

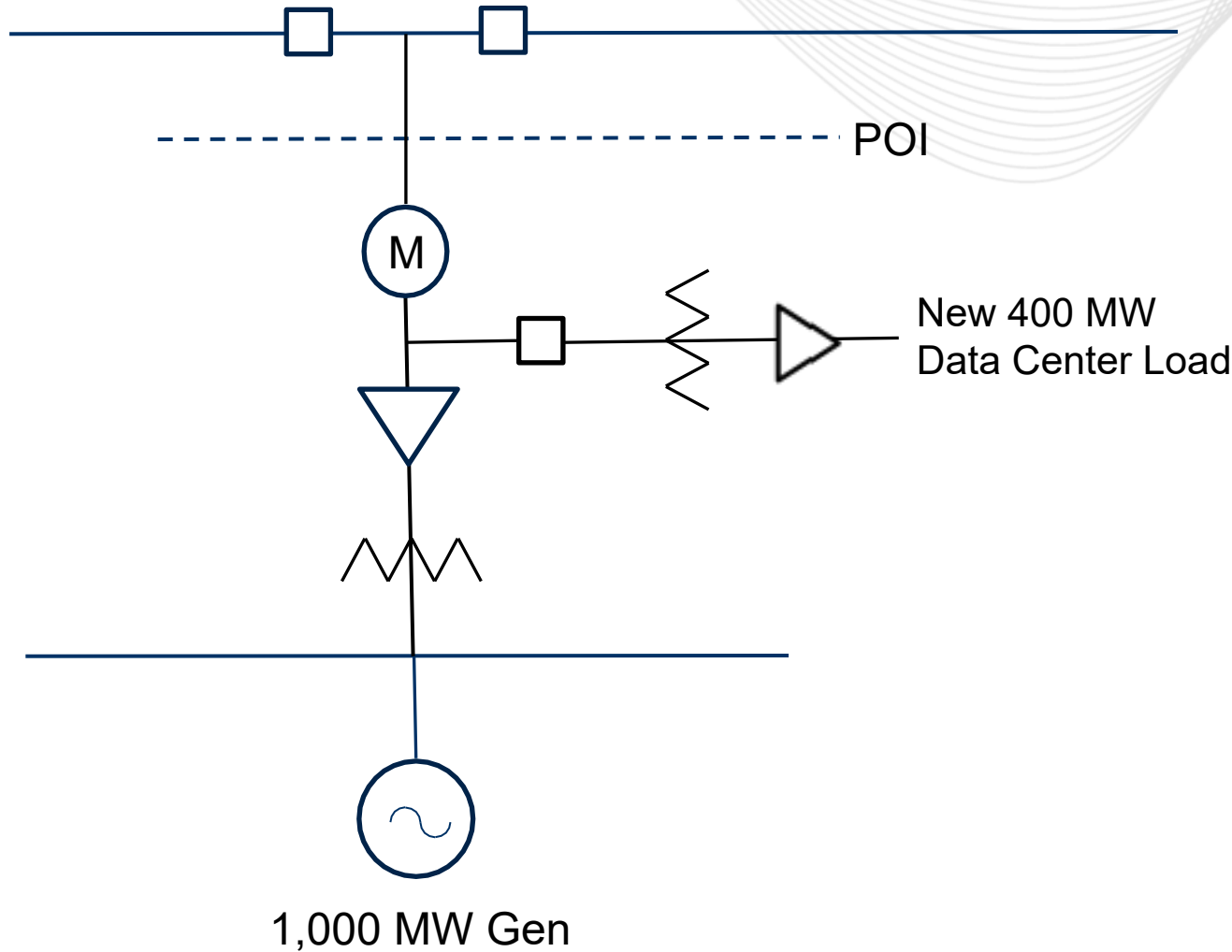


Impact of Addition of Co-Located Load on Capacity and Energy Prices

Jeff Bastian
Sr. Consultant, Market Operations
Market Implementation Committee
October 13, 2022

- For purpose of this presentation, co-located load refers to new large single-customer load (e.g., data center, bitcoin mining, etc.) that sites behind the meter of an existing even-larger generation facility for the purpose of being directly served by the generation
- An example of a co-located load configuration is described on next slide
- PJM was asked to provide an overview of the directional impact of co-located load on PJM capacity and energy market prices under both status quo rules and the Package A proposal to retain the capacity value of generation serving co-located load.

Co-Located Example Configuration



- New 400 MW data center load sites behind the meter of an existing 1,000 MW generator
- Generator is on and operating at full output unless unavailable due to forced or planned outage
- Load operates at 400 MW around the clock but can be reduced and even fully curtailed in 10-minutes on demand
- Net Injection/withdrawal of facility is measured at the POI (e.g., **under normal operations**, the POI meter reads net injection of 600 MW)
- Load that is served by co-located generation is not reflected in PJM metered load but instead measured as generation output that is lower than it would be absent the load

Status Quo Rules related to Capacity Value of Generation that Serves Co-Located Load

- Under current rules, the CIR and capacity value of an existing Generation Capacity Resource that sites new load behind its meter is reduced by the MW quantity of the new host load
 - This de-rate prevents that portion of generating unit capability that acts to reduce load from being double-counted on the supply side as Generation Capacity Resource capability
- The CIR MW and Capacity Value in ICAP MW of the 1,000 MW generator of the example is reduced to 600 MW upon the addition of the new 400 MW co-located load
- With a 600 MW ICAP commitment, the generator is required to offer 600 MW into the PJM energy market each day with actual delivery of the dispatched/scheduled amount measured by the net injection at the POI

Package A Change related to Capacity Value of Generation that Serves Co-Located Load

Under the proposed Package A rule changes, an existing generation capacity resource that sites new load behind its meter could retain its CIR MWs and capacity value (i.e., without de-rate for the co-located load MW) provided two requirements are satisfied:

1. The co-located load must be exclusively served by the generating unit and never served from the system. The co-located load is prevented from being served from the system through mechanisms that (i) instantaneously disconnect the load upon a sudden trip of its dedicated generating unit, and, (ii) ensure that the co-located load is disconnected from the system whenever its dedicated generating unit is not available to serve it.
2. The co-located load must be capable of being fully curtailed within 10 minutes thus allowing for the generator to provide full output to the system.



Package A Change related to Capacity Value of Generation that Serves Co-Located Load (cont.)

- Under the proposed Package A rules, the 1,000 MW generator of the example could retain its 1,000 MW CIR and capacity value provided it qualified to do so
- With a 1,000 MW capacity commitment, the generator is obligated to offer 1,000 MW into the PJM energy market each day
- The unit could satisfy this obligation by submitting a two-segment price-based energy offer with, as an example, the first segment for 600 MW at \$0 and the second segment for 400 MW at \$500
 - If PJM dispatches the second segment of the offer, the co-located load would have to be curtailed in order for the generator to deliver on the dispatch instruction
 - The unit is required to submit a 1,000 MW cost-based offer reflecting the variable cost to produce energy and, if mitigated, the co-located would have to be reduced/curtailed in order for the generator to deliver on any dispatch instruction based on this offer

- Table of next slide describes the expected impact that a large quantity of new co-located load would have on the supply and demand curves of the PJM capacity and energy markets
 - 5,000 MW of new co-located load in aggregate is assumed to be added
 - The 5,000 MW of new co-located load is assumed to have the same operating characteristics as the load of the example system meaning that the aggregate co-located load operates at 5,000 MW around the clock (but capable of being fully curtailed in 10-minutes on demand) and the generation serving the co-located load is on and operating at full output (unless unavailable due to outage)
- The impact is considered under both the status quo rules where capacity value is not retained and the proposed Package A rules that retain the capacity value.

Impact of Addition of 5,000 MW of Co-Located Load on Capacity and Energy Market Prices

	Status Quo	Under Proposed Package A Rules
RPM	<p><u>Expect higher clearing prices due to decrease in supply</u></p> <ul style="list-style-type: none"> - Supply is reduced by 5,000 MW (ICAP) due to de-rate of generation serving 5,000 MW of co-located load; - No impact to demand curve since load served by co-located gen is not reflected in PJM metered load or PJM forecast peak load. - Commitments from new capacity resources would likely displace some portion of the de-rated capacity. 	<p><u>No Impact on clearing prices</u></p> <ul style="list-style-type: none"> - Supply curve is unaffected (no de-rate is applied to generation serving 5,000 MW of co-located); - No impact to demand curve since load served by co-located gen is not reflected in PJM metered load or PJM forecast peak load.
Energy Market	<p><u>Expect higher clearing prices due to decrease in base load generation</u></p> <ul style="list-style-type: none"> - Base load generation to serve PJM load is reduced by 5,000 MW since this generation is instead serving the new co-located load directly. - Price increase may be somewhat mitigated depending on energy cost associated with any new capacity resources procured in RPM. 	<p><u>Expect higher clearing prices due to decrease in base load generation</u></p> <ul style="list-style-type: none"> - Base load generation to serve PJM load is reduced by 5,000 MW since this generation is instead serving the new co-located load directly. - From the perspective of PJM load, the proposed rules have the effect of converting 5,000 MW of base load generation capacity to 5,000 MW of high-priced peaker generation capacity.
Other Observations	<p>Load that is served by co-located generation is not reflected in the forecast PJM peak load or the resultant PJM Reliability Requirement against which RPM/FRR capacity commitments are procured, therefore, no reserves are procured for the co-located load. This raises a resource adequacy concern in the case where the co-located load receives back-up service from the system (i.e., "with Service from the System" configuration) because the co-located load will lean on the reserves procured on behalf of the rest of PJM system load whenever it's co-located generator is unavailable to serve it. This concern does not exist in the case where the co-located load is exclusively served by it's co-located generator (i.e., "without Service from the System" configuration) because the load is never served from the system and therefore never relies on system reserves to serve it.</p>	

Facilitator:
Lisa Morelli,
Lisa.Morelli@pjm.com

Secretary:
[Amanda Martin@pjm.com](mailto:Amanda.Martin@pjm.com)

Presenter:
Jeffrey.Bastian@pjm.com



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

**PROTECT THE
POWER GRID
THINK BEFORE
YOU CLICK!**



Be alert to
malicious
phishing emails.

Report suspicious email activity to PJM.
(610) 666-2244 / it_ops_ctr_shift@pjm.com

