

2019 Demand Response Operations Markets Activity Report: April 2020

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PJM Demand Side Response Operations

April 6, 2020



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Figure 1: DY 19/20 Active Participants in DR Programs

State	Zone	EDC	Economic		Emergency Energy Only		Load Management		Unique	
			Locations	MW	Locations	MW	Locations	MW	Locations	MW
DC	PEPCO	PEPCO	2	19.3			187	67.9	187	67.9
DE	DPL	DEMEC	9	5.1			28	17.9	29	22.5
DE	DPL	DOVDE					16	5.1	16	5.1
DE	DPL	DPL	4	158.2			181	214.0	181	214.0
DE	DPL	ODEC					11	4.3	11	4.3
IL	COMED	COMED	21	87.0			2,356	1,542.8	2,361	1,597.9
IL	COMED	GENEVA	1	1.0					1	1.0
IL	COMED	IMEAA1	1	0.3			1	1.7	1	1.7
IN	AEP	AEPIMP					143	315.1	143	315.1
IN	AEP	HEREC					1	22.2	1	22.2
IN	AEP	WVPA	1	6.1			1	6.1	2	12.2
IN	AEP	WVSDI					1	14.2	1	14.2
KY	AEP	AEPKPT					4	3.6	4	3.6
KY	DEOK	DEK					65	19.4	65	19.4
KY	EKPC	EKPC					9	123.2	9	123.2
MD	APS	AETSAP	14	35.3			127	105.9	128	109.4
MD	APS	FESCTH	1	1.8					1	1.8
MD	APS	FESCHG					4	1.2	4	1.2
MD	BGE	BC	48	647.8			675	713.4	681	731.1
MD	DPL	DPL	8	78.3			147	117.3	147	117.3
MD	DPL	EASTON					8	2.0	8	2.0
MD	DPL	ODEC	1	2.2			15	10.4	15	10.4
MD	PEPCO	PEPCO	5	368.1			154	442.0	157	442.6
MD	PEPCO	SMECO	4	0.7			116	42.1	116	42.1
MI	AEP	COSEDC					1	5.2	1	5.2
NJ	AECO	AE	4	51.7			212	108.6	212	108.6
NJ	AECO	VMEU					21	6.7	21	6.7
NJ	JCPL	JCBGS	4	81.7			353	136.7	355	217.2
NJ	PSEG	PSEG	16	59.3	1.0	0.5	909	253.8	915	282.2
NJ	RECO	RECO					16	2.6	16	2.6
NY	PENELEC	PaElec					1	1.4	1	1.4
OH	AEP	AEPOPT	38	318.4			813	483.7	817	620.9
OH	AEP	AMPO					60	60.0	60	60.0
OH	AEP	BUCK					2	20.2	2	20.2
OH	ATSI	AMPO					14	20.2	14	20.2
OH	ATSI	BUCK					2	6.0	2	6.0
OH	ATSI	CPP					14	15.2	14	15.2
OH	ATSI	OEEDC	5	21.2			920	762.9	921	765.9
OH	DAY	AMPO	1	7.0			9	4.7	9	4.7
OH	DAY	BUCK					2	4.2	2	4.2
OH	DAY	DAYEDC	6	4.4			186	147.7	186	147.7
OH	DEOK	AMPO					7	12.8	7	12.8
OH	DEOK	BUCK					2	1.6	2	1.6
OH	DEOK	DEOEDC	16	129.3			404	168.7	404	168.7
PA	APS	AECI					2	0.3	2	0.3
PA	APS	AETSAP	11	47.6			565	315.9	566	316.9
PA	ATSI	PAPWR	3	85.6			92	67.2	93	67.8
PA	DUQ	DLCO	5	16.0			357	109.8	359	125.6



State	Zone	EDC	Economic		Emergency Energy Only		Load Management		Unique	
			Locations	MW	Locations	MW	Locations	MW	Locations	MW
PA	METED	MetEd	29	37.6			429	210.9	433	217.6
PA	PECO	PE	37	129.6			994	320.4	1,003	392.2
PA	PENELEC	AECI					12	7.0	12	7.0
PA	PENELEC	PaElec	2	62.0			490	260.5	491	282.5
PA	PENELEC	WELLSB					3	0.2	3	0.2
PA	PPL	AMPO					6	1.1	6	1.1
PA	PPL	CTZECL					4	1.9	4	1.9
PA	PPL	PPL	26	211.5			1,107	518.6	1,117	626.8
PA	PPL	UGI-UI					14	3.1	14	3.1
TN	AEP	AEPAPT					11	6.2	11	6.2
VA	AEP	AEPAPT	3	6.4			206	250.0	206	250.0
VA	AEP	AMPO					16	11.5	16	11.5
VA	AEP	RADFRD					1	2.5	1	2.5
VA	AEP	VATECH					1	6.5	1	6.5
VA	APS	ODEC	3	0.9			55	36.5	55	36.5
VA	DOM	CVEC					4	3.2	4	3.2
VA	DOM	DOMEDC	40	34.4			783	632.7	783	632.7
VA	DOM	DOMVME					26	95.3	26	95.3
VA	DOM	NVEC	3	15.1			50	5.0	52	19.6
VA	DOM	ODEC	2	0.4			43	15.3	43	15.3
VA	DPL	ODEC					14	1.0	14	1.0
WV	AEP	AEPAPT	1	0.2			195	473.9	195	473.9
WV	APS	AETSAP	23	41.5			254	211.8	256	233.4
Total			398	2,773	1	0.5	13,932	9,583	13,996	10,185

- Note:
- 1) Data as of 4/6/2020.
 - 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 April 6, 2020, DY19/20 RPM Committed Values is 8,152 MW for Load Management.

Figure 2: DY 19/20 MWs in Load Management DR by Resource, Product, and Lead Times

Zone		BASE	CAPACITY PERFORMANCE	Lead Times (Minutes)			Total MW
				30	60	120	
AECO							
	Pre-Emergency	115.2	0.0	105.0	3.3	6.9	115.2
	Emergency	0.2	0.0	0.2	0.0	0.0	0.2
	Total	115.4	0.0	105.2	3.3	6.9	115.4
AEP							
	Pre-Emergency	1,604.1	28.8	848.1	134.6	650.2	1,632.9
	Emergency	48.0	0.0	28.2	0.8	19.0	48.0
	Total	1,652.2	28.8	876.3	135.5	669.2	1,680.9
APS							
	Pre-Emergency	601.8	39.2	401.1	9.2	230.7	641.0
	Emergency	30.6	0.0	21.7	0.0	8.9	30.6
	Total	632.4	39.2	422.8	9.2	239.6	671.6
ATSI							
	Pre-Emergency	571.9	210.4	350.3	27.3	404.8	782.3
	Emergency	89.1	0.0	22.9	2.6	63.6	89.1
	Total	661.0	210.4	373.1	29.9	468.4	871.4
BGE							
	Pre-Emergency	694.7	8.5	660.5	4.7	38.0	703.2
	Emergency	10.2	0.0	10.2	0.0	0.0	10.2
	Total	704.8	8.5	670.7	4.7	38.0	713.4
COMED							
	Pre-Emergency	1,484.2	1.3	1,064.6	40.3	380.5	1,485.4
	Emergency	59.1	0.0	30.2	4.1	24.7	59.1
	Total	1,543.2	1.3	1,094.8	44.5	405.3	1,544.5
DAY							
	Pre-Emergency	146.1	2.6	84.2	3.9	60.7	148.8
	Emergency	7.8	0.0	6.9	0.0	0.9	7.8
	Total	154.0	2.6	91.1	3.9	61.6	156.6
DEOK							
	Pre-Emergency	176.8	23.3	165.7	15.2	19.2	200.1
	Emergency	2.4	0.0	2.4	0.0	0.0	2.4
	Total	179.2	23.3	168.1	15.2	19.2	202.5
DOM							
	Pre-Emergency	623.5	0.0	148.4	34.0	441.2	623.5
	Emergency	127.9	0.0	89.8	13.0	25.1	127.9
	Total	751.5	0.0	238.1	47.0	466.3	751.5
DPL							
	Pre-Emergency	351.2	15.3	178.7	12.0	175.9	366.6
	Emergency	5.4	0.0	3.6	1.4	0.4	5.4
	Total	356.6	15.3	182.2	13.4	176.4	371.9
DUQ							
	Pre-Emergency	105.7	3.4	69.5	1.8	37.8	109.1
	Emergency	0.7	0.0	0.2	0.5	0.0	0.7
	Total	106.4	3.4	69.7	2.3	37.8	109.8
EKPC							
	Pre-Emergency	0.0	122.2	21.5	5.0	95.6	122.2
	Emergency	0.0	1.1	1.1	0.0	0.0	1.1
	Total	0.0	123.2	22.6	5.0	95.6	123.2

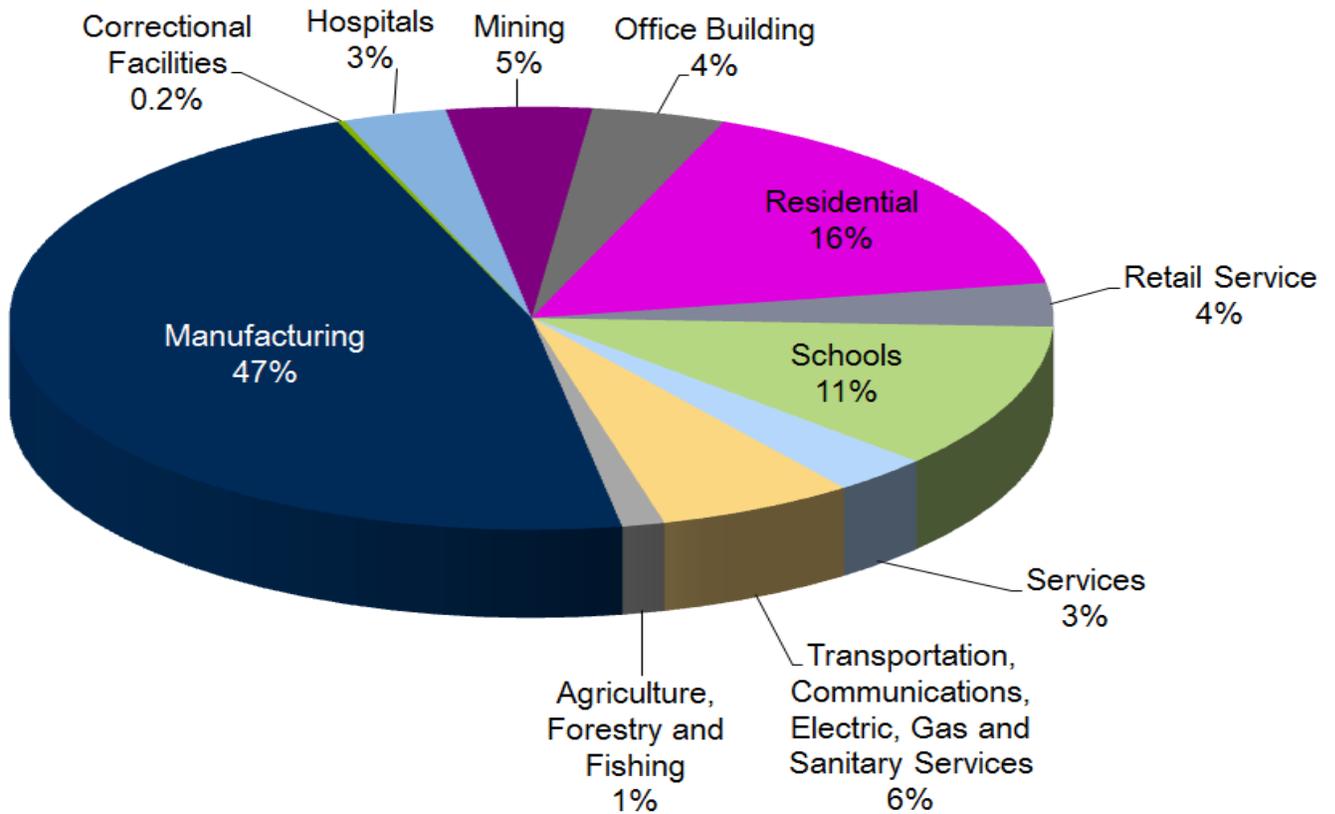
Lead Times (Minutes)

Zone		BASE	CAPACITY PERFORMANCE	Lead Times (Minutes)			Total MW
				30	60	120	
JCPL							
	Pre-Emergency	131.6	0.4	100.9	2.1	29.0	132.0
	Emergency	0.0	4.7	4.7	0.0	0.0	4.7
	Total	131.6	5.1	105.6	2.1	29.0	136.7
METED							
	Pre-Emergency	209.4	0.0	115.4	13.8	80.2	209.4
	Emergency	1.5	0.0	1.5	0.0	0.0	1.5
	Total	210.9	0.0	116.9	13.8	80.2	210.9
PECO							
	Pre-Emergency	294.1	1.7	222.5	7.0	66.4	295.8
	Emergency	23.1	1.4	20.4	2.7	1.5	24.6
	Total	317.2	3.2	242.9	9.6	67.9	320.4
PENELEC							
	Pre-Emergency	249.2	16.8	109.4	9.3	147.3	266.0
	Emergency	2.9	0.3	1.0	2.1	0.0	3.1
	Total	252.1	17.0	110.4	11.4	147.3	269.1
PEPCO							
	Pre-Emergency	485.7	58.4	318.9	1.6	223.6	544.1
	Emergency	0.0	7.9	7.3	0.0	0.6	7.9
	Total	485.7	66.3	326.2	1.6	224.2	552.0
PPL							
	Pre-Emergency	489.4	32.5	273.5	30.4	218.0	521.9
	Emergency	2.0	0.8	1.1	0.0	1.7	2.8
	Total	491.4	33.3	274.6	30.4	219.6	524.7
PSEG							
	Pre-Emergency	221.6	29.0	202.0	4.7	43.8	250.6
	Emergency	3.2	0.0	0.0	0.0	3.2	3.2
	Total	224.8	29.0	202.0	4.7	47.0	253.8
RECO							
	Pre-Emergency	2.6	0.0	2.6	0.0	0.0	2.6
	Emergency	0.0	0.0	0.0	0.0	0.0	0.0
	Total	2.6	0.0	2.6	0.0	0.0	2.6
TOTAL							
	Pre-Emergency	8,559.0	593.9	5,442.8	360.3	3,349.8	9,152.9
	Emergency	414.0	16.1	253.2	27.2	149.7	430.1
	Total	8,973.0	610.1	5,696.0	387.6	3,499.5	9,583.0

Note:

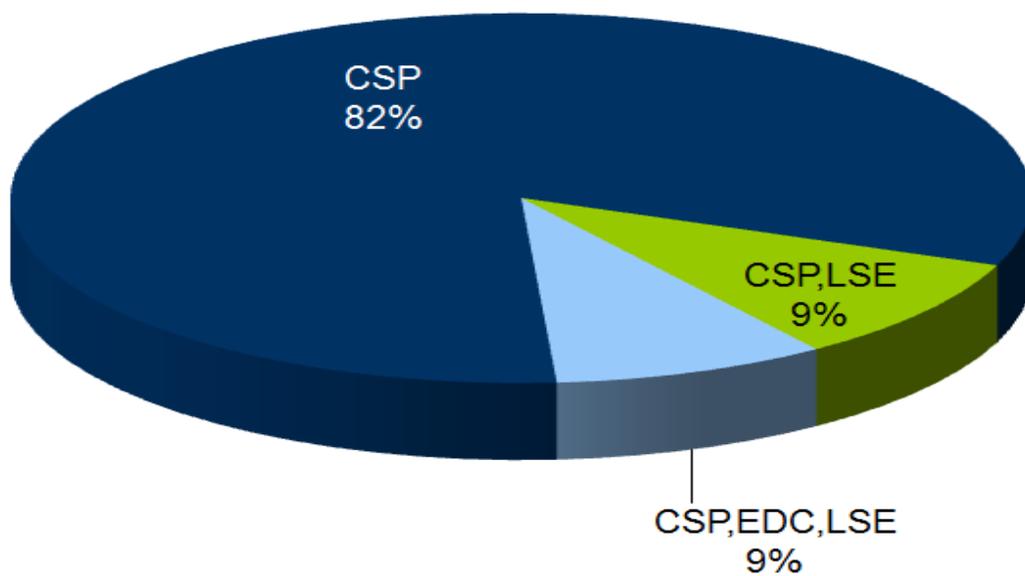
- 1) Data as of 4/6/2020.
- 2) Load Management MW are in ICAP.

Figure 3: DY 19/20 Confirmed Load Management DR Registrations Business Segments



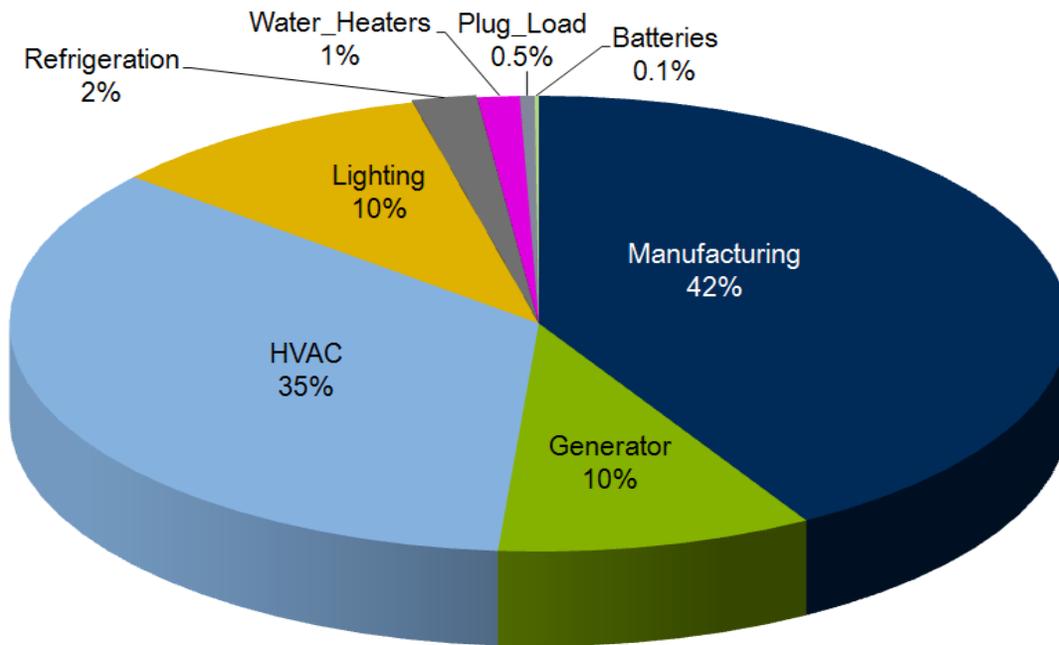
Note: Percent of Nominated Capacity (MWs). Includes Capacity Performance nominated MWs.

Figure 4: DY 19/20 Confirmed Load Management DR Registrations Owner/Company Type



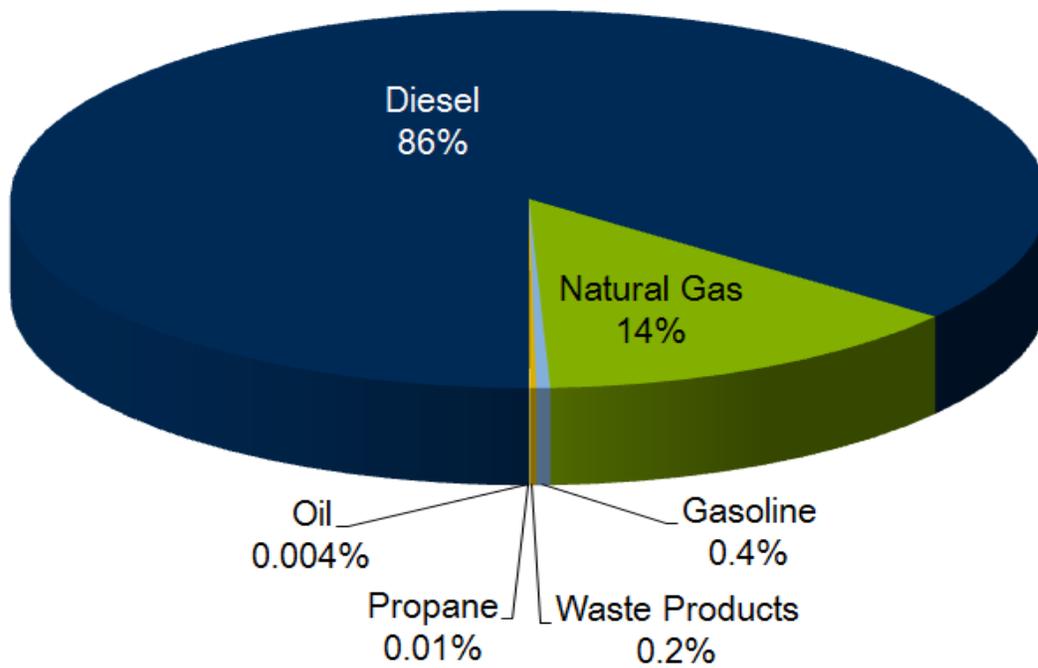
Note: Percent of Nominated Capacity (MWs). Includes Capacity Performance nominated MWs.

Figure 5: DY 19/20 Confirmed Load Management DR Registrations Customer Load Reduction Methods



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

Figure 6: DY 19/20 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 19/20 Confirmed Load Management DR Registrations Generator and Permit Type

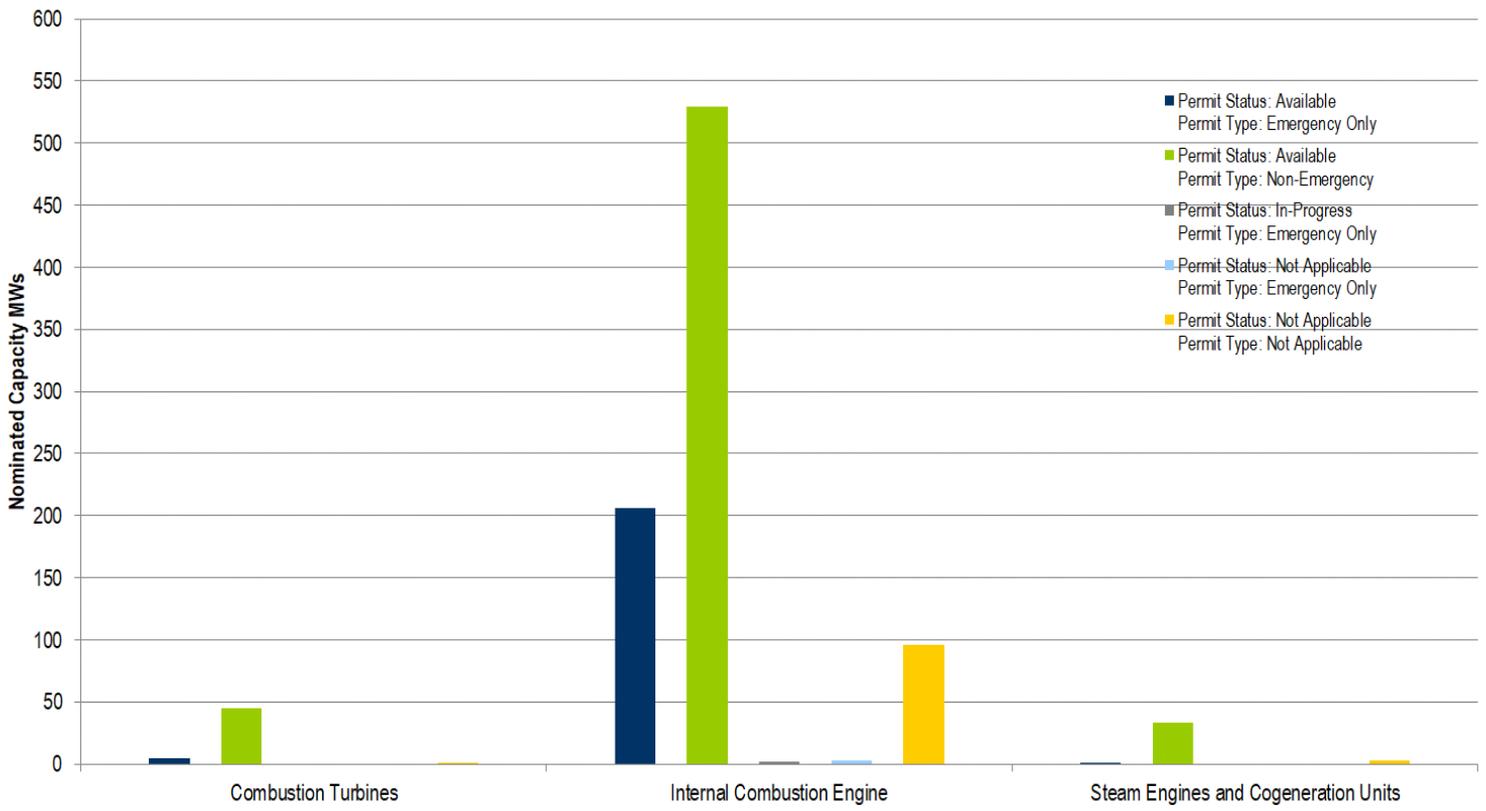


Figure 8: DY 19/20 Confirmed Load Management DR Registrations Fuel Mix with Behind the Meter Generation

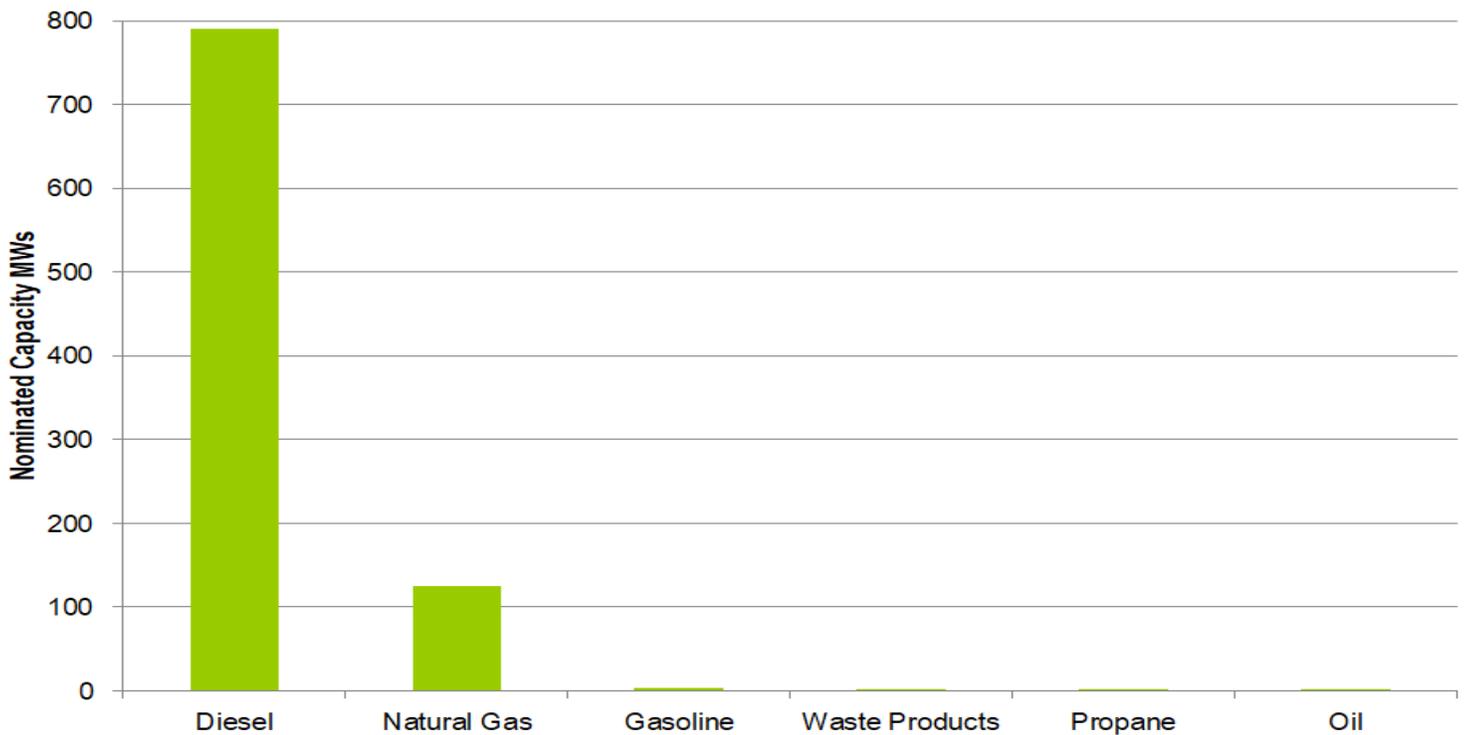
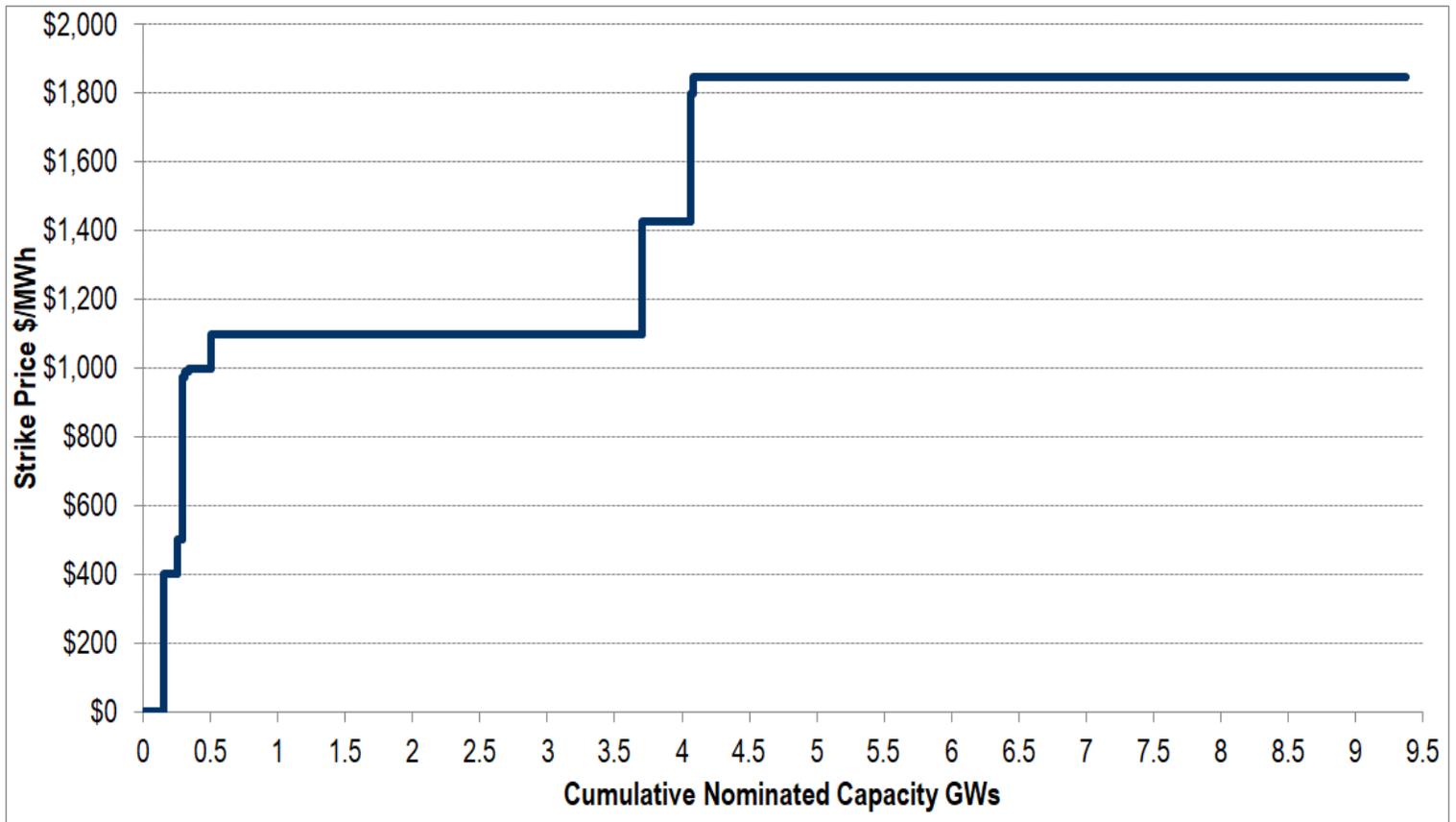


Figure 9: DY 19/20 Confirmed Load Management Full DR Registrations Energy Supply Curve:



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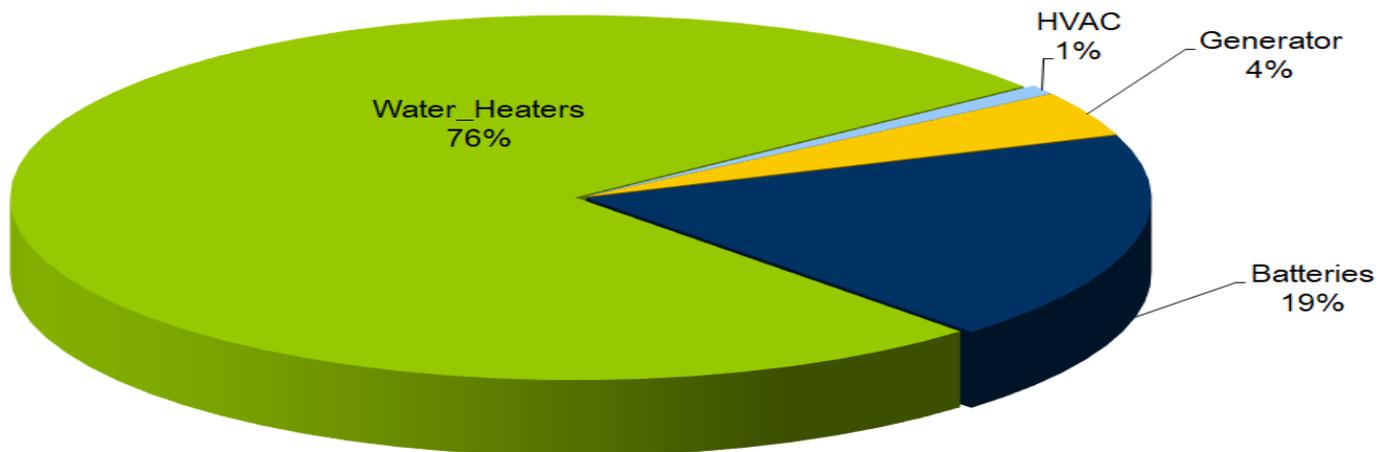
Figure 10: 2019 Economic Demand Response Capability in the Ancillary Service Markets

Synch Reserves	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Locations	MAD	108	107	108	99	102	102	101	103	103	102	102	102
	Non-MAD	28	27	27	27	27	27	28	25	26	26	28	28
	RTO	136	134	135	126	129	129	129	128	129	128	130	130
Average Number of Unique Participating Locations per Month:		130											
MWs	MAD	498	418	490	510	504	507	506	511	511	510	510	510
	Non-MAD	341	330	354	330	330	329	331	295	296	296	339	339
	RTO	839	748	844	840	834	836	837	806	807	805	848	848
Average MWs per Month:		824											

Regulation	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Locations	RTO	170	167	167	171	171	171	172	159	167	169	174	149
Average Number of Unique Participating Locations per Month:		167											
MWs	RTO	106	105	105	104	104	104	106	84	96	91	100	98
Average MWs per Month:		100											

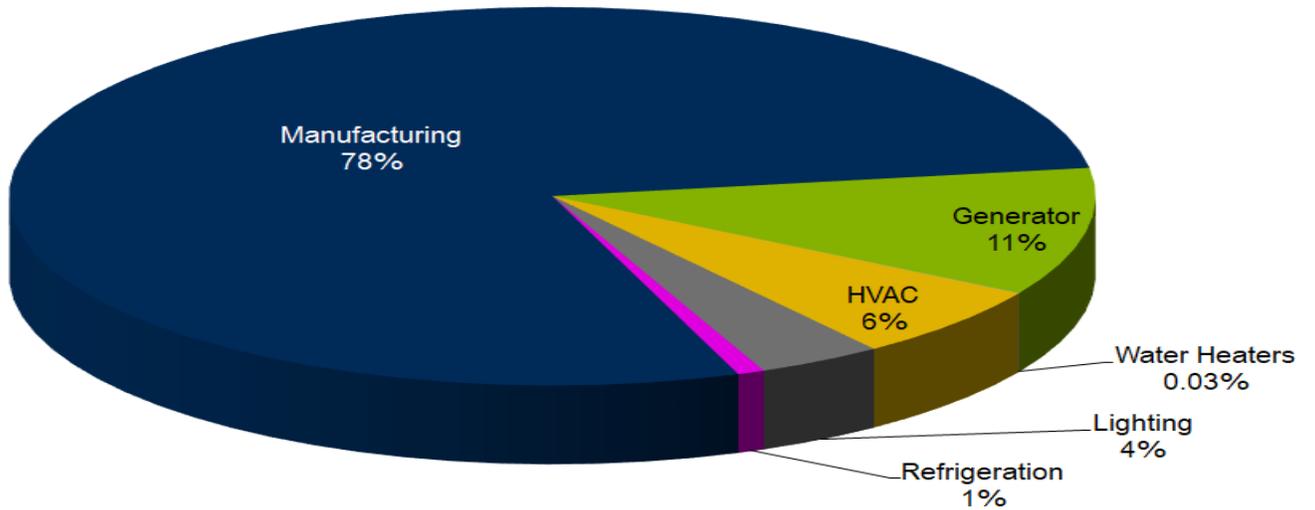
Capability represents total amount that may be offered. Actual offered and cleared volume may be significantly lower and is represented in subsequent figures/tables in report

Figure 11: 2019 PJM Demand Response Confirmed Regulation Registrations Load Reduction Methods



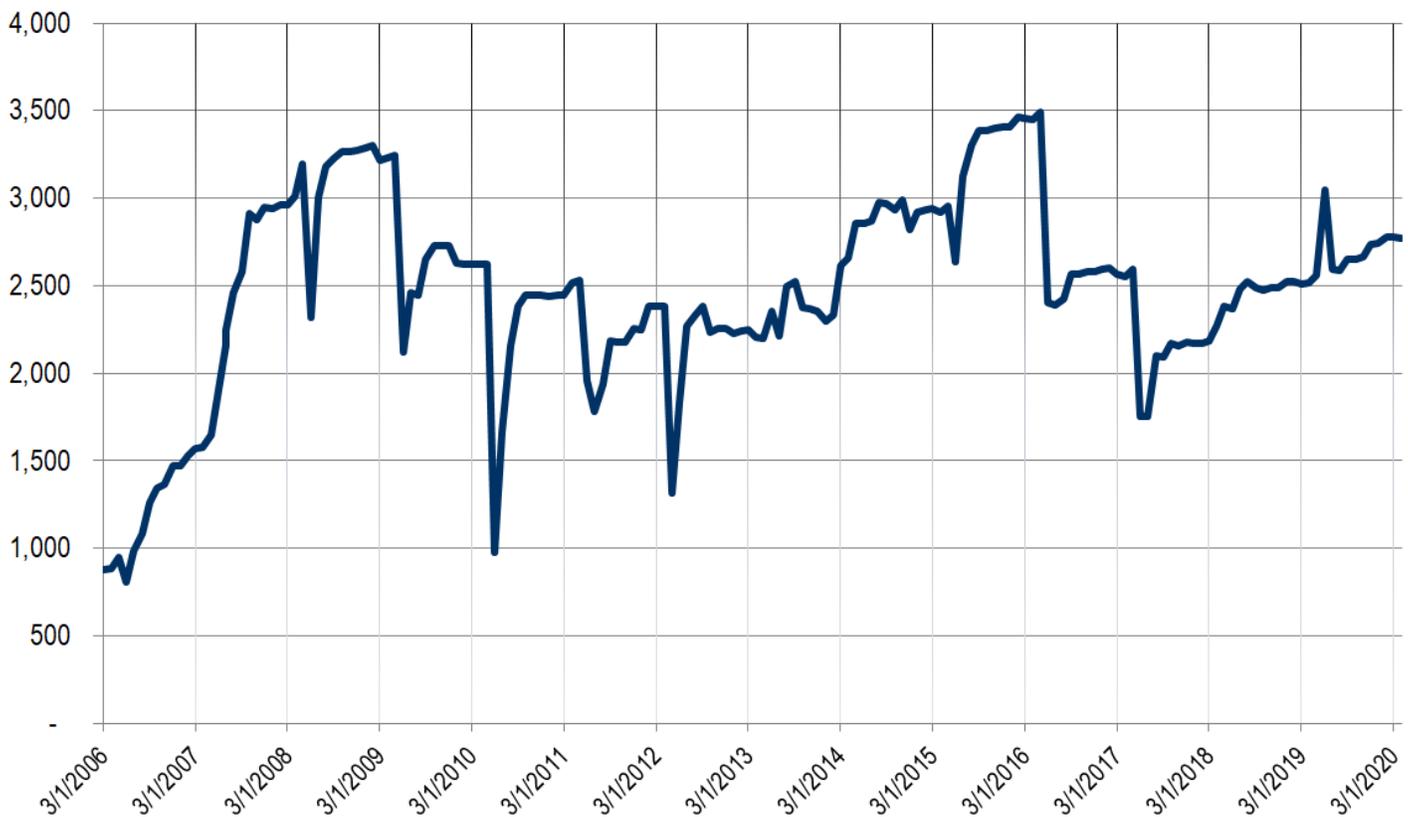
Note: Percent of CSP Reported Load Reduction MWs

Figure 12: 2019 PJM Demand Response Confirmed Synch Reserve Registrations Load Reduction Methods:



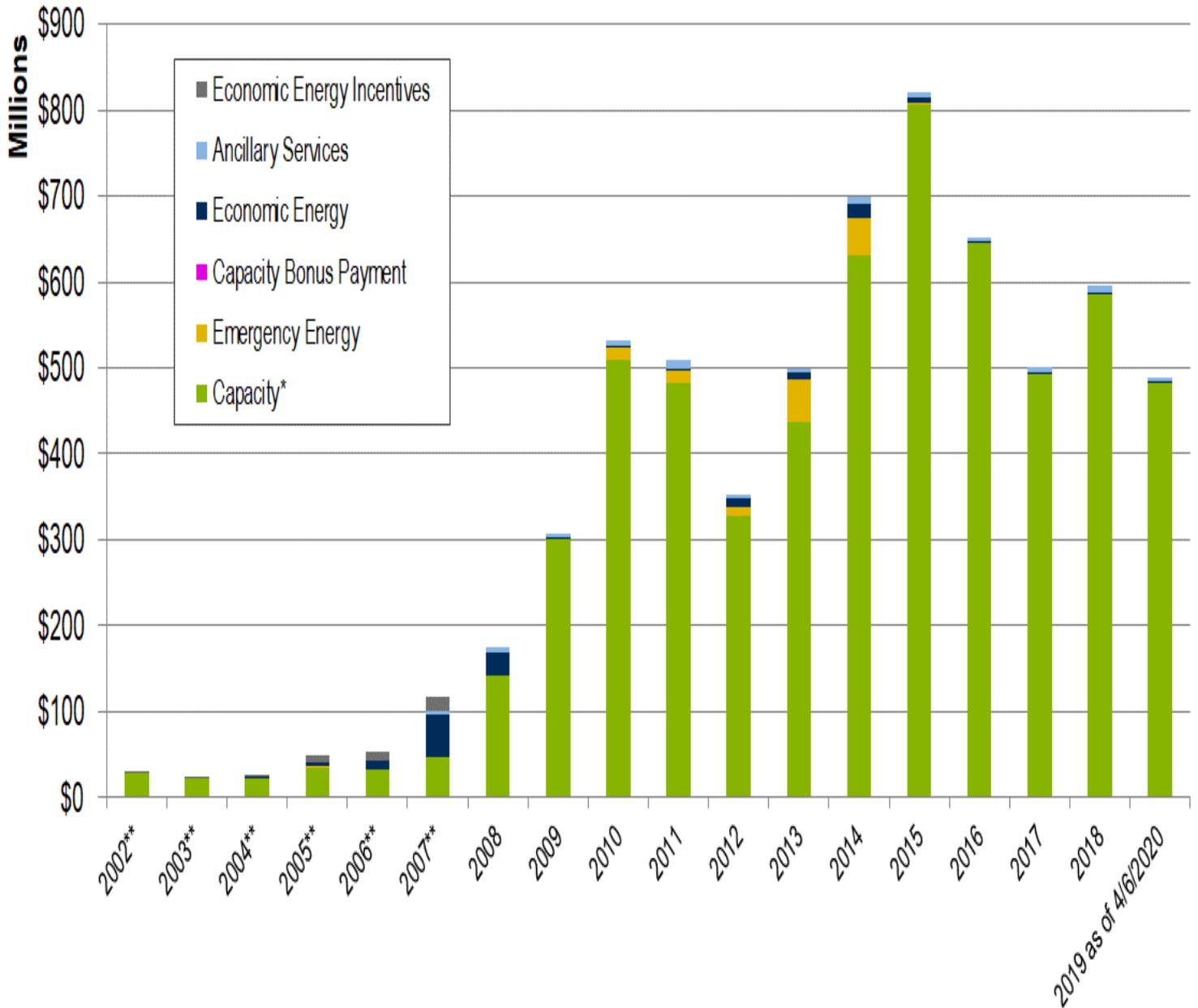
Note: Percent of CSP Reported Load Reduction MWs

Figure 13: PJM Economic Demand Response Capability in Energy Market (3/1/2006-4/6/2020)



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 16: 2019 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	1	1		1	1	1			
DE	DPL							2					
IL	COMED				1	1	1	2	1	1	1	2	1
MD	BGE							7					
	DPL							2					
	PEPCO				3	3	3	5	3	3	3	3	3
NJ	AECO							1					
	JCPL						1	4					
	PSEG	5	2	4	4	4	3	5	4	2	2	3	3
OH	AEP	1						1	1		1		
	ATSI							1					
	DEOK							7		7			
PA	APS	2			1		1	1	1	1	1	1	
	METED	3	3	2	3	3	3	3	1	1	1	1	3
	PECO	5	3	2	2		1	1	1	2	2	2	1
	PENELEC		2	1	1	2	1	2	1	1	1	1	2
	PPL	3	2				2	2	2	2		1	1
VA	DOM	1											
WV	APS											1	
Total		21	13	10	16	14	16	47	16	21	12	15	14

Average Unique Participating Registrations per Month: 18

Figure 17: 2019 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	2					
	PSEG	2	1	2	3	3	1	1	1	1	1	3	3
OH	AEP												
	ATSI							1					
	DEOK							7		7			
PA	APS	1											
	METED	1	1	1	1	1	1	1					1
	PECO	3	2	1	1		1	1	1	1	2	1	1
	PENELEC		1	1	1	1	1	1	1	1	1	1	1
	PPL	1											
VA	DOM												
WV	APS											1	
Total		8	5	5	6	5	5	14	3	10	4	6	6

Average Unique Participating Registrations per Month (Day-Ahead): 6

Figure 18: 2019 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	1	1		1	1	1			
DE	DPL							2					
IL	COMED				1	1	1	2	1	1	1	2	1
MD	BGE							7					
	DPL							2					
	PEPCO				3	3	3	5	3	3	3	3	3
NJ	AECO							1					
	JCPL							2					
	PSEG	3	1	2	1	1	2	4	3	1	1		
OH	AEP	1						1	1		1		
	ATSI												
	DEOK												
PA	APS	1			1		1	1	1	1	1	1	
	METED	2	2	1	2	2	2	2	1	1	1	1	2
	PECO	2	1	1	1					1		1	
	PENELEC		1			1		1					1
	PPL	2	2				2	2	2	2		1	1
VA	DOM	1											
WV	APS												
Total		13	8	5	10	9	11	33	13	11	8	9	8

Average Unique Participating Registrations per Month (Real-Time): 12

Figure 19: 2019 Economic Demand Response Monthly MWh Reductions

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO	8	4	0	1	1		20	0	0			
DE	DPL							85					
IL	COMED				0	10	5	85	76	29	33	26	10
MD	BGE							2,352					
	DPL							65					
	PEPCO				0	1	1	277	1	2	0	1	0
NJ	AECO							41					
	JCPL						0	338					
	PSEG	1,210	343	1,034	2,127	1,220	365	857	468	82	146	477	345
OH	AEP	17						69	22		12		
	ATSI							157					
	DEOK							53		47			
PA	APS	1			0		0	0	0	0	0	0	
	METED	97	17	15	95	71	26	334	8	2	10	20	119
	PECO	901	150	728	135		3	128	56	33	65	157	68
	PENELEC		276	519	710	544	328	605	642	552	581	597	664
	PPL	1,798	138				0	361	1	120		0	58
VA	DOM	4											
WV	APS											28	
Total		4,036	928	2,296	3,067	1,847	728	5,827	1,273	866	847	1,306	1,264

Total MWh: 24,285

Figure 20: 2019 Estimated Economic DR Load Reduction MWh by Load Reduction Method

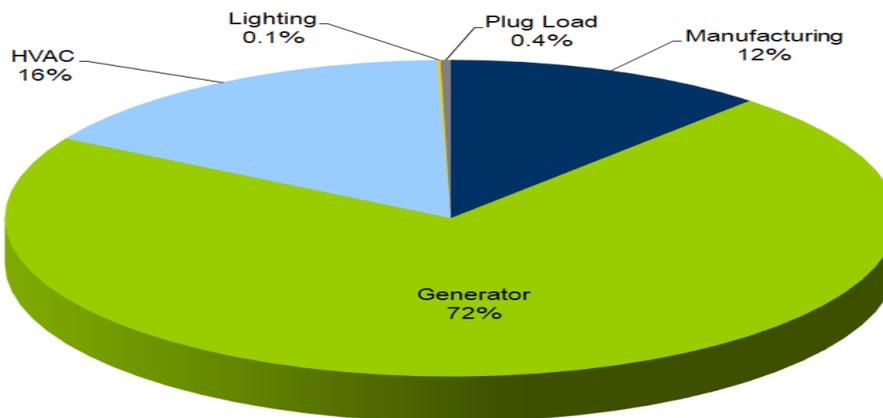


Figure 21: 2019 Economic Demand Response Monthly MWh reductions Day-Ahead Activity

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						0	338					
	PSEG	517	51	822	2,122	1,213	278	372	381	51	146	477	345
OH	AEP												
	ATSI							157					
	DEOK							53		47			
PA	APS	0											
	METED	74	12	10	62	14	13	280					55
	PECO	853	140	708	116		3	128	56	33	65	157	68
	PENELEC		276	519	710	534	328	545	642	552	581	597	605
	PPL	508											
VA	DOM												
WV	APS											28	
Total		1,953	480	2,060	3,009	1,761	621	1,873	1,079	683	791	1,259	1,072

Total Day-Ahead MWh: 16,641

Figure 22: 2019 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	8	4	0	1	1		20	0	0			
DE	DPL							85					
IL	COMED				0	10	5	85	76	29	33	26	10
MD	BGE							2,352					
	DPL							65					
	PEPCO				0	1	1	277	1	2	0	1	0
NJ	AECO							41					
	JCPL							0					
	PSEG	693	292	212	5	7	88	485	87	30	0		
OH	AEP	17						69	22		12		
	ATSI												
	DEOK												
PA	APS	1			0		0	0	0	0	0	0	
	METED	23	5	4	33	57	13	54	8	2	10	20	64
	PECO	47	10	20	19					0		0	
	PENELEC		0			10		60					59
	PPL	1,290	138				0	361	1	120		0	58
VA	DOM	4											
WV	APS												
Total		2,083	449	236	58	86	107	3,954	194	183	56	47	192

Total Real-Time MWh: 7,644
Figure 23: 2019 Economic Demand Response Monthly Energy Market Revenue

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO	\$535	\$243	\$0	\$11	\$28		\$635	\$0	\$0			
DE	DPL							\$3,155					
IL	COMED				\$0	\$247	\$161	\$2,652	\$2,008	\$870	\$478	\$301	\$192
MD	BGE							\$96,682					
	DPL							\$1,762					
	PEPCO				\$4	\$25	\$31	\$8,828	\$18	\$98	\$5	\$44	\$13
NJ	AECO							\$1,354					
	JCPL						\$929	\$15,864					
	PSEG	\$71,974	\$10,346	\$32,796	\$56,854	\$30,113	\$9,529	\$33,496	\$12,882	\$1,165	\$4,794	\$16,748	\$13,216
OH	AEP	\$1,058						\$2,791	\$929		\$3,584		
	ATSI							\$9,355					
	DEOK							\$2,922		\$3,774			
PA	APS	\$70			\$0		\$0	\$20	\$17	\$34	\$110	\$0	
	METED	\$7,453	\$838	\$679	\$2,947	\$3,256	\$871	\$12,683	\$301	\$96	\$1,033	\$930	\$4,733
	PECO	\$72,950	\$10,398	\$29,604	\$4,783		(\$109)	\$5,434	\$2,107	\$1,211	\$3,820	\$7,355	\$3,125
	PENELEC		\$9,393	\$16,525	\$21,522	\$17,308	\$9,773	\$22,466	\$21,250	\$19,168	\$16,395	\$18,075	\$17,308
	PPL	\$118,136	\$7,443				(\$2)	\$17,807	\$27	\$7,387		\$0	\$5,678
VA	DOM	\$267											
WV	APS											\$1,094	
Total		\$272,442	\$38,661	\$79,605	\$86,121	\$50,976	\$21,182	\$237,906	\$39,539	\$33,802	\$30,219	\$44,546	\$44,265

Total CSP Credits: \$979,266
Figure 24: 2019 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						\$929	\$15,864					
	PSEG	\$42,270	\$2,964	\$24,756	\$56,734	\$29,902	\$7,193	\$12,744	\$10,692	\$447	\$4,794	\$16,748	\$13,216
OH	AEP												
	ATSI							\$9,355					
	DEOK							\$2,922		\$3,774			
PA	APS	\$10											
	METED	\$5,611	\$590	\$394	\$1,969	\$531	\$475	\$10,456					\$2,419
	PECO	\$67,366	\$9,865	\$29,467	\$4,583		(\$109)	\$5,434	\$2,107	\$1,211	\$3,820	\$7,355	\$3,125
	PENELEC		\$9,393	\$16,525	\$21,522	\$17,055	\$9,773	\$20,692	\$21,250	\$19,168	\$16,395	\$18,075	\$16,132
	PPL	\$34,882											
VA	DOM												
WV	APS											\$1,094	
Total		\$150,139	\$22,811	\$71,143	\$84,808	\$47,488	\$18,261	\$77,468	\$34,048	\$24,599	\$25,008	\$43,272	\$34,892

Total Day-Ahead CSP Credits: \$633,937

Figure 25: 2019 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	\$535	\$243	\$0	\$11	\$28		\$635	\$0	\$0			
DE	DPL							\$3,155					
IL	COMED				\$0	\$247	\$161	\$2,652	\$2,008	\$870	\$478	\$301	\$192
MD	BGE							\$96,682					
	DPL							\$1,762					
	PEPCO				\$4	\$25	\$31	\$8,828	\$18	\$98	\$5	\$44	\$13
NJ	AECO							\$1,354					
	JCPL							\$0					
	PSEG	\$29,704	\$7,382	\$8,040	\$121	\$211	\$2,336	\$20,751	\$2,190	\$718	\$0		
OH	AEP	\$1,058						\$2,791	\$929		\$3,584		
	ATSI												
	DEOK												
PA	APS	\$60			\$0		\$0	\$20	\$17	\$34	\$110	\$0	
	METED	\$1,842	\$248	\$285	\$979	\$2,725	\$395	\$2,227	\$301	\$96	\$1,033	\$930	\$2,315
	PECO	\$5,584	\$534	\$137	\$200					\$0		\$0	
	PENELEC		\$0			\$253		\$1,774					\$1,176
	PPL	\$83,253	\$7,443				(\$2)	\$17,807	\$27	\$7,387		\$0	\$5,678
VA	DOM	\$267											
WV	APS												
Total		\$122,303	\$15,850	\$8,462	\$1,313	\$3,488	\$2,921	\$160,438	\$5,491	\$9,202	\$5,211	\$1,274	\$9,374

Total Real-Time CSP Credits: \$345,328

Figure 26: 2019 Economic Demand Response Energy Market Cost Allocation by Zone

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AECO	\$3,107	\$402	\$813	\$712	\$370	\$251	\$3,732	\$479	\$353	\$284	\$388	\$384
AEP	\$43,073	\$6,115	\$12,606	\$14,331	\$8,719	\$3,283	\$33,120	\$6,109	\$5,553	\$5,385	\$7,628	\$6,948
APS	\$18,269	\$2,567	\$5,104	\$5,370	\$3,330	\$1,253	\$12,696	\$2,322	\$2,004	\$2,023	\$2,941	\$2,799
ATSI	\$20,920	\$3,150	\$6,706	\$7,709	\$4,429	\$1,672	\$18,548	\$3,247	\$2,791	\$2,799	\$3,876	\$3,971
BGE	\$12,438	\$1,635	\$3,148	\$3,355	\$2,170	\$924	\$9,674	\$1,636	\$1,408	\$1,250	\$1,739	\$1,906
COMED	\$18,936	\$4,237	\$8,395	\$9,312	\$5,596	\$2,441	\$30,419	\$4,964	\$4,276	\$2,384	\$4,458	\$4,258
DAY	\$6,000	\$837	\$1,776	\$2,122	\$1,188	\$480	\$4,896	\$884	\$819	\$793	\$1,038	\$1,439
DEOK	\$7,798	\$1,224	\$2,557	\$2,943	\$1,869	\$762	\$7,665	\$1,407	\$1,309	\$1,218	\$1,566	\$1,454
DOM	\$36,308	\$4,935	\$9,651	\$10,745	\$7,510	\$2,882	\$29,520	\$5,211	\$4,480	\$4,480	\$5,801	\$5,672
DPL	\$7,438	\$901	\$1,691	\$1,522	\$706	\$447	\$5,995	\$787	\$590	\$485	\$777	\$815
DUQ	\$4,108	\$623	\$1,264	\$1,464	\$965	\$366	\$3,892	\$695	\$624	\$606	\$770	\$687
EKPC	\$4,559	\$614	\$1,299	\$1,289	\$817	\$318	\$3,423	\$620	\$582	\$524	\$805	\$763
JCPL	\$7,427	\$911	\$1,989	\$1,863	\$883	\$566	\$8,501	\$1,084	\$829	\$677	\$955	\$979
METED	\$5,815	\$775	\$1,522	\$1,530	\$814	\$387	\$4,362	\$704	\$586	\$534	\$789	\$839
OVEC	\$37.93	\$6	\$13	\$13	\$8	\$3	\$25	\$5	\$4	\$4	\$6	\$6
PECO	\$14,213	\$1,755	\$3,650	\$3,583	\$1,471	\$903	\$12,344	\$1,620	\$1,256	\$995	\$1,685	\$1,627
PENELEC	\$5,304	\$860	\$1,751	\$1,940	\$1,071	\$410	\$4,260	\$764	\$560	\$680	\$1,001	\$913
PEPCO	\$11,147	\$1,511	\$2,897	\$3,118	\$2,155	\$880	\$9,155	\$1,569	\$1,351	\$1,205	\$1,697	\$1,725
PPL	\$15,052	\$2,006	\$4,004	\$3,848	\$1,699	\$887	\$10,791	\$1,622	\$1,335	\$1,143	\$2,018	\$1,963
PSEG	\$15,476	\$1,711	\$3,783	\$3,709	\$1,753	\$1,034	\$14,344	\$1,940	\$1,540	\$1,247	\$1,915	\$1,853
RECO	\$424	\$59	\$125	\$136	\$66	\$42	\$557	\$74	\$56	\$47	\$67	\$79
Exports	\$14,962	\$1,827	\$4,862	\$5,507	\$3,388	\$990	\$9,989	\$1,798	\$1,493	\$1,455	\$2,625	\$3,184
TOTAL	\$272,811	\$38,661	\$79,605	\$86,121	\$50,976	\$21,182	\$237,906	\$39,539	\$33,802	\$30,219	\$44,546	\$44,265

Total Zonal Charges: \$979,635

Figure 27: 2019 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	\$1,640	\$166	\$602	\$554	\$316	\$563	\$2,648	\$438	\$189	\$161	\$401	\$255
AEP	\$22,958	\$2,767	\$9,256	\$11,604	\$8,216	\$6,229	\$23,746	\$5,292	\$3,416	\$3,779	\$7,725	\$5,294
APS	\$9,767	\$1,149	\$3,759	\$4,319	\$3,134	\$2,404	\$9,255	\$2,028	\$1,227	\$1,406	\$2,972	\$2,095
ATSI	\$11,207	\$1,426	\$4,959	\$6,257	\$4,174	\$3,331	\$13,318	\$2,811	\$1,699	\$1,978	\$3,911	\$3,108
BGE	\$6,654	\$732	\$2,354	\$2,725	\$2,026	\$1,770	\$6,990	\$1,445	\$855	\$832	\$1,753	\$1,430
COMED	\$10,275	\$1,912	\$6,103	\$7,491	\$5,363	\$5,013	\$20,512	\$4,202	\$2,518	\$1,881	\$4,488	\$3,119
DAY	\$3,191	\$379	\$1,314	\$1,740	\$1,121	\$915	\$3,457	\$759	\$504	\$548	\$1,052	\$1,173
DEOK	\$4,084	\$555	\$1,876	\$2,389	\$1,761	\$1,460	\$5,426	\$1,211	\$810	\$831	\$1,585	\$1,110
DOM	\$19,385	\$2,196	\$7,130	\$8,688	\$7,033	\$5,430	\$21,366	\$4,562	\$2,769	\$3,114	\$5,858	\$4,286
DPL	\$3,950	\$374	\$1,239	\$1,192	\$598	\$959	\$4,276	\$715	\$319	\$273	\$802	\$541
DUQ	\$2,200	\$281	\$928	\$1,182	\$908	\$727	\$2,838	\$608	\$376	\$419	\$776	\$515
EKPC	\$2,409	\$277	\$955	\$1,038	\$765	\$624	\$2,397	\$538	\$359	\$361	\$824	\$572
JCPL	\$3,928	\$378	\$1,470	\$1,457	\$760	\$1,271	\$5,946	\$985	\$443	\$382	\$985	\$660
METED	\$3,100	\$340	\$1,113	\$1,207	\$733	\$778	\$3,190	\$630	\$348	\$348	\$806	\$593
OVEC	\$19.73	\$3	\$10	\$11	\$7	\$5	\$18	\$4	\$3	\$3	\$6	\$5
PECO	\$7,600	\$728	\$2,657	\$2,808	\$1,240	\$1,989	\$8,863	\$1,478	\$678	\$552	\$1,737	\$1,064
PENELEC	\$2,751	\$388	\$1,286	\$1,552	\$1,009	\$788	\$3,105	\$667	\$322	\$484	\$1,011	\$680
PEPCO	\$5,975	\$682	\$2,147	\$2,511	\$2,016	\$1,666	\$6,611	\$1,376	\$830	\$804	\$1,712	\$1,286
PPL	\$8,057	\$854	\$2,935	\$3,013	\$1,492	\$1,858	\$7,856	\$1,447	\$770	\$708	\$2,083	\$1,330
PSEG	\$7,981	\$708	\$2,776	\$2,896	\$1,514	\$2,256	\$10,180	\$1,752	\$837	\$720	\$1,970	\$1,262
RECO	\$212	\$25	\$92	\$107	\$59	\$91	\$393	\$67	\$31	\$28	\$69	\$60
Exports	\$7,761	\$822	\$3,858	\$4,689	\$3,283	\$1,773	\$6,831	\$1,505	\$982	\$1,007	\$2,633	\$2,657
TOTAL	\$145,103	\$17,142	\$58,815	\$69,431	\$47,528	\$41,898	\$169,223	\$34,522	\$20,284	\$20,619	\$45,159	\$33,093

Total Day-Ahead Zonal Charges: \$702,817

Figure 28: 2019 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	\$1,466	\$236	\$211	\$158	\$54	-\$312	\$1,084	\$41	\$164	\$123	-\$13	\$129
AEP	\$20,116	\$3,348	\$3,350	\$2,727	\$503	-\$2,945	\$9,373	\$817	\$2,138	\$1,607	-\$97	\$1,655
APS	\$8,502	\$1,418	\$1,346	\$1,050	\$196	-\$1,151	\$3,441	\$294	\$777	\$617	-\$30	\$704
ATSI	\$9,714	\$1,724	\$1,747	\$1,452	\$255	-\$1,658	\$5,230	\$436	\$1,092	\$821	-\$36	\$863
BGE	\$5,784	\$903	\$794	\$630	\$144	-\$846	\$2,684	\$190	\$554	\$418	-\$14	\$476
COMED	\$8,660	\$2,325	\$2,292	\$1,821	\$233	-\$2,572	\$9,907	\$763	\$1,757	\$504	-\$30	\$1,140
DAY	\$2,809	\$459	\$462	\$382	\$67	-\$435	\$1,439	\$125	\$316	\$245	-\$14	\$266
DEOK	\$3,714	\$669	\$681	\$554	\$108	-\$698	\$2,239	\$197	\$499	\$386	-\$19	\$344
DOM	\$16,923	\$2,739	\$2,521	\$2,057	\$477	-\$2,548	\$8,154	\$649	\$1,711	\$1,366	-\$57	\$1,386
DPL	\$3,488	\$527	\$452	\$330	\$108	-\$511	\$1,718	\$71	\$271	\$212	-\$25	\$274
DUQ	\$1,908	\$341	\$336	\$282	\$58	-\$361	\$1,055	\$87	\$249	\$186	-\$7	\$172
EKPC	\$2,150	\$338	\$344	\$252	\$52	-\$305	\$1,026	\$82	\$223	\$163	-\$19	\$191
JCPL	\$3,500	\$533	\$520	\$406	\$123	-\$705	\$2,555	\$99	\$386	\$295	-\$30	\$319
METED	\$2,715	\$435	\$409	\$323	\$81	-\$391	\$1,172	\$74	\$238	\$186	-\$17	\$246
OVEC	\$18.21	\$3	\$4	\$3	\$0	-\$2	\$6	\$1	\$2	\$1	\$0	\$2
PECO	\$6,613	\$1,028	\$993	\$776	\$231	-\$1,086	\$3,480	\$142	\$578	\$444	-\$52	\$562
PENELEC	\$2,553	\$472	\$465	\$388	\$62	-\$378	\$1,156	\$97	\$238	\$196	-\$9	\$233
PEPCO	\$5,172	\$829	\$750	\$606	\$138	-\$786	\$2,544	\$193	\$521	\$401	-\$14	\$440
PPL	\$6,995	\$1,152	\$1,068	\$835	\$207	-\$971	\$2,935	\$174	\$566	\$435	-\$65	\$634
PSEG	\$7,496	\$1,003	\$1,007	\$813	\$239	-\$1,222	\$4,164	\$187	\$703	\$527	-\$55	\$591
RECO	\$211	\$34	\$33	\$29	\$7	-\$49	\$164	\$7	\$25	\$19	-\$1	\$19
Exports	\$7,201	\$1,005	\$1,004	\$818	\$106	-\$782	\$3,159	\$293	\$511	\$448	-\$8	\$528
TOTAL	\$127,709	\$21,520	\$20,789	\$16,690	\$3,448	-\$20,716	\$68,684	\$5,017	\$13,517	\$9,600	-\$612	\$11,172

Total Real-Time Zonal Charges: \$276,818

Figure 29: 2019 Load Management Demand Response Monthly Capacity Revenue from RPM

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AECO	\$1,063,052	\$960,176	\$1,063,052	\$1,028,760	\$1,063,052	\$436,515	\$451,066	\$451,066	\$436,515	\$451,065	\$436,515	\$451,066
AEP	\$6,675,669	\$6,029,636	\$6,675,669	\$6,460,325	\$6,675,669	\$3,450,422	\$3,565,436	\$3,565,436	\$3,450,422	\$3,565,436	\$3,450,422	\$3,565,436
APS	\$4,638,234	\$4,189,373	\$4,638,234	\$4,488,614	\$4,638,234	\$2,285,119	\$2,361,289	\$2,361,289	\$2,285,119	\$2,361,289	\$2,285,119	\$2,361,289
ATSI	\$4,254,499	\$3,842,773	\$4,254,499	\$4,117,257	\$4,254,499	\$2,344,392	\$2,422,538	\$2,422,538	\$2,344,392	\$2,422,538	\$2,344,392	\$2,422,538
BGE	\$1,471,812	\$1,329,378	\$1,471,812	\$1,424,334	\$1,471,812	\$630,148	\$651,153	\$651,153	\$630,148	\$651,153	\$630,148	\$651,153
COMED	\$11,763,628	\$10,625,212	\$11,763,628	\$11,384,156	\$11,763,628	\$9,639,882	\$9,961,211	\$9,961,211	\$9,639,882	\$9,961,211	\$9,639,882	\$9,961,211
DAY	\$1,082,665	\$977,891	\$1,082,665	\$1,047,740	\$1,082,665	\$533,882	\$551,678	\$551,678	\$533,882	\$551,678	\$533,882	\$551,678
DEOK	\$996,130	\$899,730	\$996,130	\$963,997	\$996,130	\$608,291	\$628,567	\$628,567	\$608,291	\$628,567	\$608,291	\$628,567
DOM	\$3,841,793	\$3,470,007	\$3,841,793	\$3,717,864	\$3,841,793	\$1,760,122	\$1,818,792	\$1,818,792	\$1,760,122	\$1,818,792	\$1,760,122	\$1,818,792
DPL	\$2,760,840	\$2,493,662	\$2,760,840	\$2,671,780	\$2,760,840	\$1,133,435	\$1,171,216	\$1,171,216	\$1,133,435	\$1,171,216	\$1,133,435	\$1,171,216
DUQ	\$1,229,930	\$1,110,904	\$1,229,930	\$1,190,255	\$1,229,930	\$599,460	\$619,442	\$619,442	\$599,460	\$619,442	\$599,460	\$619,442
EKPC	\$688,069	\$621,482	\$688,069	\$665,873	\$688,069	\$417,480	\$431,396	\$431,396	\$417,480	\$431,396	\$417,480	\$431,396
JCPL	\$1,324,124	\$1,195,983	\$1,324,124	\$1,281,410	\$1,324,124	\$605,867	\$626,062	\$626,062	\$605,867	\$626,062	\$605,867	\$626,062
METED	\$1,527,708	\$1,379,865	\$1,527,708	\$1,478,427	\$1,527,708	\$775,740	\$801,598	\$801,598	\$775,740	\$801,598	\$775,740	\$801,598
PECO	\$3,342,110	\$3,018,680	\$3,342,110	\$3,234,300	\$3,342,110	\$1,582,953	\$1,635,718	\$1,635,718	\$1,582,953	\$1,635,718	\$1,582,953	\$1,635,718
PENELEC	\$1,811,449	\$1,636,148	\$1,811,449	\$1,753,015	\$1,811,449	\$830,090	\$857,760	\$857,760	\$830,090	\$857,760	\$830,090	\$857,760
PEPCO	\$806,881	\$728,796	\$806,881	\$780,853	\$806,881	\$142,570	\$147,322	\$147,322	\$142,570	\$147,322	\$142,570	\$147,322
PPL	\$2,314,965	\$2,090,936	\$2,314,965	\$2,240,289	\$2,314,965	\$1,801,961	\$1,862,026	\$1,862,026	\$1,801,961	\$1,862,026	\$1,801,961	\$1,862,026
PSEG	\$2,521,890	\$2,277,836	\$2,521,890	\$2,440,539	\$2,521,890	\$1,157,439	\$1,196,021	\$1,196,021	\$1,157,439	\$1,196,021	\$1,157,439	\$1,196,021
RECO	\$48,971	\$44,232	\$48,971	\$47,392	\$48,971	\$30,889	\$31,919	\$31,919	\$30,889	\$31,919	\$30,889	\$31,919
Total	\$54,164,419	\$48,922,701	\$54,164,419	\$52,417,179	\$54,164,419	\$30,766,656	\$31,792,211	\$31,792,211	\$30,766,656	\$31,792,211	\$30,766,656	\$31,792,211

Total Capacity Credits: \$483,301,949

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Figure 30: 2019 Economic Demand Response Dispatched vs Settled Real-Time Energy Market Summary

Time		CSPs		Zone		Registrations			MWh			Registration Hours		
Year	Month	Dispatched	Settled	Dispatched	Settled	Dispatched	Settled	%	Dispatched	Settled	%	Dispatched	Settled	%
2019	1	7	7	8	8	13	13	100%	1,630	2,083	128%	488	488	100%
2019	2	5	5	6	6	8	8	100%	299	449	150%	136	136	100%
2019	3	4	4	4	4	5	5	100%	98	236	240%	79	79	100%
2019	4	5	5	6	6	10	10	100%	36	58	160%	87	87	100%
2019	5	4	4	5	5	9	9	100%	99	86	87%	259	259	100%
2019	6	5	5	6	6	11	11	100%	217	107	49%	203	203	100%
2019	7	10	10	12	12	33	33	100%	6,484	3,954	61%	1,027	1,027	100%
2019	8	5	5	7	7	13	13	100%	510	194	38%	509	509	100%
2019	9	6	6	7	7	11	11	100%	212	183	86%	406	406	100%
2019	10	5	5	6	6	8	8	100%	61	56	91%	173	173	100%
2019	11	5	5	6	6	9	9	100%	296	47	16%	239	239	100%
2019	12	4	4	5	5	8	8	100%	183	192	105%	232	232	100%
YTD Totals						138	138	100%	10,127	7,644	75%	3,838	3,838	100%
YTD Average		5		7										

Figure 31: 2019 Economic Demand Response Cleared vs Settled Day-Ahead Energy Market Summary

Time		CSPs		Zone		Registrations			MWh			Registration Hours		
Year	Month	Cleared	Settled	Cleared	Settled	Cleared	Settled	%	Cleared	Settled	%	Cleared	Settled	%
2019	1	6	6	5	5	8	8	100%	1,900	1,953	103%	355	355	100%
2019	2	5	5	4	4	5	5	100%	361	480	133%	97	97	100%
2019	3	4	4	4	4	5	5	100%	1,677	2,060	123%	494	494	100%
2019	4	4	4	4	4	6	6	100%	2,433	3,009	124%	624	624	100%
2019	5	3	3	3	3	5	5	100%	1,790	1,761	98%	427	427	100%
2019	6	4	4	5	5	5	5	100%	1,342	621	46%	251	251	100%
2019	7	6	6	7	7	14	14	100%	4,231	1,873	44%	598	598	100%
2019	8	2	2	3	3	3	3	100%	1,069	1,079	101%	306	306	100%
2019	9	3	3	4	4	10	10	100%	574	683	119%	142	142	100%
2019	10	3	2	3	3	5	4	80%	708	791	112%	178	175	98%
2019	11	4	4	4	4	6	6	100%	1,351	1,259	93%	344	344	100%
2019	12	4	4	4	4	6	6	100%	1,084	1,072	99%	320	320	100%
YTD Totals						78	77	99%	18,520	16,641	90%	4,136	4,133	100%
YTD Average		4		4										

Figure 32: 2019 Economic Demand Response Regulation Market Participation

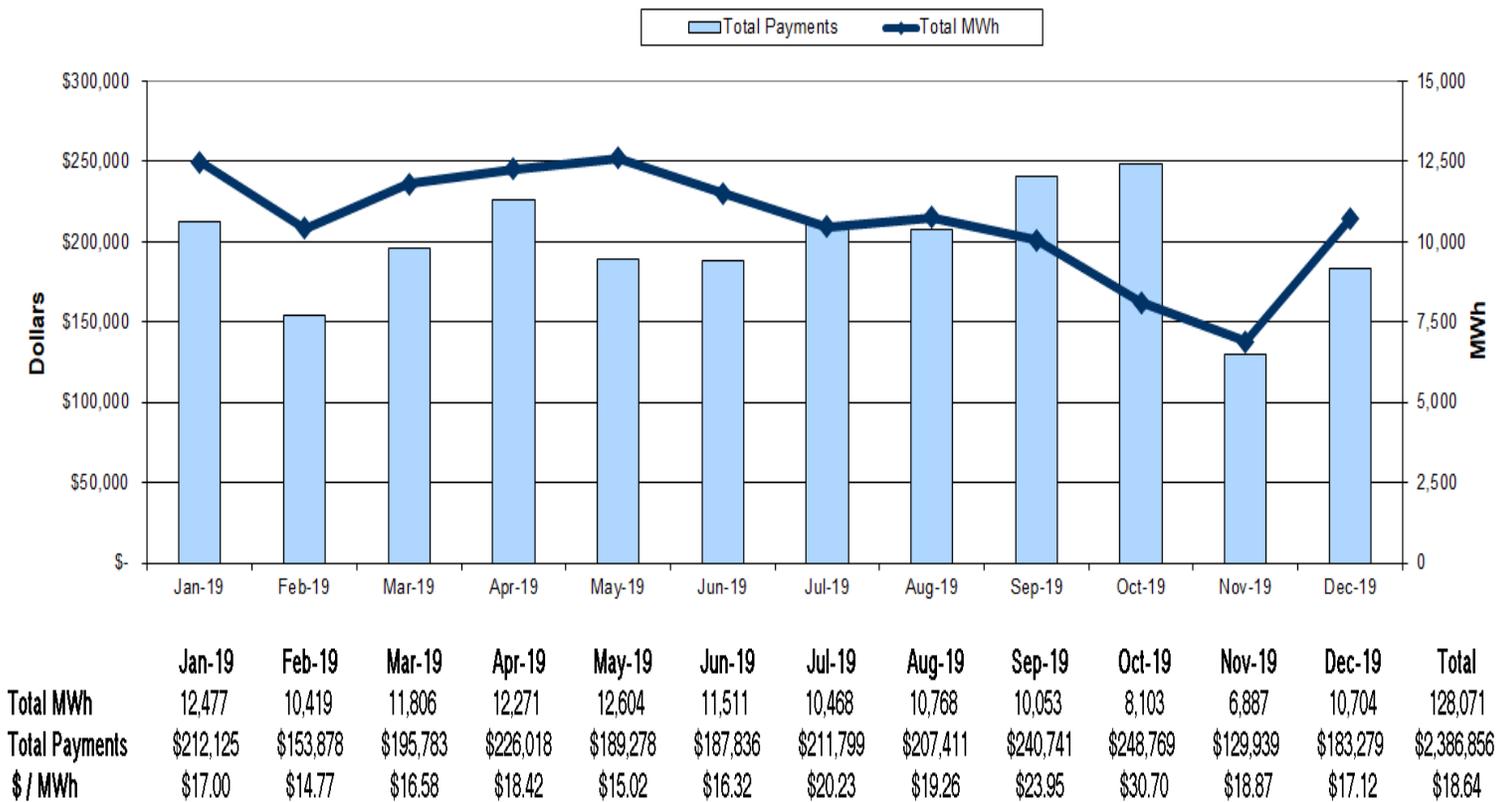
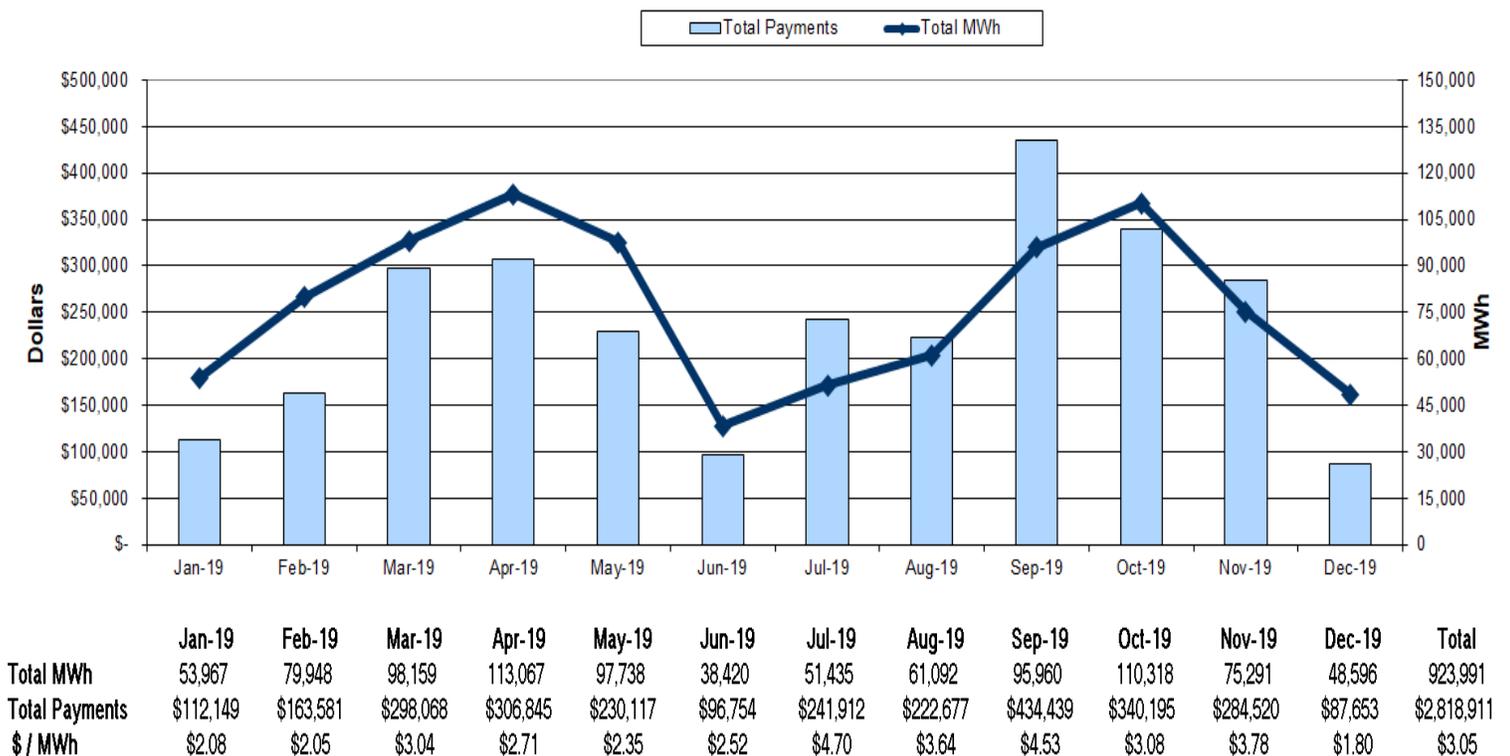
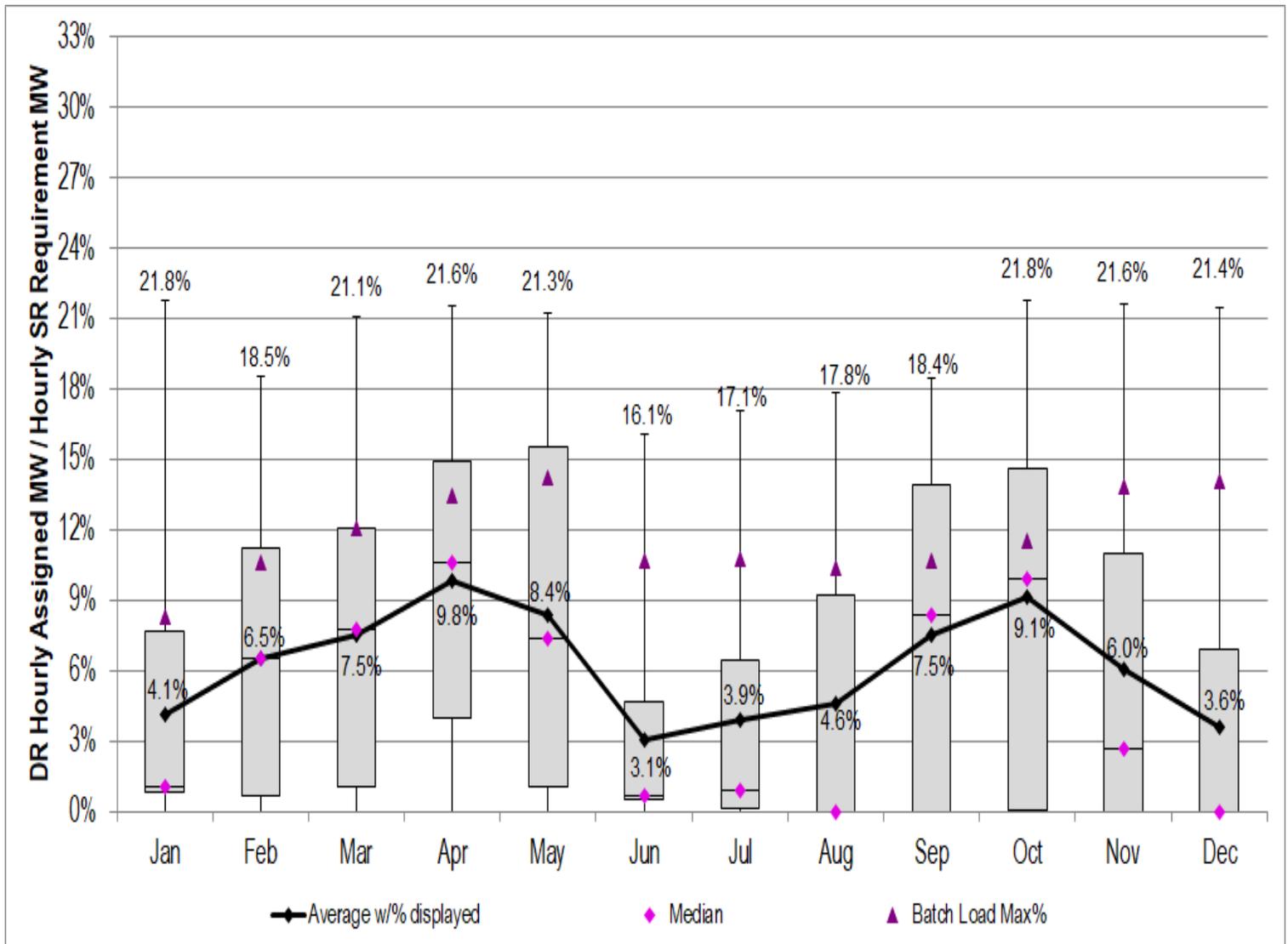


Figure 33: 2019 Economic Demand Response Synchronous Reserve Market Participation

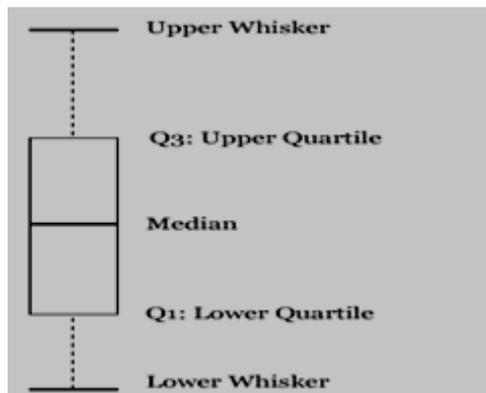


Note: For Figures 32 and 33 above, MWh=sum of the settled MW. Example: 1 MW load available for 12 hours = 12 MWh.

Figure 34: Economic DR Synchronous Reserve Penetration Distribution (Box-plot) for 2019



- 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