

Load Management and Price Responsive Demand Performance Report 2021/2022

September 2022



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For additional detailed information on any of the topics discussed, please refer to the appropriate PJM manual which can be found by accessing: <http://www.pjm.com/documents/manuals.aspx>

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Executive Summary

Load Management Demand Resources (Emergency and Pre-emergency DR) has the ability to participate as a capacity resource in the PJM capacity market (Reliability Pricing Model or RPM) or to support a Load Serving Entity's Fixed Resource Requirement (FRR) plan. There was one DR product available during the 2021/2022 Delivery Year – Capacity Performance DR. Price Responsive Demand (PRD) was also available this delivery year.

A Curtailment Service Provider (CSP) is the PJM member that nominates the end use customer location(s) as a capacity resource and is fully responsible for the performance of the resource. Load Management products are required to respond to PJM Pre-Emergency or Emergency Load Management events, based on the availability period for each product (see Table 2: DR product availability), or receive a penalty. PJM may declare Emergency Load Management events outside the required availability window but does not measure capacity compliance in such cases (resources are eligible for emergency energy revenue if they reduce load). Load Management that is not dispatched during its availability period must perform a mandatory test to demonstrate it can meet its capacity commitment or receive a penalty.

Price responsive demand (PRD) is the ability of consumers to control their energy expenditures by changing their electricity use in response to wholesale electricity prices and events. This results on lower end-use customer load (consumption) when the program is activated.

Table 1 shows both the mandatory event and test performance values for the past 12 delivery years. In the years where there was more than one event, the event performance is the event MW weighted average of all of the events. The last mandatory Load Management event was on 10/2/2019. Test performance was 154% for 21/22 Delivery Year. Historically, test performance has been substantially higher than event performance which is largely a function of the difference in the test requirements compared to what a resource must do when dispatched during Load Management Event.

Table 1: Annual performance summary. Only events with mandatory compliance are included.

Delivery year	Load Management		PRD	
	Event performance	Test performance	Event performance	Test performance
2010/11	100%	111%		
2011/12	91%	107%		
2012/13	104%	116%		
2013/14	94%	129%		
2014/15	No Events	144%		
2015/16	No Events	134%		
2016/17	No Events	153%		
2017/18	No Events	163%		
2018/19	No Events	146%		
2019/20	78%	150%		
2020/21	No Events	160%	No Events	205%
2021/22	No Events	154%	No Events	240%

Overview

PJM Interconnection, L.L.C. procures capacity for its system reliability through the Reliability Pricing Model (RPM). Members may also meet their reliability requirement through a Fixed Resource Requirement (“FRR”) plan. The sources for meeting system reliability are divided into four groups:

- 1) Generation Capacity
- 2) Transmission Upgrades
- 3) Load Management (Pre-Emergency and Emergency Demand Resources)
- 4) Energy Efficiency

There was one Load Management Products available during the 2021/22 Delivery Year¹: Capacity Performance. The availability period for is included in Table 2. By default, the interruptions must be implemented within 30 minutes of notification by PJM. Those resources that cannot be fully implemented within 30 minutes of notification and qualify for an exception may respond within either 60 or 120 minutes depending on their capabilities. PRD was also available this year. Its availability is included in Table 2.

Table 2: DR product availability window.

DR Product	Max. interruptions	Max. event duration (hrs)	Availability period	Availability Hours (EPT)
Capacity Performance	Unlimited	12	June – October, May	10AM – 10PM
		15	November - April	6AM – 9PM
PRD	Unlimited	Unlimited	June - May	All

DR compliance can be more complex to measure than compliance for generation resources meeting their capacity obligations. In order to ensure the reliability service for which a resource is paid has actually been provided, PJM utilizes two different types of measurement and verification methodologies. DR Resources can choose the most appropriate of the following measurement methodologies:

- Firm Service Level (FSL) – Load Management achieved by a customer reducing its load to a pre-determined level. The customer must be able to reduce load to or below the pre-determined level which must be lower than the amount of capacity reserved for the customer as represented by the peak load contribution (PLC).
- Guaranteed Load Drop (GLD) – Load Management achieved by a customer reducing its load below the PLC when compared to what the load would have been absent the PJM event or test.

PRD compliance is measured similar to FSL. However, the FSL is adjusted to load conditions and the resultant value is called the Maximum Emergency Service Level (MESL). During a compliance event the PRD load must get down to the MESL.

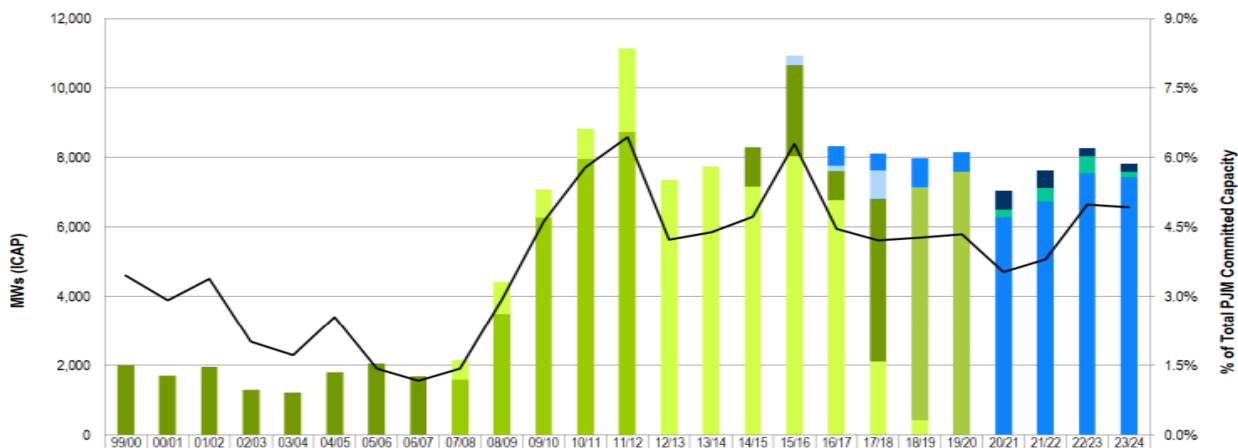
¹ The Delivery Year for the capacity construct corresponds to PJM’s Planning Year which runs each year from June 1 until May 31 of the following year.

Participation Summary

The capacity values in this report are in terms of either Installed Capacity (ICAP) or Unforced Capacity (UCAP) depending upon which is most relevant. PJM calculates the Resource amounts required to meet the reliability standard in terms of UCAP which is also utilized to measure compliance of the RPM commitment. PJM determines the UCAP value of different types of Resources based on methods described in the PJM manuals.

Figure 1 shows Load Management Commitments by Delivery Year from 1999/2000 through 2023/24 based on what cleared in the RPM auctions (BRA, IAs, and CP Transition Auctions) or as part of a LSEs FRR plan. Load Management participation in the PJM capacity market substantially increased from the 2007/08 Delivery Year through the 2011/12 Delivery Year, then declined, and has varied slightly at around 6% of PJM commitment since. The final commitment values for the next two Delivery Years are uncertain since the values can still be adjusted in the Incremental Auctions and via replacement Capacity transactions. For the 2021/22 Delivery Year, Load Management capacity commitments represented 6,960 MW of ICAP while total registered Load Management represented 10,632MW. Registered Load Management may be in excess of the commitment if the CSP has indicated they have the potential to deliver an amount that is higher than their actual commitment². There was 510 MW of PRD committed this delivery year.

Figure 1: PJM Demand Response Committed MWs by Delivery Year



² For example, a CSP may clear 10 MW of resources in an RPM auction but register 11 MW load reduction capability by end use customers to fulfill such commitment.

Notes:

- 1) Data represents net commitment ICAP value (for each product specified) on 8/9/2022.
- 2) DY 23/24 MWs include values from the Base Residual Auction.
- 3) RPM was implemented DY 07/08.
- 4) ALM MWs are seasonal averages for Delivery Years before 07/08.

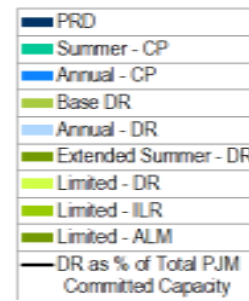


Table 3 shows the committed ICAP for each PJM zone for the 2021/22 Delivery Year. Thirty seven PJM members or affiliates operate as a Curtailment Service Provider and over 2 million end use customers across almost every segment (residential, commercial, industrial, government, education, agricultural, etc.) participate as Load Management resources.

Table 3: Committed Load Management and PRD ICAP by Zone for the 2021/22 Delivery Year.

Zone	Committed Load Management ICAP (MW)	Committed PRD ICAP (MW)
AECO	43.2	
AEP	1296.7	
APS	517.6	
ATSI	656.5	
BGE	207	240
COMED	1348.9	
DAY	156.3	
DEOK	115.6	
DOM	655.4	
DPL	163.2	75
DUQ	70.7	
EKPC	157.6	
JCPL	88.8	
METED	149.8	
PECO	256.4	
PENELEC	232.7	
PEPCO	220.6	195
PPL	423	
PSEG	198.8	
RECO	1.7	
Total	6,960	510

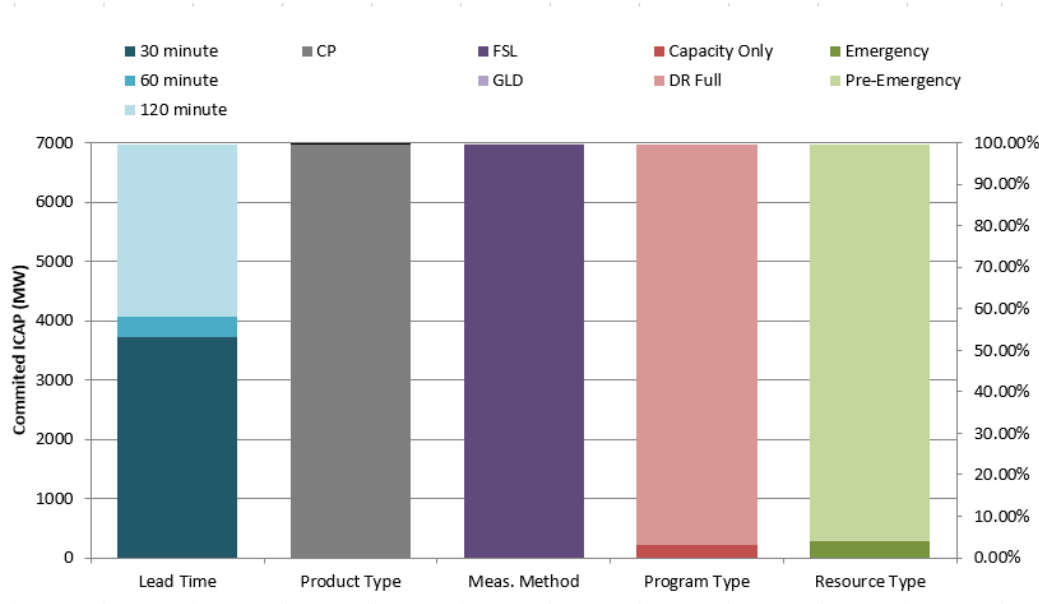
Load Management resources are registered by Lead Time, Product Type, Measurement Method, Program Type, and Resource Type. Figure 2 shows the breakdown of Committed ICAP for each item. 54% of resources were able to respond in 30 minutes, while 41% qualified for a 120 minute exception, and the remaining 5% qualified for a 60 minute exception.

The Product Type commitment level is determined by what is cleared in the RPM auctions or included in an FRR plan. There was only one product type available this delivery year – Capacity Performance – which represented the 100% of commitment. The compliance measurement method is 99.9% Firm Service Level (FSL), and only 0.1% Guaranteed Load Drop.

Figure 2 shows that 97% of committed ICAP is registered as Load Management DR Full. The remaining 3% is registered as Capacity Only. Load Management Full resources are eligible to receive both capacity revenue and emergency energy revenue when there is Load Management event. Capacity Only receives capacity revenue but is not eligible for emergency energy payments during Load Management events. Capacity Only registrations are typically only used for legacy EDC related tariff requirements or for registrations that participate with two different CSPs.

Load Management resource designations are split into Pre-Emergency and Emergency. The default designation is Pre-Emergency; Figure 2 shows that 96% of committed ICAP fell into this category. The Emergency classification is for registrations that use behind the meter generation with environmental restrictions that only allow them to run during PJM emergency conditions. 4% of resources met this condition.

Figure 2: Committed Load Management ICAP for DR by Resource Type, Lead Time, Program Type, and Measurement Method for the 2021/22 Delivery Year.



Test Requirement Overview

If a Load Management Registration is not dispatched in a mandatory Load Management event or if a PRD registration does not have a compliance event, the CSP must test the Registration. The Load Management/PRD Test is initiated by a Curtailment Service Provider (CSP) that has a capacity commitment. The CSP must simultaneously test all Registrations of the same product type in a Zone if PJM has not dispatched a mandatory event for those Registrations. If a PJM-initiated Load Management Event is dispatched for those Registrations during the product availability period, there is no test requirement and no Test Failure Charges would be assessed to a CSP for those registrations. Rather, their performance will be based on the Load Management events. Similarly, if there is no PRD compliance event the registrations must test to demonstrate performance.

The timing of a Load Management/PRD Test is intended to represent the conditions when a PJM-initiated Load Management/PRD event might occur in order to assess performance during a similar period. The Capacity Performance/PRD Product must be tested on a non-holiday weekday in June – October or May of the DY from 10AM – 10PM. The requirement to test all resources in a zone simultaneously is necessary to ensure that test conditions are as close to realistic as possible. It is requested that the CSP notify PJM of intent to test 48 hours in advance to allow coordination with PJM dispatch.

There is no limit on the number of tests a CSP can perform. However, a CSP may only submit data for one test to be used by PJM to measure compliance. If the CSP's Zonal Resources collectively achieve a reduction greater than 75% of the CSP's committed MW volume during the test, the CSP may choose to retest the Resources in that Zone that failed to meet their individual nominated value.

Load Management/PRD Resources are assessed a Test Failure Charge if their test data demonstrates that they did not meet their commitment level. The Test Failure Charge is calculated based on the CSP's Weighted Daily Revenue Rate which is the amount the CSP is paid for their RPM commitments in each Zone. The Weighted Daily Revenue Rate takes into consideration the different prices DR can be paid in the same Zone. For example, a CSP can clear DR in the Base Residual and/or Incremental Auctions in the same Zone, all of which are paid different rates. The penalty rate for under-compliance is the greater of 1.2 times the CSP's Weighted Daily Revenue Rate or \$20 plus the Weighted Daily Revenue Rate. If a CSP didn't clear in a RPM auction in a Zone, the CSP-specific Revenue Rate will be replaced by the PJM Weighted Daily Revenue Rate for such Zone.

Test Performance

All DR resources committed for the Delivery Year were required to perform tests to assess their performance capability. Of the overall DR Load Management Resource commitment of 6,960 MW (ICAP). The testing result was 3,779 MW of over-compliance or a performance level of 154% across all zones. Table 4 shows the results. The zonal level results are in Table 5. The net result for each zone is over-compliance. However, there were some individual CSPs whose tests resulted in under compliance. Price Responsive Demand (PRD) resources also required to test which concluded in 240% performance score.

Table 4. Load Management and PRD commitments, compliance, and test performance (ICAP) by product, DY2021/22

Product	Test commitment (MW)*	Reduction (MW)	Over/under performance (MW)	Performance
Capacity Performance	6,960.4	10,740	3779.9	154%
PRD	510	1224.6	764.6	240%

Table 5. Load Management commitments, compliance, and test performance (ICAP by Zone, DY2021/22)

Zone	Committed ICAP (MW)	Test commitment (MW)*	Reduction (MW)	Over/under performance (MW)	Performance
AECO	43.2	43.2	44.5	1.3	103%
AEP	1,296.7	1,296.7	1,517.4	220.8	117%
APS	517.6	517.6	561.6	44.0	109%
ATSI	656.5	656.5	768.4	111.9	117%
BGE	207.0	207.0	1,833.5	1,626.5	886%
COMED	1,348.9	1,348.9	1,528.5	179.6	113%
DAY	156.3	156.3	182.8	26.6	115%
DEOK	115.6	115.6	173.9	58.3	150%
DOM	655.4	655.4	763.0	107.6	116%
DPL	163.2	163.2	807.6	644.4	495%
DUQ	70.7	70.7	93.5	22.9	132%
EKPC	157.6	157.6	169.6	12.0	108%
JCPL	88.8	88.8	106.2	17.4	120%
METED	149.8	149.8	150.4	0.6	100%
PECO	256.4	256.4	257.7	1.3	101%
PENELEC	232.7	232.7	257.0	24.3	110%
PEPCO	220.6	220.6	861.3	640.7	390%
PPL	423.0	423.0	450.4	27.4	106%
PSEG	198.8	198.8	210.7	11.9	106%
RECO	1.7	1.7	2.2	0.5	130%
Grand Total	6,960.5	6,960.4	10,740.3	3,779.9	154%

* Test commitment = Commitment ICAP – Daily Deficiency MW – exempt MW – PAI MW

Test Failure Charges for the 2021/22 Delivery Year are applied on an individual CSP/Zone basis for settlement purposes. The Test Failure Charges are reported on an aggregate basis here to preserve confidentiality. The weighted average Penalty Rate for the 2021/22 Delivery Year is \$200.8/MW-day. The annual penalties for under-compliance total about \$1.7M which will be allocated to RPM LSEs pro-rata based on their Daily Load Obligation Ratio. Therefore, the under-compliance penalties are about 0.3% of the total annual RPM Load Management credits (\$570M) this year (see Table 6).

Table 6. Load Management Test Penalties, DY2021/22

Product	Penalties \$	Shortfall (MW)	Average Weighted Penalty Rate (\$/MW-day)	Penalties as % of Total LM/PRD Credits (\$570M)
Capacity Performance	\$ 1,745,015	18	\$207.5	0.3%
PRD	0	0	-	-

Resources that are short on Committed MWs face the deficiency charges. Deficiency charges are applied based on the amount of days in the year the resource is deficient of Committed MWs. Participants can make replacement transactions for future deficiencies which would change these values. For 21/22 Delivery Year there were no deficiencies.

Table 7. Load Management Deficiency Charges, PRD Commitment Compliance Charges DY2021/22

Product	Average Weighted Deficiency (LM)/Commitment Compliance (PRD) Charge (\$/MW-day)	Total charges (\$)
Capacity Performance	0	0
PRD	-	0