

PJM Demand Side Response Overview

PJM State & Member Training Dept.

- Overview
- Potential changes
- Economic Demand Resources
- DR in Ancillary Services
- Load Management in RPM

PJM Demand Side Response

Demand Response is a consumer's ability to reduce electricity consumption at their location when wholesale prices are high or the reliability of the electric grid is threatened.

Common examples of demand response include:

- raising the temperature of the thermostat so the air conditioner does not run as frequently
- slowing down or stopping production at an industrial operation or dimming/shutting off lights

Basically any explicit action taken to reduce load in response to short-term high prices or a signal from PJM.

PJM Demand Side Response

Demand Response can participate within the various PJM markets:

- Energy
 - Day Ahead
 - Real Time
 - Dispatched
- Ancillary Services
 - Synchronized Reserve
 - Day Ahead Scheduling Reserve
 - Regulation
- Capacity
 - Offer into auction up to 3 years in advance

Demand Response in Ancillary Service Markets

- **Day ahead scheduling reserves (30 minute spin)**
 - Must reduce net load within 30 minutes if dispatched by PJM
 - Hourly market price (DASRMCP)
- **Synchronized Reserves (10 minutes spin)**
 - Reduce load during reserve shortage, must reduce net load within 10 minutes.
 - Hourly market price (SRMCP)
- **Regulation – real time load change (increase or decrease) based on real time system conditions**
 - Hourly market price (RMCP)

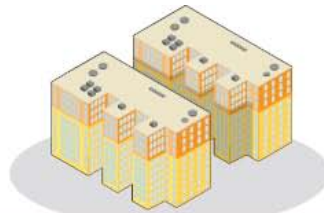
Reliability service - must be there when system operator needs it.

PJM Market Participants in Demand Response



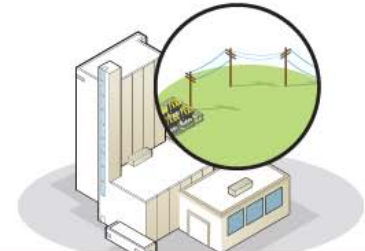
Load Serving Entity (LSE)

PJM Member, including load aggregator or power marketer, that serves end-users in PJM Control Area to sell electric energy to end-users in PJM Control Areas.



End Use Customer

Cannot directly participate unless it is a PJM Member (e.g. as an LSE or CSP).



Electric Distribution Company (EDC)

PJM Member that owns, or leases, electric distribution facilities used to provide electric distribution service to electric load in PJM Control Areas.



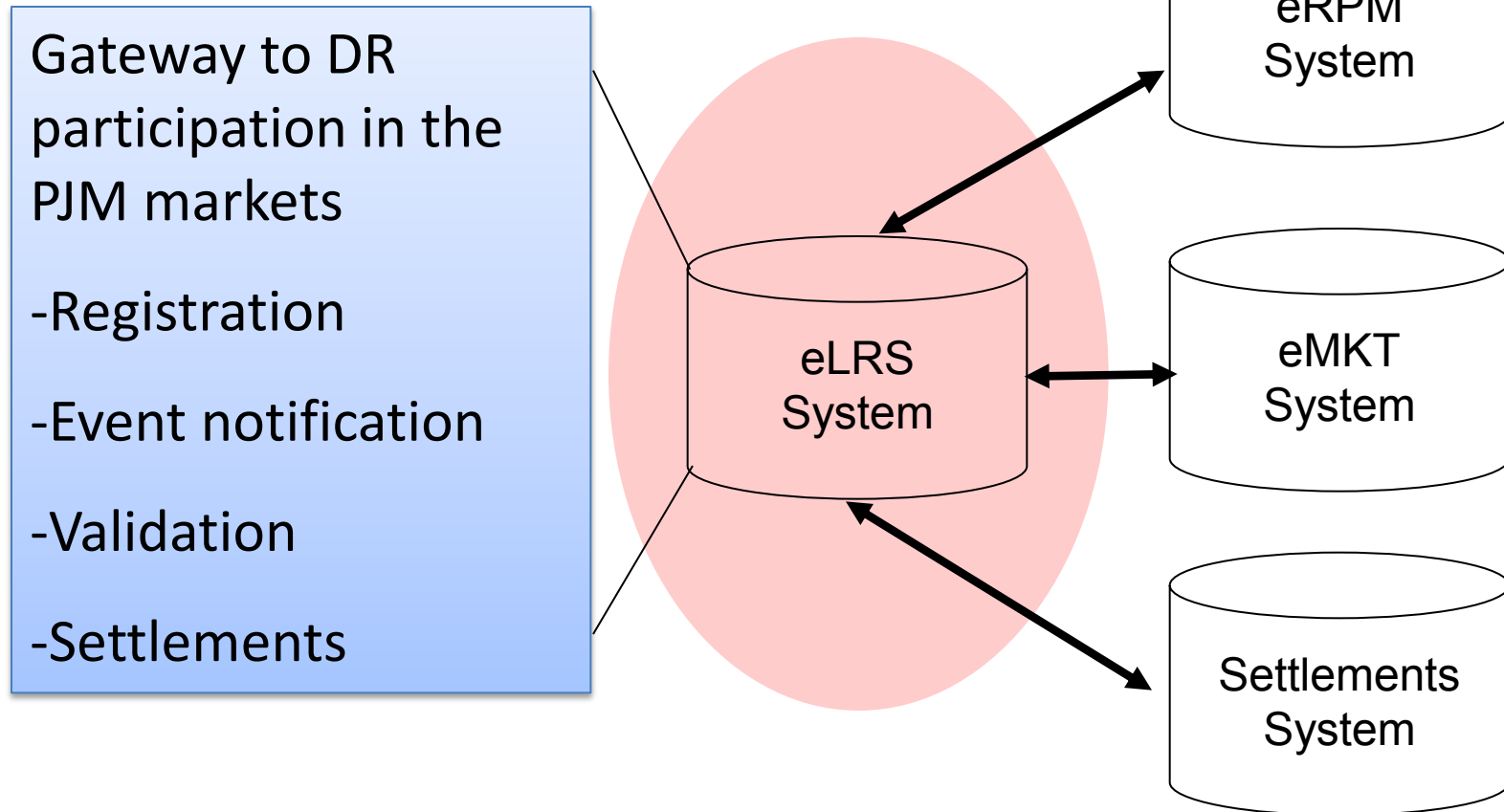
Curtailment Service Provider (CSP)

PJM Members that act on behalf of end-use customers who wish to participate in PJM Load Response opportunities.

Who can be a CSP?

- » Any LSE
- » Any EDC
- » Any third party (*PJM member*) specializing in Demand Response

System Scope



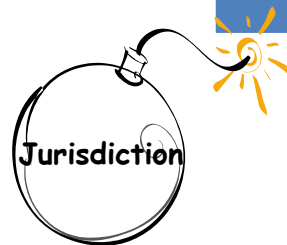
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Regulatory Headwinds - EPSA order ("vacate" order 745)



Eliminate DR
participation in all PJM
markets

Maintain current DR
participation – RERRA
already regulates
through 719A provisions

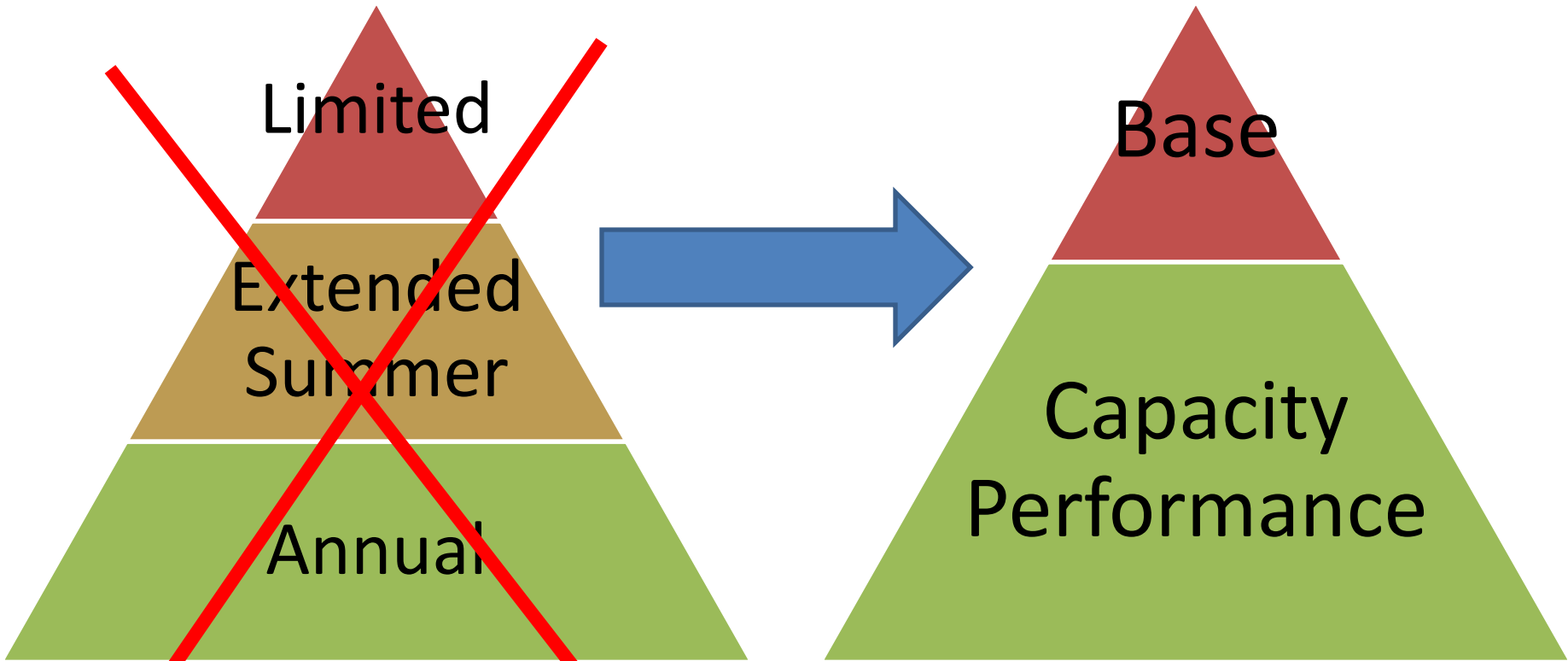


PJM proposed direction

- DR in PJM capacity market may only be provided by LSE's/retail provider
 - LSE may only provide DR for their specific customers
 - DR will be reduction in demand (not a supply resource)
- Energy market (economic & emergency/pre-emergency)
 - No compensation – customer will avoid cost
- Capacity and Ancillary Service markets
 - Similar rules as today (allow CSP to provide)

PJM believes this solution is based on viable interpretation, but there is some risk it would not comply with order

Capacity Performance Summary



Simplify & increase required DR availability

- Overview
- Potential Changes
- Economic Demand Resources
 - Registrations
 - Customer Baseline and CBL Certification
 - Settlements
- DR in Ancillary Services
- Load Management in RPM

Business Rules - Economic

- The intent of Economic DSR is for participants to respond to price (RT and DA LMP)
- End Use customers must have interval meters
 - Exception for Direct Load Control
 - Customer or CSP can provide interval meter provided it meets the PJM criteria
- The CSP, EDC, PJM and the PJM Market Monitor will monitor DSR market behavior
 - Registration & Settlement issues

PJM Demand Side Response

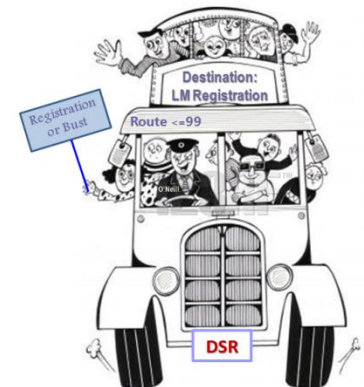
- Like a generator, a DSR resource participates in the Day Ahead and Real-Time energy markets
- Unlike a generator that is a capacity resource, DSR participation in the energy market is voluntary
 - Subject to Operating Reserve Charges
- After a DSR either clears in the Day-Ahead market or is dispatched in the Real-Time market, a settlement is created and a reduction needs to be calculated in eLRS.
 - Reduction = CBL – metered load

Creating Locations and Registrations

- Locations are created in eLRS and represent the Customer Site at the EDC Account Number level.
 - The EDC Account Number is a unique number assigned by the EDC to the metering at the customer site.
- Economic and Emergency Registrations are created in eLRS from the Locations.
 - A registration can be created from a single location.
 - An aggregate registration can be created from multiple locations per the business rules for aggregate registrations.
- Registrations are required for Market participation

Business Rules for Creating Aggregate Registrations

- All Locations in the aggregate must have the same EDC
- The aggregate will be created using functionality in the eLRS software
- All registrations must total $\geq 100\text{kW}$
 - multiple Locations will need to be selected in eLRS to form one (1) single registration $\geq 100\text{kW}$
- Only one (1) individual location in the aggregate can be $\geq 100\text{kW}$
- All Locations in the aggregate must meet all other requirements for market participation
- There is no limit to the number of Locations in an aggregate



Metering Requirements

- Metering requirements shall meet:
 - 1) Electric Distribution Company requirements for accuracy or,
 - 2) Have a maximum error of two (2) percent over the full range (end-to-end) of the metering equipment (including Potential Transformers and Current Transformers)
 - For pulse data recorders (PDR), this includes the PDR error plus EDC meter error
- Metering equipment can be either:
 - 1) The metering equipment used for retail electric service
 - 2) Customer-owned metering equipment
 - 3) Metering equipment acquired by the CSP for the customer



Rules are outlined in Manual 11, section 10 - Interval Meter Equipment and Load Data Requirements

Registration Process – Types of Registrations

Types of Registrations that can be created in eLRS:

1. Economic
2. Economic Only
3. Economic Regulation Only
4. DR Full Emergency
5. DR Capacity Only
6. Emergency Energy Only

RERRA Restrictions

- 1. If EDC is large (>4 million MWh) then by default the Demand Resource may participate in Demand Response unless there is Relevant Electric Retail Regulatory Authority (RERRA) evidence that prohibits participation.**
- 2. If EDC is small (= <4 million MWh) then by default the Demand Resource may not participate in Demand Response unless there is Relevant Electric Retail Regulatory Authority (RERRA) evidence that allows participation.**

RERRA Evidence

Relevant Electric Retail Regulatory Authority (RERRA) evidence includes:

Large EDC (>4 million MWh)

- an order, resolution or ordinance of the RERRA prohibiting or conditioning end-use customer participation, or
- an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation, or
- an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation

RERRA Evidence

Relevant Electric Retail Regulatory Authority (RERRA) evidence includes:

Small EDC (<=4 million MWh)

- an order, resolution or ordinance of the RERRA permitting or conditionally permitting end-use customer participation, or
- an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation, or
- an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation

Registration Process – EDC Responsibilities

EDC Responsibilities in Registration Process

Once a registration is submitted by the CSP, the EDC has up to 10 business days to verify the information listed below. If the information is correct, then the EDC is expected to confirm the registration. If the EDC and LSE take no action then the registration will auto confirm after 10 business days.

1. Interpret the RERRA evidence to determine participation eligibility
2. Verify EDC Account Number(s)
 - a) Corresponding to address of facility
 - addresses if an aggregate
3. Verify Loss Factors
 - a) Used for Economic participation
 - b) Used for Load Management participation
4. Peak Load Contribution (PLC)
 - a) Used for Load Management participation

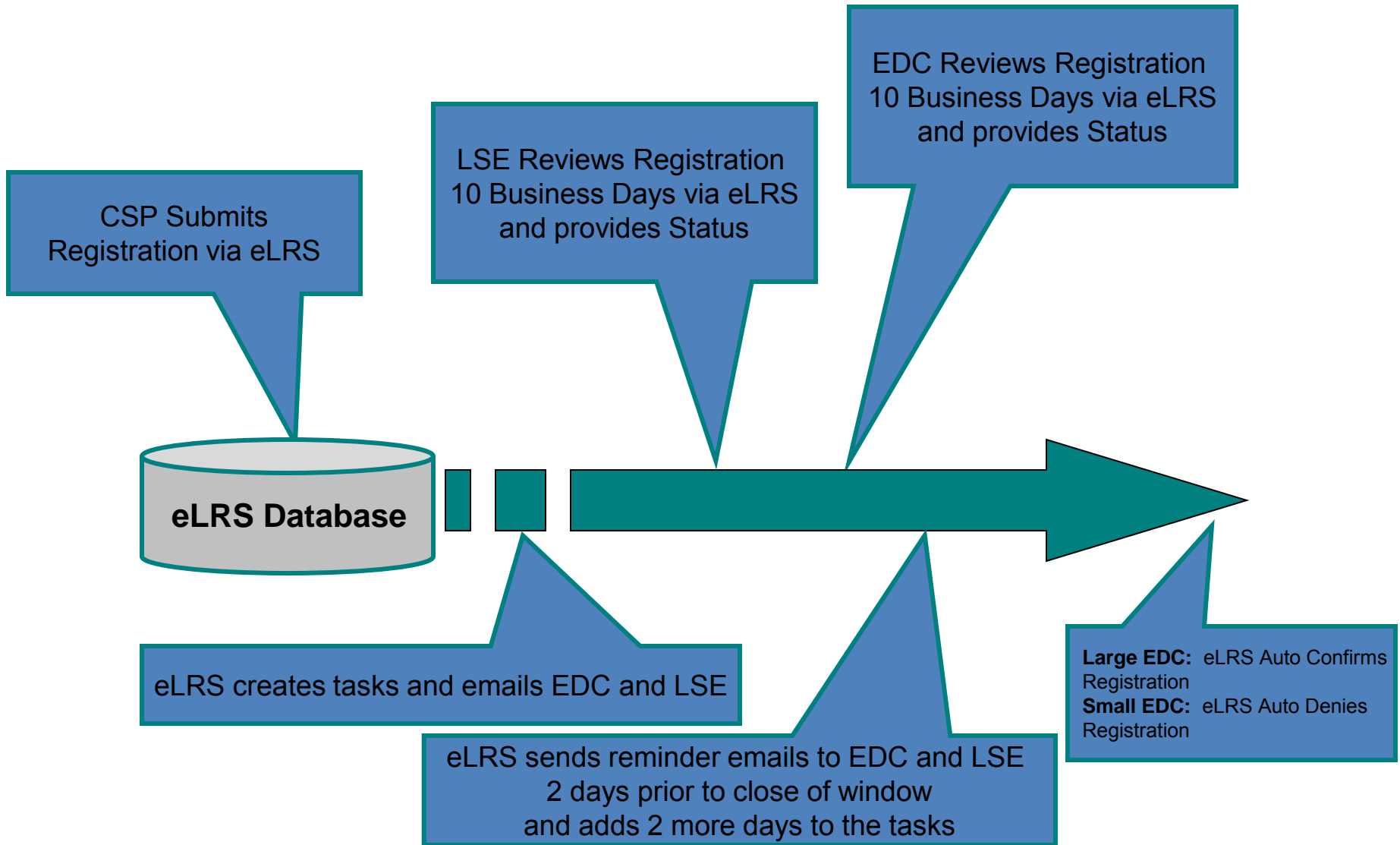
Registration Process – LSE Responsibilities

LSE Responsibilities in Registration Process

Once a registration is submitted by the CSP, the LSE has up to 10 business days to verify the information listed below. If the information is correct, then the LSE is expected to confirm the registration. If the EDC and LSE take no action then the registration will auto confirm after 10 business days.

1. Verify that the LSE has a contract with the customer
2. Verify that there are no contractual obligations that would preclude the customer from Demand Side Response participation

Registration Process Timeline



Creating Locations and Registrations in the eLRS

- The eLRS User Guide is a comprehensive document on the eLRS covering:
 1. Locations
 2. Registrations
 3. Events
 4. Settlements
 5. Compliance
 6. Tasks
- Please refer to the eLRS User Guide for creating Locations and Registrations.
 - From the PJM Web Page select:
market & operations/PJM Tools/eLRS/eLRS User Guide

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Customer Baseline Calculation

A Customer Baseline Load (CBL) is a proxy for what the load would have been absent the load reduction. A CBL is calculated for the following timeframes:

- **Average Day CBL for Weekdays**
- **Average Day CBL for Saturdays**
- **Average Day CBL for Sundays/Holidays**

Detailed CBL language found in the [PJM Operating Agreement, Section 3.3A](http://www.pjm.com/documents/downloads/agreements/oa.pdf)
<http://www.pjm.com/documents/downloads/agreements/oa.pdf>

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Economic Load Response – General Rules

1. Payments to CSP
 - a) Reduction * LMP (when LMP at pricing point \geq Net Benefits Price)
2. When the LMP at the pricing point is greater than or equal to the Net Benefits Price then the cost of Economic Demand Response settlements will be allocated to all of the Market participants with real-time exports from PJM and LSE's within a zone that has an LMP greater than or equal to the Net Benefits Price.
3. No requirement to participate in the Day-Ahead Market
 - a) If cleared, then Balancing Operating Reserve charges will be assessed based on deviations greater than 20% between real time curtailments and cleared day ahead MW.
4. No requirement to participate in the Real-Time Market
 - a) If dispatched, then Balancing Operating Reserve charges will be assessed based on deviations greater than 20% between real time curtailments and dispatched MW.

Net Benefits Test

DR is compensated at full LMP when two conditions are met:

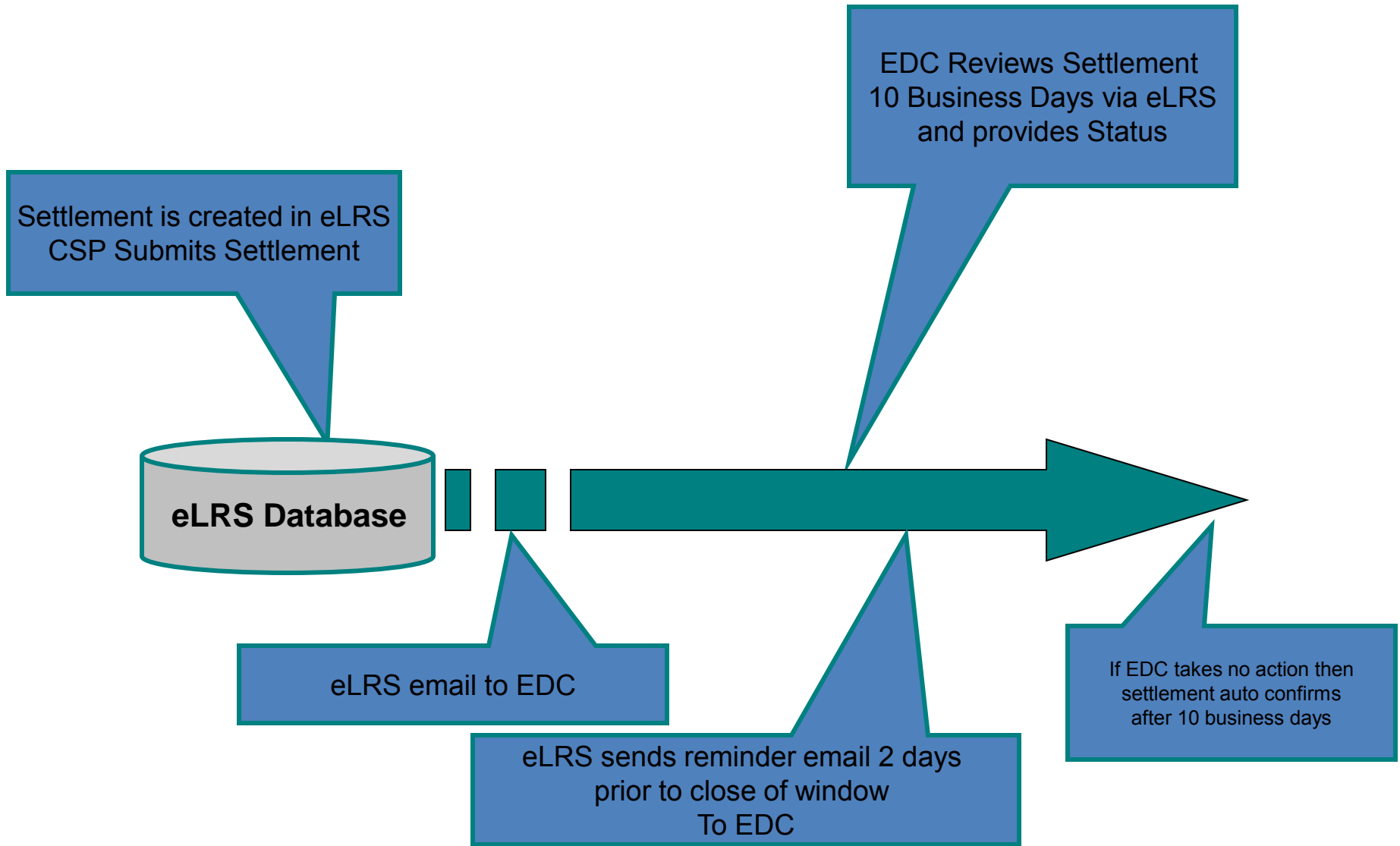
1. DR has the capability to balance supply and demand; and
2. Payment of LMP to DR is cost effective.

Cleared or dispatched DSR resources balance supply and demand. Payment of LMP to DR is cost effective when the LMP of the cleared or dispatched DSR is greater than or equal to the Net Benefits Price.

The net benefits test to define a threshold point on the PJM Supply curve where the net benefit exceeds the cost to load. The net benefit is the point where elasticity is equal to 1.

- *Generally, an "elastic" variable is one which responds "a lot" to small changes in other parameters. Similarly, an "inelastic" variable describes one which does not change much in response to changes in other parameters.*

Settlement Process Timeline



- Overview
- Potential Changes
- Economic Demand Resources
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 - Regulation
 - Synchronized Reserves
- Load Management in RPM

Mandatory Training Requirement

CSP's that have resources participating in Synchronized Reserves and/or Regulation, need to designate the individuals at their company that interface with these markets and have them take a mandatory annual training. The following is the procedure for a company to "sign-up" each individual for the mandatory training.

The first step is for the company to designate a Training Liaison (point person in charge of monitoring that individuals have completed the initial training and subsequent refresher training).

- a) Send the Training Liaison Identification Form (DOC) found on the Member Training Liaison webpage <http://pjm.com/training/member-training-liaison.aspx> to trainingsupport@pjm.com
 - Select CSP for Company Type on the form.
- b) PJM will send the designated Training Liaison a spreadsheet to populate the company's roster with the information on the individuals who will be interfacing with the Regulation and/or Synchronized Reserve Markets.

The second step is to send the populate spreadsheet to trainingsupport@pjm.com. Those individuals will be added to the company roster and given access to the mandatory training.

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PJM Market with Market-based Regulation

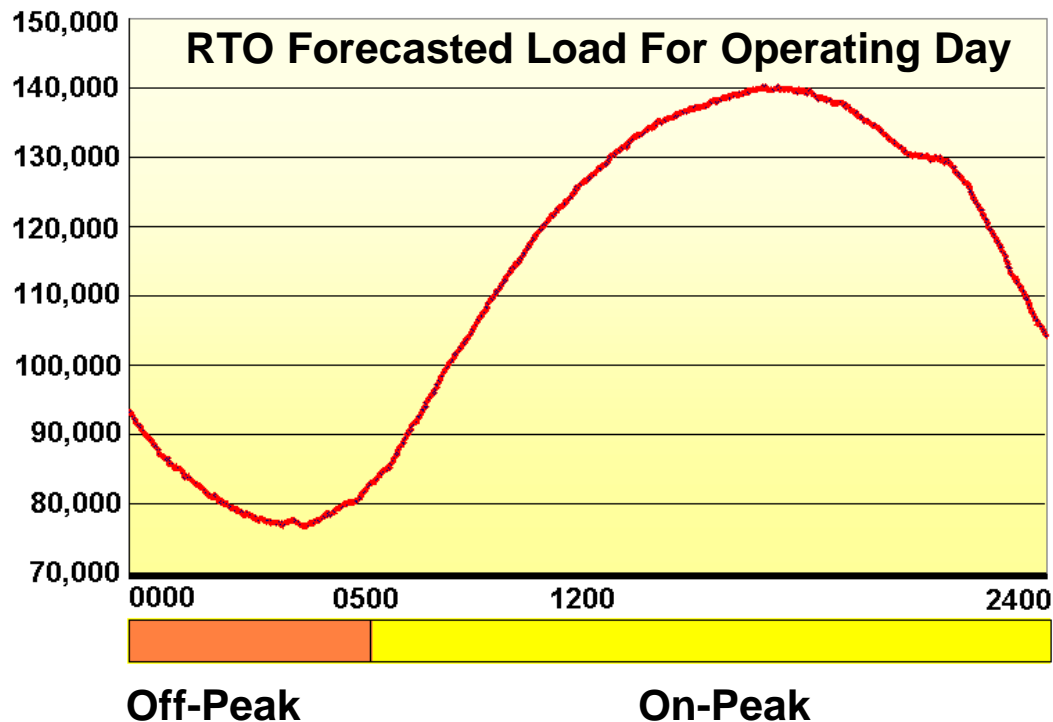
- Creates single Regulation market for entire RTO
- Provides Market Clearing Price for regulation
- Protects supplier by providing opportunity cost of energy
- Provides more incentive to provide regulation



PJM's Regulation Requirement

The RTO requirement is a fixed number for the on and off peak periods with a reevaluation every 6 months

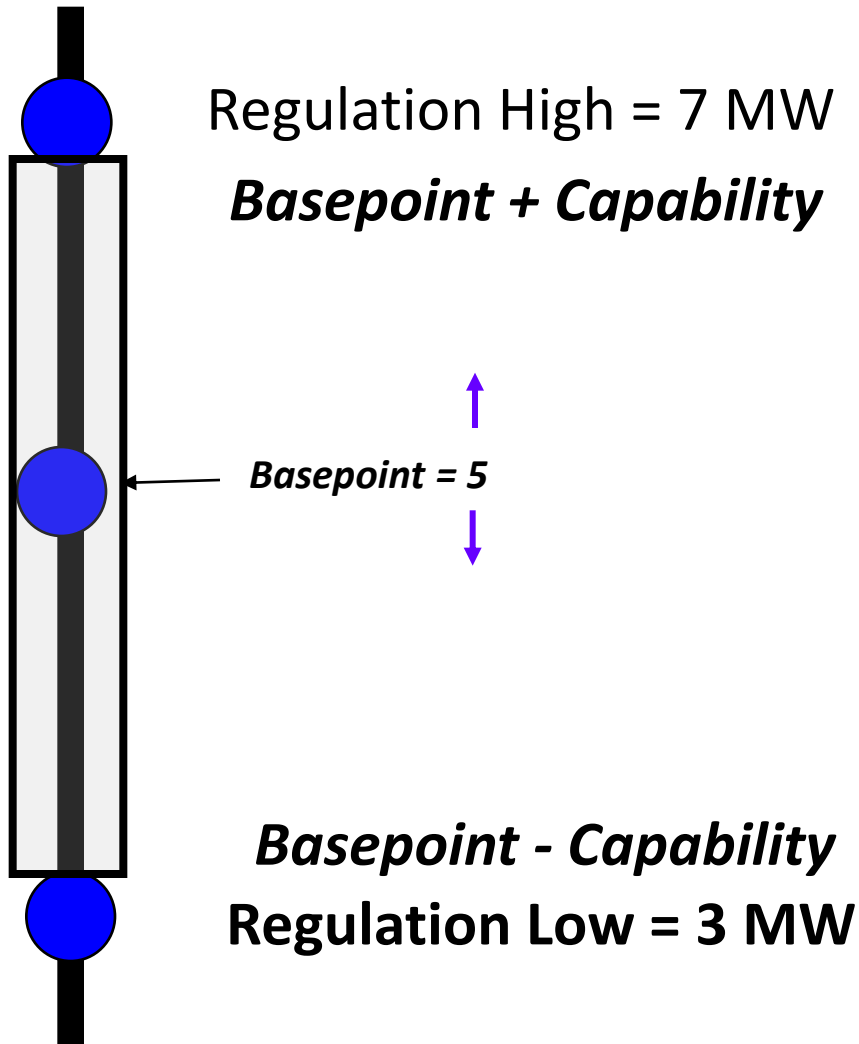
- Requirement for off-peak hours (0000-0459)
 - 525 MW
- Requirement for on-peak hours (0500-2359)
 - 700 MW



Participation Requirements

- Ability to receive and react to a dynamic regulation control signal from PJM
- Real time telemetry
- Five-minute response (raise or lower load within specified bandwidth)
- Minimum .1 MW offer
- Resource certification and testing requirements
- Demand Resources are limited to providing 25% of the Regulation requirement

Regulation for Demand Response Example



Demand is normally a 5 MW load

They are offering 2 MW of regulation

Regulation High Limit = 7 MW

Regulation Low Limit = 3 MW

Regulation Limits can be changed hourly

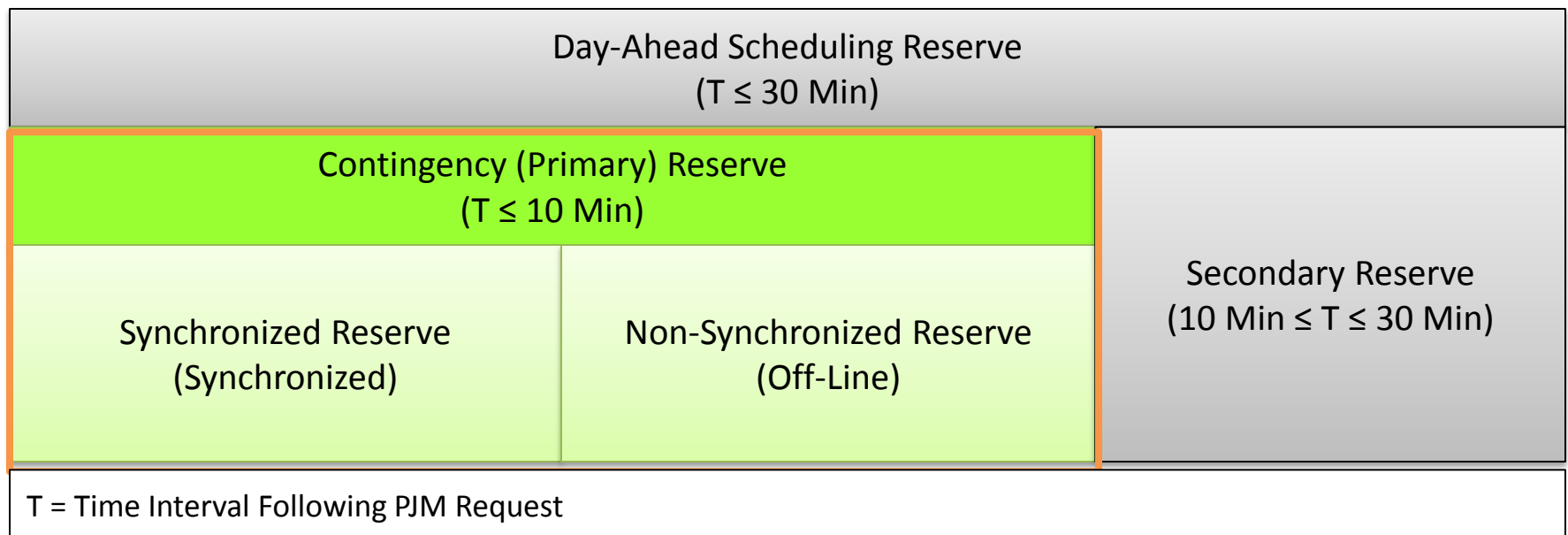
Regulation Qualification Test

- Resources must meet the following criteria:
 - Pass three consecutive tests with a performance score of 75% or better
 - The resource will follow the RegA or RegD signal for 40 minutes using more operational tests
 - Resources may complete one self-test and two PJM administered tests
 - Or three PJM administered tests
 - Resources can dual qualify for RegA and RegD by completing additional tests

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Reserves

- Reserves are additional generation capacity above the expected load. Scheduling excess capacity protects the power system against the uncertain occurrence of future operating events, including the loss of energy or load forecasting errors



Reserve Zone Definitions

Zones that are Always located in MAD	Zones that are Never located in MAD	Zones with specific buses that may be Located in MAD
PS, PE, PL, BC, JC, ME, PEP, AE, DPL, RECO	DEOK, CE, DAY, DUQ, ATSI, EKPC	PN, AP, AEP, DOM

- The MAD sub-zone Bus and Resource list is posted on the PJM website at: <http://www.pjm.com/markets-and-operations/ancillary-services/synchronized-service.aspx>
- Busses not located in the MAD sub-zone considered to be in the RTO

Synchronized Market Operation

PJM Dispatch call the Synchronized Reserve Events. The CSP is notified of the Synchronized Reserve Event via Electronic Notification and the PJM All-Call.

- Electronic Notification is a requirement and is the primary means of Synchronized Reserve notification
- PJM All-Call is a requirement and is an additional means of Synchronized Reserve notification
 - Used as confirmation for the Electronic Notification
- The CSP, without regard to price and as quickly as possible, implement the requested percentage of Synchronized Reserve
- Continue to implement Synchronized Reserve until directed by PJM dispatcher to discontinue
- The official event start time of the Synchronized Reserve Event is determined after-the-fact

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Capacity vs. Energy

Capacity

- A commitment of a resource to provide energy during PJM emergency under the capped energy price
- Capacity revenues paid to committed resource whether or not energy is produced by resource
- Daily product

Energy

- Generation of electrical power over a period of time
- Energy revenues paid to resource based on participation in PJM's Day-Ahead & Real-Time Energy Markets
- Hourly product

Capacity, energy & ancillary services revenues are expected, in the long term, to meet the fixed and variable costs of generation resources to ensure that adequate generation is maintained for reliability of the electric grid

Objectives of RPM

- Resource commitments to meet system peak loads three years in the future
- Three year forward pricing which is aligned with reliability requirements and which adequately values all capacity resources
- Provide transparent information to all participants far enough in advance for actionable response

Purpose of RPM is to enable PJM to obtain sufficient resources to reliably meet the needs of electric consumers within PJM

RPM Participation

- Eligible Capacity Resources:

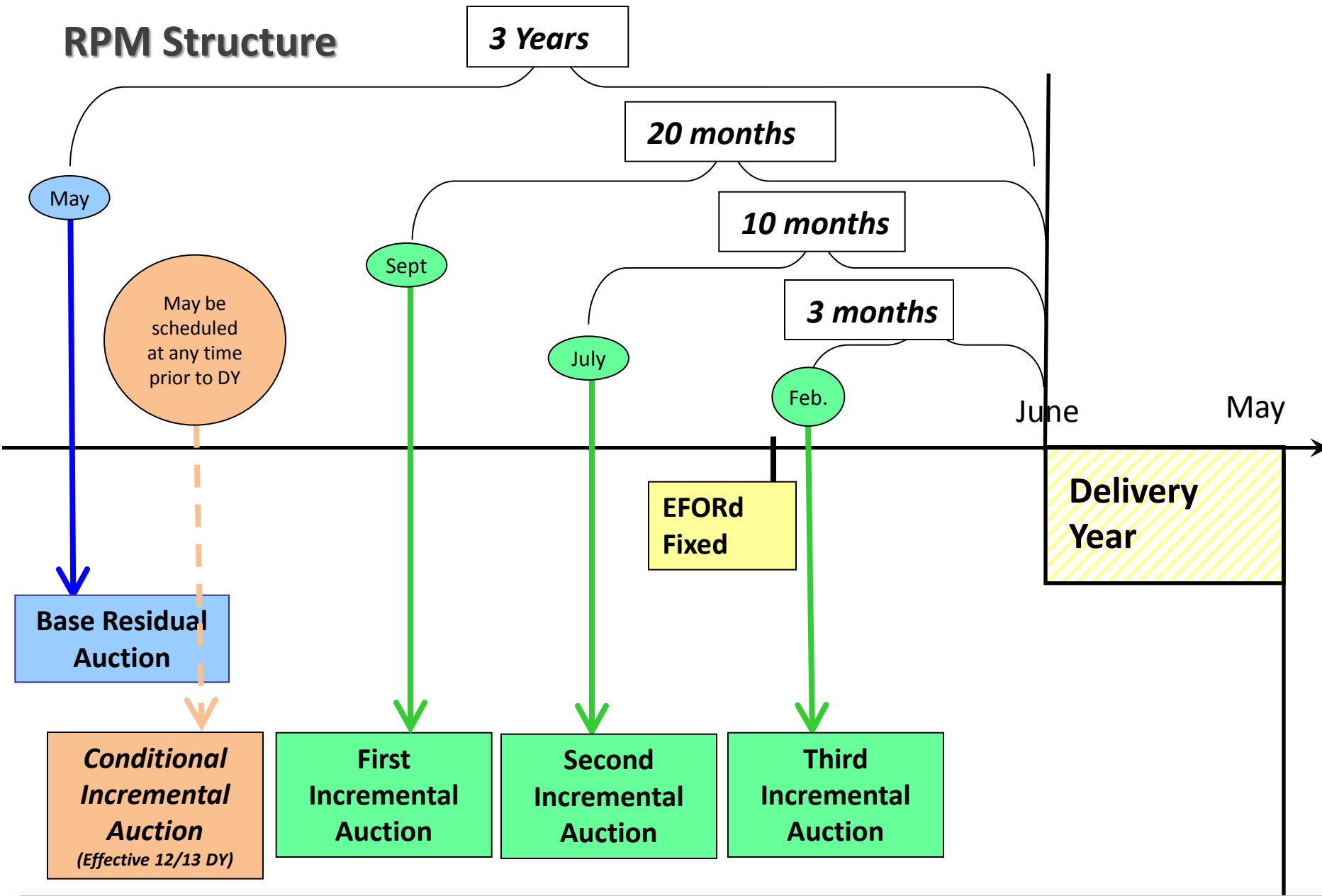
- Existing & planned generation in PJM
- Existing & planned external generation

- Load Management resources

- **➤ Demand Resources (DR) – existing & planned**

- Energy Efficiency resources
- Bilateral contracts for unit-specific capacity resources
- Qualifying Transmission Upgrades

RPM Structure



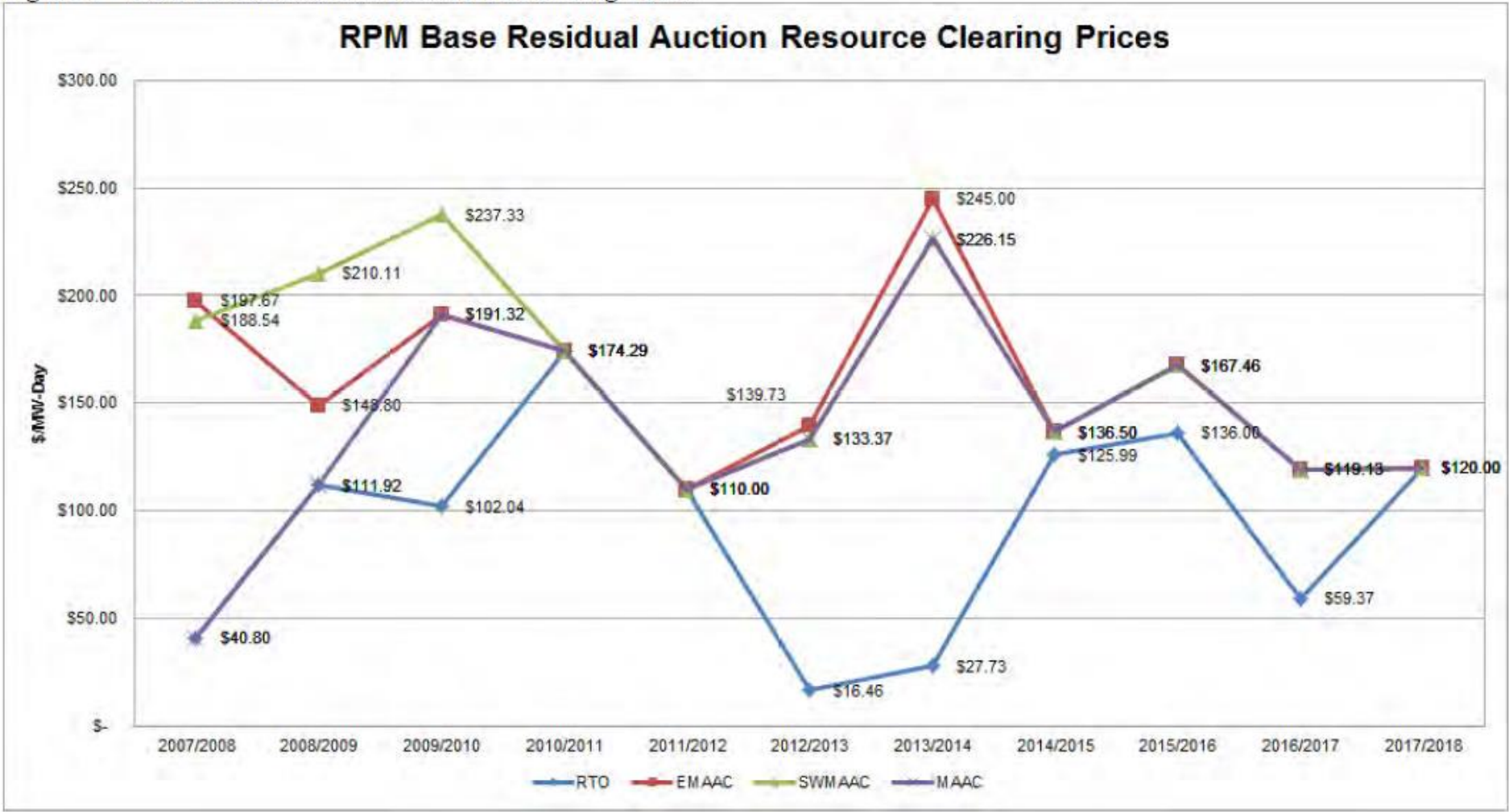
Ongoing Bilateral Market

RPM Auctions (Starting with 12/13 DY)

Activity	Purpose	Cost of Procurement
Base Residual Auction	Procurement of RTO Obligation less an amount reserved for short term resources, less FRR Obligation	Allocated to LSEs through Locational Reliability Charge
1 st Incremental Auction	Allows for: (1) replacement resource procurement (2) increases and decreases in resource commitments due to reliability requirement adjustments; and (3) deferred short-term resource procurement	Allocated to resource providers that purchased replacement resources and LSEs through Locational Reliability Charge
2 nd Incremental Auction		
3 rd Incremental Auction		
Conditional Incremental Auction	Procurement of additional capacity in a LDA to address reliability problem that is caused by a significant transmission line delay	Allocated to LSEs through Locational Reliability Charge

Base Residual Auction

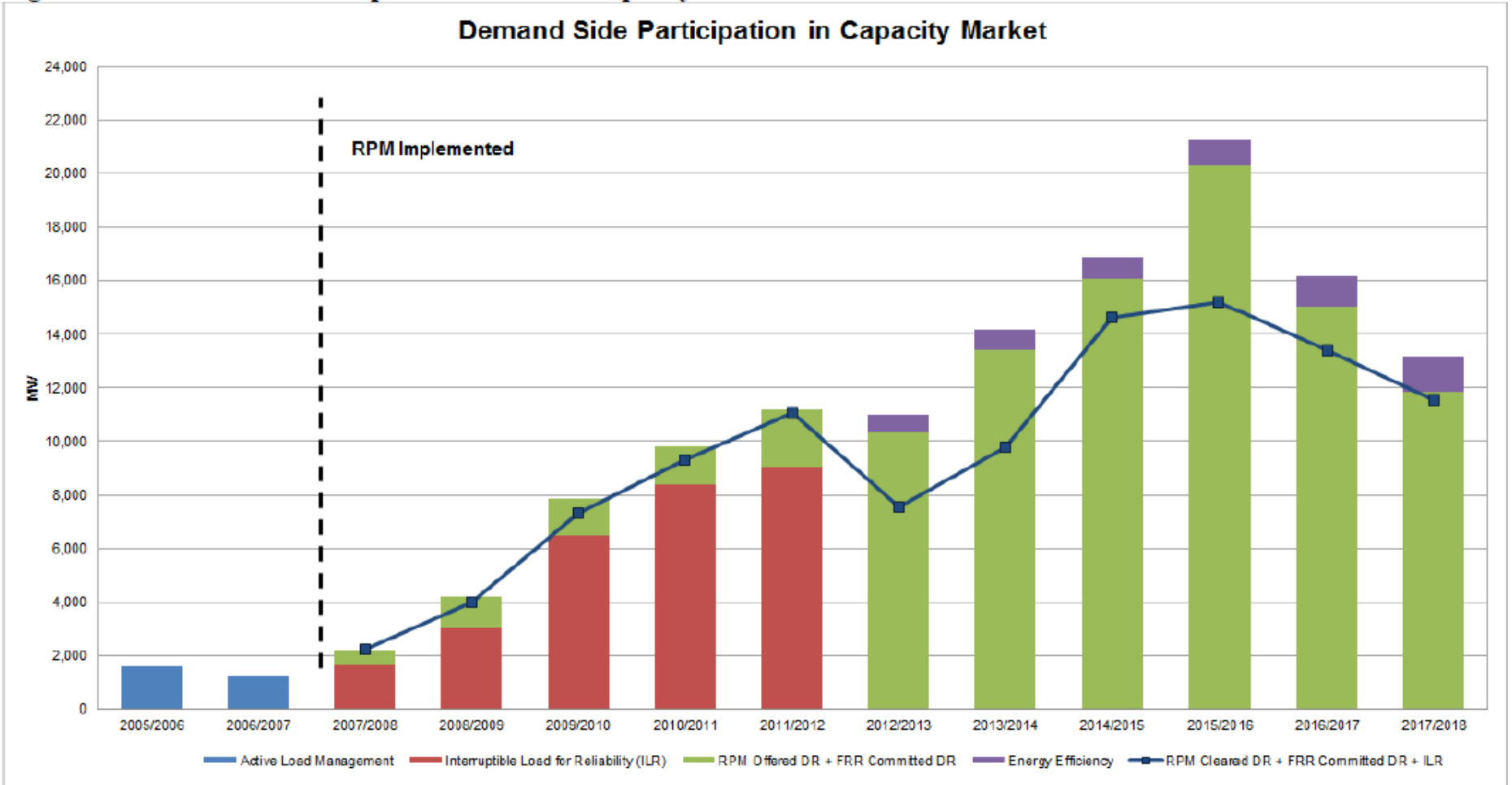
Figure 2 – Base Residual Auction Resource Clearing Prices



*2014/2015 through 2017/2018 Prices reflect the Annual Resource Clearing Prices.

DR Participation in RPM

Figure 1 – Demand Side Participation in the PJM Capacity Market



Three Product Types available beginning in the 2014/2015 DY

Requirement	Limited DR	Extended Summer DR	Annual DR
Availability	Any weekday, other than NERC holidays, during June – Sept. period of DY	Any day during June-October period and following May of DY	Any day during DY (unless on an approved maintenance outage during Oct. - April)
Maximum Number of Interruptions	10 interruptions	Unlimited	Unlimited
Hours of Day Required to Respond (Hours in EPT)	12:00 PM – 8:00 PM	10:00 AM – 10:00 PM	Jun – Oct. and following May: 10 AM – 10 PM Nov. – April: 6 AM- 9 PM
Maximum Duration of Interruption	6 Hours	10 Hours	10 Hours
Notification	Must be able to reduce load when requested by PJM All Call system within 2 hours of notification, without additional approvals required		
Registration in eLRS	Must register sites in Emergency Load Response Program in Load Response System (eLRS)		
Event Compliance	Must provide customer-specific compliance and verification information within 45 days after the end of month in which PJM-initiated LM event occurred		
Test Compliance	In absence of the PJM-initiated LM event, CSP must test load management resources and provide customer-specific compliance and verification information		

2014/2015 Base Residual Auction Results

2015/2016 DY BRA Resource Clearing Results

PJMDOCS-#699338v2A

Resource Clearing Prices

LDA	System Marginal Price [\$/MW-day]	Locational Price Adder * [\$/MW-day]	Limited Resource Clearing Price [\$/MW-day]	Extended Summer Resource Price Adder [\$/MW-day]	Extended Summer Resource Clearing Price [\$/MW-day]	Annual Resource Price Adder [\$/MW-day]	Annual Resource Clearing Price [\$/MW-day]
RTO	\$118.54	\$0.00	\$118.54	\$17.46	\$136.00	\$0.00	\$136.00
MAAC	\$118.54	\$31.46	\$150.00	\$17.46	\$167.46	\$0.00	\$167.46
EMAAC	\$118.54	\$0.00	\$150.00	\$17.46	\$167.46	\$0.00	\$167.46
SWMAAC	\$118.54	\$0.00	\$150.00	\$17.46	\$167.46	\$0.00	\$167.46
PS	\$118.54	\$0.00	\$150.00	\$17.46	\$167.46	\$0.00	\$167.46
PSNORTH	\$118.54	\$0.00	\$150.00	\$17.46	\$167.46	\$0.00	\$167.46
DPLSOUTH	\$118.54	\$0.00	\$150.00	\$17.46	\$167.46	\$0.00	\$167.46
PEPCO	\$118.54	\$0.00	\$150.00	\$17.46	\$167.46	\$0.00	\$167.46
ATSI	\$118.54	\$186.08	\$304.62	\$17.46	\$322.08	\$34.92	\$357.00

* Locational Price Adder is with respect to the immediate higher level LDA.

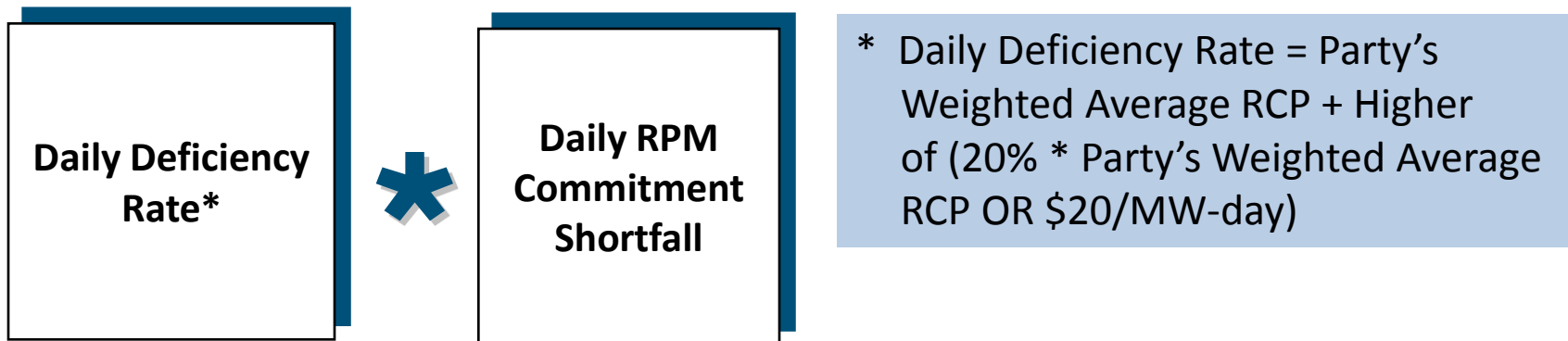
A complete list of Auction Results are located at the following link:

<http://www.pjm.com/markets-and-operations/rpm/rpm-auction-user-info.aspx>

Once at the RPM webpage, click the appropriate Delivery Year and scroll to "20##/20## Base Residual Auction Results"

Capacity Resource Deficiency Charges

Daily Capacity Resource Deficiency Charge =



- Party's Weighted Average Resource Clearing Price (WARCP) for such resource is determined by calculating the weighted average of resource clearing prices for such resource, weighted by a party's cleared and makewhole MWs for such resource
- If a Party's WARCP for such resource is \$0/MW-day, a PJM WARCP in the LDA is used
- PJM WARCP is determined by calculating the weighted average resource clearing prices in the LDA across all RPM Auctions, weighted by the total cleared and make-whole MWS in the LDA
- Charges are allocated on a pro-rata basis to those LSEs who were charged a Daily Locational Reliability Charge based on their Daily UCAP Obligation
- The Resource Provider may still receive an RPM Auction Credit

Load Management Registration

Product Types and Lead Times

Each Load Management Registration must designate the Product Type:

- Limited
- Extended Summer
- Annual

PJM recognizes three lead times for LM:

- Long_120 – Load management which must be fully implemented within 120 minutes from the time the PJM dispatcher notifies the market operations center of a curtailment event
- Short_60 - Load management which must be fully implemented within 60 minutes from the time the PJM dispatcher notifies the market operations center of a curtailment event
- Quick_30 – Load management which must be fully implemented within 30 minutes from the time the PJM dispatcher notifies the market operations center of a curtailment event

eLRS Registration

- Classify registration as pre-emergency or emergency resource
 - Default = Pre-emergency
 - Interim procedure to designate as Emergency
 - CSP to ensure location “Generator” load reduction capability > 0
 - CSP to ensure location Generator Permit Type = “Emergency Only”
 - CSP to include Comment in Registration = “Emergency Only”
 - PJM to follow up with CSP as necessary for any supporting information

Emergency resource = resource that uses behind the meter generation that has environmental restrictions that only allow it to run during PJM emergency conditions

Load Management Types

PJM recognizes three types of LM:

- Direct Load Control (DLC) – Emergency DR (Load Management) for non-interval metered customers which is initiated directly by a Curtailment Service Provider’s (CSP) market operations center, employing a communication signal to cycle HVAC or water heating equipment. This is traditionally done for residential consumers and requires the necessary statistical studies as outlined in PJM Manual 19 or other PJM approved measurement and verification methodology.
- Firm Service Level (FSL) – Emergency DR (Load Management) achieved by a customer reducing its load to a pre-determined level upon the notification from the CSP’s market operations center. The customer must be able to reduce load below the pre-determined level which must be lower than the amount of capacity reserve for the customer as represented by the peak load contribution (“PLC”).
- Guaranteed Load Drop (GLD) – Emergency DR (Load Management) achieved by a customer reducing its load below the PLC when compared to what the load would have been absent the PJM emergency or test.

Nominated Value of Load Management = ICAP Value

- The nominated value is the maximum load reduction of an end-use customer site
- The process to determine this value is consistent with the process for the determination of the capacity obligation for the customer

Load Management Program Type	Nominated Value
Direct Load Control	# Customers * Per Participant Impact * Loss Factor Load Research and Switch Operability Study must be submitted to PJM and approved in order to determine the Participant Impact. (See DLC Documentation in the Appendix)
Firm Service Level	Peak Load Contribution – (Firm Load Level * Loss Factor)
Guaranteed Load Drop	Min (Peak Load Contribution or Customer Load Reduction Value * Loss Factor)

The maximum load reduction for each resource is adjusted to include system losses

UCAP Value of Demand Resource

Unforced Capacity (UCAP) value of a Demand Resource is calculated as:

$$\text{Unforced Capacity Value Of DR X} = \text{Nominated DR Value} * \text{DR Factor} * \text{Forecast Pool Requirement (FPR)}$$

For Example:

$$\underline{10.3} \text{ MW} = 10 * 0.956 * 1.0809$$

$$\text{Unforced Capacity Value For DR} = \underline{10.3 \text{ MW}}$$

DR Factor is less than 1.0 due to the risk that the actual load is greater than the 50/50 load forecast and maintain system reliability at one day in ten years


Forecast Pool Requirement: The amount equal to one plus the unforced reserve margin (stated as a decimal number) for the PJM Region

The DR Factor and Forecast Pool Requirement is not finalized until the Third IA for the DY

Calculating Load Management Revenue - Example

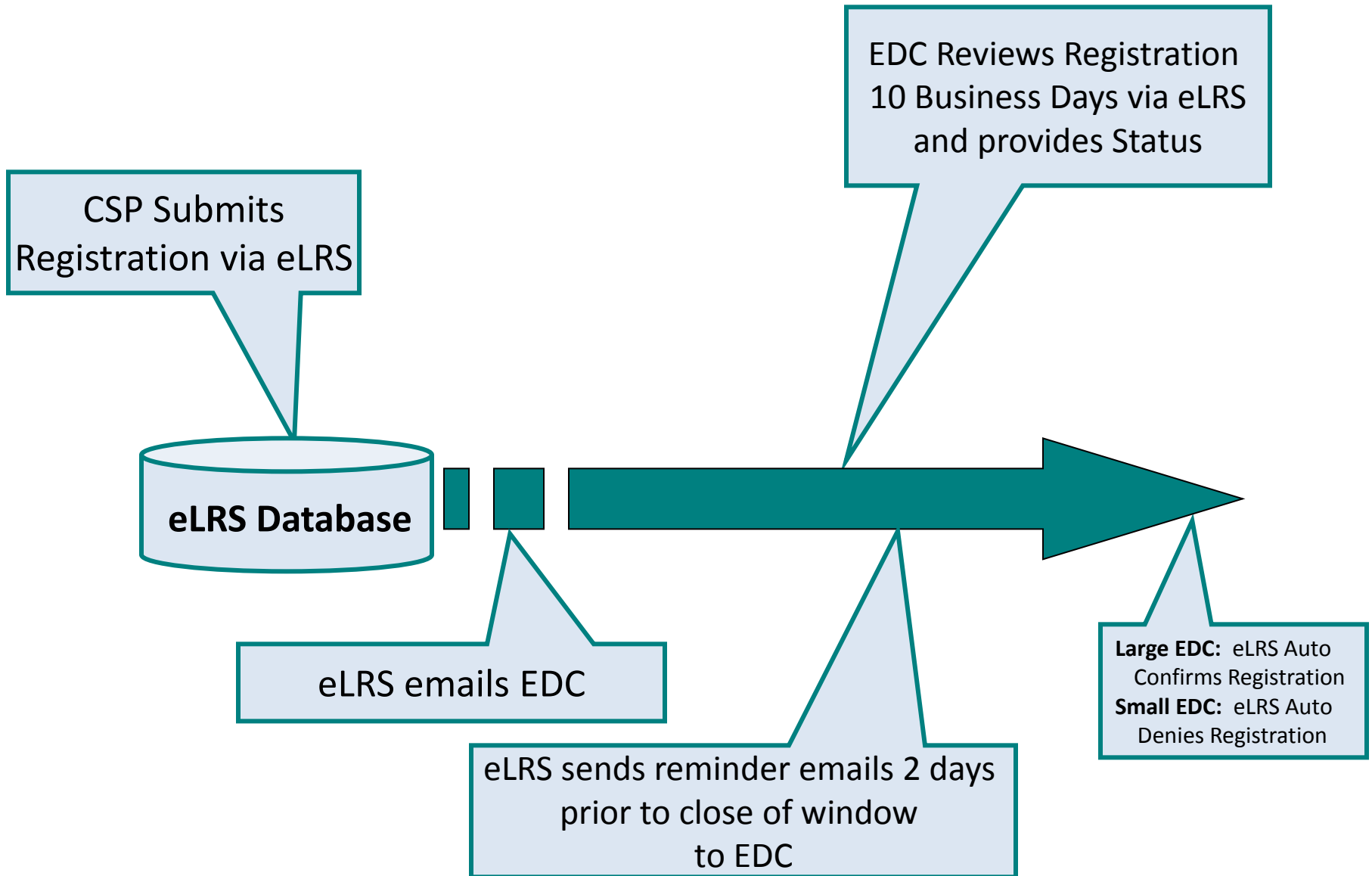
	A	B	C	D	E	F	G	H
Type	Peak Load Contribution (MW)	Managed Load (MW)	# of Sites Multiplier	Capacity Loss Factor	Nominated ICAP (MW)	DR Factor	FPR	Nominated UCAP (MW)
FSL	30	10	N/A	1.0634	19.366	0.956	1.0809	20.012
					$E=A-(B*D)$			$H=E*F*G$
GLD	25	20	N/A	1.0634	21.268	0.956	1.0809	21.977
					$E=B*D$, where $\max = A$			$H=E*F*G$
DLC		0.002	200	1.0634	0.425	0.956	1.0809	0.440
					$E=B*C*D$			$H=E*F*G$

Total Nominated UCAP (MW)	Limited Resource Clearing Price (\$/MW-day)	Days/Year	Annual Revenue
42.428	\$125.47	365	\$1,943,069.56


 See PJM Web for appropriate Planning Year Parameters

Market Price for DR is the clearing price from the auction in which the DR cleared

Registration Process Timeline (Emergency Registrations)



Emergency DR Registration timeline & requirements

- **DR Registration Timeline**

- The registration window opens the first business day in January and goes through May 14th (for 2015/2016 Delivery Year) allowing the EDC 10 business days to review the registration. Registrations that were denied prior to May 14th may be resubmitted after May 14th to correct a data errors. All registrations must be confirmed by May 31, 2015 23:50 to be included in the 2015/2016 Delivery Year
- Load Research and Switch Operability Study must be submitted to PJM and approved prior to submitting the DLC registration

- **General Requirements**

- Interval metering that complies with PJM standard, fully operational and tested
 - 24 hours of interval meter data required for compliance submittal
- Full PJM member
- CSP must have registrations that total $\geq 100\text{kW}$ by registration
- Locations may be aggregated to reach minimum registration value
- Must set up to receive Electronic Notification

Compliance & Settlements

LM Event Compliance

- Resource Providers that have demand resources with RPM Resource Commitments or FRR Capacity Plan Commitments are subject to compliance check performed after each PJM-initiated Load Management event.
- Effective 2014/2015 DY, compliance will be checked for on-peak period (all hours in definition of Limited DR) and for off-peak period (all hours specified in definition of Extended Summer DR or Annual DR, excluding on-peak period)
- CSP compliance is determined by event and is aggregated by CAA

LM Event Compliance Penalty Rate (Effective 2014/2015 DY)

LM Compliance Penalty Rate depends on the time period in which the event is called.

On Peak: Any weekday, other than NERC holidays, during June-Sept period of DY from 12 PM to 8 PM

Off Peak: All days and hours outside of the above defined On Peak period

LM Event Compliance Penalty Rate (Effective 2014/2015 DY)

- On-Peak LM Compliance Penalty Rate (\$/MW-day) =
[Lesser of (1/actual number of on-peak events during the delivery year, or 50%)] * Party's Weighted Daily Revenue Rate (\$/MW-day)
- Off-Peak LM Compliance Penalty Rate (\$/MW-day) =
1/52 * Party's Weighted Daily Revenue Rate (\$/MW-day)

Example: LM Event Compliance Penalty Charge

Resource	# of On-Peak events during DY	# of Off-Peak events during DY	Factor for On-Peak Penalty Rate	Factor for Off-Peak Penalty Rate
Limited	3	0	1/3	Not Applicable
Extended Summer	3	5	1/3	1/52
Annual	3	5	1/3	1/52

Resource	On-Peak Penalty Rate (\$/MW-day)	Off-Peak Penalty Rate (\$/MW-day)	On-Peak Penalty Charges (\$/year) (total charges for 3 events)	Off-Peak Penalty Charges (\$/year) (total charges for 5 events)	Annual Penalty Charges (\$/year)
Limited	\$33.33	Not Applicable	\$18,250	Not Applicable	\$18,250
Extended Summer	\$33.33	\$1.92	\$18,250	\$1,754.81	\$20,004.81
Annual	\$33.33	\$1.92	\$18,250	\$1,754.81	\$20,004.81

Example assumes:

- No single event comprised of both on-peak and off-peak period
- Each resource was committed for 1 MW and a shortfall of 0.5 MW for each event
- Weighted Daily Revenue Rate for each resource = \$100/MW-Day (Annual revenues = \$36,500/year)