Competitive Policy Agreement Working Group (CPAWG)

Analysis Request to PJM

The CPAWG assisted by RMI and Brattle staff has developed these proposed scenarios and corresponding outputs to inform PJM's modeling and analysis of various clean procurement market constructs. CPAWG believes this information will inform its position as these discussions advance, both in the CPAWG and CAPSTF.

OPSI Scenario	OPSI Assumptions & Desired Outputs	Illinois-Specific Assumptions
All	*Outputs* • Price and total procurement costs of clean attributes, region-wide, by product, and by state and/or other voluntary buyer • Energy market and capacity market consumer costs region-wide and by state • Societal costs (production and going-forward investment), region-wide • Resource entry/exit, region-wide and by state, technology type • GHG emissions, region-wide • Is reliability requirement met? (Y/N) • Are state clean energy goals met? (Y/N)	High-level request to PJM: Can PJM model the entire state of IL for the purposes of this study (rather than just the ComEd zone?) This request aims to align the goals of the study with IL-specific resource mix and policy goals (where nuclear happens to be focused in the ComEd/PJM regions, while large renewable resource potential exists in the Ameren/MISO portions of Illinois). The request for modeling Illinois includes: • Representing state-wide IL demand for clean energy products • Representing REC and ZEC resource potential from Illinois in total • Representing GHG emissions from Illinois in total • For capacity market modeling purposes, treat the MISO Zone 4 portion of Illinois as its own capacity "zone" with realistic import/export limits compared to the rest of PJM (ICC can provide

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		additional input assumptions as needed to represent portions of Illinois outside of PJM, but otherwise use PJM's going-forward resource cost assumptions as relevant for PJM ComEd Zone) Request the same output results as system-wide, but provide Illinois-specific information as well: • Illinois-internal energy resource mix, GHG emissions, and capacity UCAP MW mix. • Separately report resource mix and attributes procured in the PJM and MISO portions of the state. • Illinois consumer cost as allocated via the PJM market (price and quantity of each product), plus any consumer costs from non-PJM-market programs included (e.g. in the status quo case). For the purposes of allocating costs, assume that costs are allocated in proportion to load between ComEd and Ameren (e.g. clean capacity may be focused in ComEd due to nuclear, but assume that cost allocation will be equally shared by consumers across the state)

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		• For all cases, also compare to a recent historical year (e.g. 2021) – for both Illinois and PJM-wide
1. Status quo Model all state policy goals (RECs, ZECs, storage, offshore wind, DERs, DR etc.) for 2030.	*Assumptions:* Provide a summary of policy assumptions by state for OPSI CPAWG review and adjustment. Include a realistic level of "friction" (transaction costs, etc.) and non-coordination as associated with the lack of a regional marketplace. OPSI suggests 5 % would be an appropriate placeholder for this value. *Outputs: See "all" above*	Illinois 2030 assumptions: • ZEC and CMC nuclear policies expire before 2030, assume nuclear resources offer at net going-forward costs in the capacity market • Fossil resources are capped at their CEJA-defined baselines (and therefore may have lower ELCC values for capacity) • New gas CCs can be built in IL at Net CONE (assume new resources will operate with high capacity factors to achieve 95% capacity factor equivalent as baseline). • For state RPS mandates, note that RPS mandates only apply to 85% of state-wide IL consumer demand (by 2030 RPS is 40% by 2030 * 85% of projected Illinois demand). • IL RPS mandates are approximately 92% in-state (same assumptions as in PJM's OSW study), as well as a preferred mix of 55%/45% for solar/wind. • Half of all solar requirement is met by behind-the-meter programs. Assume that this BTM solar volume remains constant across all scenarios (i.e. costs can be ignored or included

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		equally across all scenarios, but should be accounted for by reducing total RPS requirements and net peak loads accordingly)
2. Regional clean attribute market scenarios A regional market for clean energy attribute credits ("CEACs") could be modeled in several different ways; we recommend the following sub-scenarios: 2A. Market for multiple state REC products: Each of the various state RPS products (Tier I RECs, solar RECs, in-state RECs, etc.) are procured through a central auction. Benefits of the regional marketplace modeled based on removing "frictions" from Scenario #1. 2B. Co-optimization with capacity market: Same as #2A, but include realistic assumptions regarding improved resource selection due to co-optimization between capacity and REC procurements (rather than time-sequential FCEM, which precedes capacity auction). 2C. Market for a common REC: One REC product that reflects the overlap in state Tier I REC resources (i.e., wind, solar, geothermal, qualifying biomass and methane) is procured through a central auction; assume existing	*Assumptions* • Market efficiencies including lower transaction costs and added transparency eliminate "frictions" and reduce clean attribute procurement costs 5% compared to Status Quo • Use historical analysis to determine the volume of renewable supply that has not offered/cleared in the capacity market, and carry this assumption into the regional attribute market scenarios • Voluntary demand participation: Use a sloping demand curve with target quantity +/-5%. For cost allocation purposes, report costs allocated to voluntary buyers separately (agnostic as to whether buyers are cities, corporates, or other consumers) *Outputs: See "all" above, plus:* • Compare regional clean attribute market simulations with different commitment periods for cleared resources (e.g., 1 year, 3 year, 7+years) and assess impact on outcomes. • Model a version of a regional clean attribute market in which there is a must-offer requirement into the	Illinois-specific assumptions: 2A-B – same as left. 2C – assume that resources already in operation or already cleared in an RPM auction are those that are already under contract. For this scenario, relax the IL solar/wind RPS breakdown requirement and relax the IL in-state requirement (renewable supply can be procured elsewhere in PJM). 2D-E – Same assumptions as described at left.

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contracts are honored (e.g., OSW already selected); all other REC & ZEC products continue to be procured as today. 2D. Add Voluntary Demand for New Region-wide REC product: Same as #2C, but add 10%, 20%, and 30% voluntary demand for regional REC product (nuclear not eligible). 2E. Add Voluntary Demand for Region-wide CEAC product: Same as #2C, but add 10%, 20%, and 30% voluntary demand for regional *CEAC* product (renewable and nuclear are both eligible).	capacity market for resources that participate in the clean attribute market; assess how outcomes differ.	
3. Clean capacity constraint Addition of a tranche for clean capacity within existing RPM, where eligible resources include renewables, storage, EE, DR, and nuclear Otherwise identical to #1 (Status Quo)	*Outputs: See "all" above, plus:* • Note impact on capacity prices and consumer costs for states/LDAs purchasing clean capacity tranche as well as those that are not • Model scenarios with lower/higher levels of clean capacity requirements. "Clean capacity" costs are allocated only to those states for whom the clean capacity has been procured.	**Illinois-specific assumptions:** • To develop the low/mid/high clean capacity assumptions for Illinois: **low** starts at the in-state cleared clean capacity from status quo, plus the MW of any IL nuclear that didn't clear (imports cannot contribute to clean capacity needs in the "low" scenario) • High (Imports Allowed): 100% clean capacity, clean imports up to CETL can contribute to clean capacity need

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		• High (No Imports): 100% clean capacity (do not allow imports to contribute)
4. Combo clean attribute market (MWh, renewable only) and clean capacity constraint (MW UCAP, all clean supply is eligible including renewable, DR, EE, battery, nuclear) This scenario would layer scenarios #2C and #3 together, reflecting a world in which states and other buyers can meet their goals through a regional attribute market and/or clean capacity constraint.	*See "all" above, plus:* • Note impact on capacity prices for states/LDAs participating in clean capacity market as well as those that are not • Note any variation in clean procurement costs between this and scenarios 2, 3	Illinois-specific assumptions: • Low: low clean capacity (from #3 above), plus same assumptions from 2C above. • High: 100% clean capacity with clean capacity imports up to CETL allowed (same as #3 above), plus 100% clean energy (nuclear and renewables eligible to meet IL clean energy demand).
5. Option for state-specific variations of the above Individual states may request state-specific scenario analysis.	*Will focus on states' specific questions and scenarios*	