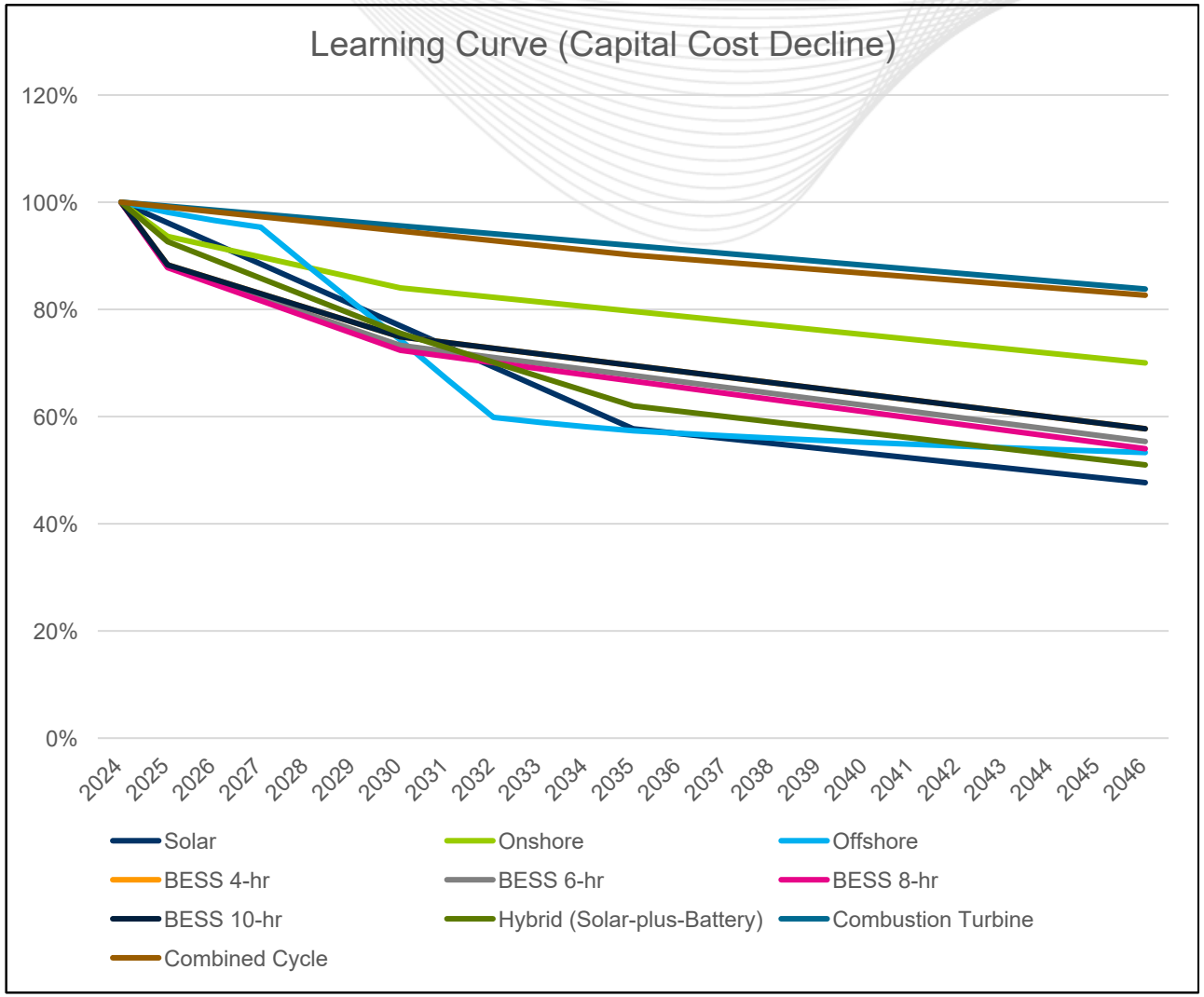
Costs will be escalated to account for inflation impact since publication in 2024

	Overnight Capital Cost (2022$/kW)	*FOM (2022$/kW-year)*
Nuclear	5750	175

NLR (National Laboratory of the Rockies) 2024 Annual Technology Baseline

Costs are for year 2030. Costs will be escalated to account for inflation impact since publication in 2024

Learning Curves



NLR (National Laboratory of the Rockies) 2024 Annual Technology Baseline

Variable Costs

	VOM (2028$/MWh)	Heat Rate (Btu/kWh)
Combined Cycle		
EMAAC	2.6	6318
SWMAAC	2.6	6345
Rest of RTO	2.7	6303
WMAAC	2.7	6314
COMED	2.6	6294
Combustion Turbine		
EMAAC	1.1	9166
SWMAAC	1.1	9161
Rest of RTO	1.0	9141
WMAAC	1.1	9149
COMED	1.1	9133

Heat rate for combined cycle is without duct firing

Brattle 2025 CONE Report for PJM (Quadrennial Review)
https://www.pjm.com/-/media/DotCom/committees-groups/committees/mic/2025/20250411-special/item-01-2-cone-report-final.pdf

Variable Costs (cont.)

	VOM (2022$/MWh)	Fuel Costs (2022$/MMBtu)	Heat Rate (Btu/kWh)
Nuclear	2.8	0.97	10.497

NLR (National Laboratory of the Rockies) 2024 Annual Technology Baseline

Costs are for year 2030. Costs will be escalated to account for inflation impact since publication in 2024

Financial Assumptions

- Fixed charge rate: Annualization coefficient for overnight capital cost (referred to as “Capital Charge Rate” in Quadrennial Review)

	Combined Cycle	*Combustion Turbine*	*Battery*	
EMAAC		17.0%	16.0%	9.6%
SWMAAC		16.9%	15.9%	9.6%
Rest of RTO		16.9%	15.9%	9.6%
WMAAC		16.9%	15.9%	9.6%
COMED		18.8%	17.8%	9.6%

Capital charge rate shown for Battery incorporates the 30% ITC

Brattle 2025 CONE Report for PJM (Quadrennial Review)

https://www.pjm.com/-/media/DotCom/committees-groups/committees/mic/2025/20250411-special/item-01-2-cone-report-final.pdf

	Solar	*Onshore*	*Offshore*	*Hybrid*	*Nuclear*
Fixed charge rate	5.7%	5.8%	6.1%	7.8%	5.3%

NLR (National Laboratory of the Rockies) 2024 Annual Technology Baseline

- Discount rate: United States 20-year treasury rate 4.98% as of May 5, 2026

Geographic Adjustment Coefficients for Renewables

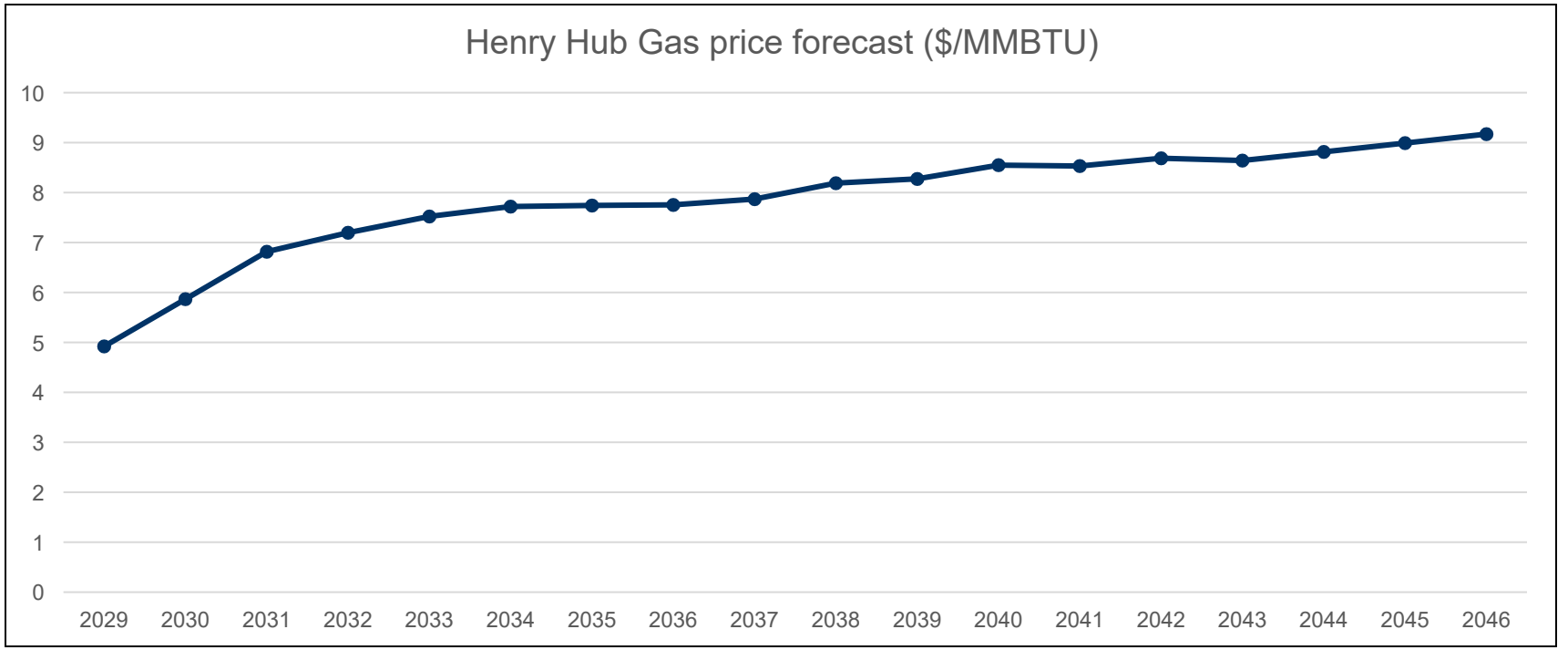
	10PJME MAAC	11PJMW Rest of RTO	12PJMC ComEd	13PJMD Dominion	16SRCE EKPC
Nuclear	1.078	0.993	1.186	1.013	1.045
Onshore	1.334	0.989	1.205	1.267	1.012
Offshore	1.083	0.985	1.191	1.017	1.093
PV	1.057	0.996	1.133	1.005	0.999
Hybrid	1.057	0.996	1.133	1.005	0.999
Battery	1.029	0.995	1.069	1.012	1.029

Regional Cost Adjustment Factors by Technology

U.S. Energy Information Administration (EIA) (2024) "Capital Cost and Performance Characteristic Estimates for Utility-Scale Electric Power Generating Technologies"

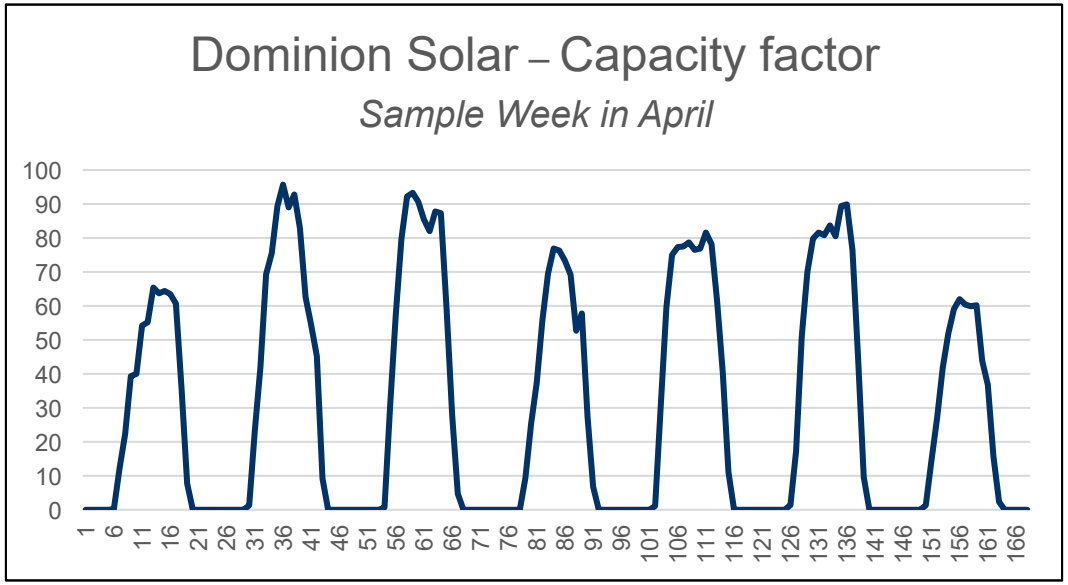
Gas Price

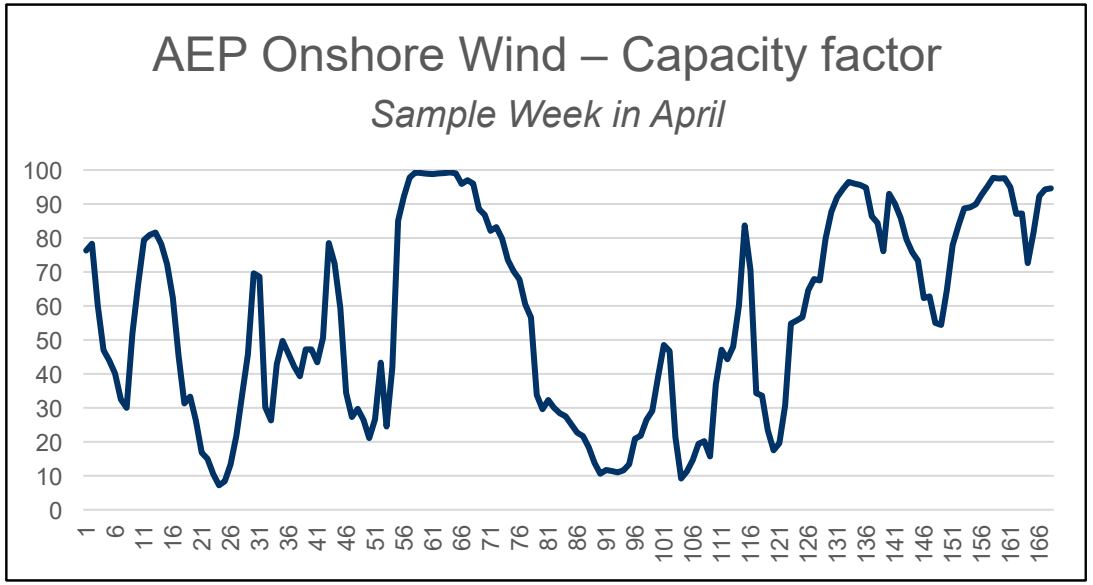
Latest forecast used by PJM's Market efficiency



Renewable Capacity Factors

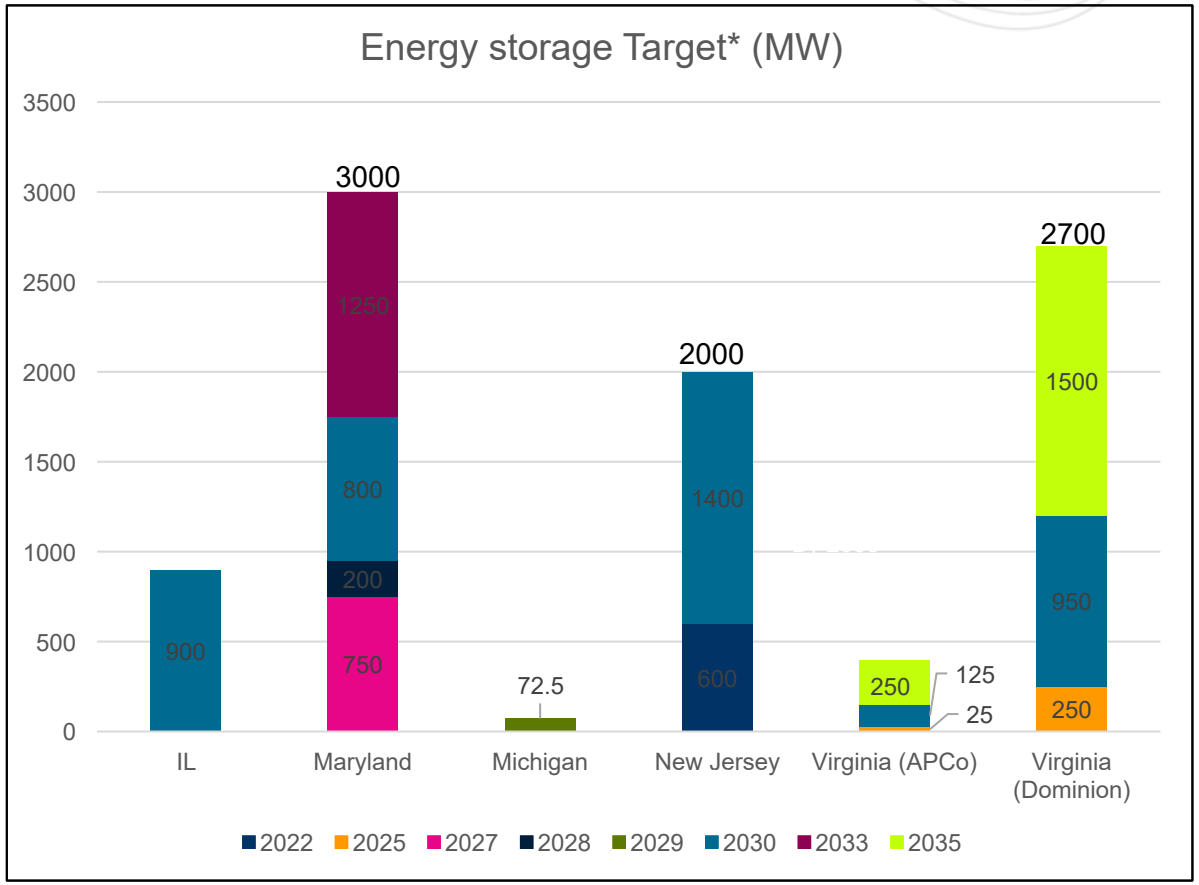
- Use Energy Exemplar's Eastern Interconnection hourly profiles for renewable capacity factors which are defined at the zonal level





Offshore Wind and Energy Storage Targets

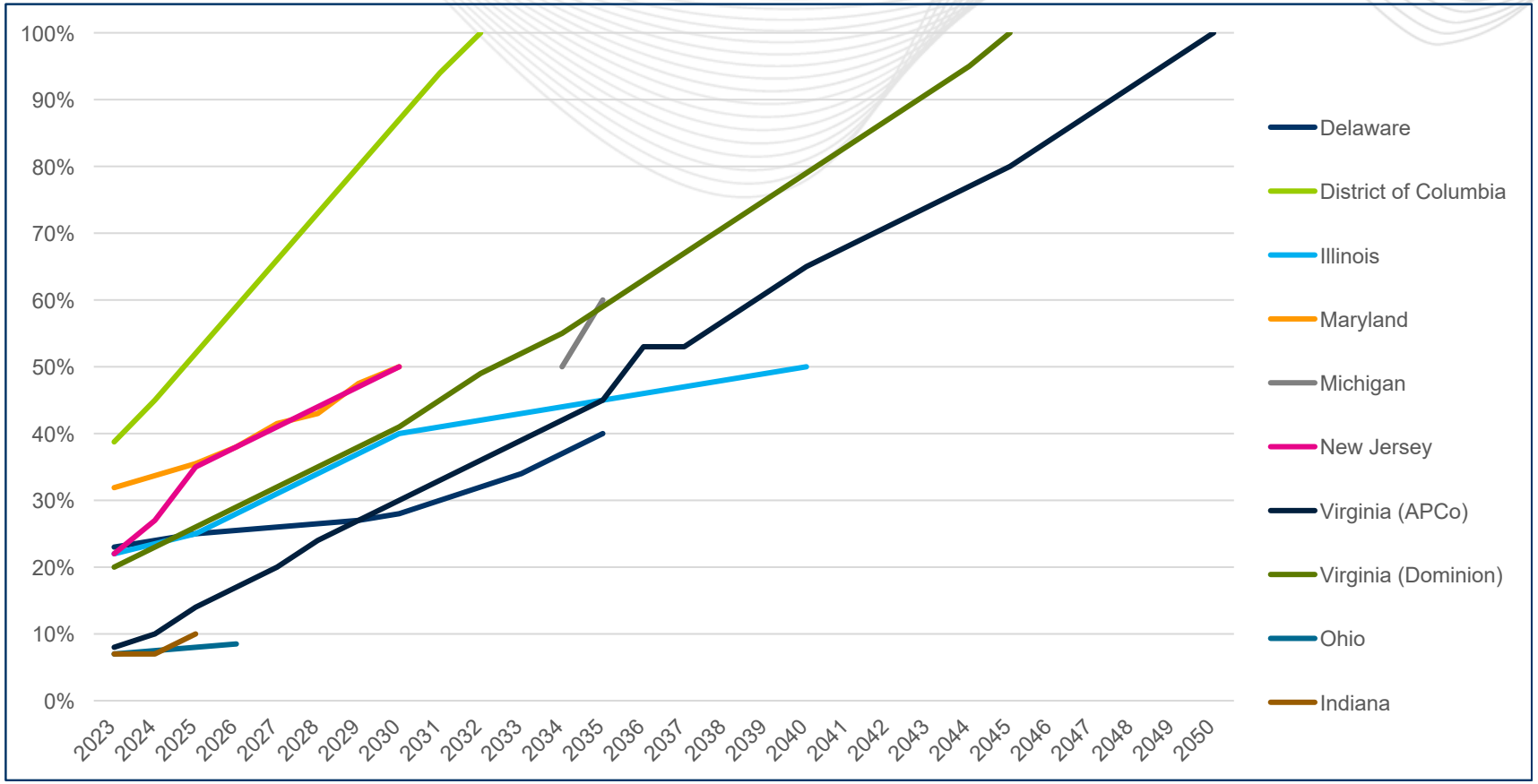
- Offshore Wind currently under construction is Coastal Virginia Offshore Wind (CVOW) with 2,489 MW MFO in VA



*IL has a target of 3000MW Energy Storage by 2030. 900MW of that target is assumed to be in PJM

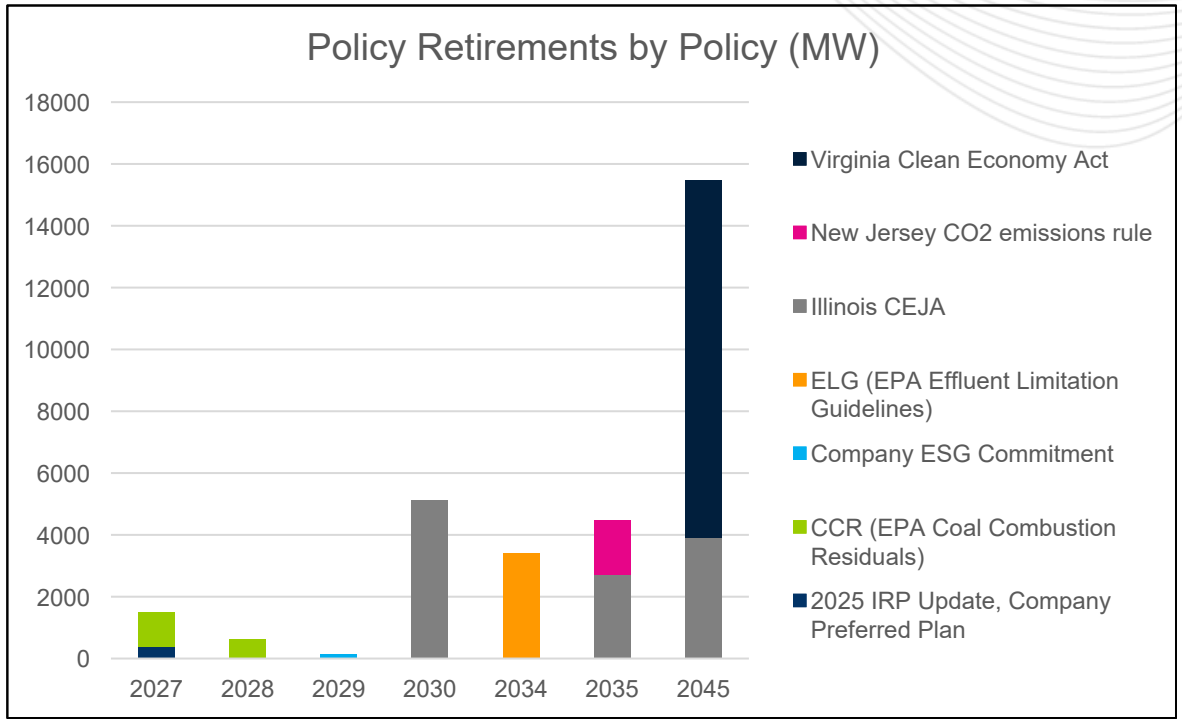
*Michigan has a target of 2500WM Energy Storage by 2029. Target for PJM is assumed to be 72.5 MW. PJM may plan for more energy storage as informed by the queue and the capacity expansion modeling

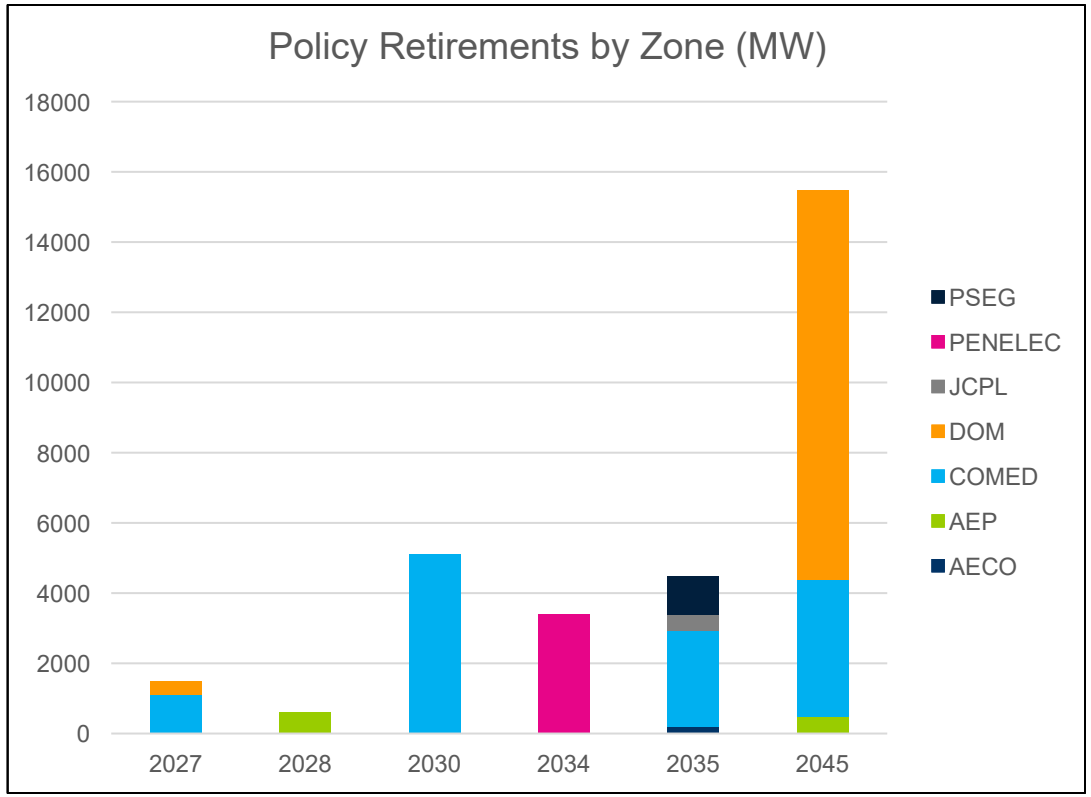
State RPS Policy



*PJM will model the geographic and technology eligibility rules for RPS Policies
**The complete policy assumptions are in the ISAC policy workbook: https://www.pjm.com/-/media/DotCom/committees-groups/state-commissions/isac/postings/2026-rtep-isac-assumptions-submission.xlsx

Unannounced Policy Retirements

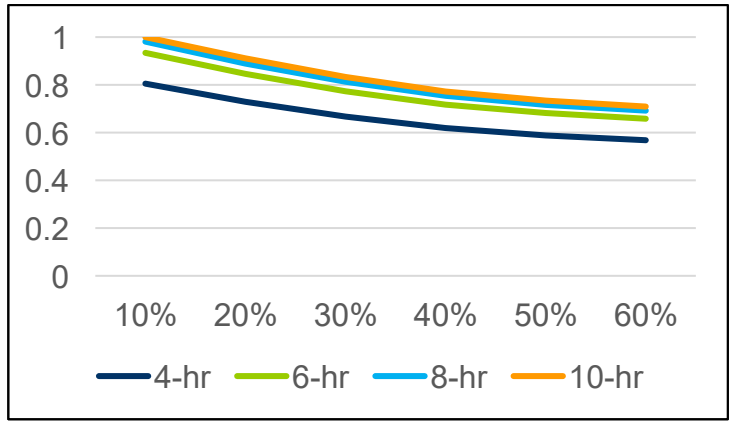


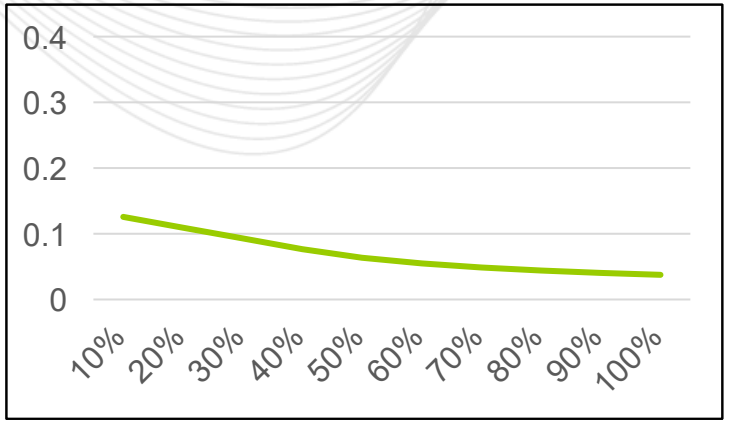


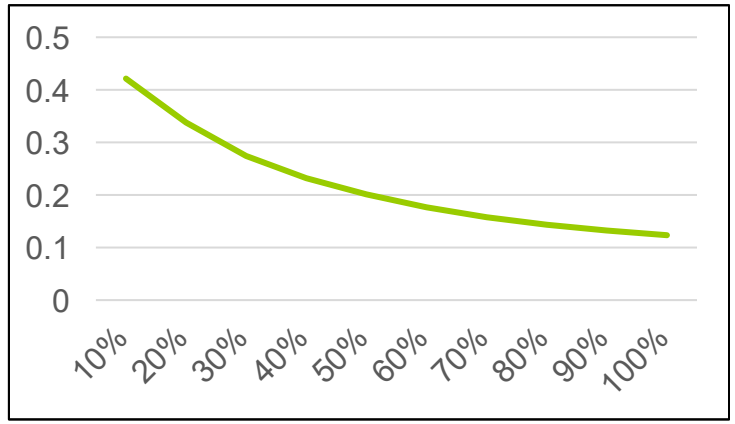
Resource Adequacy

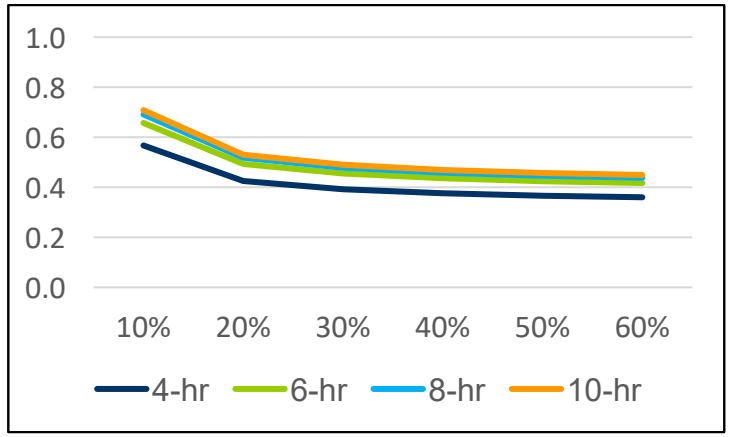
- Enforce the 1-in-10 resource adequacy constraint in the model
- Set ELCC-based capacity constraints to obtain resource adequate expansion (see next slide for ELCC curves)

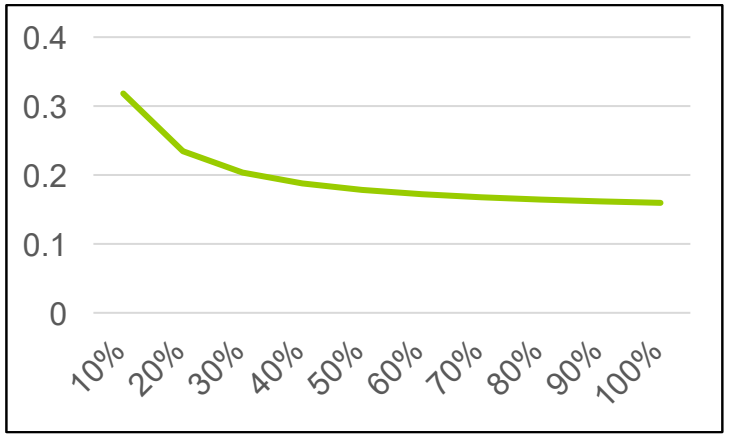
ELCC Assumptions











percent of nameplate to annual peak load

percent of nameplate to annual peak load

- Solar winter ELCC set to 0
- Hybrid: solar ELCC + 0.5 battery ELCC
- Offshore: 1.7 × onshore ELCC
- CC and CT: 0.95 summer, 0.85 winter
- Coal: 0.87
- Nuclear: 0.99

Starting Resource Mix and Build Limits

- Starting resource mix: Consistent with 2026 RTEP model-year 2031
- Build up to TC2+C1 for Scenario A and related sensitivities and 2x of existing generation + queue in Scenario B by 2034, 3x by 2045 (for VA solar 3x,10x respectively in Scenario B) and based on land availability for solar and onshore using the NLR Limiting Access scenario

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