

2018 Demand Response Operations Markets Activity Report: April 2019

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PJM Demand Side Response Operations

April 11, 2019



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Figure 1: DY 18/19 Active Participants in Load Management DR Programs

State	Zone	EDC	Economic		Emergency Energy Only		Load Management		Unique	
			Locations	MW	Locations	MW	Locations	MW	Locations	MW
DC	PEPCO	PEPCO	3	20.3			290	78.6	290	78.6
DE	DPL	DEMEC	9	5.1			22	15.1	23	19.7
DE	DPL	DOVDE					17	4.8	17	4.8
DE	DPL	DPL	5	155.1			180	208.4	180	208.4
DE	DPL	ODEC					14	4.7	14	4.7
IL	COMED	BATAV					1	0.9	1	0.9
IL	COMED	COMED	21	73.7			2,269	1,376.7	2,269	1,376.7
IL	COMED	IMEAA1	1	0.3			2	6.8	2	6.8
IN	AEP	AEPIMP					140	290.4	140	290.4
IN	AEP	HEREC	1	23.1			1	22.4	1	22.4
IN	AEP	WVSDI					1	15.3	1	15.3
KY	DEOK	DEK					60	30.9	60	30.9
KY	EKPC	EKPC					9	118.8	9	118.8
MD	APS	AETSAP	17	24.3			145	55.1	145	55.1
MD	APS	FESCHG	1	1.8			1	0.0	1	0.0
MD	APS	FESCTH					4	1.4	4	1.4
MD	BGE	BC	48	581.6			668	600.9	671	616.3
MD	DPL	DPL	8	80.7			146	114.3	147	118.7
MD	DPL	EASTON					8	1.9	8	1.9
MD	DPL	ODEC	1	2.2			15	8.5	15	8.5
MD	PEPCO	PEPCO	8	377.6			309	448.3	313	450.7
MD	PEPCO	SMECO	4	0.7			118	41.3	118	41.3
MI	AEP	COSEDC					1	2.1	1	2.1
NJ	AECO	AE	6	50.5			206	107.6	206	107.6
NJ	AECO	VMEU					21	5.7	21	5.7
NJ	JCPL	JCBGS	8	81.4			367	114.7	372	195.4
NJ	PSEG	PSEG	17	52.8	1	0.5	934	254.2	941	281.8
NJ	RECO	RECO					16	2.9	16	2.9
NY	PENELEC	PaElec					2	1.2	2	1.2
OH	AEP	AEPOPT	37	180.2			766	457.7	768	458.6
OH	AEP	AMPO					57	33.1	57	33.1
OH	AEP	BUCK					2	19.9	2	19.9
OH	ATSI	AMPO					14	40.7	14	40.7
OH	ATSI	BUCK					2	5.8	2	5.8
OH	ATSI	CPP					16	11.7	16	11.7
OH	ATSI	OEEDC	9	12.0			833	637.5	833	637.5
OH	DAY	AMPO	1	7.0			10	13.0	10	13.0
OH	DAY	BUCK					2	4.1	2	4.1
OH	DAY	DAYEDC	1	1.5			165	165.3	165	165.3
OH	DEOK	AMPO					7	12.5	7	12.5
OH	DEOK	BUCK					2	1.7	2	1.7
OH	DEOK	DEOEDC	14	133.3			398	201.3	398	201.3
PA	APS	AECI					2	0.8	2	0.8
PA	APS	AETSAP	10	41.0			530	333.0	532	338.5
PA	ATSI	PAPWR	2	50.2			68	60.7	69	60.9
PA	DUQ	DLCO	4	15.2			307	95.4	307	95.4
PA	METED	MetEd	34	47.1			419	192.4	425	202.0
PA	PECO	PE	45	126.6			1,013	282.1	1,020	349.3

State	Zone	EDC	Economic		Emergency Energy Only		Load Management		Unique	
			Locations	MW	Locations	MW	Locations	MW	Locations	MW
PA	PENELEC	AECI					12	7.9	12	7.9
PA	PENELEC	PaElec	5	39.6			478	250.9	482	260.5
PA	PENELEC	WELLSB					3	0.9	3	0.9
PA	PPL	AMPO					11	1.2	11	1.2
PA	PPL	CTZECL					3	1.6	3	1.6
PA	PPL	PPL	29	204.8			1,069	477.4	1,078	582.1
PA	PPL	UGI-UI					13	3.6	13	3.6
TN	AEP	AEPAPT					11	6.1	11	6.1
VA	AEP	AEPAPT	3	4.5			225	314.1	225	314.1
VA	AEP	AMPO					17	15.1	17	15.1
VA	AEP	RADFRD					1	2.3	1	2.3
VA	AEP	VATECH					1	5.3	1	5.3
VA	APS	ODEC	3	0.9			58	44.8	58	44.8
VA	DOM	CVEC	1	5.4			6	3.6	6	3.6
VA	DOM	DOMEDC	43	48.7			758	526.2	759	526.6
VA	DOM	DOMVME	2	0.4			26	96.1	26	96.1
VA	DOM	NVEC	3	15.1			39	1.8	41	16.4
VA	DOM	ODEC	2	0.4			41	12.8	41	12.8
VA	DPL	ODEC					16	0.7	16	0.7
WV	AEP	AEPAPT	9	1.4			183	463.8	183	463.8
WV	APS	AETSAP	39	45.5			210	207.1	210	207.1
Total			454	2,512	1	0.5	13,761	8,946	13,816	9,294

- Note:
- 1) Data as of 3/5/2019.
 - 2) Load Management MW are in ICAP.
 - 3) Economic MW are CSP reported Load Reduction values.
 - 4) Residential Locations reported as one location not a total number of end use customers in that program.
 - 5) Unique MW: represents total estimated demand reduction assuming full Load Management and Economic reductions.
 - 6) As of March 1, 2019, DY18/19 RPM Committed Values is 7,994 MW for Load Management.

Figure 2: DY 18/19 MWs in Load Management DR by Resource, Product, and Lead Times

Zone		DR Product				Lead Times (minutes)			Total MW
		Limited	Annual	Base	Capacity Performance	30	60	120	
AECO									
	Pre-Emergency	0.0	0.0	113.1	0.0	97.6	4.7	10.8	113.1
	Emergency	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.2
	Total	0.0	0.0	113.3	0.0	97.8	4.7	10.8	113.3
AEP									
	Pre-Emergency	427.0	0.0	1,106.5	68.7	728.7	150.9	722.5	1,602.1
	Emergency	0.2	0.0	45.4	0.0	28.6	0.8	16.2	45.6
	Total	427.2	0.0	1,151.9	68.7	757.3	151.7	738.7	1,647.7
APS									
	Pre-Emergency	0.0	0.0	551.6	65.7	348.6	18.3	250.3	617.3
	Emergency	0.0	0.0	25.0	0.0	19.3	0.0	5.6	25.0
	Total	0.0	0.0	576.6	65.7	368.0	18.3	255.9	642.2
ATSI									
	Pre-Emergency	0.0	0.0	496.2	170.8	295.7	30.9	340.3	667.0
	Emergency	0.0	0.0	89.5	0.0	25.3	3.2	60.9	89.5
	Total	0.0	0.0	585.7	170.8	321.0	34.1	401.3	756.4
BGE									
	Pre-Emergency	0.0	0.0	530.2	62.9	557.7	2.7	32.8	593.1
	Emergency	0.0	0.0	0.1	7.6	7.7	0.0	0.0	7.7
	Total	0.0	0.0	530.3	70.6	565.4	2.7	32.8	600.9
COMED									
	Pre-Emergency	0.0	6.8	1,288.1	26.2	916.7	30.4	373.8	1,321.0
	Emergency	0.0	0.0	63.4	0.0	32.5	4.5	26.4	63.4
	Total	0.0	6.8	1,351.5	26.2	949.2	34.9	400.2	1,384.4
DAY									
	Pre-Emergency	0.0	0.0	162.6	13.2	87.4	5.7	82.8	175.8
	Emergency	0.0	0.0	6.5	0.0	6.1	0.0	0.4	6.5
	Total	0.0	0.0	169.2	13.2	93.4	5.7	83.2	182.3
DEOK									
	Pre-Emergency	30.9	0.0	168.0	44.6	126.5	75.1	41.9	243.5
	Emergency	0.0	0.0	2.9	0.0	2.9	0.0	0.0	2.9
	Total	30.9	0.0	170.9	44.6	129.4	75.1	41.9	246.4
DOM									
	Pre-Emergency	0.0	0.0	513.0	12.5	149.2	38.8	337.4	525.5
	Emergency	0.0	0.0	115.1	0.0	75.0	14.0	26.1	115.1
	Total	0.0	0.0	628.0	12.5	224.2	52.8	363.5	640.5
DPL									
	Pre-Emergency	0.0	0.0	334.1	18.0	157.8	18.3	176.0	352.1
	Emergency	0.0	0.0	6.3	0.0	4.4	1.6	0.3	6.3
	Total	0.0	0.0	340.3	18.0	162.1	19.9	176.3	358.3
DUQ									
	Pre-Emergency	0.0	0.0	89.8	4.9	65.3	6.6	22.9	94.8
	Emergency	0.0	0.0	0.6	0.0	0.6	0.0	0.0	0.6
	Total	0.0	0.0	90.4	4.9	65.9	6.6	22.9	95.4
EKPC									
	Pre-Emergency	0.0	0.0	0.0	117.8	18.8	3.9	95.1	117.8
	Emergency	0.0	0.0	0.0	1.0	1.0	0.0	0.0	1.0
	Total	0.0	0.0	0.0	118.8	19.9	3.9	95.1	118.8

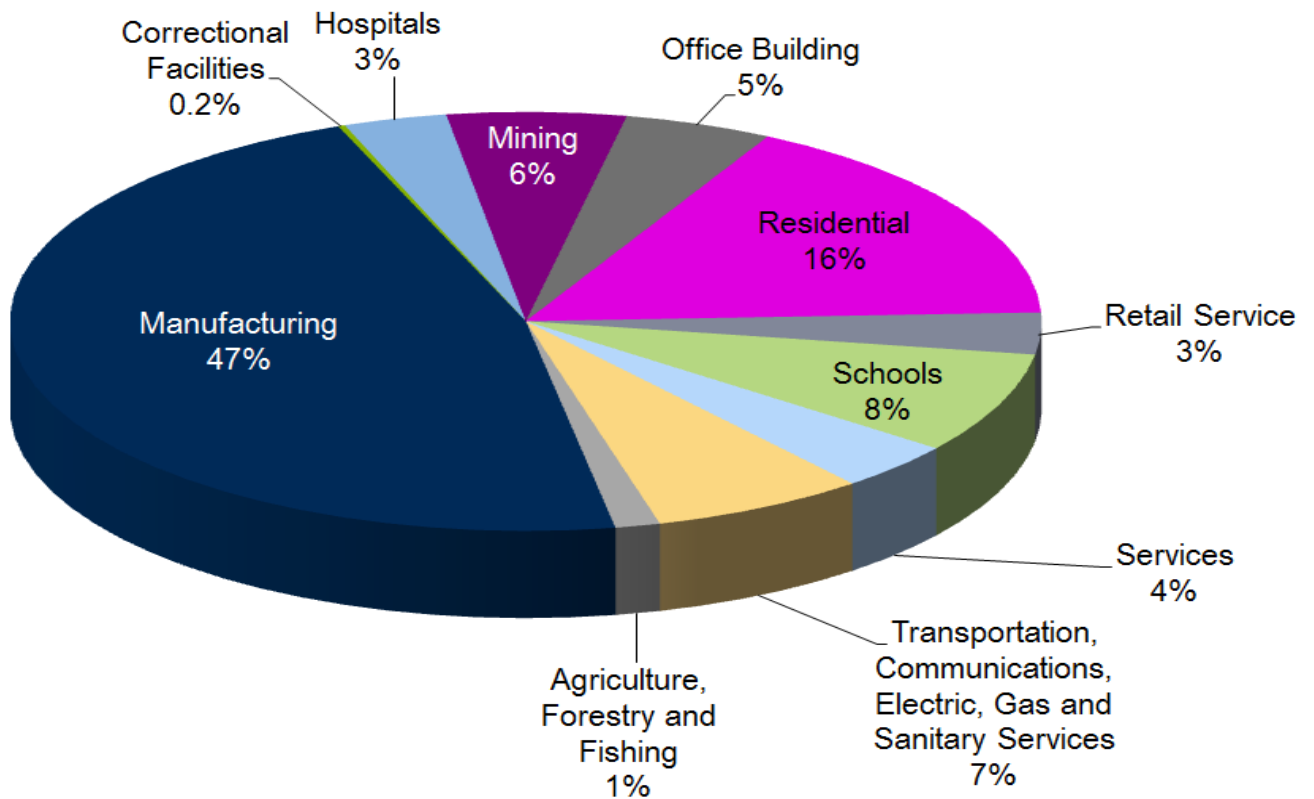


Zone		DR Product				Lead Times (minutes)			Total
		Limited	Annual	Base	Capacity Performance	30	60	120	MW
JCPL									
	Pre-Emergency	0.0	0.0	110.4	0.0	86.8	2.0	21.6	110.4
	Emergency	0.0	0.0	4.3	0.0	4.3	0.0	0.0	4.3
	Total	0.0	0.0	114.7	0.0	91.1	2.0	21.6	114.7
METED									
	Pre-Emergency	0.0	0.0	189.8	0.9	99.1	15.2	76.4	190.7
	Emergency	0.0	0.0	1.7	0.0	1.7	0.0	0.0	1.7
	Total	0.0	0.0	191.5	0.9	100.8	15.2	76.4	192.4
PECO									
	Pre-Emergency	0.0	0.0	254.0	4.1	195.7	8.5	53.8	258.1
	Emergency	0.0	0.0	22.8	1.3	20.5	2.3	1.2	24.1
	Total	0.0	0.0	276.7	5.4	216.2	10.8	55.0	282.1
PENELEC									
	Pre-Emergency	0.0	0.0	209.5	50.1	99.9	11.0	148.7	259.6
	Emergency	0.0	0.0	1.4	0.0	1.1	0.0	0.3	1.4
	Total	0.0	0.0	210.8	50.1	101.1	11.0	148.9	261.0
PEPCO									
	Pre-Emergency	0.0	0.0	538.8	21.5	332.3	1.3	226.8	560.4
	Emergency	0.0	0.0	1.4	6.4	7.1	0.0	0.7	7.8
	Total	0.0	0.0	540.2	28.0	339.4	1.3	227.6	568.2
PPL									
	Pre-Emergency	0.0	0.0	304.1	176.2	224.1	23.7	232.4	480.3
	Emergency	0.0	0.0	2.8	0.7	0.7	0.0	2.8	3.5
	Total	0.0	0.0	306.9	176.9	224.9	23.7	235.2	483.8
PSEG									
	Pre-Emergency	0.0	0.0	250.9	0.1	195.8	4.8	50.4	251.0
	Emergency	0.0	0.0	3.2	0.0	0.0	0.0	3.2	3.2
	Total	0.0	0.0	254.1	0.1	195.8	4.8	53.6	254.2
RECO									
	Pre-Emergency	0.0	0.0	2.9	0.0	2.9	0.0	0.0	2.9
	Emergency	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	0.0	0.0	2.9	0.0	2.9	0.0	0.0	2.9
TOTAL									
	Pre-Emergency	457.9	6.8	7,213.6	858.1	4,786.9	452.7	3,296.8	8,536.4
	Emergency	0.2	0.0	392.3	17.1	238.9	26.4	144.2	409.6
	Total	458.1	6.8	7,605.9	875.2	5,025.8	479.2	3,441.0	8,946.0

Note:

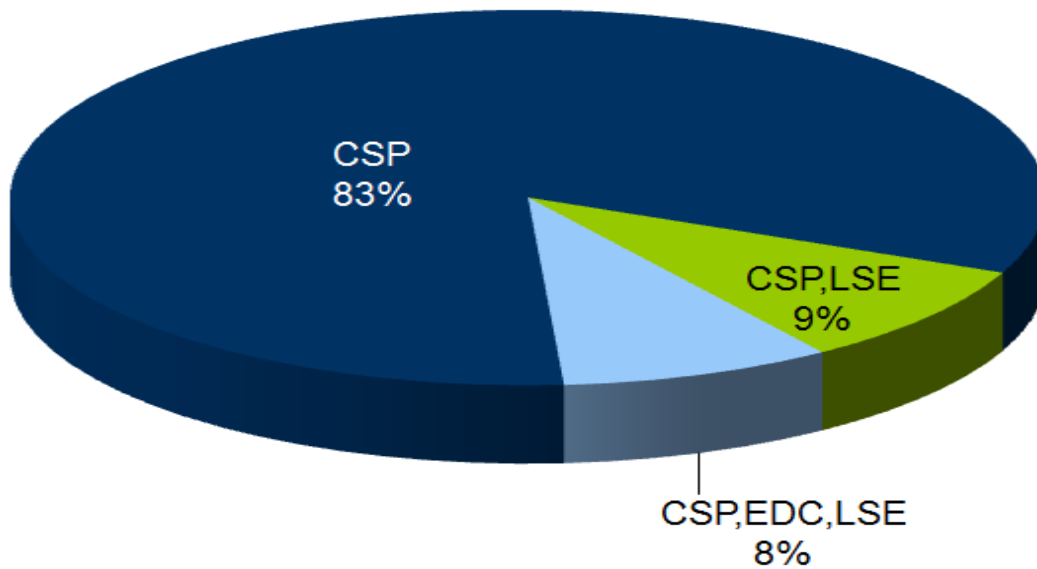
- 1) Data as of 3/1/2019.
- 2) MW are in ICAP.

Figure 3: DY 18/19 Confirmed Load Management DR Registrations Business Segments



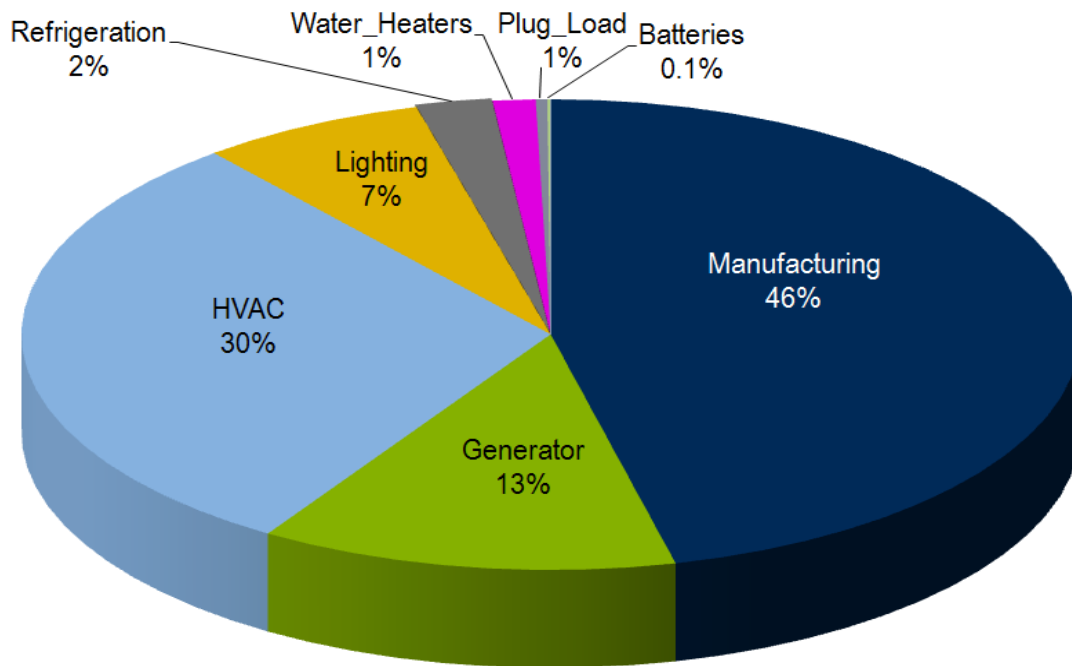
Note: Percent of Nominated Capacity (MWs). Includes Capacity Performance nominated MWs.

Figure 4: DY 18/19 Confirmed Load Management DR Registrations Owner/Company Type



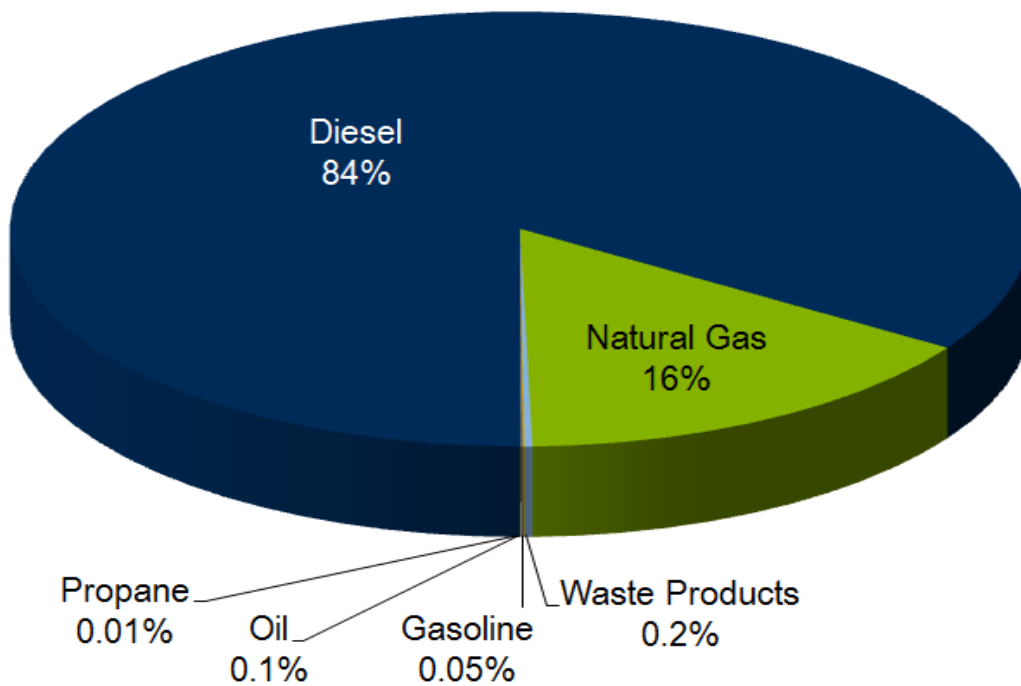
Note: Percent of Nominated Capacity (MWs). Includes Capacity Performance nominated MWs.

Figure 5: DY 18/19 Confirmed Load Management DR Registrations Customer Load Reduction Methods



Note: Percent of Nominated Capacity (MWs). Includes Capacity Performance nominated MWs.

Figure 6: DY 18/19 Confirmed Load Management DR Registrations Fuel Mix with Behind the Meter Generation



Note: Percent of Nominated Capacity (MWs). Includes Capacity Performance nominated MWs.

Figure 7: DY 18/19 Confirmed Load Management DR Registrations Generator and Permit Type

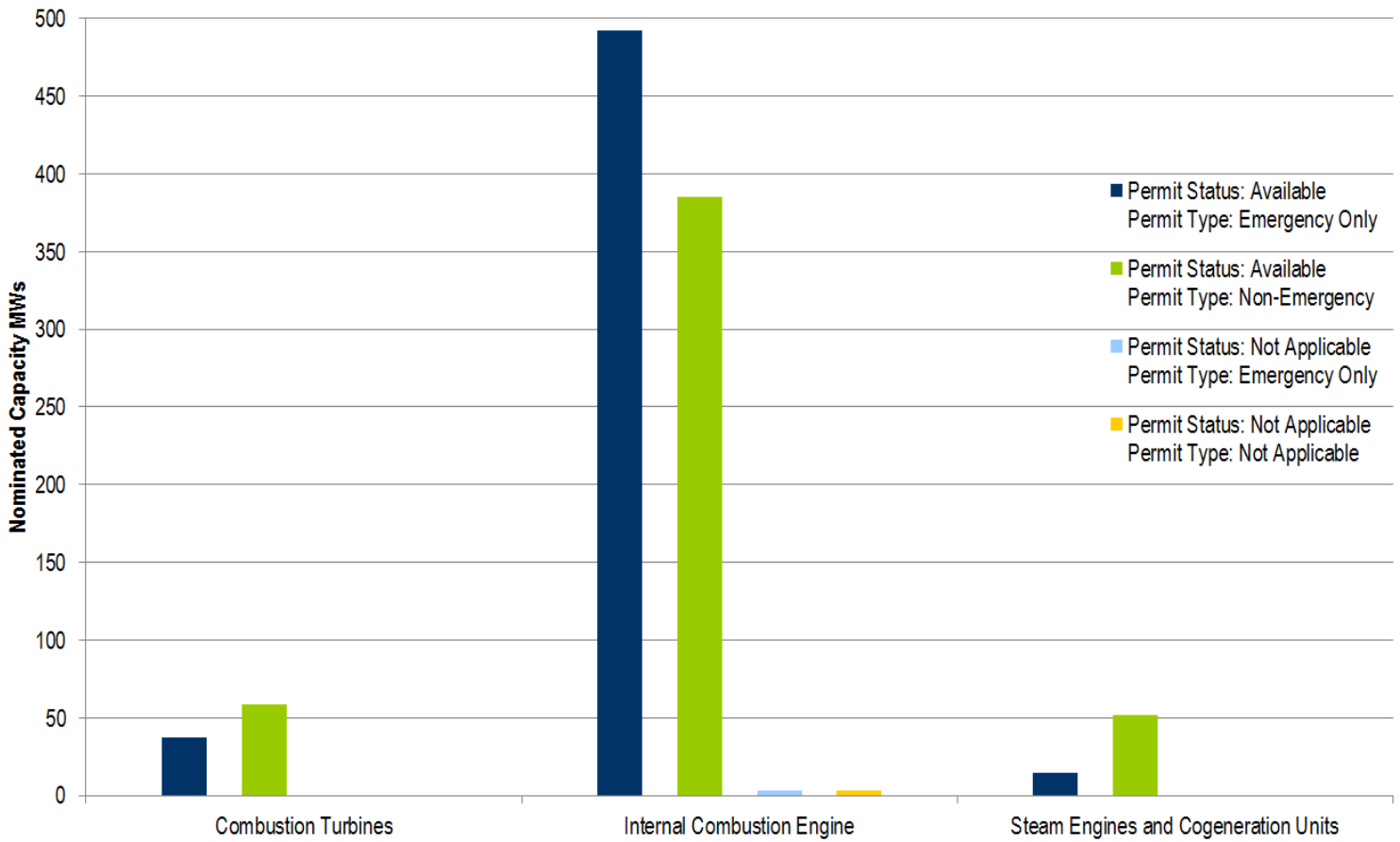


Figure 8: DY 18/19 Confirmed Load Management DR Registrations Fuel Mix with Behind the Meter Generation

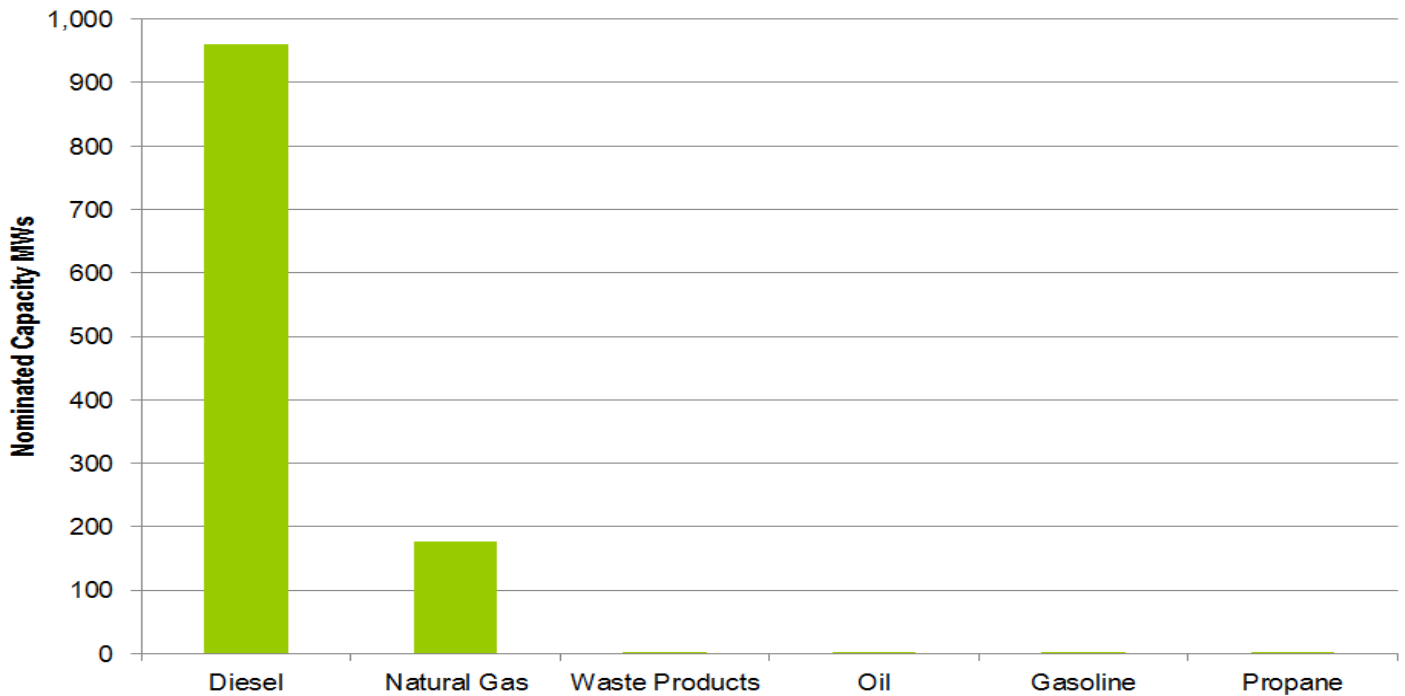
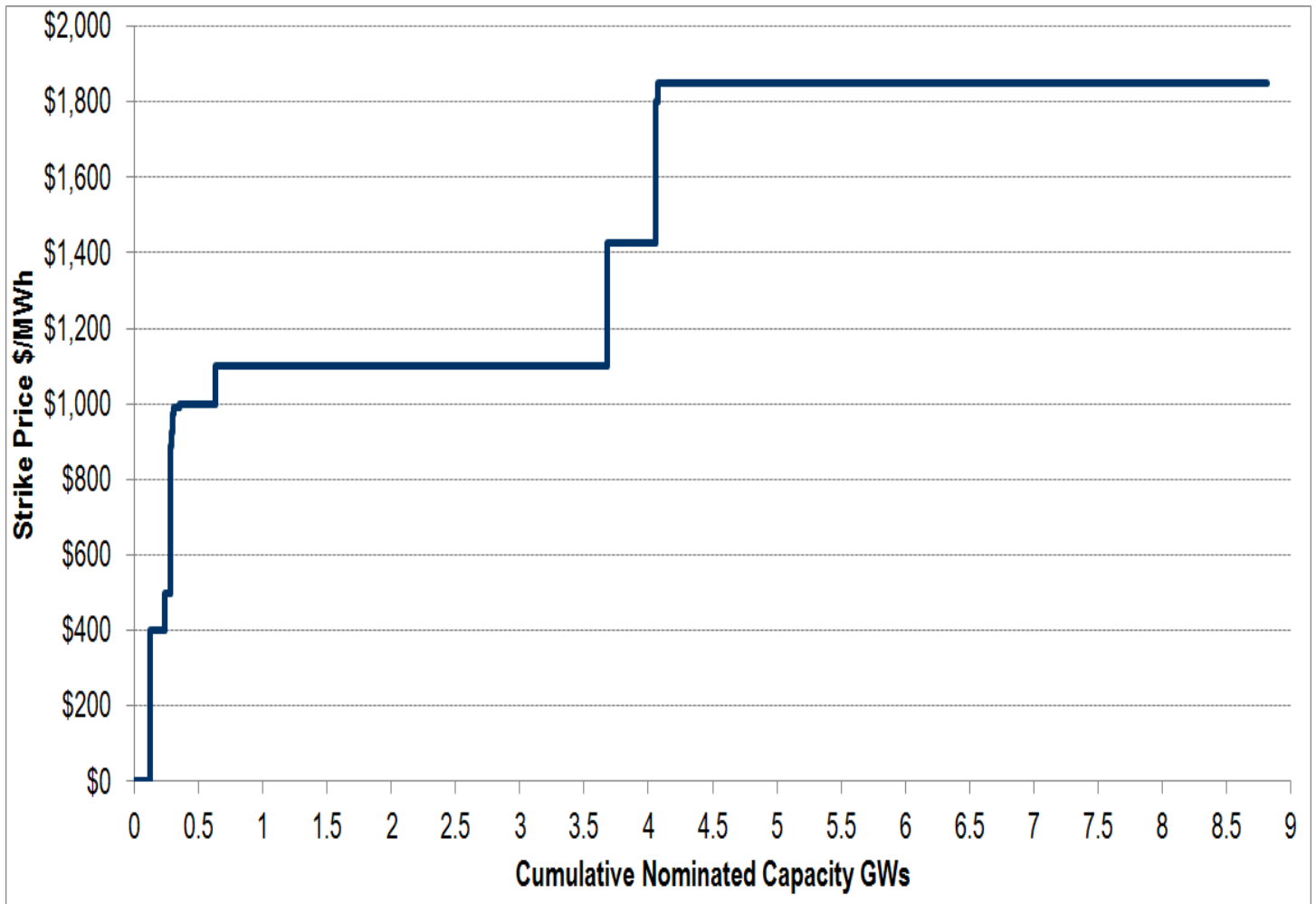


Figure 9: DY 18/19 Confirmed Load Management Full DR Registrations Energy Supply Curve:



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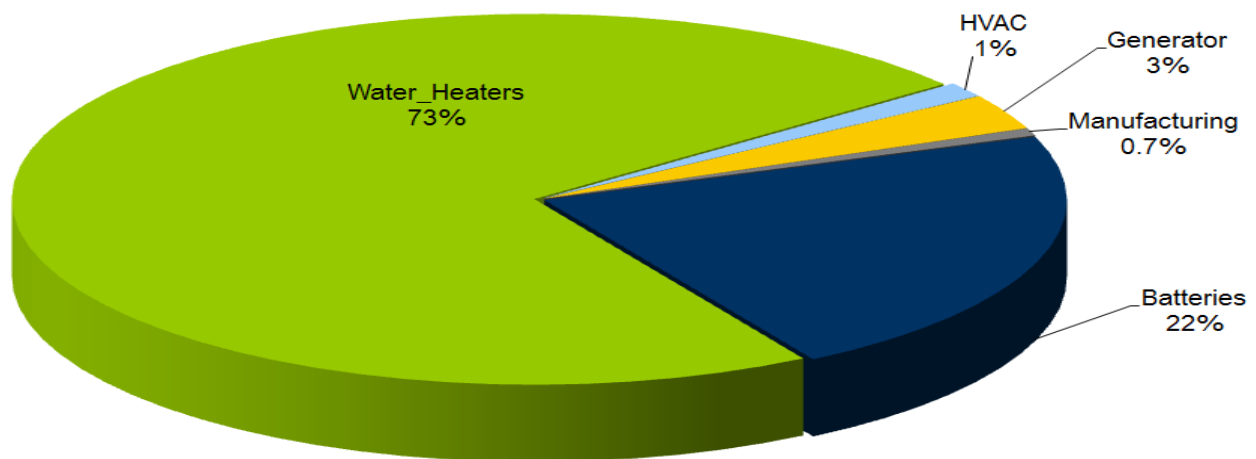
Figure 10: 2018 Economic Demand Response Capability in the Ancillary Service Markets

Synch Reserves	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Locations	MAD	139	161	112	112	110	105	107	111	108	108	109	109
	Non-MAD	22	22	23	25	25	24	24	26	26	26	28	28
	RTO	161	183	135	137	135	129	131	137	134	134	137	137
Average Number of Unique Participating Locations per Month:		141											
MWs	MAD	343	352	380	425	412	449	458	461	460	460	463	498
	Non-MAD	111	113	179	267	290	337	337	340	340	340	341	341
	RTO	453	465	559	692	702	787	796	801	800	800	804	839
Average MWs per Month:		708											

Regulation	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Locations	RTO	459	517	410	392	343	287	257	228	227	227	227	165
Average Number of Unique Participating Locations per Month:		312											
MWs	RTO	163	165	163	158	124	84	75	102	102	102	102	106
Average MWs per Month:		120											

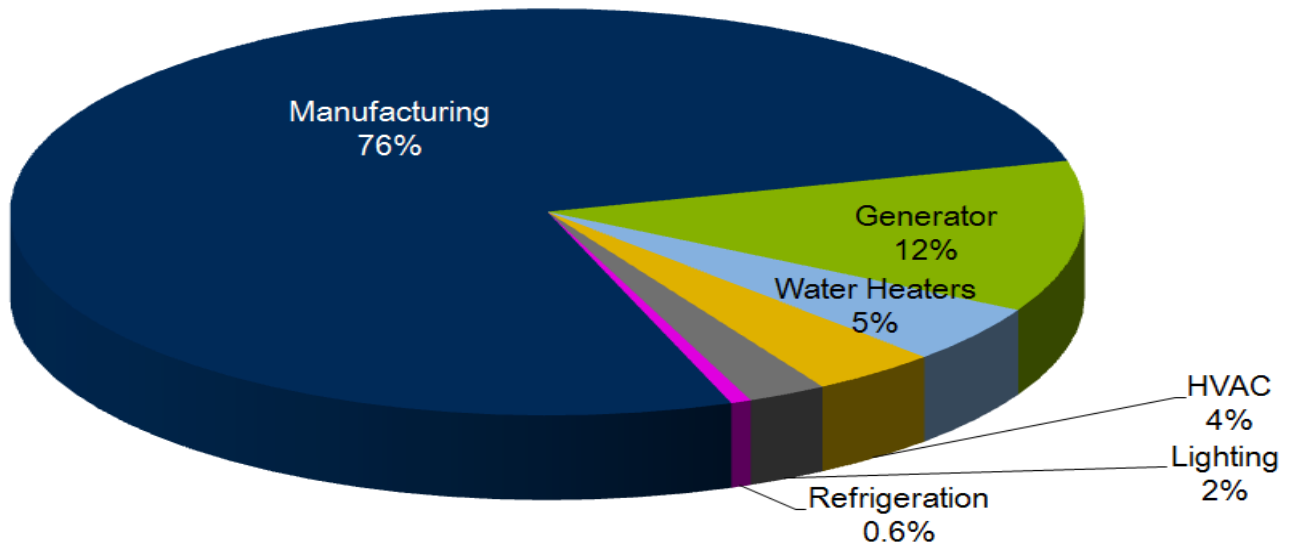
Capability represents total amount that may be offered. Actual offered and cleared volume may be significantly lower and is represented in subsequent figures/tables in report

Figure 11: 2018 PJM Demand Response Confirmed Regulation Registrations Load Reduction Methods



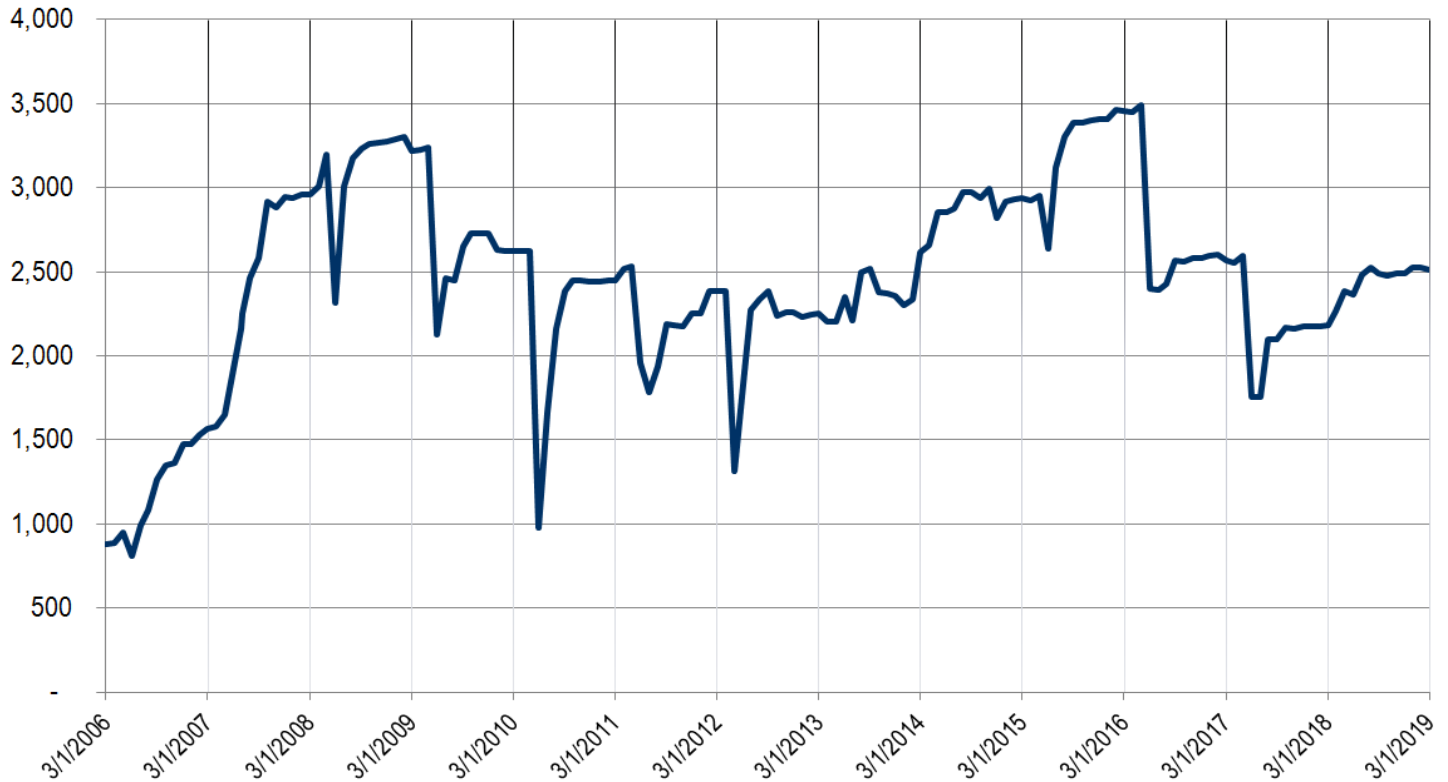
Note: Percent of CSP Reported Load Reduction MWs

Figure 12: 2018 PJM Demand Response Confirmed Synch Reserve Registrations Load Reduction Methods:



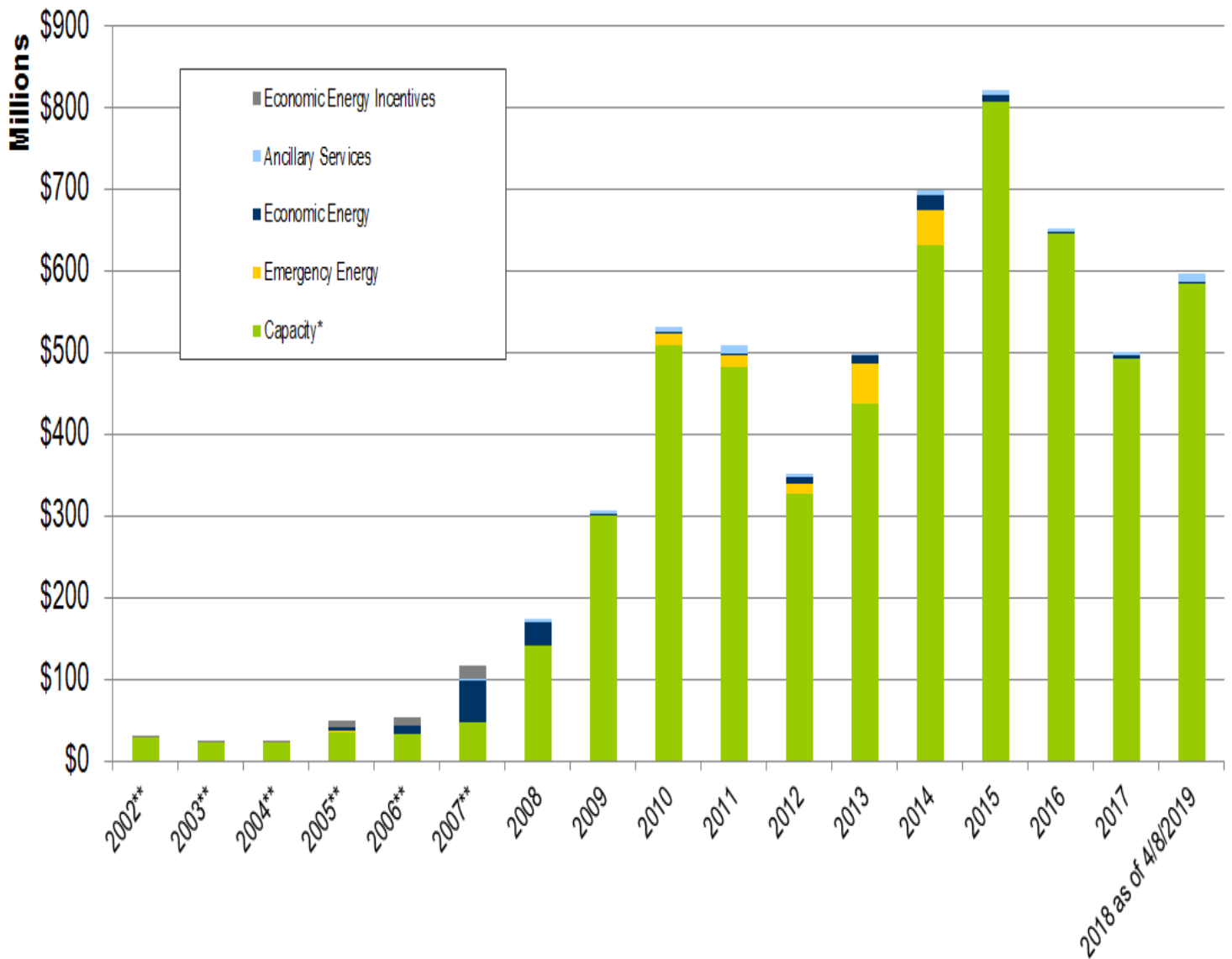
Note: Percent of CSP Reported Load Reduction MWs

Figure 13: PJM Economic Demand Response Capability in Energy Market (3/1/2006-3/5/2019)



Capability represents total amount that may be offered. Actual offered and cleared volume may be significantly lower and is represented in subsequent figures/tables in report.

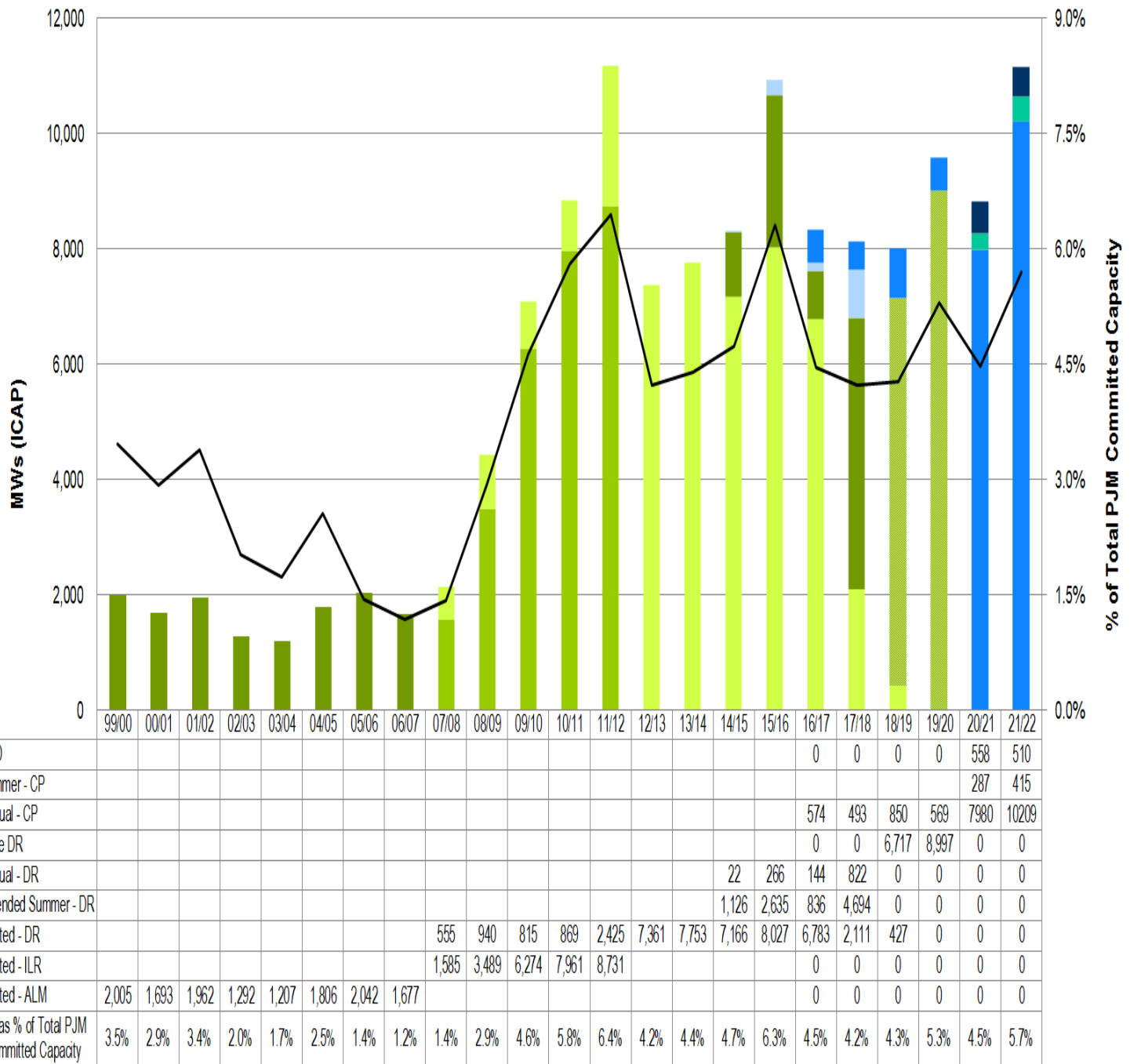
Figure 14: PJM Estimated Revenue for Economic and Load Management DR Markets



*Capacity Net Revenue inclusive of Capacity Credits and Charges.

**PJM assumes capacity value at \$50 MW Day (PJM does not know the value of capacity credits in the forward market prior to RPM; only a portion of capacity was purchased through the daily capacity market at the time).

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Figure 15: PJM Demand Response Committed MWs by Delivery Year

Notes:

- 1) Data as of 3/1/2019.
- 2) RPM was implemented DY 07/08.
- 3) DY 19/20 MWs include results from Base, First, and Second Incremental Auction.
- 4) DY 20/21 MWs include results from Base and First Incremental Auction.
- 5) DY 21/22 MWs include results from Base Residual Auction.
- 6) ALM MWs are seasonal averages for Delivery Years before 07/08.

Figure 16: 2018 Economic Demand Response Monthly Registration Participation

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO								1		1	1	
DE	DPL								2				
IL	COMED	3	2	2	2	3	2	2	2	2	2	2	
MD	BGE							7	6	1			
	DPL								2				
	PEPCO								2				
NJ	AECO								1				
	JCPL	1					1	1	2	2			
	PSEG	9	3	7	3	7	6	7	5	4	5	3	2
OH	AEP							1	1	1		1	
	ATSI	1	1	1	1	1	2	2	2	2	1		1
	DEOK							8	8	8			
PA	APS	1			1	1		1	2	1	1		1
	METED	2	1	1	1	1	2	4	4	4	3	3	1
	PECO	4	2	1	2	1	2	3	1	1	2	1	
	PENELEC	2	2	2	2	2	2	2					
	PPL	2	2				1	2	2	2	1	1	
VA	DOM	3					2		1	1	2		
WV	APS	4	1	2	1	1		1	1				
Total		32	14	16	13	20	18	41	45	29	18	12	5

Average Unique Participating Registrations per Month: 22

Figure 17: 2018 Economic Demand Response Monthly Registration Participation Day-Ahead Activity

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO												
DE	DPL												
IL	COMED												
MD	BGE												
	DPL												
	PEPCO												
NJ	AECO												
	JCPL	1					1	1	1	1			
	PSEG	3	1	3	3	4	2	3	2		2	1	1
OH	AEP												
	ATSI												
	DEOK							8	8	8			
PA	APS								1	1			
	METED	1	1	1	1	1	1	2	2	2	1	1	
	PECO	2	1	1	1	1	2	2	1	1	1	1	
	PENELEC	1	1	1	1	1	1	1					
	PPL												
VA	DOM	1											
WV	APS	2		1									
Total		11	4	7	6	7	7	17	15	13	4	3	1

Average Unique Participating Registrations per Month (Day-Ahead): 8

Figure 18: 2018 Economic Demand Response Monthly Registration Participation Real-Time Activity

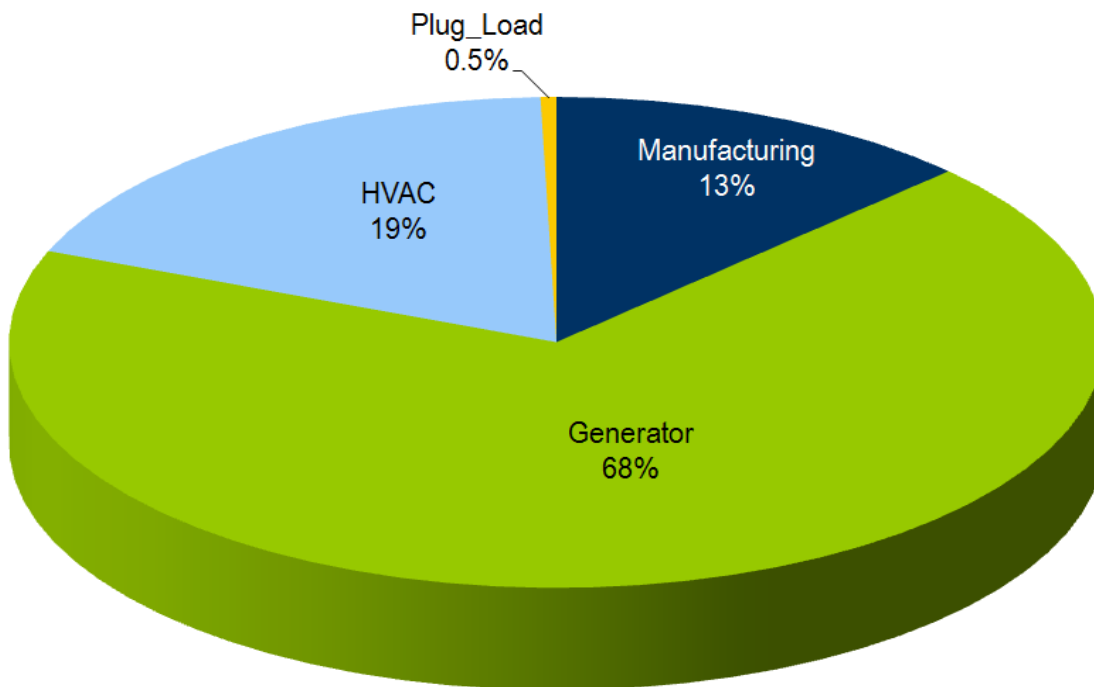
State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO								1		1	1	
DE	DPL								2				
IL	COMED	3	2	2	2	3	2	2	2	2	2	2	
MD	BGE							7	6	1			
	DPL								2				
	PEPCO								2				
NJ	AECO								1				
	JCPL								1				
	PSEG	6	2	4		3	4	4	3	4	3	2	1
OH	AEP							1	1	1		1	
	ATSI	1	1	1	1	1	2	2	2	2	1		1
	DEOK												
PA	APS	1			1	1		1	1		1		1
	METED	1					1	2	2	2	2	2	1
	PECO	2	1		1			1			1		
	PENELEC	1	1	1	1	1	1	1					
	PPL	2	2			1	1	2	2	2	1	1	
VA	DOM	2				2			1	1	2		
WV	APS	2	1	1	1	1		1	1				
Total		21	10	9	7	13	11	24	30	16	14	9	4

Average Unique Participating Registrations per Month (Real-Time): 14

Figure 19: 2018 Economic Demand Response Monthly MWh Reductions

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO								16		0	2	
DE	DPL								(101)				
IL	COMED	1,025	607	1,018	1,019	256	101	189	208	263	275	448	
MD	BGE							572	2,120	0			
	DPL								(82)				
	PEPCO								(180)				
NJ	AECO								115				
	JCPL	859					852	419	970	512			
	PSEG	901	246	973	1,594	1,922	549	404	591	0	1,814	861	249
OH	AEP							0	19	0		74	
	ATSI	1,673	957	2,135	2,502	1,500	1,924	2,551	2,742	2,675	199		0
	DEOK							134	63	143			
PA	APS	3			10	16		0	(0)	0	0		0
	METED	35	24	45	63	13	29	158	320	134	205	176	69
	PECO	134	37	154	98	55	65	100	45	9	106	145	
	PENELEC	353	584	460	646	839	0	0					
	PPL	629	190			46	56	120	32	47	36	25	
VA	DOM	104				58			7	8	23		
WV	APS	249	112	175	59	87		51	206				
Total		5,965	2,756	4,960	5,990	4,791	3,575	4,697	7,091	3,792	2,657	1,731	317

Total MWh: 48,323

Figure 20: 2018 Estimated Economic DR Load Reduction MWh by Load Reduction Method


Note: Estimates based on CSP reported load reduction capability by load reduction method for locations on Economic DR registrations that participated in the energy market.

Figure 21: 2018 Economic Demand Response Monthly MWh reductions Day-Ahead Activity

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO												
DE	DPL												
IL	COMED												
MD	BGE												
	DPL												
	PEPCO												
NJ	AECO												
	JCPL	859					852	419	764	350			
	PSEG	752	88	881	1,594	1,901	183	126	0		1,208	480	195
OH	AEP							134	63	143			
	ATSI												
	DEOK												
PA	APS								0	0			
	METED	29	24	45	63	13	24	136	269	81	122	144	
	PECO	92	37	154	57	55	65	89	45	9	87	145	
	PENELEC	118	431	447	543	831	0	0					
	PPL												
VA	DOM	90											
WV	APS	28		100									
Total		1,967	580	1,627	2,256	2,799	1,124	905	1,141	583	1,417	770	195

Total Day-Ahead MWh: 15,365

Figure 22: 2018 Economic Demand Response Monthly MWh Reductions Real-Time Activity

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO								16		0	2	
DE	DPL								(101)				
IL	COMED	1,025	607	1,018	1,019	256	101	189	208	263	275	448	
MD	BGE							572	2,120	0			
	DPL								(82)				
	PEPCO								(180)				
NJ	AECO								115				
	JCPL								206	162			
	PSEG	149	157	92		22	366	277	591	0	606	381	53
OH	AEP							0	19	0		74	
	ATSI	1,673	957	2,135	2,502	1,500	1,924	2,551	2,742	2,675	199		0
	DEOK												
PA	APS	3			10	16		0	0		0		
	METED	6					6	22	51	53	83	32	69
	PECO	43	(0)		41			10			19		
	PENELEC	235	153	13	103	8	0	0					
	PPL	629	190			46	56	120	32	47	36	25	
VA	DOM	15				58			7	8	23		
WV	APS	221	112	75	59	87		51	206				
Total		3,998	2,176	3,333	3,733	1,991	2,452	3,791	5,950	3,208	1,240	962	122

Total Real-Time MWh: 32,958

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Figure 23: 2018 Economic Demand Response Monthly Energy Market Revenue

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO								\$1,203		\$6	\$92	
DE	DPL								(\$11,142)				
IL	COMED	\$52,988	\$18,874	\$29,078	\$35,349	\$7,776	\$3,802	\$7,162	\$8,144	\$9,042	\$7,890	\$20,968	
MD	BGE							\$21,235	\$130,783	\$0			
	DPL								(\$6,365)				
	PEPCO								(\$6,200)				
NJ	AECO								\$8,505				
	JCPL	\$93,675					\$43,756	\$19,619	\$58,051	\$34,924			
	PSEG	\$148,089	\$7,792	\$29,536	\$59,127	\$59,562	\$20,338	\$22,120	\$25,120	\$0	\$64,065	\$35,546	\$12,359
OH	AEP							\$0	\$932	\$0		\$2,189	
	ATSI	\$166,861	\$31,291	\$91,585	\$97,393	\$121,178	\$81,488	\$103,479	\$119,183	\$128,852	\$7,624		\$0
	DEOK							\$18,452	\$10,168	\$15,503			
PA	APS	\$376			\$519	\$2,285		\$2	(\$15)	\$18	\$46		\$0
	METED	\$4,402	\$943	\$1,675	\$2,136	\$326	\$1,279	\$7,164	\$14,512	\$6,228	\$10,353	\$8,011	\$3,900
	PECO	\$18,201	\$2,302	\$5,990	\$4,088	\$2,487	\$4,799	\$8,613	\$2,221	(\$176)	\$4,615	\$6,103	
	PENELEC	\$21,207	\$20,880	\$17,398	\$24,193	\$26,799	(\$328)	\$1,822					
	PPL	\$99,099	\$12,385			\$2,761	\$2,418	\$5,523	\$1,357	\$2,682	\$1,640	\$1,240	
VA	DOM	\$33,748				\$3,999			\$201	\$301	\$1,920		
WV	APS	\$23,203	\$3,974	\$6,440	\$1,707	\$4,797		\$1,538	\$8,365				
Total		\$661,848	\$98,441	\$181,702	\$224,513	\$231,970	\$157,552	\$216,730	\$365,025	\$197,374	\$98,159	\$74,149	\$16,259

Total CSP Credits: \$2,523,722

Figure 24: 2018 Economic Demand Response Monthly Energy Market Revenue Day-Ahead Activity

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO												
DE	DPL												
IL	COMED												
MD	BGE												
	DPL												
	PEPCO												
NJ	AECO												
	JCPL	\$93,675					\$43,756	\$19,619	\$45,595	\$25,396			
	PSEG	\$140,646	\$3,301	\$28,224	\$59,127	\$59,032	\$7,261	\$9,143	(\$48)		\$47,160	\$19,569	\$9,890
OH	AEP							\$18,452	\$10,168	\$15,503			
	ATSI												
	DEOK												
PA	APS								(\$18)	\$18			
	METED	\$3,697	\$943	\$1,675	\$2,136	\$326	\$1,050	\$6,338	\$12,789	\$3,906	\$6,215	\$6,460	
	PECO	\$11,683	\$2,299	\$5,990	\$3,163	\$2,487	\$4,799	\$8,164	\$2,221	(\$176)	\$4,466	\$6,103	
	PENELEC	\$4,725	\$14,314	\$16,944	\$20,631	\$26,527	(\$328)	\$1,822					
	PPL												
VA	DOM	\$26,120											
WV	APS	\$5,672		\$3,708									
Total		\$286,218	\$20,857	\$56,542	\$85,058	\$88,372	\$56,538	\$63,540	\$70,708	\$44,648	\$57,842	\$32,131	\$9,890

Total Day-Ahead CSP Credits: \$872,343

Figure 25: 2018 Economic Demand Response Monthly Energy Market Revenue Real-Time Activity

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO								\$1,203		\$6	\$92	
DE	DPL								(\$11,142)				
IL	COMED	\$52,988	\$18,874	\$29,078	\$35,349	\$7,776	\$3,802	\$7,162	\$8,144	\$9,042	\$7,890	\$20,968	
MD	BGE							\$21,235	\$130,783	\$0			
	DPL								(\$6,365)				
	PEPCO								(\$6,200)				
NJ	AECO								\$8,505				
	JCPL								\$12,456	\$9,528			
	PSEG	\$7,443	\$4,491	\$1,312		\$531	\$13,077	\$12,977	\$25,168	\$0	\$16,904	\$15,976	\$2,469
OH	AEP							\$0	\$932	\$0		\$2,189	
	ATSI	\$166,861	\$31,291	\$91,585	\$97,393	\$121,178	\$81,488	\$103,479	\$119,183	\$128,852	\$7,624		\$0
	DEOK												
PA	APS	\$376			\$519	\$2,285		\$2	\$3		\$46		
	METED	\$705					\$229	\$826	\$1,723	\$2,322	\$4,138	\$1,552	\$3,900
	PECO	\$6,518	\$3		\$924			\$448			\$149		
	PENELEC	\$16,482	\$6,566	\$454	\$3,562	\$271	\$0	\$0					
	PPL	\$99,099	\$12,385			\$2,761	\$2,418	\$5,523	\$1,357	\$2,682	\$1,640	\$1,240	
VA	DOM	\$7,628				\$3,999			\$201	\$301	\$1,920		
WV	APS	\$17,531	\$3,974	\$2,732	\$1,707	\$4,797		\$1,538	\$8,365				
Total		\$375,630	\$77,584	\$125,160	\$139,455	\$143,598	\$101,014	\$153,191	\$294,316	\$152,727	\$40,317	\$42,018	\$6,369

Total Real-Time CSP Credits: \$1,651,379

Figure 26: 2018 Economic Demand Response Energy Market Cost Allocation by Zone

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AECO	\$7,315	\$1,160	\$1,275	\$2,079	\$1,696	\$1,988	\$3,202	\$5,949	\$2,484	\$1,077	\$831	\$191
AEP	\$108,608	\$14,948	\$33,086	\$38,197	\$40,963	\$24,805	\$31,756	\$53,271	\$30,849	\$15,355	\$12,099	\$2,568
APS	\$43,795	\$6,403	\$13,444	\$14,887	\$15,245	\$9,097	\$12,164	\$20,839	\$11,664	\$5,721	\$4,695	\$1,021
ATSI	\$51,311	\$8,436	\$17,486	\$20,075	\$22,175	\$13,165	\$17,540	\$29,931	\$16,780	\$8,792	\$6,252	\$1,314
BGE	\$28,542	\$4,402	\$8,677	\$9,267	\$10,182	\$6,459	\$8,874	\$15,317	\$7,949	\$3,842	\$2,784	\$620
COMED	\$56,648	\$9,205	\$15,747	\$22,842	\$24,992	\$18,971	\$26,737	\$33,712	\$23,113	\$10,657	\$8,639	\$1,809
DAY	\$14,134	\$2,166	\$4,624	\$5,488	\$6,085	\$3,470	\$4,414	\$7,682	\$4,387	\$2,228	\$1,750	\$375
DEOK	\$21,537	\$2,823	\$6,594	\$7,799	\$9,350	\$5,775	\$7,299	\$12,155	\$7,021	\$3,182	\$2,413	\$502
DOM	\$93,184	\$12,113	\$26,354	\$27,380	\$33,556	\$20,813	\$26,832	\$46,452	\$24,872	\$12,233	\$8,876	\$2,000
DPL	\$17,291	\$2,492	\$3,088	\$4,636	\$3,503	\$3,444	\$5,191	\$9,415	\$4,308	\$2,089	\$1,610	\$368
DUQ	\$10,293	\$1,533	\$3,318	\$4,066	\$4,758	\$2,802	\$3,847	\$6,598	\$3,638	\$1,727	\$1,229	\$259
EKPC	\$13,158	\$1,526	\$3,037	\$3,386	\$3,758	\$2,498	\$3,281	\$5,403	\$3,039	\$1,385	\$1,293	\$271
JCPL	\$17,227	\$2,833	\$3,046	\$5,232	\$4,603	\$4,684	\$7,338	\$13,779	\$5,471	\$2,528	\$1,946	\$441
METED	\$12,943	\$1,936	\$2,628	\$3,852	\$2,942	\$2,535	\$3,993	\$7,257	\$3,277	\$1,715	\$1,428	\$323
OVEC												\$2
PECO	\$32,991	\$4,923	\$5,502	\$10,003	\$7,342	\$7,123	\$11,119	\$20,216	\$8,804	\$4,321	\$3,535	\$789
PENELEC	\$13,925	\$2,386	\$4,231	\$5,305	\$4,773	\$2,952	\$4,040	\$7,090	\$3,884	\$2,182	\$1,690	\$355
PEPCO	\$26,398	\$3,660	\$8,305	\$8,767	\$10,384	\$6,275	\$8,499	\$14,544	\$7,684	\$3,629	\$2,689	\$576
PPL	\$35,826	\$5,002	\$5,800	\$10,303	\$6,843	\$6,165	\$9,733	\$16,792	\$8,046	\$4,482	\$3,746	\$780
PSEG	\$32,381	\$5,573	\$6,009	\$10,365	\$8,946	\$8,316	\$12,773	\$23,427	\$10,130	\$4,988	\$3,794	\$831
RECO	\$1,028	\$180	\$206	\$357	\$368	\$340	\$506	\$933	\$389	\$173	\$128	\$28
Exports	\$23,313	\$4,740	\$9,247	\$10,228	\$9,507	\$5,875	\$7,593	\$14,263	\$9,585	\$5,852	\$2,720	\$836
TOTAL	\$661,848	\$98,441	\$181,702	\$224,513	\$231,970	\$157,552	\$216,730	\$365,025	\$197,374	\$98,159	\$74,149	\$16,259

Total Zonal Charges: \$2,523,722

Figure 27: 2018 Economic Demand Response Day-Ahead Energy Market Cost Allocation by Zone

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AECO	\$4,324	\$194	\$406	\$727	\$729	\$905	\$1,336	\$1,214	\$668	\$662	\$411	\$116
AEP	\$63,910	\$1,969	\$9,545	\$13,321	\$17,599	\$9,520	\$11,998	\$10,723	\$6,681	\$9,414	\$5,927	\$1,543
APS	\$25,903	\$878	\$3,841	\$5,248	\$6,812	\$3,493	\$4,684	\$4,154	\$2,591	\$3,591	\$2,310	\$615
ATSI	\$30,272	\$1,230	\$5,115	\$7,204	\$9,450	\$5,097	\$6,763	\$6,047	\$3,760	\$5,547	\$3,066	\$792
BGE	\$16,900	\$739	\$2,778	\$3,479	\$4,833	\$2,522	\$3,518	\$3,108	\$1,853	\$2,441	\$1,383	\$375
COMED	\$33,620	\$1,148	\$4,015	\$7,841	\$9,495	\$8,310	\$10,371	\$9,088	\$5,766	\$6,568	\$4,225	\$1,070
DAY	\$8,373	\$280	\$1,393	\$2,036	\$2,689	\$1,349	\$1,696	\$1,550	\$957	\$1,381	\$857	\$226
DEOK	\$12,729	\$358	\$1,920	\$2,832	\$4,036	\$2,246	\$2,743	\$2,464	\$1,532	\$1,902	\$1,182	\$300
DOM	\$54,865	\$1,601	\$7,839	\$9,652	\$15,530	\$7,951	\$10,491	\$9,305	\$5,475	\$7,449	\$4,376	\$1,211
DPL	\$10,221	\$408	\$958	\$1,650	\$1,535	\$1,504	\$2,137	\$1,916	\$1,077	\$1,282	\$798	\$223
DUQ	\$6,134	\$210	\$960	\$1,466	\$2,043	\$1,088	\$1,492	\$1,314	\$833	\$1,053	\$602	\$157
EKPC	\$7,793	\$191	\$826	\$1,147	\$1,612	\$965	\$1,251	\$1,076	\$684	\$838	\$625	\$160
JCPL	\$10,165	\$513	\$981	\$1,870	\$1,918	\$2,098	\$3,097	\$2,823	\$1,541	\$1,549	\$971	\$267
METED	\$7,698	\$275	\$801	\$1,413	\$1,232	\$1,115	\$1,610	\$1,461	\$852	\$1,075	\$702	\$196
PECO	\$19,505	\$741	\$1,758	\$3,544	\$3,174	\$3,182	\$4,586	\$4,136	\$2,366	\$2,697	\$1,776	\$483
PENELEC	\$8,195	\$419	\$1,204	\$1,888	\$2,067	\$1,165	\$1,570	\$1,416	\$866	\$1,363	\$833	\$214
PEPCO	\$15,620	\$518	\$2,689	\$3,231	\$4,931	\$2,426	\$3,346	\$2,924	\$1,728	\$2,280	\$1,338	\$348
PPL	\$21,192	\$730	\$1,926	\$3,767	\$2,911	\$2,740	\$3,991	\$3,450	\$2,086	\$2,764	\$1,865	\$489
PSEG	\$19,083	\$1,038	\$1,910	\$3,709	\$3,753	\$3,647	\$5,254	\$4,780	\$2,720	\$3,053	\$1,900	\$505
RECO	\$607	\$34	\$64	\$129	\$153	\$150	\$208	\$190	\$106	\$106	\$64	\$17
Exports	\$13,510	\$1,312	\$5,201	\$4,348	\$4,567	\$2,001	\$2,798	\$2,863	\$1,941	\$3,649	\$1,481	\$520
TOTAL	\$390,621	\$14,784	\$56,130	\$80,501	\$101,071	\$63,473	\$84,937	\$76,002	\$46,082	\$60,666	\$36,692	\$9,826

Total Day-Ahead Zonal Charges: \$1,020,786

Figure 28: 2018 Economic Demand Response Real-Time Energy Market Cost Allocation by Zone

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AECO	\$2,991	\$967	\$870	\$1,352	\$967	\$1,084	\$1,866	\$4,735	\$1,816	\$415	\$420	\$75
AEP	\$44,698	\$12,979	\$23,540	\$24,876	\$23,363	\$15,285	\$19,757	\$42,548	\$24,169	\$5,941	\$6,173	\$1,025
APS	\$17,892	\$5,525	\$9,603	\$9,639	\$8,433	\$5,604	\$7,480	\$16,685	\$9,072	\$2,130	\$2,385	\$405
ATSI	\$21,039	\$7,206	\$12,371	\$12,871	\$12,725	\$8,068	\$10,777	\$23,884	\$13,020	\$3,245	\$3,186	\$522
BGE	\$11,642	\$3,663	\$5,898	\$5,789	\$5,349	\$3,937	\$5,356	\$12,209	\$6,096	\$1,401	\$1,400	\$246
COMED	\$23,028	\$8,057	\$11,732	\$15,001	\$15,497	\$10,661	\$16,366	\$24,623	\$17,347	\$4,089	\$4,415	\$739
DAY	\$5,761	\$1,887	\$3,231	\$3,452	\$3,396	\$2,121	\$2,718	\$6,132	\$3,431	\$847	\$894	\$149
DEOK	\$8,808	\$2,465	\$4,674	\$4,966	\$5,314	\$3,528	\$4,556	\$9,691	\$5,490	\$1,280	\$1,231	\$203
DOM	\$38,319	\$10,512	\$18,516	\$17,728	\$18,026	\$12,862	\$16,341	\$37,147	\$19,396	\$4,784	\$4,500	\$788
DPL	\$7,070	\$2,084	\$2,130	\$2,986	\$1,967	\$1,941	\$3,054	\$7,499	\$3,231	\$807	\$813	\$145
DUQ	\$4,159	\$1,324	\$2,358	\$2,600	\$2,714	\$1,714	\$2,355	\$5,284	\$2,805	\$674	\$627	\$103
EKPC	\$5,366	\$1,335	\$2,211	\$2,239	\$2,146	\$1,532	\$2,030	\$4,326	\$2,355	\$547	\$668	\$112
JCPL	\$7,062	\$2,320	\$2,065	\$3,362	\$2,685	\$2,586	\$4,241	\$10,956	\$3,930	\$979	\$974	\$174
METED	\$5,244	\$1,661	\$1,827	\$2,439	\$1,710	\$1,420	\$2,383	\$5,796	\$2,425	\$639	\$726	\$127
												\$1
PECO	\$13,486	\$4,183	\$3,744	\$6,459	\$4,167	\$3,941	\$6,533	\$16,080	\$6,439	\$1,624	\$1,759	\$306
PENELEC	\$5,730	\$1,967	\$3,027	\$3,417	\$2,706	\$1,788	\$2,470	\$5,674	\$3,018	\$819	\$857	\$141
PEPCO	\$10,778	\$3,142	\$5,616	\$5,536	\$5,452	\$3,849	\$5,153	\$11,620	\$5,956	\$1,349	\$1,351	\$228
PPL	\$14,635	\$4,272	\$3,873	\$6,536	\$3,932	\$3,425	\$5,742	\$13,342	\$5,960	\$1,718	\$1,881	\$291
PSEG	\$13,299	\$4,534	\$4,099	\$6,656	\$5,194	\$4,669	\$7,518	\$18,647	\$7,410	\$1,935	\$1,894	\$326
RECO	\$422	\$147	\$142	\$228	\$215	\$190	\$298	\$743	\$283	\$67	\$64	\$11
Exports	\$9,803	\$3,428	\$4,046	\$5,880	\$4,940	\$3,873	\$4,796	\$11,400	\$7,644	\$2,203	\$1,240	\$316
TOTAL	\$271,228	\$83,656	\$125,572	\$144,012	\$130,899	\$94,078	\$131,793	\$289,023	\$151,292	\$37,493	\$37,457	\$6,432

 Total Real-Time Zonal Charges: **\$1,502,936**
Figure 29: 2018 Load Management Demand Response Monthly Capacity Revenue from RPM

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AECO	\$490,121	\$442,690	\$490,121	\$474,310	\$490,121	\$1,028,760	\$1,063,052	\$1,063,052	\$1,028,760	\$1,063,052	\$1,028,760	\$1,063,052
AEP	\$5,650,283	\$5,103,481	\$5,650,283	\$5,468,015	\$5,650,283	\$6,460,324	\$6,675,669	\$6,675,669	\$6,460,325	\$6,675,669	\$6,460,325	\$6,675,669
APS	\$3,635,631	\$3,283,796	\$3,635,631	\$3,518,353	\$3,635,631	\$4,488,614	\$4,638,234	\$4,638,234	\$4,488,613	\$4,638,234	\$4,488,613	\$4,638,234
ATSI	\$4,068,474	\$3,674,751	\$4,068,474	\$3,937,233	\$4,068,474	\$4,117,257	\$4,254,499	\$4,254,499	\$4,117,257	\$4,254,499	\$4,117,257	\$4,254,499
BGE	\$2,978,415	\$2,690,181	\$2,978,415	\$2,882,337	\$2,978,415	\$1,424,334	\$1,471,812	\$1,471,812	\$1,424,334	\$1,471,812	\$1,424,334	\$1,471,812
COMED	\$5,931,017	\$5,357,047	\$5,931,017	\$5,739,694	\$5,931,017	\$11,384,156	\$11,763,628	\$11,763,628	\$11,384,156	\$11,763,628	\$11,384,156	\$11,763,628
DAY	\$757,213	\$683,934	\$757,213	\$732,787	\$757,213	\$1,047,740	\$1,082,665	\$1,082,665	\$1,047,740	\$1,082,665	\$1,047,740	\$1,082,665
DEOK	\$680,554	\$614,694	\$680,554	\$658,601	\$680,554	\$963,997	\$996,130	\$996,130	\$963,997	\$996,130	\$963,997	\$996,130
DOM	\$4,444,838	\$4,014,692	\$4,444,838	\$4,301,456	\$4,444,838	\$3,717,864	\$3,841,793	\$3,841,793	\$3,717,864	\$3,841,793	\$3,717,864	\$3,841,793
DPL	\$1,493,172	\$1,348,671	\$1,493,172	\$1,445,005	\$1,493,172	\$2,671,780	\$2,760,840	\$2,760,840	\$2,671,780	\$2,760,840	\$2,671,780	\$2,760,840
DUQ	\$664,561	\$600,248	\$664,561	\$643,123	\$664,561	\$1,190,255	\$1,229,930	\$1,229,930	\$1,190,255	\$1,229,930	\$1,190,255	\$1,229,930
EKPC	\$627,700	\$566,955	\$627,700	\$607,451	\$627,700	\$665,873	\$688,069	\$688,069	\$665,873	\$688,069	\$665,873	\$688,069
JCPL	\$616,455	\$556,798	\$616,455	\$596,570	\$616,455	\$1,281,410	\$1,324,124	\$1,324,124	\$1,281,410	\$1,324,124	\$1,281,410	\$1,324,124
METED	\$1,122,182	\$1,013,583	\$1,122,182	\$1,085,982	\$1,122,182	\$1,478,427	\$1,527,708	\$1,527,708	\$1,478,427	\$1,527,708	\$1,478,427	\$1,527,708
PECO	\$1,860,312	\$1,680,282	\$1,860,312	\$1,800,302	\$1,860,312	\$3,234,300	\$3,342,110	\$3,342,110	\$3,234,300	\$3,342,110	\$3,234,300	\$3,342,110
PENELEC	\$1,330,187	\$1,201,460	\$1,330,187	\$1,287,278	\$1,330,187	\$1,753,015	\$1,811,449	\$1,811,449	\$1,753,015	\$1,811,449	\$1,753,015	\$1,811,449
PEPCO	\$2,320,851	\$2,096,252	\$2,320,851	\$2,245,985	\$2,320,851	\$780,853	\$806,881	\$806,881	\$780,853	\$806,881	\$780,853	\$806,881
PPL	\$2,491,224	\$2,250,138	\$2,491,224	\$2,410,862	\$2,491,224	\$2,240,289	\$2,314,965	\$2,314,965	\$2,240,289	\$2,314,965	\$2,240,289	\$2,314,965
PSEG	\$2,576,169	\$2,326,862	\$2,576,169	\$2,493,066	\$2,576,169	\$2,440,539	\$2,521,890	\$2,521,890	\$2,440,539	\$2,521,890	\$2,440,539	\$2,521,890
RECO	\$12,475	\$11,267	\$12,475	\$12,072	\$12,475	\$47,392	\$48,971	\$48,971	\$47,392	\$48,971	\$47,392	\$48,971
Total	\$43,751,832	\$39,517,784	\$43,751,832	\$42,340,483	\$43,751,832	\$52,417,179	\$54,164,419	\$54,164,419	\$52,417,179	\$54,164,419	\$52,417,179	\$54,164,419

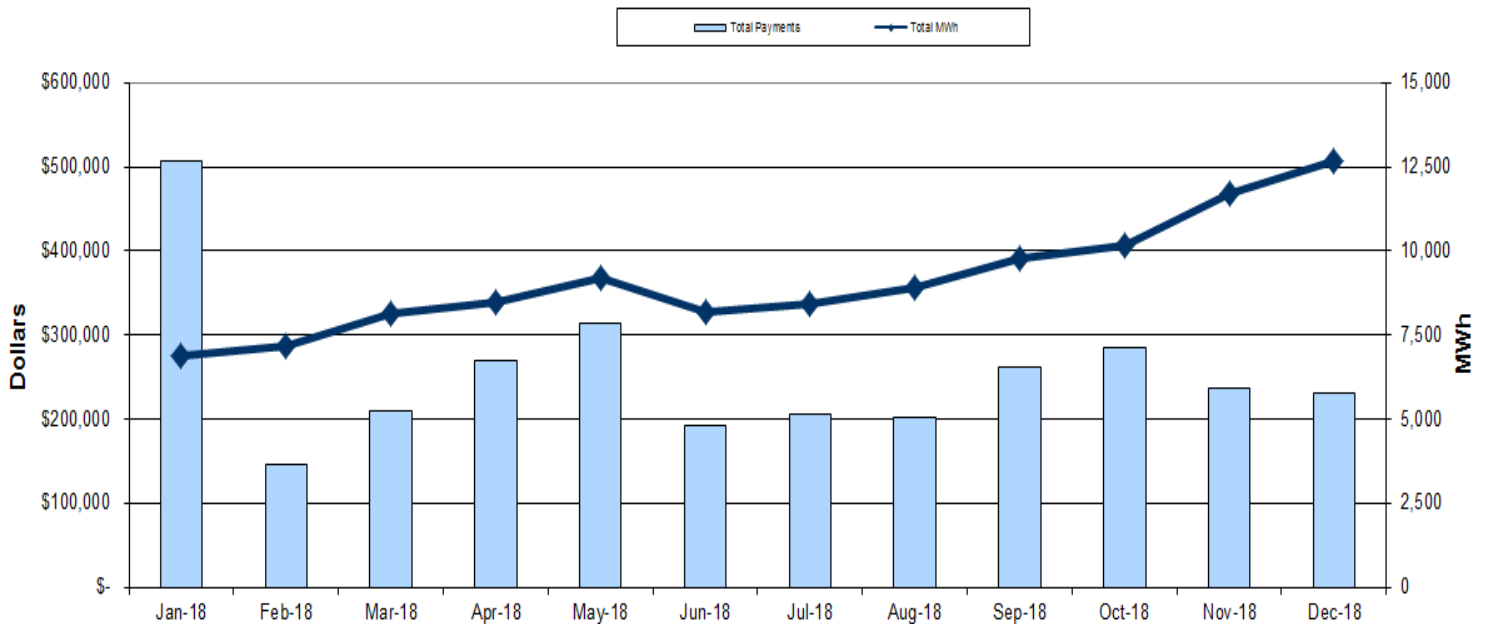
 Total Capacity Credits: **\$587,022,976**

Figure 30: 2018 Economic Demand Response Dispatched vs Settled Real-Time Energy Market Summary

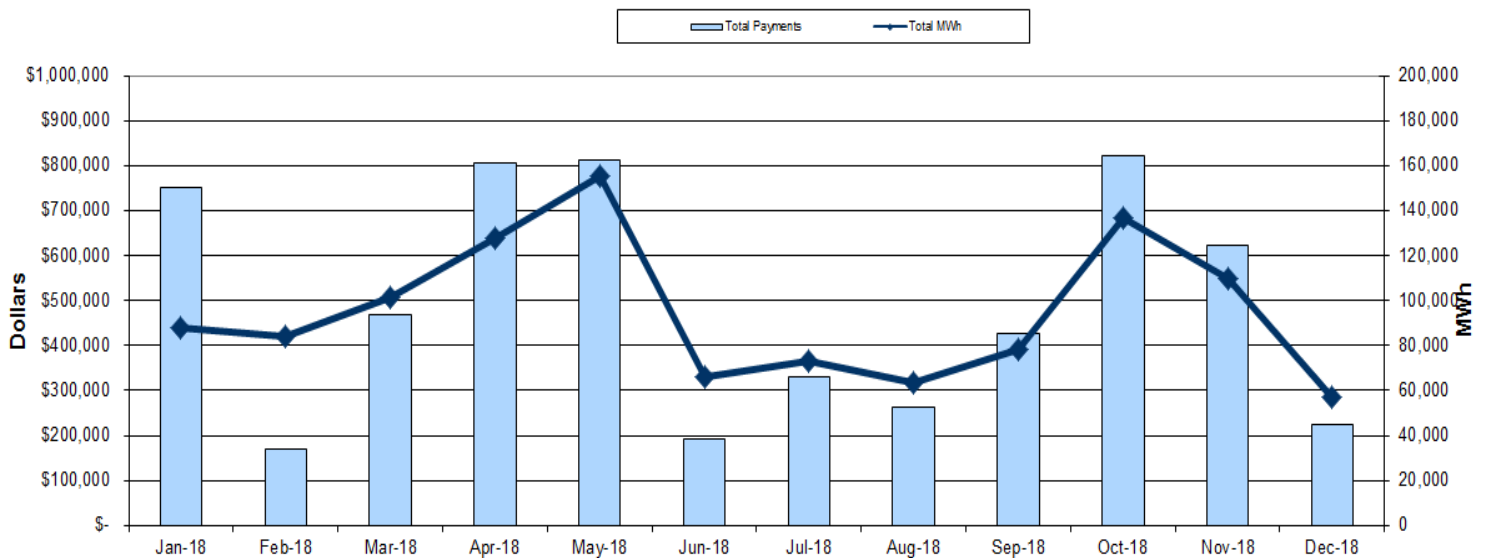
Year	Month	CSPs		Zone		Registrations			MWh			Registration Hours		
		Dispatched	Settled	Dispatched	Settled	Dispatched	Settled	%	Dispatched	Settled	%	Dispatched	Settled	%
2018	1	8	8	9	9	21	21	100%	3,723	3,998	107%	1,154	1,154	100%
2018	2	3	3	7	7	10	10	100%	1,676	2,176	130%	480	480	100%
2018	3	3	3	5	5	9	9	100%	2,891	3,333	115%	766	766	100%
2018	4	5	5	5	5	7	7	100%	3,493	3,733	107%	789	789	100%
2018	5	4	4	7	7	13	13	100%	2,441	1,991	82%	707	707	100%
2018	6	4	4	6	6	11	11	100%	2,783	2,452	88%	835	835	100%
2018	7	8	8	10	10	24	24	100%	5,317	3,791	71%	1,152	1,152	100%
2018	8	11	11	13	13	30	30	100%	9,371	5,950	63%	1,465	1,465	100%
2018	9	5	5	9	9	16	16	100%	4,130	3,208	78%	1,051	1,051	100%
2018	10	7	7	9	9	14	14	100%	2,671	1,240	46%	1,167	954	82%
2018	11	4	4	6	6	9	9	100%	633	962	152%	469	469	100%
2018	12	4	4	4	4	4	4	100%	161	122	76%	99	99	100%
YTD Totals						168	168	100%	39,290	32,958	84%	10,134	9,921	98%
YTD Average		6	6	8	8									

Figure 31: 2018 Economic Demand Response Cleared vs Settled Day-Ahead Energy Market Summary

Year	Month	CSPs		Zone		Registrations			MWh			Registration Hours		
		Cleared	Settled	Cleared	Settled	Cleared	Settled	%	Cleared	Settled	%	Cleared	Settled	%
2018	1	8	8	7	7	11	11	100%	2,464	1,967	80%	492	492	100%
2018	2	3	3	4	4	4	4	100%	359	580	162%	194	194	100%
2018	3	5	5	5	5	7	7	100%	1,713	1,627	95%	666	666	100%
2018	4	4	4	4	4	6	6	100%	2,188	2,256	103%	674	674	100%
2018	5	4	4	4	4	7	7	100%	2,607	2,799	107%	820	820	100%
2018	6	5	5	5	5	7	7	100%	1,307	1,124	86%	204	204	100%
2018	7	6	6	6	6	17	17	100%	1,373	905	66%	472	472	100%
2018	8	6	6	6	6	15	15	100%	1,326	1,141	86%	416	416	100%
2018	9	5	5	5	5	13	13	100%	683	583	85%	145	145	100%
2018	10	4	4	3	3	4	4	100%	1,558	1,417	91%	367	367	100%
2018	11	3	3	3	3	3	3	100%	878	770	88%	342	342	100%
2018	12	1	1	1	1	1	1	100%	199	195	98%	57	57	100%
YTD Totals						95	95	100%	16,654	15,365	92%	4,849	4,849	100%
YTD Average		5	5	4	4									

Figure 32: 2018 Economic Demand Response Regulation Market Participation


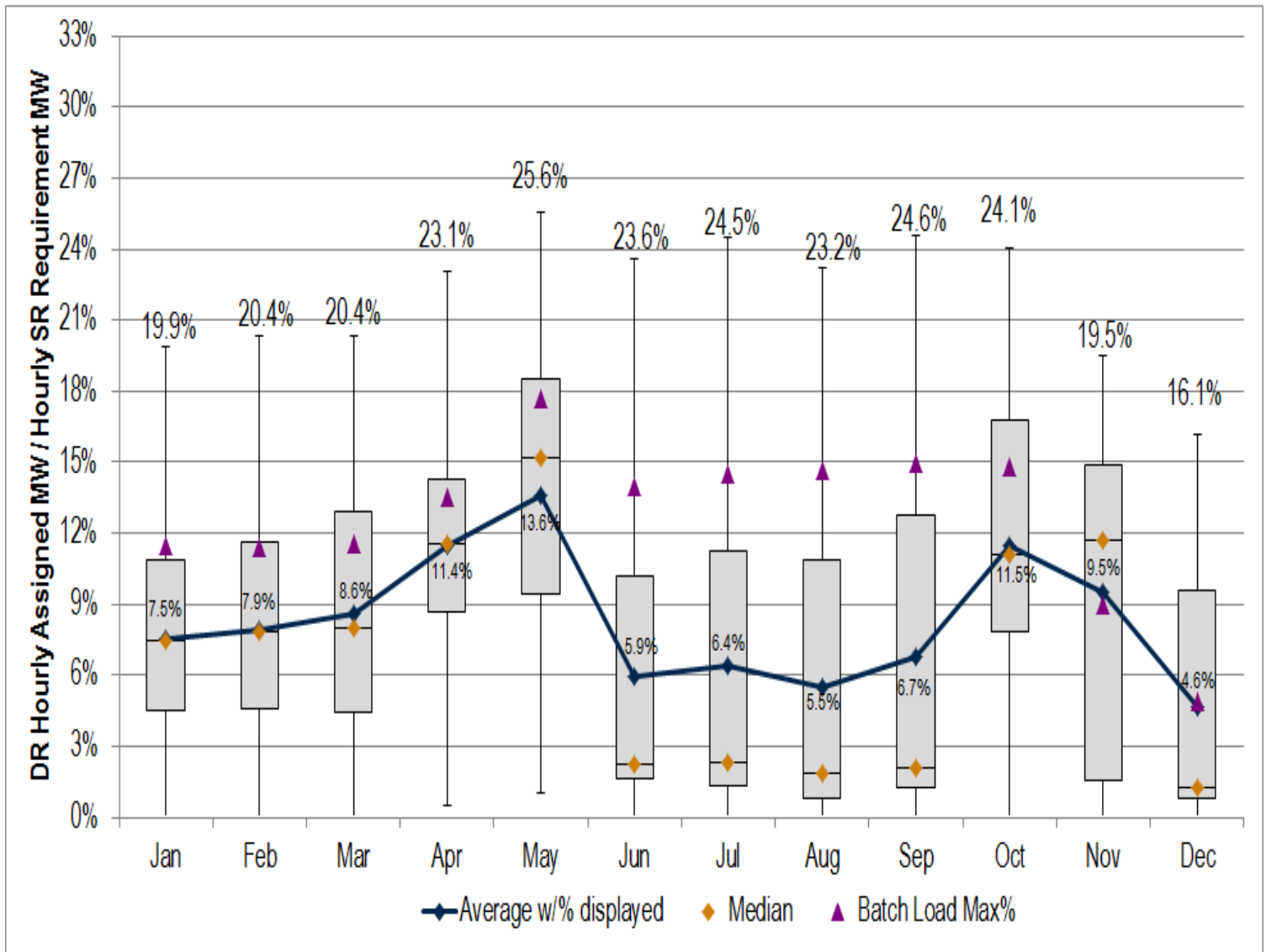
	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Total
Total MWh	6,866	7,152	8,150	8,495	9,215	8,194	8,420	8,913	9,781	10,158	11,697	12,692	109,731
Total Payments	\$506,727	\$145,434	\$209,971	\$268,765	\$313,882	\$192,179	\$205,221	\$201,675	\$262,515	\$285,560	\$237,411	\$231,354	\$3,060,693
\$ / MWh	\$73.81	\$20.34	\$25.76	\$31.64	\$34.06	\$23.45	\$24.37	\$22.63	\$26.84	\$28.11	\$20.30	\$18.23	\$27.89

Figure 33: 2018 Economic Demand Response Synchronous Reserve Market Participation


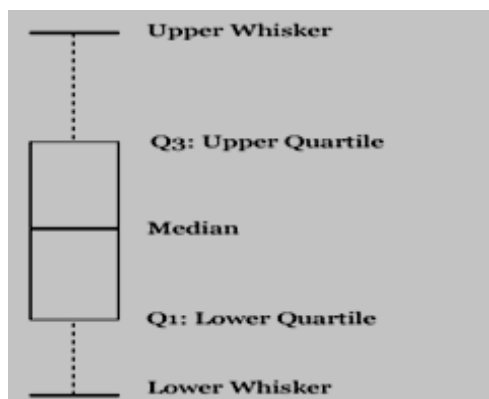
	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Total
Total MWh	87,697	83,800	101,430	127,629	155,335	66,312	73,250	63,658	78,305	136,584	109,788	57,372	1,141,161
Total Payments	\$750,921	\$170,305	\$467,817	\$807,610	\$811,970	\$191,947	\$329,362	\$262,021	\$426,805	\$820,585	\$622,274	\$223,773	\$5,885,391
\$ / MWh	\$8.56	\$2.03	\$4.61	\$6.33	\$5.23	\$2.89	\$4.50	\$4.12	\$5.45	\$6.01	\$5.67	\$3.90	\$5.16

Note: For Figures 32 and 33 above, MWh=sum of the settled MW. Example: 1 MW load available for 12 hours = 12 MWh.

Figure 34: Economic DR Synchronous Reserve Penetration Distribution (Box-plot) for 2018



- Notes:
- 1) Economic Demand Response are Tier2 resources.
 - 2) Percents shown on upper whisker are maximum hourly DR percentage of Total SR Requirement.
 - 3) The Box-plot depicts the distribution of DR hourly assigned (as a percentage of the Total requirement) for a month:



The upper whisker is the maximum value

The box top is the Upper Quartile (75%) value

The line inside the box is the median (50%) value

The box bottom is the Lower Quartile (25%) value

The lower whisker is the minimum value