Price Responsive Demand
Education related to PRD Credits Disposition
Problem Statement

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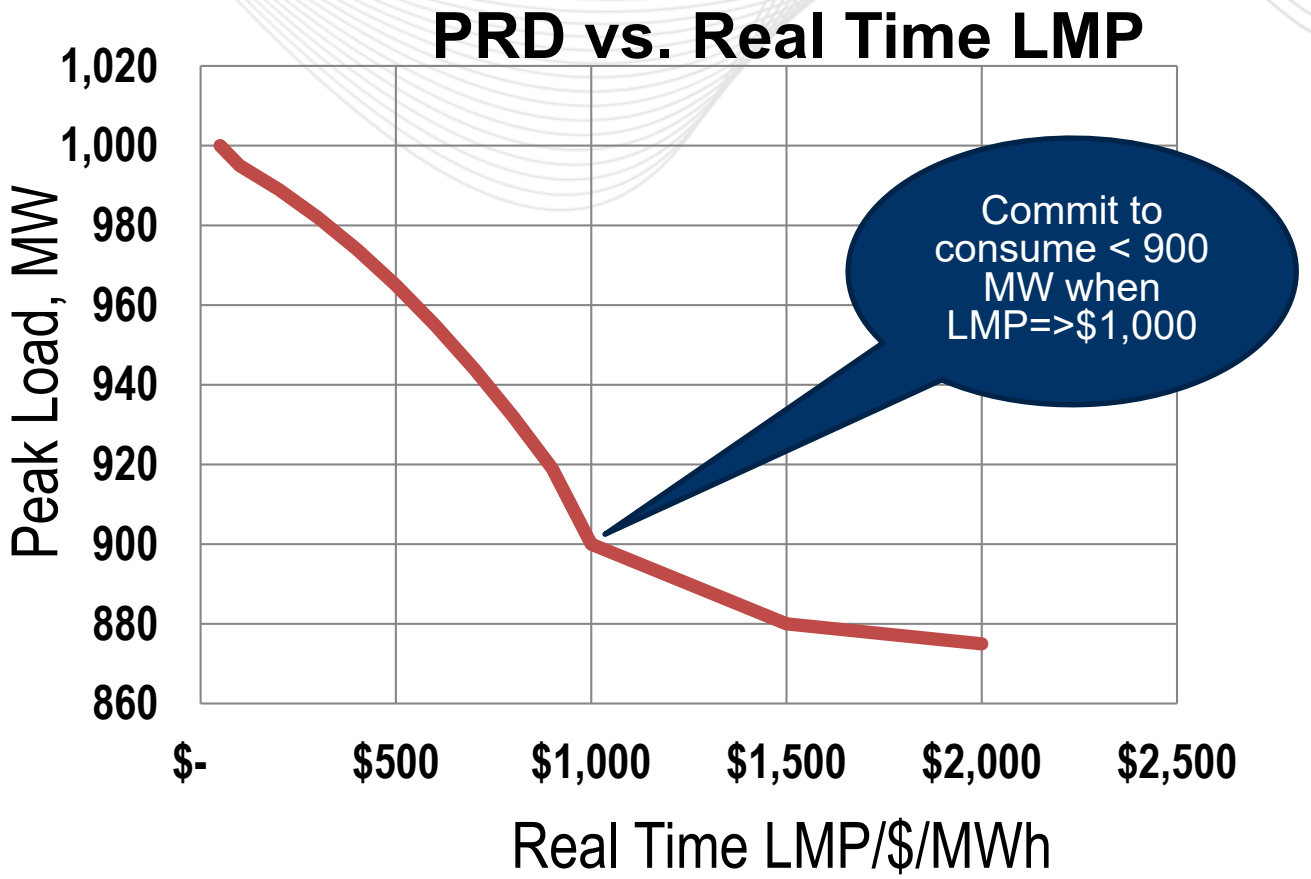
Background

- 2009 – 2012 (~4 years): PRD developed, filed, and approved
  - Focus on avoiding over-procurement of capacity for LSEs with dynamic retail rates and AMI with supervisory control
    - LSE customers' will reduce load at high energy prices and therefore need less capacity to ensure reliability
  - ER11-4628-000, 001, 002, 003
- 2017 – 2020 (~3 years): PRD update for CP capacity market requirements
  - FERC rejected some but subsequently approved others
    - ER19-1012-000, ER20-271-000

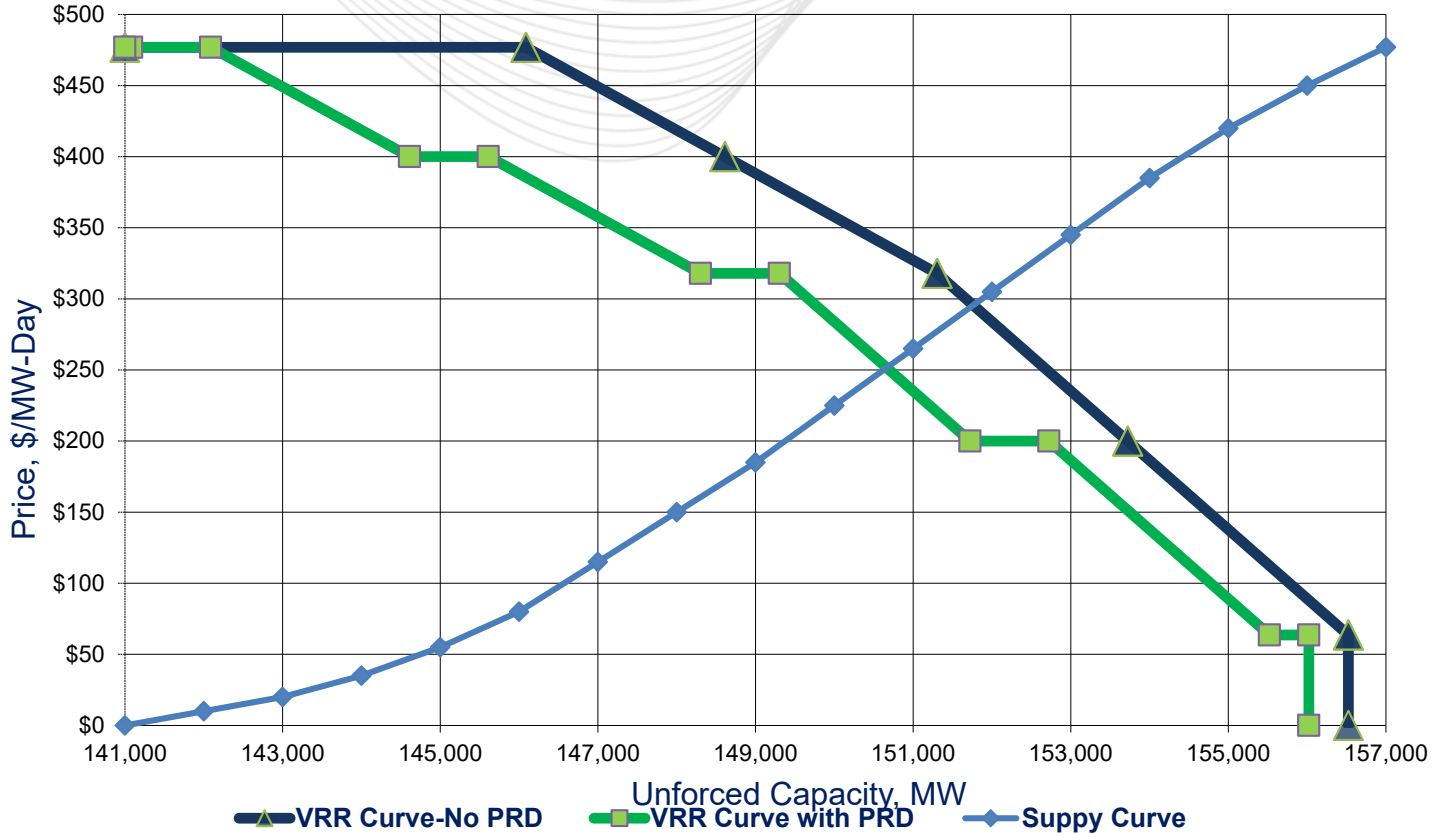
Slides are based on changes effective for 22/23 or 23/24 DY

PRD participated for the first time in 2020/21 DY (558 MW)



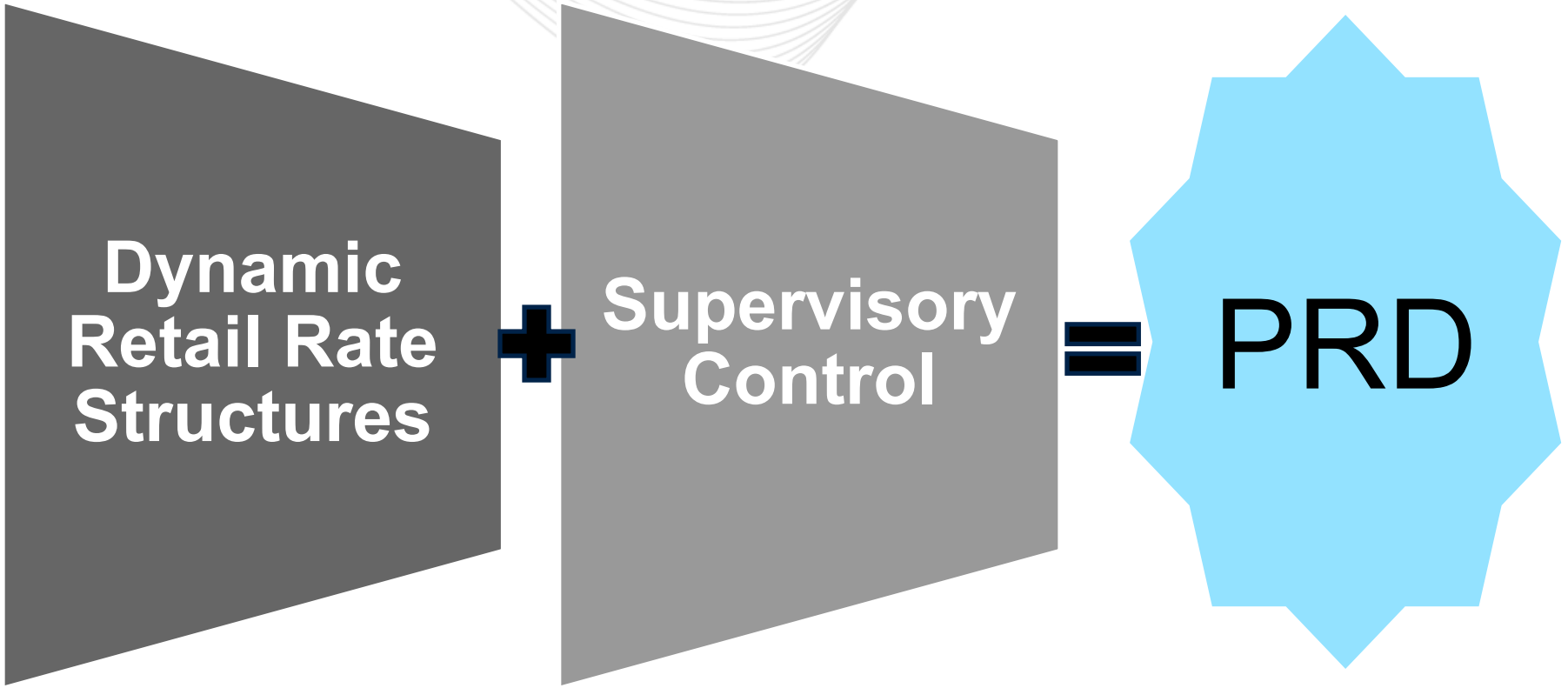
Load that will automatically respond to energy prices and be off the grid during a PJM emergency (PAI) and therefore the LSE will receive a lower capacity requirement.

PRD in RPM auction process



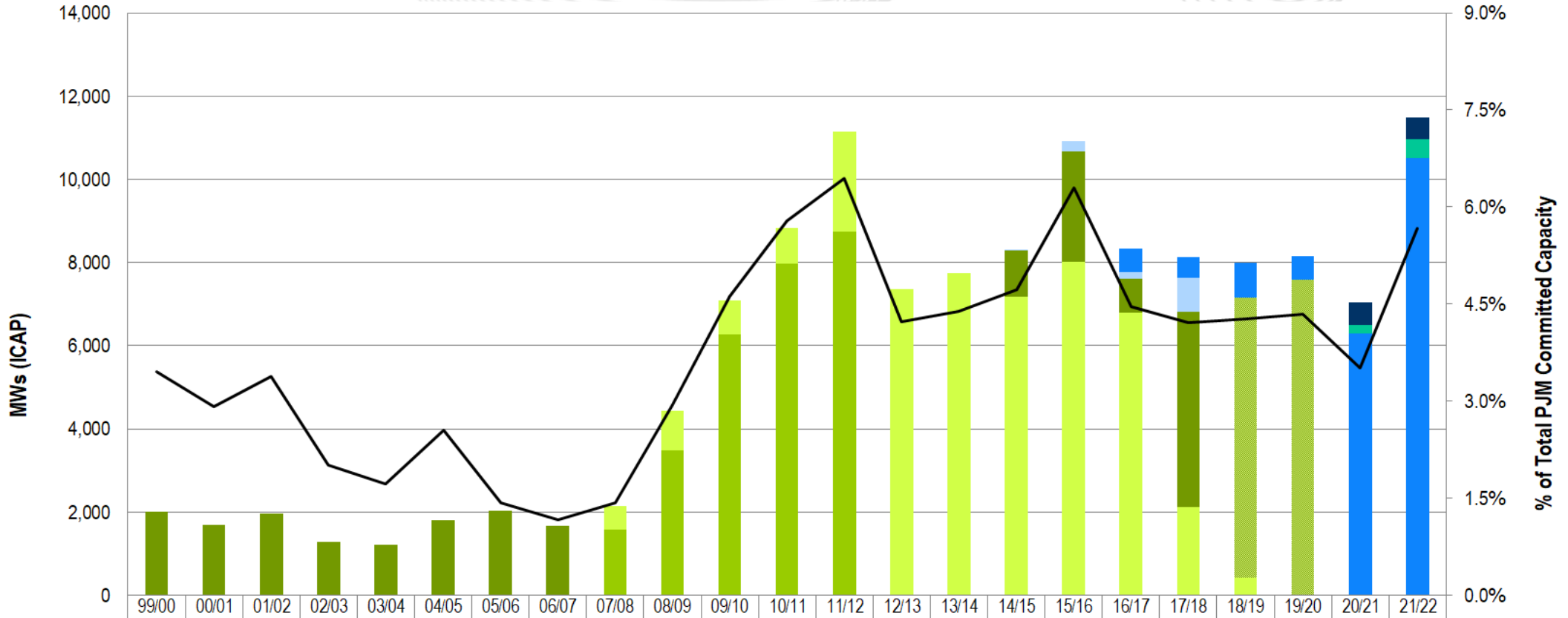
PRD will shift the demand curve to the left which will reduce the overall capacity requirement

Eligibility Requirements



PRD must be managed by pricing point/substation (“pnode”)

PRD and DR participation over time



	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22
PRD																						558	510
Summer - CP																						195	452
Annual - CP																		574	493	843	556	6296	10521
Base DR																				6,717	7,596		
Annual - DR																22	266	144	822				
Extended Summer - DR																1,126	2,635	836	4,694				
Limited - DR									555	940	815	869	2,425	7,361	7,753	7,166	8,027	6,783	2,111	427			
Limited - ILR									1,585	3,489	6,274	7,961	8,731										
Limited - ALM	2,005	1,693	1,962	1,292	1,207	1,806	2,042	1,677															
DR as % of Total PJM Committed Capacity	3.5%	2.9%	3.4%	2.0%	1.7%	2.5%	1.4%	1.2%	1.4%	2.9%	4.6%	5.8%	6.4%	4.2%	4.4%	4.7%	6.3%	4.5%	4.2%	4.3%	4.3%	3.5%	5.7%

Overview of PRD roles
one member may perform all 3 roles…..

- LSE (for the retail customer that will participate as PRD)
  - receives reduced capacity charges (PJM displays lower charges with explicit “bill credit”)
  - Registration review – verifies their retail customers if they are not the PRD Provider
- PRD provider
  - PJM member
    - Originally envisioned as the LSE but may be the EDC or other PJM member
  - Responsible for all PRD obligations and associated penalties
- EDC
  - Registration review - data validation for account number, PLC, line losses, etc.

PRD customer may not participate as Economic or Emergency (Load Management) DR

PRD high level time line

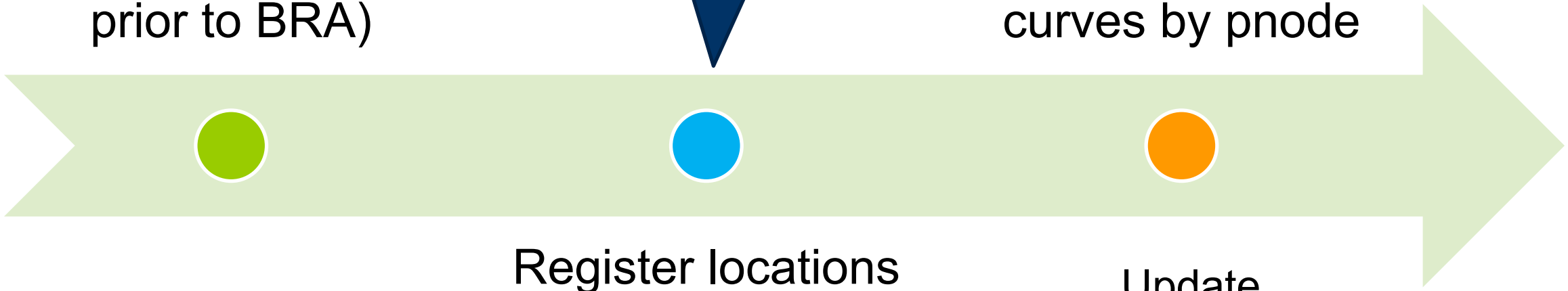
Submit PRD plan

~3.5 years in advance (Jan 15 prior to BRA)

PRD may participate in 3rd IA if Load Forecast goes up

DY

Submit PRD curves by pnode



Register locations by pnode by LSE

Jan – May prior to DY

Update Registrations, Performance compliance

Key PRD processes when there is a PRD commitment

PRD Registration

- Identify each customer location (EDC account #) by Transmission Zone, EDC, Pnode, and LSE
- Determine the nominated capacity based on the EDC determined customer peak load contribution (PLC)
  - Nominated Capacity = PLC – (Firm Service Level* Line Losses)
- Manage the registration for any changes (LSE, service disconnect, etc.)
- Ensure hourly metering is +/- 2 percent accuracy

PRD Curves

- PRD provider manages and operates to PRD curves
  - Load MW by Price by hour by pnode
  - PJM will measure compliance and assess penalties when:
    - LMP=>PRD price and,
    - Performance Assessment Interval (effective 22/23)
- PJM will use PRD curve in overall dispatch to maintain power balance
  - PJM will commit other resources to meet lower load forecast

LSE capacity cost reduction

- LSE is charged for capacity based on capacity requirement without PRD
- LSE receives PRD Credit = [PRD Icap commitment * Final Zonal RPM Scaling Factor * FPR * Final Zonal Capacity Price)
  - similar to DR BRA credit.

Zone	Nominated PRD Value [MW]	PRD Credit [$/day]	PRD Credit [$/MWday]	Adjusted Preliminary Zonal Capacity Price** [$/MW-day]
BGE	240.0	$56,775.81	$236.57	$203.19
DPL	75.0	$14,522.67	$193.64	$166.31
PEPCO	195.0	$31,905.64	$163.62	$140.53

What if PRD provider is different from LSE?

- PRD provider maintains the PRD obligation and LSE receives the PRD credit
  - PRD provider and LSE develop commercial agreement and settle bilaterally
  - PRD provider may leverage PJM Billing Line Item Transfer (BLIT) tool to facilitate commercial agreement payment, if applicable
    - This is used for “Billing Line Items” – LSE has one billing line for the PRD credit across the RTO.
- Note - PRD provider and LSE are identified and verified on the registration (PJM OrgID)

PRD Test

- PRD that is not required to reduce load for compliance is required to perform an annual test
- New test requirements (effective for 23/24 DY):
  - PJM initiated 2 hour test per year
  - Test may occur throughout the year
  - Ability for retest

PRD Penalties

Commitment Penalty (do not have enough customers to cover commitment)

Max Emergency Event Penalty (don't reduce enough load when required)

Test Penalty (don't reduce enough load when required)

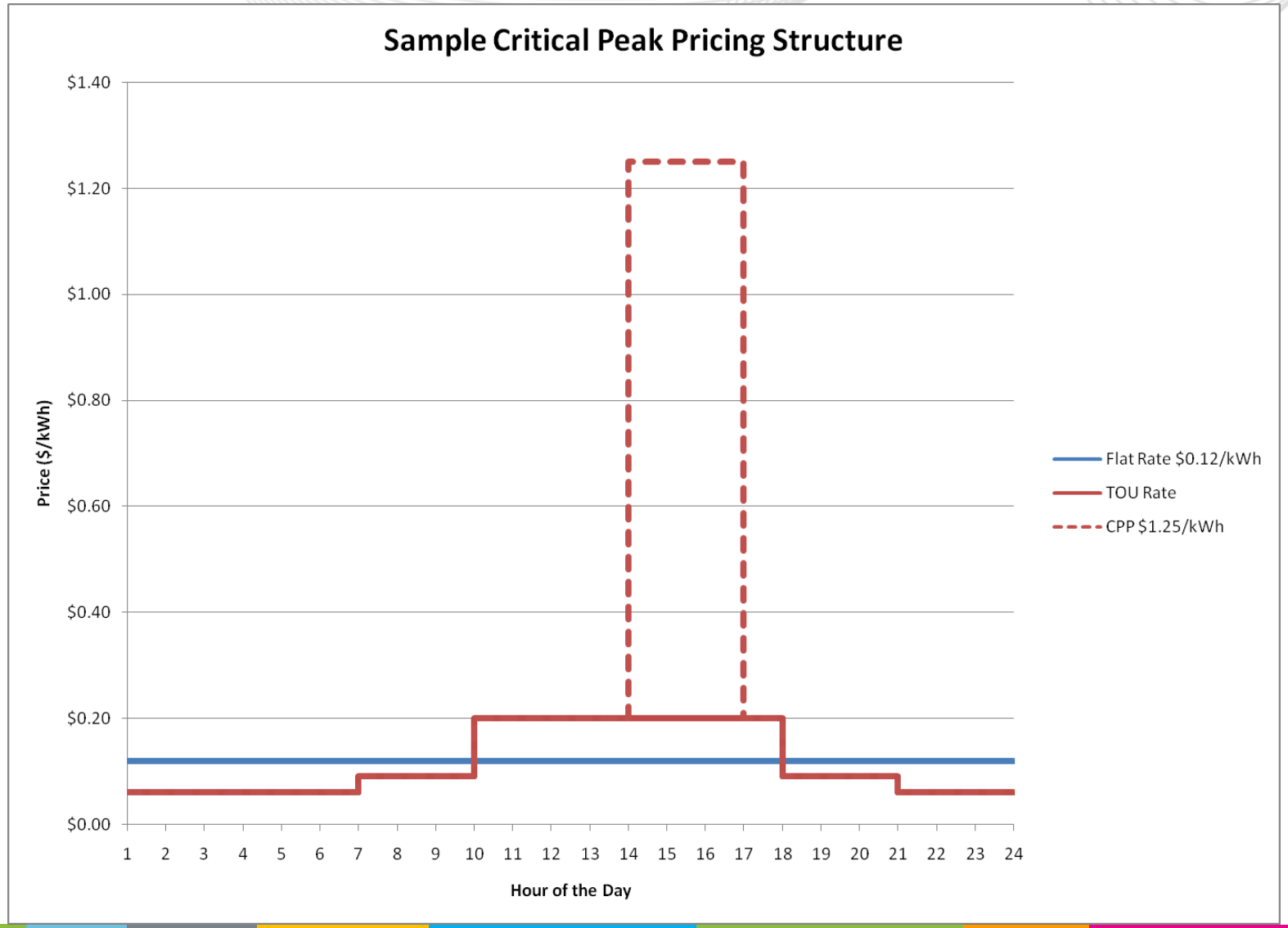
Appendix

- Eligibility requirements
- Penalties
- DR vs PRD comparison matrix
- PRD changes effective 22/23

Eligibility Requirement - Retail Rates

- Customer response if based on a dynamic retail rate.
  - "….. and a retail rate structure, or equivalent contractual arrangement, capable of changing retail rates as frequently as an hourly basis, that is linked to or based upon changes in real-time Locational Marginal Prices at a PRD Substation level and that results in a predictable automated response to varying wholesale electricity prices".
- Examples:
  - ***Critical Peak*** that allows retail rates to rise when the wholesale market price exceeds a threshold level;
  - ***Critical Peak Rebate*** which provides bill credits to consumers who reduce their usage below a baseline quantity during periods when the wholesale market price exceeds a threshold level; or
  - ***Index based on Real-Time LMP***.

Examples of Critical Peak Pricing Retail Rates



Eligibility Requirement - Supervisory Control (automated load reduction)

- Customer load at each substation automatically reduced based on PRD price curve
  - "load shall be reduced automatically in response to control signals sent by the PRD Provider directly to the control equipment where the load is located without the requirement for any action by the end-use customer."
  - Exception: individual site with supervisory control
- PRD provider can reduce customer's load remotely

Load must be reduced – capacity was not procured for the customer

PRD Commitment Compliance Penalty

(1) Daily Unforced Capacity Obligation shortfall (MW)

Shortfall (MW) * Forecast Pool Requirement

(2) RPM PRD Commitment Compliance Penalty rate ($/MW-Year)

[Weighted Final Zonal Capacity Price in $/MW-Day + Higher of 0.2 * Weighted Final Zonal Capacity Price or $20/MW-day].

- LSE's Weighted Final Zonal Capacity Price is the average of the Final Zonal Capacity Price and the price component of the Final Zonal Capacity Price due to the Third Incremental Auction, weighted by the Nominal PRD Values committed in BRA and Third IA.

PRD Compliance Penalty for RPM LSE ($/Year) = (1) * (2)

PRD PAI Compliance Penalty

MW shortfall

*

[Forecast Pool Requirement]

*

Higher PAI penalty rate or Daily Commitment Penalty

PRD Test Penalty

MW shortfall
*
[Weighted Final Zonal Capacity Price in $/MW-Day + Higher of 0.2 * Final Zonal Capacity Price or $20/MW-day] * 365 days.

PRD vs DR/CP comparison in capacity market

Process	PRD	DR/CP
RPM	BRA or 3rd IA if forecast goes increases, No replacement, Submit PRD plan, PRD provider only. Credit based on the CP rates	BRA and IAs, replacement allowed, Submit DR plan, CSPs provide. Credit based on new CP rates
Revenue	No revenue – bill credit to LSE based on FZCP if cleared in BRA. No energy market revenue. If PRD provider different from LSE then they must work out arrangements for any transfer for money	Revenue to CSP based on auction clearing price. Energy market revenue based on full LMP
Registration	LSE required and pnode required (and limits aggregation), Dynamic retail rates (linked to nodal LMP). Not allowed to participate as economic DR	No LSE required. Registration not permitted after start of DYs.
Reporting	PRD hourly curve (load and LMP) by pnode	Expected reductions by dispatch group
Dispatch & Notification	PRD provider dispatches from price curve and supervisory control during Max Emergency. Eligible to set LMP. May have price curve of 1 point at energy offer cap	PJM dispatch/release by zone/subzone by type by lead time. Eligible to set LMP. PJM dispatches based on system needs when short on reserves
Verification	FSL (compared to PLC, hourly basis	Summer FSL (compared to PLC) and Winter FSL (compared to WPL). Hourly basis
Penalty	Daily deficiency charge (FZCP * > of 1.2 or $20/mwday Event – same as DR	Daily deficiency charge (RPM price * > of 1.2 or $20/mwday Event – Net Cone * 365/30
Testing	Same	same
Add Back	Based on emergency event and 5 CPs	Based on emergency and economic events

PRD changes filed at FERC (22/23 DY)

Design Components	Status Quo	Original Filing (FERC rejected)	New Filing
Auction/FRR Plan credit requirement	Credit based on Base Capacity Rate	Credit based on new CP rates (which are higher than base rates)	same
Auction/FRR Plan Nominated capacity amount (PRD plan)	Existing based on prior registered capacity nomination, Planned based on estimated nominated capacity amount	Existing based on prior registered capacity nomination, Planned based on estimated nominated capacity amount	same
Nominated capacity amount (PRD registration)	Expected Peak Load (PLC times Zonal Forecast Peak / Zonal W/N Peak) minus MESL	Lesser of: PLC - Summer FSL (adjusted for lossses), WPL - Winter FSL (adjusted for WWAF and losses)	PLC - FSL (adjusted for losses)
Event Compliance Penalty Rate	Provider's Weighted Final Zonal Capacity Price + Higher of [0.2 Provider's Weighted Final Zonal Capacity Price, $20/MW-day]*number of days in DY. The penalty is applied on event basis	Subject to CP non-performance assessment. Higher of (Net Cone * 365/30 and Daily Commitment Penalty), up to the stop loss provision. Penalty applied on hourly basis	same
load reduction measurement	Expected Peak Load minus load plus MESL adjustment amount	Summer = PLC minus Summer load, Winter = adjusted WPL minus Winter load. Perfomance measured for each hour	PLC - load. Performance measured for each hour.
add back (PJM unrestricted load for forecast and customer PLC input)	Based on emergency event and 5 CPs	Based on when PRD required to reduce load from PRD energy curve (add back amount based on capacity compliance amount)	same
Trigger to assess CP Penalty	LMP at or above PRD curve and max emergency generation action	PAH and LMP greater than PRD curve triggers penalty	same
Overperformance/bonus payments	not applicable	overperformance will be eligible for bonus payment (similar to Load Management event), update balancing ratio calculation to include PRD bonus performance (similar to DR bonus performance).	same

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Price Responsive Demand
Education related to PRD Credits Disposition
Problem Statement

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