

2021 Demand Response Operations Markets Activity Report: March 2022

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PJM Demand Side Response Operations

March 9, 2022



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Figure 1: DY 21/22 Active Participants in DR Programs

State	Zone	EDC	Economic		Load Management		Price Responsive Demand		Unique	
			Locations	MW	Locations	MW	Locations	MW	Locations	MW
DC	PEPCO	PEPCO	1	13.8	234	88.5			234	88.5
DE	DPL	DEMEC	9	5.4	22	21.5			22	21.5
DE	DPL	DOVDE			15	2.3			15	2.3
DE	DPL	DPL	3	99.0	186	73.3	140.0	30.0	327	103.4
DE	DPL	ODEC			11	3.8			11	3.8
DE	DPL-SOUTH	DPL					104.0	9.5	104	9.5
IL	COMED	COMED	56	60.4	2,513	1,391.7			2,552	1,395.6
IL	COMED	IMEAA1			2	22.0			2	22.0
IN	AEP	AEPIMP			146	388.4			146	388.4
IN	AEP	HEREC			1	27.1			1	27.1
IN	AEP	WVPA	1	6.1	1	6.0			1	6.0
KY	AEP	AEPKPT			7	14.5			7	14.5
KY	DEOK	DEK			2	3.5			2	3.5
KY	EKPC	EKPC			12	202.6			12	202.6
MD	APS	AETSAP	10	25.0	110	81.1			112	81.3
MD	APS	FESCTH			1	0.2			1	0.2
MD	BGE	BC	28	288.0	611	157.7	61.0	287.5	675	445.5
MD	DPL	DPL	8	44.6	136	32.5	39.0	6.9	175	39.4
MD	DPL	EASTON			7	1.8			7	1.8
MD	DPL	ODEC			13	9.1			13	9.1
MD	DPL-SOUTH	DPL					292.0	23.5	292	23.5
MD	PEPCO	PEPCO	5	158.0	261	68.3	1,341.0	204.7	1,606	273.4
MD	PEPCO	SMECO	5	0.7	36	6.3			38	6.5
MI	AEP	AEPIMP			1	15.3			1	15.3
NJ	AECO	AE	6	2.2	172	45.9			173	46.0
NJ	AECO	VMEU			24	5.9			24	5.9
NJ	JCPL	JCBGS	8	1.2	317	108.5			320	109.2
NJ	PSEG	BSRNJ	1	10.0					1	10.0
NJ	PSEG	PSEG	17	50.4	885	317.0			894	329.8
NJ	RECO	RECO			15	2.8			15	2.8
NY	PENELEC	PaElec			1	1.3			1	1.3
OH	AEP	AEOPT	58	230.7	795	724.0			804	738.0
OH	AEP	AMPO	1	10.0	55	58.5			56	68.5
OH	ATSI	AMPO			22	32.0			22	32.0
OH	ATSI	CPP			14	15.8			14	15.8
OH	ATSI	OEECD	16	136.0	906	959.5			917	1,057.8
OH	DAY	AMPO			19	19.6			19	19.6
OH	DAY	DAYEDC	2	1.5	174	167.6			174	167.6
OH	DEOK	AMPO			8	19.0			8	19.0
OH	DEOK	DEOEDC	3	134.2	329	137.2			330	172.2
PA	APS	AECI			2	1.7			2	1.7
PA	APS	AETSAP	7	74.6	560	288.2			561	289.2
PA	ATSI	PAPWR	11	86.4	96	79.8			105	81.2
PA	DUQ	DLCO	18	59.2	357	106.2			370	164.6
PA	METED	MetEd	12	31.8	401	182.0			402	182.2
PA	PECO	PE	31	71.1	909	322.8			915	350.8
PA	PENELEC	AECI			8	12.5			8	12.5
PA	PENELEC	PaElec	4	65.5	487	276.1			489	300.1



State	Zone	EDC	Economic		Load Management		Price Responsive Demand		Unique	
			Locations	MW	Locations	MW	Locations	MW	Locations	MW
PA	PENELEC	WELLSB			2	1.3			2	1.3
PA	PPL	AMPO			8	14.5			8	14.5
PA	PPL	CTZECL			2	1.4			2	1.4
PA	PPL	PPL	27	145.3	1,037	525.8			1,050	555.1
PA	PPL	UGI-UI			12	3.8			12	3.8
TN	AEP	AEPAPT			10	3.5			10	3.5
VA	AEP	AEPAPT	8	13.5	239	296.3			243	301.6
VA	AEP	AMPO	1	10.0	17	6.1			17	6.1
VA	AEP	RADFRD			1	1.2			1	1.2
VA	AEP	VATECH			1	2.6			1	2.6
VA	APS	ODEC	2	0.4	48	31.6			48	31.6
VA	DOM	CVEC			10	17.0			10	17.0
VA	DOM	DOMEDC	61	126.5	883	626.0			927	730.9
VA	DOM	DOMVME			27	88.4			27	88.4
VA	DOM	NVEC	1	0.5	99	8.9			99	8.9
VA	DOM	ODEC	4	0.5	43	17.2			46	17.5
VA	DPL	ODEC			13	1.1			13	1.1
WV	AEP	AEPAPT	6	80.6	193	437.0			195	517.1
WV	APS	AETSAP	27	61.8	251	247.7			251	247.7
Total			458	2,105	13,780	8,833	1,977	562	15,942	9,914

- Note:
- 1) Data as of 3/2/2022.
 - 2) Load Management MW are Winter ICAP, PRD MW are 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 9, 2022, DY21/22 RPM Committed Values is 6,337 MW for Load Management.
 - 7) As of March 9, 2022, DY21/22 RPM Committed Values is 510 MW for PRD.

Figure 2: DY 21/22 MWs in Load Management DR by Resource, Product, and Lead Times

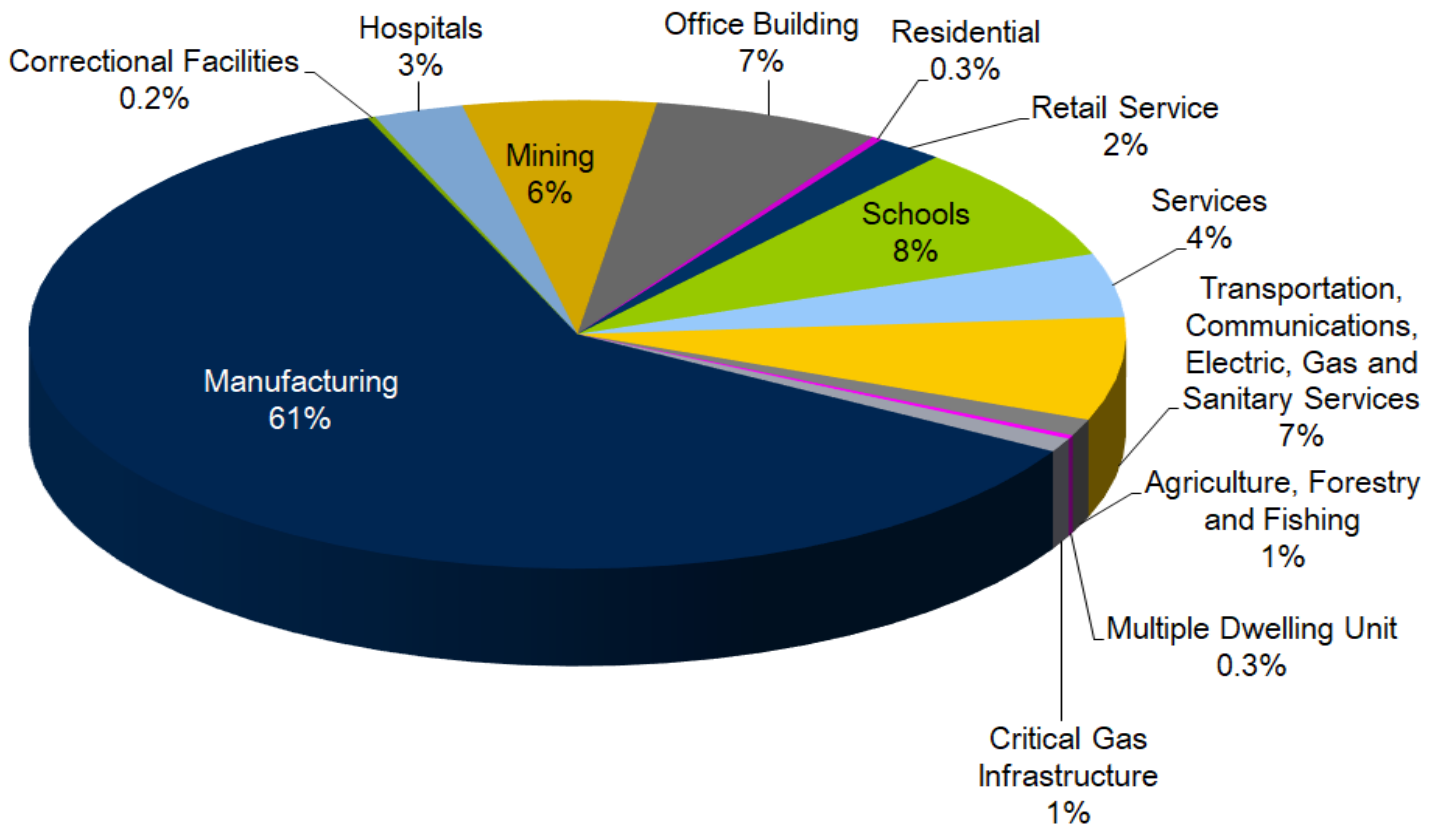
Zone		Capacity Performance	Lead Times (Minutes)			Total DR
		Annual	30	60	120	MW
AECO						
	Pre-Emergency	51.1	37.6	2.8	10.8	51.1
	Emergency	0.7	0.0	0.7	0.0	0.7
	Total	51.8	37.6	3.4	10.8	51.8
AEP						
	Pre-Emergency	1,943.2	937.3	163.2	842.7	1,943.2
	Emergency	37.4	21.1	1.1	15.3	37.4
	Total	1,980.6	958.4	164.3	857.9	1,980.6
APS						
	Pre-Emergency	628.6	329.0	23.7	275.9	628.6
	Emergency	21.9	17.0	0.0	5.0	21.9
	Total	650.5	345.9	23.7	280.9	650.5
ATSI						
	Pre-Emergency	1,034.6	410.7	69.3	554.6	1,034.6
	Emergency	52.4	23.5	2.2	26.8	52.4
	Total	1,087.0	434.2	71.5	581.4	1,087.0
BGE						
	Pre-Emergency	145.7	91.9	13.9	39.8	145.7
	Emergency	12.0	9.2	0.0	2.8	12.0
	Total	157.7	101.2	13.9	42.6	157.7
COMED						
	Pre-Emergency	1,349.7	929.6	29.2	390.9	1,349.7
	Emergency	63.9	33.6	2.7	27.7	63.9
	Total	1,413.6	963.2	31.9	418.5	1,413.6
DAY						
	Pre-Emergency	179.7	101.1	3.5	75.1	179.7
	Emergency	7.5	6.9	0.0	0.6	7.5
	Total	187.2	108.0	3.5	75.7	187.2
DEOK						
	Pre-Emergency	158.3	109.6	6.2	42.5	158.3
	Emergency	1.4	1.4	0.0	0.0	1.4
	Total	159.7	111.0	6.2	42.5	159.7
DOM						
	Pre-Emergency	599.4	165.5	32.7	401.2	599.4
	Emergency	158.0	87.3	14.2	56.5	158.0
	Total	757.4	252.8	46.9	457.7	757.4
DPL						
	Pre-Emergency	141.7	96.2	3.0	42.5	141.7
	Emergency	3.7	1.2	1.9	0.7	3.7
	Total	145.4	97.3	4.9	43.2	145.4
DUQ						
	Pre-Emergency	105.8	58.3	6.2	41.4	105.8
	Emergency	0.3	0.3	0.0	0.0	0.3
	Total	106.2	58.6	6.2	41.4	106.2
EKPC						
	Pre-Emergency	200.6	33.7	16.3	150.6	200.6
	Emergency	2.1	2.1	0.0	0.0	2.1
	Total	202.6	35.8	16.3	150.6	202.6
JCPL						
	Pre-Emergency	104.1	68.8	2.0	33.3	104.1
	Emergency	4.4	4.4	0.0	0.0	4.4
	Total	108.5	73.2	2.0	33.3	108.5
METED						
	Pre-Emergency	182.0	113.3	11.9	56.7	182.0

Zone	Capacity Performance		Lead Times (Minutes)			Total DR
	Annual		30	60	120	MW
Emergency	0.0		0.0	0.0	0.0	0.0
Total	182.0		113.3	11.9	56.7	182.0
PECO						
Pre-Emergency	318.9		210.6	11.7	96.5	318.9
Emergency	3.9		2.3	0.0	1.6	3.9
Total	322.8		213.0	11.7	98.1	322.8
PENELEC						
Pre-Emergency	282.2		117.5	14.7	150.1	282.2
Emergency	9.0		0.9	8.2	0.0	9.0
Total	291.3		118.3	22.9	150.1	291.3
PEPCO						
Pre-Emergency	154.7		138.0	1.2	15.4	154.7
Emergency	8.4		8.4	0.0	0.0	8.4
Total	163.1		146.4	1.2	15.4	163.1
PPL						
Pre-Emergency	544.4		272.1	22.6	249.8	544.4
Emergency	1.0		0.2	0.0	0.9	1.0
Total	545.5		272.3	22.6	250.7	545.5
PSEG						
Pre-Emergency	317.0		244.7	10.3	62.0	317.0
Emergency	0.0		0.0	0.0	0.0	0.0
Total	317.0		244.7	10.3	62.0	317.0
RECO						
Pre-Emergency	2.8		2.8	0.0	0.0	2.8
Emergency	0.0		0.0	0.0	0.0	0.0
Total	2.8		2.8	0.0	0.0	2.8
TOTAL						
Pre-Emergency	8,444.4		4,468.3	444.5	3,531.7	8,444.4
Emergency	388.2		219.7	30.8	137.6	388.2
Total	8,832.6		4,688.0	475.3	3,669.3	8,832.6

Note:

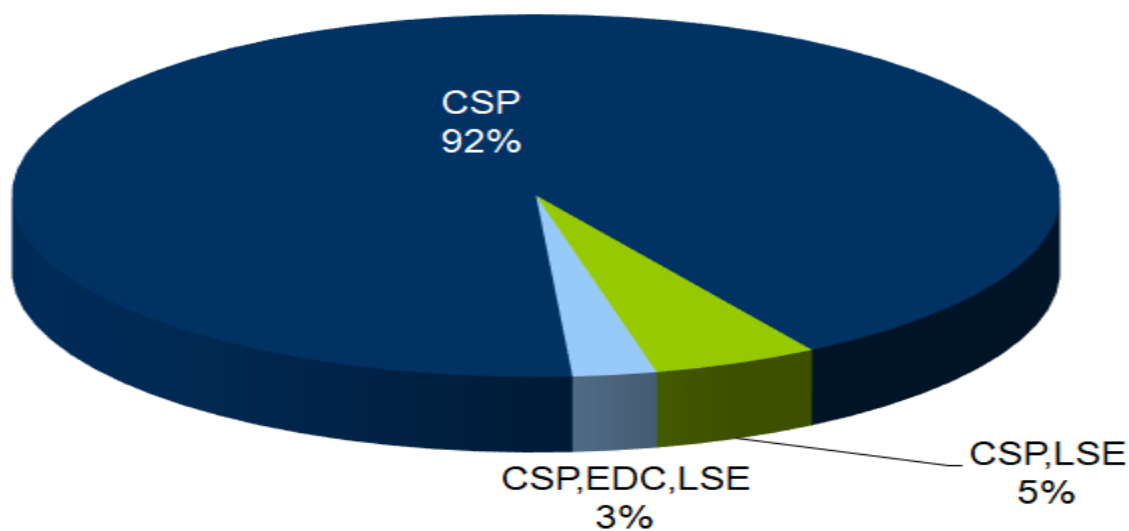
- 1) Data as of 3/2/2022.
- 2) Load Management MW are Winter ICAP.

Figure 3: DY 21/22 Confirmed Load Management DR Registrations Business Segments



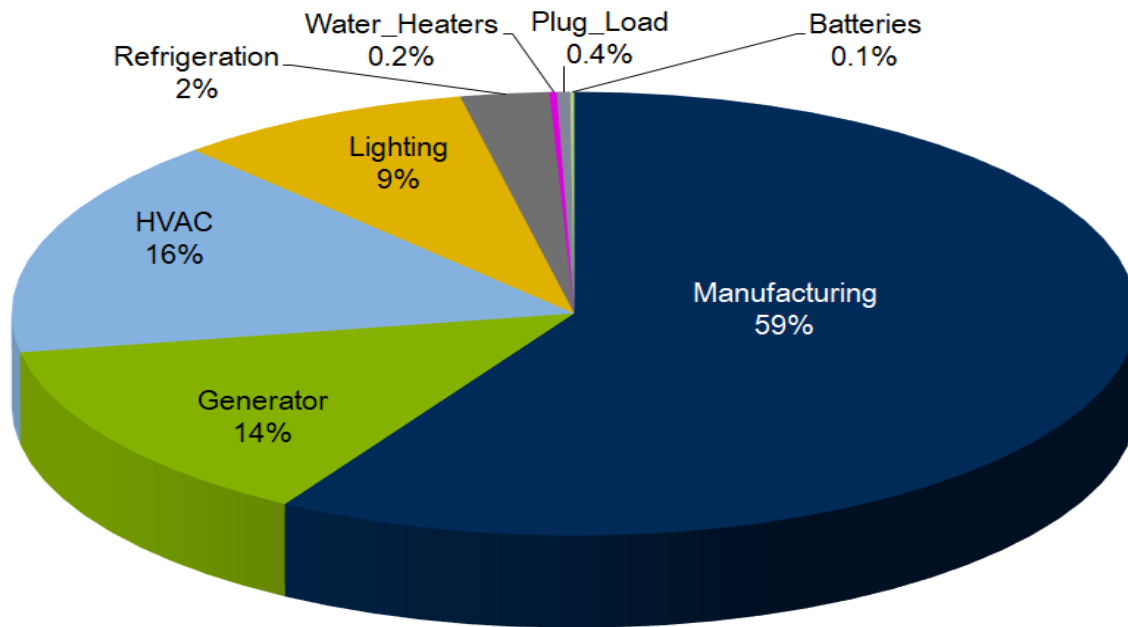
Note: Percent of Winter Nominated Capacity (MWs).

Figure 4: DY 21/22 Confirmed Load Management DR Registrations Owner/Company Type



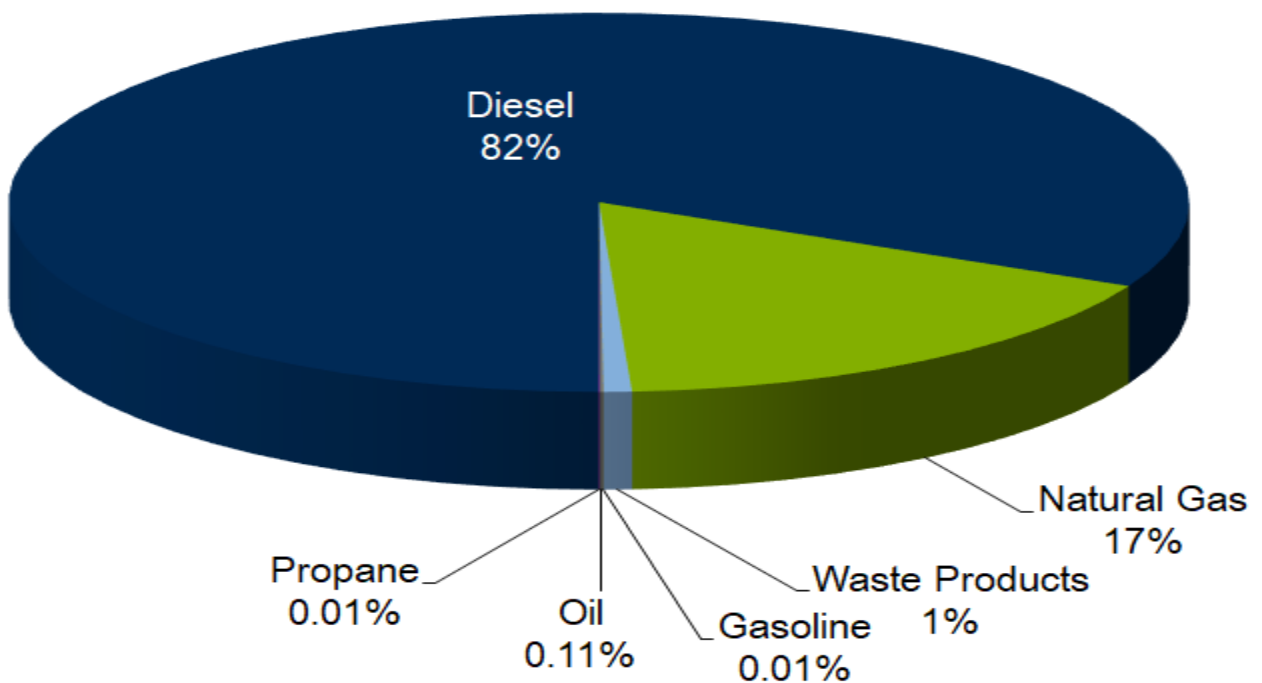
Note: Percent of Winter Nominated Capacity (MWs).

Figure 5: DY 21/22 Confirmed Load Management DR Registrations Customer Load Reduction Methods



Note: Percent of Winter Nominated Capacity (MWs).

Figure 6: DY 21/22 Confirmed Load Management DR Registrations Fuel Mix with Behind the Meter Generation



Note: Percent of Winter Nominated Capacity (MWs).

Figure 7: DY 21/22 Confirmed Load Management DR Registrations Generator and Permit Type

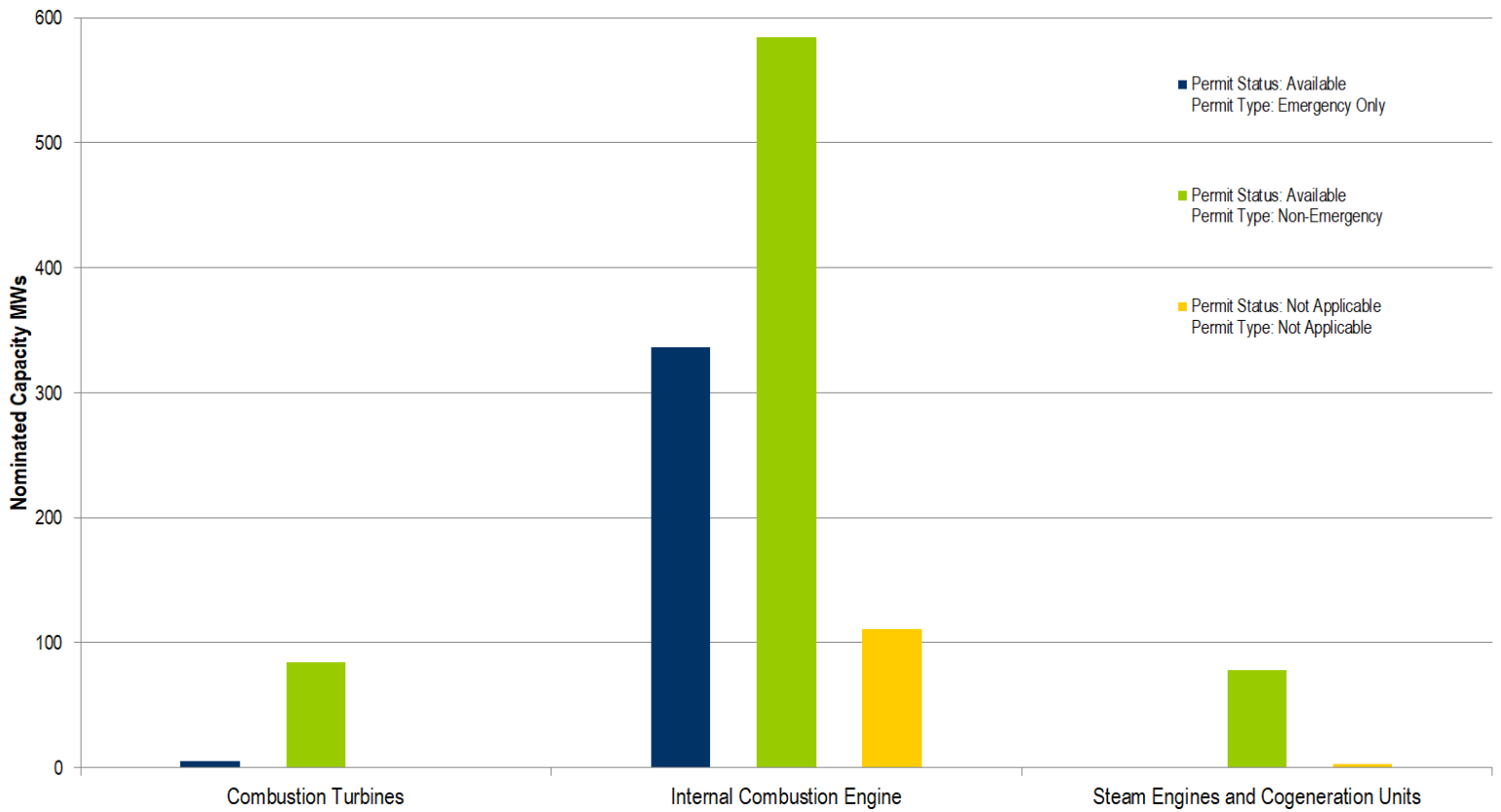


Figure 8: DY 21/22 Confirmed Load Management DR Registrations Fuel Mix with Behind the Meter Generation

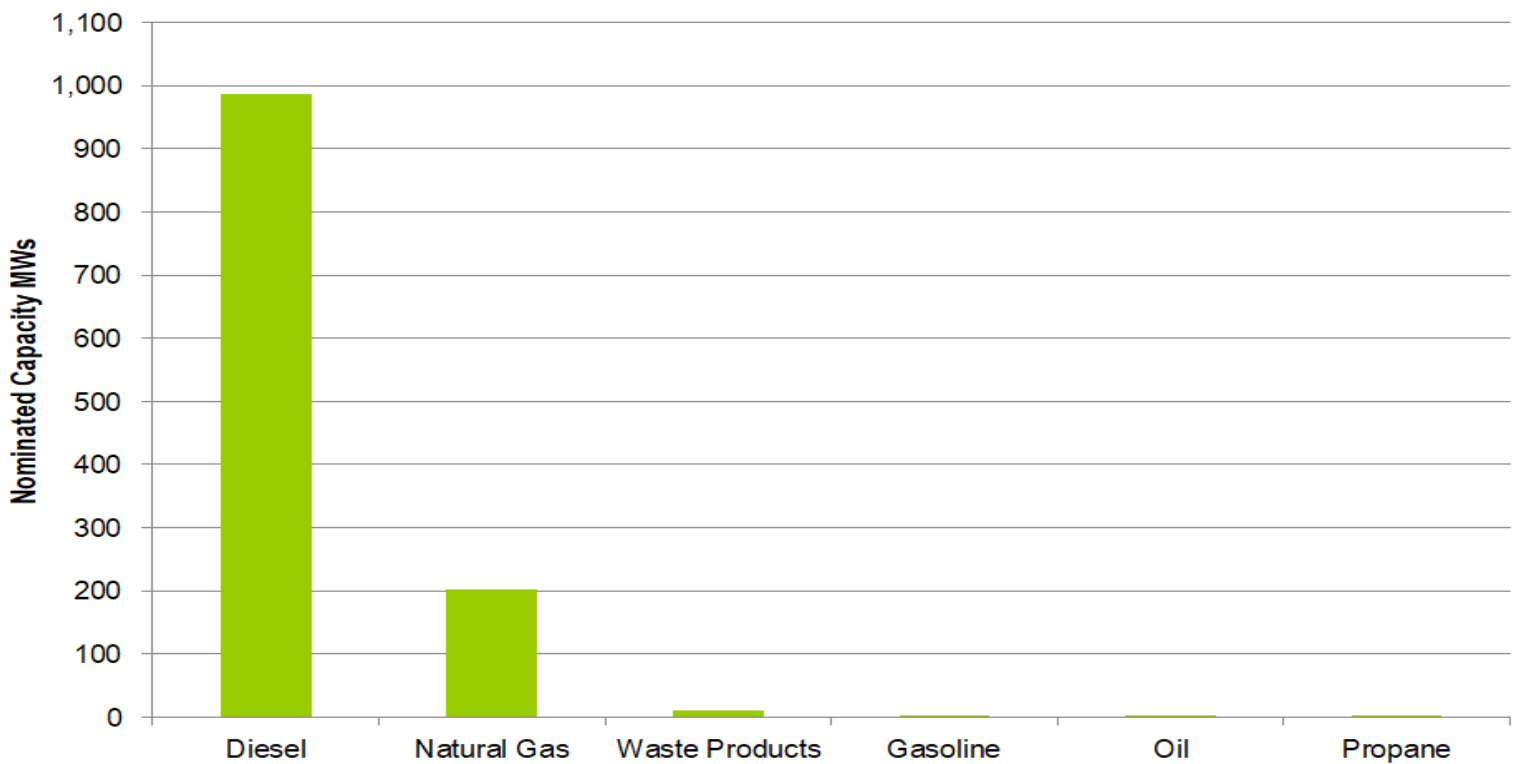
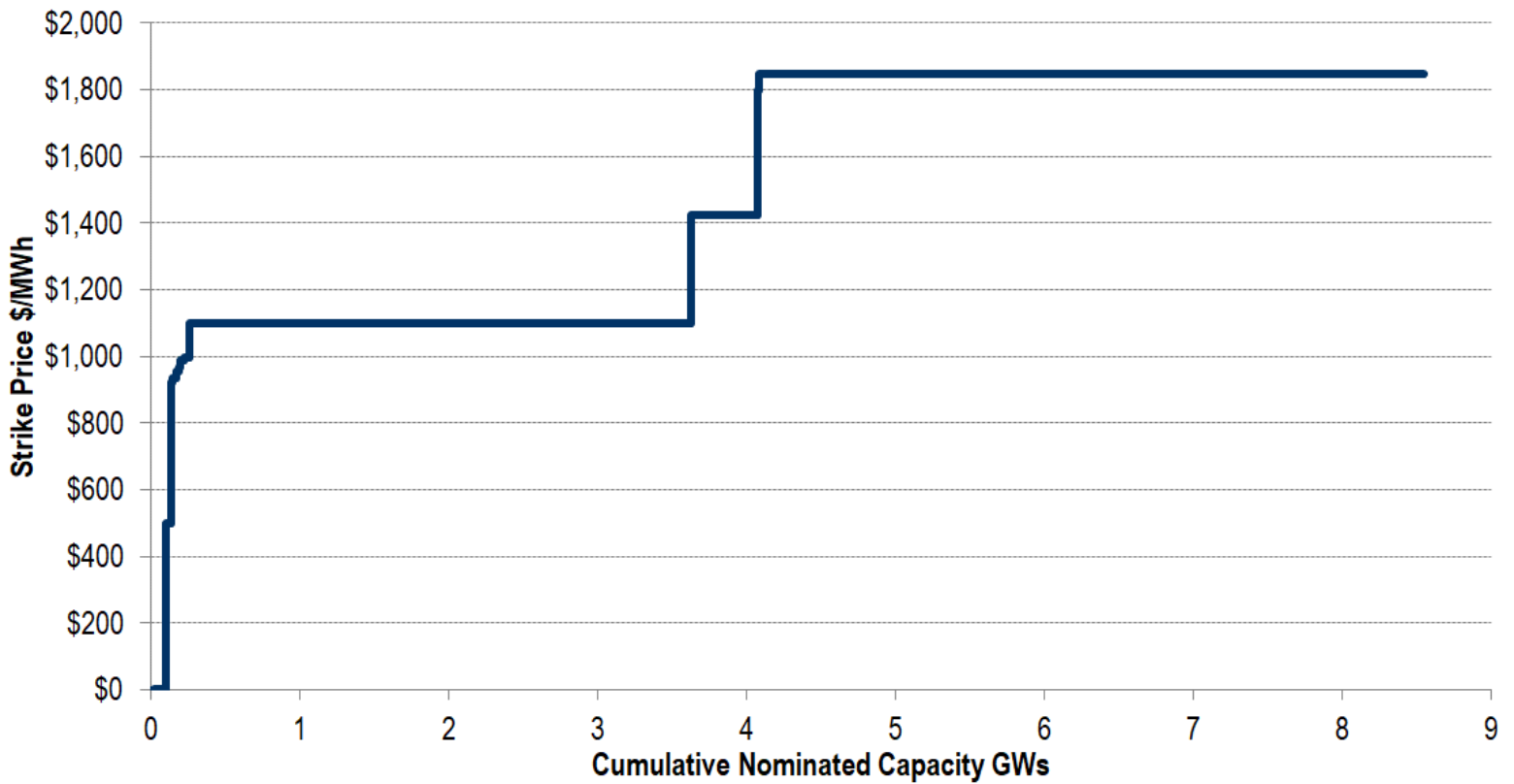


Figure 9: DY 21/22 Confirmed Load Management Full DR Registrations Energy Supply Curve:



Note: Winter Nominated Capacity (GWs).

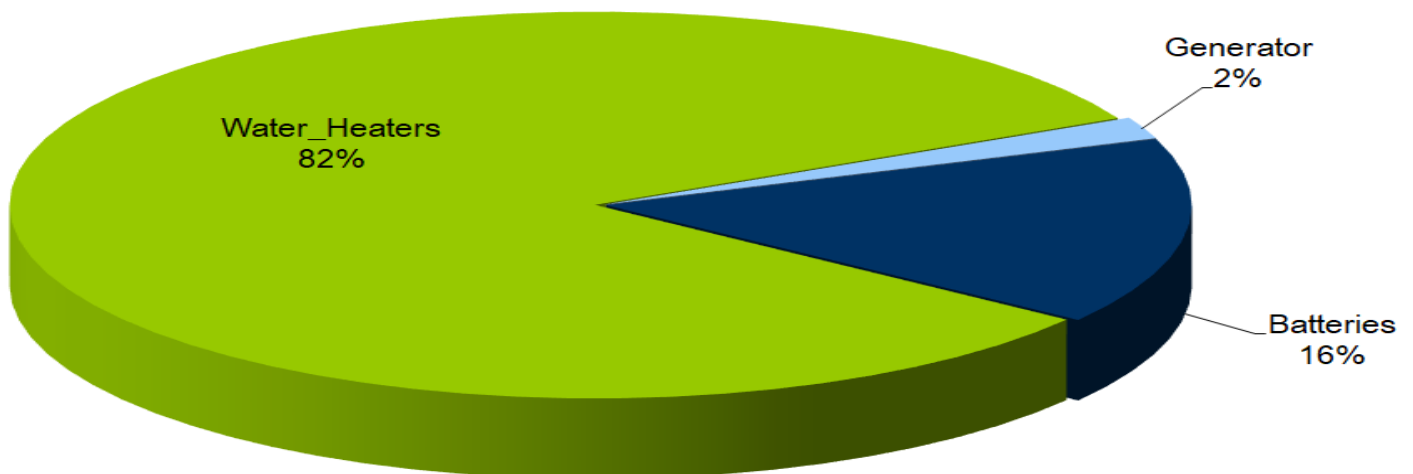
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Figure 10: 2021 Economic Demand Response Capability in the Ancillary Service Markets

Synch Reserves	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Locations	MAD	50	52	55	55	56	98	94	95	134	134	133	133
	Non-MAD	32	32	33	33	35	61	104	106	107	111	112	111
	RTO	82	84	88	88	91	159	198	201	241	245	245	244
Average Number of Unique Participating Locations per Month:		164											
MWs	MAD	268	363	425	435	449	448	445	445	448	436	437	439
	Non-MAD	468	466	471	495	504	608	613	615	662	667	675	671
	RTO	736	829	897	929	953	1057	1057	1059	1110	1103	1113	1110
Average MWs per Month:		996											

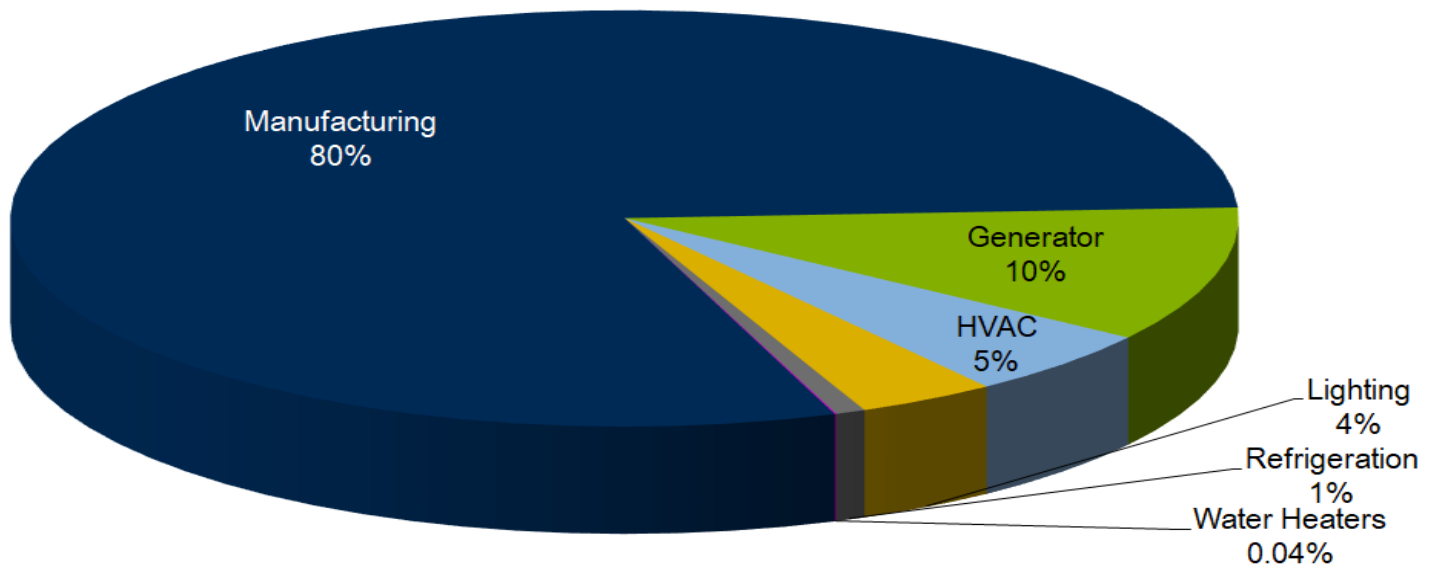
Regulation	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Locations	RTO	137	135	135	135	137	136	136	135	131	130	130	138
Average Number of Unique Participating Locations per Month:		135											
MWs	RTO	79	77	77	77	79	79	79	78	74	73	73	89
Average MWs per Month:		78											

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: 2021 PJM Demand Response Confirmed Regulation Registrations Load Reduction Methods


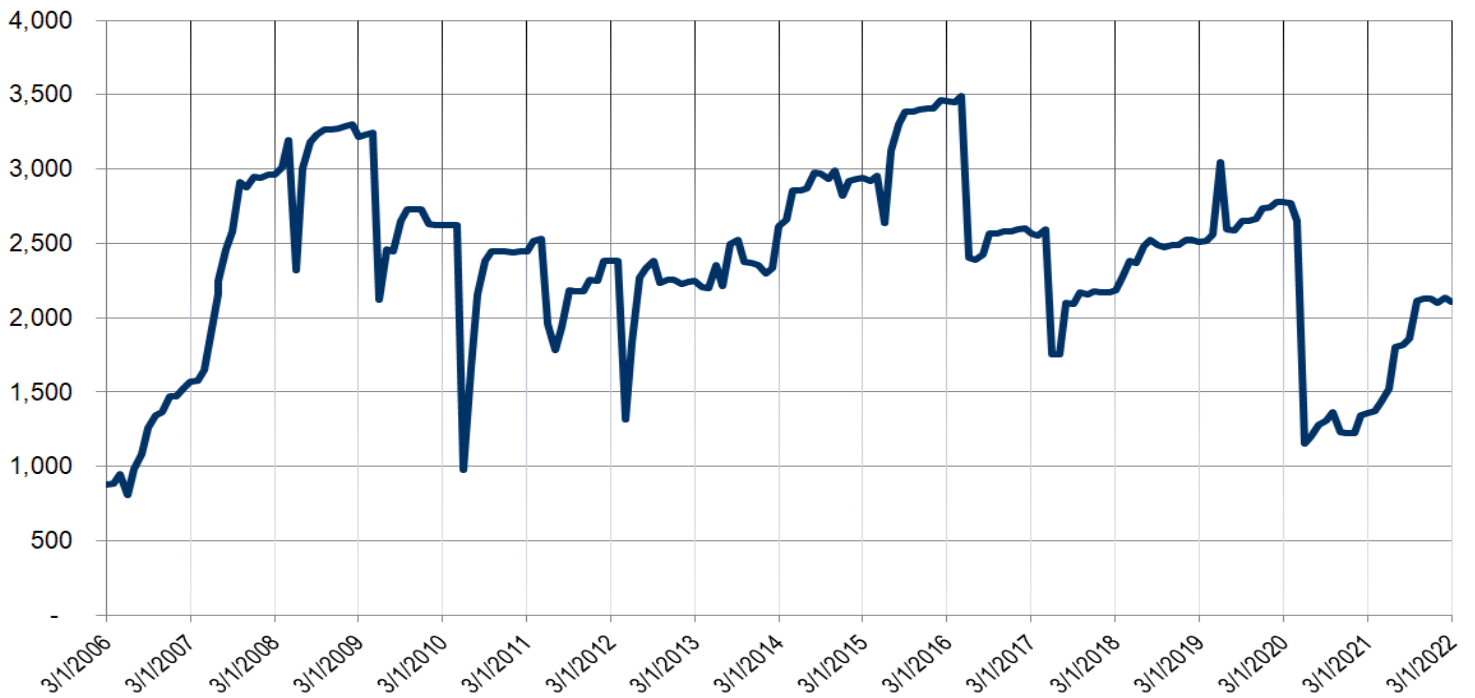
Note: Percent of CSP Reported Load Reduction MWs

Figure 12: 2021 PJM Demand Response Confirmed Synch Reserve Registrations Load Reduction Methods:



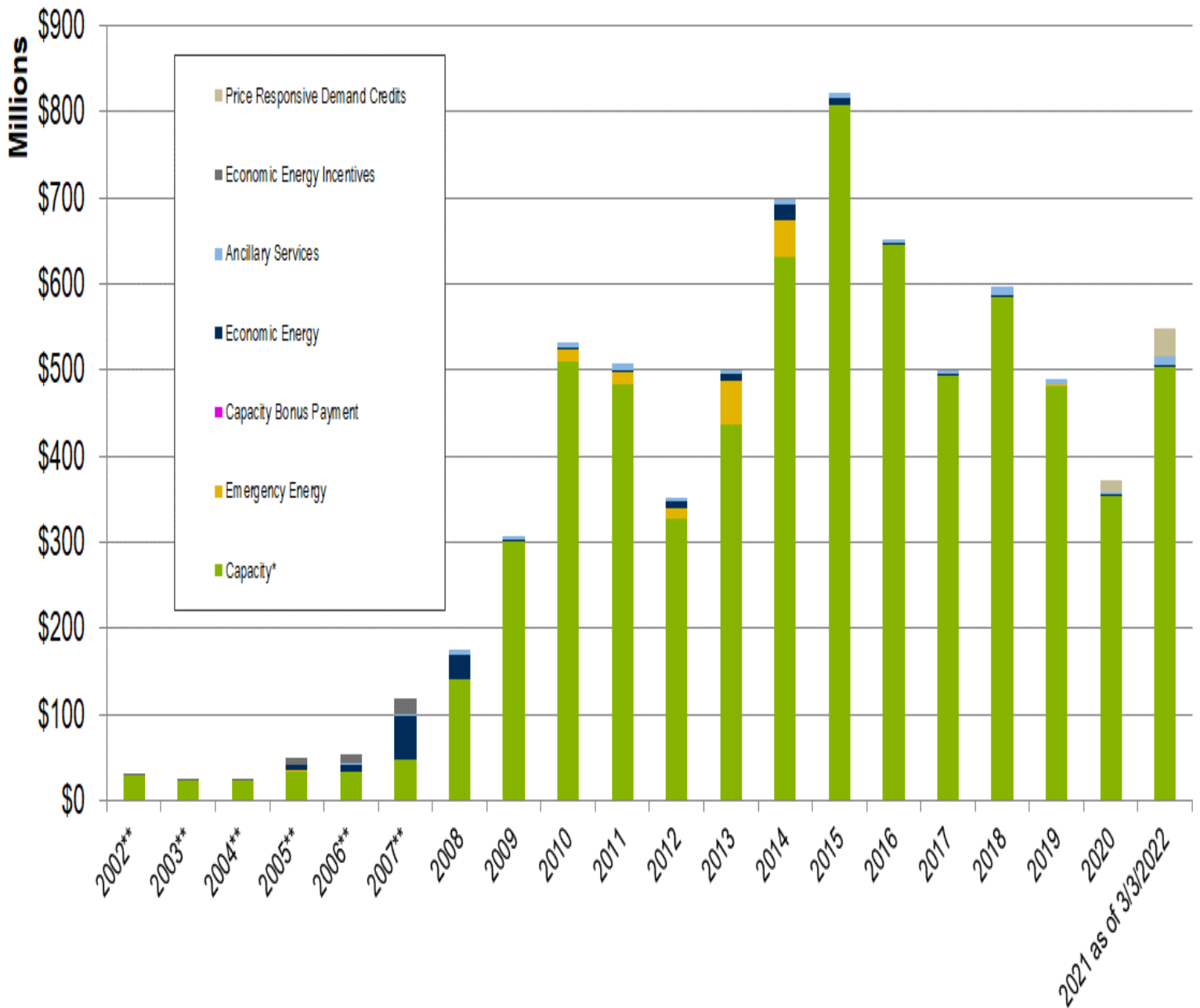
Note: Percent of CSP Reported Load Reduction MWs

Figure 13: PJM Economic Demand Response Capability in Energy Market (3/1/2006-3/3/2022)



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.

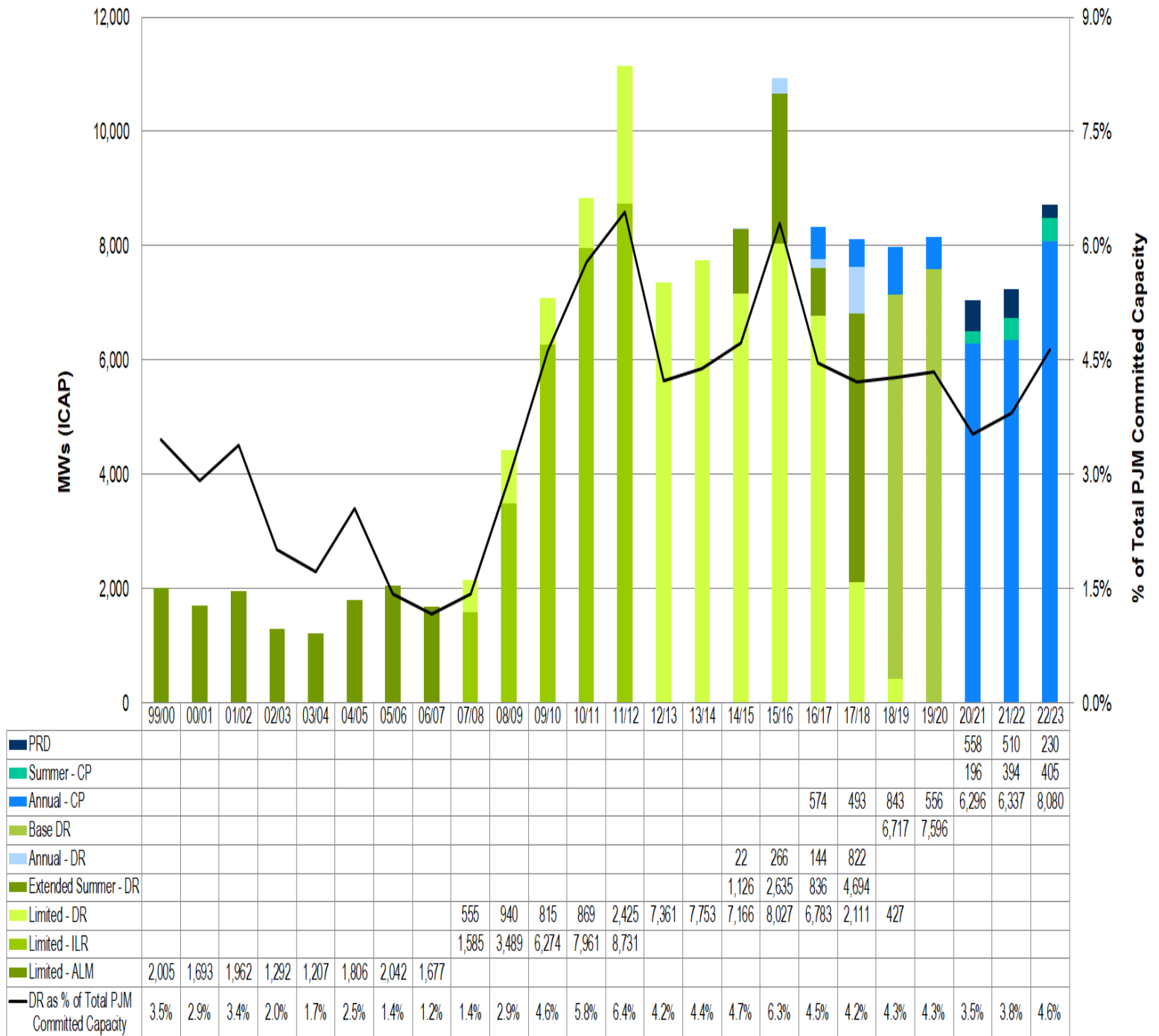
Figure 14: PJM Estimated Revenue for Economic and Load Management DR Markets



*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).

Figure 15: PJM Demand Response Committed MWs by Delivery Year



- Notes:
- 1) Data represents net commitment ICAP value (for each product specified) on 3/9/2022.
 - 2) RPM was implemented DY 07/08.
 - 3) DY 22/23 MWs include results from Base Residual Auction.
 - 4) ALM MWs are seasonal averages for Delivery Years before 07/08.

Figure 16: 2021 Economic Demand Response Monthly Registration Participation

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO						1		1				
DE	DPL						2	1	2				
IL	COMED		2		1	1	1	1	2	1	1	1	1
MD	BGE		1				1	1	1				
	DPL						1		1				
	PEPCO						1		1				
NJ	JCPL		1				1	1	1				
	PSEG	3	4			2	6	5	4	4	3	4	3
OH	AEP							2	1	1	1	1	1
	ATSI						1	1	1				
PA	DUQ											2	
	METED	1	1	3	3	1	3	3	3	3	3	1	1
	PECO	1	2	1				1	1	3	2	3	2
	PENELEC	1	1	1	1	1	1		1				
	PPL		2				3	3	2		1	1	
VA	DOM	1	1		1	1	1	1	1	1	1	1	1
WV	APS		1	1	1		2		2				
Total		7	18	6	7	6	25	20	25	13	12	14	9
Average Unique Participating Registrations per Month:		14											

Figure 17: 2021 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								1				
MD	BGE												
	DPL												
	PEPCO												
NJ	JCPL		1				1	1	1				
	PSEG	3	3			1	3	3	2	2	1	2	1
OH	AEP							1	1	1	1	1	1
	ATSI												
PA	DUQ											1	
	METED			1	1		1	1	1	1	1		
	PECO	1	2	1				1	1	3	2	3	2
	PENELEC	1	1	1	1	1	1		1				
	PPL												
VA	DOM												
WV	APS		1	1	1								
Total		5	8	4	3	2	6	7	8	7	5	7	4
Average Unique Participating Registrations per Month (Day-Ahead):		6											

Figure 18: 2021 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				
DE	DPL						2	1	2				
IL	COMED		2		1	1	1	1	1	1	1	1	1
MD	BGE		1				1	1	1				
	DPL						1		1				
	PEPCO						1		1				
NJ	JCPL												
	PSEG		1			1	3	2	2	2	2	2	2
OH	AEP							1					
	ATSI						1	1	1				
PA	DUQ											1	
	METED	1	1	2	2	1	2	2	2	2	2	1	1
	PECO												
	PENELEC												
	PPL		2				3	3	2		1	1	
VA	DOM	1	1		1	1	1	1	1	1	1	1	1
WV	APS						2		2				
Total		2	10	2	4	4	19	13	17	6	7	7	5
Average Unique Participating Registrations per Month (Real-Time):		8											

Figure 19: 2021 Economic Demand Response Monthly MWh Reductions

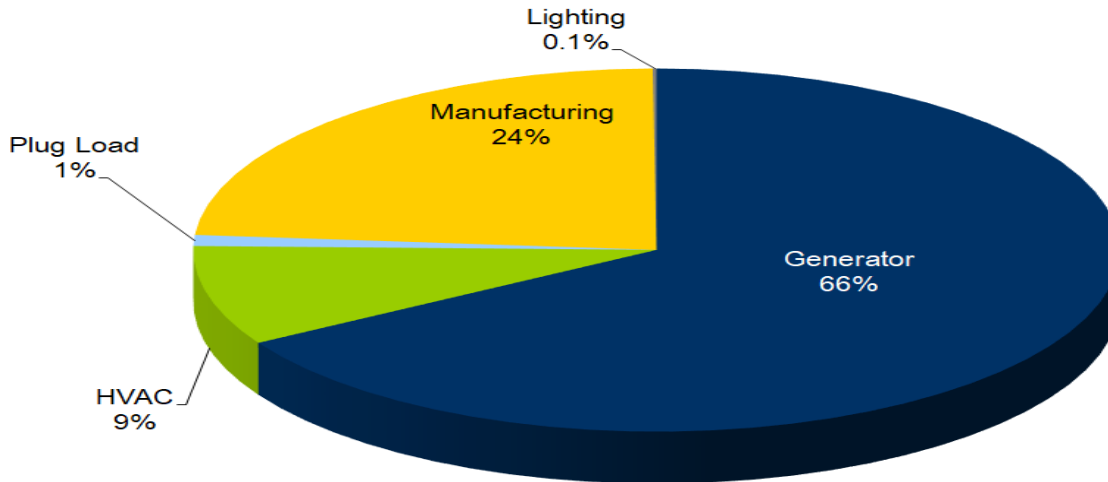
State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO						8,1017		41,1898				
DE	DPL						20	90	301				
IL	COMED		52		13	28	64	71	150	58	80	70	58
MD	BGE		48				85	11	497				
	DPL						(46)		156				
	PEPCO		0				(109)		357				
NJ	JCPL		531				117	142	296				
	PSEG	42	349			4	195	243	226	163	135	53	32
OH	AEP							1,612	1,825	683	541	1,093	157
	ATSI						80	146	131				
PA	DUQ											0	
	METED	2	29	25	135	14	281	189	197	175	58	14	5
	PECO	116	1,104	48				208	378	283	207	292	20
	PENELEC	236	243	273	162	64	291		63				
	PPL		727				395	412	407		174	139	
VA	DOM	10	6		5	0	10	14	29	5	0	0	0
WV	APS		24	46	43		52		33				
Total		407	3,113	393	358	110	1,444	3,139	5,088	1,367	1,195	1,661	272
Total MWh:		18,545											

Figure 20: 2021 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								95				
MD	BGE												
	DPL												
	PEPCO												
NJ	JCPL		531				117	142	296				
	PSEG	42	347			4	192	226	194	82	94	53	16
OH	AEP							1,592	1,825	683	541	1,093	157
	ATSI												
PA	DUQ											0	
	METED			19	82		186	134	159	143	45		
	PECO	116	1,104	48				208	378	283	207	292	20
	PENELEC	236	243	273	162	64	291		63				
	PPL												
VA	DOM												
WV	APS		24	46	43								
Total		394	2,249	387	287	68	786	2,303	3,009	1,191	888	1,437	193
Total Day-Ahead MWh:		13,191											

Figure 21: 2021 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		41				
DE	DPL						20	90	301				
IL	COMED		52		13	28	64	71	55	58	80	70	58
MD	BGE		48				85	11	497				
	DPL						(46)		156				
	PEPCO		0				(109)		357				
NJ	JCPL												
	PSEG		2			0	3	17	32	81	41	0	16
OH	AEP							19					
	ATSI						80	146	131				
PA	DUQ											0	
	METED	2	29	6	53	14	95	55	39	32	12	14	5
	PECO												
	PENELEC												
	PPL		727				395	412	407		174	139	
VA	DOM	10	6		5	0	10	14	29	5	0	0	0
WV	APS						52		33				
Total		13	864	6	71	42	658	836	2,079	176	307	224	79
Total Real-Time MWh:		5,353											

Figure 22: 2021 Estimated Economic DR Load Reduction MWh by Load Reduction Method

Figure 23: 2021 Economic Demand Response Monthly Energy Market Revenue

State	Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DC	PEPCO						\$989		\$3,837				
DE	DPL						(\$2,113)	\$3,438	\$32,033				
IL	COMED		\$4,330		\$200	\$667	\$2,431	\$2,782	\$8,447	\$2,756	\$5,041	\$3,894	\$2,361
MD	BGE		\$5,143				\$5,799	\$1,917	\$37,264				
	DPL						(\$4,373)		\$12,942				
	PEPCO		\$0				(\$12,592)		\$36,210				
NJ	JCPL		\$52,596				\$11,006	\$10,617	\$24,891				
	PSEG	\$2,149	\$31,279			\$186	\$9,981	\$12,249	\$14,535	\$10,456	\$8,176	\$4,501	\$915
OH	AEP							\$84,109	\$103,629	\$48,689	\$41,773	\$89,498	\$10,510
	ATSI						\$8,016	\$7,662	\$13,609				
PA	DUQ											\$233	
	METED	\$74	\$2,296	\$775	\$4,622	\$1,229	\$11,655	\$9,221	\$11,707	\$11,422	\$4,673	\$966	\$291
	PECO	\$4,764	\$63,531	\$1,865				\$9,504	\$19,787	\$18,492	\$13,164	\$21,001	\$1,534
	PENELEC	\$7,291	\$9,267	\$7,203	\$3,383	\$1,875	\$8,760		\$2,873				
	PPL		\$29,827				\$28,196	\$20,045	\$33,512		\$10,239	\$8,973	
VA	DOM	\$573	\$811		\$1,783	\$166	\$1,174	\$750	\$4,737	\$471	\$0	\$0	\$0
WV	APS		\$3,730	\$580	\$2,110		\$5,489		\$2,057				
Total		\$14,851	\$202,811	\$10,424	\$12,098	\$4,122	\$74,417	\$162,294	\$362,067	\$92,286	\$83,066	\$129,066	\$15,612
Total CSP Credits:		\$1,163,113											

Figure 24: 2021 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								\$5,742				
MD	BGE												
	DPL												
	PEPCO												
NJ	JCPL		\$52,596				\$11,006	\$10,617	\$24,891				
	PSEG	\$2,149	\$31,213			\$186	\$9,866	\$11,567	\$12,972	\$5,529	\$6,281	\$4,501	\$194
OH	AEP							\$82,645	\$103,629	\$48,689	\$41,773	\$89,498	\$10,510
	ATSI												
PA	DUQ											\$233	
	METED			\$639	\$2,839		\$8,170	\$6,530	\$8,987	\$7,562	\$3,467		
	PECO	\$4,764	\$63,531	\$1,865				\$9,504	\$19,787	\$18,492	\$13,164	\$21,001	\$1,534
	PENELEC	\$7,291	\$9,267	\$7,203	\$3,383	\$1,875	\$8,760		\$2,873				
	PPL												
VA	DOM												
WV	APS		\$3,730	\$580	\$2,110								
Total		\$14,204	\$160,337	\$10,287	\$8,332	\$2,060	\$37,802	\$120,863	\$178,881	\$80,272	\$64,685	\$115,233	\$12,238
Total Day-Ahead CSP Credits:		\$805,195											

Figure 25: 2021 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						\$989		\$3,837				
DE	DPL						(\$2,113)	\$3,438	\$32,033				
IL	COMED		\$4,330		\$200	\$667	\$2,431	\$2,782	\$2,704	\$2,756	\$5,041	\$3,894	\$2,361
MD	BGE		\$5,143				\$5,799	\$1,917	\$37,264				
	DPL						(\$4,373)		\$12,942				
	PEPCO		\$0				(\$12,592)		\$36,210				
NJ	JCLP												
	PSEG		\$66			\$0	\$115	\$682	\$1,563	\$4,928	\$1,894	\$0	\$721
OH	AEP							\$1,464					
	ATSI						\$8,016	\$7,662	\$13,609				
PA	DUQ											\$0	
	METED	\$74	\$2,296	\$136	\$1,783	\$1,229	\$3,485	\$2,692	\$2,719	\$3,860	\$1,206	\$966	\$291
	PECO												
	PENELEC												
	PPL		\$29,827				\$28,196	\$20,045	\$33,512		\$10,239	\$8,973	
VA	DOM	\$573	\$811		\$1,783	\$166	\$1,174	\$750	\$4,737	\$471	\$0	\$0	\$0
WV	APS						\$5,489		\$2,057				
Total		\$648	\$42,474	\$136	\$3,766	\$2,062	\$36,615	\$41,431	\$183,186	\$12,014	\$18,381	\$13,833	\$3,373
Total Real-Time CSP Credits:			\$357,919										

Figure 26: 2021 Economic Demand Response Energy Market Cost Allocation by Zone

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AECO	\$142	\$2,082	\$75	\$28	\$34	\$1,005	\$2,485	\$5,616	\$1,275	\$1,012	\$1,482	\$135
AEP	\$2,443	\$30,173	\$1,562	\$1,987	\$683	\$10,648	\$22,654	\$50,098	\$13,673	\$12,720	\$21,112	\$2,537
APS	\$980	\$12,123	\$672	\$476	\$262	\$4,296	\$8,892	\$19,835	\$5,158	\$4,798	\$8,386	\$1,021
ATSI	\$1,214	\$14,678	\$878	\$1,092	\$357	\$6,006	\$12,324	\$27,841	\$7,274	\$6,805	\$10,546	\$1,229
BGE	\$586	\$7,600	\$635	\$494	\$156	\$3,011	\$6,543	\$14,407	\$3,634	\$3,131	\$5,007	\$635
COMED	\$1,578	\$21,412	\$829	\$1,115	\$484	\$7,775	\$18,880	\$43,052	\$10,981	\$9,707	\$12,662	\$1,430
DAY	\$329	\$4,140	\$268	\$348	\$95	\$1,563	\$3,282	\$7,299	\$1,941	\$1,797	\$2,839	\$344
DEOK	\$499	\$6,349	\$326	\$427	\$146	\$2,479	\$5,236	\$11,694	\$3,072	\$2,761	\$4,188	\$511
DOM	\$2,135	\$25,913	\$1,612	\$1,655	\$554	\$9,738	\$21,178	\$46,654	\$12,336	\$11,152	\$17,836	\$2,208
DPL	\$313	\$4,634	\$199	\$584	\$66	\$1,714	\$4,081	\$8,788	\$2,177	\$1,828	\$2,818	\$314
DUQ	\$241	\$2,937	\$140	\$212	\$77	\$1,301	\$2,644	\$5,880	\$1,506	\$1,392	\$2,073	\$240
EKPC	\$273	\$3,854	\$161	\$190	\$62	\$1,091	\$2,366	\$5,440	\$1,363	\$1,249	\$2,354	\$269
JCLP	\$298	\$4,851	\$186	\$68	\$104	\$2,567	\$5,467	\$12,749	\$2,798	\$2,216	\$3,457	\$381
METED	\$243	\$3,719	\$153	\$151	\$79	\$1,403	\$3,027	\$6,910	\$1,758	\$1,553	\$2,617	\$322
OVEC	\$2	\$28	\$1	\$2	\$0	\$7	\$15	\$34	\$10	\$11	\$19	\$2
PECO	\$606	\$9,083	\$315	\$132	\$144	\$3,708	\$8,245	\$18,667	\$4,605	\$3,863	\$5,770	\$610
PENELEC	\$333	\$4,001	\$197	\$130	\$90	\$1,412	\$2,906	\$6,618	\$1,752	\$1,741	\$2,885	\$347
PEPCO	\$488	\$6,970	\$510	\$405	\$149	\$2,779	\$5,947	\$12,870	\$3,349	\$2,936	\$4,498	\$565
PPL	\$658	\$10,063	\$335	\$284	\$200	\$3,502	\$7,524	\$16,917	\$4,345	\$3,986	\$6,947	\$857
PSEG	\$785	\$9,360	\$425	\$133	\$198	\$4,398	\$9,295	\$21,469	\$5,176	\$4,322	\$6,604	\$715
RECO	\$25	\$292	\$14	\$4	\$8	\$184	\$356	\$842	\$183	\$144	\$215	\$24
Exports	\$681	\$18,547	\$931	\$2,184	\$175	\$3,832	\$8,946	\$18,386	\$3,918	\$3,941	\$4,752	\$918
TOTAL	\$14,851	\$202,811	\$10,424	\$12,098	\$4,122	\$74,417	\$162,294	\$362,067	\$92,286	\$83,066	\$129,066	\$15,612

Total Zonal Charges: \$1,163,113

Figure 27: 2021 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	\$118	\$1,720	\$84	\$14	\$9	\$503	\$1,989	\$3,124	\$1,022	\$828	\$1,621	\$144
AEP	\$2,121	\$24,960	\$1,631	\$1,141	\$314	\$5,275	\$18,307	\$29,518	\$11,103	\$10,343	\$23,320	\$2,492
APS	\$848	\$10,035	\$709	\$319	\$117	\$2,083	\$7,135	\$11,406	\$4,170	\$3,875	\$9,255	\$1,007
ATSI	\$1,053	\$12,111	\$929	\$645	\$171	\$2,849	\$9,881	\$16,060	\$5,894	\$5,519	\$11,677	\$1,190
BGE	\$497	\$6,272	\$660	\$390	\$63	\$1,558	\$5,247	\$8,182	\$2,919	\$2,553	\$5,522	\$629
COMED	\$1,359	\$17,520	\$884	\$497	\$241	\$4,282	\$15,068	\$25,202	\$8,952	\$7,878	\$14,029	\$1,342
DAY	\$284	\$3,433	\$283	\$232	\$44	\$759	\$2,638	\$4,354	\$1,577	\$1,468	\$3,139	\$334
DEOK	\$434	\$5,261	\$347	\$247	\$69	\$1,207	\$4,211	\$6,834	\$2,502	\$2,274	\$4,635	\$499
DOM	\$1,863	\$21,311	\$1,707	\$957	\$226	\$5,071	\$17,094	\$26,959	\$9,955	\$9,080	\$19,692	\$2,192
DPL	\$259	\$3,817	\$215	\$561	\$19	\$867	\$3,276	\$4,960	\$1,748	\$1,498	\$3,073	\$329
DUQ	\$210	\$2,425	\$149	\$122	\$35	\$593	\$2,114	\$3,345	\$1,219	\$1,137	\$2,298	\$233
EKPC	\$240	\$3,149	\$167	\$113	\$28	\$532	\$1,913	\$3,095	\$1,114	\$1,022	\$2,605	\$275
JCPL	\$242	\$4,013	\$209	\$40	\$40	\$1,283	\$4,289	\$6,901	\$2,242	\$1,794	\$3,816	\$383
METED	\$207	\$3,082	\$166	\$99	\$33	\$697	\$2,420	\$3,925	\$1,411	\$1,252	\$2,884	\$317
OVEC	\$2	\$23	\$1	\$1	\$0	\$4	\$13	\$20	\$8	\$9	\$21	\$2
PECO	\$504	\$7,514	\$351	\$75	\$44	\$1,866	\$6,558	\$10,440	\$3,694	\$3,132	\$6,279	\$631
PENELEC	\$289	\$3,317	\$207	\$57	\$42	\$688	\$2,330	\$3,817	\$1,414	\$1,391	\$3,192	\$338
PEPCO	\$420	\$5,763	\$533	\$252	\$62	\$1,431	\$4,765	\$7,449	\$2,690	\$2,395	\$4,962	\$555
PPL	\$543	\$8,324	\$376	\$171	\$85	\$1,734	\$6,006	\$9,626	\$3,494	\$3,192	\$7,656	\$854
PSEG	\$682	\$7,736	\$457	\$79	\$79	\$2,219	\$7,345	\$11,831	\$4,145	\$3,487	\$7,281	\$709
RECO	\$22	\$242	\$15	\$3	\$3	\$92	\$276	\$446	\$146	\$116	\$238	\$24
Exports	\$591	\$14,837	\$982	\$1,911	\$90	\$2,098	\$7,339	\$11,093	\$3,260	\$3,217	\$5,279	\$838
TOTAL	\$12,788	\$166,867	\$11,064	\$7,926	\$1,816	\$37,691	\$130,212	\$208,586	\$74,679	\$67,459	\$142,472	\$15,315

Total Day-Ahead Zonal Charges: \$876,874

Figure 28: 2021 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	\$24	\$362	(\$9)	\$13	\$24	\$502	\$496	\$2,492	\$253	\$184	(\$139)	(\$9)
AEP	\$321	\$5,213	(\$69)	\$846	\$369	\$5,374	\$4,348	\$20,581	\$2,570	\$2,377	(\$2,208)	\$45
APS	\$131	\$2,088	(\$37)	\$157	\$144	\$2,213	\$1,758	\$8,429	\$988	\$923	(\$869)	\$14
ATSI	\$161	\$2,567	(\$51)	\$447	\$186	\$3,157	\$2,443	\$11,781	\$1,380	\$1,286	(\$1,131)	\$39
BGE	\$89	\$1,328	(\$25)	\$104	\$93	\$1,453	\$1,296	\$6,225	\$715	\$579	(\$515)	\$6
COMED	\$219	\$3,892	(\$55)	\$618	\$243	\$3,493	\$3,812	\$17,850	\$2,030	\$1,829	(\$1,367)	\$88
DAY	\$44	\$707	(\$16)	\$116	\$51	\$803	\$644	\$2,945	\$364	\$329	(\$300)	\$11
DEOK	\$66	\$1,088	(\$21)	\$180	\$78	\$1,272	\$1,025	\$4,860	\$571	\$487	(\$447)	\$11
DOM	\$272	\$4,602	(\$95)	\$698	\$328	\$4,667	\$4,084	\$19,696	\$2,382	\$2,072	(\$1,855)	\$16
DPL	\$54	\$817	(\$15)	\$23	\$46	\$846	\$805	\$3,828	\$428	\$330	(\$256)	(\$16)
DUQ	\$31	\$512	(\$9)	\$90	\$42	\$708	\$530	\$2,535	\$287	\$255	(\$225)	\$7
EKPC	\$33	\$705	(\$6)	\$78	\$34	\$559	\$453	\$2,345	\$249	\$228	(\$251)	(\$6)
JCPL	\$56	\$837	(\$23)	\$28	\$64	\$1,284	\$1,178	\$5,848	\$556	\$422	(\$358)	(\$2)
METED	\$35	\$637	(\$13)	\$52	\$46	\$707	\$607	\$2,985	\$347	\$302	(\$267)	\$5
OVEC	\$0	\$5	(\$0)	\$1	\$0	\$3	\$3	\$14	\$2	\$2	(\$2)	\$0
PECO	\$102	\$1,569	(\$37)	\$56	\$100	\$1,842	\$1,687	\$8,227	\$911	\$731	(\$509)	(\$21)
PENELEC	\$44	\$684	(\$10)	\$73	\$48	\$724	\$577	\$2,801	\$338	\$350	(\$307)	\$9
PEPCO	\$68	\$1,207	(\$24)	\$152	\$87	\$1,348	\$1,182	\$5,422	\$659	\$541	(\$463)	\$9
PPL	\$115	\$1,739	(\$41)	\$113	\$115	\$1,768	\$1,518	\$7,291	\$851	\$794	(\$709)	\$3
PSEG	\$103	\$1,624	(\$32)	\$54	\$120	\$2,178	\$1,950	\$9,638	\$1,031	\$835	(\$677)	\$6
RECO	\$3	\$50	(\$1)	\$2	\$5	\$91	\$80	\$396	\$36	\$28	(\$23)	\$1
Exports	\$90	\$3,709	(\$51)	\$273	\$85	\$1,734	\$1,607	\$7,293	\$658	\$724	(\$526)	\$80
TOTAL	\$2,063	\$35,943	(\$640)	\$4,172	\$2,307	\$36,726	\$32,082	\$153,481	\$17,607	\$15,607	(\$13,406)	\$296

Total Real-Time Zonal Charges: \$286,239

Figure 29: 2021 Load Management Demand Response Monthly Capacity Revenue from RPM

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AECO	\$364,810	\$329,506	\$364,810	\$353,042	\$364,810	\$414,657	\$428,479	\$428,479	\$414,657	\$428,479	\$414,657	\$428,479
AEP	\$2,981,379	\$2,692,859	\$2,981,379	\$2,885,206	\$2,981,379	\$7,085,832	\$7,322,026	\$7,322,026	\$7,085,832	\$7,322,026	\$7,085,832	\$7,322,026
APS	\$1,790,204	\$1,616,959	\$1,790,204	\$1,732,456	\$1,790,204	\$4,296,522	\$4,439,739	\$4,439,739	\$4,296,522	\$4,439,739	\$4,296,522	\$4,439,739
ATSI	\$1,882,518	\$1,700,339	\$1,882,518	\$1,821,792	\$1,882,518	\$5,909,358	\$6,106,337	\$6,106,337	\$5,909,358	\$6,106,337	\$5,909,358	\$6,106,337
BGE	\$468,186	\$422,877	\$468,186	\$453,083	\$468,186	\$1,170,553	\$1,209,572	\$1,209,572	\$1,170,553	\$1,209,572	\$1,170,553	\$1,209,572
COMED	\$8,465,782	\$7,646,513	\$8,465,782	\$8,192,693	\$8,465,782	\$10,830,893	\$11,191,922	\$11,191,922	\$10,830,893	\$11,191,922	\$10,830,893	\$11,191,922
DAY	\$465,983	\$420,888	\$465,983	\$450,951	\$465,983	\$956,340	\$988,218	\$988,218	\$956,340	\$988,218	\$956,340	\$988,218
DEOK	\$586,115	\$529,394	\$586,115	\$567,208	\$586,115	\$801,363	\$828,075	\$828,075	\$801,363	\$828,075	\$801,363	\$828,075
DOM	\$1,791,652	\$1,618,266	\$1,791,652	\$1,733,857	\$1,791,652	\$4,805,706	\$4,965,896	\$4,965,896	\$4,805,706	\$4,965,896	\$4,805,706	\$4,965,896
DPL	\$972,021	\$877,954	\$972,021	\$940,665	\$972,021	\$1,004,324	\$1,037,801	\$1,037,801	\$1,004,324	\$1,037,801	\$1,004,324	\$1,037,801
DUQ	\$383,237	\$346,149	\$383,237	\$370,874	\$383,237	\$568,680	\$587,636	\$587,636	\$568,680	\$587,636	\$568,680	\$587,636
EKPC	\$328,165	\$296,407	\$328,165	\$317,579	\$328,165	\$675,489	\$698,005	\$698,005	\$675,489	\$698,005	\$675,489	\$698,005
JCPL	\$817,686	\$738,555	\$817,686	\$791,309	\$817,686	\$846,714	\$874,938	\$874,938	\$846,714	\$874,938	\$846,714	\$874,938
METED	\$644,939	\$582,525	\$644,939	\$624,134	\$644,939	\$1,519,890	\$1,570,553	\$1,570,553	\$1,519,890	\$1,570,553	\$1,519,890	\$1,570,553
PECO	\$2,133,013	\$1,926,593	\$2,133,013	\$2,064,206	\$2,133,013	\$2,219,456	\$2,293,438	\$2,293,438	\$2,219,456	\$2,293,438	\$2,219,456	\$2,293,438
PENELEC	\$826,762	\$746,753	\$826,762	\$800,092	\$826,762	\$1,542,009	\$1,593,409	\$1,593,409	\$1,542,009	\$1,593,409	\$1,542,009	\$1,593,409
PEPCO	\$432,443	\$390,594	\$432,443	\$418,494	\$432,443	\$947,100	\$978,670	\$978,670	\$947,100	\$978,670	\$947,100	\$978,670
PPL	\$1,594,416	\$1,440,118	\$1,594,416	\$1,542,983	\$1,594,416	\$2,884,710	\$2,980,867	\$2,980,867	\$2,884,710	\$2,980,867	\$2,884,710	\$2,980,867
PSEG	\$1,901,994	\$1,717,930	\$1,901,994	\$1,840,640	\$1,901,994	\$2,503,407	\$2,586,854	\$2,586,854	\$2,503,407	\$2,586,854	\$2,503,407	\$2,586,854
RECO	\$22,613	\$20,424	\$22,613	\$21,883	\$22,613	\$28,837	\$29,798	\$29,798	\$28,837	\$29,798	\$28,837	\$29,798
Total	\$28,853,918	\$26,061,603	\$28,853,918	\$27,923,146	\$28,853,918	\$51,011,841	\$52,712,236	\$52,712,236	\$51,011,841	\$52,712,236	\$51,011,841	\$52,712,236

Total Capacity Credits: \$504,430,968

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Figure 30: 2021 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	%
2021	1	2	2	2	2	2	2	100%	13	13	96%	12	12	100%
2021	2	3	3	7	7	10	10	100%	747	864	116%	309	309	100%
2021	3	1	1	1	1	2	2	100%	7	6	86%	10	10	100%
2021	4	2	2	3	3	4	4	100%	58	71	122%	127	127	100%
2021	5	2	2	4	4	4	4	100%	39	42	110%	245	245	100%
2021	6	6	6	10	10	19	19	100%	1,203	658	55%	446	446	100%
2021	7	4	4	9	9	13	13	100%	928	836	90%	493	493	100%
2021	8	7	7	10	10	17	17	100%	1,735	2,079	120%	447	447	100%
2021	9	3	3	4	4	6	6	100%	138	176	127%	379	379	100%
2021	10	3	3	5	5	7	7	100%	271	307	113%	384	384	100%
2021	11	3	3	6	6	7	7	100%	245	224	91%	346	346	100%
2021	12	2	2	4	4	5	5	100%	42	79	190%	146	146	100%
YTD Totals						96	96	100%	5,425	5,353	99%	3,344	3,344	100%
YTD Average		3		5										

Figure 31: 2021 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	%
2021	1	4	4	3	3	5	5	100%	348	394	113%	104	104	100%
2021	2	6	6	5	5	8	8	100%	2,364	2,249	95%	548	548	100%
2021	3	4	4	4	4	4	4	100%	374	387	104%	90	90	100%
2021	4	3	3	3	3	3	3	100%	278	287	103%	80	80	100%
2021	5	2	2	2	2	2	2	100%	59	68	115%	16	16	100%
2021	6	4	4	4	4	6	6	100%	755	786	104%	348	348	100%
2021	7	6	6	5	5	7	7	100%	2,537	2,303	91%	690	690	100%
2021	8	7	7	7	7	8	8	100%	3,604	3,009	83%	874	874	100%
2021	9	5	5	4	4	7	7	100%	1,151	1,191	103%	436	436	100%
2021	10	5	5	4	4	5	5	100%	957	888	93%	366	366	100%
2021	11	5	5	4	4	7	7	100%	1,852	1,437	78%	780	780	100%
2021	12	4	4	3	3	4	4	100%	252	193	77%	54	54	100%
YTD Totals						66	66	100%	14,530	13,191	91%	4,386	4,386	100%
YTD Average		5		4										

Figure 32: 2021 Economic Demand Response Regulation Market Participation

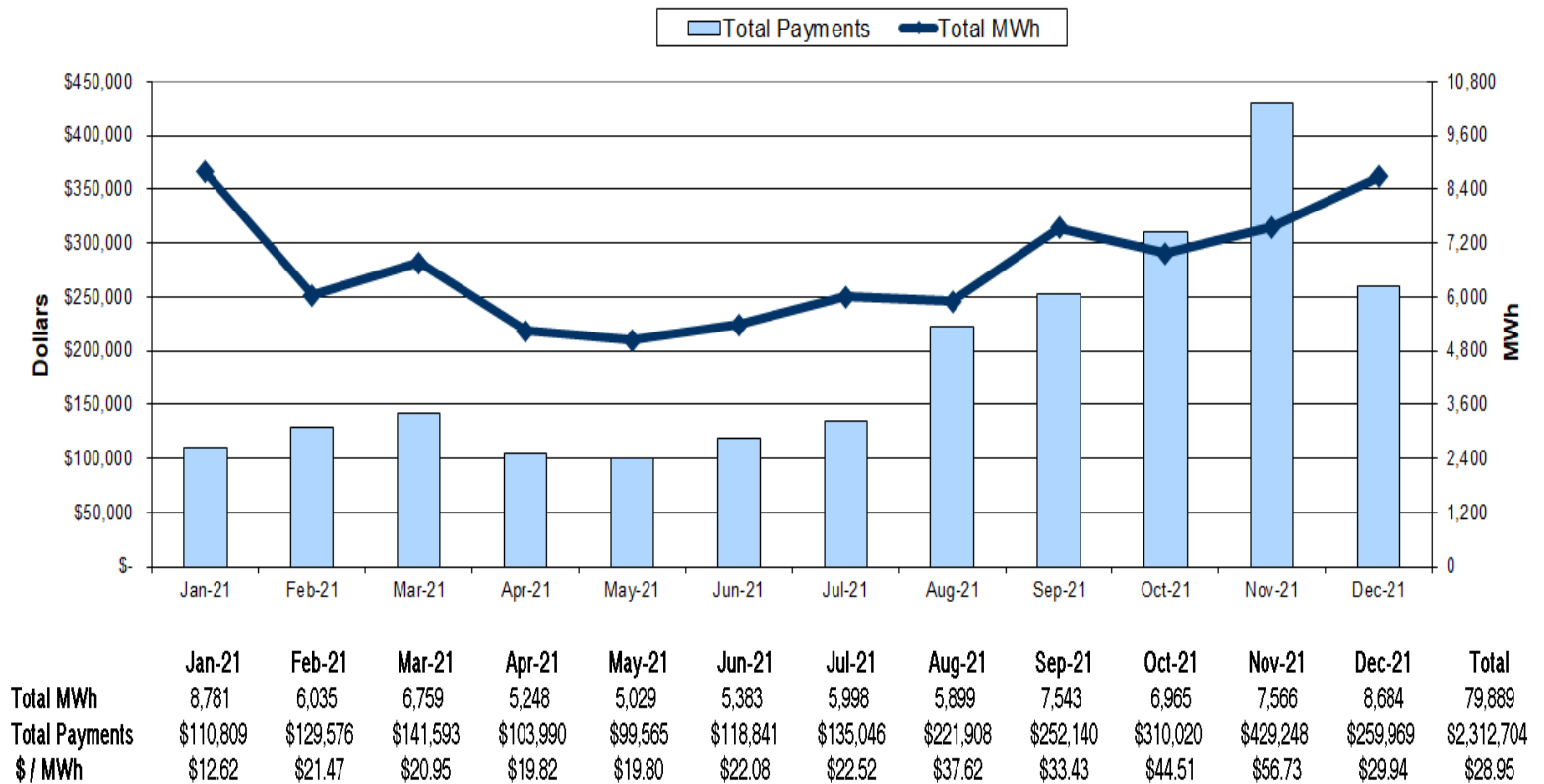
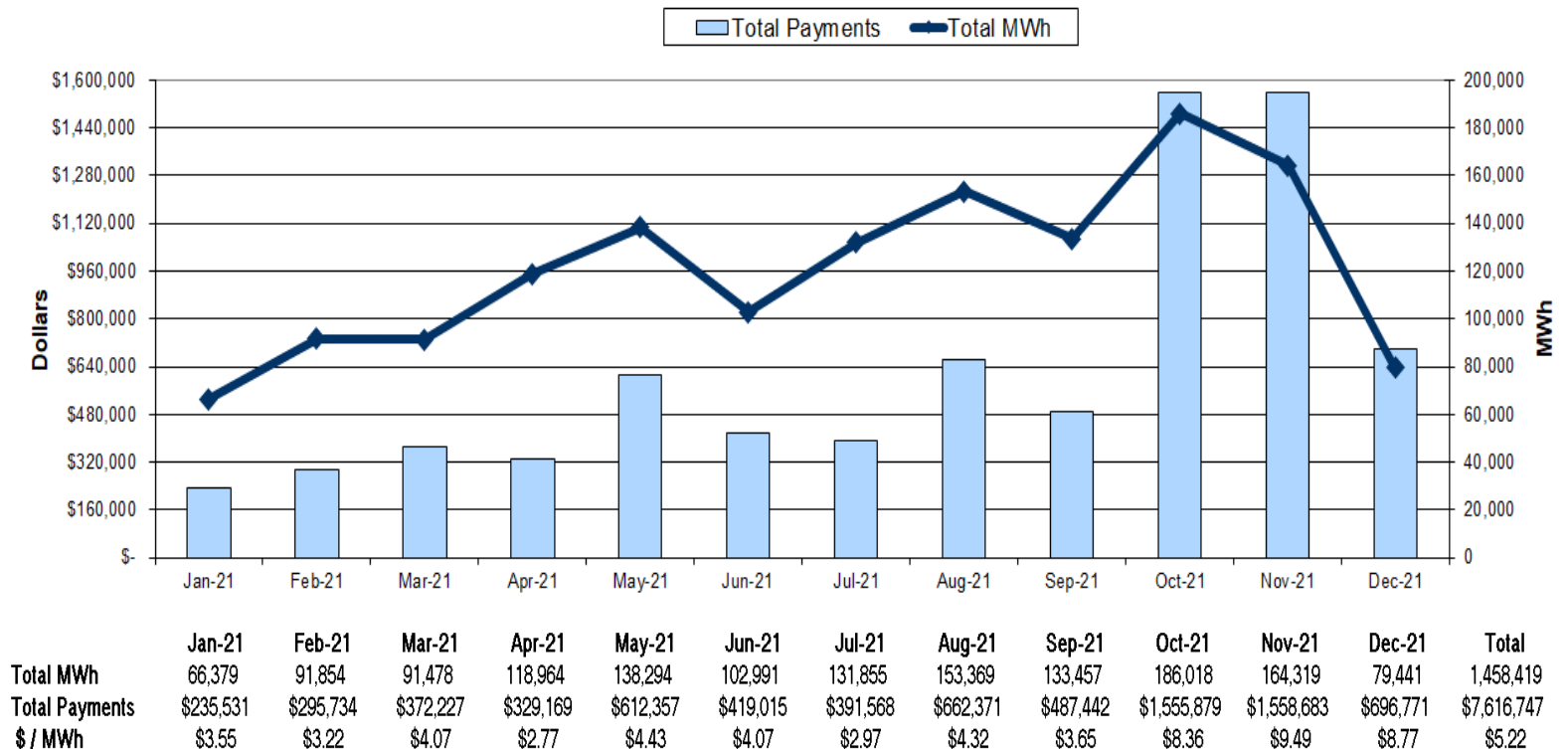
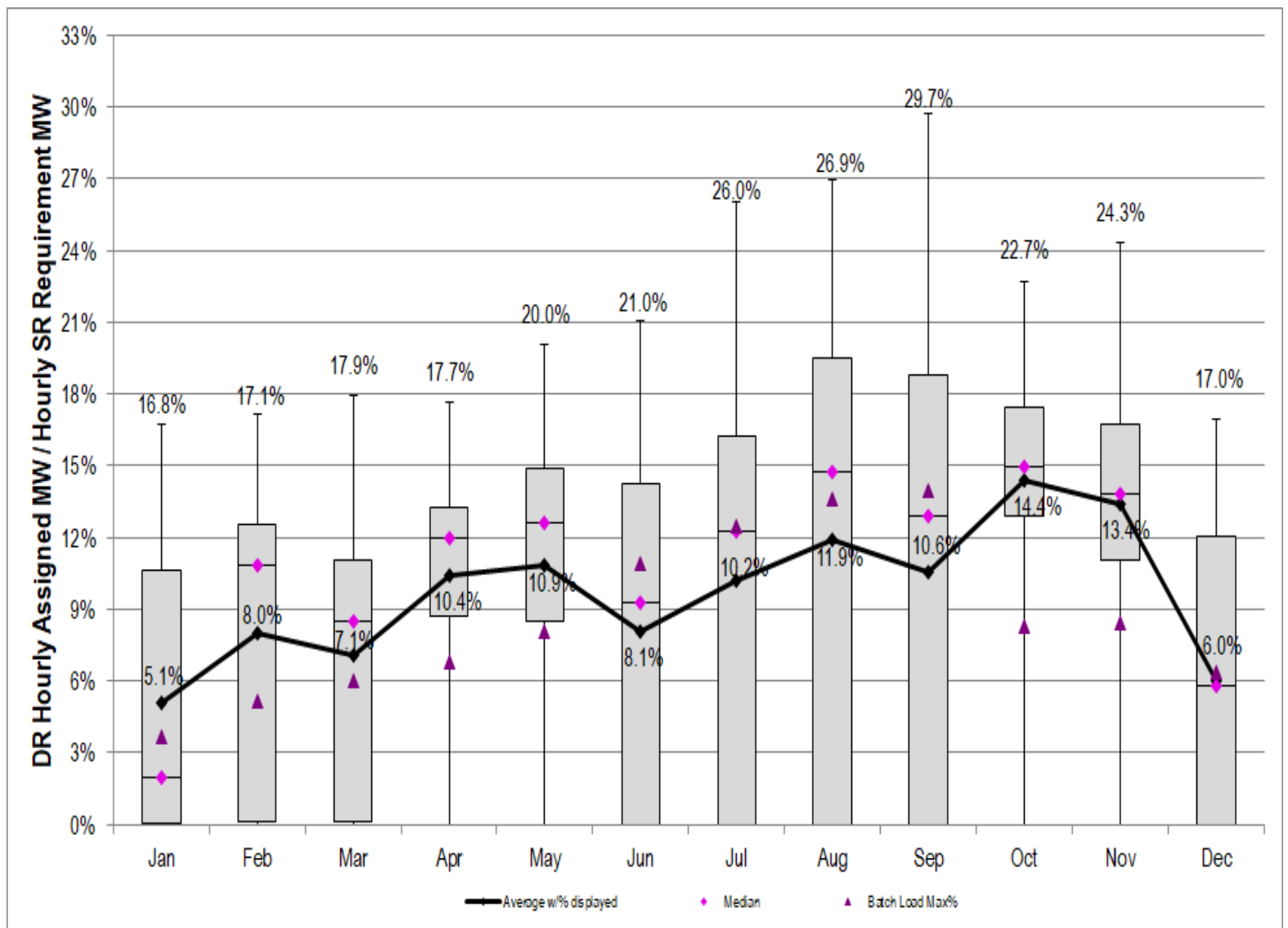


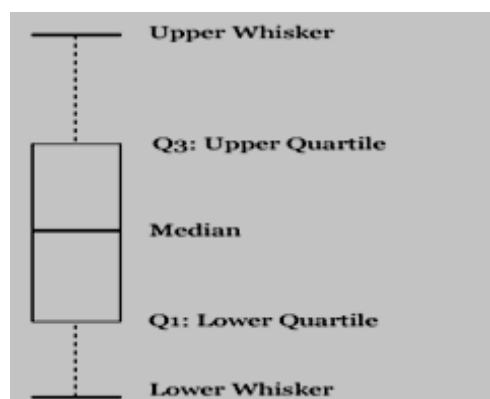
Figure 33: 2021 Economic Demand Response Synchronous Reserve Market Participation



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 2021

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