

Load Management Performance Report

2018/2019

(mid Delivery Year update)

January 2019



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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>

Contents

Executive Summary.....	4
Overview.....	5
Participation Summary.....	6
Test Requirement Overview	9
Test Performance	9

Executive Summary

Load Management Demand Resources (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 were five DR products available during the 2018/2019 Delivery Year: for RPM commitments – Base DR and Capacity Performance DR were available; for FRR commitments – Limited DR, Summer Extended DR, Annual DR were also available. This is the third year that the Capacity Performance product has been available and the first year for the Base product.

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.

Table 1 shows both the mandatory event and test performance values for the past 10 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. PJM Load Management events outside the mandatory compliance period are excluded from the results. To date there have been no Load Management events in the 2018/19 delivery year (the last mandatory Load Management event was on 9/11/2013). Since there were no events, Base and Limited DR resources were required to test between June and September. The test results are available (performance = 148%) in this report. Since other products are required to be available in May, and can also test in May if there are no events, we will not know the performance of the other products until after the 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	Event performance	Test performance
2009/10	No Events	118%
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*	148%

* As of the time of this report

Overview

PJM Interconnection, L.L.C. procures capacity for its system reliability through the Reliability Pricing Model (RPM). 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 were five Load Management Products available during the 2018/19 Delivery Year¹: Limited DR, Extended Summer DR, Annual DR, Base DR and Capacity Performance DR. The availability period for each of the products is detailed in Table 2. By default, the interruptions must be implemented within thirty minutes of notification by PJM. Those resources that cannot be fully implemented within thirty minutes of notification and qualify for an exception may respond within either 60 or 120 minutes depending on their capabilities.

Table 2: DR product availability window.

DR Product	Max. interruptions	Max. event duration (hrs)	Availability period	Availability Hours (EPT)
Limited	10	6	June – September Non-NERC Hol. Wkdys.	12PM – 8PM
Base	Unlimited	10	June – September	10AM – 10PM
Extended Summer	Unlimited	10	June – October, May	10AM – 10PM
Annual/ Capacity Performance	Unlimited	12	June – October, May	10AM – 10PM
		15	November - April	6AM – 9PM

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 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.

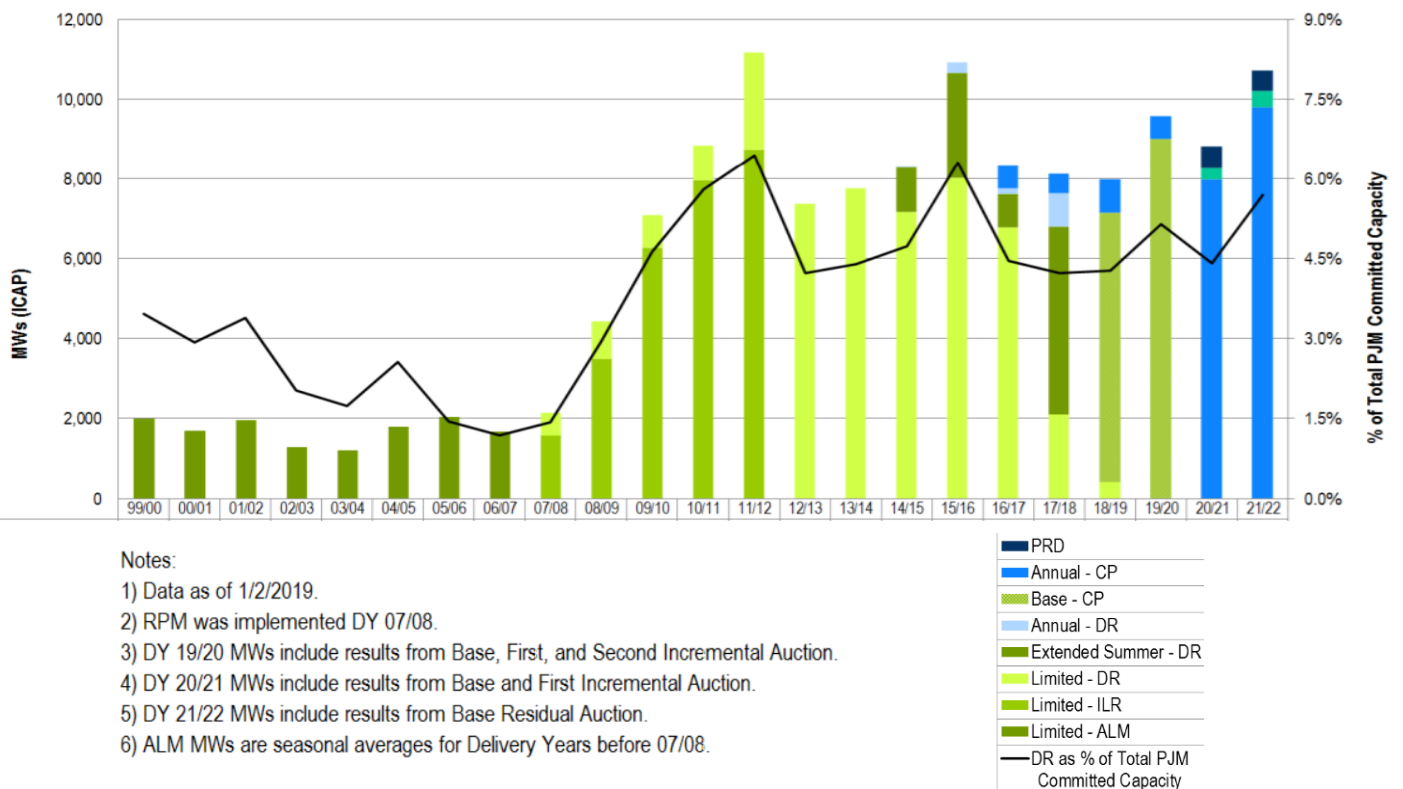
¹ The Delivery Year for the capacity construct corresponds to PJM's Planning Year which runs each year from June 1 until May 31 of the following year.

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 with 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 2021/22 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 since. The final commitment values for the next three Delivery Years are uncertain since the values can still be adjusted in the Incremental Auctions and via Replacement Capacity Transactions. For the 2018/19 Delivery Year, Load Management capacity commitments represented 7,993MW of ICAP while total registered Load Management represented 8,946 MW. 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.

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.

Table 3 shows the committed ICAP by Product Type (Limited DR, Annual DR, Base DR, Capacity Performance DR) for each of the 20 PJM zones for the 2018/19 Delivery Year. Note, there was no Extended Summer DR registered during this delivery year. Fifty-two 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 ICAP (MW) by Product Type and Zone for the 2018/19 Delivery Year.

Zone	Limited DR	Annual DR	Base DR	Capacity Performance	Total
Atlantic City Electric (AECO)			107.1		107.1
American Electric Power (AEP)	427.3		932.2	68.1	1427.6
Allegheny Power (APS)			499.1	59.1	558.2
American Transmissions Systems Inc. (ATSI)			546.6	162.6	709.2
Baltimore Gas and Electric (BGE)			382.6	70.1	452.7
Commonwealth Edison (COMED)		6.8	1316.6	26.2	1349.6
Dayton Power & Light (DAY)			152.5	13.2	165.7
Duke Energy Ohio & Kentucky (DEOK)			126.9	44.2	171.1
Dominion Virginia Power (DOM)			559.2	12.5	571.7
Delmarva Power & Light (DPL)			305.6	17.8	323.4
Duquesne Light (DUQ)			84	4.6	88.6
East Kentucky Power Cooperative (EKPC)				117.7	117.7
Jersey Central Power & Light (JCPL)			105.6		105.6
Metropolitan Edison (METED)			177.6	0.7	178.3
PECO (PECO)			265.7	5.3	271
Pennsylvania Electric Company (PENELEC)			193	39.6	232.6
Pepco (PEPCO)			462.3	27.5	489.8
Pennsylvania Power & Light (PPL)			278.6	173.8	452.4
Public Service Enterprise Group (PSEG)			218.6	0.1	218.7
Rockland Electric Company (RECO)			1.8		1.8
Total	427.3	6.8	6715.6	843.1	7992.8

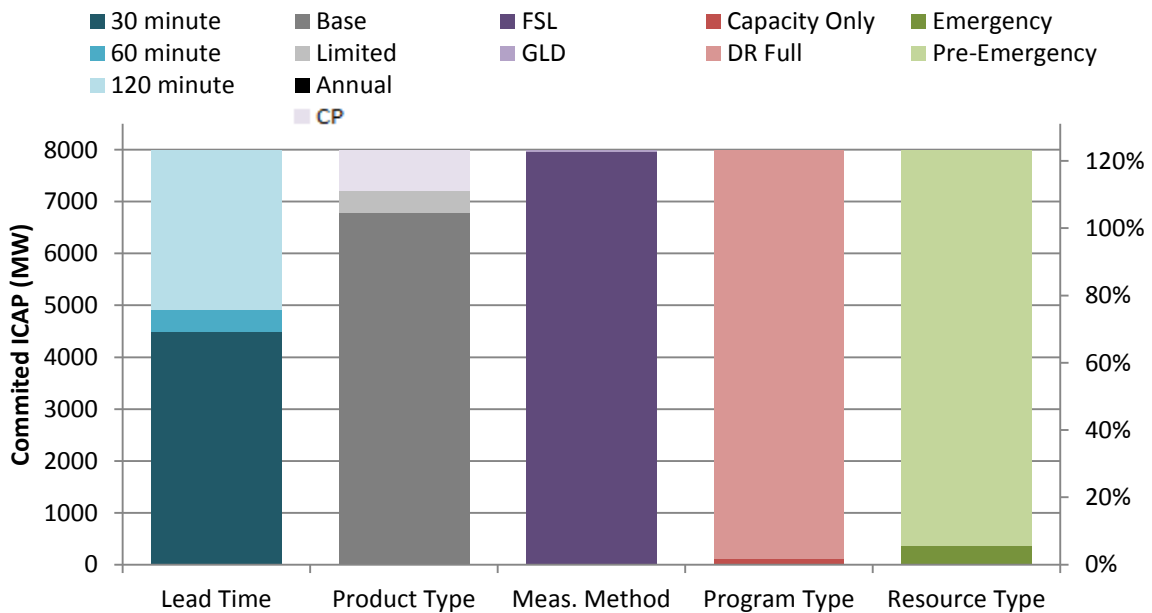
Load Management resources are registered by Lead Time, Product Type, Measurement Method, Program Type, and Resource Type. Figure 2 shows the breakdown of Committed ICAP for each item. 56% of resources were able to respond in 30 minutes, while 38% qualified for a 120 minute exception, and the remaining 5% qualified for a 60 minute exception.

The Product Type commitment level is determined by what is cleared in the RPM auctions. 5% of committed ICAP is Limited, 0.1% is Annual, 85% is Base, and the remaining 10% is Capacity Performance (see Figure 2). The compliance measurement method is 99.7% Firm Service Level (FSL), and only 0.3% Guaranteed Load Drop.

Figure 2 shows that 98.6% of committed ICAP is registered as Load Management DR Full. The remaining 1.4% is registered as Capacity Only. Load Management Full resources are eligible to receive both a capacity revenue stream as well as an emergency energy revenue when there is Load Management event. Capacity Only receives capacity payments but is not eligible for emergency energy payments during Load Management events and is 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 95% of committed ICAP fell into this category. The Emergency classification is for those resources that use behind the meter generation and have environmental restrictions that permit them to run only during PJM emergency conditions. 5% of resources met this condition.

Figure 2: Committed ICAP for DR by Resource Type, Lead Time, Program Type, and Measurement Method for the 2018/19 Delivery Year.



Test Requirement Overview

If a Load Management Registration is not called in a mandatory Load Management event, the CSP must test the Registration. The Load Management 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 called a mandatory event for those Registrations. If a PJM-initiated Load Management Event is called 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.

The timing of a Load Management Test is intended to represent the conditions when a PJM-initiated Load Management event might occur in order to assess performance during a similar period. The Base and Limited Products must be tested on a non-holiday weekday from June – September between 12PM and 8PM of that Delivery Year. The Annual, and Capacity Performance Products must be tested on a non-holiday weekday in June – October or May 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 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

Since there have been no Load Management events during the 2018/2019 Delivery Year so far, all Base DR and Limited DR resources that are committed for the Delivery Year were required to perform tests to assess their performance capability. 7,141 MW (ICAP) were committed as Base or Limited DR Load Management Resources. The net result of the testing for Base and Limited DR was 10,603 MW of over-compliance or a performance level of 148% across all zones. Table 4 shows the results, to date, by product type. The zonal level results for Base and Limited DR are in Table 5. The net result for each zone is over-compliance. There were some individual CSPs whose tests resulted in under compliance.

Table 4: Load Management commitments, compliance, and test performance (ICAP) by product, DY2018/19

Product	Test commitment (MW)*	Reduction (MW)	Over/under performance (MW)	Performance	Re-test
Limited	427	482	55	113%	0
Base	6,716	10,120	3,404	150%	1.7%
Annual	6.8	N/A	N/A	N/A	N/A
Capacity Performance	843	N/A	N/A	N/A	N/A
Total	7,993	N/A	N/A	N/A	N/A

Table 5: Load Management commitments, compliance, and test performance for Base and Limited DR resources (ICAP by Zone, DY2018/19)

Zone	Committed ICAP (MW)	Test commitment (MW)*	Reduction (MW)	Over/under performance (MW)	Performance	Re-test
AECO	107.1	107.1	114.5	7.4	107%	3.2%
AEP	1352.3	1352.2	1609.8	250.4	118%	3.5%
APS	499.1	499.1	556.3	57.2	111%	1.2%
ATSI	546.6	546.6	615.6	69.0	113%	2.2%
BGE	382.6	382.6	1949.2	1566.6	509%	0.0%
COMED	1315.1	1315.1	1448.5	133.4	110%	2.5%
DAY	152.5	152.5	212.1	59.7	139%	0.0%
DEOK	126.9	126.9	236.3	109.4	186%	0.0%
DOM	559.2	559.2	710.1	151.0	127%	1.3%
DPL	305.6	305.6	681.5	375.9	223%	1.6%
DUQ	84.0	84.0	109.1	25.1	130%	0.0%
JCPL	105.6	105.6	128.0	22.4	121%	1.6%
METED	177.6	177.6	188.5	10.9	106%	2.4%
PECO	265.7	265.6	307.1	41.5	116%	3.5%
PENELEC	193.0	192.9	209.6	16.6	109%	2.1%
PEPCO	462.3	462.3	929.9	467.6	201%	0.0%
PPL	279.0	279.0	340.9	61.9	122%	7.8%
PSEG	218.2	218.1	252.8	34.7	116%	0.0%
RECO	1.8	1.8	3.2	1.4	176%	0.0%
Total	7,141.4	7,140.9	10,602.9	3,462	148%	1.7%

* Test commitment = Commitment ICAP – Daily Deficiency MW

Test Failure Charges for the 2018/19 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 Base and Limited DR resources for the 2018/19 Delivery Year is \$187/MW-day and \$180/MW-day respectively. The annual penalties for Base and Limited DR under-compliance total about \$1.1M which will be allocated to RPM LSEs pro-rata based on their Daily Load Obligation Ratio. Therefore, the under-compliance penalties at the time of this report (i.e. Base and Limited DR only) are about 0.17% of the total expected annual RPM Load Management credits (\$638M) this year. Table 6 below shows Penalties by Product for the 2018/2019 Delivery Year thus far.

Table 6: Load Management Test Penalties by Product, DY2018/19

Product	Penalties \$	Shortfall (MW)	Average Weighted Penalty Rate (\$/MW-day)	Penalties as % of Total LM Credits (\$638M)
Base	\$ 1,110,134	14.9	\$187	0.17%
Limited	\$ 2,100	0.03	\$180	Very small
Capacity Performance	N/A	N/A	N/A	N/A
Annual	N/A	N/A	N/A	N/A
Total	\$1,112,234	14.93	\$187	0.17%

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. Thus, data in the table below may change based on ongoing replacement transactions. As of January 30th, 2019 there was only one deficiency for 1 day.

Table 7: Load Management Deficiency Charges by Product, DY2018/19

Zone	Average Weighted Deficiency Charge (\$/MW-day)	Total charges through 1/30 (\$)	Deficiency Charges as % of Total LM Credits through 1/30 (\$638M)
Base	\$253	\$253	Very small
Limited	0	0	0
Capacity Performance	0	0	0
Annual	0	0	0
Grand Total	\$253	\$253	Very small