



Aspen Energy Week

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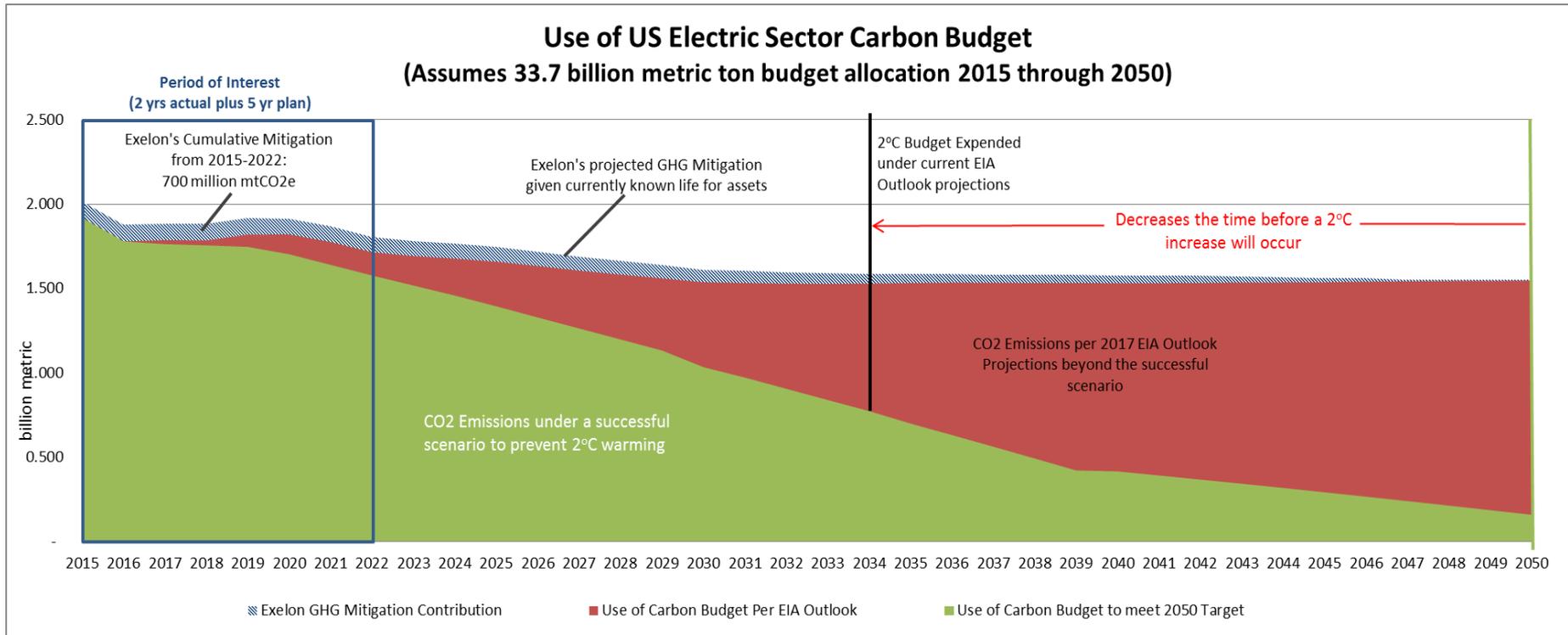
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Electric Sector Contribution to Meeting 2-degree C Target

- The red shaded area depicts the work yet to be done for the electric sector to reach needed societal carbon goals to avoid a 2-degree C increase in global temperatures.
- Exelon is contributing over 700 million metric tons of GHG mitigation from 2015 through 2022, which helps close the electricity sector GHG emissions gap¹ through 2022 by ~50%.



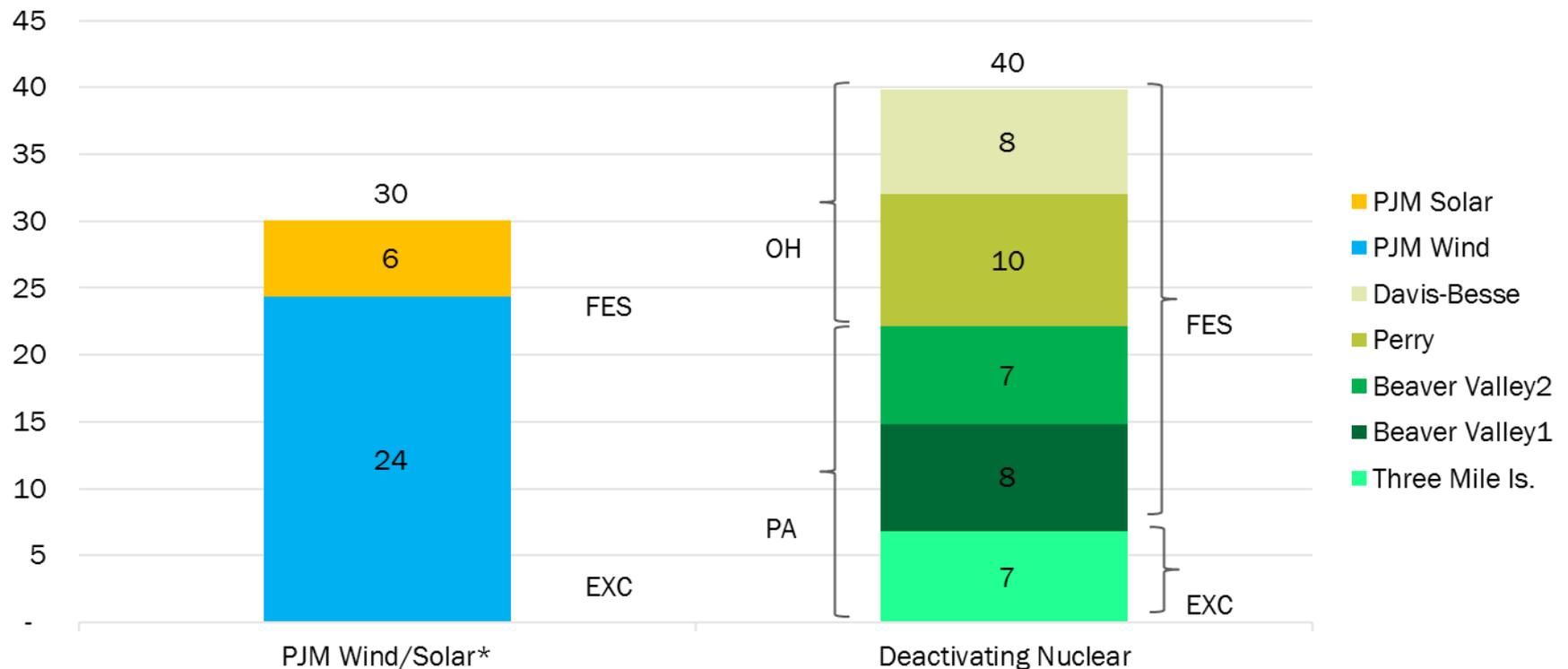
Why a 2°C target? A 2°C global average temperature increase is the internationally agreed upon threshold representing the measure beyond which significant climatic changes would occur and be disruptive to earth's systems currently relied on to meet basic societal needs. Two degrees of warming is twice the historical global average variation over the past 10,000 years.

¹ – Based on the Science-based Target Initiative's Sector Decarbonization Model for meeting a successful 2°C pathway.

Case Study: OH and PA Clean Generation

- The four announced deactivating nuclear plants in Ohio and Pennsylvania generated more energy in 2017 than all of the wind and solar generation in PJM.

2017 Announced Deactivating OH & PA Nuclear vs PJM Wind/Solar (TWH)

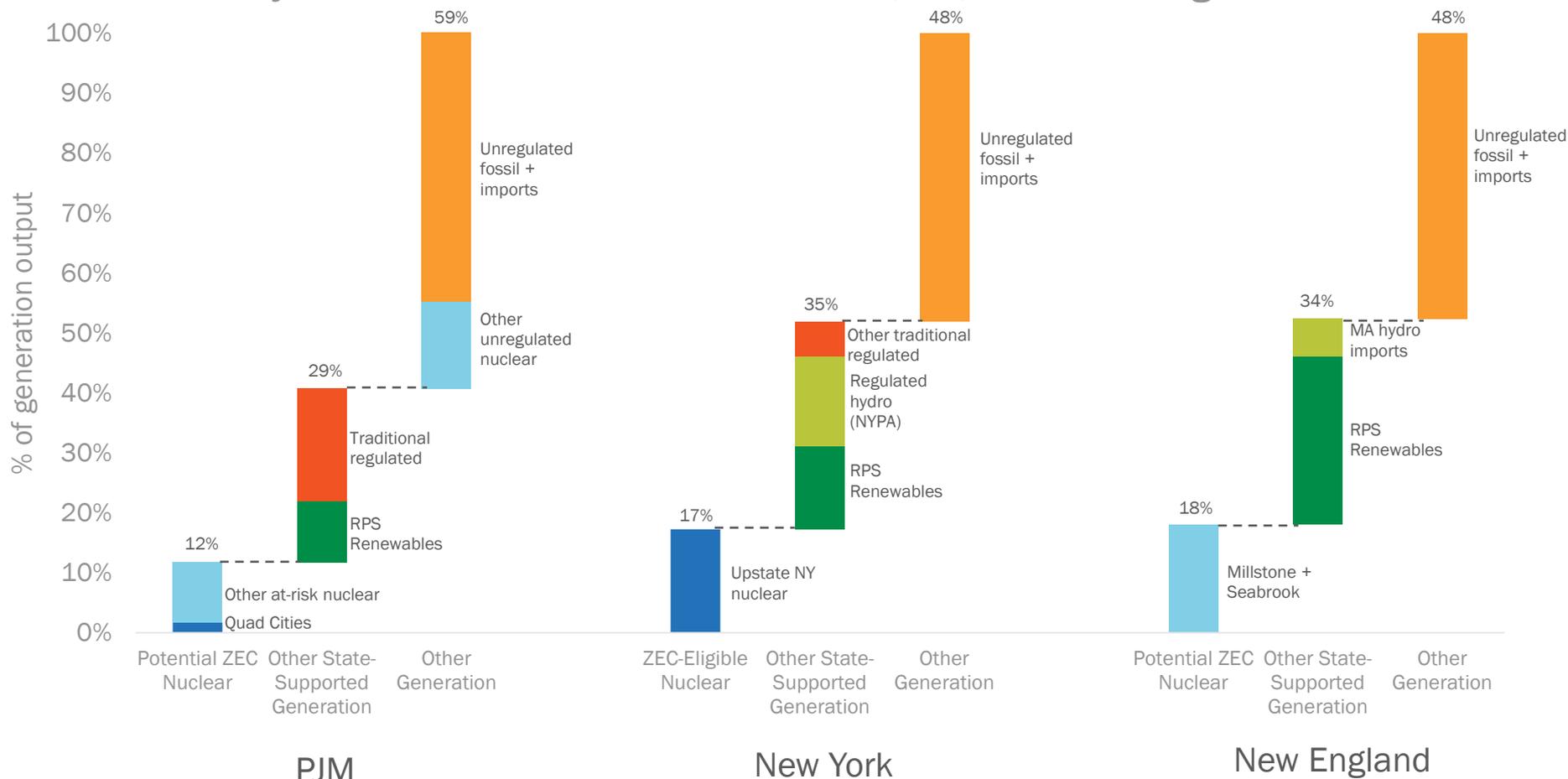


Sources: EIA-923, PJM GATS

*Note: Includes all wind and solar physically located in PJM plus generators that have been certified to serve an RPS in a PJM state, for example, RECs from adjoining states can be used for compliance in the Illinois RPS.

How “Competitive” are the Competitive Markets in the East?

Projected 2025 Generation Mix in PJM, NY, and New England

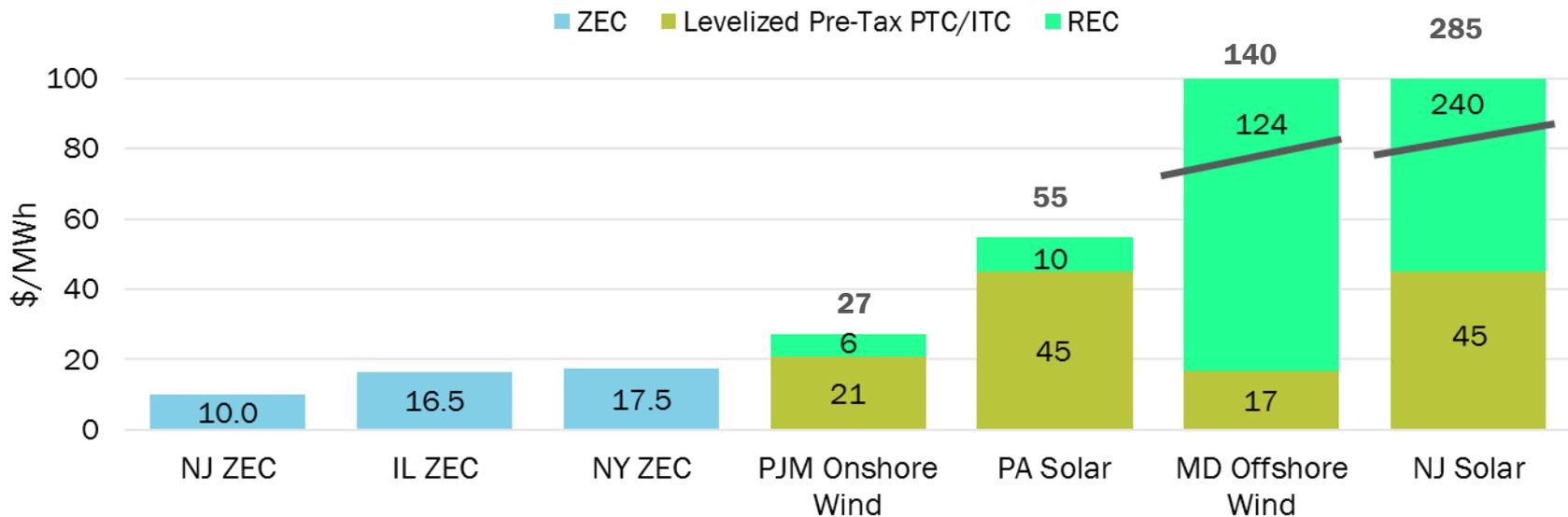


Sources: 2016 ISO-NE CELT Report; 2015 New York Gold Book; 2016 PJM Load Forecast Report; FERC Form 1 filings for investor-owned utilities in PJM and NY; Projected RPS renewables based on existing RPS legislation in various states; MA hydro imports based on 9.45 TWh clean generation procurement target specified in MA H.N. 4568.

Environmental Attribute Price Comparison

- How much do other clean resources get paid for the carbon-free attribute?
 - \$27/MWh combined attribute price for PJM on-shore wind
 - \$55/MWh combined attribute price for Pennsylvania solar
 - \$140/MWh combined attribute price for Maryland off-shore wind
 - \$285/MWh combined attribute price for New Jersey solar

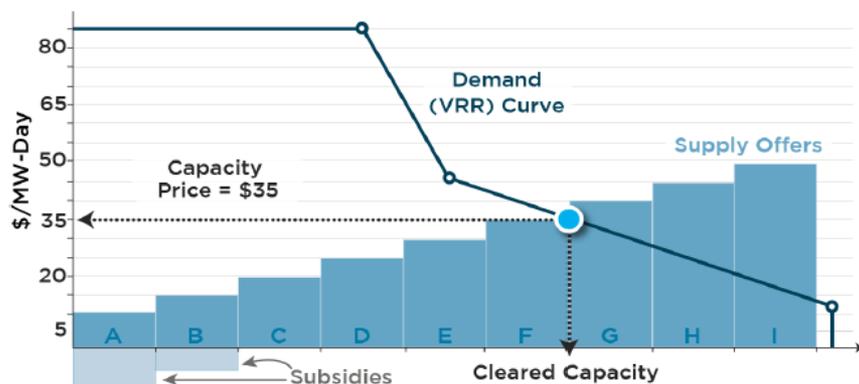
2018 Environmental Attribute Price



Notes: REC prices as of 4/18/2018. Wind PTC = \$23.75/MWh in 2017; converted to pretax using $1/(1-21\%)$; escalated 2% per year for 10 years; levelized over 25 years at 8% WACC. Solar ITC = 30% ITC; \$2000/kw capital, 20 year life, 18% capacity factor, 8% WACC. Maryland offshore wind per Maryland PSC Order 5/11/2017, with PTC 20% step-down.

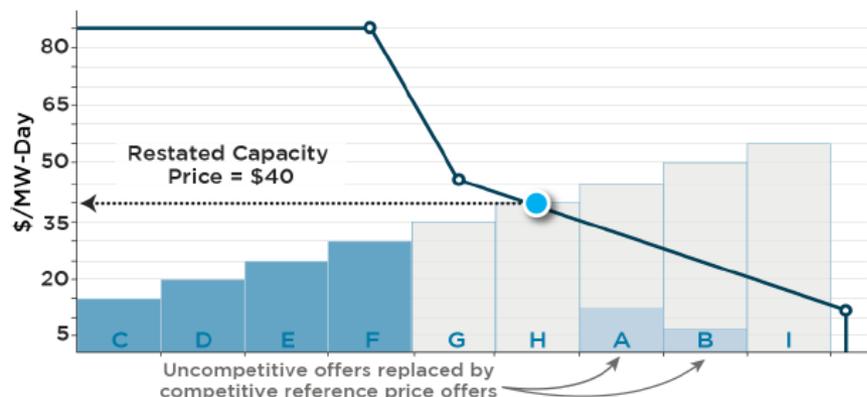
PJM's "Solution" for Subsidies – Capacity Repricing or MOPR

First stage: determine which resources receive capacity obligations



- “Subsidized” resources (A and B) are identified by PJM, using a list of criteria intended to identify “actionable subsidies” (see next slide for more details)
- “Subsidized” resources are entered into supply curve at the prices they bid (which may be suppressed due to impact of subsidies)
- Market is cleared as normal. Resources which clear market (A,B,C,D,E and F) receive a capacity obligation
- The resulting “suppressed” capacity price would not normally be used for anything.

Second stage: determine capacity clearing price



- PJM removes “subsidized” resources from supply curve and re-inserts them at a (higher) “competitive reference” offer level
- “Competitive reference” offer level would be a technology-specific generic offer based on net avoided costs, without consideration of subsidy revenue
- Market is cleared as normal with new supply curve
- Resources that clear second stage but not first stage (G and half of H) do not receive capacity obligation
- “Restated capacity price” (which is higher than stage 1 price) is paid to all non-”subsidized” resources
- “Subsidized” resources are also paid “restated capacity price,” but states have option to tell PJM to pay “subsidized resources a lesser price (such as the “suppressed capacity price”)

What would Pat Wood do?



Finally, FERC Speaks

- By 3-2 party line vote, FERC rejected both of PJM’s proposals but held that PJM’s capacity construct is not just and reasonable because it has been “untenably threatened by out of market payments provided or required by certain states for the purpose of supporting the entry or continued operation of preferred generation resources.”
- FERC ordered PJM to participate in a 90-day paper hearing to develop changes to the capacity market to expand the Fixed Resource Requirement (FRR) provisions in its tariff to allow resources that want to continue receiving state support to opt out of the capacity market, and to take the associated load with them. Otherwise, units receiving state support would be subject to MOPR. This would be done for any unit receiving support with “few or no” exemptions.
- Calpine’s CEO in response: “In this obviously delicate and difficult balance that the Commission sought to strike, there is one major issue that if not adequately addressed could haunt this order and completely bankrupt competitive markets in the Eastern United States: the evolution over time of a purely residual capacity market. . . . The creation of a purely residual capacity market can only lead to failure of what we believe your order is attempting to create.”

The day before the order was issued, Commissioner Powelson announced that he is retiring from the Commission to take a job in the water industry.