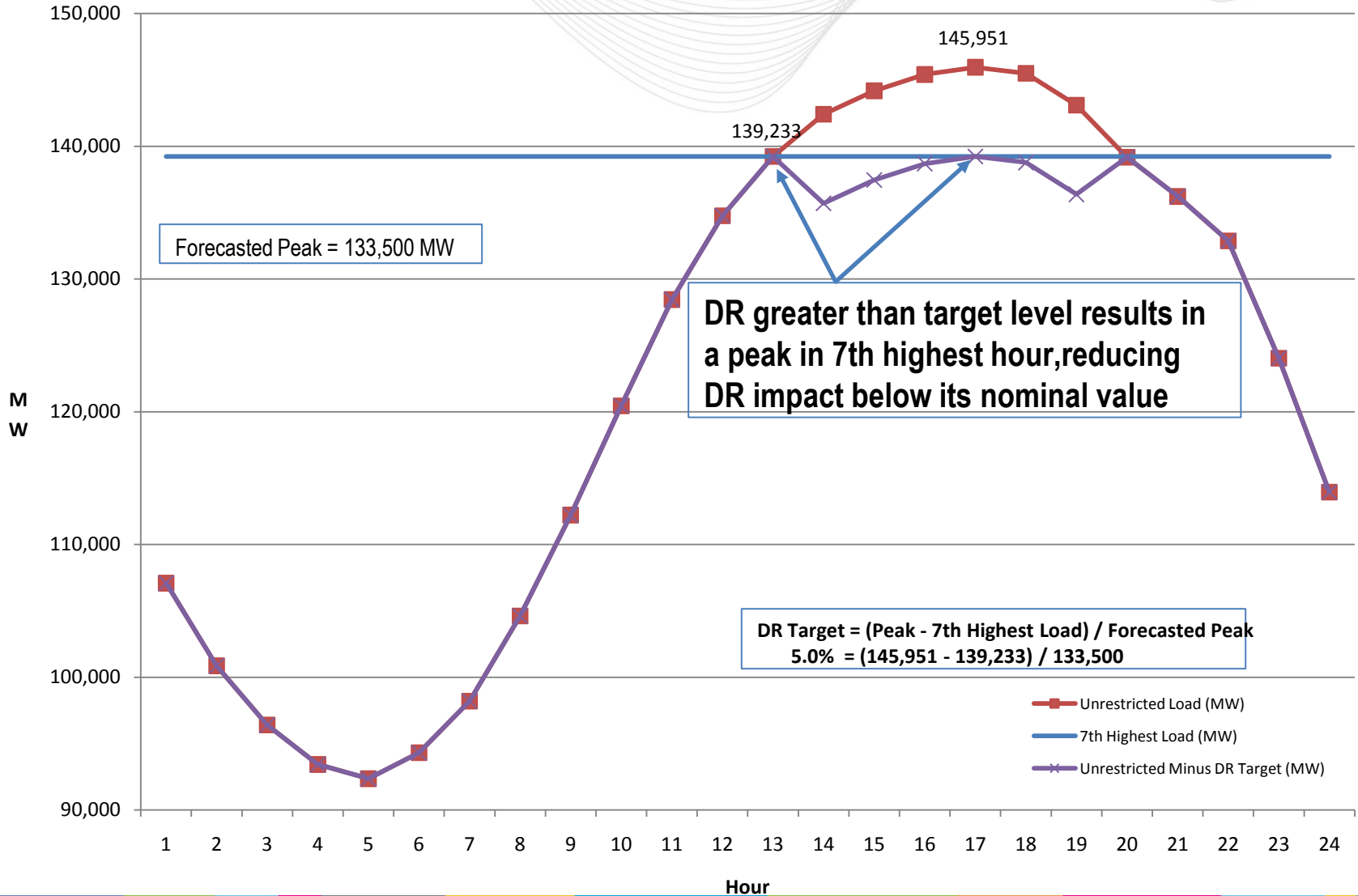


Minimum Unlimited Resource Requirement Determination

Planning Committee
November 3, 2011

- **Limited DR** – Available for interruption up to ten times per year, with each interruption lasting no more than six hours (“10x6” Product)
- **Extended Summer DR** – Available for interruption an unlimited number of times from May 1 – October 31 but not interruptible from November 1 – April 30. Each interruption may last up to ten hours.
- **Annual DR** – Available any day of the year and for an unlimited number of interruptions during the year.
- **DR Reliability Targets** are established for the Limited DR and Extended Summer DR products per Section 5 of Manual 20.

DR Target Calculation: PJM RTO - August 2, 2006

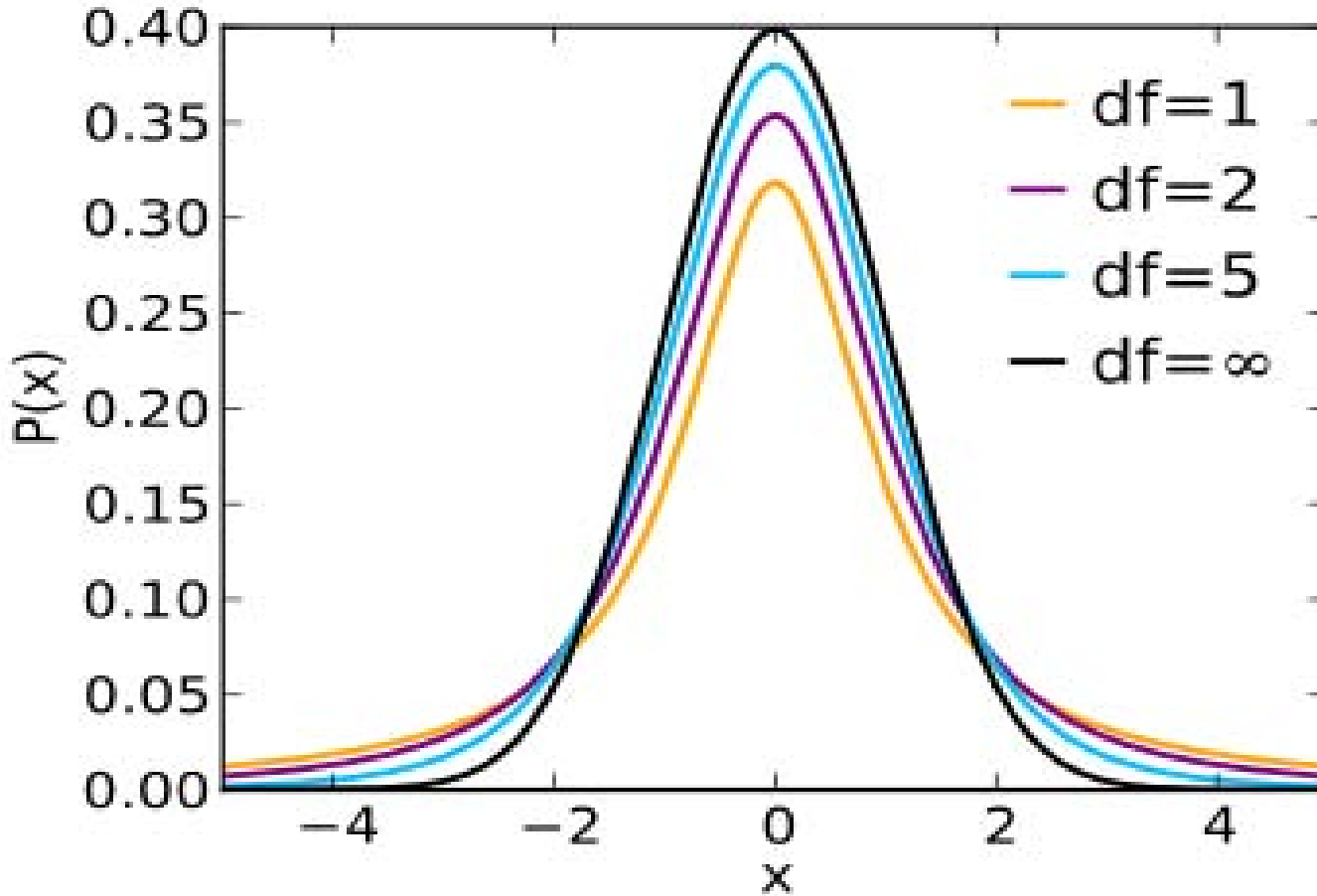


DR TARGET FOR SELECTED LOAD DAYS 2006-2011 (excl 2008, 2009)

<u>Date</u>	<u>Annual Peak</u>	<u>Load Mngt</u>	<u>Above 50/50</u>	<u>Cap for 6 Hour Duration</u>
7/17/2006			X	4.5%
7/31/2006			X	4.5%
8/1/2006			X	5.0%
8/2/2006	X		X	5.0%
8/3/2006			X	3.6%
8/8/2007	X		X	5.1%
7/6/2010			X	5.2%
7/7/2010	X		X	6.0%
7/20/2011*			X	4.2%
7/21/2011*		X	X	3.9%
7/22/2011*		X	X	3.6%
Average (07-11)				4.7%
Average (06-11)				4.6%

* Based on preliminary data

- Over the 2006-2011 period, 6 of the 11 observations are below the mean value of 4.6%. This represents a greater than 50% probability that the target of 4.6% is too high (i.e. the peak would have shifted to outside the six hour interruption window in 6 of the 11 high load days).
- PJM recommends that a “10/90” value be used rather than the mean value. This will ensure with 90% confidence that the target is sufficient. The 90% confidence factor is used in the two other DR Reliability Target procedures related to the 10 interruption limitation and the Extended Summer DR Product.
- The “10/90” value can be estimated by applying the Student t distribution to the 11 observations.



df	Tail probability p											
	.25	.20	.15	.10	.05	.025	.02	.01	.005	.0025	.001	.0005
1	1.000	1.376	1.963	3.078	6.314	12.71	15.89	31.82	63.66	127.3	318.3	636.6
2	.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.60
3	.765	.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.95
4	.741	.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	.727	.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	.718	.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	.711	.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	.706	.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	.703	.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	.700	.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	.697	.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	.695	.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318

Degrees of freedom = # observations – 1 = 11 - 1 = 10
 The 0.10 tail probability with 10 degrees of freedom is
1.372 standard deviations below the mean

DR TARGET FOR SELECTED LOAD DAYS 2006-2011 (excl 2008, 2009)				
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8/3/2006			X	3.6%
8/8/2007	X		X	5.1%
7/6/2010			X	5.2%
7/7/2010	X		X	6.0%
7/20/2011*			X	4.2%
7/21/2011*		X	X	3.9%
7/22/2011*		X	X	3.6%
* Based on preliminary data				
Average (06-11)				4.6%
STDEV				0.758%
10% Tail Probability				1.372
"10/90" DR Target				3.6%



Example – Impact of Changes on RTO Min Resource Requirement

2014/2015 Minimum Resource Requirements		
Forecast Pool Requirement	1.0809	
Demand Resource Factor	0.956	
Quantities are in Unforced Capacity Megawatts	PJM Region	PJM Region
Reliability Requirement (without FRR)	148,323.1	148,323.1
Short-Term Resource Procurement Target (STRPT)	3,708.1	3,708.1
Reliability Requirement minus STRPT	144,615.0	144,615.0
CETL	NA	NA
Reliability Requirement minus STRPT minus CETL	NA	NA
Preliminary Peak Load Forecast	164,757.6	164,757.6
FRR Peak Load	27,535.8	27,535.8
Peak Load Forecast adjusted for FRR	137,221.8	137,221.8
Limited Demand Resource Reliability Target		
Percent of Preliminary Forecast Peak Load	4.7%	3.6%
Unforced Capacity, MW	6,664.5	5,104.7
Extended Summer Demand Resource Reliability Target		
Percent of Preliminary Forecast Peak Load	11.4%	11.4%
Unforced Capacity, MW	16,164.8	16,164.8
Minimum Resource Requirements for RPM, MW		
Minimum Extended Summer Resource Requirement	137,950.5	139,510.3
Minimum Annual Resource Requirement	128,450.2	128,450.2
Minimum Resource Requirements for FRR (% Obligation)		
Minimum Extended Summer Resource Requirement	95.5%	96.6%
Minimum Annual Resource Requirement	89.1%	89.1%

The determination of the 6-hour-based DR Reliability Target for Limited DR should be modified in two ways:

1. The load days examined should include all days beginning with January 1, 2006 through the most recent summer (rather than only days from the most recent 5 calendar years).
2. The Target calculation should be based on the “10/90” value of the distribution resulting from all qualified load days (rather than the average of that distribution).

These changes would be applied to both the RTO and the LDA procedures and would become effective with the 2014/2015 DY. PJM will request Manual 20 changes at the December PC meeting.

Duration Requirement

1. PJM examines ~~the all days since January 1, 2006 through the most recent September 30~~ last five calendar years and identifies any day which is an annual peak load day and/or a day with an unrestricted peak load greater than the 50/50 weather normalized peak and/or a day on which RTO-wide load management was implemented. These days would be most likely to require invocation of DR
2. The unrestricted hourly loads for each of the days identified in step 1 are ranked from highest to lowest. The MW difference between the day's unrestricted hourly peak load and its seventh highest unrestricted hourly load is computed.
3. For each day examined in step 2, the MW difference between the day's unrestricted hourly peak load and its seventh highest unrestricted hourly load is divided by the forecasted 50/50 peak load for that particular summer. The resulting percentages are tabulated for all days that qualify per step 1. ~~The average of these percentages is~~ the DR Reliability Target based on the 6 hour duration requirement is the 10th percentile value from the distribution defined by these percentages. -Any day with a peak load well below the 50/50 peak may be excluded from this calculation as it is not representative of a day that would require implementation of DR.