

Demand Response in a Mandated EE & DR Environment (Pennsylvania Act 129)

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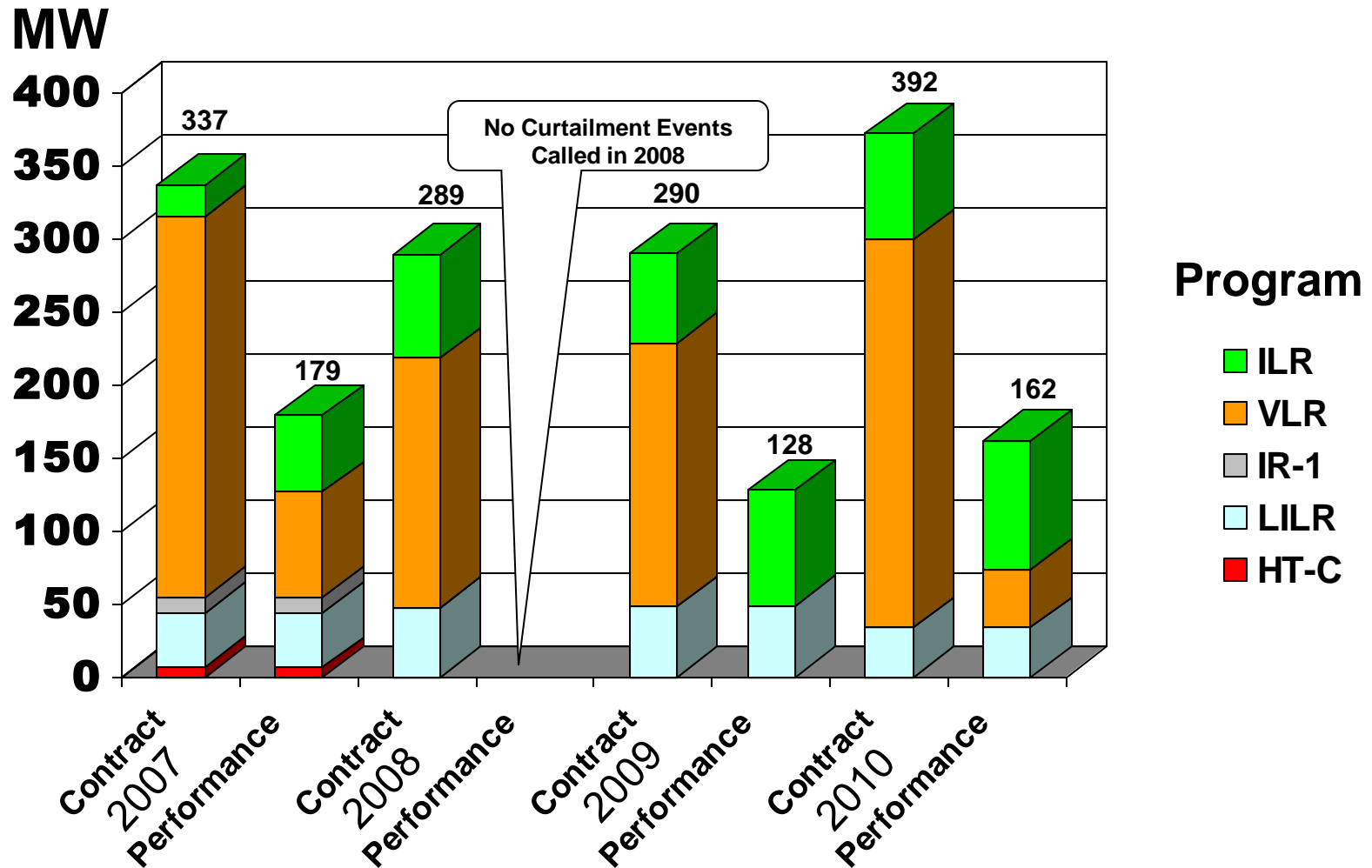


November 9, 2010

- PECO has been in the Demand Response (DR) business for decades
- A couple of significant developments have shifted our focus from what was previously a margin based exercise to one mandated by the State (to influence wholesale market prices)
- Challenges:
 - *Moving to fully deregulated energy market January 2011*
 - *Pennsylvania's Act 129 EE& C legislation (DR)*
 - *3% reduction in energy sales by May 2013 ~ 1.2 Billion kWh*
 - *4.5% reduction in peak load over the "Top 100" hours (measured summer of 2012) – 355 MW*

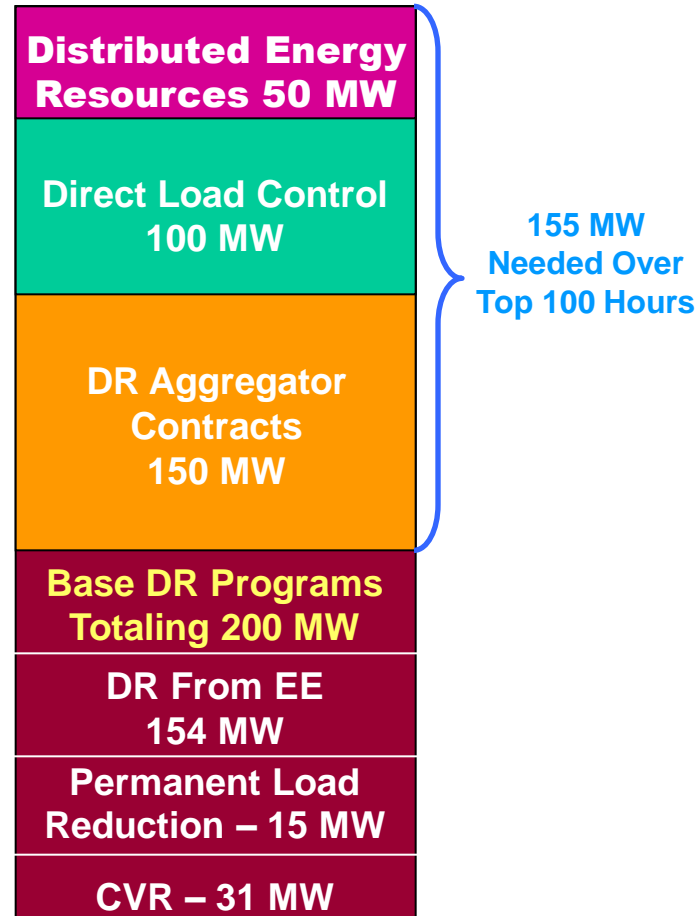


Contracted DR vs. Performance 2007 - 2010



- **PECO obligated to reduce peak demand – 355 MW over the highest 100 hours (June 1 – September 30)**
 - By May 2013 – (Performance Jun 1 – Sep 30 2012)
- **Strategy**
 - **Diverse program portfolio**
 - *Includes (1) mix of DR measures, (2) contract MW and (3) resultant DR from energy efficiency measures (projected at up to 200 MW in 2012)*
 - **Weighted Average proposed**
 - *Utilization of an “over-performance” strategy over a portion of the highest 100 hours. Will result in a corresponding reduction in required DR to satisfy the target requirements for the remaining hours (refer to slide 10 for more detail)*
 - *Absent of the “Weighted Average” DR accounting method, PECO would have to deliver 355 MW each of the “Top 100” hours, which could include weekends holidays*

DR Programs



Total Act 129 DR 355 MW

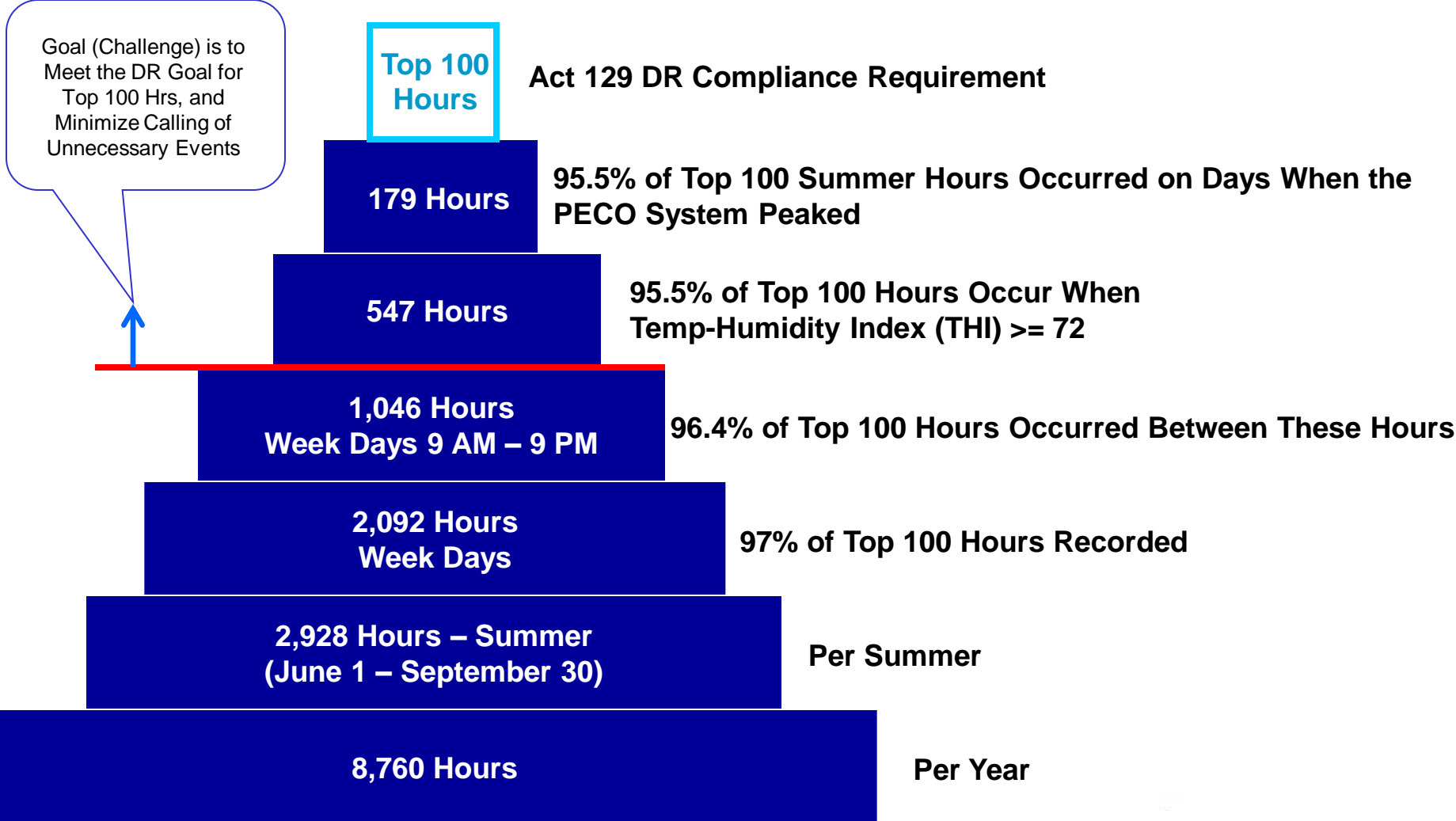
Predicting the Top 100 Hours of System Peak Load

- Predicting the “Top 100” hours of peak load requires 2 components:
 - Short-term load forecasting capability (weekly, daily, hourly)
 - Development of an accompanying statistical probability model
 - Multiple predictive algorithms are needed
 - Probability assignment (will today bring any Top 100 hours? How many?)
 - Classifying hours into “Top 50” & “Top 100” hour buckets

- Demand Response Management System (DRMS)
 - The ability to accurately forecast the “Top 100 Hours” is critical, but is only half of the equation. To assure achievement of the 4.5% DR goal the Team will rely on a preprogrammed DRMS which provides multiple scenarios on how best to dispatch the portfolio of DR programs



Historical Load Performance Part of the Equation




Based on Summer Hours 2000 - 2008



Challenges – (Complex Forecasting)

- To accurately forecast when the system will establish “Peak 100 Hours”
 - Highlighted below – a breakdown of the “Peak 100 Hours” for 2008/9
 - Note that in summary, the two summers look quite similar, even though 2009 was significantly cooler than 2008



Peak 100 Hours	2008					2009				
	Jun	Jul	Aug	Sep	Total	Jun	Jul	Aug	Sep	Total
Peak Hours/Month					100					100
Count of Peak Days					17					16
Max Hours Per Day					12					11
Min Hours Per Day					2					2
Avg Hours Per Day					5.9					6.3

Note: Assumes for 2009 none of the Peak 100 Hours will occur in the remainder of September

Challenges (Many Variables at Play)

- In 2008 a portion of the Peak 100 hours occurred in both June & September
- In 2009, none of the Peak hours occurred during those same months

Peak 100 Hours	2008					2009				
	Jun	Jul	Aug	Sep	Total	Jun	Jul	Aug	Sep	Total
Peak Hours/Month	30			7	100	0			0	100
Count of Peak Days	4			2	17	0			0	16
Max Hours Per Day	12			5	12	0			0	11
Min Hours Per Day	3			2	2	0			0	2
Avg Hours Per Day	7.5			3.5	5.9	0			0	6.3

Note: Assumes for 2009 none of the Peak 100 Hours will occur in the remainder of September

Challenges - Every Summer Will Have Top 100 Hours – But When will they Occur?

- Note that the majority of Peak 100 Hours in 2008 occurred in July
- In 2009, the majority of Peak 100 Hours occurred in August

Peak 100 Hours	2008					2009				
	Jun	Jul	Aug	Sep	Total	Jun	Jul	Aug	Sep	Total
Peak Hours/Month	30	61	2	7	100	0	23	77	0	100
Count of Peak Days	4	10	1	2	17	0	6	10	0	16
Max Hours Per Day	12	10	2	5	12	0	6	11	0	11
Min Hours Per Day	3	2	2	2	2	0	2	4	0	2
Avg Hours Per Day	7.5	6.1	2	3.5	5.9	0	3.8	7.7	0	6.3

- To accurately forecast when the system will establish the Peak 100 Hours will require:
 - Dynamic (accurate) load forecasting capability
 - Identification of factors which most closely correlate with load
 - *Historical load profiles vs. temperature, humidity, weather etc.*

Peak 100 Hours	2008					2009				
	Jun	Jul	Aug	Sep	Total	Jun	Jul	Aug	Sep	Total
Peak Hours/Month	30	61	2	7	100	0	23	77	0	100
Count of Peak Days	4	10	1	2	17	0	6	10	0	16
Max Hours Per Day	12	10	2	5	12	0	6	11	0	11
Min Hours Per Day	3	2	2	2	2	0	2	4	0	2
Avg Hours Per Day	7.5	6.1	2	3.5	5.9	0	3.8	7.7	0	6.3

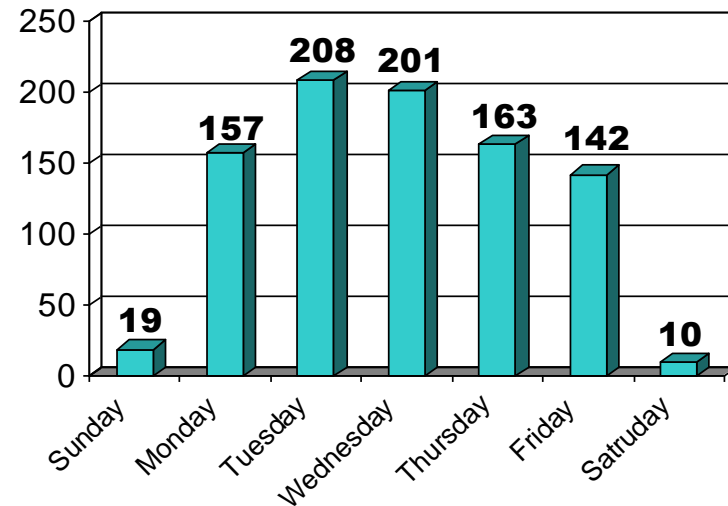
- Establishment of triggers to initiate/end curtailment events?

Note: Assumes for 2009 none of the Peak 100 Hours will occur in the remainder of September

Distribution by Day - Peak 100 Hours (2000 – 2008)

- In three of the last nine years, peak hours have occurred on weekends
 - *Per the Act, PECO must account for, and ensure the 4.5% DR target is achieved, regardless of which day of the week peak hours occur*
 - *Calling curtailment events on weekends could create problems for mass market programs, since historically these hours have been considered “off-peak”*
- **How will frequent curtailment events impact customer satisfaction?**

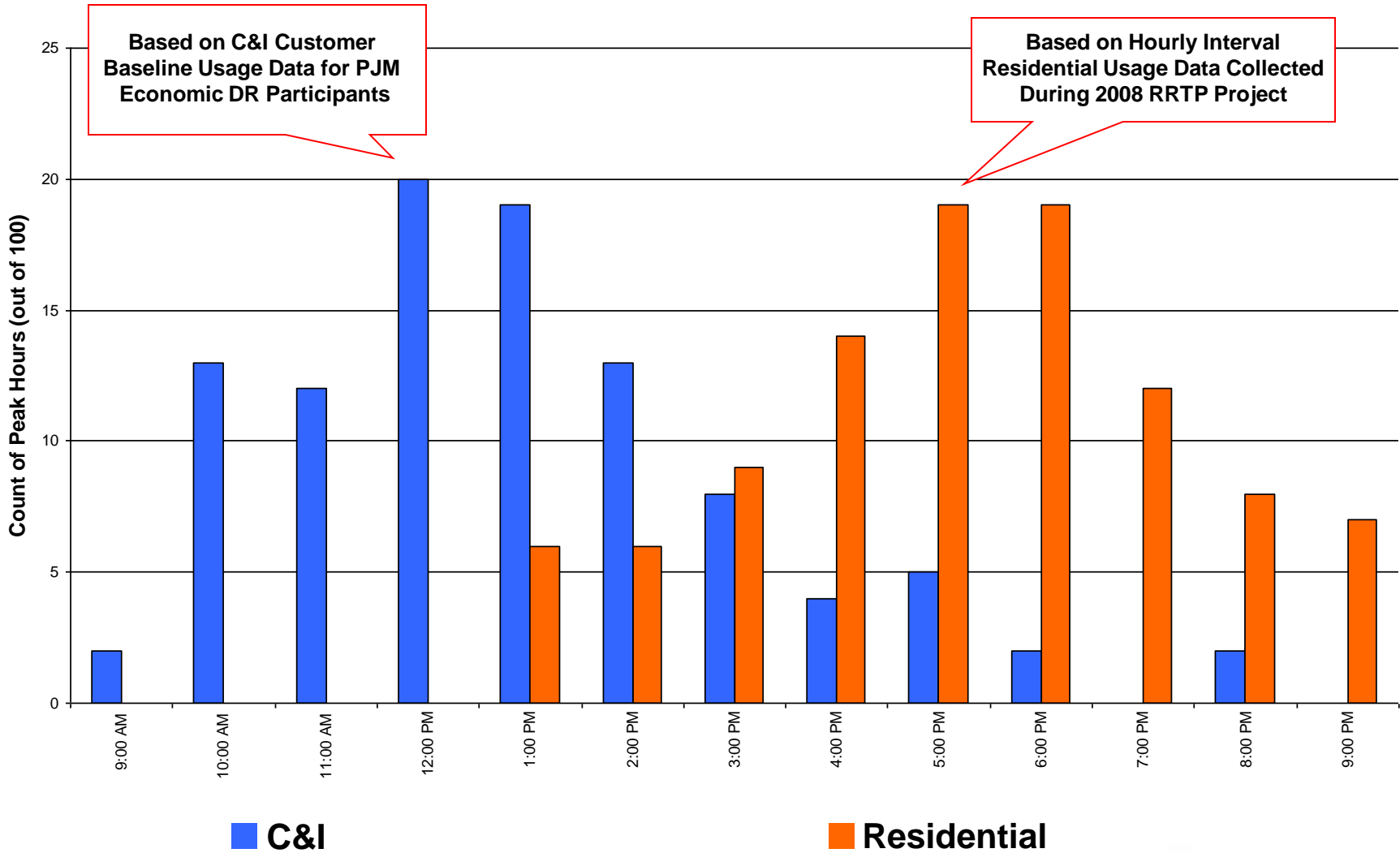
Hours



Average Curtailment in MW During Top 50 Hours							
355	400	425	450	475	500	525	550
Average MW Reduction Required Over Remaining 50 Hours							
355	310	285	260	235	210	185	160

- Prospective CSPs have advocated for utilizing this approach to help EDCs satisfy their DR goals. Study is ongoing to leverage our Act 129 DR Aggregator spend, and to identify large customers who are interested, and can deliver sizable MWs on a contract basis
 - **Keys to success:**
 - Favorable interpretation by PUC of weighted average method vs. full target DR amount (355 MW) for each of the 100 hours
 - *Over performance on weekdays should mitigate the need to curtail on weekends*
 - Ensure proper credit for DR resulting from EE programs is captured – counted
 - Development of a dynamic, short-term forecasting capability and flawless execution (DRMS)

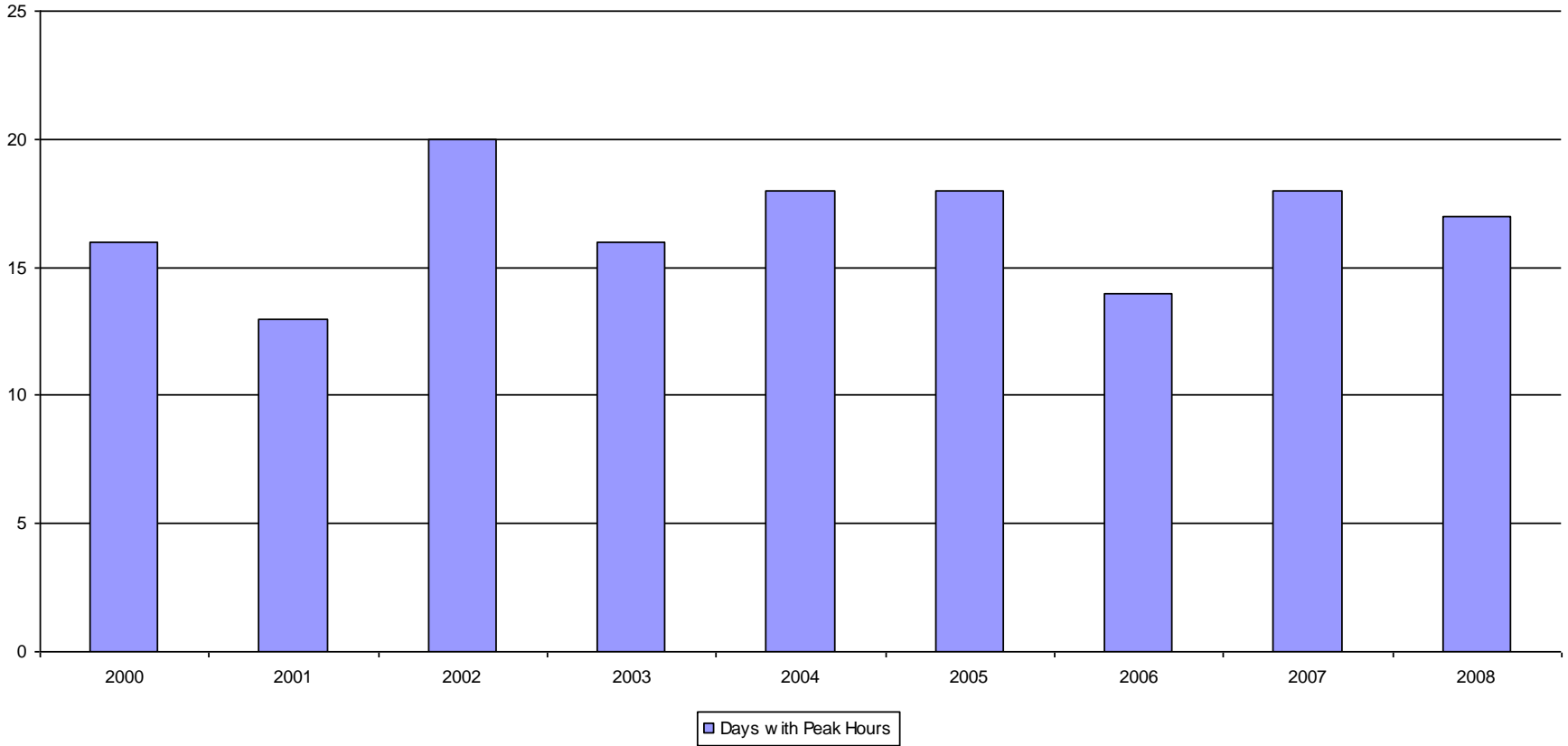
Typical Load Distributions (PECO Zone)



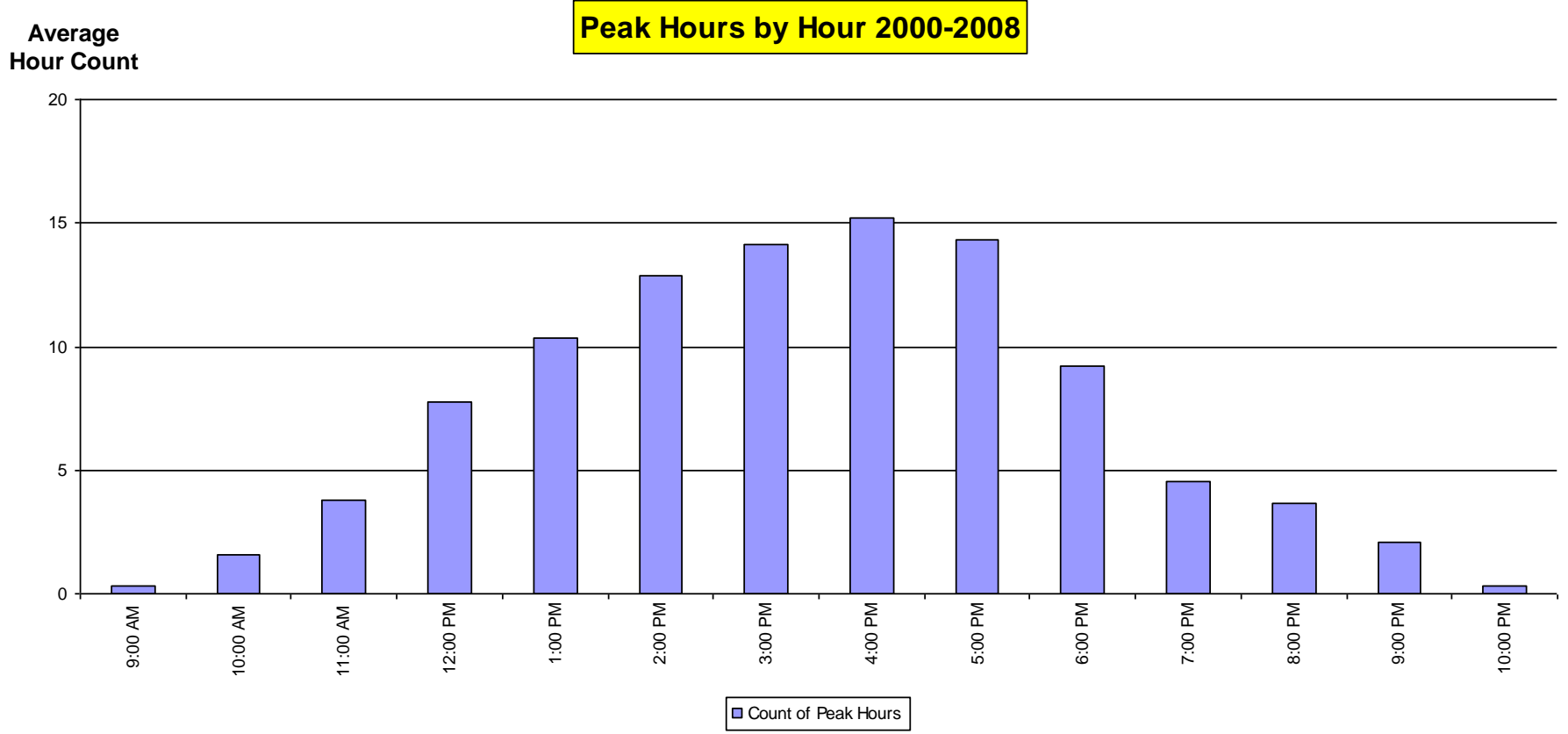
Count of Days w/Peak 100 Hrs by Year (2000 – 08)

Average 16.7 Days/yr (Max = 20 Min = 13)
"Summer Months June 1 – September 30"

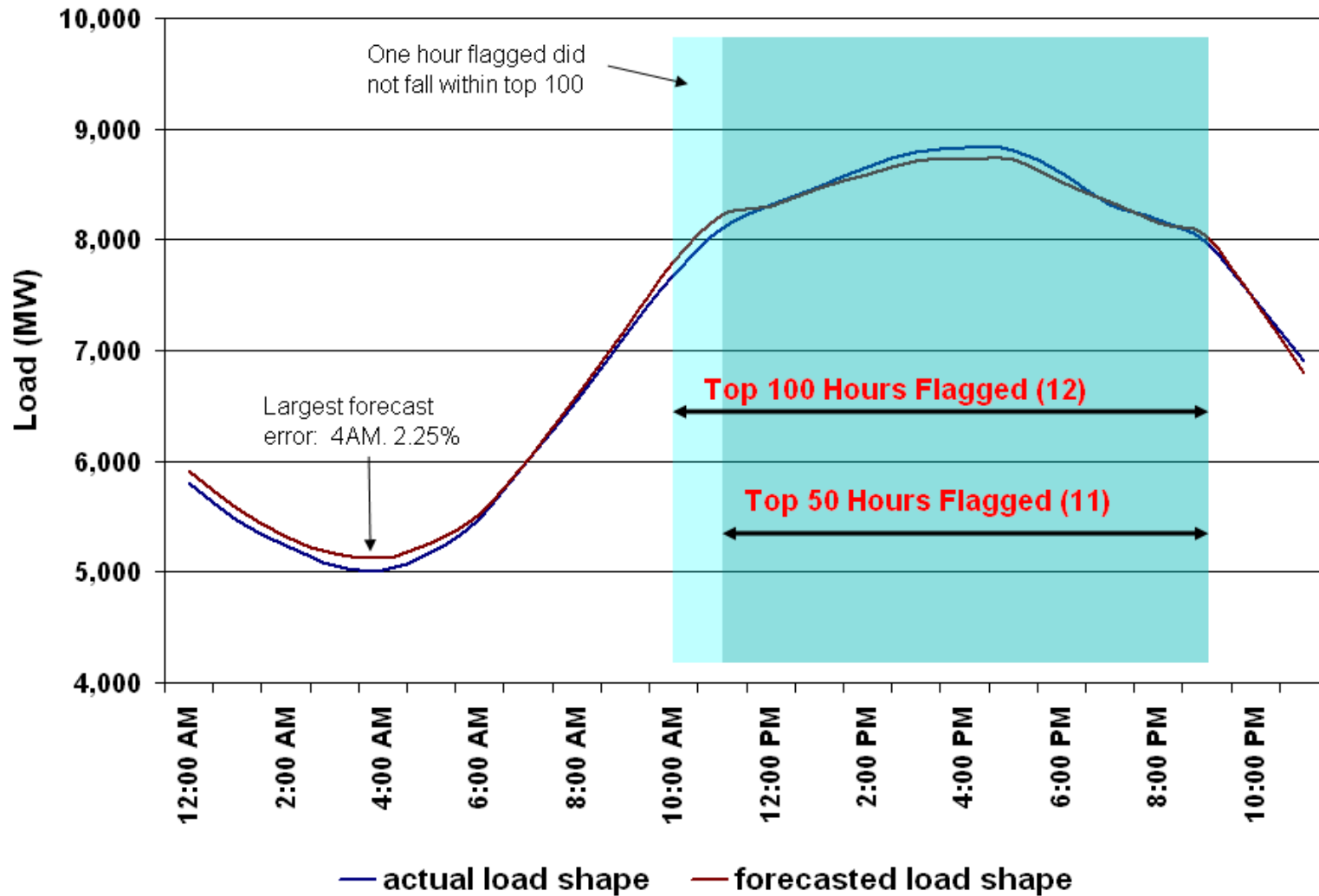
Days/Month



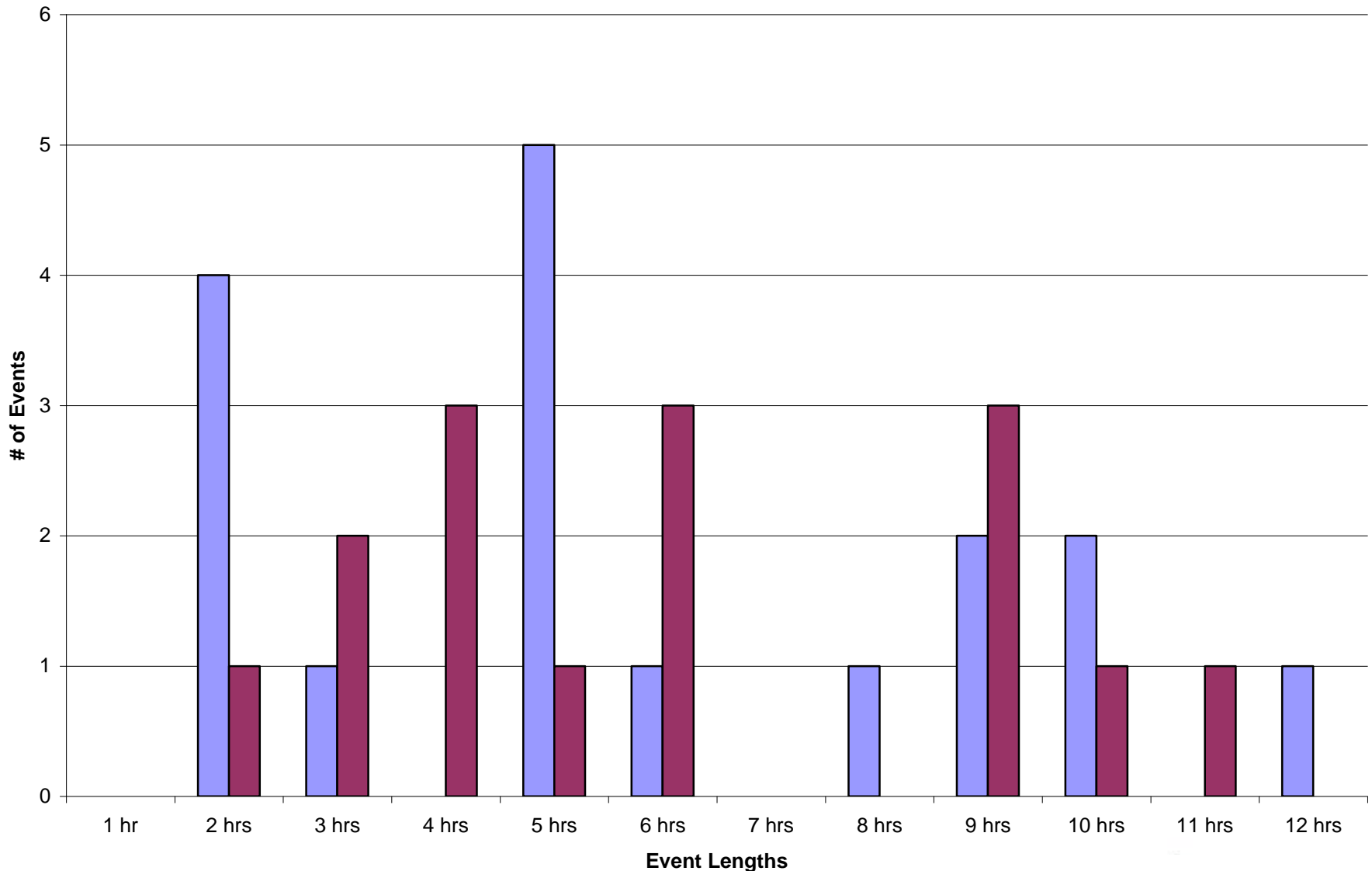
Peak 100 Hour Distribution (Duration in Hours)



A Look At Summer's Peak – July 6, 2010



2008/9 "100 Hour" Event Count by Duration



November 9, 2010

■ 2008 - 17 Event Days ■ 2009 - 16 Event Days





Thank You