Selecting the Customer Base Line (CBL) Protocol

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Protocol Background

- Goals for establishing customer baselines:
  - Keep the protocol simple!
  - Allow for a simple adjustment for customers that are weather sensitive.

- Current Operational Models:
  - **CAISO**: Uses the average of the previous ten business days.
  - **NYISO**[1]: Effectively uses the average of the five highest days of load in previous ten business days.
  - I**SONE**[1]: Effectively uses the average of previous ten business days trued-up to two hours prior to control.
  - **PJM**-PEPCo: Matched day approach with true-up.

[1] These protocols have slightly more complex rules…

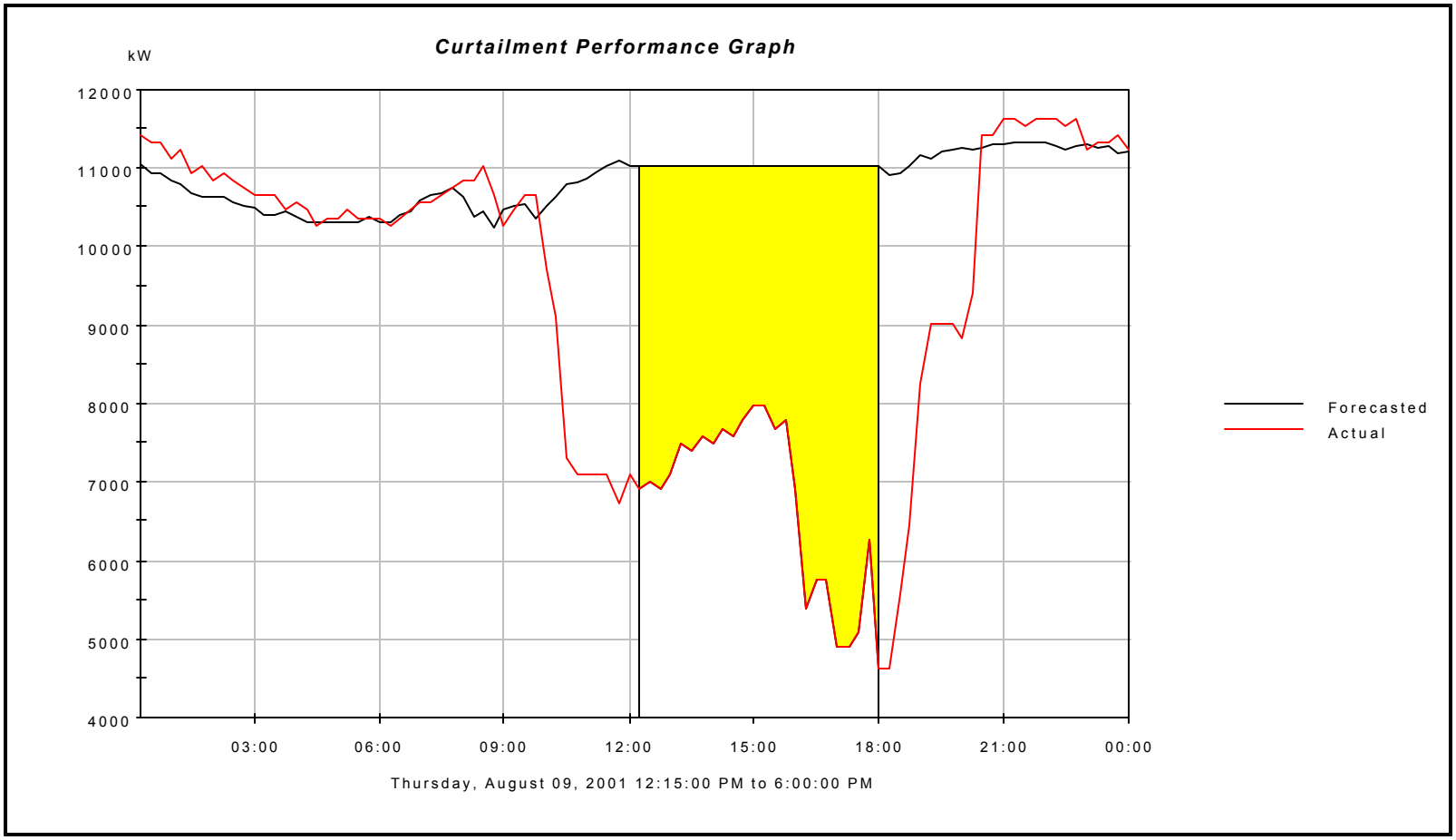
Protocol Structures

- Methods for establishing customer baselines (CBLs):
  - Previous hour method or flat-line approach,
  - "N-day" hourly profile method (could include day-of-week or weekday/weekend mappings),
  - Matched day approach,
  - Adjusted hourly profile method,
  - Temperature-response modeling approach,
  - Multivariate temperature-response modeling approach, and
  - More complex forecasting approaches.

Flat-Line Method - Pros and Cons

- Pros
  - Very easy to implement, understand and communicate;
  - Works well for customers with stable 24 x 7 load
    - Works well for industrial customers with little or no variation in load;
    - May work well for certain public works facilities, e.g., pumping;
  - Can be easily programmed into a software system;
- Cons
  - Does a poor job estimating the loads for the majority of customer classes
    - Customers with variable loads;
    - Customers that are weather sensitive; etc.
  - Still must decide what hour(s) to flat line.

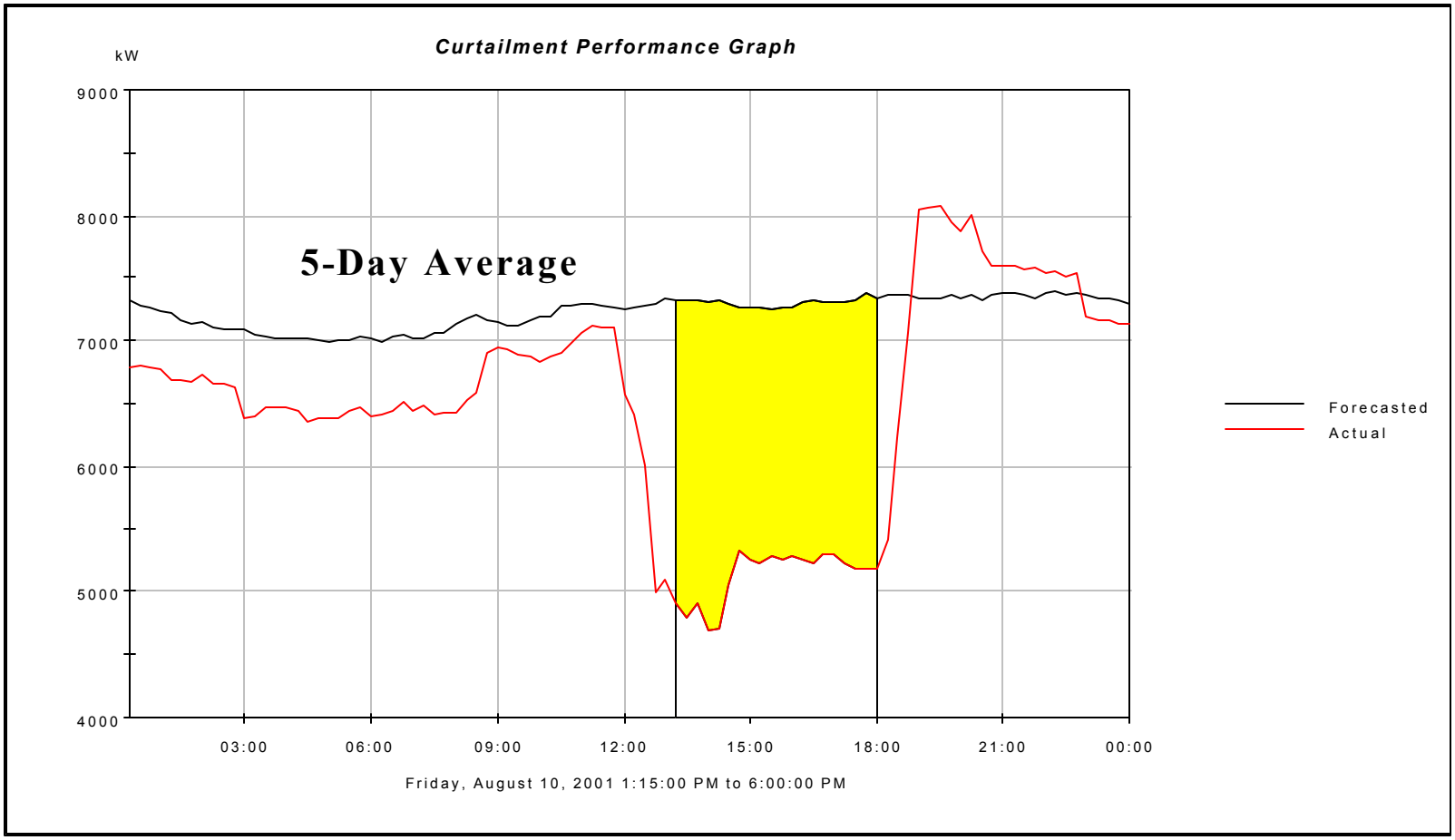
Flat-Line Method



N-Day Average - Pros and Cons

- Pros
  - Easy to implement, understand and communicate;
  - Can be programmed into a software system;
  - Works well for customers with stable hourly load from day to day;
  - Can use day-of-week, or weekday/weekend mappings;
- Cons
  - Does a poor job on customers that are variable or highly weather sensitive;
    - Tendency is to dampen the load profile.
    - May be particularly poor on early season curtailments;
  - Still must decide how many n-days to use, 1, 3 5, 10, etc.

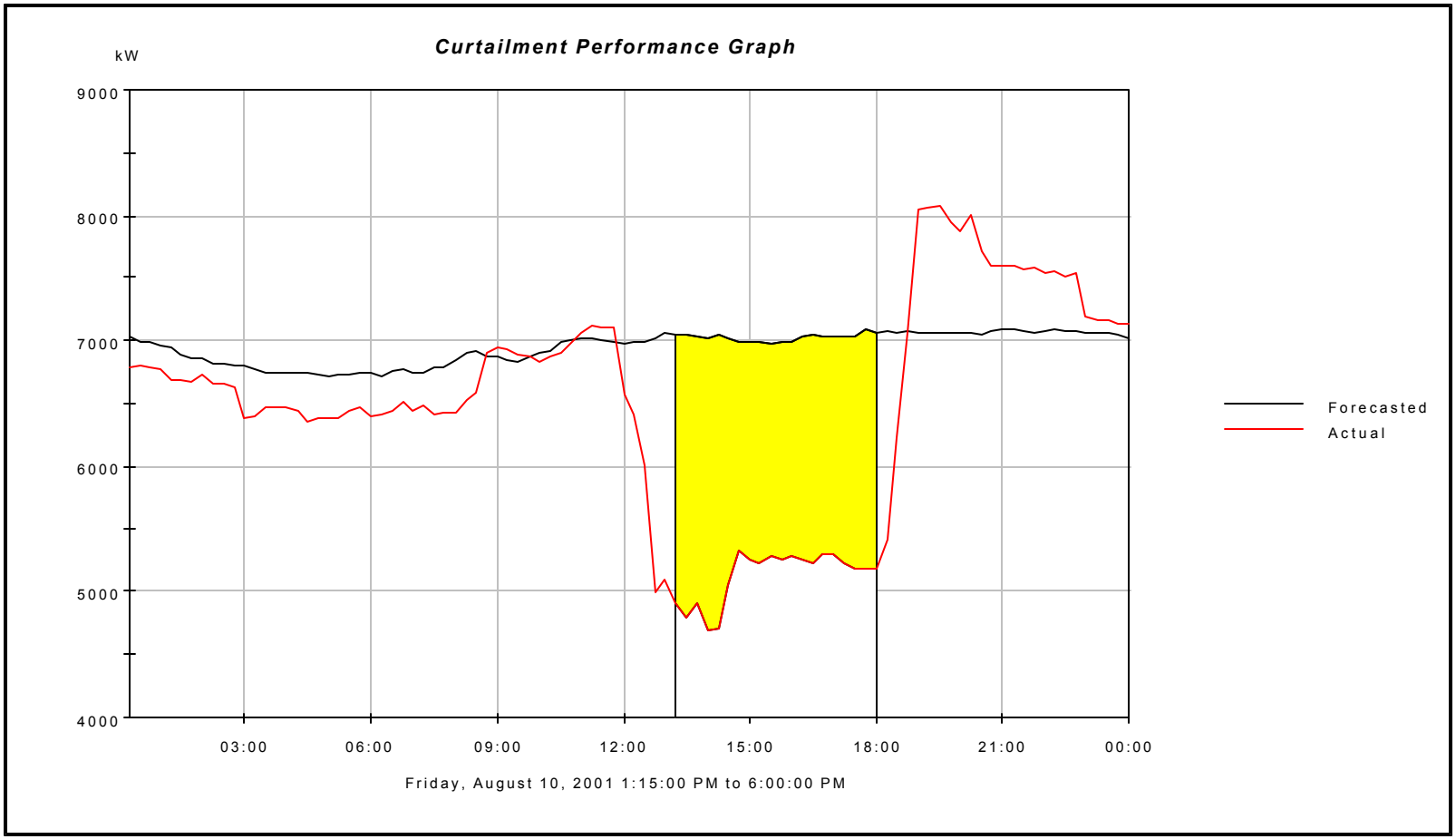
N-Day Average Method



N-Day Average with True-Up Pros and Cons

- Pros
  - Easy to implement, understand and communicate;
  - Can be programmed into a software system;
  - Works well for customers with stable daily load profile, but with difference in level of load;
  - Can use day-of-week, weekday/weekend mappings;
  - True-up helps adjust for difference in load due to variation, i.e., seasonal or production,
  - True-up could be up or down
- Cons
  - May require large adjustment that may be difficult to justify;
  - Still have problem with determining how many n-days to use, 1, 3 5, 10, etc.
  - What period do we true-up to, 1 hour, 2 hours, n-x hours, etc.
  - Could be subject to gaming if load is increased during the period used in the true-up adjustment, e.g., pre-cooling.

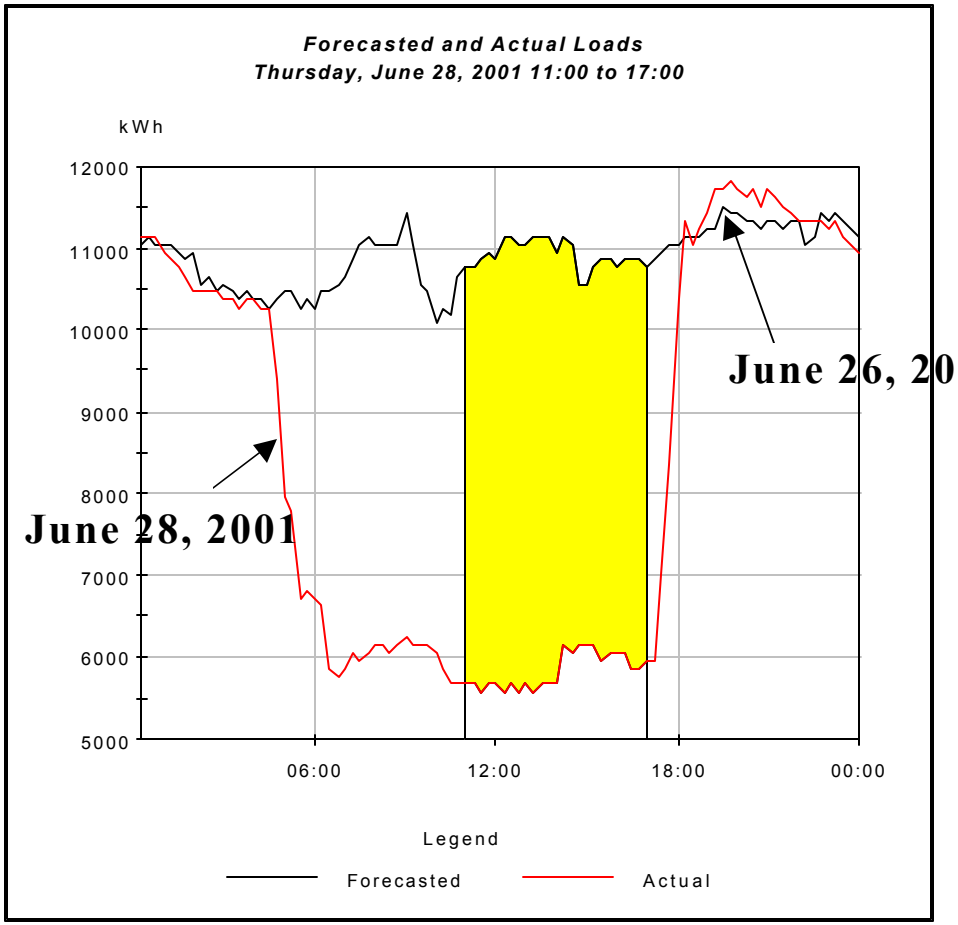
5-Day Average with True-Up



Matched Day Algorithm - Pros and Cons

- Pros
  - Assuming an appropriate "matched day" can be found provides the most suitable baseline;
  - Easy to implement, explain and communicate;
  - Can be programmed into a software system;
  - Does a better job of capturing days with extreme temperatures than a simple n-day average;
  - More difficult to "game" the methodology.
- Cons
  - It can be difficult to find suitable matched days;
    - Matched days for events early in the season may not be available.
    - All suitable matched days may turn out to be curtailment days;
  - Most suitable for commercial loads where the weather sensitive component is a large component of the overall load.

Matched Day Method



NYISO - Pros and Cons

- Pros
  - Already approved by NYISO;
  - Relatively easy to implement;
  - Can be programmed into a software system;
  - Does a better job of capturing days with extreme temperatures than a simple n-day average;
  - More difficult to “game” the methodology.
- Cons
  - Does a poor job on customers that are highly weather sensitive;
  - Requires calculating the load within the curtailment period;
  - Reporting requirements could be simplified;

Observations

- NY ISO baseline is higher than N-day average, so estimated load reduction is greater.
- True up could be used to increase or decrease the baseline…however, there are legitimate concerns over gaming and pre-cooling.
- A proxy day or weather modeling approach might do a better job of separating the pre-cooling effect from any temperature effect…but these approaches are more difficult to implement, explain and communicate.

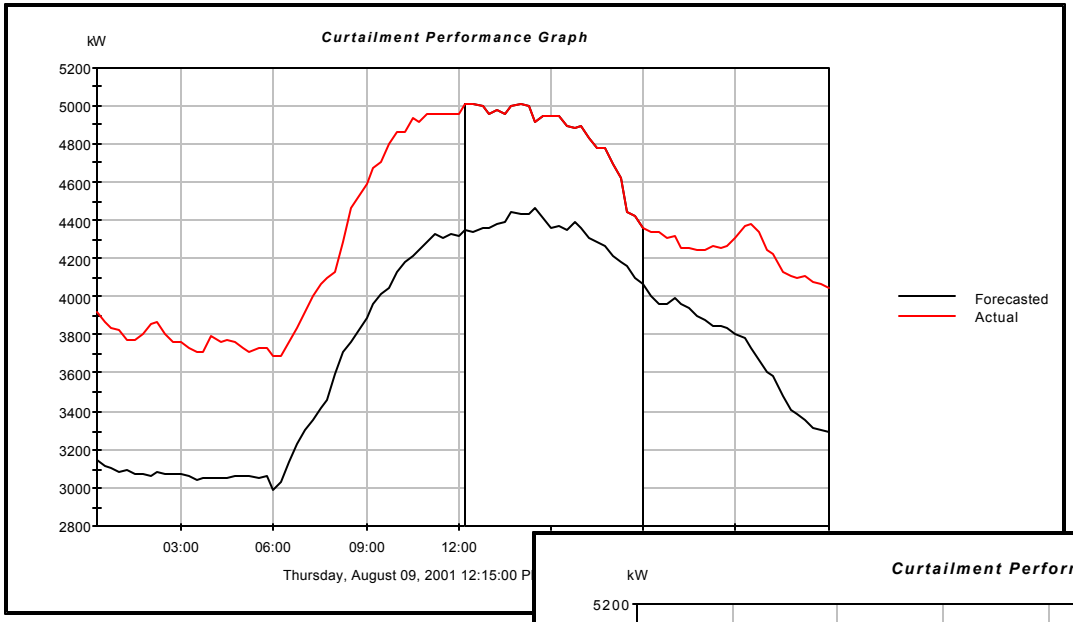
NYISO Protocol Recommendations

- Keep it simple…
- Recognize different classes of load might require different protocols…
  - Weather sensitive loads;
  - Non-weather sensitive loads.
- Existing NYISO algorithm is fine for non-weather sensitive loads;
- Weather sensitive loads are better served using a “matched day” strategy;
- Weather sensitive algorithms could include an n-day average with a “true-up”;
  - Please note: “true-up” algorithms can be more easily gamed at the individual customer level;
  - “True-ups” could be used at a more aggregated level, e.g., used for the LSE’s filings with the NYISO versus the LSE settling individual customer accounts;

Additional Observations

- Recognize that one size might not fit all…
- Some customers will come down early and stay off later due to operational considerations.
- True-ups can work very well for customers that have consistent load patterns with a magnitude shift (see figure #1)
- True-ups can cause large increases in the early morning and evening periods which are difficult to explain (see figure #2)
- Some customers are being instructed to pre-cool their facilities so the true-up will not work for these facilities (see figure #3).
- Some customers do not participate (figure #4) and others participate too frequently (figure #5)

Figure #1 – Effective True-Up



NYISO

W/o True-Up

True-ups can work well!

NYISO

With True-Up

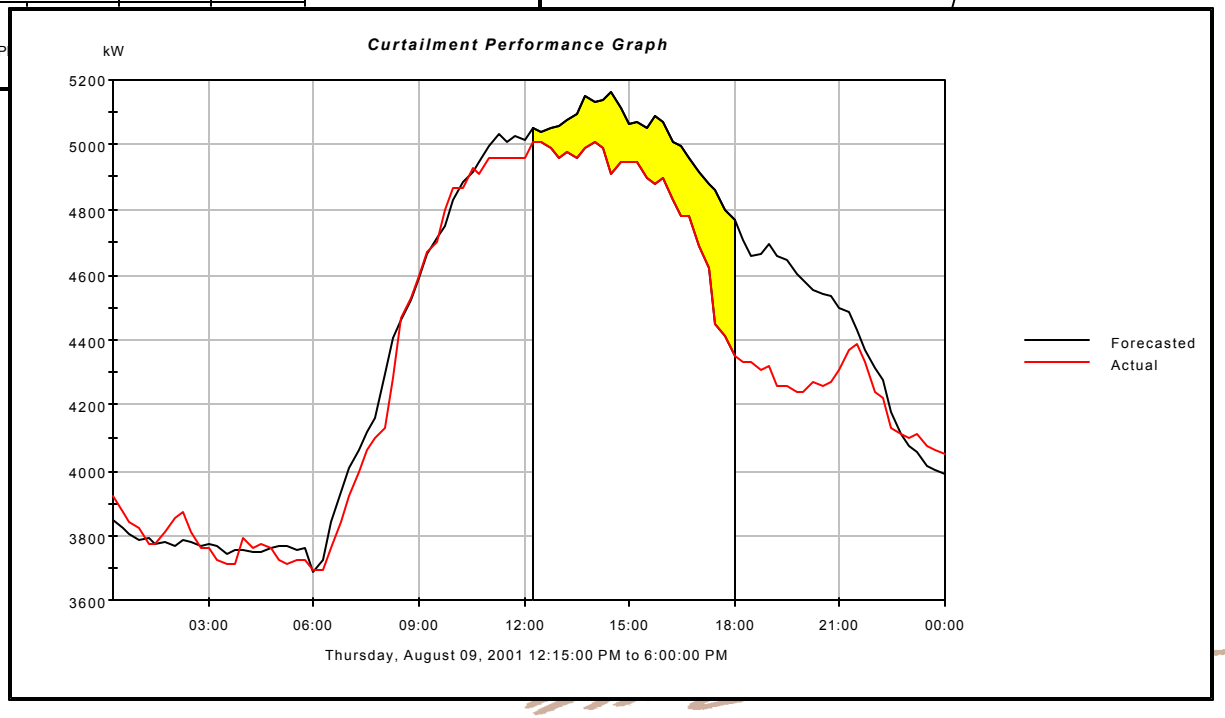
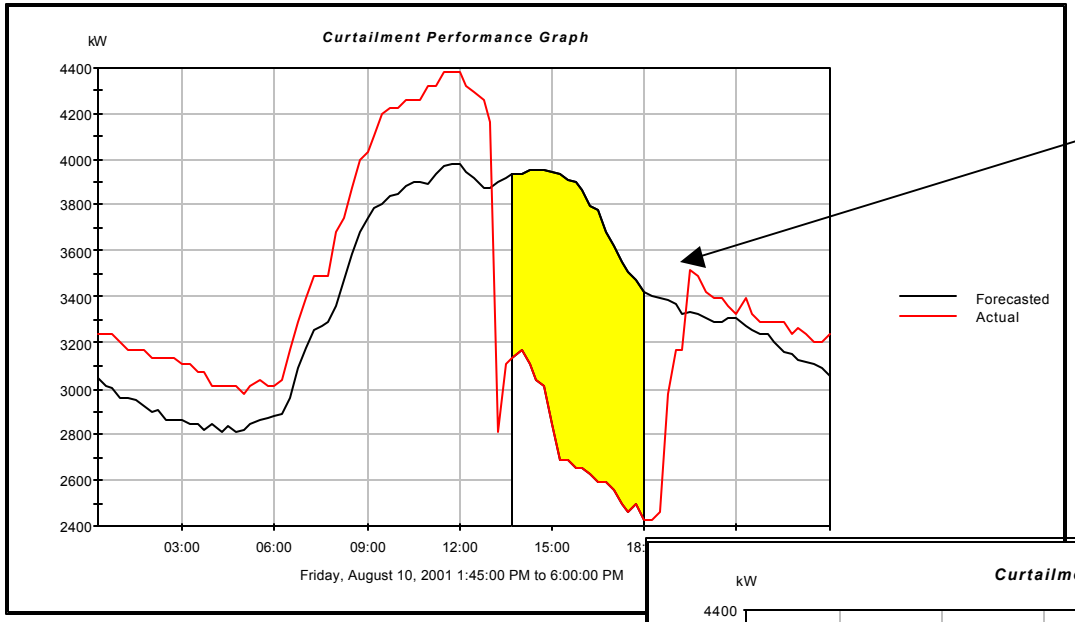


Figure #2 – Questionable True-Up



NYISO
W/o True-Up

Be careful,
true-ups can include large adjustments that may be difficult to explain!

NYISO

With True-Up

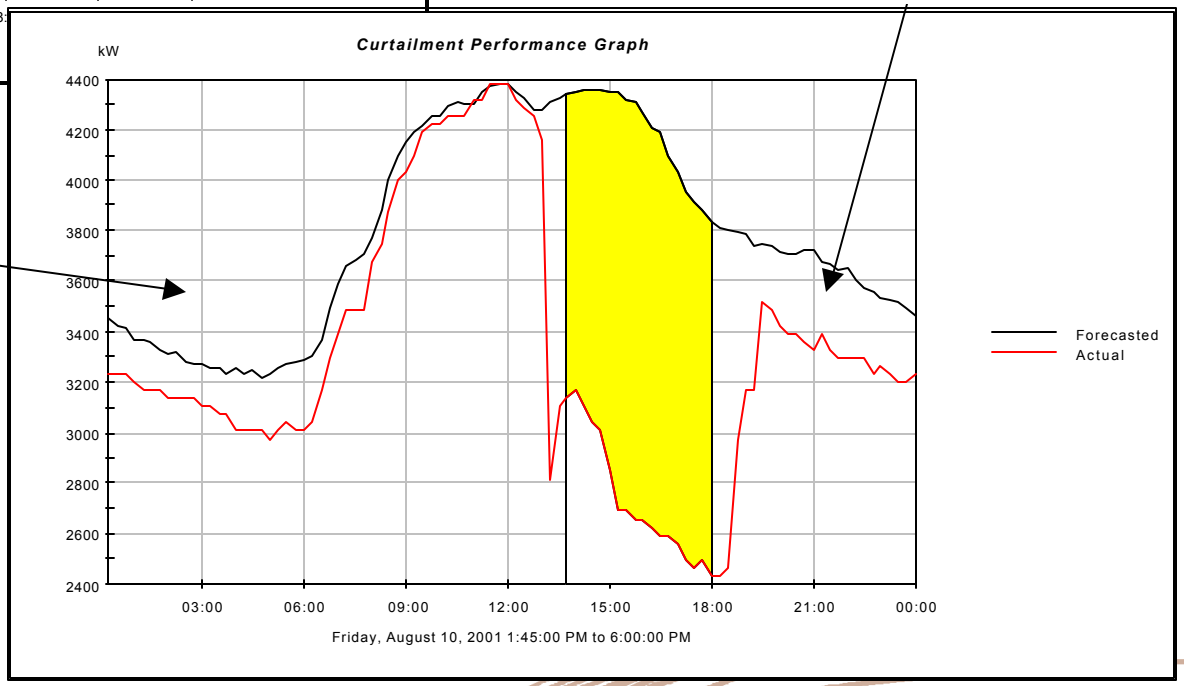
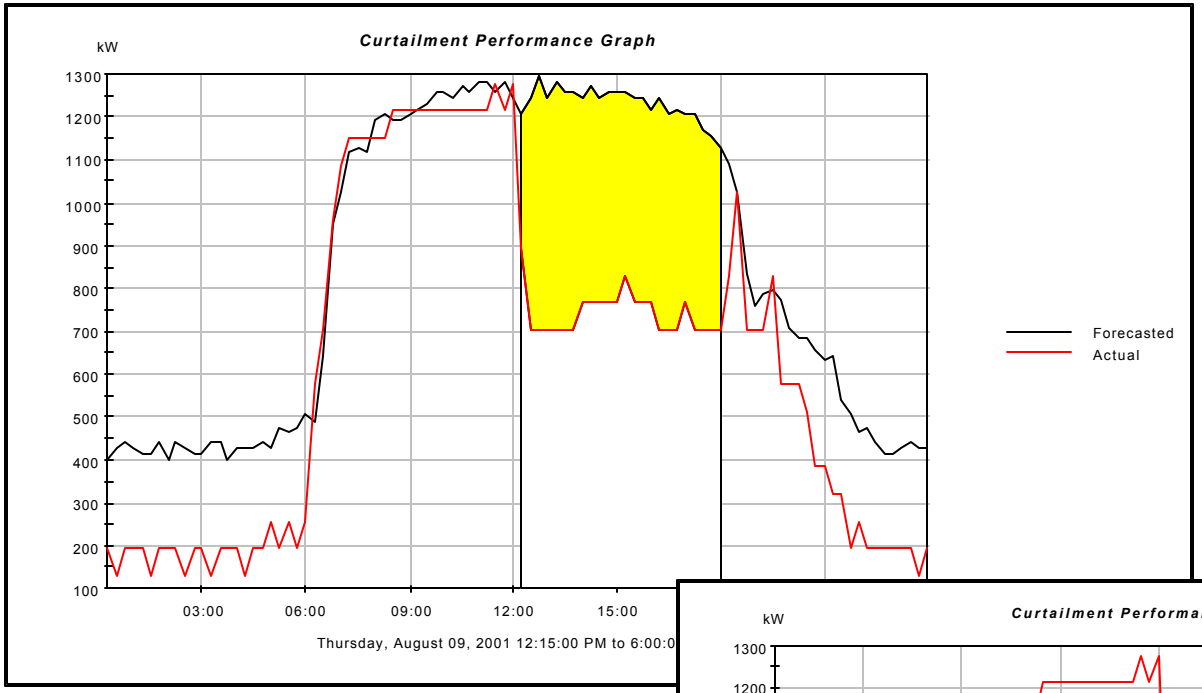


Figure #3 – Customer Pre-Cooling



Know Your Customers!

NYISO Protocol With True-Up However, this customer was instructed to pre-cool their facility

NYISO Protocol W/o True-Up

Pre-Cool Set New Peak for Customer!

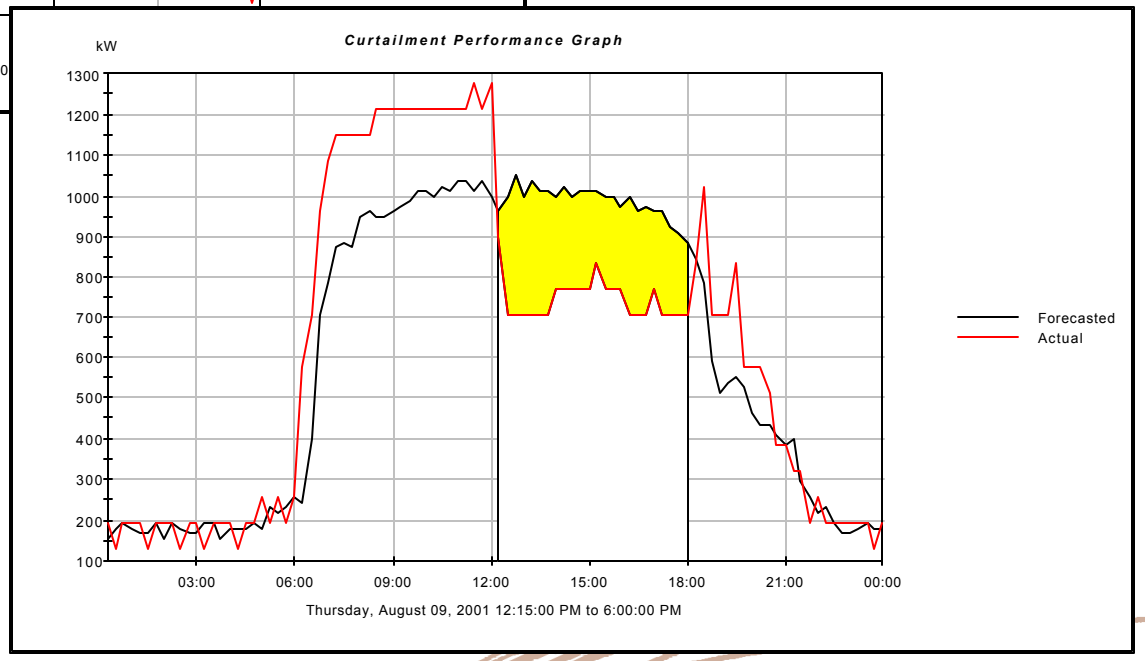


Figure #4 – Customer Did Not Participate

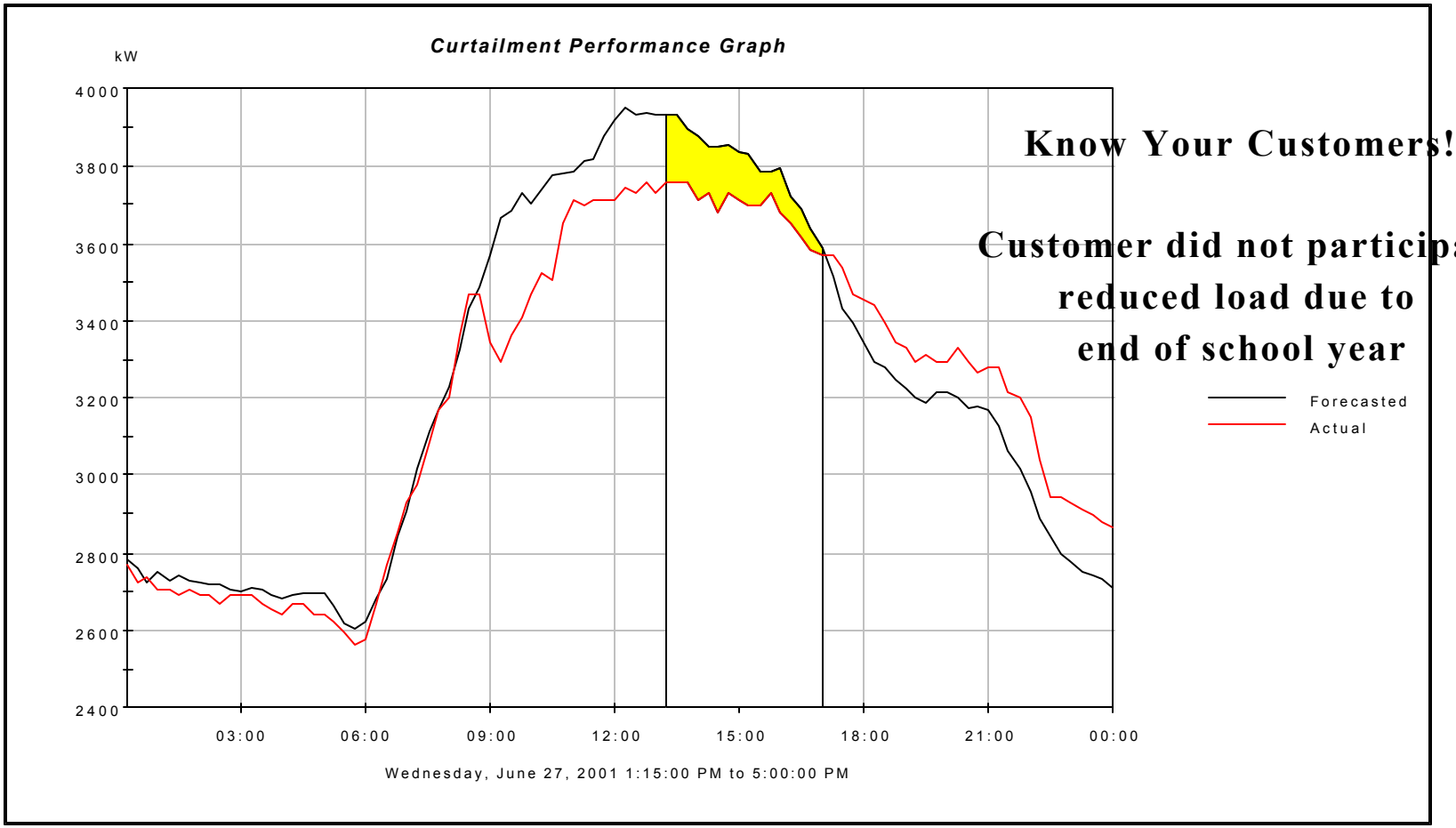


Figure #5 – Customer Participated Too Frequently