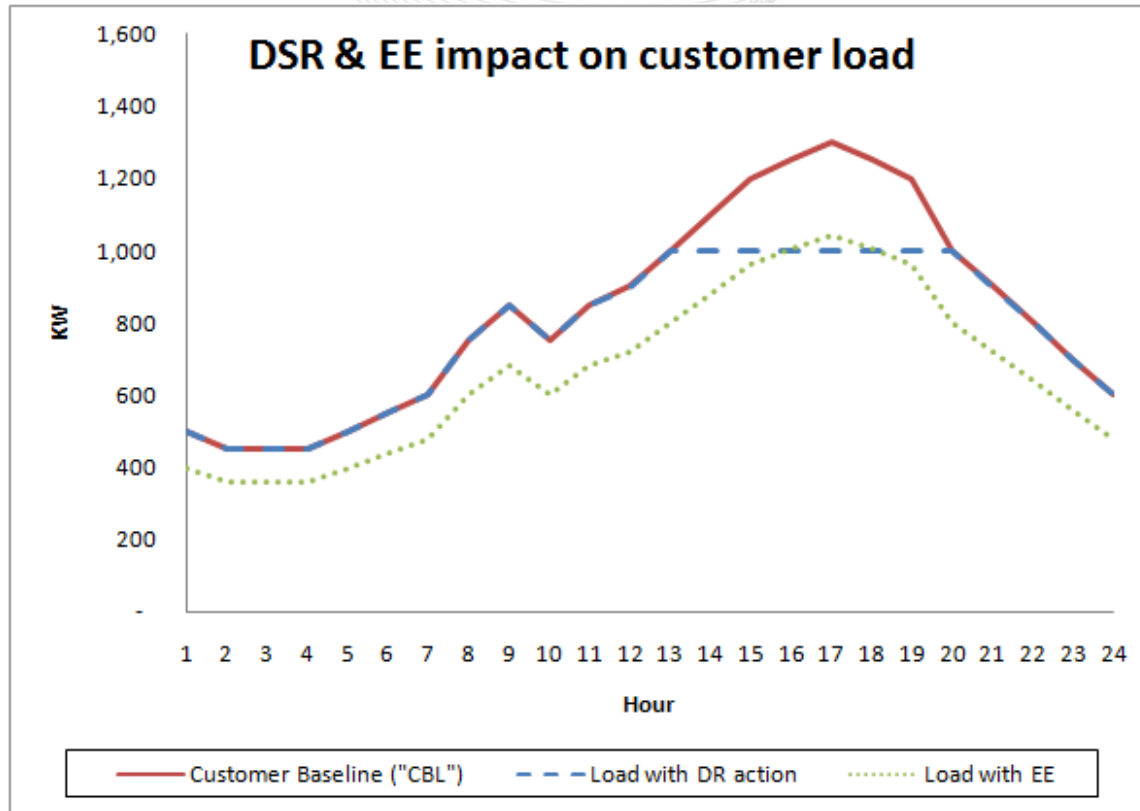


Overview of PJM Demand Response measurement and verification

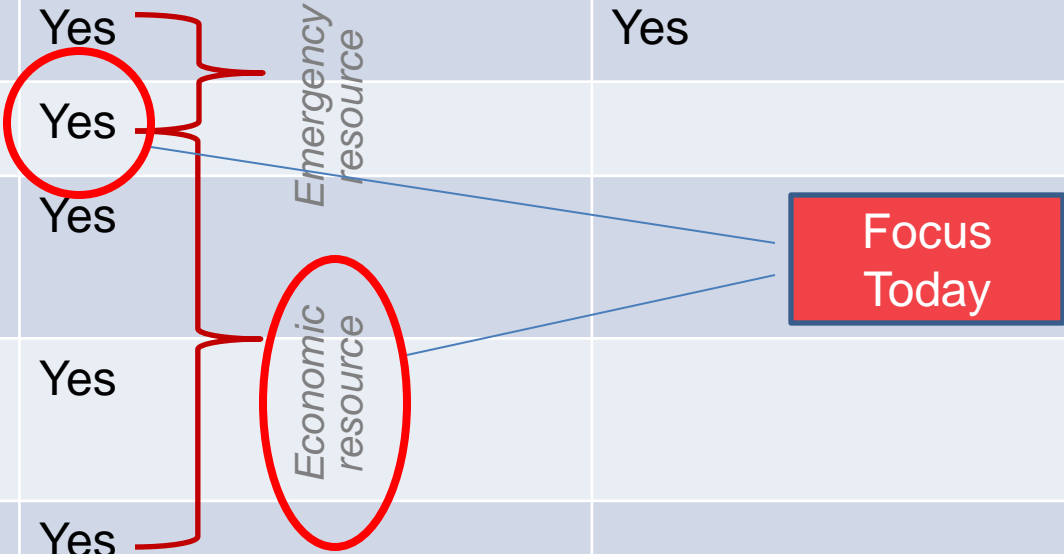
Pete Langbein
Manager, DR Operations
PJM
April 26, 2011



- Demand Side Response (DSR) – ability to shift or reduce load in response to price or signal by PJM
- Energy Efficiency (EE) – investment in assets, not mandated by government codes and standards, which results in a sustained net decrease in energy and demand usage.

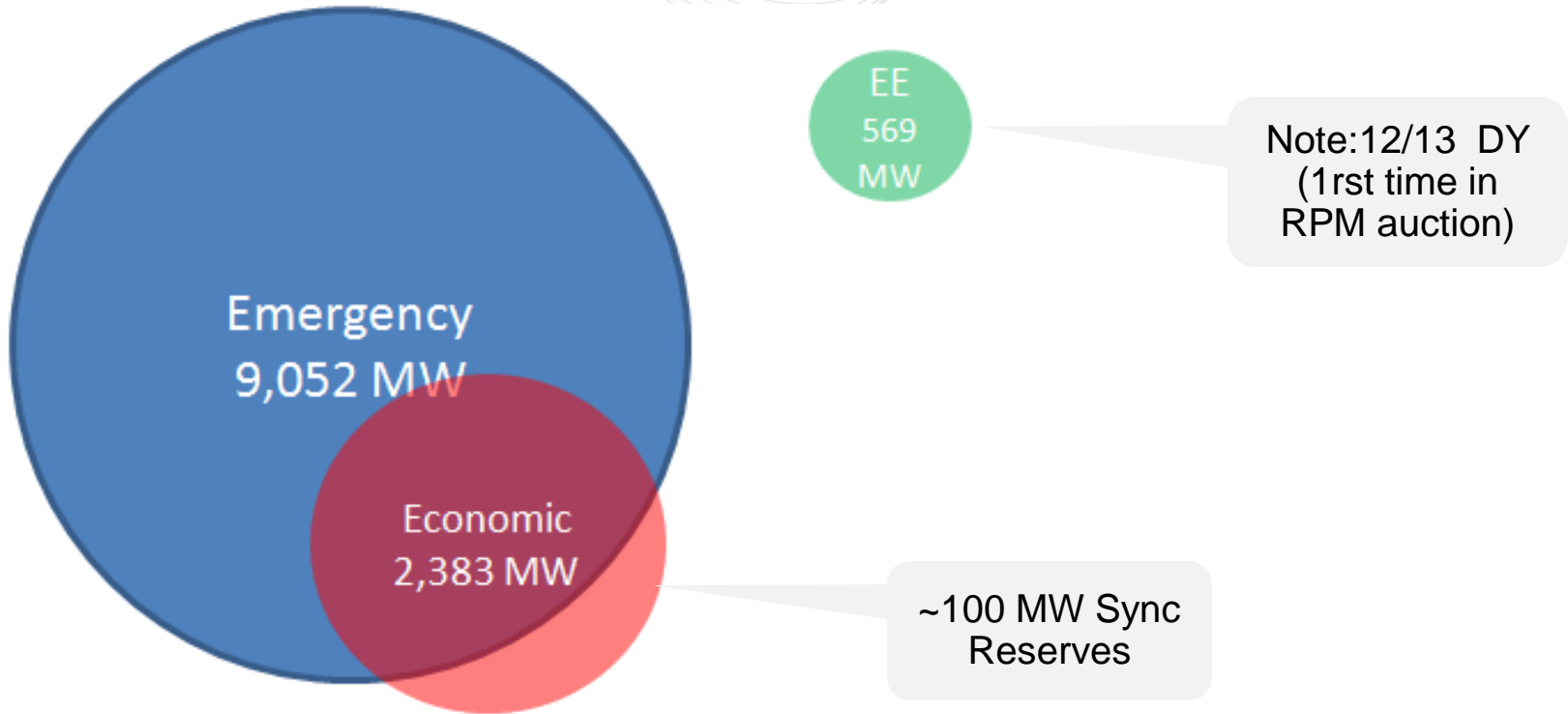
- DR resources provide:
 - Additional competitive resources bidding into multiple markets
 - New resources to mitigate emergencies & ensure reliability
 - Emergency resources can be deployed a variety of ways
 - Additional resource diversity (based on capability and geographic location) to mitigate risk
 - Vehicle to compliment retail policy objectives

Wholesale Service	Demand Side Response Resource	Energy Efficiency Resource
Capacity	Yes	Yes
Energy	Yes	
Day Ahead Scheduling Reserves (30 min)	Yes	
Synchronized Reserves (10 min)	Yes	
Regulation	Yes	



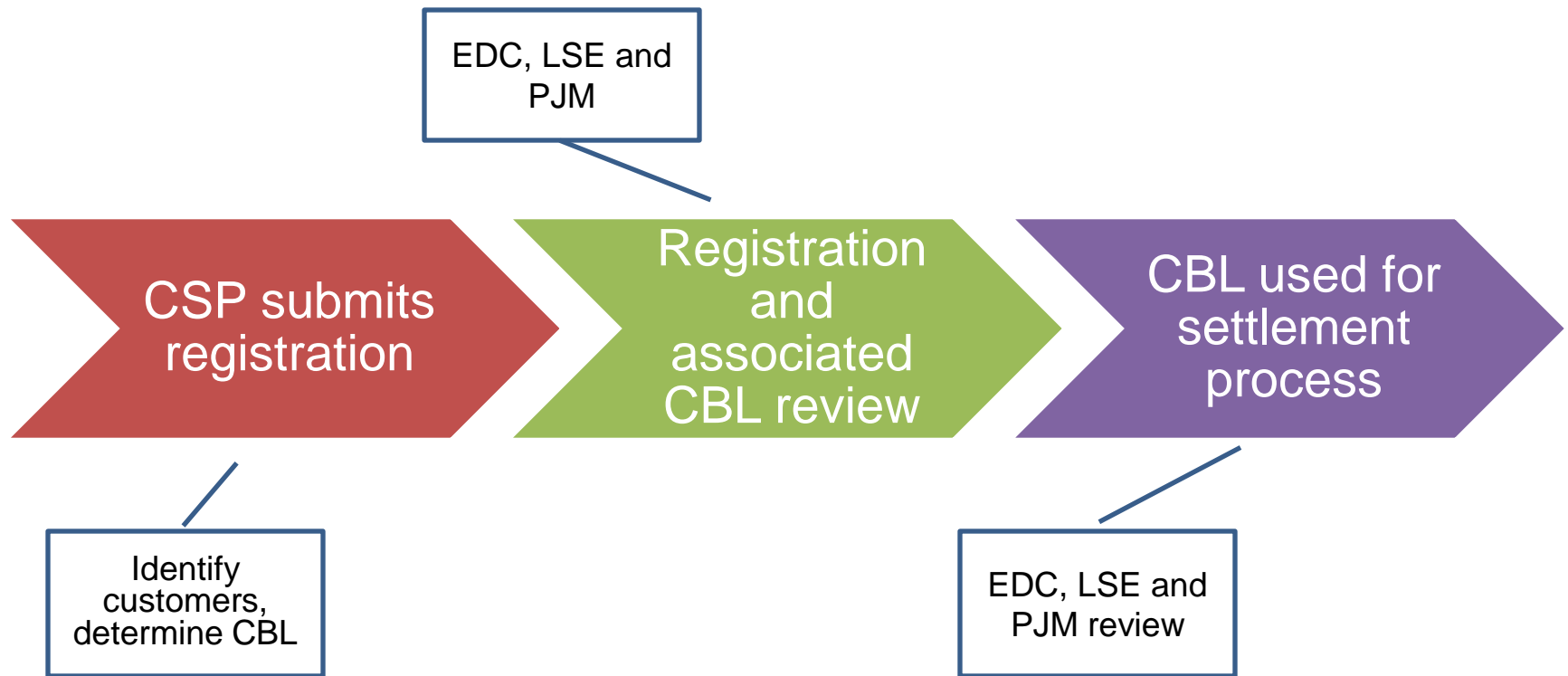
Customer may participate as Emergency & Economic DSR and as EE

Current (10/11) estimated DSR capability ~ 7% of System Peak Load



DSR represents over 1 million end use customers (~10,000 C&I) across PJM





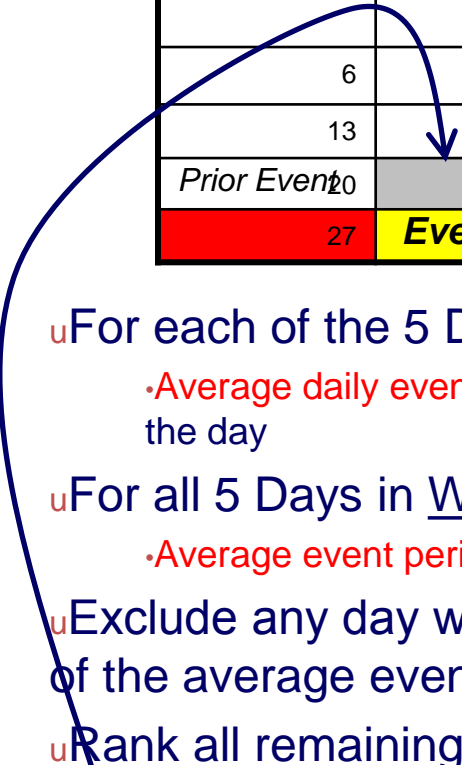
Step # 1: Weekday CBL Basis Window

Monday	Tuesday	Weds	Thursday	Friday	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
Prior Event	20	21	22	Prior Event	23	24
25	26	27	28	29	30	31

- u Select 5 most recent non-event days
- u Exclude the following day-types:
 - NERC holidays
 - Weekend Days
 - Event Days
- u Replace excluded days with next valid day
- u Final Weekday CBL Basis Window contains 5 days (unless 45 day look-back window is reached)

Step # 2: Weekday CBL Basis

Monday	Tuesday	Weds	Thursday	Friday	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
Prior Event 20	21	22	Prior Event 23	24	25	26
27	Event 28	29	30	31		



- u For each of the 5 Days in Weekday CBL Basis Window calculate:
 - **Average daily event period usage** = simple average of the participants usage over the event hours in the day
- u For all 5 Days in Weekday CBL Basis Window calculate:
 - **Average event period usage level** = simple average of 5 average daily event period usage values
- u Exclude any day which the day's average daily event period usage is less than 25% of the average event period usage level (25% rule) and replace
- u Rank all remaining 5 days, and eliminate 1 day with lowest average daily event period usage
- u Weekday CBL Basis must contain 4 days

Symmetric Additive Adjustment

The purpose is to more properly reflect an accurate CBL

- Skip one hour prior to the start of the event
- Counting back, average the next three hours (Basis Average)
- Use this Basis Average to compare to the CBL for the same hours
- The difference is used to ratchet up (or down) the CBL value

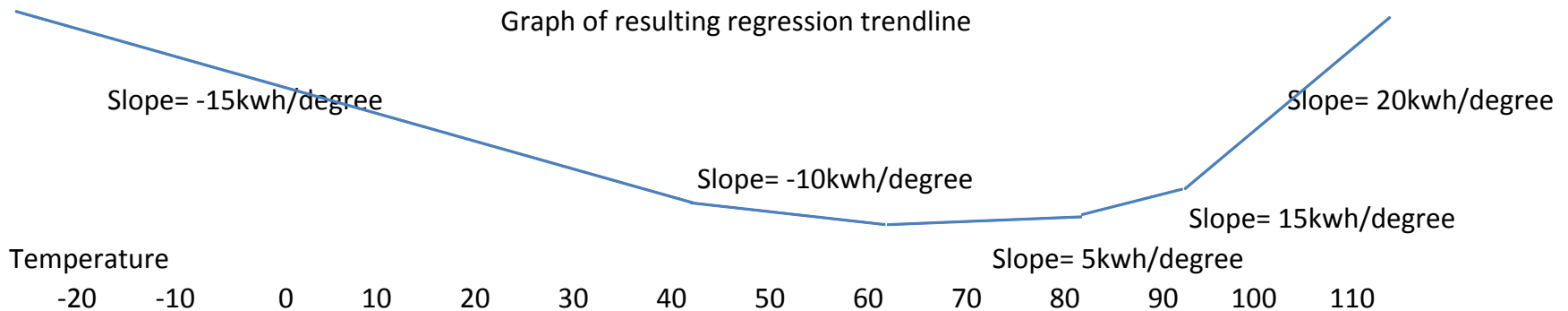
	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16
Event Day	600	700	800	900	900	950	1000	1050
CBL	450	550	650	750	850	950	1050	1150
Additive Adjustment	→				150	150	150	150
Adjusted CBL	→				1000	1100	1200	1300
Calculated Load Reduction	→				100	150	200	250

Additive Adjustment
Period

Hours curtailed
during event day

Example:
In this scenario, usage is much higher than normal on event day. Using the Additive Adjustment will result in a positive (higher) adjustment to the CBL.

- Regression – determine correlation of weather on load and adjust CBL based on relative difference in weather between CBL days and event day conditions.



- Alternative CBL nomination process
 - Alternative CBLs are nominated only during the registration or re-registration processes
 - Entity that proposes an alternative CBL must provide analytical support that method is more accurate and can be administered
 - If no agreement, PJM will decide on the CBL

Goal of Alternative CBL is to provide some flexibility for unique load patterns

- Keep consistent where possible
 - Some flexibility for specific customer loads may be necessary
 - Variable loads are very difficult to predict.
- Balance empirical performance with administration
- Clearly define objectives and what is and is not appropriate market behavior.
- Ensure transparency (inputs to outputs)

Extensive empirical analysis on CBLs is underway and is expected to be published in June.