



Load Management Event

October 2, 2019

Demand Response Subcommittee
November 6, 2019

- Compliance Due:
 - December 15, 2019 11:50 PM
 - All Capacity Performance registrations in DOM, AEP, PEPCO and BGE **must** submit compliance data by:
- Emergency Energy Settlements Due:
 - December 1, 2019 11:50 PM
 - Any dispatched Load Management DR Full registration **may** submit an Emergency Energy Settlement
- Billing
 - February 7, 2020
 - First monthly bill issued with Non-Performance charges and Bonus Credits
 - *Non-Performance Charges and Bonus Credits are spread over remaining months of Delivery Year (through May 2020 bill issued in June)

- EAA for the Oct. 2, 2019 Load Management Event

PAI Date	PAI Area	PAI Start Time (GMT)	PAI Stop Time (GMT)	PAI Start Time (EPT)	PAI Stop Time (EPT)
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:00	10/2/2019 18:05	10/2/2019 14:00	10/2/2019 14:05
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:05	10/2/2019 18:10	10/2/2019 14:05	10/2/2019 14:10
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:10	10/2/2019 18:15	10/2/2019 14:10	10/2/2019 14:15
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:15	10/2/2019 18:20	10/2/2019 14:15	10/2/2019 14:20
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:20	10/2/2019 18:25	10/2/2019 14:20	10/2/2019 14:25
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:25	10/2/2019 18:30	10/2/2019 14:25	10/2/2019 14:30
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:30	10/2/2019 18:35	10/2/2019 14:30	10/2/2019 14:35
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:35	10/2/2019 18:40	10/2/2019 14:35	10/2/2019 14:40
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:40	10/2/2019 18:45	10/2/2019 14:40	10/2/2019 14:45
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:45	10/2/2019 18:50	10/2/2019 14:45	10/2/2019 14:50
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:50	10/2/2019 18:55	10/2/2019 14:50	10/2/2019 14:55
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 18:55	10/2/2019 19:00	10/2/2019 14:55	10/2/2019 15:00
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 19:00	10/2/2019 19:05	10/2/2019 15:00	10/2/2019 15:05
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 19:05	10/2/2019 19:10	10/2/2019 15:05	10/2/2019 15:10
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 19:10	10/2/2019 19:15	10/2/2019 15:10	10/2/2019 15:15
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 19:15	10/2/2019 19:20	10/2/2019 15:15	10/2/2019 15:20
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 19:20	10/2/2019 19:25	10/2/2019 15:20	10/2/2019 15:25
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 19:25	10/2/2019 19:30	10/2/2019 15:25	10/2/2019 15:30
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 19:30	10/2/2019 19:35	10/2/2019 15:30	10/2/2019 15:35
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 19:35	10/2/2019 19:40	10/2/2019 15:35	10/2/2019 15:40
10/2/2019	AEP-BGE-DOM-PEPCO	10/2/2019 19:40	10/2/2019 19:45	10/2/2019 15:40	10/2/2019 15:45
10/2/2019	AEP	10/2/2019 19:45	10/2/2019 19:50	10/2/2019 15:45	10/2/2019 15:50
10/2/2019	AEP	10/2/2019 19:50	10/2/2019 19:55	10/2/2019 15:50	10/2/2019 15:55
10/2/2019	AEP	10/2/2019 19:55	10/2/2019 20:00	10/2/2019 15:55	10/2/2019 16:00

- Any excess DR capacity load reductions will be eligible for bonus payment
 - Who is eligible for bonus payments?
 - **Must be dispatched by PJM**
 - All Load Management CP
 - All Base registrations, must be below PLC (10/2/19 is a Summer Event) and submit compliance meter data
 - All Economic DR registrations

Estimated Demand Response Activity October 1 and 2, 2019

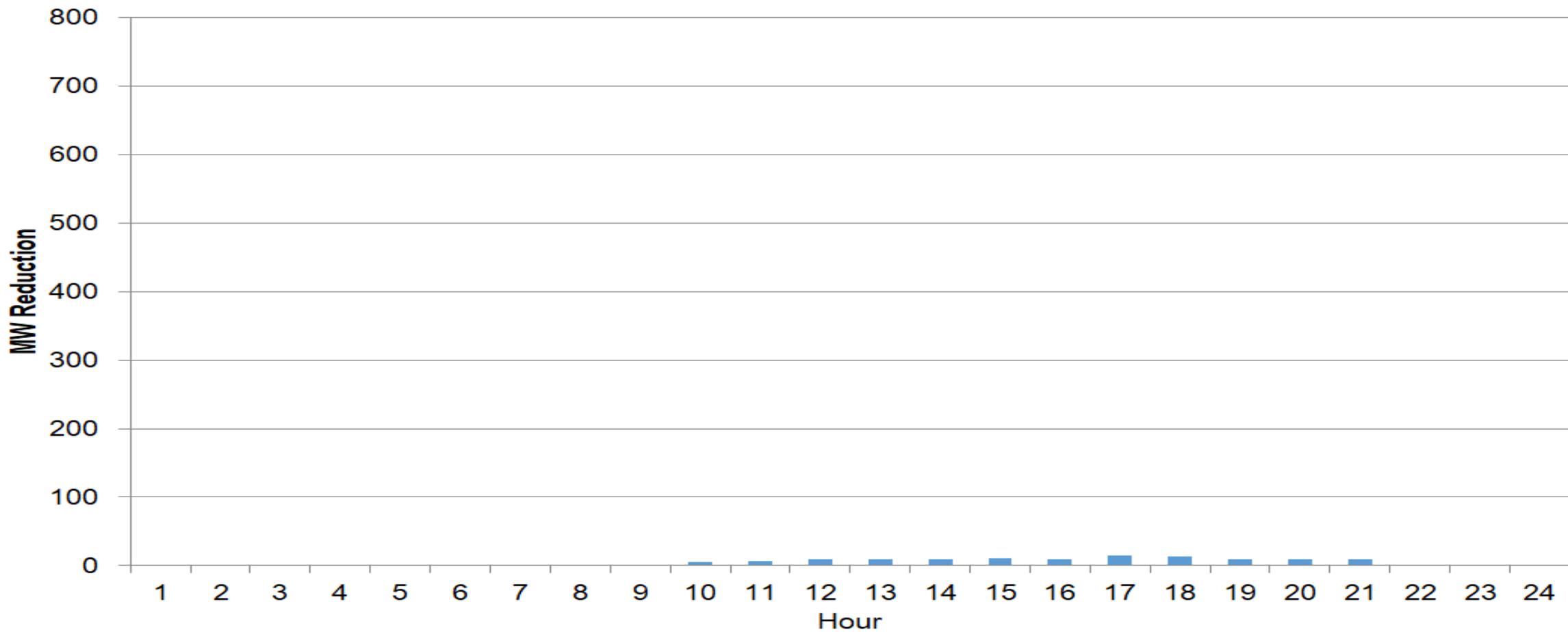
October 21, 2019

- Load Management (“Emergency & Pre-Emergency DR”) dispatched by PJM on October 2
 - Estimated 728 MW load reduction
 - Pre-Emergency, Long lead (required to implement load reductions in 2 hour), Base/CP in AEP (450 MW), Dominion (240 MW), PEPCO (4 MW) and BGE (34 MW) zones.
 - Load Reduction expected to be fully implemented
 - From 1400 through 1545 Dominion, PEPCO and BGE zones
 - From 1400 through 1600 AEP zone
- *See [Historic Load Management Events](#) for prior events.
- Economic DR dispatched across PJM October 1 and 2
 - Estimated 15 MW maximum load reduction on October 1
 - Estimated 33 MW maximum load reduction on October 2

- DR Capacity Performance – mandatory event. Load reductions eligible for penalties, energy settlement and CP bonus payments.
- DR Base – voluntary event since resources were only required to reduce load through September. Load reductions eligible for energy settlement and CP bonus payments.
- Load Management estimated load reductions on the following charts based on CSP reported expected energy load reductions. Expected energy load reductions can be significantly different from capacity commitment for Base DR because it was a voluntary event.
- Actual load reductions will be published by December 31
 - CSP must provide load data by 12/15 for capacity performance evaluation (penalties/bonus payments)



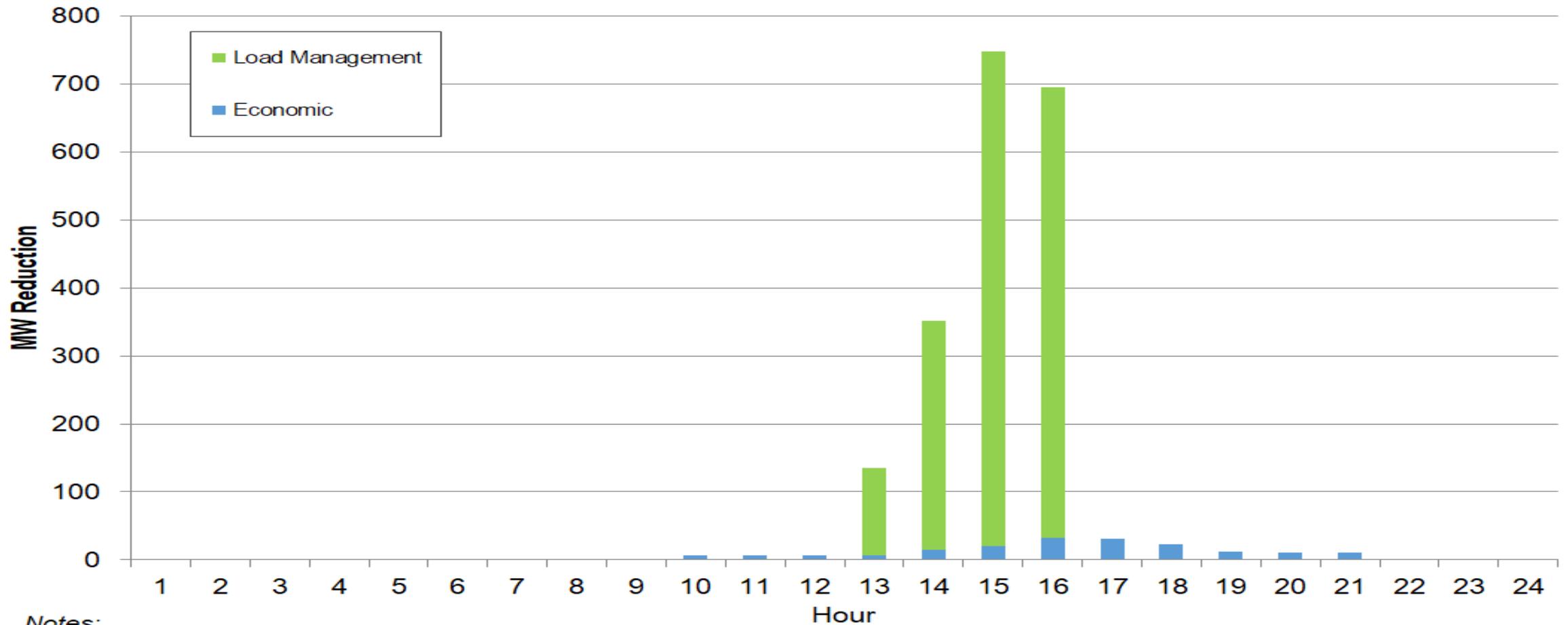
Estimated Economic Demand Response in PJM: October 1, 2019



Notes:
Actual load reductions are not finalized until up to 3 months after event.



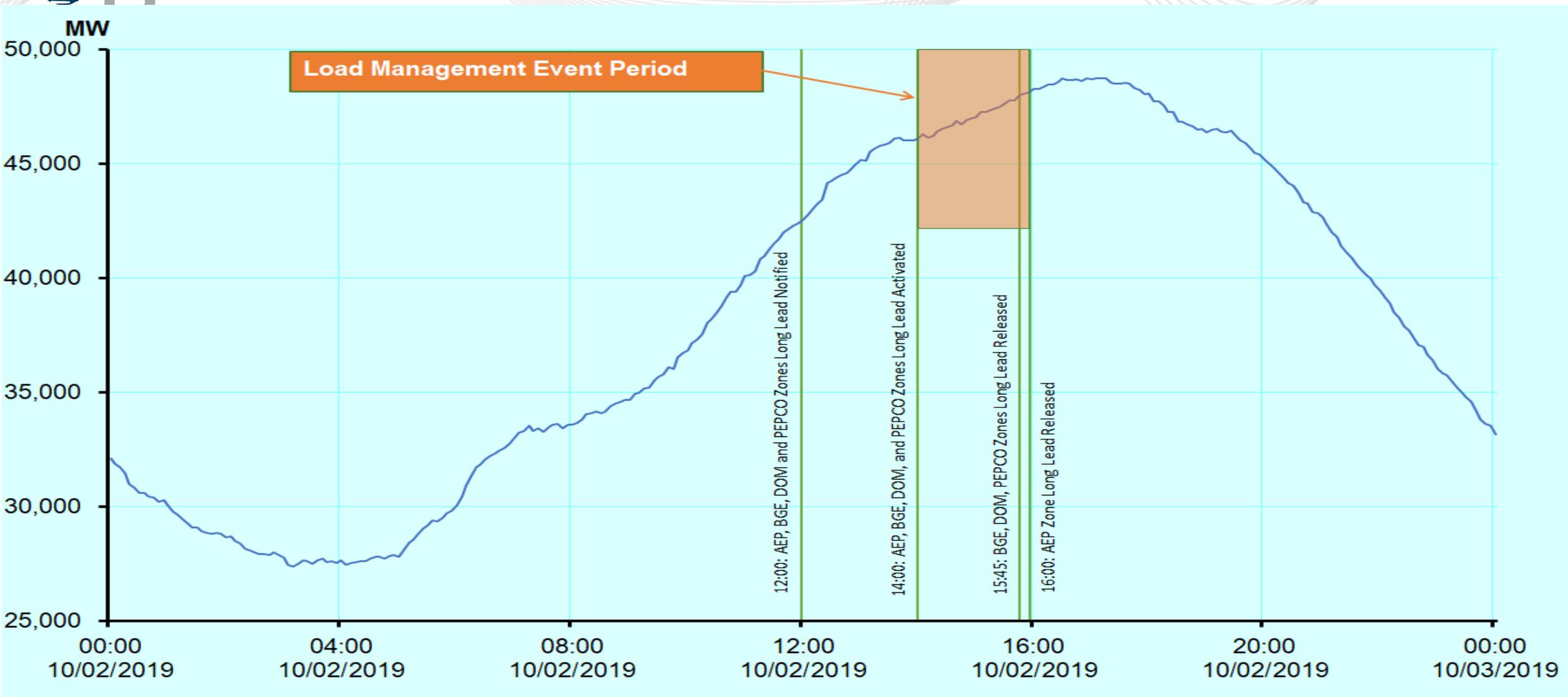
Estimated Demand Response in PJM: October 2, 2019



Notes:
Load Management Amounts are CSP estimated expected reductions.
Actual load reductions are not finalized until up to 3 months after event.



Instantaneous Load for Zones dispatched for Load Management - October 2, 2019



Load Management Compliance and Penalties

- Purpose of Non-Performance Assessment is to evaluate the performance of committed capacity resources during emergency conditions
- Non-Performance Assessment is applicable to capacity resources with Base and Capacity Performance (CP) commitments (includes Summer Only DR)
- Resources with Base or CP commitments that fail to perform are subject to Non-Performance Charge and resources (capacity or energy-only) that over-perform may be eligible for a Bonus Performance Credit
 - Base commitments are exposed to Non-Performance Charges only for under-performance during Emergency Actions in summer months of June – September
 - Base commitments are not subject to Non-Performance Charge, but are eligible for Bonus Performance Credit outside the summer months

- Performance Assessment Interval shall mean each Real-time Settlement Interval for which Load Management registration was dispatched by PJM
 - PJM may dispatch Load Management on a sub-zonal basis (PJM provides list of registrations) and CSP must perform or receive penalty
- Compare a resource's Expected Performance against Actual Performance for each Performance Assessment Interval



Measurement of Actual Load Reduction for Registration

PAI occurs during:	Actual Load Reduction (MW) =	
	FSL Customer	GLD Customer
June-October & May of DY	$PLC - [\text{hourly metered load} * \text{loss factor}]$	Lessor of (a) $[\text{Comparison load} - \text{hourly metered load}] * \text{loss factor}$ or (b) $PLC - [\text{hourly metered load} * \text{loss factor}]$ <i>Summer load reduction only recognized if $[\text{hourly metered load} * \text{loss factor}] < PLC$</i>
November – April of DY	$[\text{Winter Peak Load} * \text{Zonal Winter Weather Adjustment Factor} * \text{loss factor}] - [\text{hourly metered load} * \text{loss factor}]$	Lessor of (a) $[\text{Comparison load} - \text{hourly metered load}] * \text{loss factor}$ or (b) $[\text{Winter Peak Load} * \text{Zonal Winter Weather Adjustment Factor} * \text{loss factor}] - [\text{hourly metered load} * \text{loss factor}]$ <i>Non-summer load reduction only recognized if $[\text{hourly metered load} * \text{loss factor}] < \text{Winter Peak Load} * \text{Zonal Winter Weather Adjustment Factor} * \text{loss factor}$</i>

Note: If 5-minute metered load data is submitted, 5-minute load data is used to determine load reduction for PAI.



Converting Registration's Hourly Load Reduction to Interval Load Reduction

- Actual hourly load reduction for hour ending that includes Performance Assessment Intervals is flat-profiled over the set of dispatch intervals in the hour.
- Actual load reduction for PAI is calculated as the actual hourly load reduction multiplied by (12 divided by number of 5-minute intervals the registration was dispatched in the hour)
- Actual load reduction for PAI capped at PLC in summer period and at Winter Peak Load multiplied by Zonal Winter Weather Adjustment Factor in winter period

Example of Actual Load Reduction for PAI

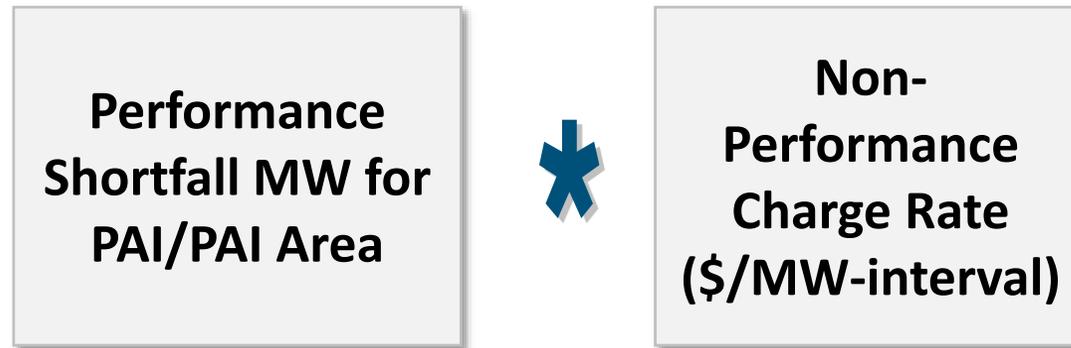
- Registration with 15 MW PLC is dispatched for 7 PAIs in the hour in summer period
- Hourly metered load reduction for hour ending 13:00 = 14 MW
- Calculated actual load reduction for each PAI = $14 \text{ MW} * (12 / 7) = 24 \text{ MW}$
- Actual load reduction for each PAI

Interval	Calculated Load Reduction (MW)	Actual Load Reduction (MW)
12:00 - 12:05	NA	NA
12:05 - 12:10	NA	NA
12:10 - 12:15	NA	NA
12:15 - 12:20	NA	NA
12:20 - 12:25	24	15
12:25 - 12:30	24	15
12:30 - 12:35	24	15
12:35 - 12:40	24	15
12:40 - 12:45	24	15
12:45 - 12:50	24	15
12:50 - 12:55	24	15
12:55 - 13:00	NA	NA

Compliance is not measured if registration is dispatched for less than 30 minutes of the clock hour.

CP/Base Aggregated RPM Resources compliance

- Committed resource with a positive Performance Shortfall for PAI/PAI Area is subject to **Non-Performance Charge =**



- Non-Performance Charge Rate is based on yearly Net CONE (for CP commitments) or yearly Weighted Average Resource Clearing Price (for Base commitments), a divisor (i.e., an assumed 30 Emergency Action hours per year), and the number of Real-time Settlement Intervals in an hour

- Non-Performance Charge Rate for shortfall due to CP commitments (\$/MW-interval) = [(modeled LDA Net CONE (\$/MW-day in ICAP terms) for which the resource resides * 365 days)/30]/number of Real-time Settlement Intervals in an hour
 - If LDA Net CONE = \$300/MW-day, the Non-Performance Charge Rate = [(\$300/MW-day * 365 days)/30]/12 = \$304.17/MW-interval
 - For 2017/18 DY, RTO NPCR is \$201.69/MW-interval = 60%*[((\$331.54/MW-day*365 days)/30 hours)]/12
 - This charge rate is also applied to Summer Only DR
- Non-Performance Charge Rate for shortfall due to Base commitments (\$/MW-interval) = [(Weighted Average Resource Clearing Price (\$/MW-day) for resource's base commitments * 365 days)/30]/12

Modeled LDAs and respective Net CONE are provided in DY Planning Parameters posted on Capacity Market (RPM) web page

- Stop-loss provisions limit the total Non-Performance Charge that can be assessed on each Capacity Resource
- The maximum yearly Non-Performance Charge is:
 - CP commitments: $1.5 * \text{Applicable LDA Net CONE} * 365 \text{ days} * \text{max daily CP UCAP MW commitment from June of DY through end of billing month for which Non-Performance Charge was assessed}$
 - Stop-loss for Seasonal Capacity Performance Resource considers the number of days in the applicable season (Effective 2020/2021 Delivery Year) instead of 365.
 - Base commitments: total capacity revenues due to the resource for Base commitments for the Delivery Year
- The Stop-Loss for the Transition Year:
 - $2017/2018 \text{ CP Stop loss} = \$108,910.23 * \text{max daily CP UCAP MW commitment from June of DY through end of billing month for which Non-Performance Charge was assessed}$

- Any excess DR capacity load reductions will be eligible for bonus payment
 - Performance is first aggregated across products and across Emergency Action area for all registrations dispatched by PJM for the hour.
 - CSP must ensure Expected Load Reductions reported to PJM are accurate
 - Volume of load reduction eligible for bonus payment is based on capacity compliance calculation for registrations dispatched.
 - PLC based in summer
 - WPL based in non-summer
 - Who is eligible for bonus payments?
 - All Load Management CP and Base registrations dispatched by PJM
 - All Economic DR registrations dispatched by PJM.

Compliance Data Submission

Submission of Load Management Compliance Data in DRHub

- Both FSL and GLD Emergency registrations require 24 hours of data for all Load Management Compliance submissions
 - Load Management Event
 - Load Management Test
 - Load Management Retest
- All compliance data is in the Daily load format similar to the load data for Economic Settlements
 - Load and compliance profile data in hour ending format

Templates for uploading Load Management Compliance data is posted on the PJM website under:

- **Markets & operations > eTools > DRHub > DRHub Meter Data Management (non-web services)**
 1. Meter Data Example EmergCap GLD Gen (M19 - *Generation*)
 2. Meter Data Example EmergCap GLD Regression (M19 - *Regression Analysis*)
 3. Meter Data Example EmergCap GLD Same Day (M19 - *Same Day (Before/After Event)*)
 4. Meter Data Example EmergCap GLD Similar Day (M19 - *Customer Baseline*)
 5. Meter Data Example EmergCap GLD Compare Day (M19 - *Comparable Day*)
 6. Meter Data Example EmergCap FSL

- Load Management Compliance Data can be submitted in three different ways:
 - Upload from Compliance Details screen
 - Upload from Meter Data Management Screen
 - Uploaded via web services
- Emergency registrations that have a Measurement Method of Firm Service Level (FSL) must submit 24 hours of load data
- Emergency registrations that have a Measurement Method of Guaranteed Load Drop (GLD) must submit data as follows on the next slide:

CP/Base DR Energy Settlement

- Emergency and Economic Settlements (same locations)
 - Adjust SAA period so it occurs before emergency and economic event.
 - Exclude emergency event days from CBL selection
 - Overlapping emergency/economic settlement hours are settled based on Emergency rules
 - Overlapping emergency/economic settlement hours use economic shutdown cost
 - no balancing operating reserve charges will be assessed for deviations from real time dispatch amount or from cleared Day-Ahead amount

- CSP will receive DRHub “tasks” to submit settlements
- CSP goes to each emergency energy settlement and:
 - Adjust first 1 or 2 Settlement hours – DRHub default is that all emergency registrations began reductions when notified
 - If registration did not start load reduction when notified (notification time) then CSP must deselect settlement hours as appropriate.
 - Example – Event Notification Time 12:40 and Event Start Time 14:40. If registration began reduction at 13:00 then CSP must deselect HE 13 (noon to 1pm).
 - Submit required meter data based on CBL needs
 - Calculate CBL and associated load reduction
 - Review results
 - Submit emergency energy settlement

- PJM pays Zonal LMP
 - Resource is made whole to its offer value, which includes:
 - Strike Price
 - Shutdown costs

	HE 14	HE 15	HE 16	HE 17	HE 18	Total
Nominated MWs	10	10	10	10	10	
Actual Reduction (MW)	10	10	10	10	10	
Real-Time LMP (\$/MWh)	300	350	500	300	200	
Strike Price	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	
Load Response						
Emergency Credits	\$3,000	\$3,500	\$5,000	\$3,000	\$2,000	\$16,500
Emergency Bid	\$11,000	\$11,000	\$11,000	\$11,000	\$11,000	\$55,000

Shutdown Costs = \$1000

Resources will be paid Daily Load Response Emergency Credits + Emergency Load Response Make Whole Credit

- Load Response Emergency Credits = \$16,500
- Emergency Load Response Make Whole Credit = Emer. Bid + Shutdown cost – Daily Load Response Emergency Credits
 - \$55,000 + \$1,000 - \$16,500 = \$39,500

Settlement Details

- Tasks
- Locations
- Registrations
- Events
- Meter Data
- Energy Settlements**
- Compliance
- Dispatch Groups
- Account and Users
- Reports
- RERRA

Cancel Save Submit

Submit this settlement

Settlement Id: 1830944

CSP: BC LSE: N/A EDC: BC

Registration ID: 3256205 Registration Name: BGE PR without AMI 2017-18 Final Event Date: 11/17/2017

Program: Load Management DR Full Invoice Date: Pricing Point: BGE PR DR AGG

Zone: BGE Status: Incomplete **H**

Details

Reduction Hour?	HE	Market	Scheduled (kW)	Dispatched (kW)	Loss Factor
<input checked="" type="checkbox"/>	12	Emergency Energy	0.0	3063.4	06665
<input checked="" type="checkbox"/>	13	Emergency Energy	0.0	8354.8	06665
<input checked="" type="checkbox"/>	14	Emergency Energy	0.0	8354.8	06665
<input checked="" type="checkbox"/>	15	Emergency Energy	0.0	8354.8	06665
<input checked="" type="checkbox"/>	16	Emergency Energy	0.0	8354.8	06665
<input checked="" type="checkbox"/>	17	Emergency Energy	0.0	2227.9	06665
Total/Average			0.0	38710.6	06665

1. Upload Meter Data
2. Calculate CBL
3. Validate Accuracy
4. Uncheck Reduction Hours (if necessary)
5. Save
6. Submit

CBL Calculation

CBL Method: 3 Day Types with SAA (DEFAULT) Status: Pending

Summary: Valid as of:

Download Meter Data Upload Meter Data Calculate CBL Load Data Review CBL Detail Report

Hour	Load Reduction (kW)	Measured Load(kW)	Calculated Baseline (kW)	Load Adjustment (kW)	Adjusted Baseline (kW)
No records found.					

- Questions specific to DR Hub – Settlements, Compliance, M&V
 - Email demand_response_operations@pjm.com
- Demand Response Hot & Cold Day Reports
 - [Oct 1 & 2, 2019](#)
- Training Material for Load Management in Capacity Market
 - [Load Management \(Emergency/Pre-Emergency DR\) in Capacity Market](#)
- General PAI Questions
 - [October 2 PAI FAQ](#)