NYISO SCR Baseline Study Analysis

Overview of Results

Roger Kirkpatrick
Market Product Specialist
Demand Response Products
New York Independent System Operator

Timothy Hennessy
Senior Principal, Sustainable Use Consulting
DNV KEMA Energy & Sustainability

Business Issues Committee

December 11, 2013

DRAFT – FOR DISCUSSION PURPOSES ONLY

Topics

- **Overview of SCR Baseline Study**
- **Review of Task 1 - CBL Results**
- **Review of Task 2 - ACL Results**
- **Review of Task 3 – CBL/ACL Comparison**
- **Observations from the study**
- **Next Steps**

Evaluation of ACL Baseline

- **At the January 26, 2011 BIC meeting, the motion to approve the change from APMD to ACL included a commitment by NYISO to conduct an evaluation of the revised baseline methodology in 2013:**
  - ***"… and will include in the meeting minutes that the NYISO staff has indicated that in Calendar Year 2013, the NYISO will report to the ICAP Working Group on its evaluation of the revised SCR baseline performance methodology that is part of this motion."***

The Path of the Study

- **October 23, 2012 – NYISO presented the request for data to be sent to the RIPs**
- **November 1, 2012 – NYISO requested data from RIPs for the period of November 1, 2010 through October 31, 2012**
- **February 2013 – NYISO presented the results of the data request, identifying adequate resources in all areas**
  - ***Categories of size were combined into three size categories***
- **May 22, 2013 – NYISO presented the Analysis Design for the SCR Baseline Study**

The Path of the Study (cont.)

- **November 14, 2013 – NYISO presented the results of the CBL area of the study (Task 1) to ICAP Working Group**
- **December 10, 2013 – NYISO presented to ICAP Working Group:**
  - ***Follow-up on the CBL aspects of the study (Task 1);***
  - ***The results of the ACL portion of the study (Task 2); and***
  - ***Provided analysis on the concept of a capacity baseline for market participation and an energy baseline for performance evaluation (Task 3)***

Task 1: CBL Analysis

Analysis Design Approach - CBL

- **Start with the 2011 PJM Baseline Study approach**
  - ***Retain metrics: Accuracy, Bias, and Variability***
  - ***Expand and adjust segmentations: Size, Facility Type, Weather Sensitivity, and Load Variability***
  - ***Add variations of existing NYISO CBL, including accurate modeling of exclusion rules***
  - ***Explore multiple in-day adjustment options***
    - **In part to consider the question of uncapped multiplicative adjustment raised in May 2013 decision on Order 745**
  - ***Compare Accuracy results to 2011 PJM Study to benchmark current study results***

Segment Distributions

	Capability Period							
	Summer				Winter			
Category	N	PCT	ICAP (MW)	PCT	N	PCT	ICAP (MW)	PCT
Customer Size								
Up to 100 kW	442	19%	15.6	2%	437	24%	17.6	3%
Between 100 kW and 1,000 kW	1,568	69%	218.7	22%	1,190	66%	205.6	30%
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Weather Sensitivity								
Non-Weather Sensitive	732	32%	124.3	13%	988	55%	280.7	41%
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Load Varibility								
Low	221	10%	544.5	56%	169	9%	268.9	40%
Medium	1,416	62%	344.1	35%	1,137	63%	316.7	47%
High	646	28%	86.6	9%	500	28%	94.7	14%
Total	2,283		975.3		1,806		680.3	

Baselines Tested

#	NYISO Study Name	Short Name	Description	Estimation Method	PJM Study Name
1	NYISO High 5 of 10 (Current NYISO CBL)	NYISO 5 of 10	Average of high 5 of 10 most recent qualifying days.	Average	NYISO Standard CBL
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3	NYISO High 4 of 5	NYISO 4 of 5	Average of high 4 of 5 most recent qualifying days.	Average	Not Used in PJM Study
4	NYISO High 5 of 8	NYISO 5 of 8	Average of high 5 of 8 most recent qualifying days.	Average	Not Used in PJM Study
5	NYISO 10 of 10	NYISO 10 of 10	Average of 10 most recent qualifying days.	Average	Not Used in PJM Study
6	PJM Economic High 4 of 5	PJM 4 of 5	Average of high 4 of 5 most recent qualifying days.	Average	PJM Economic CBL
7	PJM Middle 4 of 6	PJM Comparable	Average of middle 4 of 6 most recent qualifying days.	Average	(MMU) Middle 4 of 6
8	PJM Emergency Comparable Day, Non-Weather Sensitive	PJM Same Day	Most similar day, excluding weekend/holidays	Matching	PJM Emergency GLD Comparable Day (Non-Weather Sensitive)
9	PJM Emergency Same Day	PJM Settlement	Average of hours pre- and post-event	Average	PJM emergency GLD same day
10	ISONE Standard	ISONE	Average of 90% baseline + 10% meter	Average	ISONE Standard CBL
11	CAISO Standard	CAISO 10 of 10	Average of 10 most recent qualifying days.	Average	CAISO Standard CBL

In-Day Adjustments Tested

- **Unadjusted**
  - ***The baseline with no adjustments***
- **Additive**
  - ***The additive approach measures the magnitude of the pre-event period load difference (positive or negative), and adds that to the baseline throughout the event period***
- **Multiplicative Adjustment**
  - ***The multiplicative approach applies the ratio pre-event period baseline load to the pre-event period observed load to the baseline throughout the event period***
    - **Permitted testing of the current adjustment cap for possible revision**
- **Multiplicative Adjustment (Cap)**
  - ***This limits the ratios of the Multiplicative Adjustment to between 0.8 and 1.2***

Analysis Approach

- **Baselines were calculated and compared for each of the resources for all weekdays, by capability period type**
  - ***Summer: 2,283 resources with 975.3 MW of ICAP***
  - ***Winter: 1,806 resources with 680.3 MW of ICAP***
- **Candidate peak-like event days were identified based on system load conditions, and weather conditions**

Candidate Peak-Like Event Day Selection

- **Summer:**
  - ***Weekdays with a Cumulative Temperature-Humidity Index at or above 79.20 degrees and peak NYCA load hour >30,600 MW***
  - ***5 days in Summer 2011, 4 days in Summer 2012***
- **Winter:**
  - ***Weekdays with a peak NYCA load hour >23,700 MW***
  - ***4 days in Winter 2010-2011, 2 days in Winter 2011-2012***

Analysis Criteria

- **Summary statistics for the candidate baselines were developed and ranked for each baseline using three criterion:**
  - ***Accuracy – How closely a baseline method predicts resource actual loads in the sample***
  - ***Bias – The systematic tendency of a baseline method to over- or under-predict actual loads***
  - ***Variability – The measure of how well the baseline is at predicting hourly load under many different conditions and across many different customers***

All Resources Observations - Accuracy

- **From the All days and Peak Like days analyses, 51 baselines were identified as having high levels of accuracy**
- **All of these baselines used an adjustment**
  - ***The most common adjustment was Multiplicative (32 of 51)***
- **NYISO's current CBL, 5 of 10 and two of its variants: NYISO 10 of 10 and NYISO 5 of 8, were the most frequently identified baselines**
- **The following baselines were identified as highly accurate across every season for each segment analyzed:**
  - ***CAISO 10 of 10 Multiplicative***
  - ***ISONE Multiplicative***
  - ***NYISO 10 of 10 Multiplicative***
  - ***NYISO 5 of 10 Multiplicative***
  - ***NYISO 5 of 8 Multiplicative***

In-Day Adjustment Mechanism

- **Candidate energy baselines are more accurate with a multiplicative adjustment**
- **Candidate energy baselines were analyzed to determine the magnitude and distribution of adjustments used**
  - ***To compare with the current in-day adjustment cap of +/- 20%***

In-day Adjustment Cap

Magnitude and Distribution

- **Table shows the distribution and value of the in-day adjustment from the analysis for the candidate energy baselines.**
- **Approximately 95% of the adjustments used in the analysis would be captured by the current +/- 20% cap.**
- **Approximately 99% of the adjustments used in the study would be captured by an adjustment cap of +/- 50%, or 0.5 to 1.5.**

Distribution Statistic	NYISO 10 of 10	NYISO 5 of 10	NYISO 5 of 8
100% Max	56.46	315.00	315.00
99%	1.68	1.53	1.57
95%	1.30	1.20	1.22
90%	1.19	1.11	1.13
75% Q3	1.07	1.03	1.04
50% Median	1.00	0.97	0.98
25% Q1	0.92	0.88	0.89
10%	0.76	0.70	0.72
5%	0.56	0.50	0.52
1%	0.17	0.16	0.16
0% Min	0.00	0.00	0.00
Mean	0.99	0.95	0.95
Std Dev	0.28	0.48	0.48

Candidate Energy Baselines Based on All Resources, Best Accuracies

BaseLine		Adjustment	Summer			Winter		
			Accuracy	Bias	Varibility	Accuracy	Bias	Varibility
NYISO	10 of 10	Multiplicative	0.130	0.001	0.130	0.117	0.001	0.118
NYISO	5 of 10	Multiplicative	0.138	0.020	0.135	0.123	0.019	0.121
NYISO	5 of 8	Multiplicative	0.135	0.016	0.134	0.125	0.014	0.122

- **ISO New England CBL approach is operationally intensive and is difficult to administer/manage**
- **CAISO CBL approach was modeled in simplistic form in the DNV KEMA analysis**
  - ***An exclusion rule was not modeled***
  - ***May reduce accuracy of results***

Task 2: ACL Analysis

Analysis Design Approach - ACL

- **Compare existing capacity baseline with variations under consideration**
  - ***Evaluate how seasonal load variations impact amount of capacity available for a season***
- **Identify a measure of available capacity in advance that closely reflects the estimated load during an event**
- **To consider a combination of capacity baseline to use for market participation and an energy baseline to use for performance evaluation**
- **5 CPk – Five Coincident Peak Hours used for comparison as an alternative coincident demand metric**

Assessment of Current and Alternative ACLs

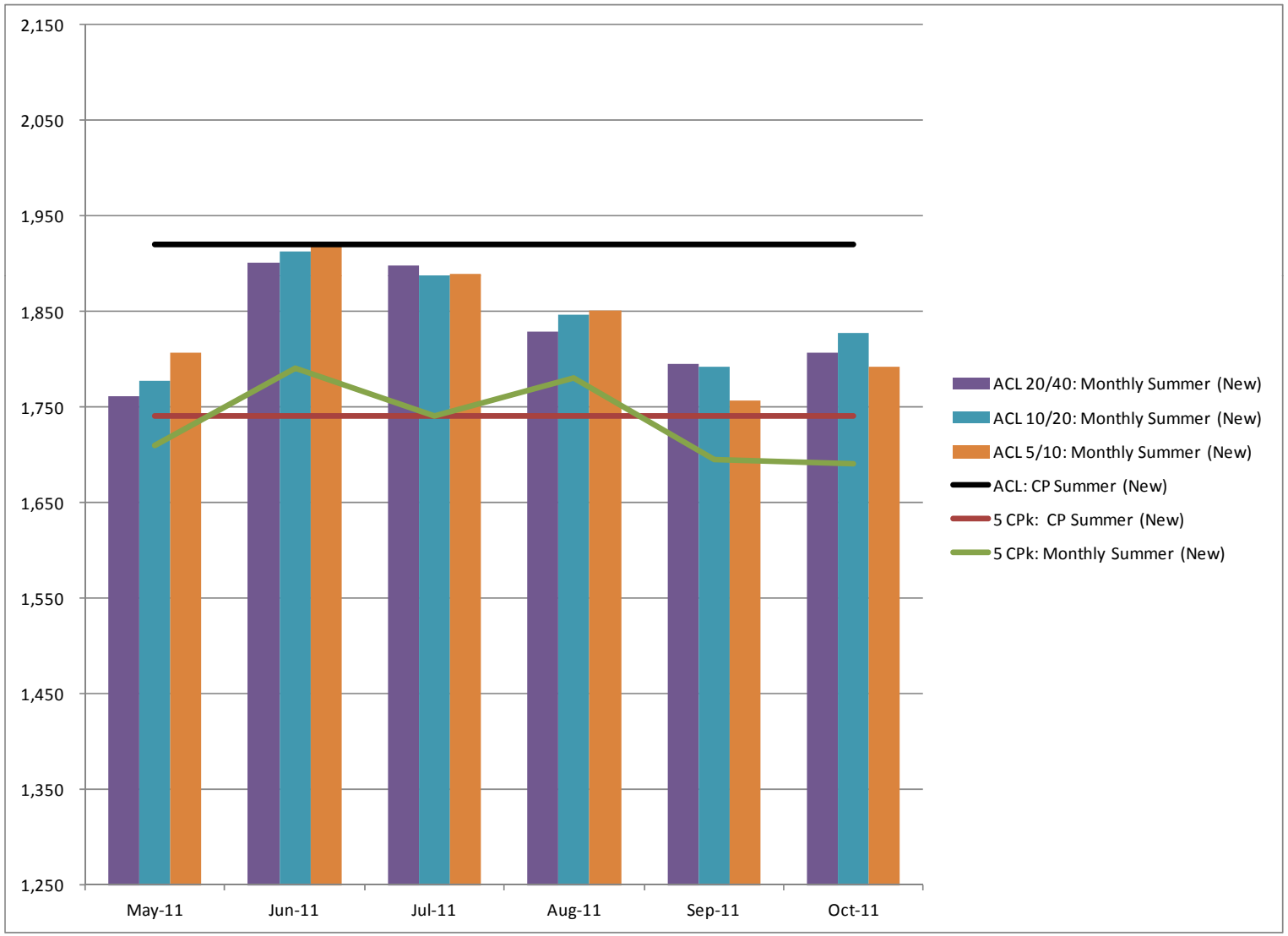
ACL Approach	Purpose
Current Capability Period ACL -Top 20 of 40 hours - HB 13 through HB 18	To evaluate the current ACL methodology • Per January 26, 2011 BIC motion approving ACL methodology
Revised Capability Period ACL -Top 20 of 40 hours - HB 11 through HB 19	To analyze the new hours awaiting FERC approval in the Provisional ACL filings
Monthly -Using HB 11 through HB 19 -Includes: - Top 20 of 40 hours - Top 10 of 20 hours - Top 5 of 10 hours	To analyze if a monthly ACL better reflects the available capacity from a resource compared to a single capability period wide ACL

Summary of ACL Analysis

- **Existing ACL**
  - ***Within 7.6% of the Capability Period 5 CPk (Coincident Peak) in the Summer, within 6.4% of the Capability Period 5 CPk in Winter***
- **New Hours ACL (proposed with Provisional ACL (11 a.m. to 8 p.m.)**
  - ***Within 8.3% of the Capability Period 5 CPk (Coincident Peak) in the Summer, within 6.4% of the Capability Period 5 CPk in Winter***
- **Monthly Top 10 of 20**
  - ***Performed the best amongst the three monthly ACLs tested at measuring the available capacity of resources during both peak and shoulder months***
  - ***Based on the difference and percentage of error when compared to the new CP (Capability Period) ACL, the Monthly 5 CPk, and to the other Monthly ACLs evaluated***

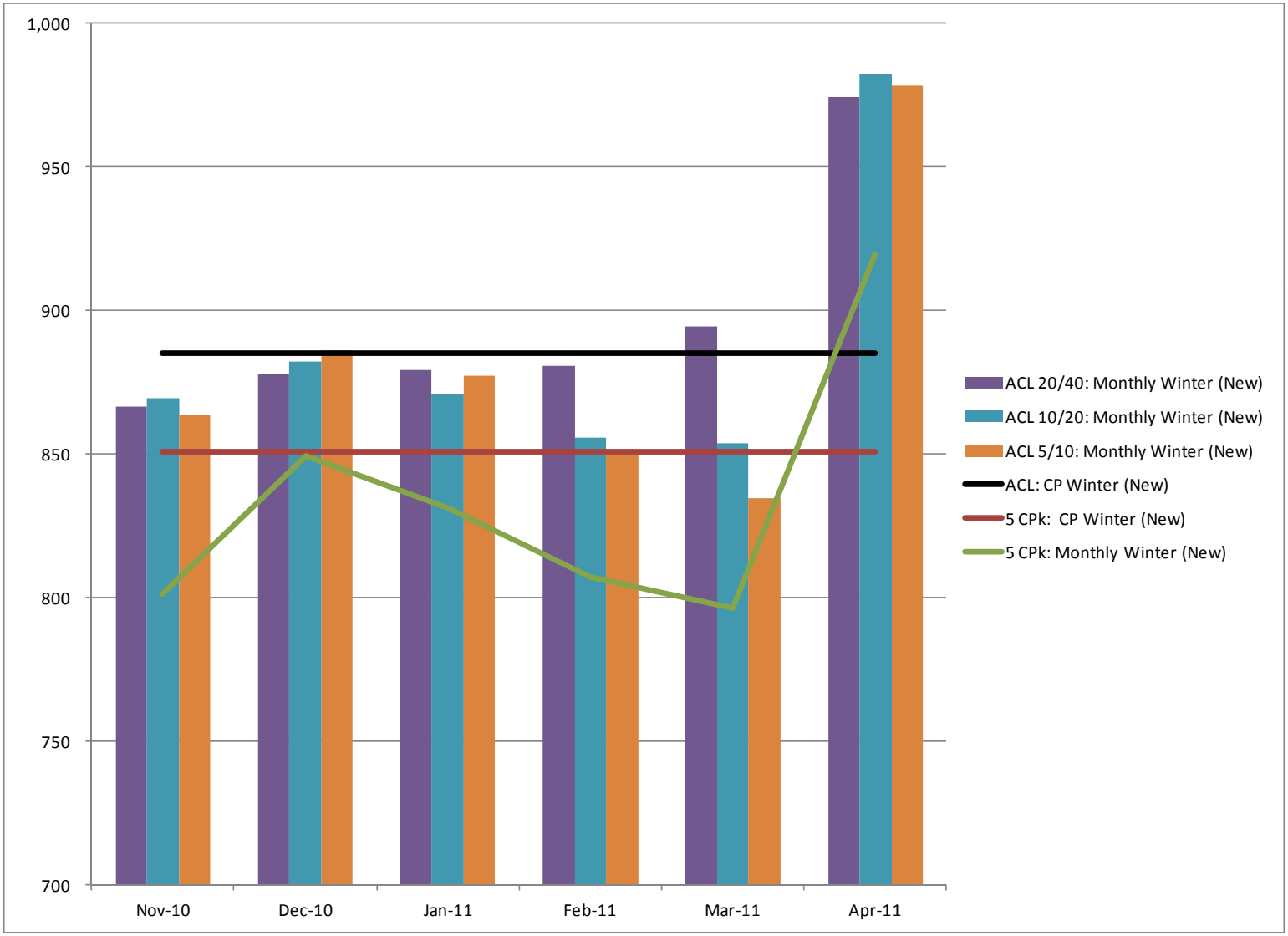
ACL Comparison Charts

Comparison of CP and Monthly ACLs and 5 CPks – Summer 2011

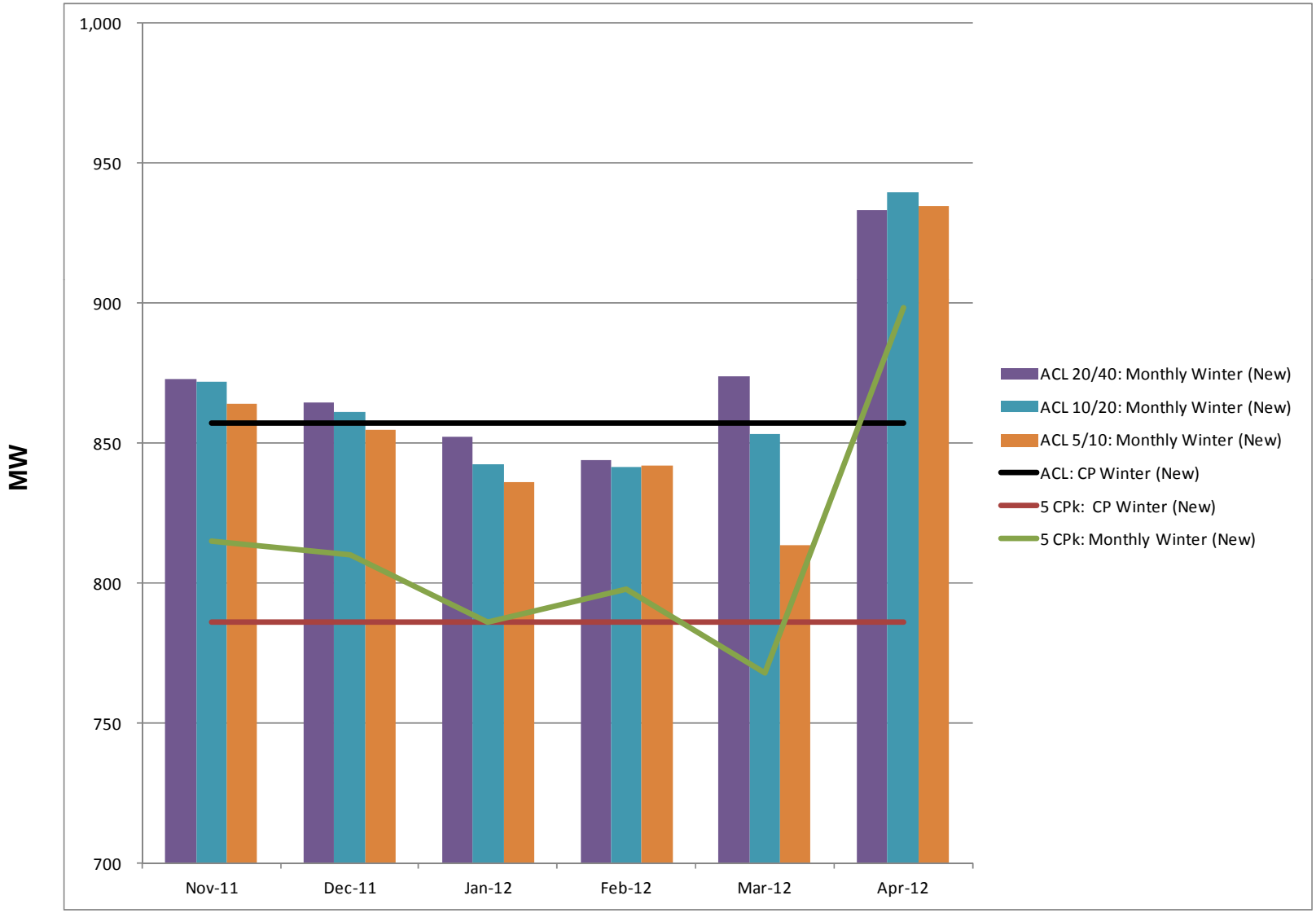


Comparison of CP and Monthly ACLs and 5 CPks – Summer 2012

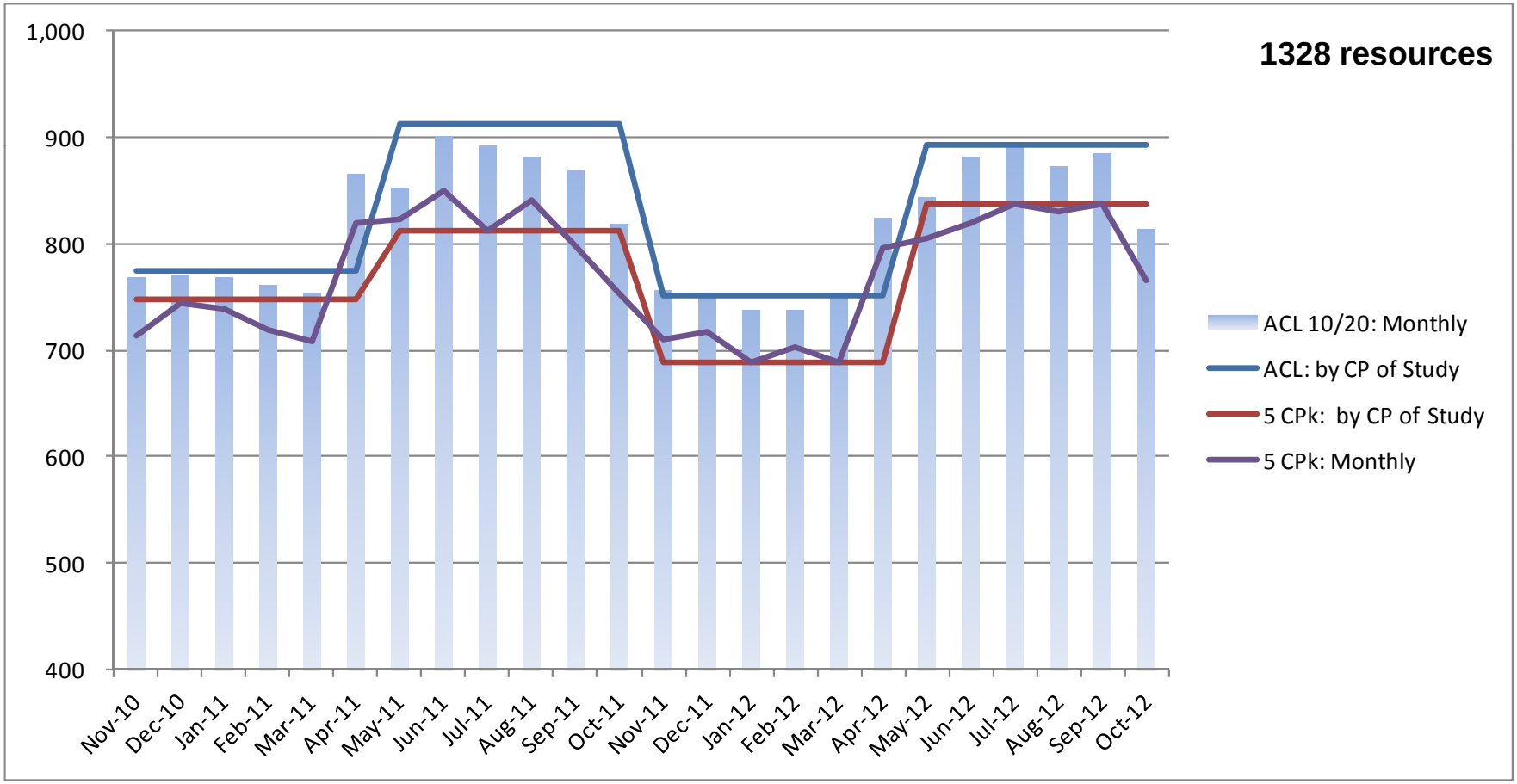
Comparison of CP and Monthly ACLs and 5 CPks – Winter 2010/2011



Comparison of CP and Monthly ACLs and 5 CPks – Winter 2011/2012



Entire Study – Resources included in the study, in both Winter and Summer



Observations: ACL

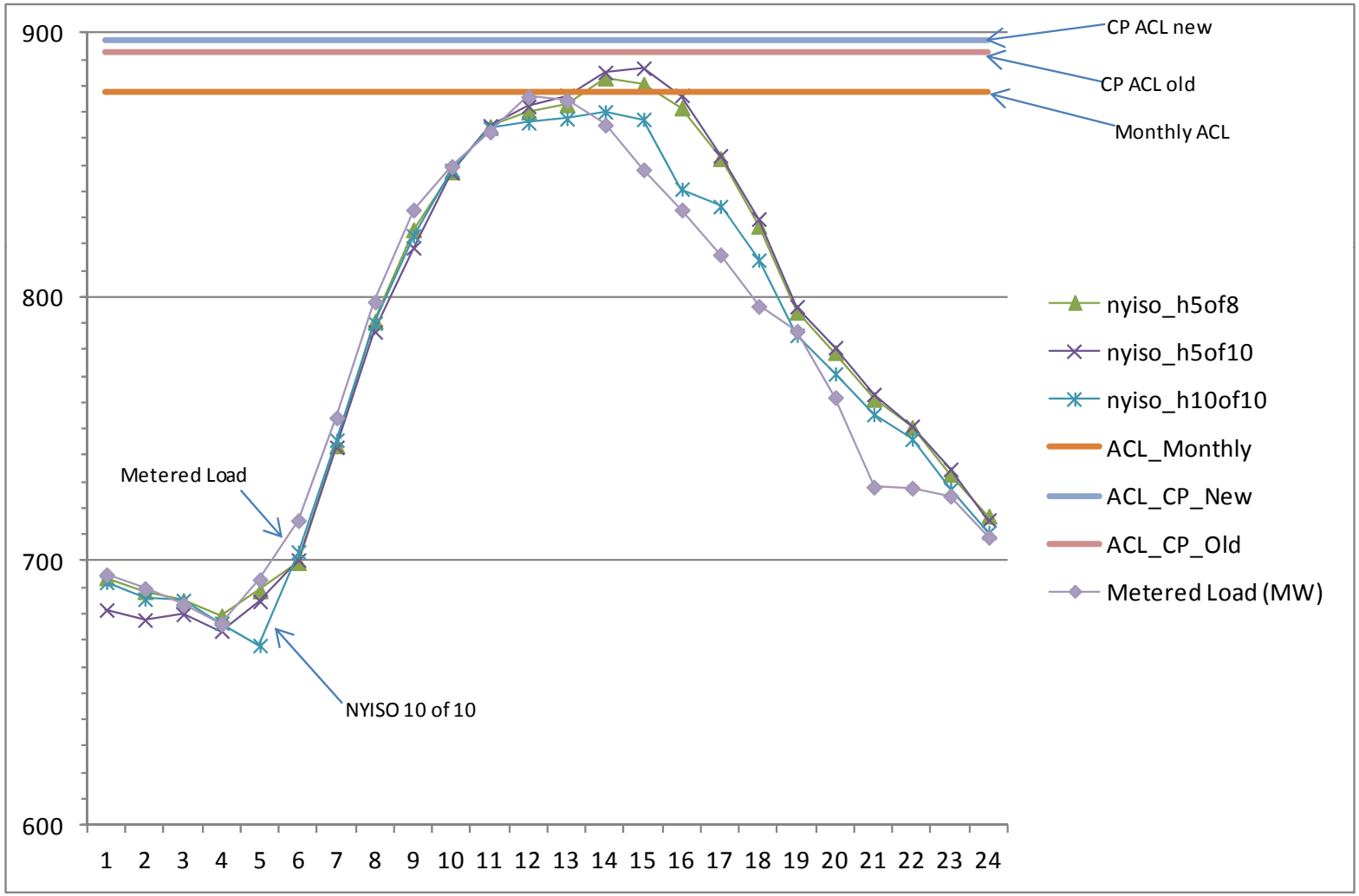
- **Current ACL reflects the coincident load of the resource close to what was expected**
  - ***Estimated difference between the ACL and CP 5 CPk from previous baseline study showed that the CP 5 CPk understated proposed ACL by 5.4% (October 29, 2010 ICAPWG presentation)***
  - ***Current study shows 5 CPk understating the ACL by up to 8% in Summer and 6% in Winter***
    - **Given the diversity of the larger sample size, the expanded hours of the ACL, and two Capability Periods analyzed for each season in this study, the increase from the first study is not significant**
- **CP ACL tends to overstate capability in the shoulder months when load is lower than the months from which the current CP ACL is calculated**
  - ***Monthly ACL better reflects load levels than CP ACL***
- **5 CPk is lower than the ACL, regardless of basis: Capability Period or Monthly**

Task 3
Combination of ACL and CBL

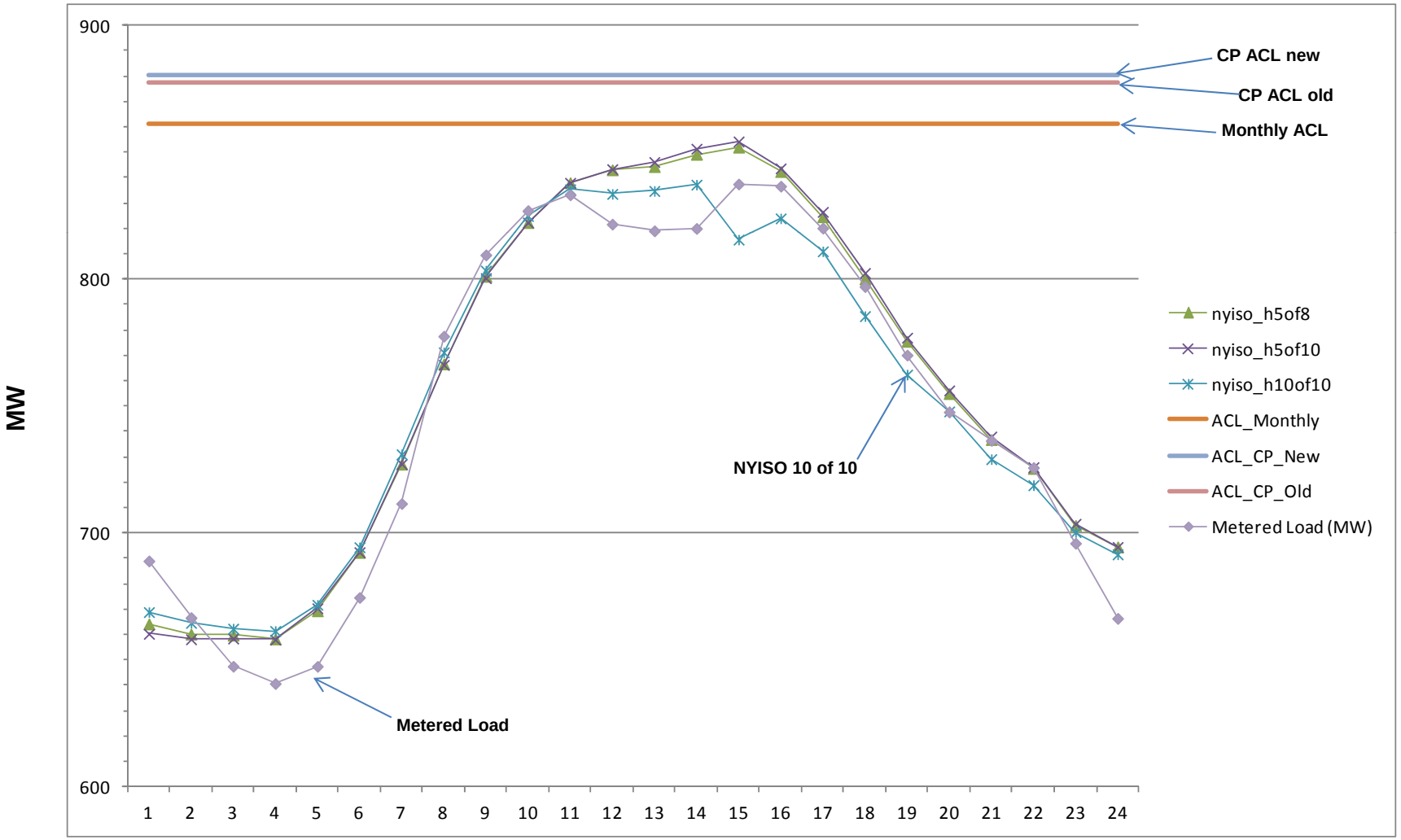
Task 3: Combination of ACL and CBL

- **Task 3 analyzes a combination of a capacity baseline (ACL) to use for market participation/ enrollment and energy baseline (CBL) to use for performance evaluation exists.**
- **Compared**
  - ***Capability ACL (both old and new hours)***
  - ***Monthly ACL (10 of 20 hours)***
  - ***Three NYISO CBLs with uncapped Multiplicative adjustments (5 of 8, 5 of 10 and 10 of 10)***
- **Comparison done for four event-like days, one from each Capability Period**
  - ***July 12, 2011 (31,623.7 MW peak NYCA load)***
  - ***August 3, 2012 (30,989.3 MW peak NYCA load)***
  - ***December 14, 2010 (24,653.7 MW peak NYCA load)***
  - ***January 3, 2012 (23,900.9 MW peak NYCA load)***

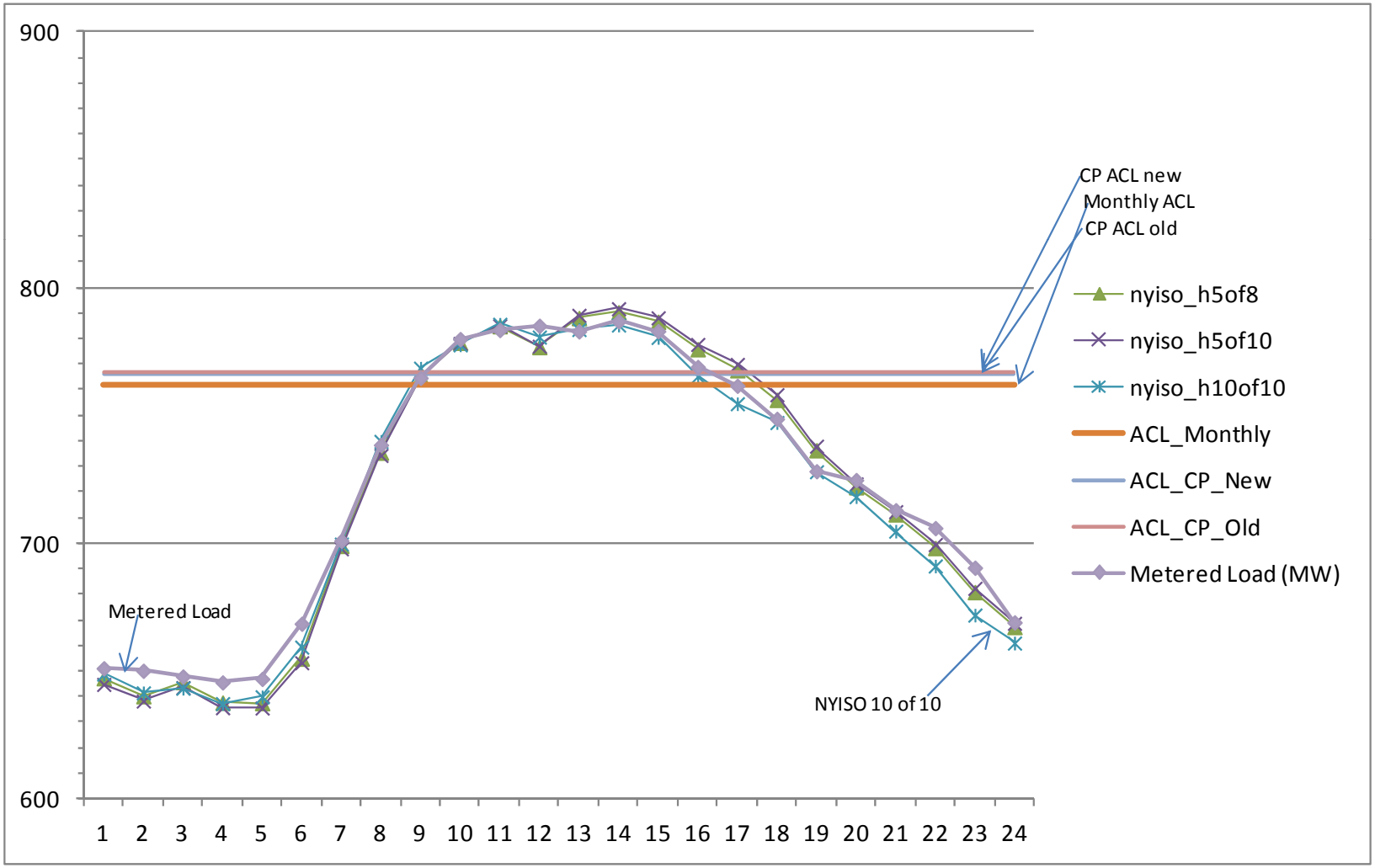
Event-Like Day: July 12, 2011



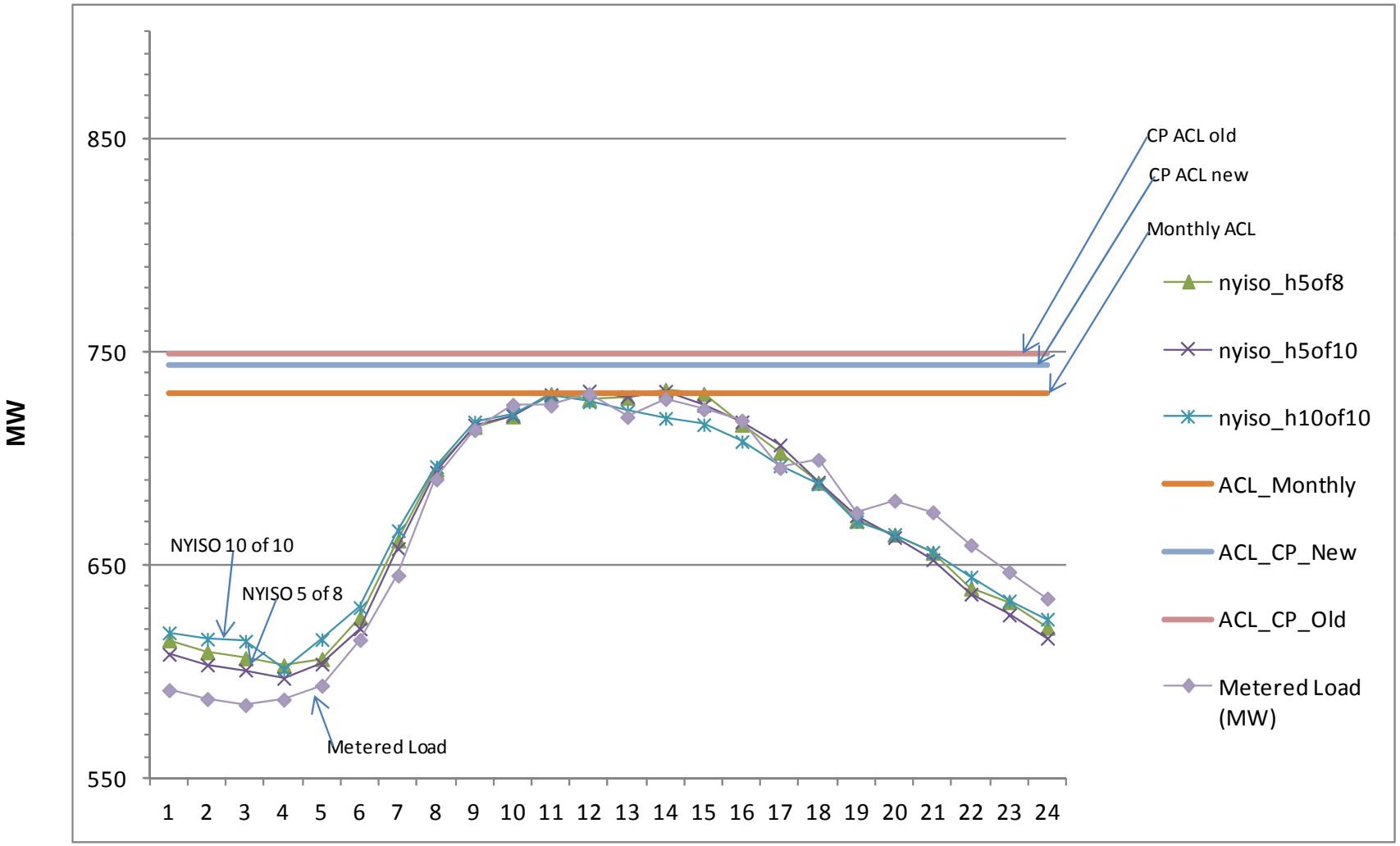
Event-Like Day: August 3, 2012



Event-Like Day: December 14, 2010



Event-Like Day: January 3, 2012



Observations: CBL

- **The three candidate NYISO CBLs are performing comparably and among the best in the industry for accuracy, bias and variability**
- **Highly variable loads may need a separate CBL and/or in-day adjustment type**
  - ***PJM currently uses a separate CBL for highly variable loads***

Observations: CBL (cont.)

- **Uncapped multiplicative adjustment tested very well in the baseline analysis**
  - ***However, this study, as in previous studies by DNV KEMA, shows that a significant weakness of unbounded multiplicative adjustments is that in rare cases they can produce gross inaccuracies***
  - ***Accordingly, a reasonably established boundary, (e.g., 99th percentile of observed multiplicative adjustments) should adopted to address this deficiency***
- **The inherent qualities of highly variable loads do not lend themselves to a baseline methods based on previous load patterns**
- **Accordingly, alternative approaches to determine these resources contributions should be considered**

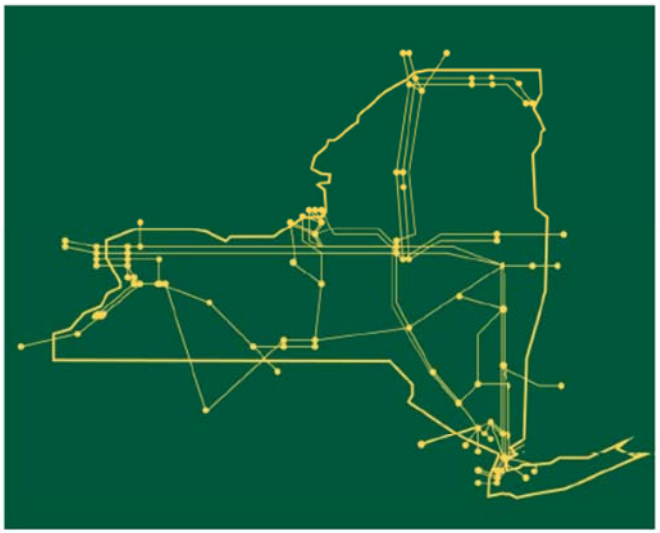
Observations: ACL

- **ACL reflects the coincident load of the resource as expected**
- **CP ACL tends to overstate capability in the shoulder months when load is lower than the months from which the ACL is calculated**
  - ***Monthly ACL better reflects load levels than CP ACL***
- **5 CPk is lower than the ACL, regardless of basis: Capability Period or Monthly**

Next Steps

- **NYISO invites written comments on the SCR Baseline results presented**
  - ***Send to Debbie Eckels (deckels@nyiso.com) by Friday, January 3, 2014***
- **NYISO and DNV KEMA to complete the SCR Baseline Study Report and Recommendations**
  - ***Post the final report to NYISO's website late January/early February***
- **Stakeholders will have the opportunity to provide comments on the SCR Baseline Study Report**
- **NYISO Management Response to SCR Baseline Study Report in Q2 2014**

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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Appendices

November 14, 2013 ICAPWG Presentation (CBL Results)

December 10, 2013 ICAPWG Presentation (ACL Results)

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CBL Results (Updated)

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Joint PRLWG/ICAPWG
November 14, 2013

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Action item from 2011

- **At the January 26, 2011 BIC meeting, the motion to approve the change from APMD to ACL included a commitment by NYISO to conduct an evaluation of the revised baseline methodology in 2013:**
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Objectives of the Study

- **Task 1: To evaluate multiple energy CBLs and adjustment options**
  - ***To find the combined energy CBL and adjustment mechanism with the best overall accuracy for all days and/or peak days***
- **Task 2: To validate the NYISO's current ACL and ACL alternatives**
- **Task 3: To identify the combination of capacity baseline and energy baseline to use for market participation and performance evaluation**

Analysis Design Approach - CBL

- **Start with the 2011 PJM Baseline Study approach**
  - ***Retain metrics: Accuracy, Bias, and Variability***
  - ***Expand and adjust segmentations: Size, Facility Type, Weather Sensitivity, and Load Variability***
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  - ***Compare Accuracy results to 2011 PJM Study to benchmark current study results***

Baseline Analysis

Segment Definitions

- **Resource Size**
  - **Small: Up to 100 kW**
  - **Medium: Between 100 kW and 1,000 kW**
  - **Large: Greater than 1,000 kW**
- **Weather sensitivity**
  - ***Sort the peak load for each of the 6 months by capability period in descending order***
  - ***Check top 4 of 6 months***
    - **For Summer Capability period, if. June, July, and August are in top four months, then designated weather sensitive**
    - **For Winter Capability period:, if December, January, and February are in top 4 months, then designated weather sensitive**

Segment Definitions - continued

- **Load Variability**
  - ***Three variability categories (low, medium and high) based on the Coefficient of Variation of the event period loads***
    - **Low: 14% of the resources are classified as low variability**
    - **Medium: 64% were classified as medium variability**
    - **High: 22% were classified as high variability**
  - ***Similar approach as PJM's study***
- **Facility Type**
  - ***Considered subjective by project team, therefore not used***

Segment Distributions

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4	NYISO High 5 of 8	NYISO 5 of 8	Average of high 5 of 8 most recent qualifying days.	Average	Not Used in PJM Study
5	NYISO 10 of 10	NYISO 10 of 10	Average of 10 most recent qualifying days.	Average	Not Used in PJM Study
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- **Multiplicative Adjustment**
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    - **Permitted testing of the current adjustment cap for possible revision**
- **Multiplicative Adjustment (Cap)**
  - ***This limits the ratios of the Multiplicative Adjustment to between 0.8 and 1.2***

Analysis Design Approach

- **Define the analysis for the capacity baseline (ACL)**
  - ***Compare existing capacity baseline with variations***
    - **Assess how load variations across the season impact amount of capacity available**
- ***Identify a measure of available capacity in advance that closely reflects the estimated load (CBL) during an event***
- ***Evaluate the combination of:***
  - ***Capacity baseline to use for enrollment and market participation***
  - ***Energy baseline to use for performance evaluation***

Analysis Approach

- **Selected baselines were calculated and compared for each of the resources for all days, by capability period**
  - ***Summer: 2,283 resources with 975.3 MW of ICAP***
  - ***Winter: 1806 resources with 680.3 MW of ICAP***
- **Candidate event days were identified based on system load conditions, and weather conditions**

Candidate Event Day Selection

- **Summer:**
  - ***Weekdays with a Cumulative Temperature-Humidity Index at or above 79.20 degrees and peak NYCA load hour >30,500 MW***
  - ***5 days in Summer 2011, 4 days in Summer 2012***
- **Winter:**
  - ***Weekdays with a peak NYCA load hour >23,700 MW***
  - ***4 days in Winter 2010-2011, 2 days in Winter 2011-2012***

Analysis Criteria

- **Summary statistics for the candidate baselines were developed and ranked for each of the candidate baseline based on three criterion:**
  - ***Accuracy – How closely a baseline method predicts resource actual loads in the sample***
  - ***Bias – The systematic tendency of a baseline method to over- or under-predict actual loads***
  - ***Variability – The measure of how well the baseline is at predicting hourly load under many different conditions and across many different customers***

All Resources
All Days

Accuracy Statistic Description

- **This statistic describes how closely a baseline method predicts resource actual loads in the sample**
- **Comparison of Accuracy is made by comparing the Median of the relative root mean squared error (RRMSE) of the baselines to actual load.**
  - ***By definition, accuracy is a positive value***
- **A baseline for a typical customer with a median RRMSE of 0.10 is one where that baseline could expect to have an hourly error, on average of 10% of their actual load**
- **When comparing the accuracy of different baselines, the smaller the value, the better (or more accurate the accuracy)**
- **The accuracy statistic (RRMSE) is defined as variability plus bias. Accordingly, the Accuracy statistics incorporates both**
  - ***Accuracy can be considered "first among equals" of the statistics examined***

Accuracy Statistic Results - All Days

Summer

Summer Period
All Days
Summer
All Resources

Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.224	0.205	0.195	0.210	0.199	0.192	0.173	0.226	0.226	0.199	0.195
Additive Adjustment	0.155	0.165	0.149	0.152	0.146	0.148	0.168	0.247	0.247	0.145	0.146
Multiplicative Adjustment	0.138	0.151	0.135	0.135	0.130	0.135	0.170	0.247	0.247	0.129	0.131
Multiplicative Adjustment(Cap)	0.159	0.159	0.148	0.154	0.147	0.145	0.159	0.221	0.235	0.144	0.143

Summer Capability Period
All Days
Accuracy Statistic
All Resources

Baseline		Adjustment	Median	Mean	Range	Std Dev.
ISONE		Multiplicative	0.129	0.207	7.350	0.304
NYISO	10 of 10	Multiplicative	0.130	0.219	9.320	0.401
CAISO	10 of 10	Multiplicative	0.131	0.219	14.880	0.457
NYISO	4 of 5	Multiplicative	0.135	0.305	122.840	2.689
NYISO	5 of 8	Multiplicative	0.135	0.263	39.460	1.151
PJM	4 of 5	Multiplicative	0.135	0.271	20.360	0.828
NYISO	5 of 10	Multiplicative	0.138	0.266	39.460	1.142
NYISO	Mid 2 of 10	Multiplicative	0.151	0.362	61.520	1.680
PJM	Comparable	Multiplicative	0.170	1.529	1,188.490	26.300

Winter

Winter Capability Period
All Days
Accuracy
All Resources

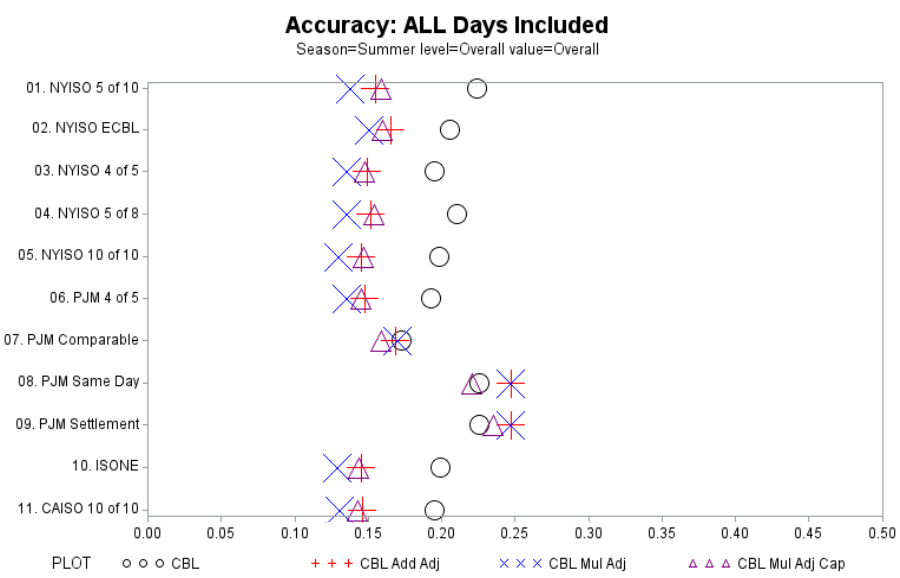
Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.211	0.197	0.185	0.200	0.188	0.184	0.175	0.179	0.189	0.182	0.187
Additive Adjustment	0.144	0.149	0.140	0.141	0.135	0.139	0.159	0.211	0.211	0.132	0.134
Multiplicative Adjustment	0.124	0.138	0.123	0.123	0.118	0.123	0.153	0.211	0.211	0.115	0.118
Multiplicative Adjustment(Cap)	0.152	0.154	0.143	0.146	0.138	0.140	0.156	0.194	0.200	0.133	0.136

Winter Capability Period
All Days
Accuracy Statistic
All Resources

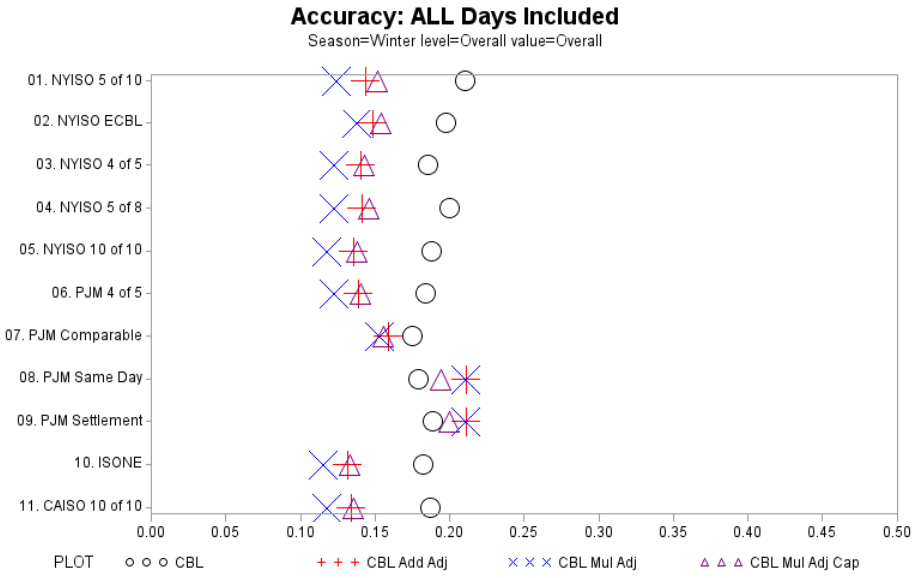
Baseline		Adjustment	Median	Mean	Range	Std Dev.
ISONE		Multiplicative	0.115	0.181	6.280	0.273
CAISO	10 of 10	Multiplicative	0.118	0.188	8.380	0.333
NYISO	10 of 10	Multiplicative	0.118	0.193	10.860	0.376
NYISO	5 of 8	Multiplicative	0.123	0.227	33.170	0.885
PJM	4 of 5	Multiplicative	0.123	0.217	10.400	0.472
NYISO	4 of 5	Multiplicative	0.123	0.311	155.460	3.736
NYISO	5 of 10	Multiplicative	0.124	0.231	33.060	0.898
NYISO	Mid 2 of 10	Multiplicative	0.138	0.299	75.230	1.926
PJM	Comparable	Multiplicative	0.153	1.216	1,377.980	32.482

Accuracy Statistic Results - All Days

Summer



Winter



Bias Statistic Description

- **This statistic describes the systematic tendency of a baseline method to over- or under-predict actual loads**
- **Metric: Median of the Average Relative Error (ARE)**
- **A median value of 0 would indicate that the typical customer in the sample had no systematic tendency to over- or under-predict loads using that baseline**
- **The closer to 0, the better**
- **The values in the Table are presented in absolute values**

Bias Statistic Results - All Days

Summer

Summer Capability Period
All Days
Summer
All Resources

Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.089	0.002	0.033	0.064	0.003	0.035	0.003	0.035	0.066	0.000	0.002
Additive Adjustment	0.016	0.000	0.006	0.012	0.000	0.009	0.002	0.056	0.056	0.001	0.001
Multiplicative Adjustment	0.020	0.004	0.010	0.016	0.001	0.012	0.010	0.056	0.056	0.001	0.002
Multiplicative Adjustment(Cap)	0.042	0.000	0.018	0.032	0.004	0.018	0.002	0.009	0.049	0.000	0.001

Summer Capability Period
All Days
Bias Statistic
All Resources

Baseline		Adjustment	Median	Mean	Range	Std Dev.
ISONE		Multi w/Cap	-	-	0.330	0.020
ISONE		Unadjusted	-	0.001	0.410	0.016
NYISO	Mid 2 of 10	Multi w/Cap	-	(0.003)	0.770	0.045
NYISO	Mid 2 of 10	Additive	-	0.008	2.160	0.074
NYISO	10 of 10	Additive	-	0.015	3.010	0.097
CAISO	10 of 10	Multi w/Cap	0.001	0.001	0.240	0.015
ISONE		Multiplicative	0.001	0.003	0.700	0.021
ISONE		Additive	0.001	0.010	1.750	0.064
CAISO	10 of 10	Additive	0.001	0.011	1.660	0.064
NYISO	10 of 10	Multiplicative	0.001	0.019	2.880	0.108
PJM	Comparable	Additive	0.002	0.017	1.520	0.074
NYISO	10 of 10	Unadjusted	0.003	0.043	3.800	0.157
NYISO	Mid 2 of 10	Multiplicative	0.004	0.025	5.510	0.173
NYISO	10 of 10	Multi w/Cap	0.004	0.035	3.600	0.135
PJM	Comparable	Multiplicative	0.010	0.162	132.140	2.929

Winter

Winter Capability Period
All Days
Bias
All Resources

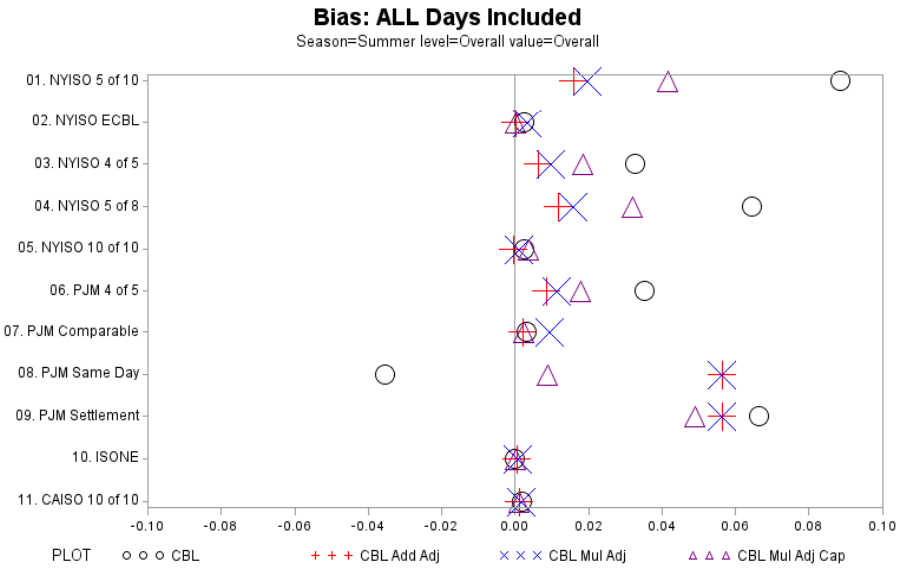
Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.084	0.005	0.033	0.063	0.003	0.035	0.010	0.023	0.051	0.002	0.001
Additive Adjustment	0.015	0.002	0.005	0.011	0.000	0.006	0.003	0.067	0.067	0.000	0.001
Multiplicative Adjustment	0.019	0.001	0.009	0.014	0.001	0.009	0.009	0.067	0.067	0.000	0.002
Multiplicative Adjustment(Cap)	0.044	0.002	0.017	0.033	0.006	0.017	0.005	0.035	0.062	0.004	0.003

Winter Capability Period
All Days
Bias Statistic
All Resources

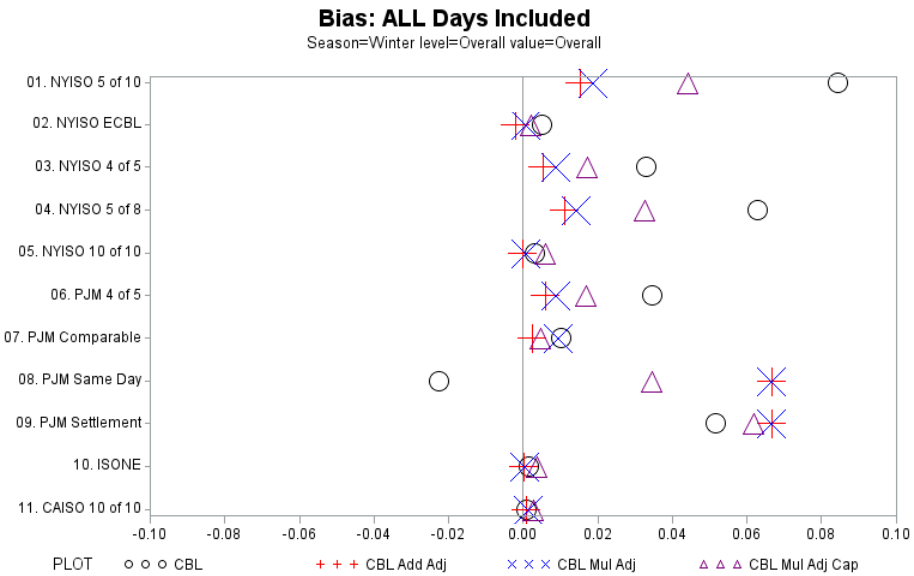
Baseline		Adjustment	Median	Mean	Range	Std Dev.
ISONE		Multiplicative	-	0.003	0.500	0.017
ISONE		Additive	-	0.006	0.870	0.033
NYISO	10 of 10	Additive	-	0.010	2.380	0.081
CAISO	10 of 10	Unadjusted	0.001	0.001	0.360	0.012
CAISO	10 of 10	Additive	0.001	0.008	0.760	0.032
NYISO	10 of 10	Multiplicative	0.001	0.012	1.340	0.066
NYISO	Mid 2 of 10	Multiplicative	0.001	0.016	5.640	0.149
NYISO	Mid 2 of 10	Multi w/Cap	0.002	0.002	0.860	0.043
CAISO	10 of 10	Multiplicative	0.002	0.005	0.820	0.025
NYISO	10 of 10	Unadjusted	0.003	0.037	2.610	0.135
NYISO	4 of 5	Multiplicative	0.009	0.038	8.930	0.279
PJM	Comparable	Multiplicative	0.009	0.148	170.640	4.019

Bias Statistic Results - All Days

Summer



Winter



Variability Statistic Description

- **This statistic measures how well the baseline is at predicting hourly load under many different conditions and across many different customers**
- **Metric: Relative Error Ratio (RER)**
- **The smaller the median RER, the less variable the baseline's error is for the typical customer**
  - ***The better the baseline performs across a wide variety of circumstances***
- **By definition, the Variability statistic is a positive value.**

Variability Statistic Results - All Days

Summer

Summer Capability Period
All Days
Variability
All Resources

Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.205	0.204	0.192	0.200	0.198	0.189	0.172	0.179	0.189	0.199	0.195
Additive Adjustment	0.153	0.165	0.149	0.150	0.145	0.148	0.168	0.205	0.205	0.145	0.146
Multiplicative Adjustment	0.135	0.151	0.135	0.134	0.130	0.135	0.170	0.205	0.205	0.129	0.131
Multiplicative Adjustment(Cap)	0.153	0.159	0.146	0.150	0.147	0.143	0.159	0.189	0.196	0.143	0.143

Summer Capability Period
All Days
Variability Statistic
All Resources

Baseline		Adjustment	Median	Mean	Range	Std Dev.
ISONE		Multiplicative	0.129	0.206	7.330	0.304
NYISO	10 of 10	Multiplicative	0.130	0.216	9.280	0.388
CAISO	10 of 10	Multiplicative	0.131	0.219	14.840	0.456
NYISO	5 of 8	Multiplicative	0.134	0.257	39.390	1.138
PJM	4 of 5	Multiplicative	0.135	0.269	20.270	0.824
NYISO	4 of 5	Multiplicative	0.135	0.299	122.590	2.679
NYISO	5 of 10	Multiplicative	0.135	0.258	39.390	1.128
NYISO	Mid 2 of 10	Multiplicative	0.151	0.360	61.330	1.672
PJM	Comparable	Multiplicative	0.170	1.519	1,181.530	26.145

Winter

Winter Capability Period
All Days
Variability
All Resources

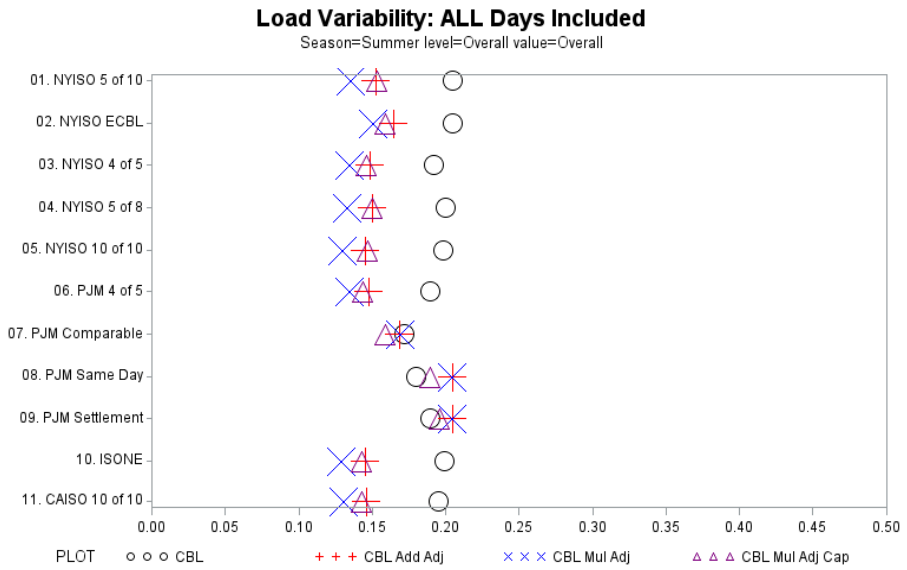
Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.191	0.195	0.182	0.189	0.188	0.180	0.174	0.144	0.155	0.182	0.187
Additive Adjustment	0.141	0.148	0.140	0.140	0.135	0.138	0.158	0.168	0.168	0.132	0.134
Multiplicative Adjustment	0.121	0.138	0.123	0.122	0.118	0.122	0.153	0.168	0.168	0.115	0.117
Multiplicative Adjustment(Cap)	0.144	0.153	0.141	0.142	0.137	0.138	0.155	0.155	0.161	0.131	0.136

Winter Capability Period
All Days
Variability Statistic
All Resources

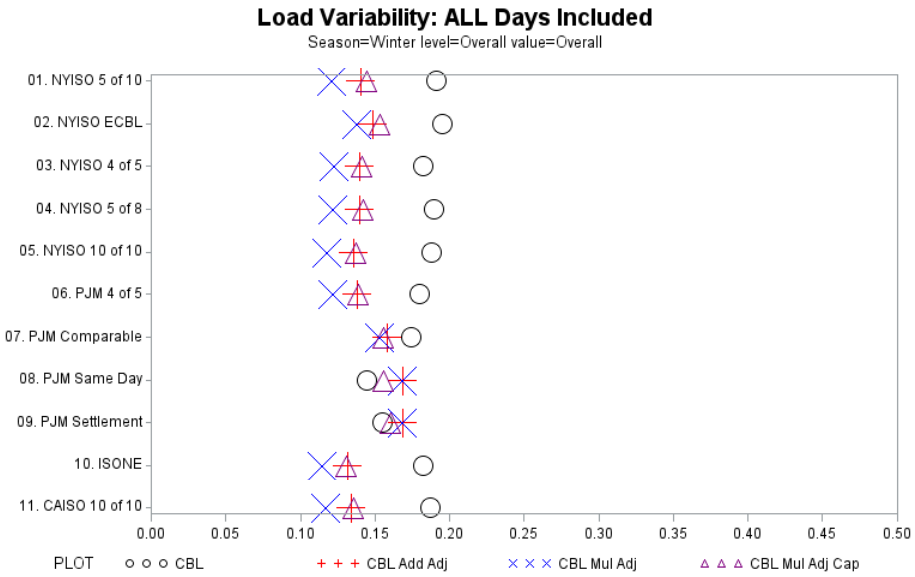
Baseline		Adjustment	Median	Mean	Range	Std Dev.
ISONE		Multiplicative	0.115	0.181	6.270	0.272
CAISO	10 of 10	Multiplicative	0.117	0.188	8.370	0.332
NYISO	10 of 10	Multiplicative	0.118	0.191	10.820	0.371
NYISO	5 of 10	Multiplicative	0.121	0.224	32.350	0.877
NYISO	5 of 8	Multiplicative	0.122	0.221	32.400	0.864
PJM	4 of 5	Multiplicative	0.122	0.215	10.340	0.468
NYISO	4 of 5	Multiplicative	0.123	0.308	155.270	3.727
NYISO	Mid 2 of 10	Multiplicative	0.138	0.297	75.070	1.921
PJM	Comparable	Multiplicative	0.153	1.206	1,367.830	32.243

Variability Statistic Results - All Days

Summer



Winter



All Resources
Event Like Days

Accuracy Statistic Results - Event Like Days

Summer

Summer Capability Period
Peak Like Days
Accuracy
All Resources

Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.188	0.202	0.183	0.186	0.219	0.160	0.159	0.215	0.197	0.217	0.194
Additive Adjustment	0.140	0.146	0.134	0.138	0.136	0.129	0.169	0.225	0.225	0.134	0.132
Multiplicative Adjustment	0.129	0.138	0.125	0.128	0.124	0.123	0.164	0.225	0.225	0.123	0.122
Multiplicative Adjustment(Cap)	0.141	0.147	0.135	0.141	0.149	0.126	0.159	0.208	0.212	0.144	0.135

Summer Capability Period
Event Like Days
Accuracy Statistic
All Resources

Baseline		Adjustment	Median	Mean	Range	Std Dev.
CAISO	10 of 10	Multiplicative	0.122	0.202	17.910	0.465
ISONE		Multiplicative	0.123	0.195	12.450	0.351
PJM	4 of 5	Multiplicative	0.123	0.224	17.870	0.645
NYISO	10 of 10	Multiplicative	0.124	0.204	25.500	0.605
NYISO	4 of 5	Multiplicative	0.125	0.216	24.120	0.597
PJM	4 of 5	Multi w/Cap	0.126	0.200	12.810	0.354
NYISO	5 of 8	Multiplicative	0.128	0.217	26.300	0.630
PJM	4 of 5	Additive	0.129	0.217	22.810	0.545
NYISO	5 of 10	Multiplicative	0.129	0.219	26.300	0.631
CAISO	10 of 10	Additive	0.132	0.217	22.650	0.534
NYISO	4 of 5	Additive	0.134	0.219	23.250	0.539
ISONE		Additive	0.134	0.220	22.330	0.528
CAISO	10 of 10	Multi w/Cap	0.135	0.201	9.180	0.287
NYISO	4 of 5	Multi w/Cap	0.135	0.247	30.150	0.853
NYISO	10 of 10	Additive	0.136	0.218	23.640	0.555
NYISO	5 of 8	Additive	0.138	0.224	24.670	0.578
NYISO	Mid 2 of 10	Multiplicative	0.138	0.271	34.390	1.050
NYISO	5 of 10	Additive	0.140	0.228	24.680	0.579
NYISO	5 of 8	Multi w/Cap	0.141	0.258	30.440	0.943
NYISO	5 of 10	Multi w/Cap	0.141	0.264	30.440	0.945
NYISO	Mid 2 of 10	Additive	0.146	0.238	23.370	0.555
NYISO	10 of 10	Multi w/Cap	0.149	0.248	29.020	0.888
PJM	Comparable	Multiplicative	0.164	0.484	129.020	3.799

Winter

Winter Capability Period
Peak Like Days
Accuracy
All Resources

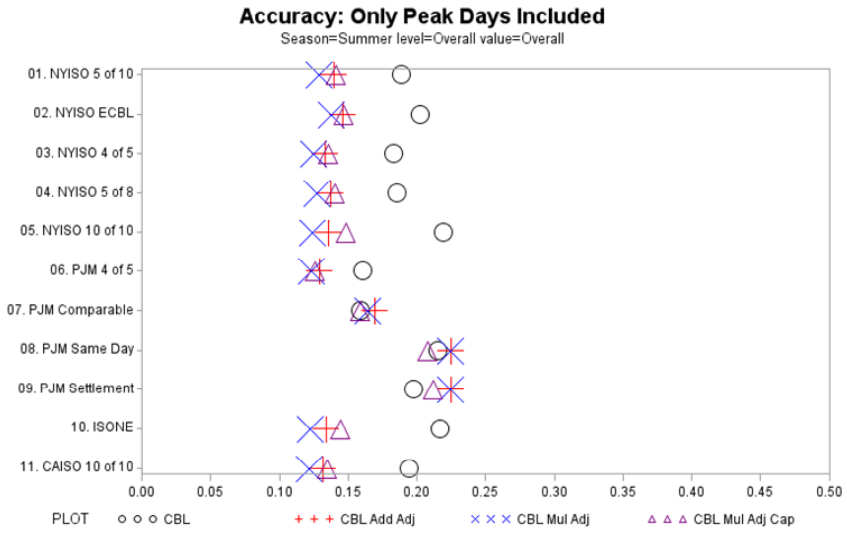
Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.115	0.155	0.143	0.127	0.143	0.139	0.178	0.152	0.158	0.158	0.166
Additive Adjustment	0.094	0.115	0.107	0.097	0.099	0.107	0.125	0.182	0.182	0.097	0.102
Multiplicative Adjustment	0.088	0.110	0.102	0.090	0.089	0.103	0.129	0.182	0.182	0.085	0.092
Multiplicative Adjustment(Cap)	0.092	0.123	0.110	0.096	0.099	0.109	0.151	0.171	0.175	0.100	0.112

Winter Capability Period
Event Like Days
Accuracy Statistic
All Resources
Overall

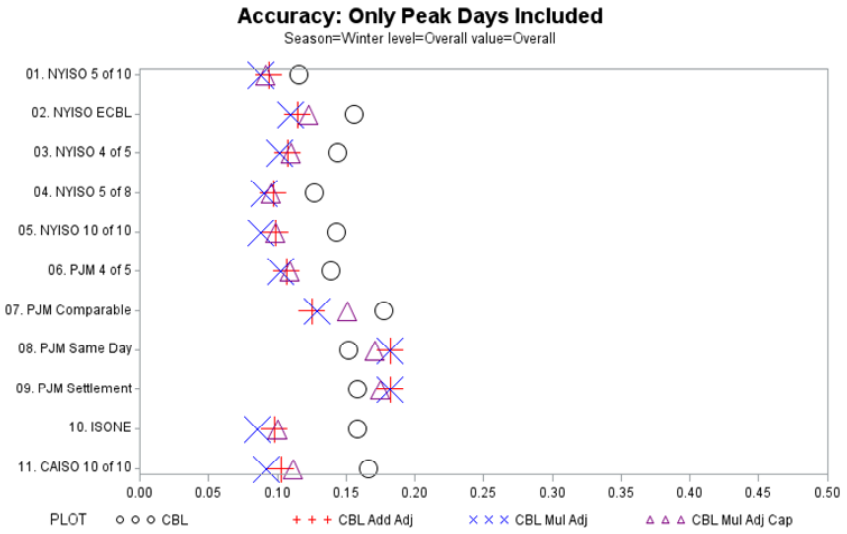
Baseline		Adjustment	Median	Mean	Range	Std Dev.
ISONE		Multiplicative	0.085	0.137	2.190	0.178
NYISO	5 of 10	Multiplicative	0.088	0.153	4.080	0.248
NYISO	10 of 10	Multiplicative	0.089	0.139	2.200	0.180
NYISO	5 of 8	Multiplicative	0.090	0.153	4.080	0.249
NYISO	5 of 10	Multi w/Cap	0.092	0.162	12.320	0.404
CAISO	10 of 10	Multiplicative	0.092	0.144	2.470	0.185
NYISO	5 of 10	Additive	0.094	0.157	8.760	0.286
NYISO	5 of 8	Multi w/Cap	0.096	0.163	12.320	0.401
NYISO	5 of 8	Additive	0.097	0.159	8.760	0.285
NYISO	10 of 10	Multi w/Cap	0.099	0.156	11.410	0.357

Accuracy Statistic Results - Event Like Days

Summer



Winter



Bias Statistic Results - Event Like Days

Summer

Summer Capability Period
Event Like Days
Summer
All Resources

Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.026	0.081	0.053	0.036	0.091	0.050	0.025	0.045	0.065	0.097	0.083
Additive Adjustment	0.002	0.007	0.004	0.001	0.012	0.003	0.003	0.042	0.042	0.010	0.005
Multiplicative Adjustment	0.006	0.006	0.002	0.004	0.013	0.004	0.002	0.042	0.042	0.010	0.007
Multiplicative Adjustment(Cap)	0.012	0.020	0.005	0.007	0.021	0.003	0.004	0.000	0.039	0.023	0.018

Summer Capability Period
Event Like
Bias Statistic
All Resources

Baseline		Adjustment	Median	Mean	Range	Std Dev.
PJM	Same Day	Multi w/Cap	-	0.056	5.880	0.246
NYISO	5 of 8	Additive	0.001	0.031	23.630	0.516
NYISO	4 of 5	Multiplicative	(0.002)	0.032	24.200	0.520
NYISO	5 of 10	Additive	0.002	0.033	23.630	0.517
PJM	Comparable	Multiplicative	0.002	0.078	38.440	1.059
PJM	Comparable	Additive	(0.003)	0.009	8.130	0.188
PJM	4 of 5	Multi w/Cap	(0.003)	0.009	6.050	0.157
PJM	4 of 5	Additive	0.003	0.024	8.570	0.210
PJM	Comparable	Multi w/Cap	(0.004)	(0.006)	1.110	0.060
NYISO	4 of 5	Additive	(0.004)	0.022	23.210	0.494
PJM	4 of 5	Multiplicative	0.004	0.026	6.320	0.210
NYISO	5 of 8	Multiplicative	0.004	0.042	26.200	0.567
CAISO	10 of 10	Additive	(0.005)	0.012	7.800	0.188
NYISO	4 of 5	Multi w/Cap	(0.005)	0.055	24.030	0.691
NYISO	Mid 2 of 10	Multiplicative	(0.006)	0.020	10.410	0.295
NYISO	5 of 10	Multiplicative	0.006	0.047	26.200	0.568
CAISO	10 of 10	Multiplicative	(0.007)	0.003	5.840	0.152
NYISO	Mid 2 of 10	Additive	(0.007)	0.010	9.420	0.221
NYISO	5 of 8	Multi w/Cap	0.007	0.077	29.370	0.786
ISONE		Additive	(0.010)	0.002	7.360	0.187
NYISO	10 of 10	Additive	(0.012)	0.012	22.880	0.502

Winter

Winter Capability Period
Event Like Days
Bias
All Resources

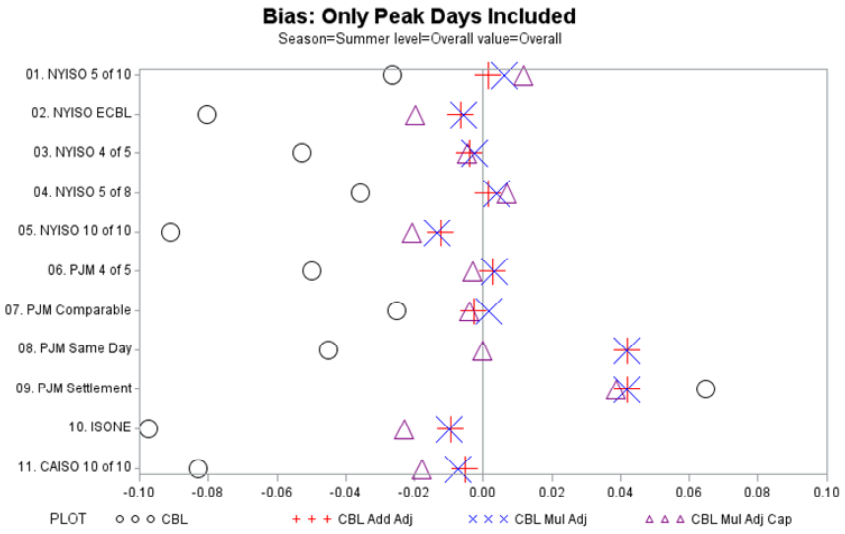
Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.010	0.059	0.028	0.007	0.049	0.033	0.053	0.028	0.042	0.077	0.073
Additive Adjustment	0.011	0.005	0.011	0.012	0.005	0.011	0.014	0.061	0.061	0.008	0.008
Multiplicative Adjustment	0.010	0.002	0.009	0.009	0.000	0.009	0.016	0.061	0.061	0.000	0.001
Multiplicative Adjustment(Cap)	0.011	0.022	0.005	0.005	0.009	0.008	0.021	0.030	0.055	0.015	0.020

Winter Capability Period
Event Like
Bias Statistic
All Resources
Overall

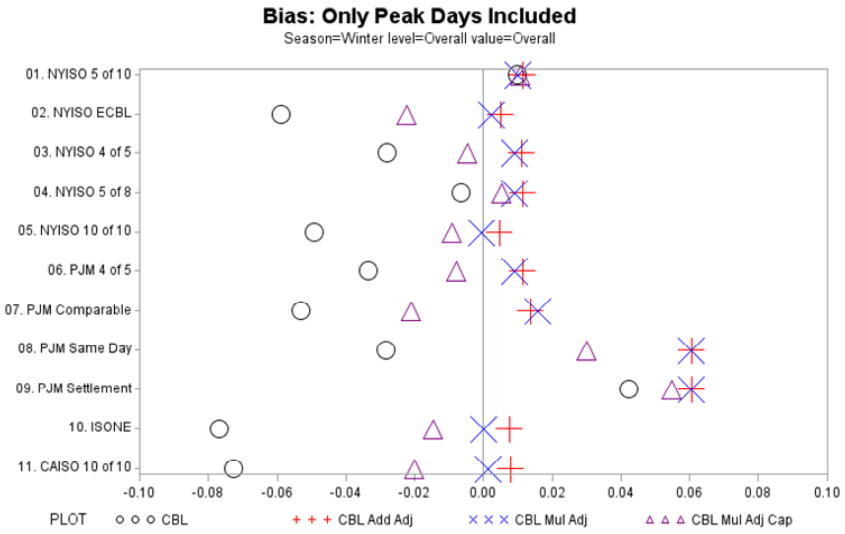
Baseline		Adjustment	Median	Mean	Range	Std Dev.
ISONE		Multiplicative	-	-	1.290	0.070
NYISO	10 of 10	Multiplicative	-	0.005	1.510	0.090
CAISO	10 of 10	Multiplicative	0.001	0.003	1.310	0.076
NYISO	Mid 2 of 10	Multiplicative	0.002	0.016	2.670	0.130
NYISO	4 of 5	Multi w/Cap	(0.005)	0.014	8.870	0.280
NYISO	10 of 10	Additive	0.005	0.016	2.780	0.117
NYISO	Mid 2 of 10	Additive	0.005	0.018	1.680	0.104
NYISO	5 of 8	Multi w/Cap	0.005	0.036	12.560	0.348
NYISO	5 of 8	Unadjusted	(0.007)	0.027	15.990	0.446
NYISO	10 of 10	Multi w/Cap	(0.009)	0.002	11.710	0.316
NYISO	5 of 10	Unadjusted	0.010	0.051	15.980	0.447
NYISO	5 of 10	Multi w/Cap	0.011	0.049	12.550	0.350

Bias Statistic Results - Event Like Days

Summer



Winter



Variability Statistic Results - Event Like Days

Summer

Summer Capability Period
Event Like Days
Variability Statistic
All Resources

Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.151	0.151	0.135	0.148	0.148	0.126	0.153	0.163	0.168	0.147	0.144
Additive Adjustment	0.131	0.139	0.127	0.130	0.126	0.124	0.167	0.183	0.183	0.126	0.125
Multiplicative Adjustment	0.122	0.132	0.119	0.120	0.115	0.119	0.162	0.183	0.183	0.115	0.116
Multiplicative Adjustment(Cap)	0.131	0.136	0.124	0.128	0.127	0.118	0.157	0.171	0.175	0.129	0.123

Summer Capability Period
Event Like Days
Accuracy Statistic
All Resources

Baseline		Adjustment	Median	Mean	Range	Std Dev.
NYISO	10 of 10	Multiplicative	0.115	0.181	7.260	0.273
ISONE		Multiplicative	0.115	0.186	12.120	0.339
CAISO	10 of 10	Multiplicative	0.116	0.195	17.350	0.448
PJM	4 of 5	Multi w/Cap	0.118	0.190	11.750	0.327
PJM	4 of 5	Multiplicative	0.119	0.215	17.150	0.619
NYISO	4 of 5	Multiplicative	0.119	0.195	8.340	0.313
NYISO	5 of 8	Multiplicative	0.120	0.193	6.750	0.301
NYISO	5 of 10	Multiplicative	0.122	0.194	6.760	0.303
CAISO	10 of 10	Multi w/Cap	0.123	0.190	8.150	0.265
PJM	4 of 5	Additive	0.124	0.207	21.570	0.513
NYISO	4 of 5	Multi w/Cap	0.124	0.211	22.080	0.523
CAISO	10 of 10	Additive	0.125	0.207	21.680	0.510
PJM	4 of 5	Unadjusted	0.126	0.207	14.820	0.385
NYISO	10 of 10	Additive	0.126	0.193	8.340	0.269
ISONE		Additive	0.126	0.206	21.480	0.505
NYISO	4 of 5	Additive	0.127	0.196	5.890	0.241
NYISO	10 of 10	Multi w/Cap	0.127	0.207	21.490	0.518
NYISO	5 of 8	Multi w/Cap	0.128	0.216	22.320	0.547
NYISO	5 of 10	Multi w/Cap	0.131	0.219	22.320	0.548
NYISO	Mid 2 of 10	Multiplicative	0.132	0.261	33.310	1.020
NYISO	4 of 5	Unadjusted	0.135	0.242	27.690	0.644
PJM	Comparable	Multiplicative	0.162	0.473	124.440	3.684

Winter

Winter Capability Period
Event Like Days
Variability Statistic
All Resources

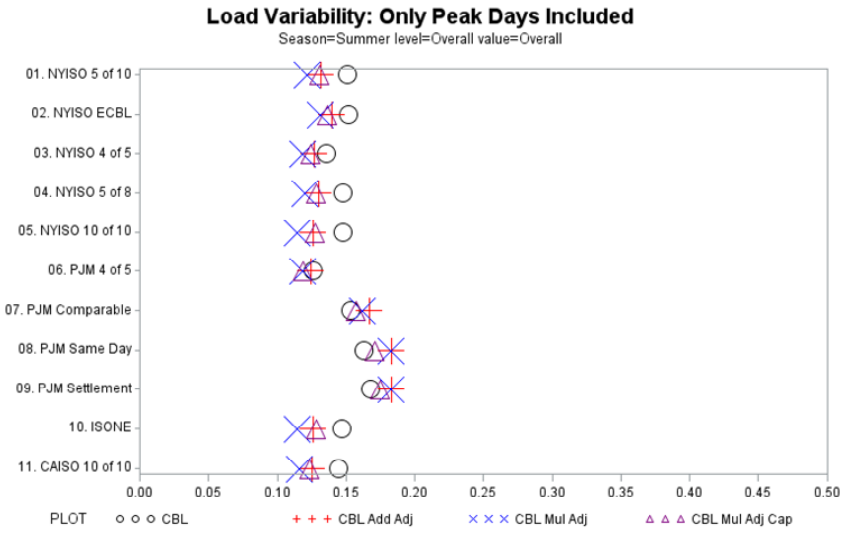
Baseline Type	NYISO 5 of 10	NYISO M2 of 10	NYISO 4 of 5	NYISO 5 of 8	NYISO 10 of 10	PJM 4 of 5	PJM Comparable	PJM Same Day	PJM Settlement	ISONE	CAISO 10 of 10
Unadjusted Baseline	0.090	0.121	0.114	0.100	0.100	0.117	0.162	0.119	0.124	0.102	0.117
Additive Adjustment	0.087	0.104	0.098	0.089	0.088	0.099	0.122	0.134	0.134	0.088	0.094
Multiplicative Adjustment	0.082	0.102	0.093	0.084	0.083	0.096	0.125	0.134	0.134	0.079	0.086
Multiplicative Adjustment(Cap)	0.085	0.111	0.100	0.088	0.087	0.101	0.144	0.129	0.129	0.087	0.099

Winter Capability Period
Event Like Days
Variability Statistic
Overall
Overall

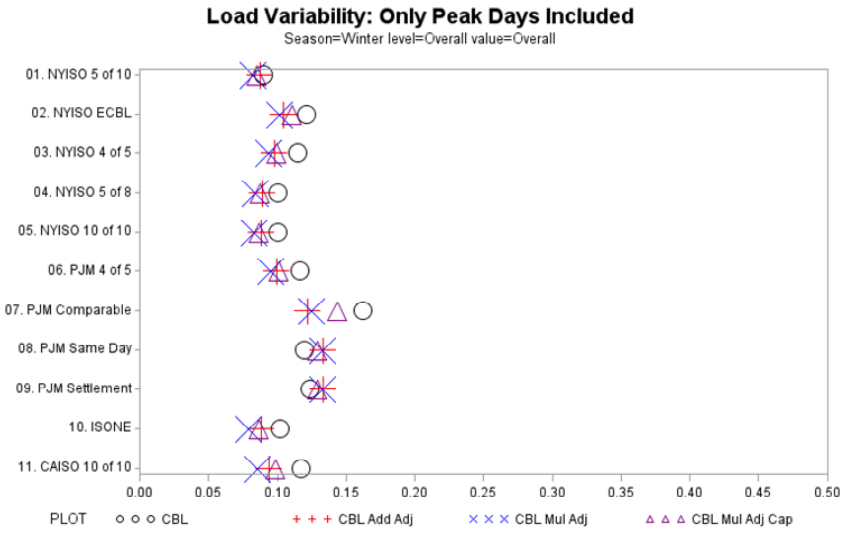
Baseline		Adjustment	Median	Mean	Range	Std Dev.
ISONE		Multiplicative	0.079	0.129	2.220	0.174
NYISO	5 of 10	Multiplicative	0.082	0.139	3.270	0.215
NYISO	10 of 10	Multiplicative	0.083	0.130	2.110	0.167
NYISO	5 of 8	Multiplicative	0.084	0.140	3.270	0.217
NYISO	5 of 10	Multi w/Cap	0.085	0.137	5.870	0.219
CAISO	10 of 10	Multiplicative	0.086	0.136	2.350	0.179
ISONE		Multi w/Cap	0.087	0.132	2.060	0.158
NYISO	10 of 10	Multi w/Cap	0.087	0.134	4.700	0.191
NYISO	5 of 10	Additive	0.087	0.142	7.020	0.239
NYISO	5 of 8	Multi w/Cap	0.088	0.139	5.880	0.220
ISONE		Additive	0.088	0.143	2.880	0.193
NYISO	10 of 10	Additive	0.088	0.138	3.250	0.179
NYISO	5 of 8	Additive	0.089	0.144	7.020	0.240
NYISO	5 of 10	Unadjusted	0.090	0.151	7.470	0.261

Variability Statistic Results - Event Like Days

Summer



Winter



All Resources Observations - Accuracy

- **From the All days and Event Like days accuracy analyses, 51 baselines were identified as having high levels of accuracy**
- **All of these baselines used an adjustment**
  - ***The most common adjustment was Multiplicative (32 of 51)***
- **Three variants of the NYISO's current effective CBL - NYISO 10 of 10, NYISO 5 of 10 and NYISO 5 of 8 - were the most frequently identified baselines (8)**
- **The following baselines were identified as highly accurate across seasons for each segment analyzed:**
  - ***CAISO 10 of 10 Multiplicative***
  - ***ISONE Multiplicative***
  - ***NYISO 10 of 10 Multiplicative***
  - ***NYISO 5 of 10 Multiplicative***
  - ***NYISO 5 of 8 Multiplicative***

All Resources Observations - Bias

- **From the All days and Event Like days accuracy analyses, 64 baselines were identified as having the least bias**
- **Of these all but seven used an adjustment**
  - ***The most common adjustment was the Multiplicative (22)***
- **The NYISO 10 of 10 was the most frequently identified baseline (13)**
- **The following baselines were identified with the least overall bias, in across every season for each segment analyzed:**
  - ***NYISO 10 of 10 Additive***
  - ***NYISO 10 of 10 Multiplicative***
  - ***NYISO Mid 2 of 10 Multiplicative***

All Resources Observations - Variability

- **From the All days and Event Like days accuracy analyses, 54 baselines were identified as having the least variability**
- **All baselines identified used an adjustment.**
  - ***The most common adjustment was multiplicative (32)***
- **The NYISO 5 of 10 and the NYISO 10 of 10 were the most frequently identified baselines (8)**
- **The following baselines were identified across seasons for each segment analyzed:**
  - ***CAISO 10 of 10 Multiplicative***
  - ***ISONE Multiplicative***
  - ***NYISO 10 of 10 Multiplicative***
  - ***NYISO 5 of 10 Multiplicative***
  - ***NYISO 5 of 8 Multiplicative***

Summary Of CBL Results - Accuracy

- 44 combinations of baselines tested in 10 different ways.
- Where checkmark is indicated, the CBL was a high performer in each of the four capability periods or seasons of the study.
- Baselines/adjustment combinations with statistically significant results (26) were identified.
- Those with >90% accuracy (6) are shown in yellow.
- Three (3) variations of existing NYISO CBL were top performers.

BaseLine		Adjustment	All Resources	Not Highly Variable	Up to 100 kW	Between 100 kW and 1000 kW	Greater than 1000 kW	Non-Weather Sensitive	Weather Sensitive	Low Variability	Medium Varaibility	High Varibility	Pct Of Best
CAISO	10 of 10	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
ISONE		Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	10 of 10	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	5 of 10	Multiplicative	√		√	√	√	√	√			√	93%
NYISO	5 of 8	Multiplicative	√		√	√	√	√	√	√		√	93%
NYISO	4 of 5	Multiplicative				√	√	√	√	√		√	85%
PJM	Comparable	Multiplicative				√	√	√	√				80%
PJM	4 of 5	Multiplicative				√	√			√			78%
NYISO	Mid 2 of 10	Multiplicative					√						70%
ISONE		Additive		√		√	√			√			68%
NYISO	10 of 10	Additive				√	√			√			68%
CAISO	10 of 10	Additive				√	√			√			60%
NYISO	10 of 10	Multi w/Cap				√	√			√			58%
NYISO	5 of 8	Additive					√			√			55%
CAISO	10 of 10	Multi w/Cap					√			√			53%
ISONE		Multi w/Cap				√	√			√			53%
NYISO	5 of 8	Multi w/Cap					√			√			53%
NYISO	5 of 10	Multi w/Cap					√						50%
PJM	4 of 5	Multi w/Cap					√			√			50%
NYISO	4 of 5	Additive					√			√			48%
NYISO	5 of 10	Additive					√						48%
PJM	4 of 5	Additive					√			√			48%
NYISO	4 of 5	Multi w/Cap					√			√			43%
NYISO	Mid 2 of 10	Additive					√						28%
NYISO	Mid 2 of 10	Multi w/Cap					√						18%
PJM	Comparable	Additive					√						15%

Candidate Energy Baselines Based on All Resources, Best Accuracies

BaseLine		Adjustment	Summer			Winter		
			Accuracy	Bias	Varibility	Accuracy	Bias	Varibility
NYISO	10 of 10	Multiplicative	0.130	0.001	0.130	0.117	0.001	0.118
NYISO	5 of 10	Multiplicative	0.138	0.020	0.135	0.123	0.019	0.121
NYISO	5 of 8	Multiplicative	0.135	0.016	0.134	0.125	0.014	0.122

- **ISO New England CBL**
  - ***Operationally intensive***
  - ***Difficult for the NYISO and MPs to administer/manage***
  - ***Therefore, was not considered as a candidate CBL***
- **CAISO CBL**
  - ***Consistent with the PJM study, only major attributes were modeled by KEMA.***
  - ***NYISO 10 of 10 CBL, which was in the top 5 best CBLs, has similar rules and was studied with all the attributes and hence was considered as a candidate CBL.***

In-Day Adjustment Mechanism

- **Candidate energy baselines are more accurate with a multiplicative adjustment**
- **Candidate energy baselines were analyzed to determine the magnitude and distribution of adjustments used**
  - ***To compare with the current in-day adjustment cap***

In-day Adjustment Cap

Magnitude and Distribution

- **Table shows the distribution and value of the in-day adjustment from the analysis, for the candidate energy baselines.**
- **Approximately 95% of the adjustments used in the analysis would be captured by the current +/- 20% cap.**
- **Approximately 99% of the adjustments used in the study would be captured by an adjustment cap of +/- 50%, or 0.5 to 1.5.**

Distribution Statistic	NYISO 10 of 10	NYISO 5 of 10	NYISO 5 of 8
100% Max	56.46	315.00	315.00
99%	1.68	1.53	1.57
95%	1.30	1.20	1.22
90%	1.19	1.11	1.13
75% Q3	1.07	1.03	1.04
50% Median	1.00	0.97	0.98
25% Q1	0.92	0.88	0.89
10%	0.76	0.70	0.72
5%	0.56	0.50	0.52
1%	0.17	0.16	0.16
0% Min	0.00	0.00	0.00
Mean	0.99	0.95	0.95
Std Dev	0.28	0.48	0.48

Comparison to the PJM Empirical Analysis of Demand Response Baseline Methods

Comparison to the PJM Empirical Analysis of Demand Response Baseline Methods (Continued)

- **NYISO demand values are based on ICAP. PJM demand values are based on peak load contribution (PLC)**
- **In the NYISO study, seven of the eleven PJM candidate baselines were utilized**
  - ***The NYISO study modelled all the attributes of the NYISO 5 of 10 baseline to reflect all NYISO CBL calculation rules***
  - ***Added three variants of the NYISO CBL to the study, as well as ECBL used for Order 745***
  - ***Final study included 5 NYISO baseline variants, 6 other baselines from other ISOs/RTOs***
- **The PJM analysis included three same day adjustments: load-based multiplicative (uncapped-ratio), additive adjustments, as well as a regression-based adjustment based on the PJM alternative weather sensitive adjustment**
  - ***For the NYISO analysis, the regression adjustment was replaced by a multiplicative variant that featured a cap and floor (0.8 to 1.2)***

Comparison to the PJM Empirical Analysis of Demand Response Baseline Methods (Continued)

- **The NYISO baseline analysis used the same statistics (Accuracy, Variability and Bias) developed for the PJM Analysis.**
- **The NYISO high variability load represented 28% of the resources, and 8% of the total ICAP. The PJM high variability load represented 20% of the resources.**
- **Both studies categorized loads based on size:**
  - ***NYSO categories were: Up to 100 kW, 100 kW to 1 MW, Greater than 1 MW***
  - ***PJM categories were: Up to 500 kW, 500 kW to 2 MW, Greater than 2 MW***

Comparison to the PJM Empirical Analysis of Demand Response Baseline Methods (Continued)

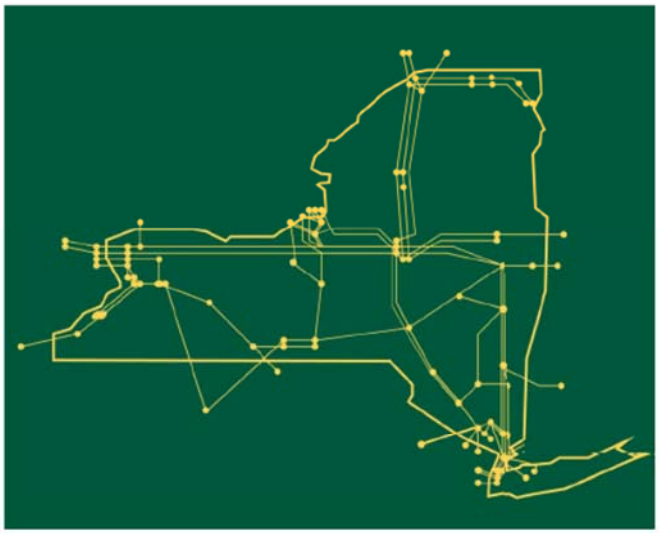
- **Conclusions**
  - ***NYISO's analysis builds on the experience afforded by and approach developed for the "PJM Empirical Analysis of Demand Response Baseline Methods" and was adapted for the NYISO situation, goals and objectives***
  - ***As a result of the fundamental differences in analysis details, the PJM results are not directly comparable to the NYISO results***

Next Steps

- **Complete remaining tasks of the Baseline Study**
- **Stakeholder Presentations**
  - ***ACL results to PRLWG/ICAPWG on December 10, 2013***
  - ***Summary CBL and ACL results to BIC on December 11, 2013***
- **Complete Overall Report and Recommendations**
- **2014 Project**
  - ***NYISO Management Response to SCR Baseline Study***

Questions

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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NYISO SCR Baseline Study Analysis

ACL Results

Roger Kirkpatrick
Market Product Specialist
Demand Response Products
New York Independent System Operator

Timothy Hennessy
Senior Principal, Sustainable Use Consulting
DNV KEMA Energy & Sustainability

Joint PRLWG/ICAPWG

December 10, 2013

DRAFT – FOR DISCUSSION PURPOSES ONLY

Topics

- **Follow up on CBL items requested**
- **Objectives of ACL study (Task 2)**
- **Results of ACL study**
- **Results of CBL and ACL Analysis (Task 3)**
- **Next Steps**

CBL Presentation Follow-Up

Peak Like Day Selection

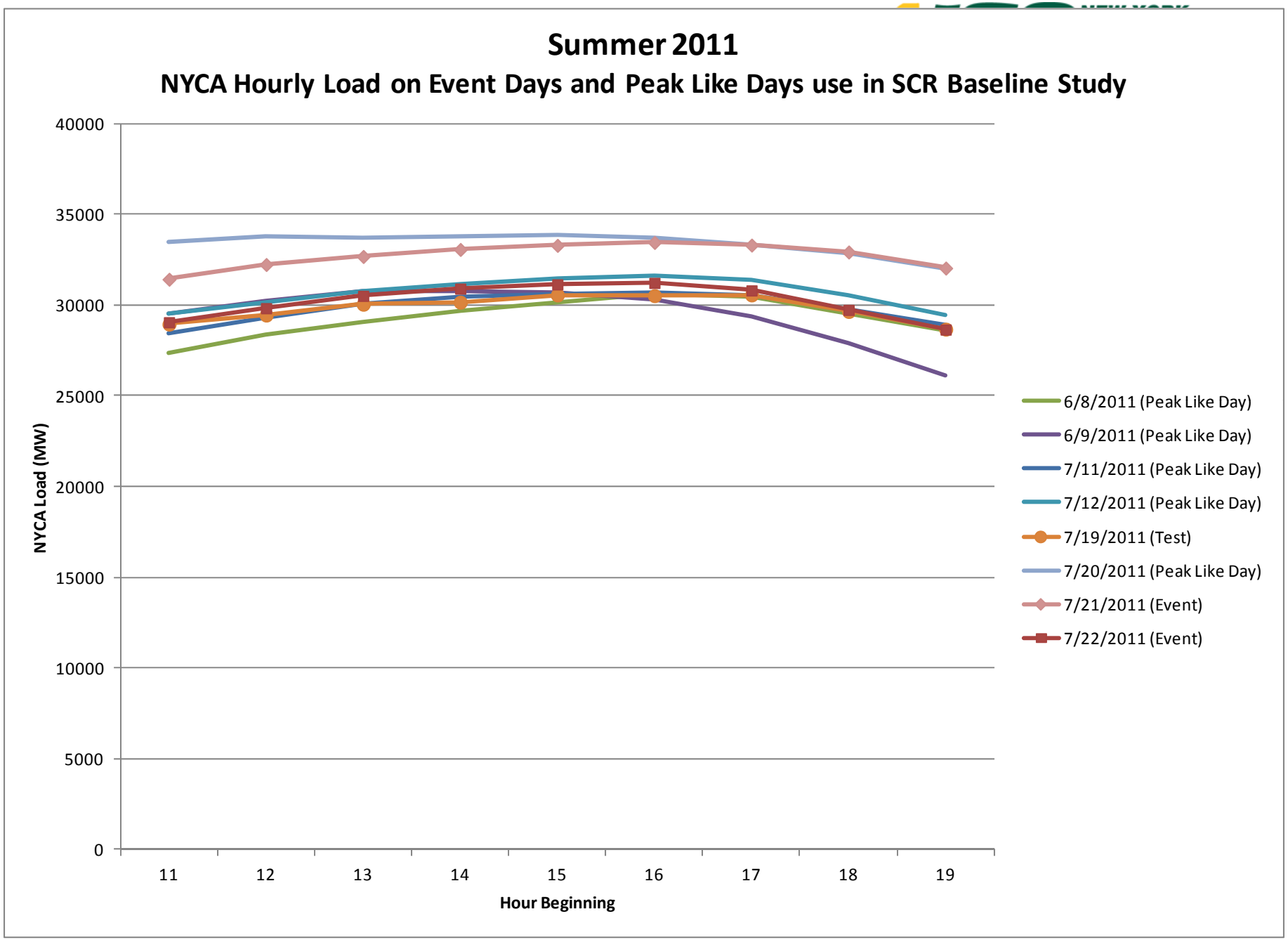
Stakeholder Comments

- **Peak Like Day Selection**
  - ***Identify other days that were part of candidate list that were not selected***
    - **Slides 5, 8**
  - ***How did system conditions used to identify pseudo-events compare with actual events?***
    - **Slides 6, 7, 9, 10**
  - ***Consideration of conditions that actually warranted Winter events – lower loads during a spring heat wave coupled with significant generation and transmission maintenance***
    - **Slide 11**

Summer Peak Like Days

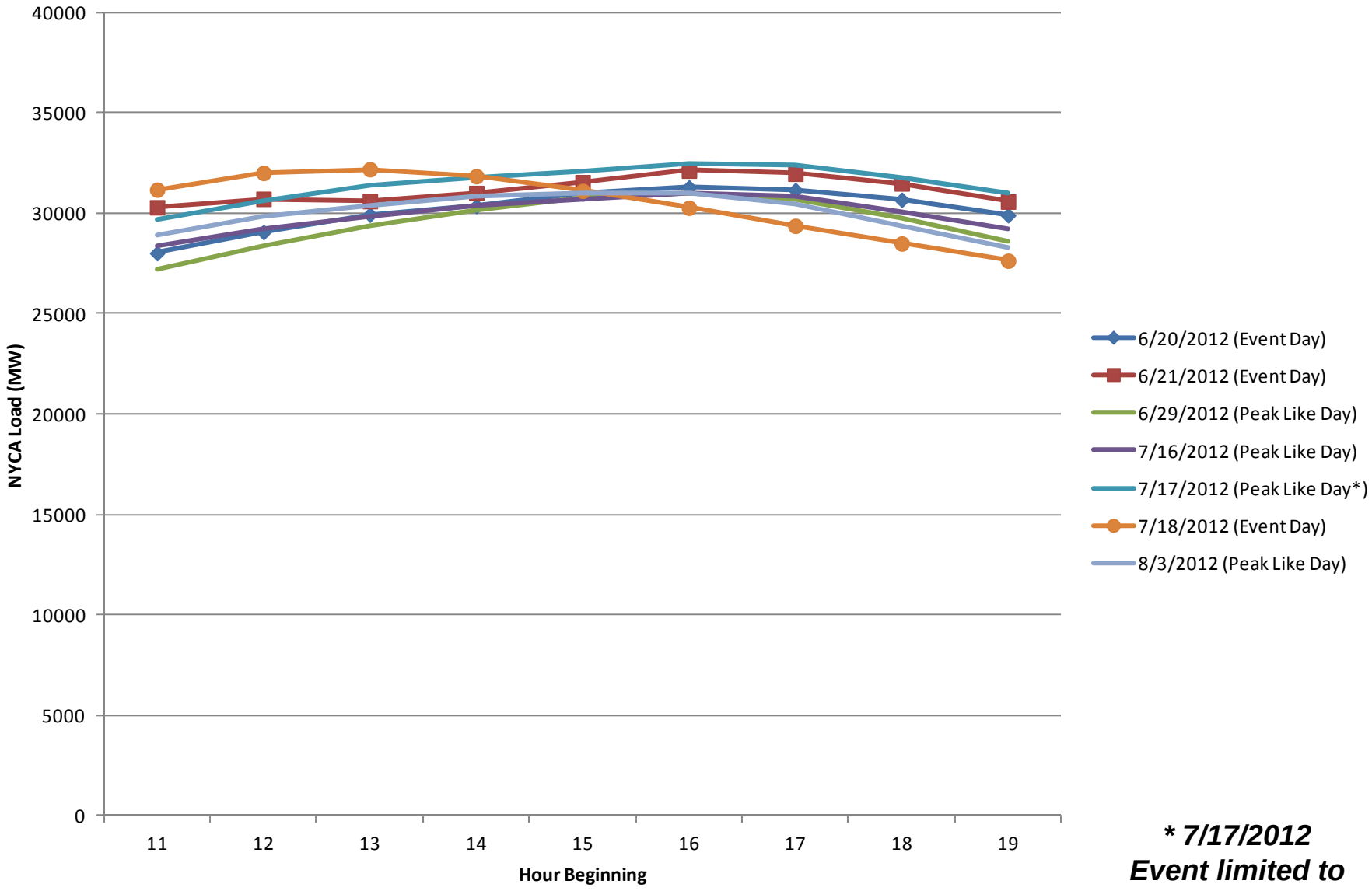
Summer 2011 19 Days met NYISO's Load Forecasting Criteria for Peak Like Day			
Date	Max NYCA Load	Any SCR Load Zone Peak Hours	Reason(s) Excluded
7/22/2011	33865.6	Y	Event Day
7/21/2011	33454.2	Y	Event Day
7/12/2011	**31623.7**	**Y**	
7/20/2011	**31224.2**	**Y**	
6/9/2011	**30775.4**	**Y**	
7/11/2011	**30717.8**	**Y**	
6/8/2011	**30603.5**	**Y**	
7/19/2011	30562.2	Y	Event Day (test)
7/23/2011	30420.8	Y	Weekend, Max NYCA Load Below 30,600
8/1/2011	30404.1	Y	Max NYCA Load Below 30,600
7/18/2011	30038.9	Y	Max NYCA Load Below 30,600
8/8/2011	29508.9	N	Max NYCA Load Below 30,600
8/2/2011	28908	N	Max NYCA Load Below 30,600
7/6/2011	28713.8	N	Max NYCA Load Below 30,600
7/24/2011	27242.9	N	Weekend, Max NYCA Load Below 30,600
7/17/2011	26558.5	N	Weekend, Max NYCA Load Below 30,600
8/7/2011	26551.4	N	Weekend, Max NYCA Load Below 30,600
7/30/2011	25986.8	N	Weekend, Max NYCA Load Below 30,600
7/31/2011	25831.6	N	Weekend, Max NYCA Load Below 30,600

Summer 2012 24 Days met NYISO's Load Forecasting Criteria for Peak Like Day			
Date	Max NYCA Load	Any SCR Load Zone Peak Hours	Reason(s) Excluded
7/17/2012	**32438.7**	**Y**	
7/18/2012	32192.2	Y	Event Day
6/21/2012	32127.8	Y	Event Day
6/20/2012	31295.9	Y	Event Day
8/3/2012	**30989.3**	**Y**	
6/29/2012	**30981.5**	**Y**	
7/16/2012	**30976.6**	**Y**	
7/6/2012	30562.6	Y	Max NYCA Load Below 30,600
7/5/2012	30518.4	Y	Max NYCA Load Below 30,600
7/24/2012	30131.6	Y	Max NYCA Load Below 30,600
6/22/2012	29932.4	N	Event Day, Max NYCA Load Below 30,600
7/26/2012	29096.3	N	Max NYCA Load Below 30,600
8/4/2012	28927.7	N	Weekend, Max NYCA Load Below 30,600
7/13/2012	28849.6	N	Max NYCA Load Below 30,600
7/27/2012	28660	N	Max NYCA Load Below 30,600
5/29/2012	28242.1	N	Max NYCA Load Below 30,600
8/5/2012	27667.2	N	Weekend, Max NYCA Load Below 30,600
7/7/2012	27474.3	N	Weekend, Max NYCA Load Below 30,600
6/30/2012	27321.8	N	Weekend, Max NYCA Load Below 30,600
7/4/2012	27096.5	N	Max NYCA Load Below 30,600
7/1/2012	26974.1	N	Weekend, Max NYCA Load Below 30,600
7/8/2012	26405.5	N	Weekend, Max NYCA Load Below 30,600
7/14/2012	26071.1	N	Weekend, Max NYCA Load Below 30,600
7/15/2012	25817	N	Weekend, Max NYCA Load Below 30,600



Summer 2012

NYCA Hourly Load on Event Days and Peak Like Days use in SCR Baseline Study



**** 7/17/2012 Event limited to Zone B***

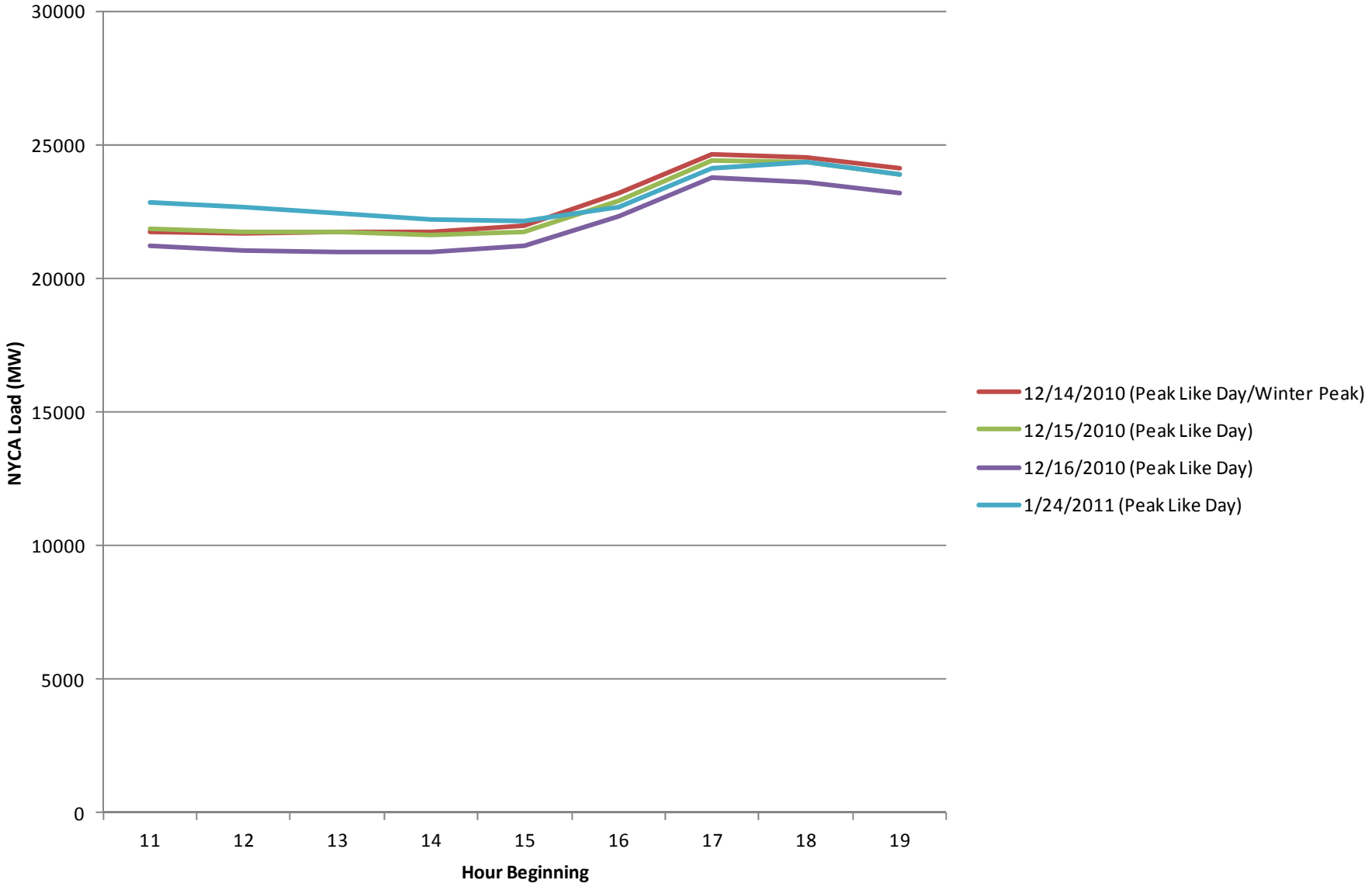
Winter Peak Like Days

Winter 2010-2011 17 Days included in SCR Load Zone Peak Hours			
Date	Max NYCA Load	Any SCR Load Zone Peak Hours	Reason(s) Excluded
12/14/2010	**24653.7**	**Y**	
12/15/2010	**24400.8**	**Y**	
1/24/2011	**24341.6**	**Y**	
12/16/2010	**23756.1**	**Y**	
12/20/2010	23693.8	Y	Max NYCA Load Below 23,750
12/21/2010	23469.6	Y	Max NYCA Load Below 23,750
1/12/2011	23448.3	Y	Max NYCA Load Below 23,750
2/1/2011	23442.9	Y	Max NYCA Load Below 23,750
1/13/2011	23441.4	Y	Max NYCA Load Below 23,750
12/22/2010	23319.9	Y	Max NYCA Load Below 23,750
2/8/2011	23171.8	Y	Max NYCA Load Below 23,750
2/9/2011	23166.6	Y	Max NYCA Load Below 23,750
2/10/2011	23154	Y	Max NYCA Load Below 23,750
1/31/2011	23152.1	Y	Max NYCA Load Below 23,750
12/27/2010	23149.5	Y	Max NYCA Load Below 23,750
1/10/2011	23107.3	Y	Max NYCA Load Below 23,750
1/11/2011	23087.6	Y	Max NYCA Load Below 23,750

Winter 2011-2012 17 Days included in SCR Load Zone Peak Hours			
Date	Max NYCA Load	Any SCR Load Zone Peak Hours	Reason(s) Excluded
1/3/2012	**23900.9**	**Y**	
1/4/2012	**23811.6**	**Y**	
1/19/2012	23119.9	Y	Max NYCA Load Below 23,750
12/19/2011	22879.7	Y	Max NYCA Load Below 23,750
1/5/2012	22754.6	Y	Max NYCA Load Below 23,750
1/20/2012	22577.4	Y	Max NYCA Load Below 23,750
1/13/2012	22563	Y	Max NYCA Load Below 23,750
12/20/2011	22549.1	Y	Max NYCA Load Below 23,750
12/29/2011	22473.1	Y	Max NYCA Load Below 23,750
12/28/2011	22443.1	Y	Max NYCA Load Below 23,750
1/17/2012	22329.3	Y	Max NYCA Load Below 23,750
12/21/2011	22207.3	Y	Max NYCA Load Below 23,750
1/23/2012	22182.7	Y	Max NYCA Load Below 23,750
1/26/2012	22172.9	Y	Max NYCA Load Below 23,750
1/30/2012	22134.1	Y	Max NYCA Load Below 23,750
2/8/2012	22131.6	Y	Max NYCA Load Below 23,750
2/13/2012	22049.9	Y	Max NYCA Load Below 23,750

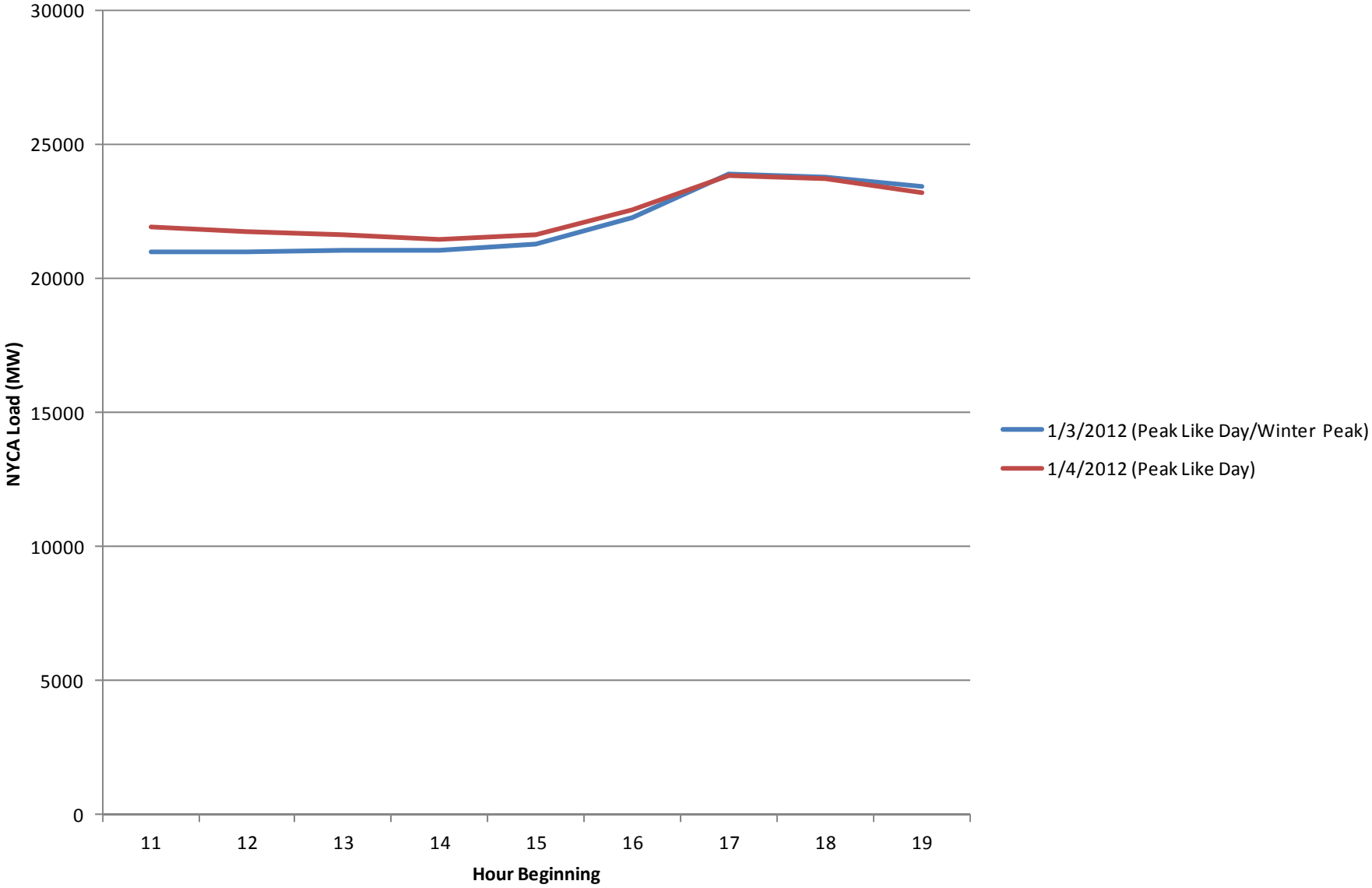
Winter 2010 - 2011

NYCA Hourly Load on Peak Like Days use in SCR Baseline Study



Winter 2011 - 2012

NYCA Hourly Load on Peak Like Days use in SCR Baseline Study



Generator Outages

- **Generator outages for Peak-Like Day Selections**
  - ***NYISO reviewed the Generator outages during the event and peak-like days with the study boundaries.***
  - ***The numbers of generators on forced outage and the MWs associated with those forced outages are consistent between the event and peak-like days***

CBL Presentation Follow-Up

Resource Load Variability
by
Resource Size

CBL Presentation Follow-Up

Load Variability by Resource Size

		Capability Period							
		Summer				Winter			
Category	Category	N	PCT	ICAP (MW)	PCT	N	PCT	ICAP (MW)	PCT
Customer Size	***Load Varibility***								
	Low	11	0%	0.6	0%	10	1%	0.6	0%
Up to 100 kW	Medium	227	10%	7.7	1%	227	13%	9.3	1%
	High	204	9%	7.3	1%	200	11%	7.8	1%
	Low	169	7%	38.3	4%	139	8%	22.7	3%
Between 100 kW and 1,000 kW	Medium	988	43%	130.1	13%	770	43%	128.3	19%
	High	411	18%	50.3	5%	281	16%	54.5	8%
	Low	41	2%	505.6	52%	20	1%	245.6	36%
Greater than 1,000 kW	Medium	201	9%	206.4	21%	140	8%	179.0	26%
	High	31	1%	29.1	3%	19	1%	32.4	5%
Total	***Total***	2,283		975.3		1,806		680.3	

CBL Presentation Follow-Up

Summary Slides by Summer/Winter

Stakeholder Comments

- **Seasonal Results**
  - ***Provide overall summary tables separately for Summer and Winter***
    - **Accuracy: Slides 16, 17**
    - **Bias: Slides 18, 19**
    - **Variability: Slides 20, 21**

Summer Period Accuracy Results

- 44 combinations of baselines tested in 10 different ways
- Where checkmark is indicated, the CBL was a high performer in each of the four capability periods or seasons of the study
- Baselines/adjustment combinations with statistically significant results (27) were identified
- Those >90% (9) are shown in yellow

			Summer										
BaseLine		Adjustment	All Resources	Not High/Variable	100 kW	Between 100 kW and 1000 kW	Greater than 1000 kW	Non-Weather Sensitive	Weather Sen…	Low Variabili…	Medium Var…ility	High Varibility	…f Best
CAISO	10 of 10	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
ISONE		Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	10 of 10	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	4 of 5	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	5 of 8	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
PJM	4 of 5	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
PJM	Comparable	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	5 of 10	Multiplicative	√	√	√	√	√	√	√		√	√	95%
NYISO	Mid 2 of 10	Multiplicative	√	√	√	√	√	√	√		√	√	95%
CAISO	10 of 10	Additive		√	√	√	√		√	√	√		80%
PJM	4 of 5	Multi w/Cap			√	√	√		√	√		√	80%
CAISO	10 of 10	Multi w/Cap			√	√	√		√	√		√	75%
ISONE		Additive		√	√	√	√		√	√			75%
NYISO	10 of 10	Additive			√	√	√		√	√			75%
NYISO	4 of 5	Additive					√		√	√			65%
PJM	4 of 5	Additive			√		√		√	√			65%
NYISO	10 of 10	Multi w/Cap				√	√		√	√			60%
NYISO	4 of 5	Multi w/Cap				√	√		√	√			60%
ISONE		Multi w/Cap			√	√	√			√		√	55%
NYISO	5 of 8	Multi w/Cap					√		√	√			55%
NYISO	5 of 10	Multi w/Cap					√		√				50%
NYISO	5 of 8	Additive					√		√	√			50%
NYISO	5 of 10	Additive					√		√				45%
NYISO	Mid 2 of 10	Additive					√		√				45%
NYISO	Mid 2 of 10	Multi w/Cap					√						25%
PJM	Comparable	Additive					√						20%
PJM	Settlement	Unadjusted					√			√			20%

Winter Period Accuracy Results

- 44 combinations of baselines tested in 10 different ways
- Where checkmark is indicated, the CBL was a high performer in each of the four capability periods or seasons of the study
- Baselines/adjustment combinations with statistically significant results (29) were identified
- Those >90% (4) are shown in yellow

			Winter										
BaseLine		Adjustment	All Resources	Not Highly Variable	100 kW	Between 100 kW and 1000 kW	Greater than 1000 kW	Non-Weather Sensitive	Weather Sensitive	Low Variability	Medium Variability	High Variability	Best
CAISO	10 of 10	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
ISONE		Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	10 of 10	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	5 of 10	Multiplicative	√		√	√	√	√	√	√		√	90%
NYISO	5 of 8	Multiplicative	√		√	√	√	√	√	√		√	85%
NYISO	4 of 5	Multiplicative				√	√	√	√	√		√	70%
ISONE		Additive		√		√	√	√		√			60%
NYISO	10 of 10	Additive				√	√	√		√		√	60%
NYISO	5 of 8	Additive				√	√	√		√			60%
PJM	Comparable	Multiplicative				√	√	√	√				60%
NYISO	10 of 10	Multi w/Cap				√	√	√		√			55%
PJM	4 of 5	Multiplicative				√	√			√			55%
ISONE		Multi w/Cap				√	√	√		√			50%
NYISO	5 of 10	Additive					√			√			50%
NYISO	5 of 10	Multi w/Cap					√			√			50%
NYISO	5 of 8	Multi w/Cap					√			√			50%
NYISO	Mid 2 of 10	Multiplicative					√			√			45%
CAISO	10 of 10	Additive				√	√	√		√			40%
CAISO	10 of 10	Multi w/Cap					√			√			30%
NYISO	4 of 5	Additive					√			√			30%
PJM	4 of 5	Additive					√			√			30%
NYISO	4 of 5	Multi w/Cap					√			√			25%
NYISO	5 of 8	Unadjusted					√						20%
PJM	4 of 5	Multi w/Cap					√			√			20%
NYISO	10 of 10	Unadjusted					√						15%
NYISO	4 of 5	Unadjusted					√						10%
NYISO	Mid 2 of 10	Additive					√						10%
NYISO	Mid 2 of 10	Multi w/Cap					√						10%
PJM	Comparable	Additive					√						10%

Summer Period Bias Results

- **44 combinations of baselines tested in 10 different ways**
- **Where checkmark is indicated, the CBL was a high performer in each of the four capability periods or seasons of the study**
- **Baselines/adjustment combinations with statistically significant results (30) were identified**
- **Those >90% (3) are shown in yellow**

			Summer										
BaseLine		Adjustment	All Resources	Not Highly Variable	100 kW	Between 100 kW and 1000 kW	Greater than 1000 kW	Non-Weather Sensitive	Weather Sen…	Low Variabili…	Medium Var…ility	High Variability	…est
PJM	Comparable	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	Mid 2 of 10	Additive	√	√	√	√	√	√	√			√	90%
NYISO	Mid 2 of 10	Multiplicative	√		√	√	√	√	√	√		√	90%
ISONE		Additive	√	√	√		√	√	√			√	85%
NYISO	10 of 10	Multiplicative	√	√	√		√	√	√			√	85%
CAISO	10 of 10	Additive	√		√	√	√	√	√			√	80%
ISONE		Multiplicative		√	√		√	√	√			√	75%
NYISO	10 of 10	Additive	√		√		√	√	√			√	75%
NYISO	10 of 10	Multi w/Cap	√	√	√		√						70%
PJM	Comparable	Additive	√		√	√	√		√				70%
NYISO	4 of 5	Multiplicative				√	√	√				√	65%
NYISO	Mid 2 of 10	Multi w/Cap		√			√	√					65%
CAISO	10 of 10	Multiplicative					√		√			√	60%
NYISO	4 of 5	Additive			√		√	√					60%
NYISO	5 of 8	Additive					√	√					60%
ISONE		Multi w/Cap		√			√					√	55%
NYISO	5 of 10	Additive						√					55%
PJM	Comparable	Multi w/Cap					√						50%
CAISO	10 of 10	Multi w/Cap										√	45%
ISONE		Unadjusted						√					40%
PJM	Same Day	Multi w/Cap		√			√						40%
PJM	Comparable	Unadjusted		√									25%
PJM	Same Day	Additive					√		√				25%
PJM	Same Day	Multiplicative					√		√				25%
PJM	Settlement	Additive					√		√				25%
PJM	Settlement	Multi w/Cap					√		√				25%
PJM	Settlement	Multiplicative					√		√				25%
CAISO	10 of 10	Unadjusted						√					20%
PJM	Same Day	Unadjusted						√				√	20%
PJM	Settlement	Unadjusted								√			15%

Winter Period Bias Results

- **44 combinations of baselines tested in 10 different ways**
- **Where checkmark is indicated, the CBL was a high performer in each of the four capability periods or seasons of the study**
- **Baselines/adjustment combinations with statistically significant results (26) were identified**
- **Those >90% (3) are shown in yellow**

			Winter										
BaseLine		Adjustment	All Resources	Not Highly Variable		Between 100 kW and 1000 kW	Greater than 1000 kW	Non-Weather Sensitive	Weather Sensitive	Low Variability	Medium Variability	High Variability	
NYISO	Mid 2 of 10	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
ISONE		Multiplicative	√		√	√	√	√	√	√		√	90%
NYISO	10 of 10	Multiplicative	√		√	√	√	√	√	√		√	90%
CAISO	10 of 10	Multiplicative	√			√	√	√	√	√		√	85%
NYISO	10 of 10	Additive	√		√	√	√	√		√		√	85%
ISONE		Additive					√	√		√			60%
NYISO	Mid 2 of 10	Additive					√	√		√			60%
CAISO	10 of 10	Additive					√	√		√			50%
NYISO	10 of 10	Multi w/Cap				√	√			√			50%
NYISO	10 of 10	Unadjusted					√						50%
PJM	Comparable	Multiplicative				√		√		√			50%
NYISO	4 of 5	Multiplicative						√	√				45%
NYISO	5 of 8	Multi w/Cap					√						45%
NYISO	Mid 2 of 10	Multi w/Cap					√			√			45%
CAISO	10 of 10	Unadjusted								√			40%
NYISO	4 of 5	Multi w/Cap					√						40%
PJM	Comparable	Additive								√			20%
PJM	Same Day	Multi w/Cap					√			√			20%
CAISO	10 of 10	Multi w/Cap								√			15%
ISONE		Multi w/Cap								√			15%
PJM	Same Day	Additive								√			15%
PJM	Same Day	Multiplicative								√			15%
PJM	Settlement	Additive								√			15%
PJM	Settlement	Multiplicative								√			15%
PJM	Comparable	Multi w/Cap								√			10%
PJM	Settlement	Multi w/Cap								√			10%

Summer Period Variability Results

- 44 combinations of baselines tested in 10 different ways
- Where checkmark is indicated, the CBL was a high performer in each of the four capability periods or seasons of the study
- Baselines/adjustment combinations with statistically significant results (27) were identified
- Those >90% (8) are shown in yellow

			Summer										
BaseLine		Adjustment	All Resources	Not Highly Variable	100 kW	Between 100 kW and 1000 kW	Greater than 1000 kW	Non-Weather Sensitive	Weather Sen...ive	Low Variabili...	Medium Var...ility	High Variability	...est
PJM	Comparable	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
CAISO	10 of 10	Multiplicative	√	√	√	√	√	√	√		√	√	95%
ISONE		Multiplicative	√	√	√	√	√	√	√		√	√	95%
NYISO	10 of 10	Multiplicative	√	√	√	√	√	√	√		√	√	95%
PJM	4 of 5	Multiplicative	√	√	√	√	√	√	√		√	√	95%
NYISO	4 of 5	Multiplicative	√	√	√	√	√	√	√		√	√	90%
NYISO	5 of 8	Multiplicative	√	√	√	√	√	√	√		√	√	90%
NYISO	Mid 2 of 10	Multiplicative	√	√	√	√	√	√	√		√	√	90%
NYISO	5 of 10	Multiplicative	√	√	√	√	√	√	√			√	85%
ISONE		Additive		√	√	√	√		√		√		80%
CAISO	10 of 10	Additive		√	√	√	√		√				75%
PJM	4 of 5	Multi w/Cap			√	√	√		√			√	75%
CAISO	10 of 10	Multi w/Cap			√	√	√		√			√	70%
NYISO	10 of 10	Additive		√		√	√		√		√		70%
PJM	4 of 5	Additive			√		√		√				65%
ISONE		Multi w/Cap			√		√		√			√	55%
NYISO	10 of 10	Multi w/Cap				√	√		√				55%
NYISO	4 of 5	Multi w/Cap				√	√		√				55%
NYISO	4 of 5	Additive					√		√				50%
NYISO	5 of 8	Multi w/Cap					√		√				40%
NYISO	5 of 10	Multi w/Cap					√		√				35%
NYISO	5 of 10	Additive					√		√				30%
NYISO	5 of 8	Additive					√		√				30%
NYISO	Mid 2 of 10	Additive					√		√				25%
PJM	Same Day	Unadjusted					√			√			25%
PJM	Settlement	Unadjusted					√			√			20%
NYISO	Mid 2 of 10	Multi w/Cap					√						15%

Winter Period Variability Results

- 44 combinations of baselines tested in 10 different ways
- Where checkmark is indicated, the CBL was a high performer in each of the four capability periods or seasons of the study
- Baselines/adjustment combinations with statistically significant results (31) were identified
- Those >90% (5) are shown in yellow

			Winter										
BaseLine		Adjustment	All Resources	Not Highly Variable	100 kW	Between 100 kW and 1000 kW	Greater than 1000 kW	Non-Weather Sensitive	Weather Sen…	Low Variabili…	Medium Var…	High Variability	Best
CAISO	10 of 10	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
ISONE		Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	10 of 10	Multiplicative	√	√	√	√	√	√	√	√	√	√	100%
NYISO	5 of 10	Multiplicative	√	√	√	√	√	√	√	√		√	95%
NYISO	5 of 8	Multiplicative	√		√	√	√	√	√	√		√	90%
ISONE		Multi w/Cap				√	√	√		√			70%
NYISO	10 of 10	Additive				√	√	√		√			70%
NYISO	4 of 5	Multiplicative				√	√	√	√	√		√	70%
ISONE		Additive		√		√	√	√		√			65%
NYISO	10 of 10	Multi w/Cap				√	√	√		√			65%
NYISO	5 of 10	Additive					√	√		√			65%
PJM	4 of 5	Multiplicative				√	√	√	√	√			65%
NYISO	5 of 10	Multi w/Cap					√			√			55%
NYISO	5 of 8	Additive				√	√	√		√			55%
PJM	Comparable	Multiplicative				√	√	√					55%
CAISO	10 of 10	Additive				√	√	√		√			50%
NYISO	5 of 8	Multi w/Cap					√			√			50%
NYISO	Mid 2 of 10	Multiplicative					√		√	√			50%
CAISO	10 of 10	Multi w/Cap					√			√			30%
NYISO	4 of 5	Additive					√						25%
PJM	4 of 5	Additive					√						25%
NYISO	4 of 5	Multi w/Cap					√			√			20%
PJM	4 of 5	Multi w/Cap					√			√			20%
NYISO	10 of 10	Unadjusted					√						15%
NYISO	5 of 8	Unadjusted					√						15%
NYISO	Mid 2 of 10	Additive					√						15%
NYISO	Mid 2 of 10	Multi w/Cap					√						15%
PJM	Same Day	Unadjusted								√			15%
NYISO	4 of 5	Unadjusted					√						10%
PJM	Comparable	Additive					√						10%
PJM	Settlement	Unadjusted					√						10%

CBL Presentation Follow-Up

Additive versus Multiplicative Adjustments

(Previous DNV KEMA Studies)

Stakeholder Comments

- **In-day Adjustments**
  - ***Results about uncapped multiplicative in-day adjustments do not seem to agree with other DNV KEMA baseline studies***
    - **Slides 24, 25, 26**

Multiplicative Adjustment from other DNV KEMA Studies (AEMO)

- **AEMO (Australia)**
  - ***Recommendation included the use of an additive adjustment, which was considered equally with the multiplicative adjustment.***
  - ***Additive was recommended due to the susceptibility of multiplicative adjustment to gross inaccuracies.***
  - ***Multiplicative adjustment cap would limit some, if not most of these gross inaccuracies.***

Multiplicative Adjustment from other DNV KEMA Studies (PJM)

- **PJM**
  - ***Both the additive and multiplicative adjustment provided significant improvement to the accuracy of the baselines tested and their performance***
  - ***Performance difference from either method is insignificant***
  - ***Amongst factors in choosing the baseline with the additive adjustment, the lack of additional administrative costs involved with changing from the current approach was one factor.***

Multiplicative Adjustment from other DNV KEMA Studies (ISO New England)

- **ISO-NE**
  - ***The ISO-NE baseline study did not compare additive and multiplicative adjustments***
  - ***The ISO-NE study only looked into the asymmetrical, additive baseline adjustment.***

CBL Presentation Follow-Up

Analysis on Multiplicative In-day Adjustments between the 99th and 100th percentiles

Stakeholder Comments

- **In-day Adjustments for 99th-100th percentile**
  - ***What is the correlations between load levels and the in-day adjustment cap?***
    - **Slide 30**
  - ***Provide overall summary tables for In-day Adjustments***
    - **Slides 5, 8**

Multiplicative In-day Adjustments in the 99th-100th Percentile

- **30,283 baseline-day observations are equally distributed across three NYISO baselines**
  - ***The Multiplicative In-day Adjustment applies to all hours of the day for which the CBL was calculated***
- **1,425 unique Resource IDs included in the top 1% of uncapped multiplicative adjustments**
- **Analysis of maximum NYCA Loads during which CBL was calculated and the period from which the days were selected to calculate the CBL**
- **Analysis of adjustments by Resource count, Size, Load Variability, Baseline Type, Season, number per Resource and size of adjustments**

All-Days Analysis for Multiplicative In-day Adjustments in the 99th-100th percentile

- **Top 5 non-peak days with Multiplicative In-day Adjustments in the 99th-100th percentile from each of the three NYISO candidate CBLs were ranked**
- **Max NYCA Load during the "event" period for the CBL calculation identified for each non-peak day and from the prior 15 weekdays**
- **With the exception of 4/16/2012, the maximum NYCA Load during "event" hours was lower than the maximum NYCA Load that occurred during the period from which the CBL was calculated**

Date	Number of Mult. Adj. Between 1.5 and 2.0	Number of Mult. Adj. Greater than 2.0	"Event" Max NYCA Load	"Event" day - 15 weekdays	Max Load HB13-HB19 w/in 15 days prior to event
9/5/2012	274	155	26280	8/13/2012	27433
9/7/2011	195	114	21240	8/15/2011	26442
9/6/2012	195	97	25756	8/13/2012	27433
9/4/2012	192	106	25838	8/13/2012	27433
9/6/2011	172	102	20962	8/15/2011	26442
4/16/2012	171	49	21128	3/26/2012	19582
1/4/2012	143	38	23812	12/14/2011	23901

SCR ID Counts and ICAP by Size, Baseline and Season for Multiplicative Adjustments in 99th-100th percentile

	NYISO 5 of 8		NYISO 5 of 10		NYISO 10 of 10	
Resource Size (ACL)	Summer	Winter	Summer	Winter	Summer	Winter
Up to 100 kW	271 57 MW	224 65 MW	270 57 MW	216 61 MW	255 57 MW	216 68 MW
Between 100 kW and 1000 kW	642 447 MW	440 576 MW	646 447 MW	393 574 MW	619 418 MW	413 567 MW
Greater than 1000 kW	55 222 MW	43 423 MW	52 176 MW	43 539 MW	52 163 MW	39 537 MW
Totals	968 726 MW	707 1,064 MW	968 680 MW	652 1,174 MW	926 638 MW	668 1,172 MW

- **MW values shown are the sum of ICAP for all observations in a category**
- **Seasonal totals show between 25% and 28% fewer SCRs in winter and an increase of between 46% and 84% over summer for winter MW affected by multiplicative adjustments in the 99th-100th percentile**
- ***Observation: The number of adjustments per resource ID in the 99th-100th percentile increases in Winter, resulting in higher ICAP MW in Winter***

SCR ID Counts and ICAP by Load Variability , Baseline and Season for Multiplicative Adjustments in 99th-100th percentile

	NYISO 5 of 8		NYISO 5 of 10		NYISO 10 of 10	
Load Variability	Summer	Winter	Summer	Winter	Summer	Winter
Low	4 3 MW	4 9 MW	4 3 MW	6 5 MW	3 2 MW	4 2 MW
Medium	521 299 MW	432 424 MW	526 273 MW	384 484 MW	503 260 MW	400 486 MW
High	443 424 MW	271 631 MW	438 404 MW	262 685 MW	420 376 MW	264 684 MW
Totals	968 726 MW	707 1,064 MW	968 680 MW	652 1,174 MW	926 638 MW	668 1,172 MW

- **MW values shown are the sum of ICAP for all observations in a category**
- **Seasonal totals show 58% - 59% of the MW associated with multiplicative adjustments in the 99-100th percentile occur with highly variable loads**
- ***Observation: While the number of resources with medium load variability is slightly higher than the number of resources with highly variable loads, the number of adjustments per resource ID is greater for resources with highly variable loads, especially in Winter***

Number of Adjustments by Load Variability, Resource Size, Baseline and Season for Multiplicative Adjustments in 99th-100th percentile

	NYISO 5 of 8		NYISO 5 of 10		NYISO 10 of 10	
Load Variability	Summer	Winter	Summer	Winter	Summer	Winter
Low	**11**	**12**	**8**	**13**	**7**	**8**
Between 100 kW and 1000 kW	2	6	3	10	2	7
Greater than 1000 kW	9	6	5	3	5	1
Medium	**2,133**	**2,007**	**2,165**	**1,846**	**2,197**	**2,064**
Up to 100 kw	607	629	609	592	584	655
Between 100 kW and 1000 kW	1,423	1,250	1,457	1,130	1,483	1,285
Greater than 1000 kW	103	128	99	124	109	124
High	**3,384**	**2,541**	**3,356**	**2,701**	**3,338**	**2,492**
Up to 100 kw	1,067	854	1,075	926	1,093	829
Between 100 kW and 1000 kW	2,190	1,601	2,157	1,688	2,132	1,574
Greater than 1000 kW	127	86	124	87	113	89

- **For each baseline and season, between 50% and 60% of multiplicative adjustments in the 99-100th percentile occur with loads identified as highly variable**
- ***Observation: Highly variable loads have the highest number of adjustments in every baseline and season***

Count of Adjustments per Resource ID, Load Variability and Resource Size for Multiplicative Adjustments in 99th-100th percentile

Load Variability Resource Size	One adjustment per Resource ID	Between 2 and 10 adjustments per Resource ID	Between 11 and 25 adjustments per Resource ID	Between 26 and 50 adjustments per Resource ID	Between 51 and 100 adjustments per resource ID	More than 100 values per Resource ID	Grand Total
High	**396**	**1500**	④ **386**	**88**	**18**	**1**	**2389**
3. Greater than 1000 kW	13	69	19				101
2. Between 100 kW and 1000 kW	238	898	219	62	18	1	1436
1. Up to 100 kW	145	533	148	26			852
Low	**13**	**13**					**26**
3. Greater than 1000 kW	1	8					9
2. Between 100 kW and 1000 kW	12	5					17
Med	**919**	**1888**	**231**	**7**	**1**		**3046**
3. Greater than 1000 kW	80	109	13				202
2. Between 100 kW and 1000 kW	637	1281	143	5	1		2067
1. Up to 100 kW	202	498	75	2			777
Grand Total	① **1328**	② **3401**	**617**	③ **95**	**19**	**1**	**5461**

1. **SCRs with only one multiplicative adjustment in the 99th-100th percentile account for 24% of the unique Resource IDs**
2. **SCRs with between two and 25 multiplicative adjustments in the 99th-100th percentile account for 74% of the unique Resource IDs**
3. **Two percent of Resource IDs have more than 25 adjustments in the 99th-100th percentile**
   - **Majority of which are categorized as highly variable loads**
4. ***Observation: The number of resources categorized as highly variable may be fewer than resources with medium load variability, however the higher number of adjustments per resource ID are attributed to resource IDs with highly variable load***

Count of Multiplicative Adjustments in 99th-100th percentile by Load Variability and Resource Size

Load Variability Resource Size	One adjustment per Resource ID	Between 2 and 10 adjustments per Resource ID	Between 11 and 25 adjustments per Resource ID	Between 26 and 50 adjustments per Resource ID	Between 51 and 100 adjustments per resource ID	More than 100 values per Resource ID	Grand Total	
High	**396**	**7033**	**6082**	**2988**	**1212**	**101**	**17812**	58.8%
3. Greater than 1000 kW	13	303	310				626	
2. Between 100 kW and 1000 kW	238	4188	3457	2146	1212	101	11342	
1. Up to 100 kW	145	2542	2315	842			5844	
Low	**13**	**46**					**59**	0.2%
3. Greater than 1000 kW	1	28					29	
2. Between 100 kW and 1000 kW	12	18					30	
Med	**919**	**7914**	**3296**	**229**	**54**		**12412**	41.0%
3. Greater than 1000 kW	80	406	201				687	
2. Between 100 kW and 1000 kW	637	5105	2065	167	54		8028	
1. Up to 100 kW	202	2403	1030	62			3697	
Grand Total	**1328**	**14993**	**9378**	**3217**	**1266**	**101**	**30283**	
	4.4%	49.5%	31.0%	10.6%	4.2%	0.3%		

① ② ③ ④

1. **58.8% of all Multiplicative Adjustments in the 99th-100th percentile are from Resources categorized as highly variable loads**
2. **63.7% of Multiplicative Adjustments in the 99th-100th percentile from highly variable loads are from resources with loads between 100kW and 1000kW**
3. **54% of all Multiplicative Adjustments in the 99th-100th percentile are from Resources with fewer than 10 Multiplicative Adjustments per Resource ID**
4. ***Observation: The number of adjustments per resource ID greater than 10 for highly variable loads is one-third of all adjustments and nearly three times the number of adjustments as loads with medium variability***

Count of adjustments in the 99-100th percentile By Load Variability, Resource Size, and Size of Multiplicative Adjustment

Load Variability / Resource Size	Less than or equal to 1.5	Between 1.5 and 2.0	Between 2.0 and 5.0	Between 5.0 and 10.	Greater than 10.0	Grand Total
High	**293**	**10,370**	**6,535**	**412**	**202**	**17,812**
1. Up to 100 kW	125	3,719	1,942	40	18	5,844
2. Between 100 kW and 1000 kW	157	6,237	4,407	360	181	11,342
3. Greater than 1000 kW	11	414	186	12	3	626
Low	**3**	**51**	**5**			**59**
2. Between 100 kW and 1000 kW	3	24	3			30
3. Greater than 1000 kW		27	2			29
Med	**311**	**9,264**	**2,820**	**17**		**12,412**
1. Up to 100 kW	101	2,740	856			3,697
2. Between 100 kW and 1000 kW	185	6,037	1,788	14		8,024
3. Greater than 1000 kW	25	487	176	3		691
Grand Total	**607**	**19,685**	**9,360**	**429**	**202**	**30,283**

- **65% of all multiplicative adjustments in the 99th-100th percentile fall between 1.5 and 2.0, with over half from resources with highly variable loads**
- **Uncapped multiplicative adjustments greater than 2.0 occur nearly three times as often for resources categorized as highly variable loads**
- ***Observations:***
  - ***67% of all Multiplicative Adjustments in the 99th-100th percentile fall between 1.46 and 2.0***
    - ***Excluding highly variable loads increases that percentage to 77%***
  - ***99.67% of all uncapped multiplicative adjustments for the three NYISO candidate CBLs are below 2.0***

Summary of Observations

- **The number adjustments per resource ID in the 99th-100th percentile increases in Winter, resulting in higher ICAP MW in Winter**
- **While the number of resources with medium load variability is slightly higher than the number of resources with highly variable loads, the number of adjustments per resource ID is greater for resources with highly variable loads, especially in Winter**
- **Highly variable loads have the highest number of adjustments in every baseline and season**
- **The number of resources categorized as highly variable may be fewer than resources with medium load variability, however the higher number of adjustments per resource ID are attributed to resource IDs with highly variable load**
- **The number of adjustments per resource ID greater than 10 for highly variable loads is nearly three times the number of adjustments for loads with medium variability**
- **67% of all Multiplicative Adjustments in the 99th-100th percentile fall between 1.46 and 2.0**
  - ***Excluding highly variable loads increases that percentage to 77%***
- **99.67% of all uncapped multiplicative adjustments for the three NYISO candidate CBLs are below 2.0**

Additive In-day Adjustment Analysis

- **For resources with uncapped Multiplicative Adjustments in the 99th-100th percentile, NYISO also conducted limited analysis on the Additive In-day Adjustments**
- **5% of the adjustments (1,619) have an Additive Adjustment greater than the ACL**
  - ***75% of those adjustments apply to resources categorized as highly variable loads***
- **6% of the adjustments (1,878) have an Additive Adjustment greater than 95% of the ACL**
  - ***The number of adjustments for highly variable loads increases by 17%, while the number of adjustments for loads with medium variability increases by 13%***
- **Further analysis would be required to assess the percentage of Additive Adjustments for resources with Multiplicative Adjustments in the 99th-100th percentile that would cause the adjusted CBL to exceed the ACL**

Conclusions

- **The uncapped Multiplicative Adjustment for highly variable loads accounts for a significant portion of the adjustments in the 99th-100th percentile for Multiplicative In-day adjustments**
- **The Additive Adjustment for highly variable loads and, to a lesser extent loads with medium variability, shows potential for adjusting the CBL above the ACL**
- **Further examination into the characteristics of resources with highly variable load should be considered to determine whether an alternative adjustment mechanism or alternative baseline is necessary**

Task 2: ACL Analysis

Evaluation of ACL Baseline

- **At the January 26, 2011 BIC meeting, the motion to approve the change from APMD to ACL included a commitment by NYISO to conduct an evaluation of the revised baseline methodology in 2013:**
  - ***"… and will include in the meeting minutes that the NYISO staff has indicated that in Calendar Year 2013, the NYISO will report to the ICAP Working Group on its evaluation of the revised SCR baseline performance methodology that is part of this motion."***

Analysis Design Approach - ACL

- **Compare existing capacity baseline with variations under consideration**
  - ***Evaluate how seasonal load variations impact amount of capacity available for a season***
- **Identify a measure of available capacity in advance that closely reflects the estimated load during an event**
- **To consider a combination of capacity baseline to use for market participation and an energy baseline to use for performance evaluation**

Assessment of Current and Alternative ACLs

- **Capability Period ACL**
  - ***Top 20 of 40, 1 p.m. – 7 p.m. ("old")***
    - **Hours reflecting the current effective tariff**
  - ***Top 20 of 40, 11 a.m. – 8 p.m. ("new")***
    - **Proposed hours in Provisional ACL filing**
- **Monthly ACL**
  - ***Top 20 of 40***
  - ***Top 10 of 20, and***
  - ***Top 5 of 10***

Assessment of Current and Alternative ACLs

ACL Approach	Reasoning
Old (Current) Capability Period ACL -Top 20 of 40 hours - HB 13 through HB 18	To evaluate the current ACL methodology • Per January 26, 2011 BIC motion approving ACL methodology.
New (Revised) Capability Period ACL -Top 20 of 40 hours - HB 11 through HB 19	To analyze the new hours awaiting FERC approval in the Provisional ACL filings
Monthly -Using HB 11 through HB 19 -Includes: - Top 20 of 40 hours - Top 10 of 20 hours - Top 5 of 10 hours	To analyze the number of hours that would be needed for a Monthly ACL to reflect the available capacity of a resource on a monthly basis

ACL Comparisons

	Compare:	To:	Purpose of comparison
ACL 1	CP ACL (old)	CP ACL (new)	To determine the impact of the new SCR Load Zone Peak Hours, proposed in ER14-39
ACL 2	CP ACL (old)	CP 5 CPk (Top 5)	To determine how closely the old (current) ACL reflects the top 5 NYCA load hours (CP 5CPk)
ACL 3	CP ACL (new)	CP 5 CPk (Top 5)	To determine how closely the new (revised) ACL reflects the top 5 NYCA load hours (CP 5CPk)
ACL 4	CP ACL (new)	Monthly ACL (new) (20/40)	To compare and contrast the differences between the New CP ACL and a monthly ACL utilizing the average of the highest 20 out of 40 hours
ACL 5	CP ACL (new)	Monthly ACL (new) (10/20)	To compare and contrast the differences between the new CP ACL and a monthly ACL utilizing the average of the highest 10 out of 20 hours
ACL 6	CP ACL (new)	Monthly ACL (new) (5/10)	To compare and contrast the differences between the new CP ACL and a monthly ACL utilizing the average of the highest 5 out of 10 hours
ACL 7	Monthly ACL (new) (20/40)	Monthly 5CPk (Top 5)	To determine whether a monthly ACL utilizing the average of the highest 20 out of 40 hours, reflects the top 5 NYCA load hours for the respective month
ACL 8	Monthly ACL (new) (10/20)	Monthly 5CPk (Top 5)	To determine whether a monthly ACL utilizing the average of the highest 10 out of 20 hours, reflects the top 5 NYCA load hours for the respective month
ACL 9	Monthly ACL (new) (5/10)	Monthly 5CPk (Top 5)	To determine whether a monthly ACL utilizing the average of the highest 5 out of 10 hours, reflects the top 5 NYCA load hours for the respective month

Outline of Results

- **For each ACL Analysis Code 1-9:**
  - ***Overall Performance***
    - **By Summer and Winter**
      - Error/Difference
      - Absolute Error/Difference
      - ICAP
      - No. of Resource Observations
  - ***5 CPk – Five Coincident Peak Hours***
    - **CP 5 CPk – calculated as the average of the five load hours for each resource corresponding to the NYCA top five load hours in the Capability Period of the SCR Load Zone Peak Hours**
    - **Monthly 5 CPk – calculated as the average of the five load hours for each resource corresponding to the NYCA top five load hours for the month**

Capability Period Analysis

- **ACL Analyis1-3: Comparison of Capability Period ACLs**
  - ***CP old vs. CP new***
  - ***CP ACL old vs. CP 5 CPk***
  - ***CP ACL new vs. CP 5 CPk***

ACL 1: 20/40 CP ACL Old vs. New Hours - Overall

- **Purpose: To determine the impact of the new SCR Load Zone Peak Hours, proposed in ER14-39**
  - ***This analysis compares two ACLs, therefore the differences are presented***
- **Overall, the new CP ACL is 0.5% higher than the old CP ACL in Summer, and 0.4% lower in Winter**
- **In absolute terms (the sum of all differences both positive and negative), the difference between the old CP ACL and new CP ACL is 0.8% in the Summer and 1.2% in the Winter**

20/40 Old Rules Capability Period ACL Compared to the 20/40 New Rules Capability Period ACL				
	Summer		Winter	
Statistic	MW	Pct	MW	Pct
CP ACL (20/40 Old Rules)	3,922		1,750	
CP ACL (20/40 New Rules)	3,943		1,742	
Difference (Old - New)	(22)	-0.5%	8	0.4%
Absolute Difference	31	0.8%	21	1.2%
ICAP	1,672		1,131	
No. of Resource Observations	4,108		3,078	

ACL 2: 20/40 CP ACL Old vs. CP 5 CPk – Overall

- **Purpose: To determine how closely the old (current) ACL reflects the top 5 NYCA load hours (CP 5CPk)**
- **Overall, the total old CP ACL is 7.6% higher than the CP 5 CPk in Summer, and 6.4% higher in Winter**
- **In absolute terms, the old CP ACL is 8.2% different from the CP 5 CPk in the Summer, and 7.2% different in the Winter**

20/40 Old Rules Capability Period ACL Compared to the CP 5 CPk				
	Summer		Winter	
Statistic	MW	Pct	MW	Pct
CP ACL (20/40 Old Rules)	3,922		1,750	
CP 5 CPk	3,644		1,645	
Error	278	7.6%	105	6.4%
Absolute Error	300	8.2%	119	7.2%
ICAP	1,672		1,131	
No. of Resource Observations	4,108		3,078	

ACL 3: 20/40 CP ACL New vs. CP 5 CPk - Overall

- **Purpose: To determine how closely the new (revised) ACL reflects the top 5 NYCA load hours (CP 5CPk)**
- **Overall, the total new CP ACL is 8.3% higher than the CP 5 CPk in Summer, and 6.4% higher in Winter**
- **In absolute terms, the new CP ACL is 8.9% different from the CP 5 CPk in the Summer, and 7.1% different in the Winter**

20/40 New Rules Capability Period ACL Compared to the CP 5 CPk				
	Summer		Winter	
Statistic	MW	Pct	MW	Pct
CP ACL (20/40 New Rules)	3,943		1,742	
CP 5 CPk	3,640		1,637	
Error	303	8.3%	105	6.4%
Absolute Error	324	8.9%	117	7.1%
ICAP	1,672		1,131	
No. of Resource Observations	4,108		3,078	

NYISO Load Variability used for ACL

- **Identify the maximum NYCA load day of each month that was not an event day in the capability period**
- **For each resource, identify minimum and maximum kW during SCR Load Zone Peak Hour time window of the maximum NYCA load day for the month**
- **Calculate percent difference (PD) for each month**
  - ***PD = [max(kW) – min(kw)] / max(kW)***
- **Assign load variability status to each month**
  - ***Low – indicating less than 25% load variability***
  - ***Medium – indicating between 25% and 50% load variability***
  - ***High – indicating greater than 50% load variability***
- **Average load variability status across months, rounding up the variable load designation**

ACL 2-3: Comparison Tables - Error

- **The overall error comparing the CP ACL to the 5 CPK is slightly higher under the new hours for Summer (8.3% vs. 7.6%), and the same for Winter (6.4%)**

Comparison of 20/40 CP ACL to CP 5 CPk								
	Summer				Winter			
	% of Resource Obs	% ICAP	% Error		% of Resource Obs	% ICAP	% Error	
			CP Old	CP New			CP Old	CP New
Overall	100%	100%	7.6%	8.3%	100%	100%	6.4%	6.4%
By Size:								
Small	20%	2%	23.8%	21.1%	24%	3%	10.5%	11.6%
Medium	70%	20%	11.7%	11.2%	66%	29%	6.1%	6.4%
Large	10%	78%	6.6%	7.6%	10%	68%	6.3%	6.3%
By Variability:								
Low	24%	46%	3.7%	4.5%	29%	21%	4.7%	4.9%
Medium	41%	42%	6.7%	7.6%	42%	62%	6.3%	6.2%
High	35%	12%	52.0%	48.2%	29%	17%	14.1%	14.2%

ACL 2-3: Comparison Tables – Absolute Error

- **The overall *absolute* error comparing the CP ACL to the 5 CPk is slightly higher under the new hours for Summer (8.9% vs. 8.2%), and about the same under the new hours for Winter (7.1% vs. 7.2%)**

Comparison of 20/40 CP ACL to CP 5 CPk								
	Summer				Winter			
	% of Resource Obs	% ICAP	% Absolute Error		% of Resource Obs	% ICAP	% Absolute Error	
			CP Old	CP New			CP Old	CP New
Overall	100%	100%	8.2%	8.9%	100%	100%	7.2%	7.1%
By Size:								
Small	20%	2%	25.0%	23.3%	27%	3%	11.4%	12.6%
Medium	70%	20%	12.7%	12.5%	65%	27%	7.8%	7.9%
Large	10%	78%	7.1%	8.0%	8%	71%	7.0%	6.8%
By Variability:								
Low	24%	46%	4.1%	4.9%	26%	18%	5.2%	5.4%
Medium	41%	42%	7.5%	8.1%	42%	65%	7.4%	7.1%
High	35%	12%	53.2%	49.8%	31%	17%	14.9%	15.2%

Capability Period ACL vs. Monthly ACL

- **ACL 4 – 6: Comparison of Capability Period ACL vs. Monthly ACL**
  - ***20/40 new CP ACL vs:***
    - **20/40 Monthly ACL**
    - **10/20 Monthly ACL**
    - **5/10 Monthly ACL**

ACL 4: 20/40 CP ACL New vs. 20/40 Monthly ACL New - Overall

- **Purpose: To compare and contrast the differences between the New CP ACL and a monthly ACL utilizing the average of the highest 20 out of 40 hours**
- **Overall, the new CP ACL is 4.6% higher than the Monthly ACL in Summer, and 1.5% lower in Winter**
- **In absolute terms, the new CP ACL is 9.3% different from the Monthly ACL in the Summer, and 8.7% different in the Winter**

ACL 4: 20/40 CP ACL New vs. 20/40 Monthly ACL New – By Month

20/40 New Rules Capability Period ACL Compared to the 20/40 New Rules Monthly ACL						
	SUMMER					
Statistic	May	Jun	Jul	Aug	Sep	Oct
CP ACL - 20/40 New Rules (MW)	3,943	3,943	3,943	3,943	3,943	3,943
Monthly ACL - 20/40 New Rules (MW)	3,638	3,876	3,912	3,782	3,784	3,629
Difference (MW)	305	68	31	162	160	314
Difference (%)	8.4%	1.7%	0.8%	4.3%	4.2%	8.7%
Absolute Difference (MW)	475	212	78	226	362	741
Absolute Difference (%)	13.1%	5.5%	2.0%	6.0%	9.6%	20.4%
ICAP (MW)	1,672	1,672	1,672	1,672	1,672	1,672
No. of Resource Observations	4,108	4,108	4,108	4,108	4,108	4,108
	WINTER					
Statistic	Nov	Dec	Jan	Feb	Mar	Apr
CP ACL - 20/40 New Rules (MW)	1,742	1,742	1,742	1,742	1,742	1,742
Monthly ACL - 20/40 New Rules (MW)	1,739	1,742	1,732	1,725	1,769	1,908
Difference (MW)	3	0	11	18	(26)	(165)
Difference (%)	0.2%	0.0%	0.6%	1.0%	-1.5%	-8.7%
Absolute Difference (MW)	165	60	57	117	187	336
Absolute Difference (%)	9.5%	3.5%	3.3%	6.8%	10.6%	17.6%
ICAP (MW)	1,131	1,131	1,131	1,131	1,131	1,131
No. of Resource Observations	3,078	3,078	3,078	3,078	3,078	3,078

ACL 5: 20/40 CP ACL New vs. 10/20 Monthly ACL New - Overall

- **Purpose: To compare and contrast the differences between the new CP ACL and a monthly ACL utilizing the average of the highest 10 out of 20 hours**
- **Overall, the new CP ACL is 4.3% higher than the Monthly ACL in Summer, and 0.7% lower in Winter**
- **In absolute terms, the new CP ACL is 9.4% different from the Monthly ACL in the Summer, and 8.7% different in the Winter**

ACL 5: 20/40 CP ACL New vs. 10/20 Monthly ACL New – By Month

20/40 New Rules Capability Period ACL Compared to the 10/20 New Rules Monthly ACL						
	SUMMER					
Statistic	May	Jun	Jul	Aug	Sep	Oct
CP ACL - 20/40 New Rules (MW)	3,943	3,943	3,943	3,943	3,943	3,943
Monthly ACL - 10/20 New Rules (MW)	3,674	3,932	3,903	3,731	3,794	3,654
Difference (MW)	269	11	41	212	149	289
Difference (%)	7.3%	0.3%	1.0%	5.7%	3.9%	7.9%
Absolute Difference (MW)	446	216	98	286	366	732
Absolute Difference (%)	12.1%	5.5%	2.5%	7.7%	9.6%	20.0%
ICAP (MW)	1,672	1,672	1,672	1,672	1,672	1,672
No. of Resource Observations	4,108	4,108	4,108	4,108	4,108	4,108
	WINTER					
Statistic	Nov	Dec	Jan	Feb	Mar	Apr
CP ACL - 20/40 New Rules (MW)	1,742	1,742	1,742	1,742	1,742	1,742
Monthly ACL - 10/20 New Rules (MW)	1,741	1,743	1,714	1,697	1,707	1,922
Difference (MW)	1	(1)	29	45	35	(180)
Difference (%)	0.1%	-0.1%	1.7%	2.7%	2.1%	-9.3%
Absolute Difference (MW)	169	56	67	112	155	359
Absolute Difference (%)	9.7%	3.2%	3.9%	6.6%	9.1%	18.7%
ICAP (MW)	1,131	1,131	1,131	1,131	1,131	1,131
No. of Resource Observations	3,078	3,078	3,078	3,078	3,078	3,078

ACL 6: 20/40 CP ACL New vs. 5/10 Monthly ACL New - Overall

- **Purpose: To compare and contrast the differences between the new CP ACL and a monthly ACL utilizing the average of the highest 5 out of 10 hours**
- **Overall, the new CP ACL is 4.6% higher than the Monthly ACL in Summer, and 0.2% higher in Winter**
- **In absolute terms, the new CP ACL is 10.2% different from the Monthly ACL in the Summer, and 9.2% different in the Winter**

ACL 6: 20/40 CP ACL New vs. 5/10 Monthly ACL New – By Month

20/40 New Rules Capability Period ACL Compared to the 5/10 New Rules Monthly ACL						
	SUMMER					
Statistic	May	Jun	Jul	Aug	Sep	Oct
CP ACL - 20/40 New Rules (MW)	3,943	3,943	3,943	3,943	3,943	3,943
Monthly ACL - 5/10 New Rules (MW)	3,728	3,945	3,909	3,655	3,739	3,639
Difference (MW)	215	(1)	34	288	205	304
Difference (%)	5.8%	0.0%	0.9%	7.9%	5.5%	8.4%
Absolute Difference (MW)	432	217	145	372	385	758
Absolute Difference (%)	11.6%	5.5%	3.7%	10.2%	10.3%	20.8%
ICAP (MW)	1,672	1,672	1,672	1,672	1,672	1,672
No. of Resource Observations	4,108	4,108	4,108	4,108	4,108	4,108
	WINTER					
Statistic	Nov	Dec	Jan	Feb	Mar	Apr
CP ACL - 20/40 New Rules (MW)	1,742	1,742	1,742	1,742	1,742	1,742
Monthly ACL - 5/10 New Rules (MW)	1,728	1,741	1,713	1,693	1,648	1,913
Difference (MW)	14	2	29	50	94	(171)
Difference (%)	0.8%	0.1%	1.7%	2.9%	5.7%	-8.9%
Absolute Difference (MW)	167	60	76	116	169	371
Absolute Difference (%)	9.7%	3.4%	4.4%	6.9%	10.3%	19.4%
ICAP (MW)	1,131	1,131	1,131	1,131	1,131	1,131
No. of Resource Observations	3,078	3,078	3,078	3,078	3,078	3,078

ACL 4-6: Comparison Tables – Difference, Overall

Comparison of Capability Period ACL to Monthly ACL - NEW Rules					
	Summer				
	No. of Resources (% of Total)	% ICAP	% Difference		
	20/40, 10/20, 5/10	20/40, 10/20, 5/10	20/40	10/20	5/10
Overall	**100%**	**100%**	**4.6%**	**4.3%**	**4.6%**
By Size:					
Small	20%	2%	7.0%	4.9%	5.2%
Medium	70%	20%	7.1%	5.3%	5.1%
Large	10%	78%	4.0%	4.1%	4.5%
By Variability:					
Low	24%	46%	6.3%	5.4%	5.1%
Medium	41%	42%	3.7%	3.9%	4.7%
High	35%	12%	-0.3%	-0.6%	1.4%

Comparison of Capability Period ACL to Monthly ACL - NEW Rules					
	Winter				
	No. of Resources (% of Total)	% ICAP	% Difference		
	20/40, 10/20, 5/10	20/40, 10/20, 5/10	20/40	10/20	5/10
Overall	**100%**	**100%**	**-1.5%**	**-0.7%**	**0.2%**
By Size:					
Small	27%	3%	-5.3%	-2.6%	-0.1%
Medium	65%	27%	-2.1%	-1.1%	-0.1%
Large	8%	71%	-1.2%	-0.5%	0.2%
By Variability:					
Low	26%	18%	-1.4%	-1.2%	-0.7%
Medium	42%	65%	-0.8%	0.0%	0.8%
High	31%	17%	-5.8%	-2.4%	-0.2%

ACL 4-6: Comparison Tables – Difference, by Month

20/40 New Rules Capability Period ACL Compared to the 20/40 New Rules Monthly ACL						
	SUMMER					
% Difference	May	Jun	Jul	Aug	Sep	Oct
Monthly ACL (20/40 New Rules)	8.4%	1.7%	0.8%	4.3%	4.2%	8.7%
Monthly ACL (10/20 New Rules)	7.3%	0.3%	1.0%	5.7%	3.9%	7.9%
Monthly ACL (5/10 New Rules)	5.8%	0.0%	0.9%	7.9%	5.5%	8.4%
	WINTER					
% Difference	Nov	Dec	Jan	Feb	Mar	Apr
Monthly ACL (20/40 New Rules)	0.2%	0.0%	0.6%	1.0%	-1.5%	-8.7%
Monthly ACL (10/20 New Rules)	0.1%	-0.1%	1.7%	2.7%	2.1%	-9.3%
Monthly ACL (5/10 New Rules)	0.8%	0.1%	1.7%	2.9%	5.7%	-8.9%

Monthly ACL vs. Monthly 5 CPk

- **ACL 7 – 9: Comparison of Monthly ACL vs. Monthly 5 CPk**
  - ***20/40 Monthly ACL vs. Monthly 5 CPk***
  - ***10/20 Monthly ACL vs. Monthly 5 CPk***
  - ***5/10 Monthly ACL vs. Monthly 5 CPk***

ACL 7: 20/40 Monthly ACL New vs. Monthly 5 CPk - Overall

- **Purpose: To determine whether a monthly ACL utilizing the average of the highest 20 out of 40 hours, reflects the top 5 NYCA load hours for the respective month**
- **Overall, the Monthly ACL is 6.3% higher than the Monthly 5 CPk in Summer and 7.4% higher in Winter**
- **In absolute terms, the Monthly ACL is 7.4% different from the Monthly 5 CPk in the Summer, and 8.2% different in the Winter**

ACL 7: 20/40 Monthly ACL New vs. Monthly 5 CPk – By Month

20/40 New Rules Monthly ACL Compared to the Monthly 5 CPk						
	SUMMER					
Statistic	May	Jun	Jul	Aug	Sep	Oct
Monthly ACL - 20/40 New Rules (MW)	3,638	3,876	3,912	3,782	3,784	3,629
Monthly 5 CPk (MW)	3,532	3,664	3,641	3,417	3,607	3,427
Error (MW)	107	211	272	365	176	202
Error (%)	3.0%	5.8%	7.5%	10.7%	4.9%	5.9%
Absolute Error (MW)	218	241	292	410	199	217
Absolute Error (%)	6.2%	6.6%	8.0%	12.0%	5.5%	6.3%
ICAP (MW)	1,672	1,672	1,672	1,672	1,672	1,672
No. of Resource Observations	4,108	4,108	4,108	4,108	4,108	4,108
	WINTER					
Statistic	Nov	Dec	Jan	Feb	Mar	Apr
Monthly ACL - 20/40 New Rules (MW)	1,739	1,742	1,732	1,725	1,769	1,908
Monthly 5 CPk (MW)	1,616	1,659	1,618	1,605	1,564	1,818
Error (MW)	123	83	114	120	204	89
Error (%)	7.6%	5.0%	7.0%	7.5%	13.1%	4.9%
Absolute Error (MW)	127	95	122	122	210	132
Absolute Error (%)	7.8%	5.7%	7.6%	7.6%	13.4%	7.3%
ICAP (MW)	1,131	1,131	1,131	1,131	1,131	1,131
No. of Resource Observations	3,078	3,078	3,078	3,078	3,078	3,078

ACL 8: 10/20 Monthly ACL New vs. Monthly 5 CPk - Overall

- **Purpose: To determine whether a monthly ACL utilizing the average of the highest 10 out of 20 hours, reflects the top 5 NYCA load hours for the respective month**
- **Overall, the Monthly ACL is 6.6% higher than the Monthly 5 CPk in Summer and 6.5% higher in Winter**
- **In absolute terms, the Monthly ACL is 6.9% different from the Monthly 5 CPk in the Summer, and 6.8% different in the Winter**

ACL 8: 10/20 Monthly ACL New vs. Monthly 5 CPk – By Month

10/20 New Rules Monthly ACL Compared to the Monthly 5 CPk						
	SUMMER					
Statistic	May	Jun	Jul	Aug	Sep	Oct
Monthly ACL - 10/20 New Rules (MW)	3,674	3,932	3,903	3,731	3,794	3,654
Monthly 5 CPk (MW)	3,532	3,664	3,641	3,417	3,607	3,427
Error (MW)	142	268	262	314	186	227
Error (%)	4.0%	7.3%	7.2%	9.2%	5.2%	6.6%
Absolute Error (MW)	181	270	271	328	191	230
Absolute Error (%)	5.1%	7.4%	7.4%	9.6%	5.3%	6.7%
ICAP (MW)	1,672	1,672	1,672	1,672	1,672	1,672
No. of Resource Observations	4,108	4,108	4,108	4,108	4,108	4,108
	WINTER					
Statistic	Nov	Dec	Jan	Feb	Mar	Apr
Monthly ACL - 10/20 New Rules (MW)	1,741	1,743	1,714	1,697	1,707	1,922
Monthly 5 CPk (MW)	1,616	1,659	1,618	1,605	1,564	1,818
Error (MW)	125	84	96	92	143	104
Error (%)	7.7%	5.1%	5.9%	5.8%	9.1%	5.7%
Absolute Error (MW)	126	90	101	93	144	115
Absolute Error (%)	7.8%	5.4%	6.2%	5.8%	9.2%	6.3%
ICAP (MW)	1,131	1,131	1,131	1,131	1,131	1,131
No. of Resource Observations	3,078	3,078	3,078	3,078	3,078	3,078

ACL 9: 5/10 Monthly ACL New vs. Monthly 5 CPk - Overall

- **Purpose: To determine whether a monthly ACL utilizing the average of the highest 5 out of 10 hours, reflects the top 5 NYCA load hours for the respective month**
- **Overall, the Monthly ACL is 6.2% higher than the Monthly 5 CPk in Summer and 5.6% higher in Winter**
- **In absolute terms, the Monthly ACL is 6.2% different from the Monthly 5 CPk in the summer, and 5.6% different in the winter**

ACL 9: 5/10 Monthly ACL New vs. Monthly 5 CPk – By Month

5/10 New Rules Monthly ACL Compared to the Monthly 5 CPk						
	SUMMER					
Statistic	May	Jun	Jul	Aug	Sep	Oct
Monthly ACL - 5/10 New Rules (MW)	3,728	3,945	3,909	3,655	3,739	3,639
Monthly 5 CPk (MW)	3,532	3,664	3,641	3,417	3,607	3,427
Error (MW)	196	280	269	239	131	212
Error (%)	5.6%	7.6%	7.4%	7.0%	3.6%	6.2%
Absolute Error (MW)	196	280	269	239	131	212
Absolute Error (%)	5.6%	7.7%	7.4%	7.0%	3.6%	6.2%
ICAP (MW)	1,672	1,672	1,672	1,672	1,672	1,672
No. of Resource Observations	4,108	4,108	4,108	4,108	4,108	4,108
	WINTER					
Statistic	Nov	Dec	Jan	Feb	Mar	Apr
Monthly ACL - 5/10 New Rules (MW)	1,728	1,741	1,713	1,693	1,648	1,913
Monthly 5 CPk (MW)	1,616	1,659	1,618	1,605	1,564	1,818
Error (MW)	112	82	96	88	84	95
Error (%)	6.9%	4.9%	5.9%	5.5%	5.4%	5.2%
Absolute Error (MW)	112	82	96	88	84	95
Absolute Error (%)	6.9%	4.9%	5.9%	5.5%	5.4%	5.2%
ICAP (MW)	1,131	1,131	1,131	1,131	1,131	1,131
No. of Resource Observations	3,078	3,078	3,078	3,078	3,078	3,078

ACL 7-9: Comparison Tables – Error, Overall

Comparison of Monthly ACL to Monthly 5 CPk - NEW Rules					
	Summer				
	No. of Resources (% of Total)	% ICAP	% Error		
	20/40, 10/20, 5/10	20/40, 10/20, 5/10	20/40	10/20	5/10
Overall	**100%**	**100%**	**6.3%**	**6.6%**	**6.2%**
By Size:					
Small	20%	2%	18.3%	20.7%	20.4%
Medium	70%	20%	9.0%	10.9%	11.1%
Large	10%	78%	5.6%	5.5%	5.1%
By Variability:	0%	0%			
Low	24%	46%	1.8%	2.6%	3.0%
Medium	41%	42%	7.5%	7.2%	6.4%
High	35%	12%	31.8%	32.1%	29.6%

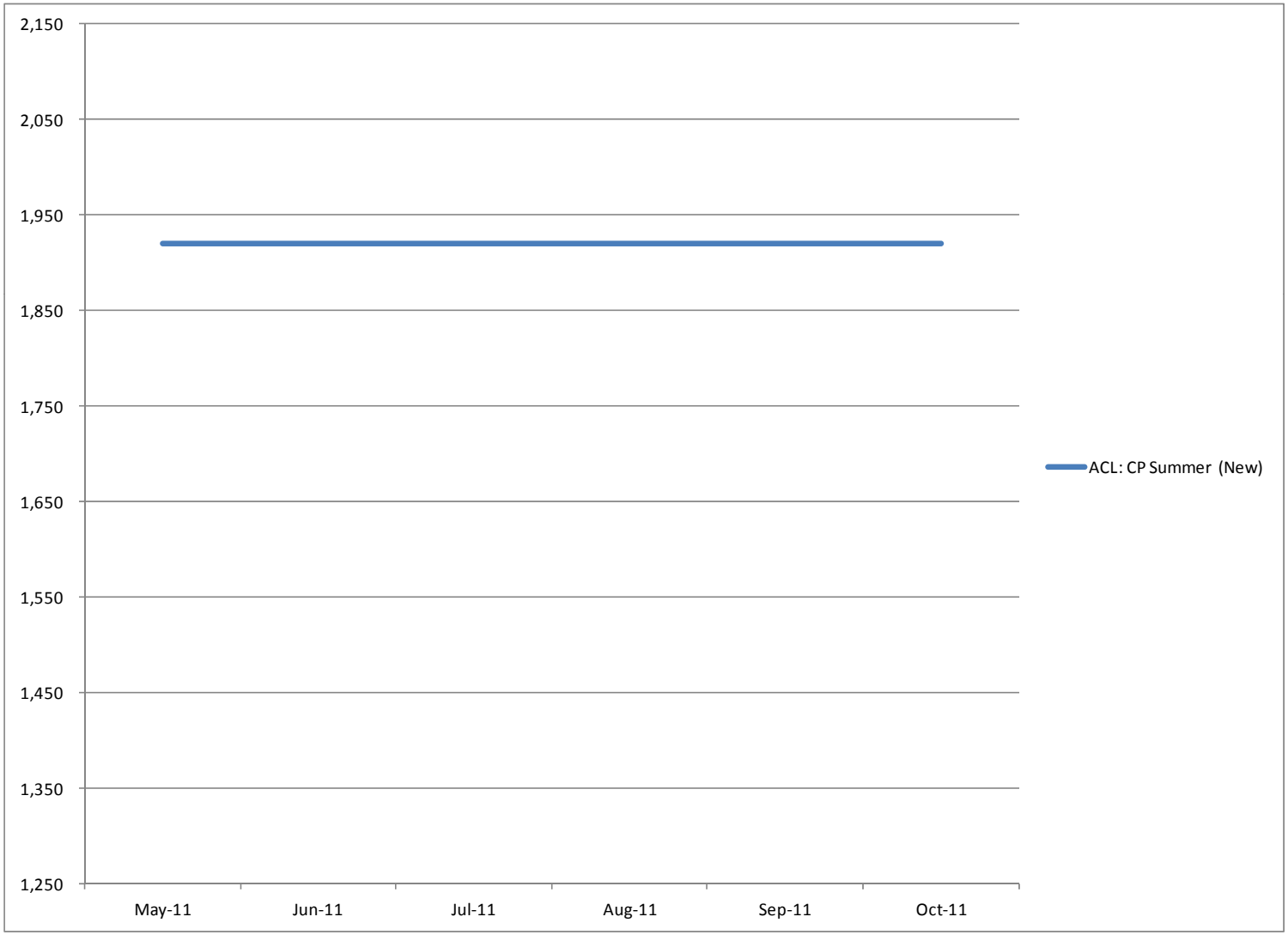
Comparison of Monthly ACL to Monthly 5 CPk - NEW Rules					
	Winter				
	No. of Resources (% of Total)	% ICAP	% Error		
	20/40, 10/20, 5/10	20/40, 10/20, 5/10	20/40	10/20	5/10
Overall	**100%**	**100%**	**7.4%**	**6.5%**	**5.6%**
By Size:					
Small	27%	3%	18.4%	15.2%	12.2%
Medium	65%	27%	9.4%	8.2%	7.1%
Large	8%	71%	6.6%	5.8%	5.0%
By Variability:	0%	0%			
Low	26%	18%	4.4%	4.2%	3.7%
Medium	42%	65%	6.5%	5.7%	4.8%
High	31%	17%	27.2%	22.7%	20.1%

ACL 7-9: Monthly ACL Comparison – Error, by Month

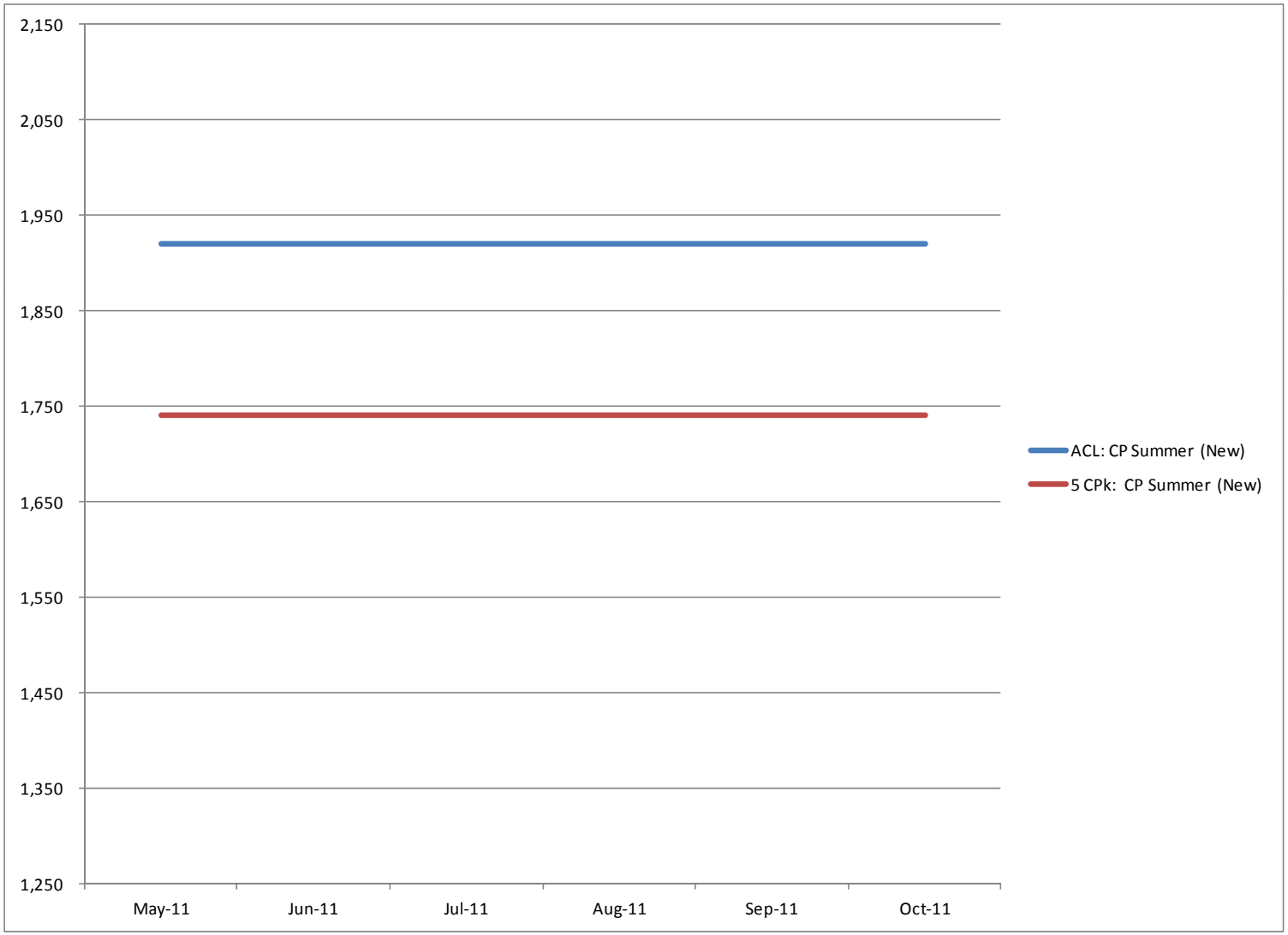
New Rules Monthly ACL Compared to the Monthly 5 CPk						
	SUMMER					
% Error	May	Jun	Jul	Aug	Sep	Oct
Monthly ACL (20/40 New Rules)	3.0%	5.8%	7.5%	10.7%	4.9%	5.9%
Monthly ACL (10/20 New Rules)	4.0%	7.3%	7.2%	9.2%	5.2%	6.6%
Monthly ACL (5/10 New Rules)	14.2%	7.6%	7.4%	7.0%	3.6%	6.2%
	WINTER					
% Error	Nov	Dec	Jan	Feb	Mar	Apr
Monthly ACL (20/40 New Rules)	7.6%	5.0%	7.0%	7.5%	13.1%	4.9%
Monthly ACL (10/20 New Rules)	7.7%	5.1%	5.9%	5.8%	9.1%	5.7%
Monthly ACL (5/10 New Rules)	6.9%	4.9%	5.9%	5.5%	5.4%	5.2%

Building the Comparison Charts

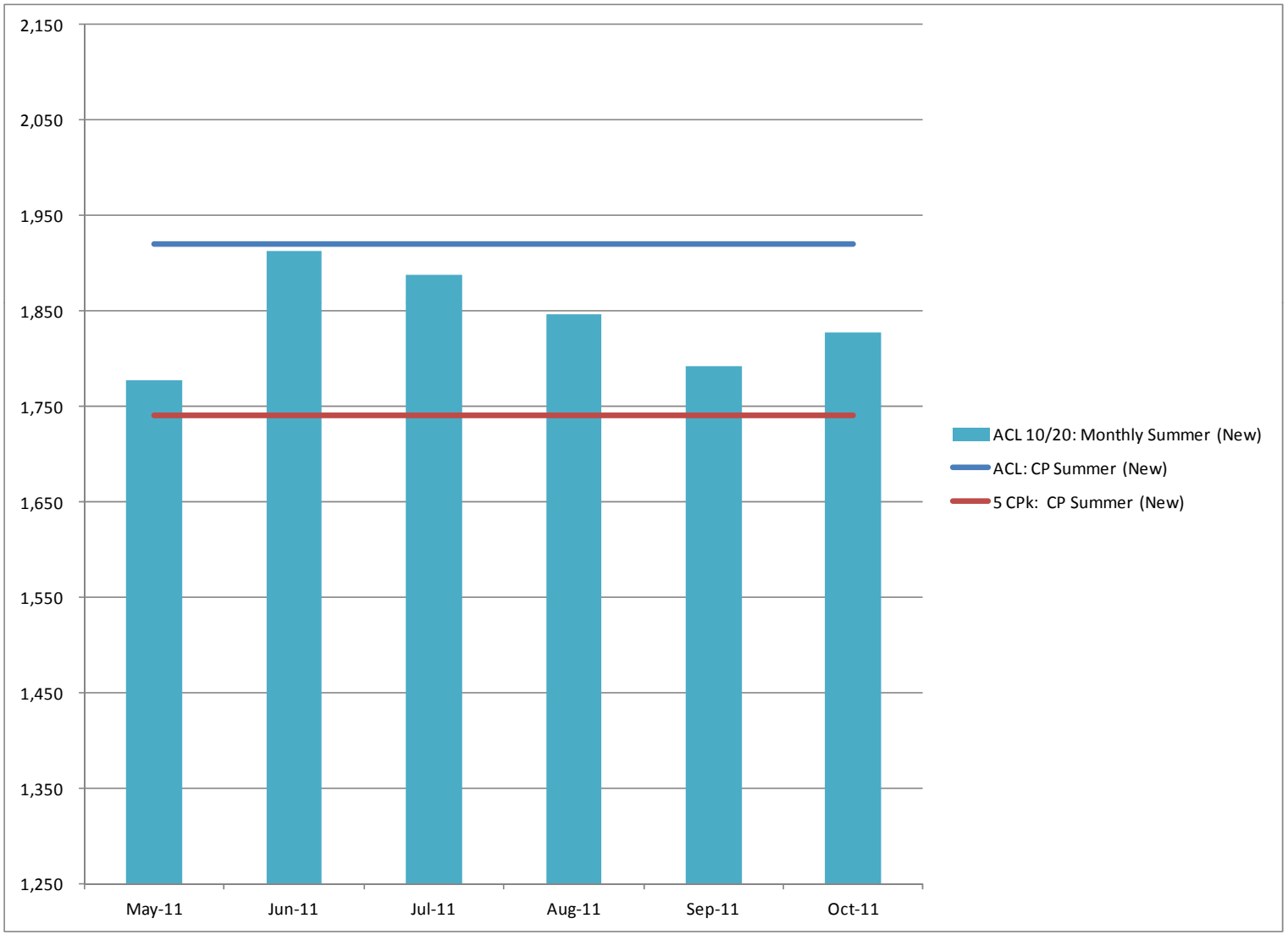
Summer 2011- start with CP ACL



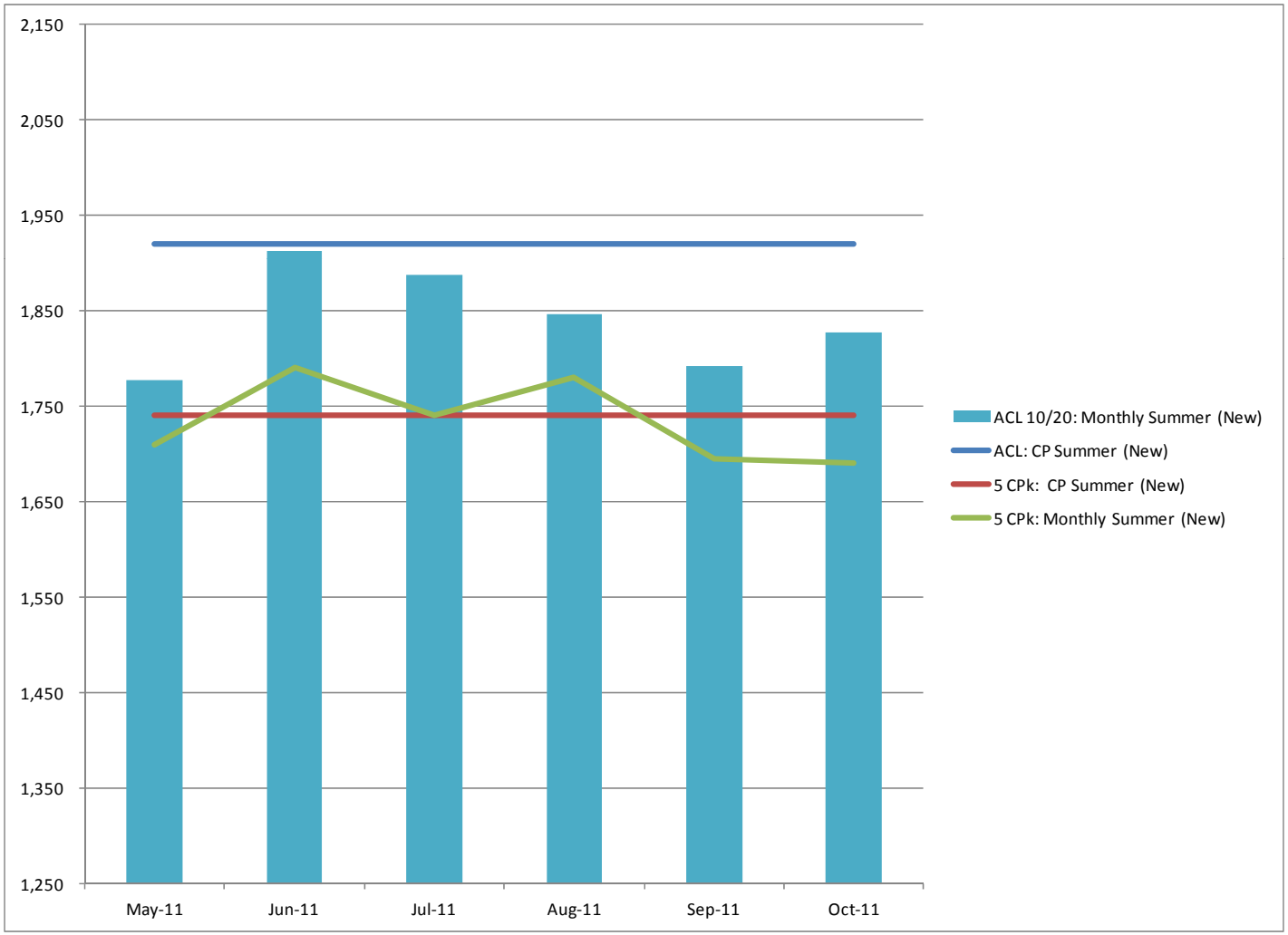
Summer 2011 – add the CP 5 CPk



Summer 2011 – add Monthly ACLs

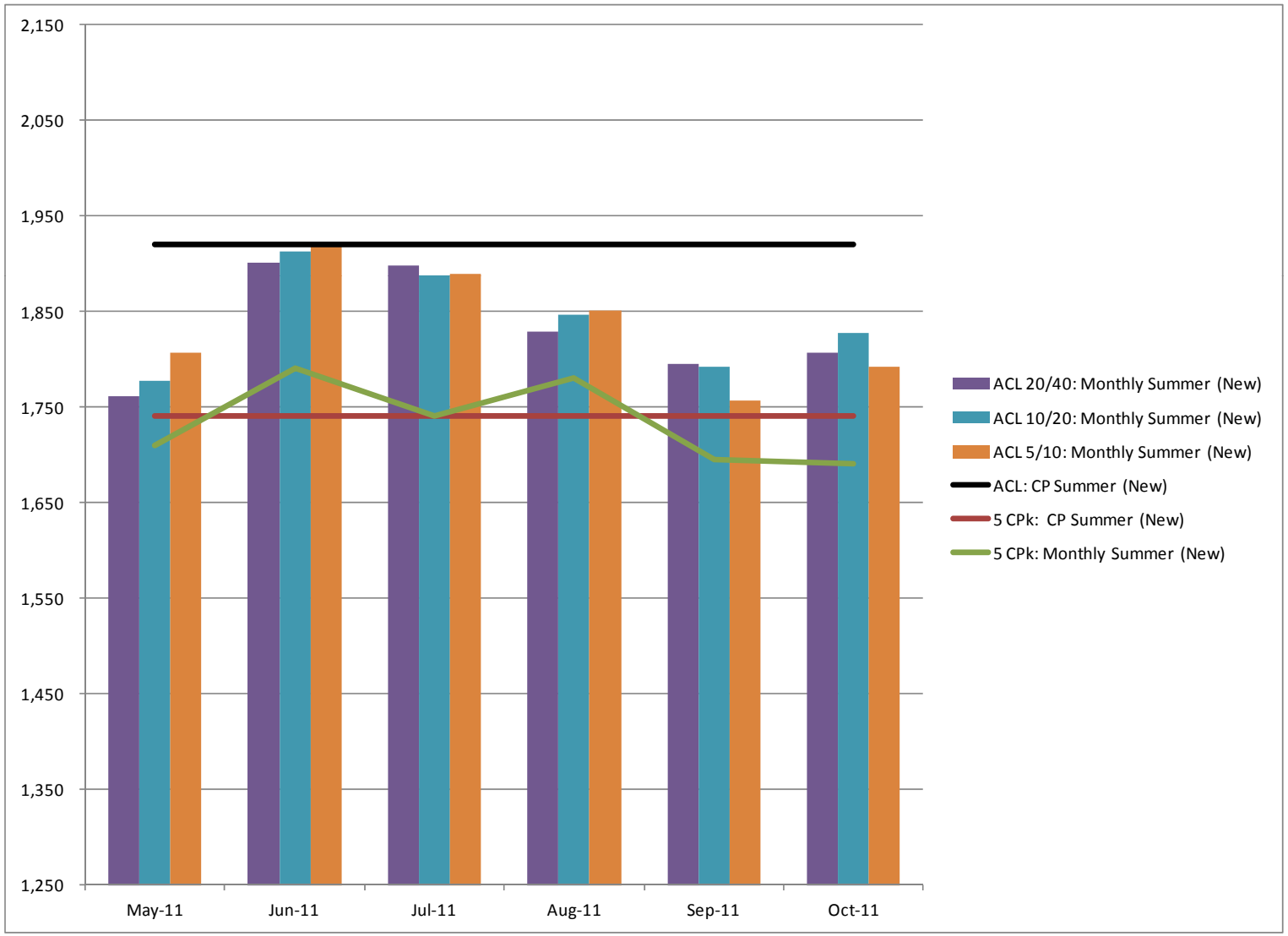


Summer 2011 – add the Monthly 5 CPk



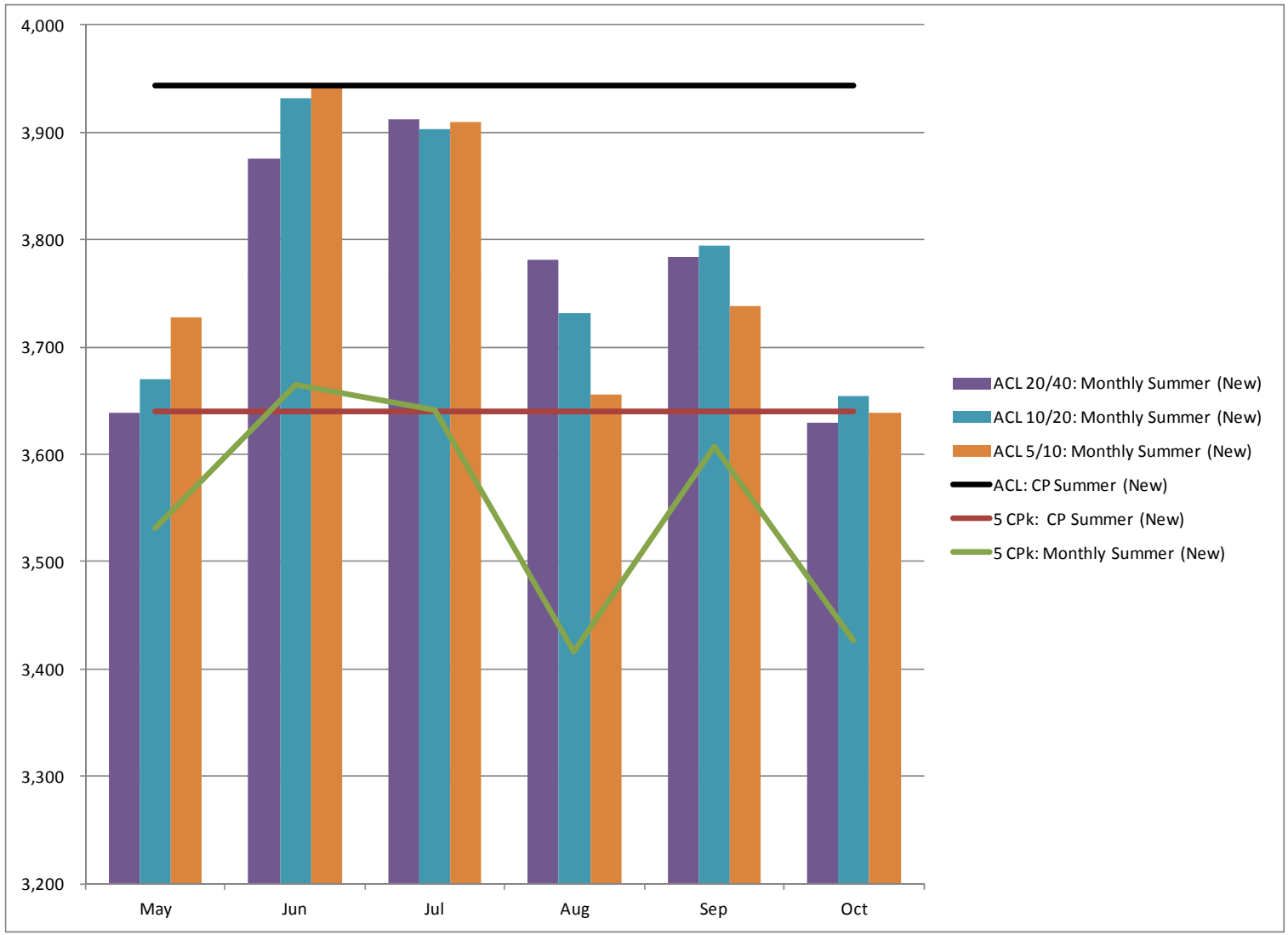
ACL Comparison Charts

Comparison of CP and Monthly ACLs and 5 CPks – Summer 2011

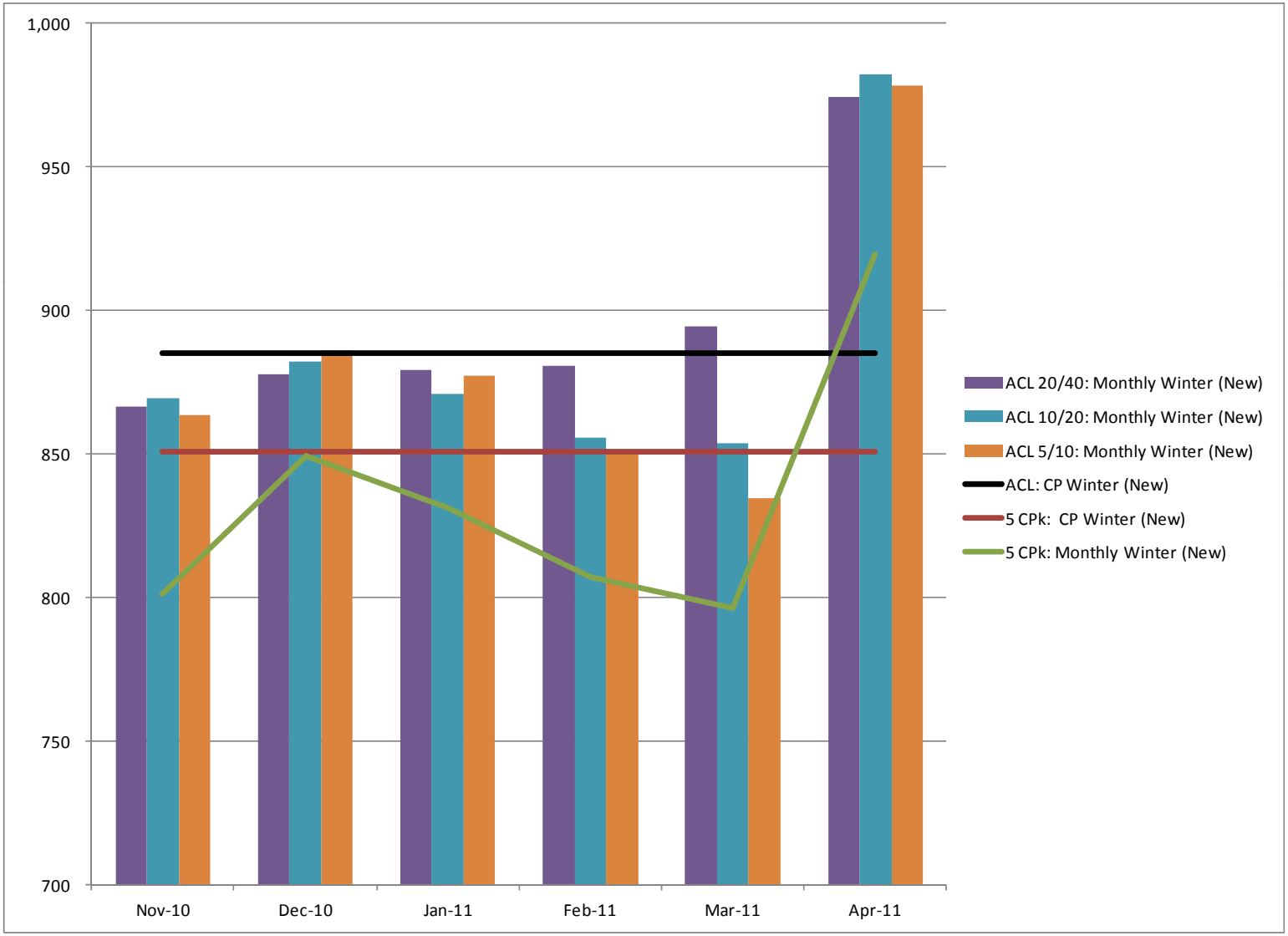


Comparison of CP and Monthly ACLs and 5 CPks – Summer 2012

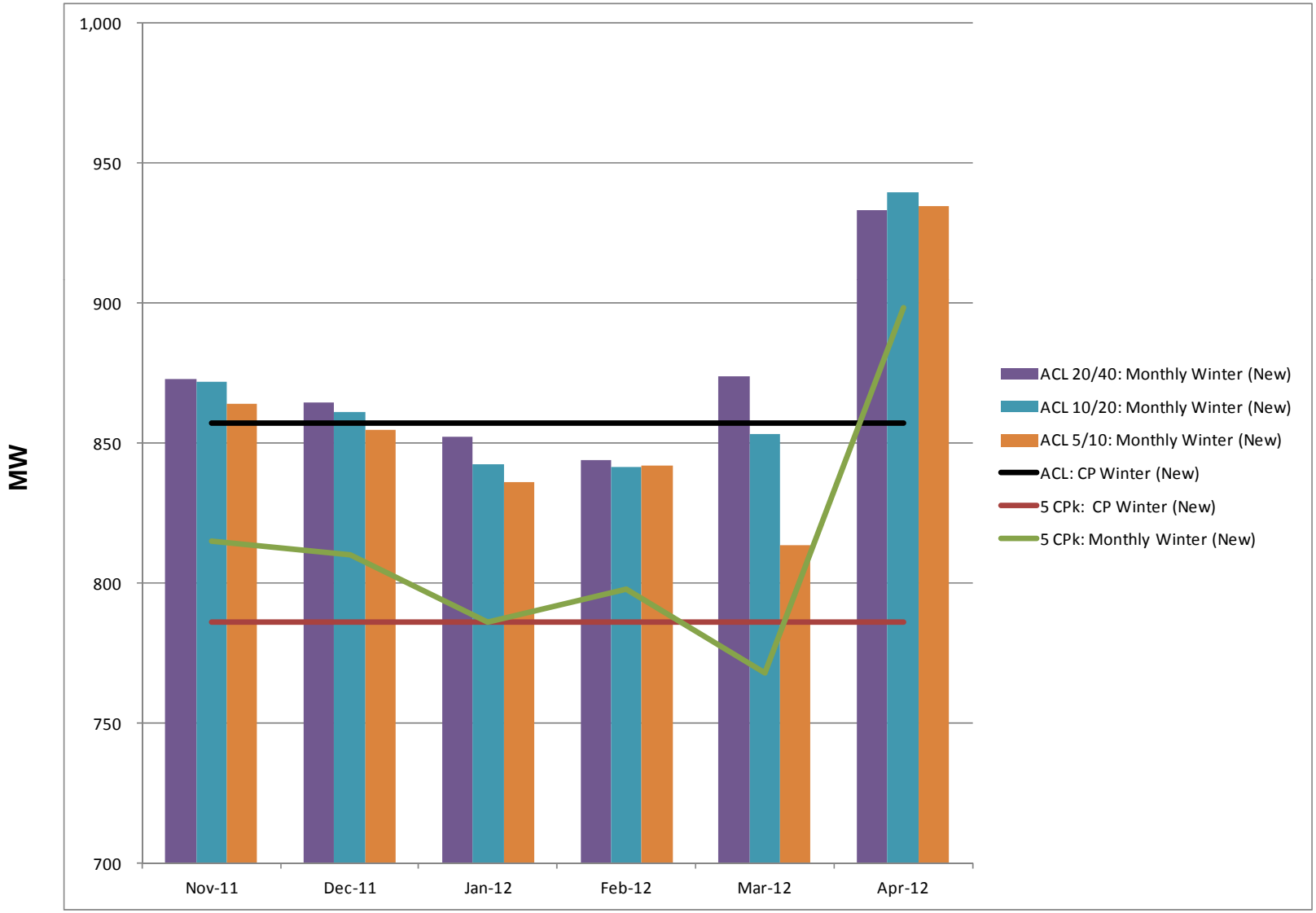
Comparison of CP and Monthly ACLs and 5 CPks – Summer Overall (2011 & 2012)



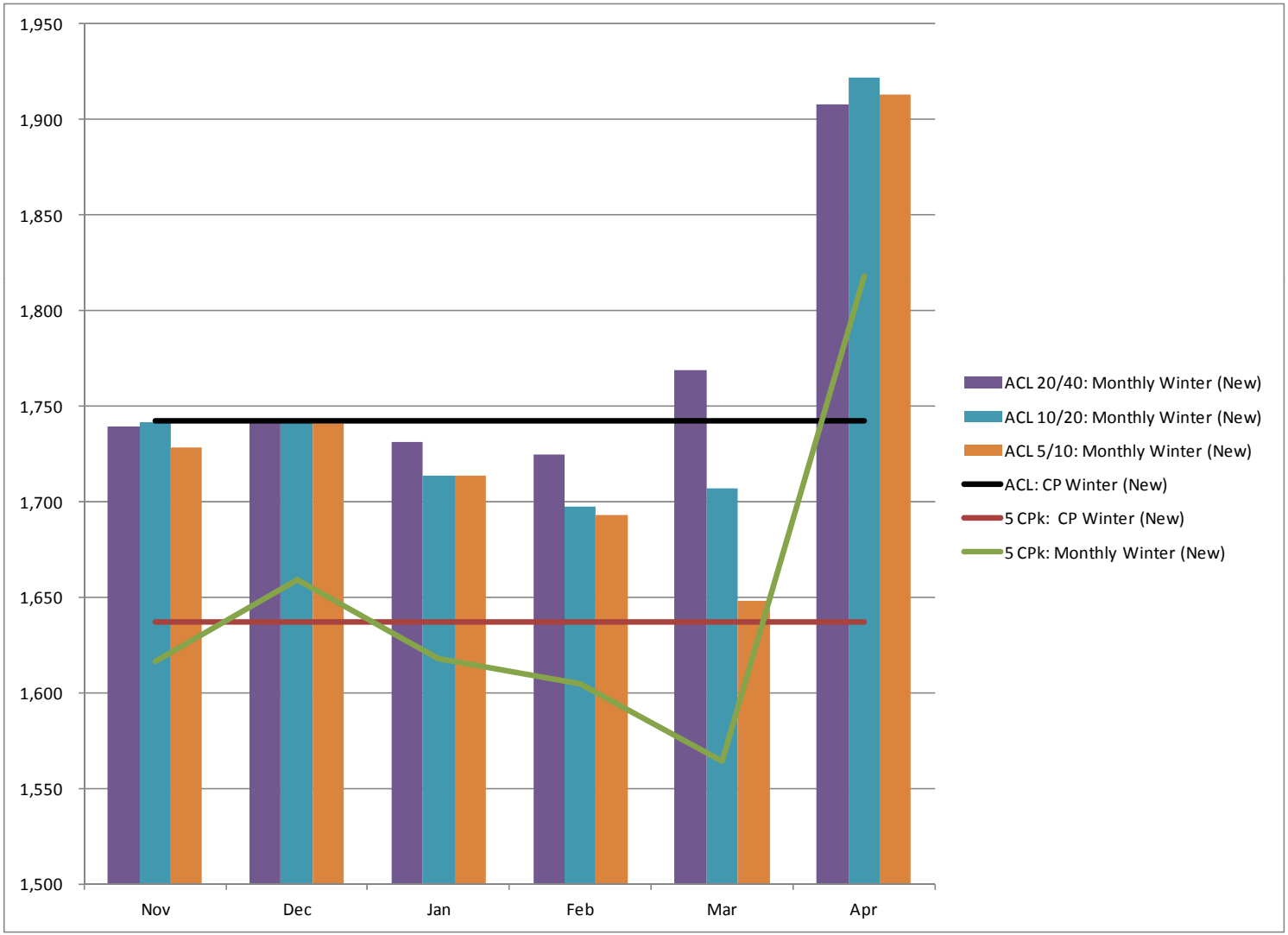
Comparison of CP and Monthly ACLs and 5 CPks – Winter 2010/2011



Comparison of CP and Monthly ACLs and 5 CPks – Winter 2011/2012



Comparison of CP and Monthly ACLs and 5 CPks – Winter Overall (2010/2011 & 2011/2012)



Best Monthly ACL Results

- **The Monthly 10 of 20 ACL performs the best at measuring the available capacity of resources during the course of both peak and shoulder months**
- **The NYISO bases this performance on the difference and error associated with the monthly 10 of 20, when compared to the new CP ACL, the monthly 5 CPk, and to the other monthly ACLs**

Monthly 10 of 20 Comparison

- **CP ACL comparison:**

Comparison of Capability Period ACL to Monthly ACL - NEW Rules					
	Summer				
	No. of Resources (% of Total)	% ICAP	% Difference		
	20/40, 10/20, 5/10	20/40, 10/20, 5/10	20/40	10/20	5/10
Overall	**100%**	**100%**	**4.6%**	**4.3%**	**4.6%**
By Size:					
Small	20%	2%	7.0%	4.9%	5.2%
Medium	70%	20%	7.1%	5.3%	5.1%
Large	10%	78%	4.0%	4.1%	4.5%
By Variability:					
Low	24%	46%	6.3%	5.4%	5.1%
Medium	41%	42%	3.7%	3.9%	4.7%
High	35%	12%	-0.3%	-0.6%	1.4%

Comparison of Capability Period ACL to Monthly ACL - NEW Rules					
	Winter				
	No. of Resources (% of Total)	% ICAP	% Difference		
	20/40, 10/20, 5/10	20/40, 10/20, 5/10	20/40	10/20	5/10
Overall	**100%**	**100%**	**-1.5%**	**-0.7%**	**0.2%**
By Size:					
Small	27%	3%	-5.3%	-2.6%	-0.1%
Medium	65%	27%	-2.1%	-1.1%	-0.1%
Large	8%	71%	-1.2%	-0.5%	0.2%
By Variability:					
Low	26%	18%	-1.4%	-1.2%	-0.7%
Medium	42%	65%	-0.8%	0.0%	0.8%
High	31%	17%	-5.8%	-2.4%	-0.2%

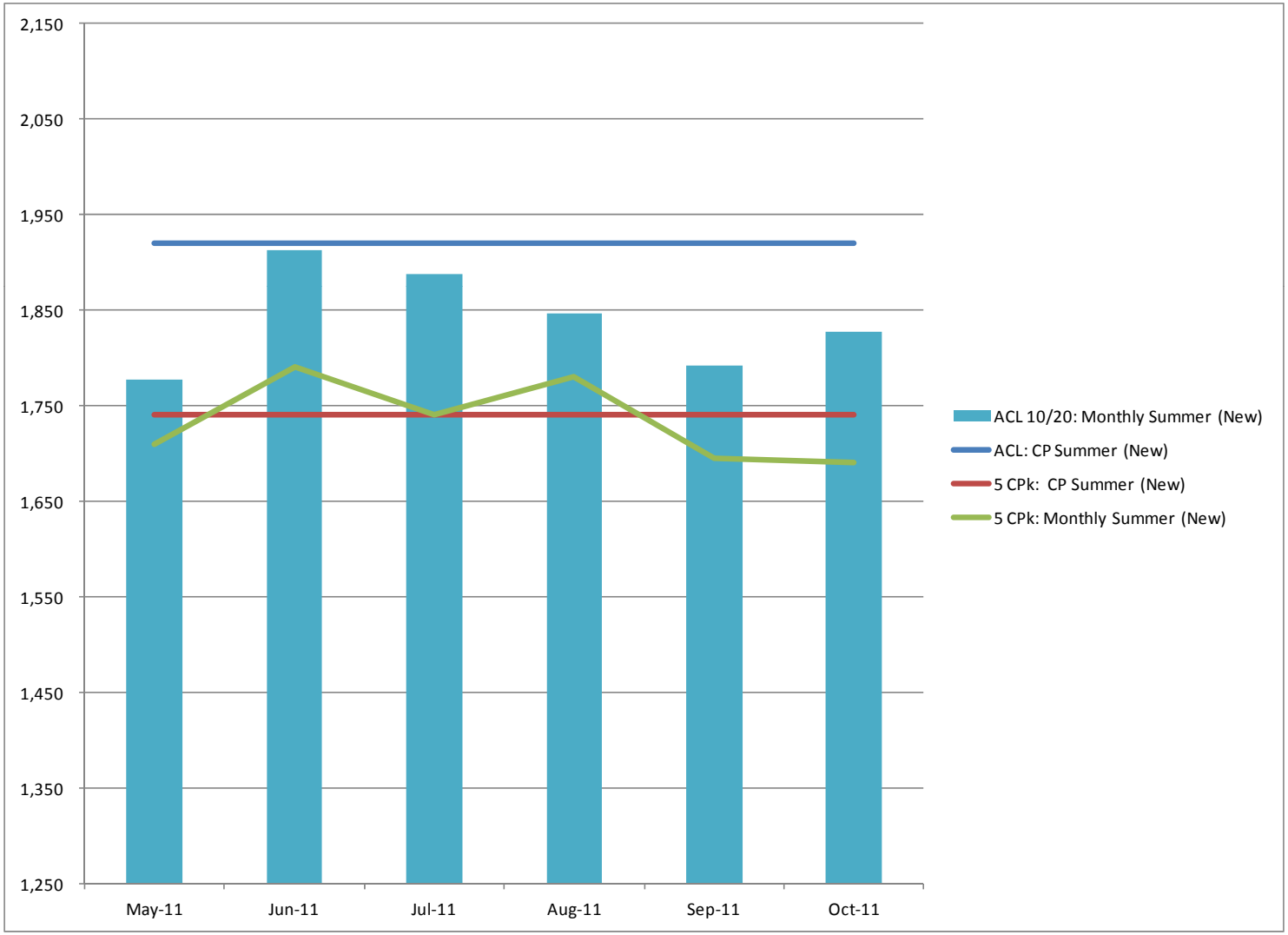
Monthly 10 of 20 Comparison (cont.)

- **Monthly 5 CPk comparison**

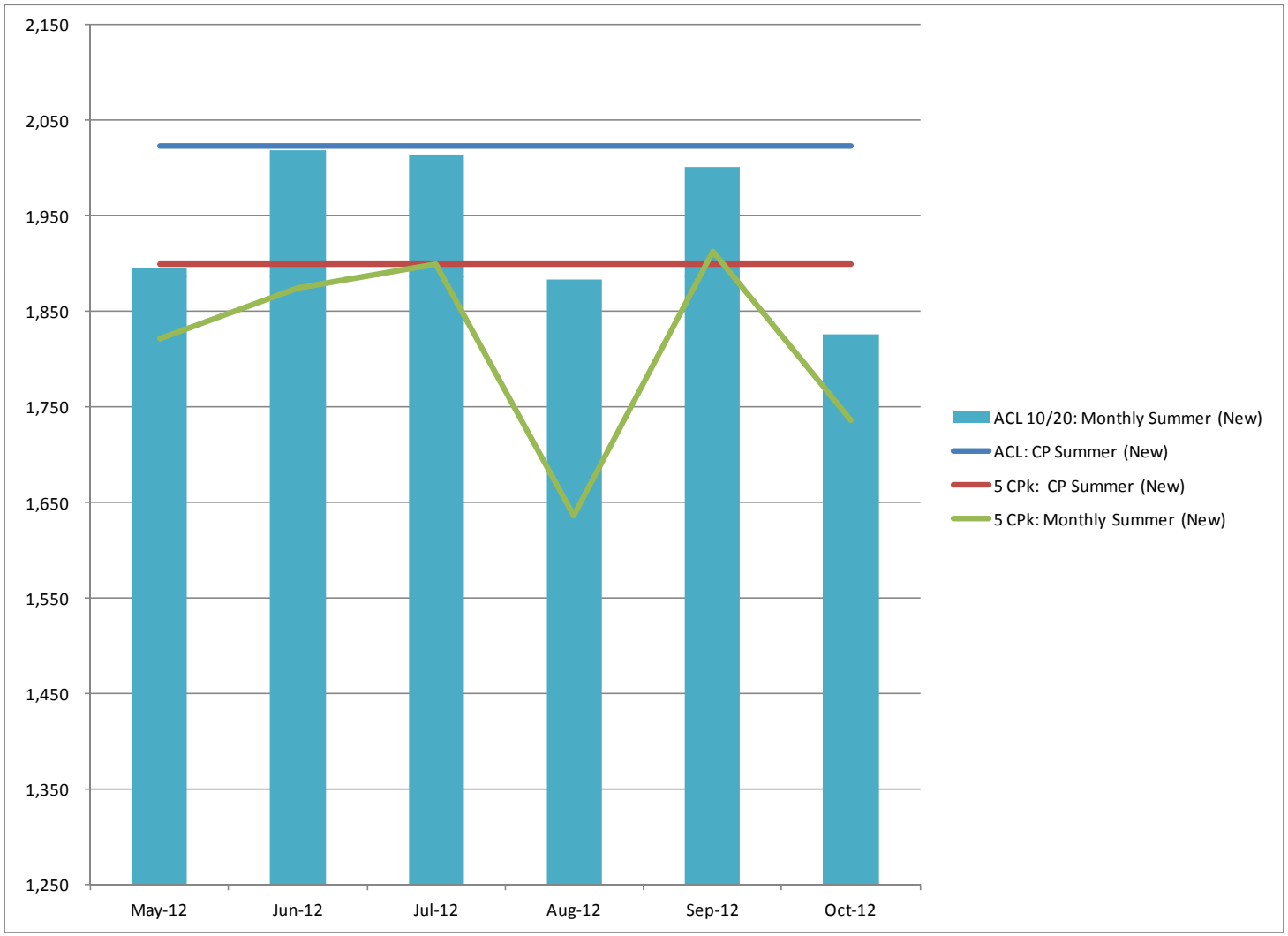
Comparison of Monthly ACL to Monthly 5 CPk - NEW Rules					
	Summer				
	No. of Resources (% of Total)	% ICAP	% Error		
	20/40, 10/20, 5/10	20/40, 10/20, 5/10	20/40	10/20	5/10
Overall	**100%**	**100%**	**6.3%**	**6.6%**	**6.2%**
By Size:					
Small	20%	2%	18.3%	20.7%	20.4%
Medium	70%	20%	9.0%	10.9%	11.1%
Large	10%	78%	5.6%	5.5%	5.1%
By Variability:	0%	0%			
Low	24%	46%	1.8%	2.6%	3.0%
Medium	41%	42%	7.5%	7.2%	6.4%
High	35%	12%	31.8%	32.1%	29.6%

Comparison of Monthly ACL to Monthly 5 CPk - NEW Rules					
	Winter				
	No. of Resources (% of Total)	% ICAP	% Error		
	20/40, 10/20, 5/10	20/40, 10/20, 5/10	20/40	10/20	5/10
Overall	**100%**	**100%**	**7.4%**	**6.5%**	**5.6%**
By Size:					
Small	27%	3%	18.4%	15.2%	12.2%
Medium	65%	27%	9.4%	8.2%	7.1%
Large	8%	71%	6.6%	5.8%	5.0%
By Variability:	0%	0%			
Low	26%	18%	4.4%	4.2%	3.7%
Medium	42%	65%	6.5%	5.7%	4.8%
High	31%	17%	27.2%	22.7%	20.1%

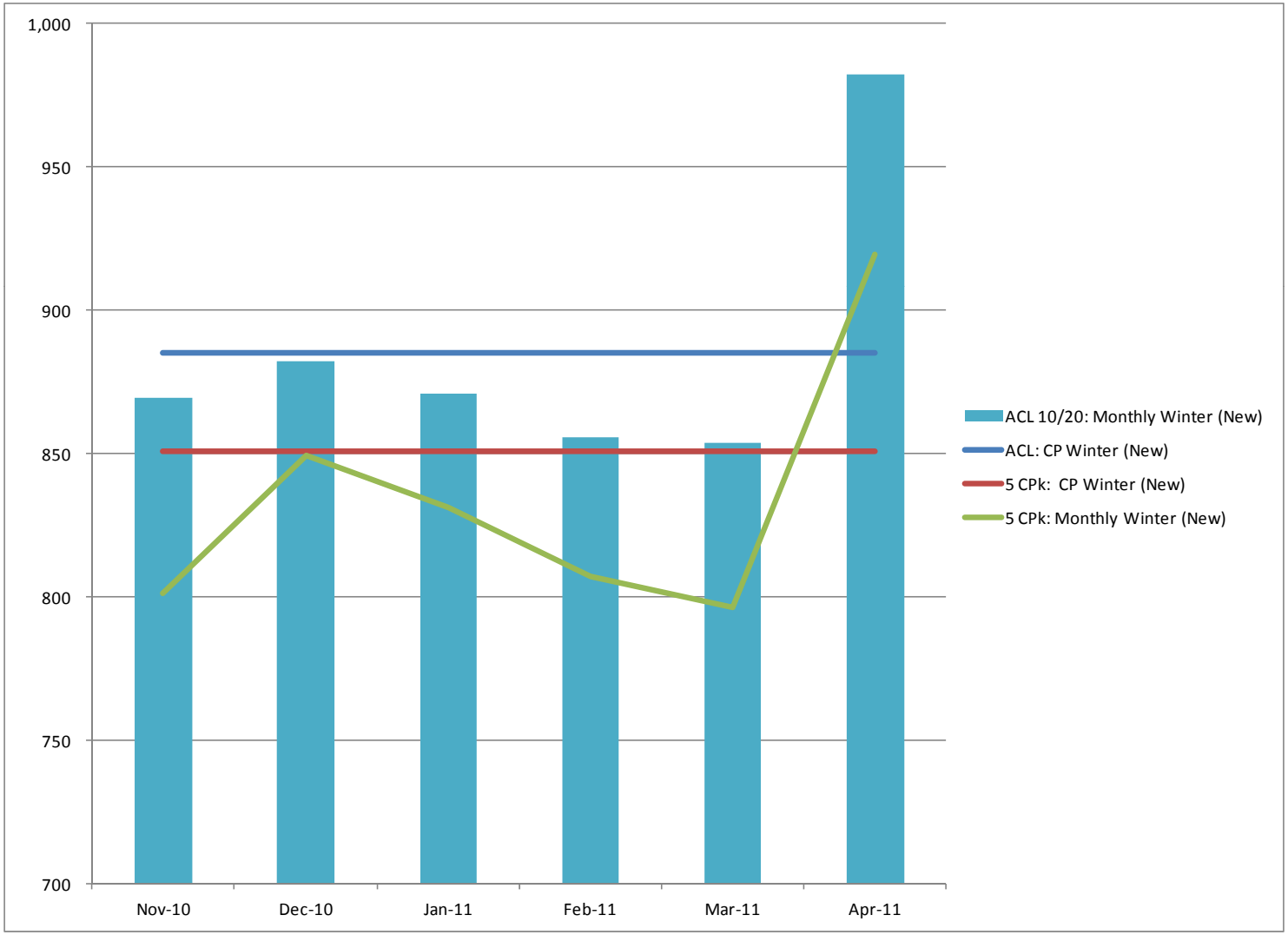
Summer 2011



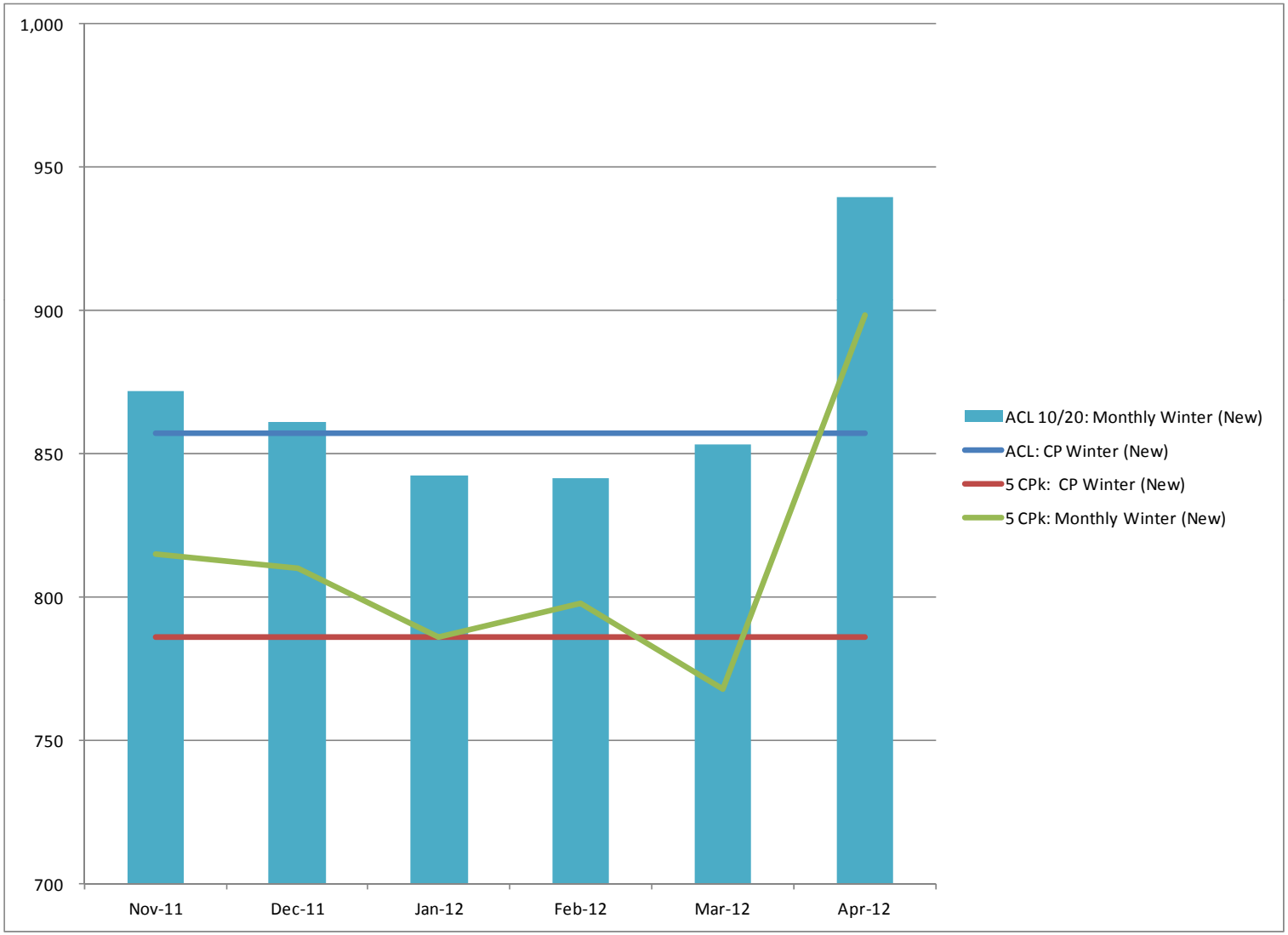
Summer 2012



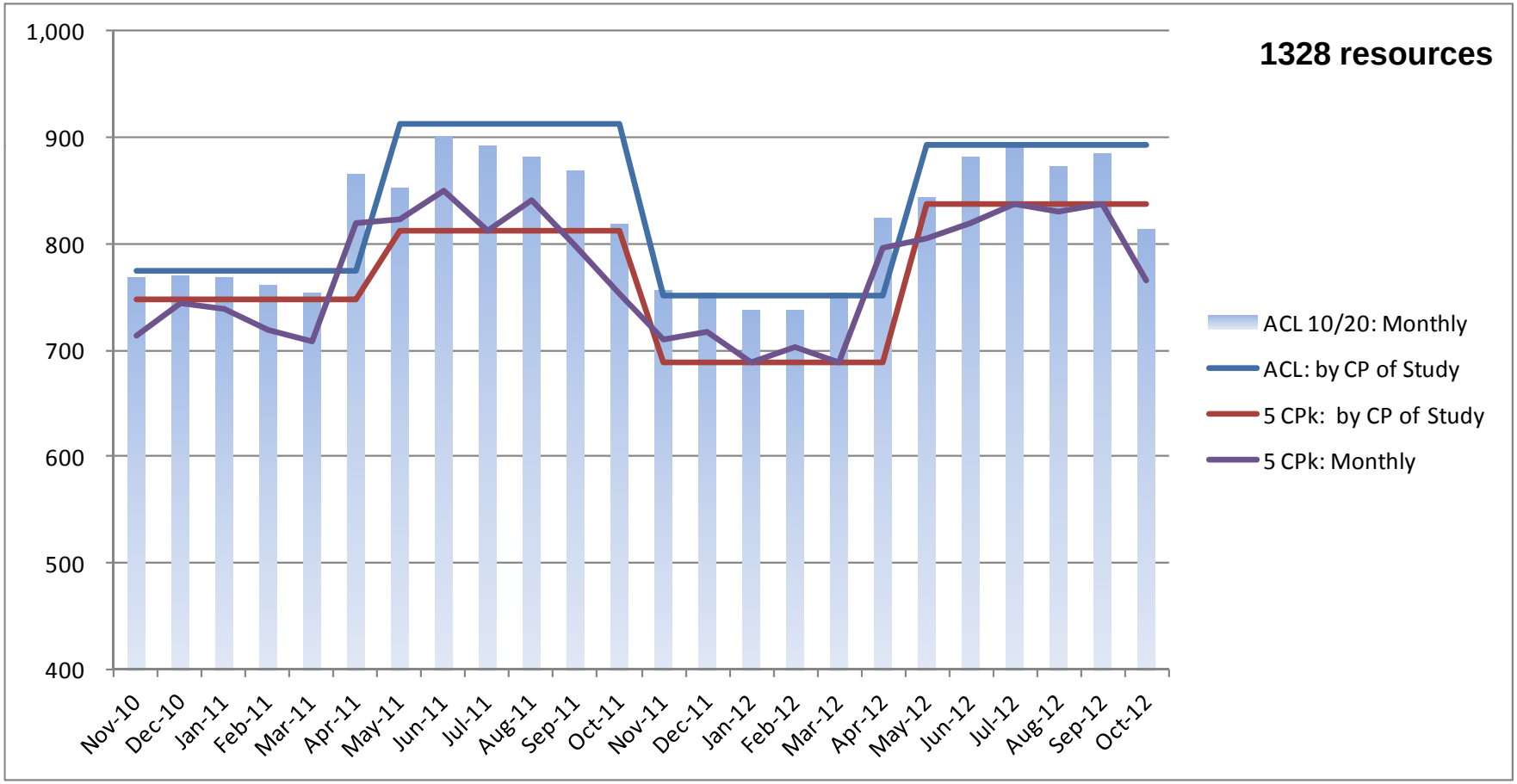
Winter 2010 - 2011



Winter 2011-2012



Entire Study – Resources included in the study, in both Winter and Summer



Observations: ACL

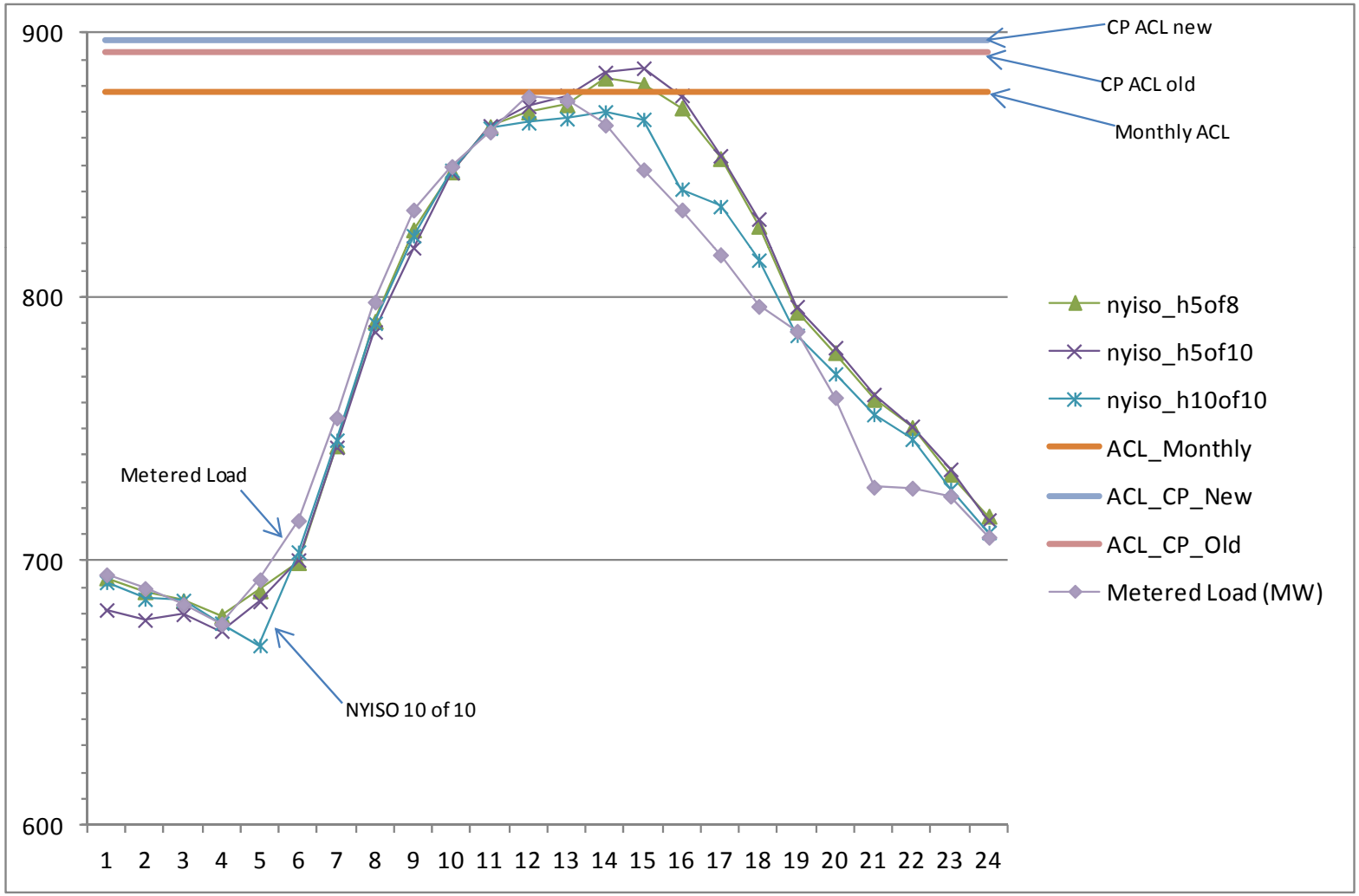
- **Current ACL reflects the coincident load of the resource close to what was expected**
  - ***Estimated difference between the ACL and CP 5 CPk from previous baseline study showed that the CP 5 CPk understated proposed ACL by 5.4% (October 29, 2010 ICAPWG presentation)***
  - ***Current study shows 5 CPk understating the ACL by up to 8% in Summer and 6% in Winter***
    - **Given the diversity of the larger sample size, the expanded hours of the ACL, and two Capability Periods analyzed for each season in this study, the increase from the first study is not significant**
- **CP ACL tends to overstate capability in the shoulder months when load is lower than the months from which the current CP ACL is calculated**
  - ***Monthly ACL better reflects load levels than CP ACL***
- **5 CPk is lower than the ACL, regardless of basis: Capability Period or Monthly**

Task 3
Combination of ACL and CBL

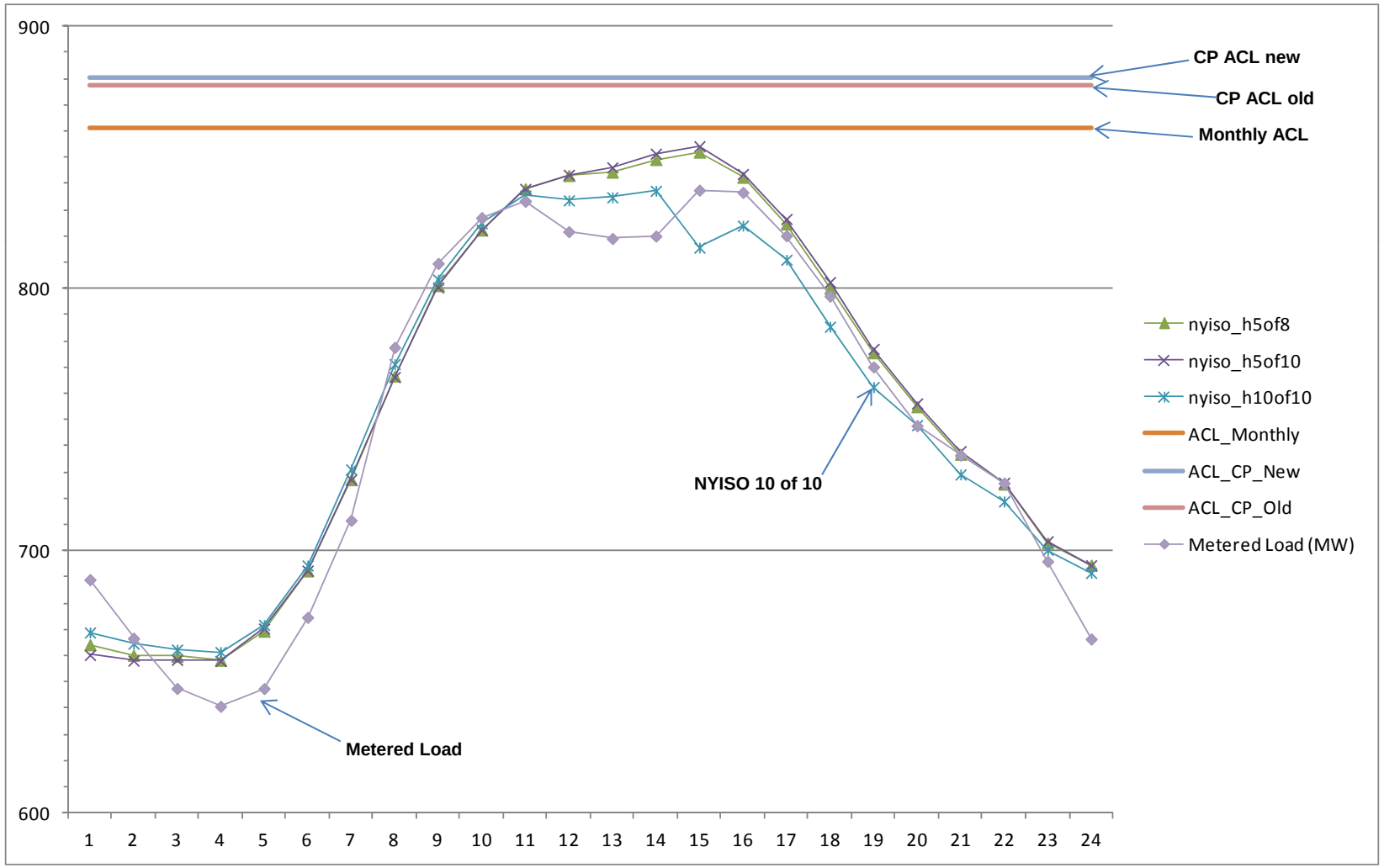
Task 3: Combination of ACL and CBL

- **Task 3 analyzes and evaluates a combination of a capacity baseline (ACL) to use for market participation/ enrollment and energy baseline (CBL) to use for performance evaluation exists.**
- **Compared**
  - ***Capability ACL (both old and new hours)***
  - ***Monthly ACL (10 of 20 hours)***
  - ***Three NYISO CBLs with uncapped Multiplicative adjustments (5 of 8, 5 of 10 and 10 of 10)***
- **Comparison done for four event-like days, one from each Capability Period**
  - ***July 12, 2011 (31,623.7 MW peak NYCA load)***
  - ***August 3, 2012 (30,989.3 MW peak NYCA load)***
  - ***December 14, 2010 (24,653.7 MW peak NYCA load)***
  - ***January 3, 2012 (23,900.9 MW peak NYCA load)***

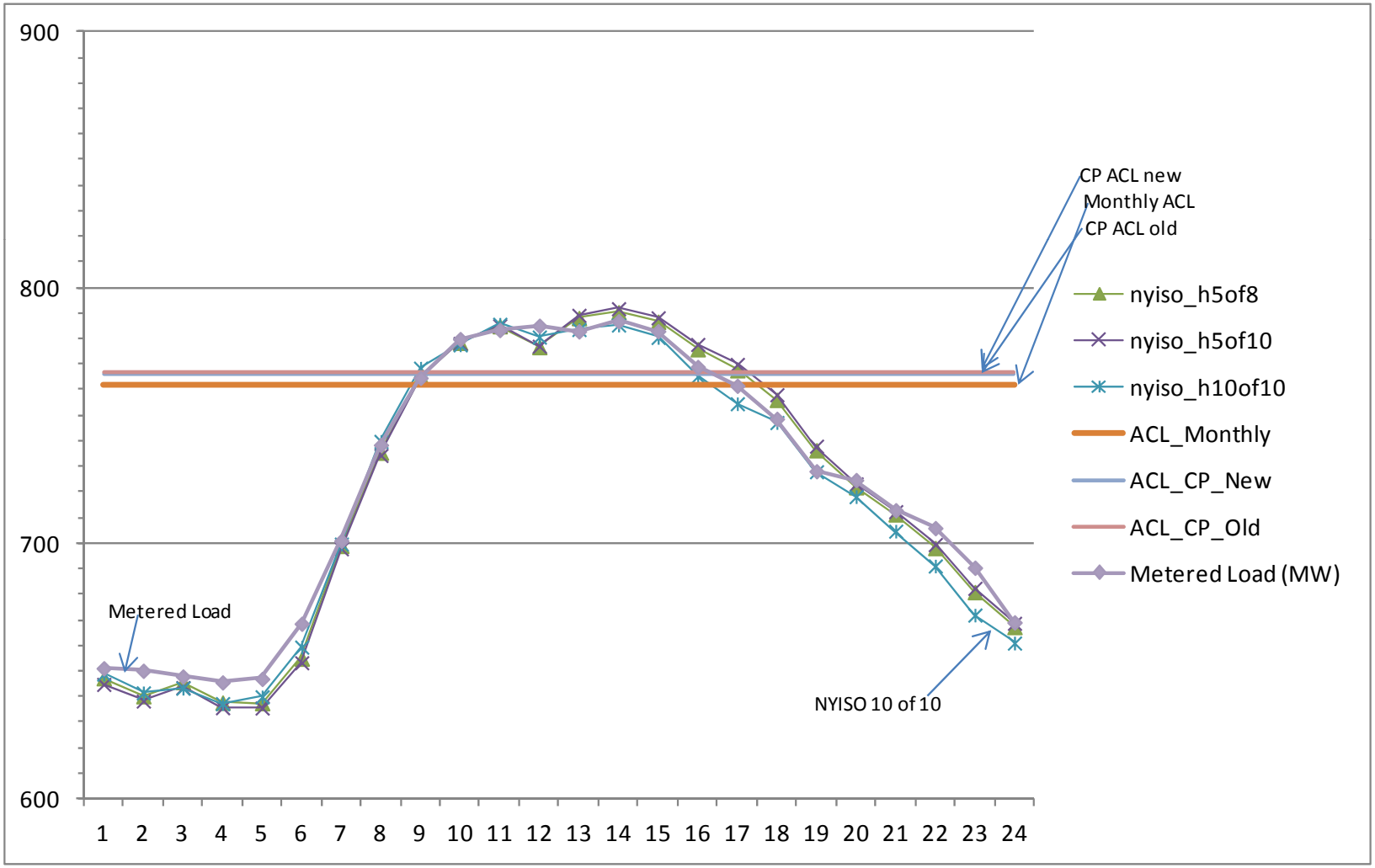
Event-Like Day: July 12, 2011



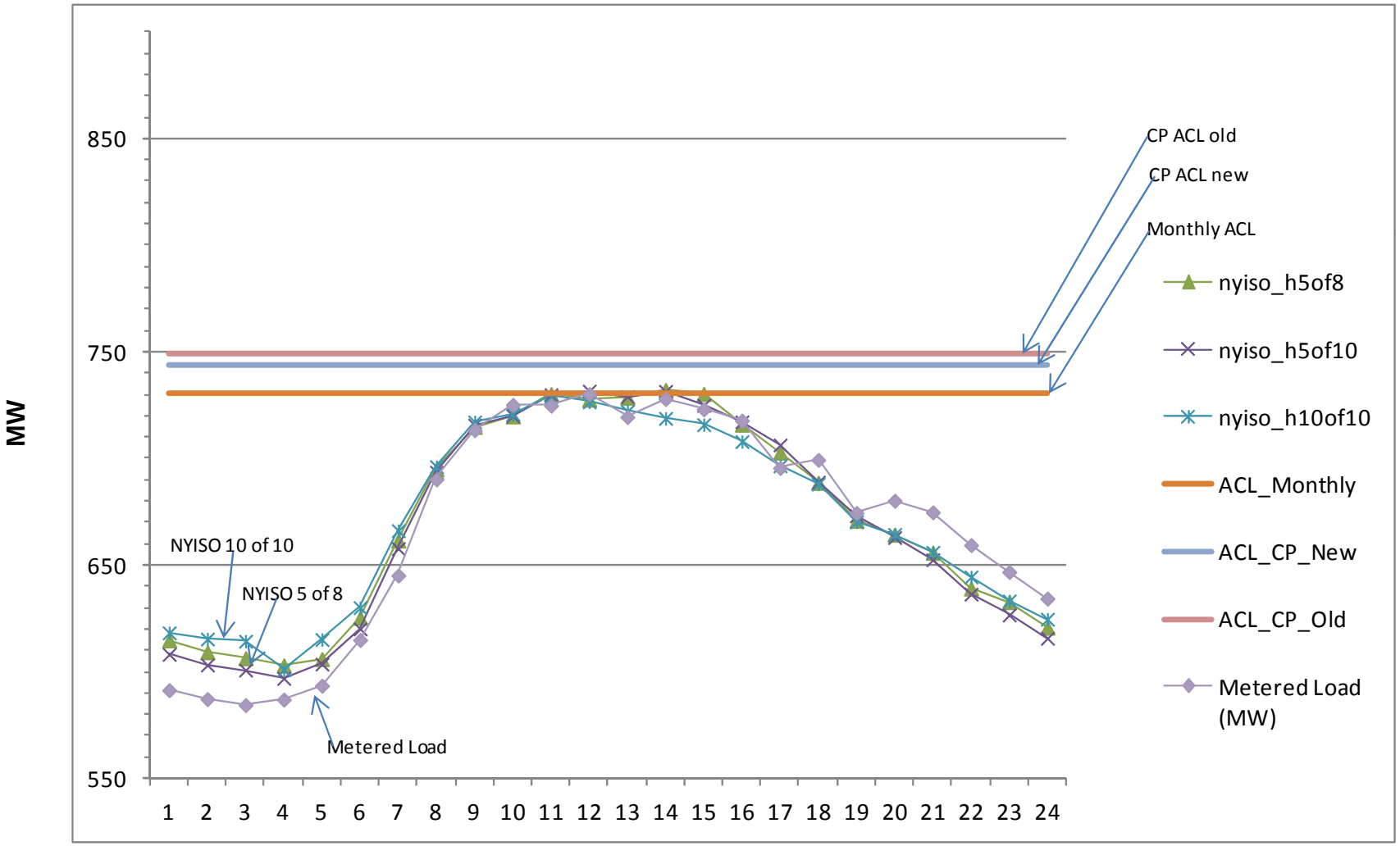
Event-Like Day: August 3, 2012



Event-Like Day: December 14, 2010



Event-Like Day: January 3, 2012



Observations: CBL

- **The three candidate NYISO CBLs are performing comparably and among the best in the industry for accuracy, bias and variability**
- **Highly variable loads may need a separate CBL and/or in-day adjustment type**
  - ***PJM currently uses a separate CBL for highly variable loads***

Observations: CBL (cont.)

- **Uncapped multiplicative adjustment, tested very well in the baseline analysis**
  - ***However, this study, as in previous studies, shows that a significant weakness of unbounded multiplicative adjustments is that in rare cases they can produce gross inaccuracies***
  - ***Accordingly, a reasonably established boundary, (e.g., 99th percentile of observed multiplicative adjustments) should adopted to address this deficiency***
- **The inherent qualities of highly variable loads do not lend themselves to a baseline methods based on previous load patterns**
- **Accordingly, alternative approaches to determine these resources contributions should be considered**

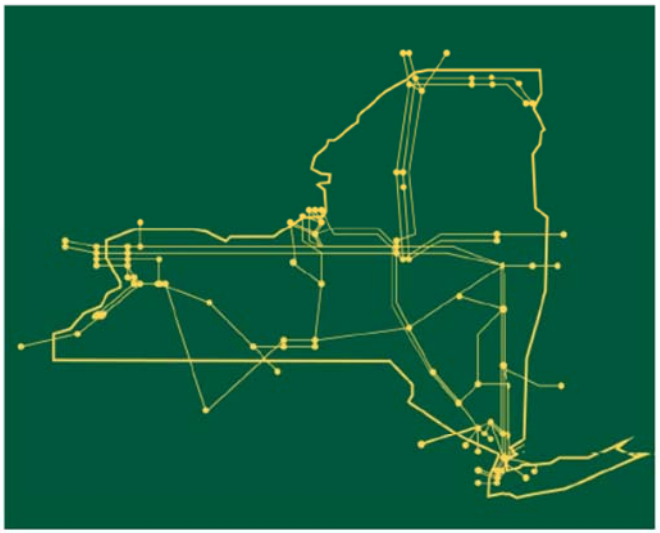
Observations: ACL

- **ACL reflects the coincident load of the resource as expected**
- **CP ACL tends to overstate capability in the shoulder months when load is lower than the months from which the ACL is calculated**
  - ***Monthly ACL better reflects load levels than CP ACL***
- **5 CPk is lower than the ACL, regardless of basis: Capability Period or Monthly**

Next Steps

- **NYISO invites written comments on the SCR Baseline results presented**
  - ***Send to Debbie Eckels (deckels@nyiso.com) by Friday, January 3, 2014***
- **NYISO and DNV KEMA to complete the SCR Baseline Study Report and Recommendations**
  - ***Post the final report to NYISO's website late January/early February***
- **Stakeholders will have the opportunity to provide comments on the SCR Baseline Study Report**
- **NYISO Management Response to SCR Baseline Study Report in Q2 2014**

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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