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# Automated Critical Peak Pricing Field Tests: Program Description and Results - Appendices

M.A. Piette, D. Watson, N. Motegi, S. Kiliccote, P. Xu

Energy Environmental Technologies Division

April 2006


# Automated Critical Peak Pricing Field Tests: Program Description and Results

# Appendices

April 6, 2006

**Mary Ann Piette**
**David Watson**
**Naoya Motegi**
**Sila Kiliccote**
**Peng Xu**

**Lawrence Berkeley National Laboratory**

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# Automated Critical Peak Pricing Field Tests: Program Description and Results

## Appendix A: Outreach Documents

April 6, 2006

**A.1.**
**Request for Participation**
**Summer 2005 Automated Critical Peak Pricing Test**

**Is your facility ready for dynamic pricing?**
Through participation in the 2005 Automated Critical Peak Pricing (CPP) test, your facility will be brought up to the speed of the Internet. PG&E will trigger price signals that will propagate to your facility to provide variable pricing for electricity. Qualified sites will be outfitted to respond to XML price signals transmitted over the Internet. During the 2005 summer test period, as the electricity price increases during a CPP event, some pre-selected electric loads will be automatically shed based on your facilities control strategy.

**Time is money**
Under dynamic electricity pricing, financial incentives will be greatest for organizations that are able to respond automatically to electric grid emergencies or price signals such as those produced in the upcoming test. The 2005 Automated Critical Peak Pricing test is a low risk way to get prepared!

**Technical assistance and Internet hardware available**
Researchers at the Lawrence Berkeley National Lab (LBNL) will provide guidance to your staff in:
- Connecting your site to the Internet based price signal.
- Evaluating your shed control strategy and assessing its impacts

For sites that lack Web access to their energy management control systems, Internet hardware will be provided.

**Publicly identified as part of the solution**

> *"Today I call upon all of my fellow Californians to work together during this peak demand period to use power wisely and take advantage of the available programs to save energy."*
> Gov. Arnold Schwarzenegger July 27, 2004

Participants in the 2005 Automated Critical Peak Pricing test will help themselves and all Californians avert future power crises, such as those that occurred in 2001. All participants will be publicly recognized in presentations at various conferences, and in trade and academic journals.

**Site requirements**
- Participation in PG&E's voluntary Critical Peak Pricing program.
- Functional energy management control system (EMCS) or energy information system (EIS).
- A means to measure and archive either whole building or component level electric loads on 15-minute intervals. Most large facilities have remotely readable interval meters such as InterAct II™ in PG&E's territory. Though not required, some systems with near "real-time" electric monitoring will also be selected.
- All sites must have access to the Internet (i.e. surf the Web from offices at the site). Having a Web-enabled EMCS or EIS is preferred but not required.

**Implementation and Customer requirements**

- Provide a public IP address to LBNL (usually available from the IT systems administrator).
- Provide access to archived energy data (e.g. guest password to utility interval meter Web site).
- Select shed strategies. Global zone temperature set point setup/setback, lighting reductions, or shutting off other non-critical loads are all valid. Each site's facilities staff should consider these and other strategies that are best suited to their facility.
- Program or hardwire energy management control systems to shed loads based on relay contact or XML signal. Simple program changes to be conducted by staff or contractor.

**Figure 1. Overview of system architecture**


Test Description:

- A client software application for each site polls a common Internet-based server to obtain the latest value of the electric shed signal generated by LBNL.
- The price signal remains in the "normal" range during most hours of the test. Three to five times during an agreed upon test period, the signal will change to a value that calls for an electric shed.
- The software application then commands the HVAC, lighting or other equipment at the site to reduce demand. This command is usually transmitted from the client application computer to the EMCS via a gateway or Internet enabled relay.
- Each test will last between three and six hours.
- The number of tests will be minimized to reduce the burden on facility occupants or other business processes.

**Schedule**

- Site recruitment and selection during May and June 2005
- System development in June 2005
- Auto-CPP tests in July through October 2005

**To sign-up and/or request more information, please contact**

Sila Kiliccote (510) 495-2615 skiliccote@lbl.gov

This project will be conducted through the **PIER Demand Response Research Center** (see drrc.lbl.gov) with funding from **PG&E**.

- For more information on Energy Information Systems see
- http://buildings.lbl.gov/hpcbs/Pubs.html. "Web-based Energy Information Systems for Energy Management and Demand Response in Commercial Buildings, Motegi, N., M.A". Piette, S. Kinney, and K. Herter, Lawrence Berkeley National Laboratory. April 2003, LBNL Report 52510.
- See also Automated Demand Response Pilot Study for 2003 (Phase 1) Report, http://drrc.lbl.gov//drrc-pubs1.html.

**A.2.**
**Participation Requirements**
**2005 Automated Critical Peak Pricing Pilot**

**Between**
**Environmental Energy Technologies Division,**
**Lawrence Berkeley National Laboratory (LBNL)**
**And**
**Participant Company Name**
**Test Participants for Demand Responsive Technology Demonstration**

**Purpose**: The purpose of this document is to describe the plans for the upcoming project and establish the roles of each party in its implementation. This is not a legally binding document.

**Introduction**: LBNL is conducting a research project for the California Energy Commission and Pacific Gas and Electric Company to test automated Critical Peak Pricing technologies in commercial buildings. Detailed information about the planned project is included in the LBNL document titled, "Automated Critical Peak Pricing in Large Commercial Facilities Pilot Study Plan", dated June 14, 2005.

**Responsibilities**
LBNL agrees to:
- Promptly respond to general comments, questions and concerns of the participants including those about controls, communications and shed strategies.
- Develop a measurement strategy for each demand shed and provide technical support as required for the tests.
- Schedule the price signal as outlined by PG&E.
- Award the participating entity the fixed price sum of $1,000.00 U.S. Dollars as a participation incentive.

Participant agrees to:
- Select appropriate shed strategies and implement them in a manner appropriate for their site.
- Provide information to LBNL about the facilities, control systems, shed strategies, energy consumption patterns, and performance measurement systems.
- Participate in the test as described in the test plan.
- Collaborate with LBNL as necessary to implement and perform the tests.
- If changes in circumstances cause the participant to drop out of the test, inform LBNL of these changes.
- Develop over-ride and fall-back strategies to switch to manual operation and activate facility shedding if the Auto-CPP system fails.

**Collection of Information on Demand Response System**
LBNL will collect and compile the following types of information, including but not limited to:
- Site characteristics (size, type, location, HVAC systems, etc.)

- Characteristics of controls, communications and monitoring systems installed at the site.
- HVAC, control, communications, energy, and other building time series data during the test to evaluate the shed.
- Strategies for aforementioned equipment during normal and shed modes.

The Participant agrees to provide the above information to LBNL. The Participant also allows it to be published and presented publicly. Upon Participant's advance request and PG&E's permission, LBNL will provide a copy of the report to Participant prior to making such report public. LBNL is in not responsible for any issues that arise at the building facility as a result of the tests.

In addition to this document, I have read the document describing the Auto-CPP test titled, **"Automated Critical Peak Pricing Pilot in Large Commercial Facilities Pilot Study Plan"**, dated June 14, 2005.

This participation requirements document applies to the following sites:

| _____<br>Site Name, Address | |
|---|---|
| _____<br>Signature and Date<br><br>Name:<br>Title:<br>Company:<br>Tax ID: | _____<br>Signature and Date<br><br>Mary Ann Piette<br>Staff Scientist, and Deputy Group Leader<br>Lawrence Berkeley National Laboratory |

**A.3.**
**Site Questionnaire**
**LBNL Automated Critical Peak Pricing 2005**

| | |
|---|---|
| LBNL Interviewer | |
| Date Interviewed | |

## 1. Contact Information

| | |
|---|---|
| Name | |
| Company | |
| E-mail | |
| Phone | |
| Fax | |
| Contact's address | |

## 2. Site Information

| | | |
|---|---|---|
| Site name | | |
| Primary services or products of the site | | |
| Number of buildings | | |
| Location (address) | | |
| Year constructed | | |
| Floor space | Total | |
| | Conditioned | |
| | In Auto-CPP | |
| # of floors | | |
| Occupancy schedule | Weekday | |
| | Non-Weekday | |
| Utility company | PG&E | |
| Facility management type | ☐ Company-owned ☐ Outsourced | |

## 3. Electric Demand

| | | |
|---|---|---|
| Peak load [kW] | | |
| Approximate breakdown of summer peak period [in %] | Lighting | |
| | HVAC | |
| | Appliances, misc. | |
| | Process line | |

## 4. HVAC Systems

| | | |
|---|---|---|
| Distribution system type | ☐ Constant volume reheat<br>☐ Multi-zone ☐ Variable air volume<br>☐ Dual duct ☐ Dual fan dual duct | |
| Fan control type | ☐ Inlet guide vanes ☐ Discharge damper<br>☐ Variable pitch ☐ Variable speed drive<br>☐ No control | |
| Supply air temperature | Cold deck (°F): | Hot deck (°F): |

| | |
|---|---|
| Temperature control type | ☐ Manual ☐ Always on<br>☐ Time clock ☐ EMCS<br>☐ Programmable thermostat<br>Zone temperature setpoint (°F): |
| Supply fans | Quantity: Airflow rate (CFM): |
| Return fans | Quantity: Airflow rate (CFM): |
| Return air path | ☐ Direct ☐ Ducted ☐ Plenum |
| % of outside air | |
| Cooling equipment type | ☐ Direct Expansion ☐ Chilled water<br>☐ Evaporative cooler ☐ Purchased chilled water<br>☐ Chilled water supplied by other building |
| Control system type | ☐ Conventional Pneumatic ☐ Pneumatic with EMCS<br>☐ Direct Digital Control (DDC) |

**5. Chillers, Circulation Pumps**

| | |
|---|---|
| Chiller type | ☐ Centrifugal ☐ Reciprocating<br>☐ Screw ☐ Scroll<br>☐ Absorption, steam ☐ Absorption, gas-fired |
| Fuel type | ☐ Electricity ☐ Gas ☐ Steam |
| Heat rejection type | ☐ Water cooled ☐ Air cooled |
| Number of units | Main: Backup: |
| Capacity (tons for each) | |
| VSD compressor control | ☐ Yes ☐ No |
| Chilled water setpoint temp | (°F) |
| Chilled water reset | ☐ Yes ☐ No<br>Reset temperature (°F): |
| Water-side economizer | ☐ In use ☐ Not in use |
| Cooling lockout | Lockout outside air temp (°F):<br>Month cooling on: Month cooling off: |
| Control system type | ☐ Conventional Pneumatic ☐ Pneumatic with EMCS<br>☐ Direct Digital Control (DDC) |
| Number of circulation pumps | Chilled water (main): (backup):<br>Secondary chilled water (main): (backup): |
| Pump power (hp) | |
| Pump control | ☐ Constant ☐ 2-speed ☐ Variable |

**6. Cooling Towers**

| | |
|---|---|
| Condenser type | ☐ Air-cooled condenser ☐ Evaporative condenser<br>☐ Air-cooled with pre-cooler |
| Temperature control | ☐ Fixed ☐ Reset ☐ Setpoint |
| Condenser water setpoint | (°F): |
| Number of fans | |
| Fan control | ☐ Constant ☐ 2-speed ☐ Variable |
| Condenser water pump | Quantity: Horsepower: |
| Pump control | ☐ Constant ☐ 2-speed ☐ Variable |

| | |
|---|---|
| Control system type | ☐ Conventional Pneumatic ☐ Pneumatic with EMCS<br>☐ Direct Digital Control (DDC) |

**7. Boilers, Circulation Pumps**

| | |
|---|---|
| Boiler type | ☐ Water ☐ Steam ☐ Other |
| Hot water temperature (°F): | |
| Fuel type | ☐ Electricity ☐ Gas ☐ Steam |
| Number of units | Main: Backup: |
| Capacity (kBtu/hr for each) | |
| Hot water temp reset | ☐ Yes ☐ No |
| Space heat lockout | Lockout outside air temp (°F):<br>Month cooling on: Month cooling off: |
| Hot water pump | Quantity: Horsepower: |
| Pump motor type | ☐ Constant ☐ 2-speed ☐ Variable |
| Control system type | ☐ Conventional Pneumatic ☐ Pneumatic with EMCS<br>☐ Direct Digital Control (DDC) |

**8. Domestic Hot Water**

| | |
|---|---|
| Domestic water heater fuel | ☐ Electricity ☐ Gas ☐ Steam |
| Water heater | Quantity: Input (kW): |
| Heater control | ☐ Continuous ☐ Temperature<br>☐ Timer ☐ Demand |
| EMCS control to heater | ☐ Yes ☐ No |
| Domestic hot water pump | Quantity: Horsepower: |
| Pump control type | ☐ Continuous ☐ Temperature<br>☐ Timer ☐ Demand |
| EMCS control to pump | ☐ Yes ☐ No |

**9. Lighting System**

| | |
|---|---|
| Control type (Office area) | ☐ None, continuous ☐ Manual on/off switch<br>☐ Time clock ☐ Bi-level switch<br>☐ Photocell ☐ Photocell/Timeclock<br>☐ Motion sensor ☐ Daylighting controls<br>☐ Dimmable ballast |
| EMCS control | ☐ Yes ☐ No |
| Control type (Common space) | ☐ None, continuous ☐ Manual on/off switch<br>☐ Time clock ☐ Bi-level switch<br>☐ Photocell ☐ Photocell/Timeclock<br>☐ Motion sensor ☐ Daylighting controls<br>☐ Dimmable ballast |
| EMCS control | ☐ Yes ☐ No |

**10. Miscellaneous Loads**

| | |
|---|---|
| Equipment which can be shed during a CPP event | ☐ Refrigerator ☐ Fountain pumps<br>☐ Anti-sweat heater ☐ Process equipment<br>☐ Other |
| EMCS control | ☐ Yes ☐ No |

**11. Energy Management and Control System**

| | |
|---|---|
| Manufacturer | Johnson Metasys |
| Control system is viewable at, | ☐ Web-browser ☐ Off-site<br>☐ On-site ☐ Never |
| Data trending capability | ☐ Yes ☐ No |
| Currently trending data? | ☐ Yes ☐ No<br>Data point collected: |
| Data trend interval (minutes) | |

**12. Energy Information System**

| | |
|---|---|
| PG&E InterAct | ☐ Yes ☐ No |
| Other EIS installed | ☐ Yes ☐ No<br>If yes, vendor: |
| Data points collected | |
| Trend interval (minutes) | |
| Is the data accessible from third party (LBNL)? | ☐ Yes ☐ No |

**13. Connectivity (Connecting the EMCS to the Internet)**

| | |
|---|---|
| ***A***. Does the site have Internet connectivity for tenants (i.e. can they surf the Web?). | ☐ Yes ☐ No |
| ***B***. Is EMCS data viewable through a Web browser on site? | ☐ Yes ☐ No |
| ***C***. Is EMCS data viewable through a Web browser off site? | ☐ Yes ☐ No |
| ***D***. If ***C*** above is Yes, is a Web programmer available to install a Web services/XML client (template provided)? | ☐ Yes ☐ No |
| ***E***. If (***A*** = Yes) and (***C*** or ***D*** = No), can you provide a public IP address? A pre-configured IP relay will be shipped to your site. | ☐ Yes ☐ No |

**14. Demand Response Control Strategy**

| | |
|---|---|
| Shed control strategies planned for summer 2005 | ☐ Zone setpoint increase ☐ Fan control<br>☐ Cooling system control ☐ Lighting shed<br>☐ Misc. equipments |
| Strategy detail | |
| Have you implemented the strategies before? | ☐ Yes ☐ No |
| How much kW do you think you can shed? [kW] | |

## A.4.
## Connecting your Facility to Receive CPP Event Signals

The purpose of this document is to help facility managers understand the options for their site(s) to receive remote signals of upcoming CPP events. In addition to human readable pager alerts and e-mails, sites in this pilot will receive signals over the Internet that triggers automated sheds of pre-selected electric loads.

### Connectivity Option A (Internet Gateway)

If all of the following are true, you should consider using Connectivity Option A (Internet Gateway) to receive remote signals of upcoming CPP events:

1. The site has a Web based user interface to the Energy Management and Control System and/or automated lighting system.
2. On site staff can surf the public Internet from computers at the site.
3. Access to staff or contractor who has computer programming skills.

If the above are all true for your site, then it is recommend that you use our software based price client template to obtain the Auto-CPP event updates. LBNL provides a software example or template. Your programmers make minor revisions to the software, as necessary to customize it for your system.

There are no firewall issues with this option because the price client software resides inside of your secure firewall. The price is returned on the standard port 80, just like viewing Web pages.

Table 1 shows the three discrete price levels that will be published by the Price Server System ver.2 (PSS2) and the associated behavior expected from the Energy Management and Control System (EMCS). CPP events are first published on the PSS2 by 3:00 PM the day prior to the event. The entire schedule for the event is published at that time. For the summer 2005 pilot, the schedule and associated price level will always be as shown in table 1.

| Price Level (Published on PSS2) | Description | Time Period | Desired Behavior of EMCS |
|---|---|---|---|
| 1.0 | Normal Price | All time except CPP events | Normal Operation |
| 3.0 | Moderate Price (CPP) | Noon - 3:00 PM | Moderate Shed of Electric Loads |
| 5.0 | High Price (CPP) | 3:00 PM - 6:00 PM | High Shed of Electric Loads |

**Table 1 Price Levels and associated behaviors (Option A only).**

### Connectivity Option B (Internet Relay)

If the above scenario doesn't work for your site, there is a second option. LBNL will provide your site with a small embedded device called an "Internet relay". The Internet relay is controlled remotely by our server. Your facilities group mounts the Internet relay near any available EMCS controller and wires into two digital inputs on the controller. When both relays are OFF, the EMCS system is in “Normal” mode. If RLY#0 = ON, then the system is in the “Moderate” price level mode. If Relay#0 AND Relay#1 are

both ON, then the system is in the "High" price level mode. Table 1 shows the function of each relay contact.

| ADAM6060 Relay # | Description | Timing When Relay is "ON" | Used for: |
|---|---|---|---|
| #0 | Moderate Price (real-time) | Noon - 3:00 pm Day of CPP Event | Digital Input Into EMCS |
| #1 | High Price (real-time) Note: Relay #1 also ON in High Price mode | 3:00 pm - 6:00 pm Day of CPP Event | Digital Input Into EMCS |
| #2 | CPP-Event Pending | ~ 3:00 pm prior day until end of CPP event* | Digital Input Into EMCS |
| #3 | Moderate Price (real-time) Indication | Same as Relay #0 | Indicator Light (optional) |
| #4 | High Price (real-time) Indication | Same as Relay #1 | Indicator Light (optional) |
| #5 | CPP-Event Pending Indication | Same as Relay #2 | Indicator Light (optional) |

**Table 2 Function of each relay contact (Option B only).**

* If CPP days are called "back-to-back" relay #2 and #5 will remain ON constantly until the end of the last day.

**Networking and Security Issues (Option B only)**

The Internet relay (ADAM-6060) needs to be plugged into a standard RJ-45 Ethernet plug on one side and to digital inputs in the energy management and control system on the other. The Advantech utility should be used to configure the ADAM-6060 to an IP address provided by your IT group.

Your site's existing firewall must be configured so that the following is allowed:

The LBNL servers on the public Internet can access the ADAM-6060 device on Ports 1 and 502 for communications. Port 1 is used for "ping" testing and 502 is used for Modbus over TCP/IP. Following are the LBNL server addresses:

???.???.???.???
???.???.???.???

If desired, the firewall can be configured to block all IP address and all TCP ports from the public Internet except as noted above.

More info on the Internet relay (Advantech, ADAM-6060) is provided in this link:

http://www.advantech.com.tw/products/Model_Detail.asp?model_id=1-LS7HR&PD=ADAM

*Alternately, a public static IP address and port 502 can be opened anywhere on a private WAN. Through use of a Network Address Translation (NAT) router, the ADAM-6060 device can be assigned private IP address. In this scenario, communication between the LBNL server and the ADAM-6060 device would traverse both the public Internet and a private WAN.

For connectivity questions, contact; Dave Watson 510.486.5562 <watson@lbl.gov> or Sila Killicote (510) 495-2615 <SKiliccote@lbl.gov>

# Automated Critical Peak Pricing Field Tests: Program Description and Results

## Appendix B: Site Descriptions & Demand Shed Details

April 6, 2006

## B.1. Alameda County Water District, Headquarters

**Site Summary**

| | |
|---|---|
| **Building Use** | Office, lab |
| **Industry Classification** | County government, water supply survice |
| **City** | Fremont, CA |
| **Gross Floor Area** | 51,200 ft² |
| **Conditioned Area** | 51,200 ft² |
| **# of Buildings, floor** | 1-building, 1-floor |
| **Peak Load kW** | 347 kW |
| **Peak W/ft²** | 6.78 W/ft² |
| **Tenant Type** | County employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Mon-Fri, 7am - 6pm |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | 7,200 ft² of lab space were added in August 2005 (gross floor area was 44,000 ft² prior to the addition). |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Variable Air Volume |
| **Air Handler Unit** | (4) 14,500 CFM supply fans, SAT: 56 °F, 20% OA<br>(4) 2,700 CFM return fans |
| **Cooling Plant** | (1) 140 ton air-cooled scroll chiller<br>CHW Supply Temp: 45 °F, Cooling lock out at 55 °F OAT.<br>(1) 20 HP variable volume chilled water pump |
| **Heating Plant** | (1) 2,000 Mbtu/h hot water boiler + (1) backup boiler<br>Hot water temp: 160 - 180 °F<br>(2) 15 HP CV hot water pumps |
| **HVAC Control System** | Invensys, control system viewable from offsite. Data trending capability. |
| **DDC Zone Control** | Yes |
| **Other Details** | None. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | EMCS trends are available on site. Each AHU has 6 points trending at 15-minute intervals. In addition, 1 zone's temperatures were being collected. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay at site | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | ADRS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=Yes | |
| **Shed Strategies** | **Pre-event** | None. | |
| | **Moderate Price** | ►Boiler disabled.<br>►CHW setpoint raised to 50 °F.<br>►Current limiting to 70%.<br>►SAT increased from 55 °F to 65 °F for AHUs 1, 2, 3 and Lab AHU.<br>►DSP setpoint decreased from 1.5" to 1.0".<br>►Zone setpoint increased to 75 °F | |
| | **High Price** | ►Zone setpoint increased to 78 °F. | |
| | **Slow Recovery** | ►Extend shed control 2 hours (until 8 pm). | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | No data |
| **Sep-29** | Succeeded | **Oct-06** | Succeeded |
| **Oct-13** | Succeeded | **Oct-25** | Succeeded |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

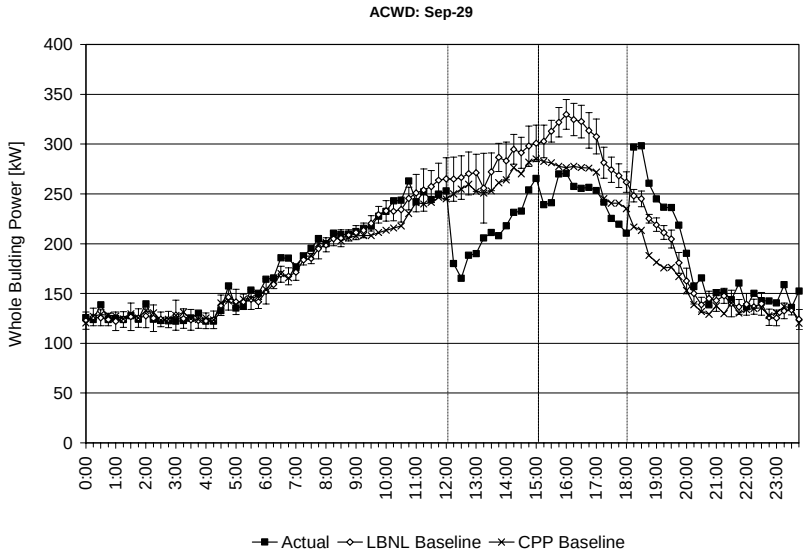
| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Sep-29** | **Moderate Price** | 101 | 67 | 2.30 | 1.53 | 38% | 24% |
| | **High Price** | 72 | 57 | 1.63 | 1.29 | 23% | 19% |
| **Oct-06** | **Moderate Price** | 74 | 55 | 1.69 | 1.25 | 31% | 22% |
| | **High Price** | 47 | 28 | 1.06 | 0.63 | 19% | 12% |
| **Oct-13** | **Moderate Price** | 73 | 53 | 1.66 | 1.20 | 31% | 21% |
| | **High Price** | 83 | 66 | 1.89 | 1.49 | 29% | 24% |
| **Oct-25** | **Moderate Price** | 77 | 69 | 1.76 | 1.57 | 35% | 30% |
| | **High Price** | 66 | 57 | 1.50 | 1.29 | 30% | 26% |

## September 22nd, 2005 (Mock CPP Event)

InterAct data was missing on this day. The shed was unable to be analyzed. A notification of the event was sent to building occupants by facility staff via e-mail a day before the event. One to two people sitting near the windows said it was warmer than usual.

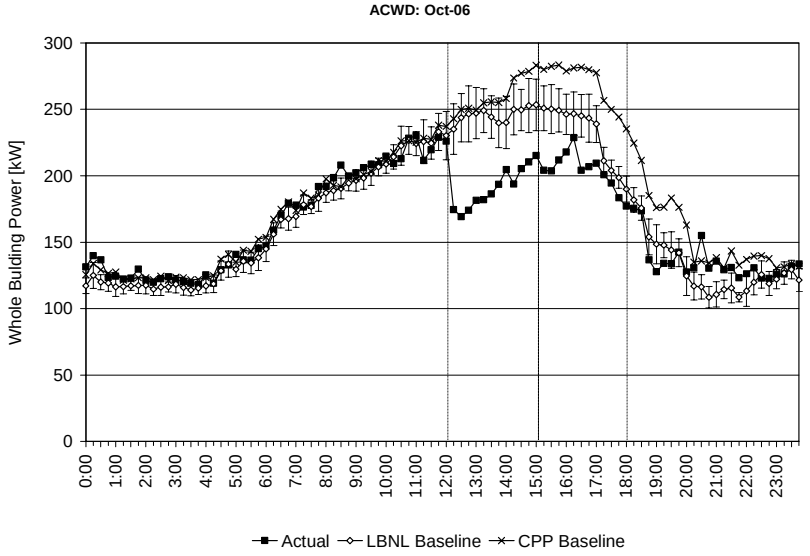
## September 29th, 2005 (Real CPP Event)

The building demand dropped down significantly at noon when the moderate price period started. At 3 pm, when the high price period started, the demand dropped slightly and came back to the previous level within 30 minutes. This might have been caused by; 1) the zone temperature was already higher than usual due to the moderate price shed operation and there was not much to save, or 2) the non-HVAC load increased over this period as indicated in the baseline. The demand had a rebound peak after the end of the high price period, though it was near the end of the day's HVAC operation cycle.



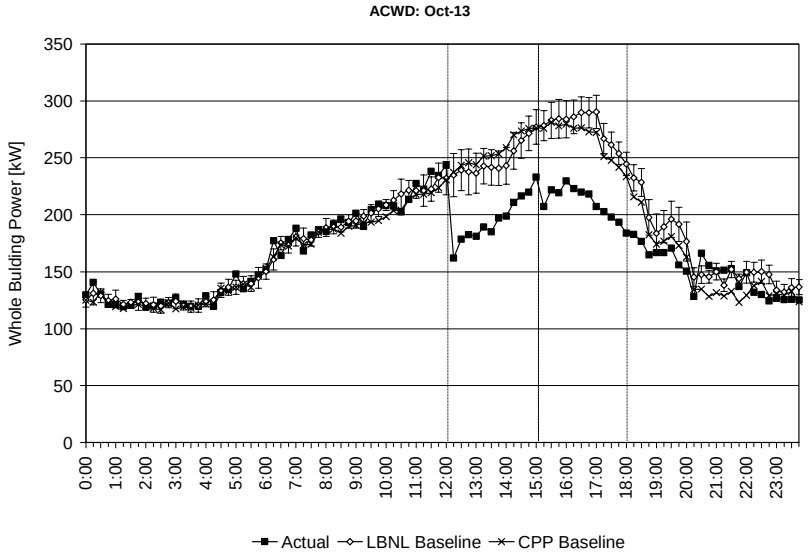

## October 6th, 2005 (Mock CPP Event)

To mitigate the rebound peak they found with the previous event, ACWD extended their shed control duration until 8 pm. The strategies were successfully operated, and they didn't get a rebound peak on this day.



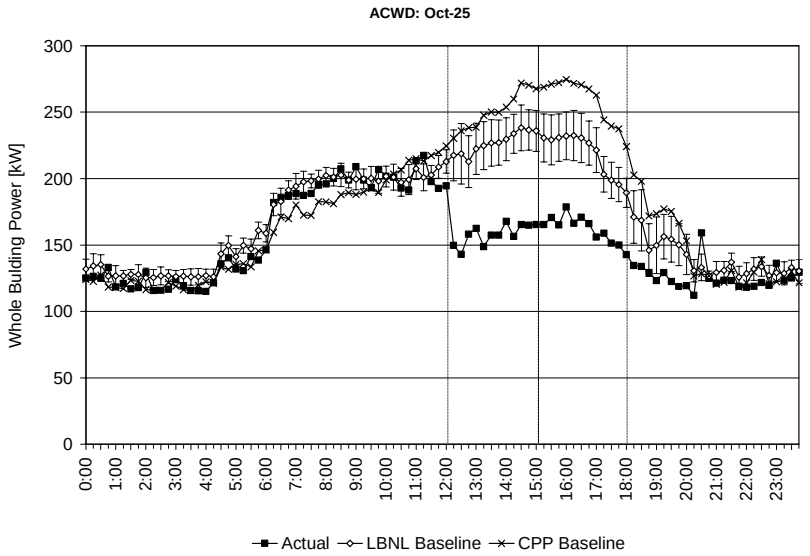
## October 13th, 2005 (Mock CPP Event)

It looks like the global set point did not allow the rooms to go higher than 73.9F and AHU-2 came on after hours (they think it was due to a networking problem). These issues were supposed to be resolved after the control contractors' visit, but seemed to resurface. They'll have the contractor visit again the week after this event.




## October 25th, 2005 (Mock CPP Event)

Some of the thermostats did not register 78 degrees. Some occupants were thinking that it may have been cold outside, but it was very comfortable in the building. No complaints.



## B.2. Bank of America, Concord Technology Center

**Site Summary**

| | |
|---|---|
| **Building Use** | Office, data center |
| **Industry Classification** | Data Processing, Hosting, and Related Services |
| **City** | Concord, CA |
| **Gross Floor Area** | 616,000 ft² |
| **Conditioned Area** | 708,000 ft² |
| **# of Buildings, floor** | 4-building, 13-floor |
| **Peak Load kW** | 5680 kW |
| **Peak W/ft²** | 8.02 W/ft² |
| **Tenant Type** | Company employees |
| **Facility Management** | Outsourced |
| **Weekday Schedule** | Mon-Fri |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | Consists of 4 buildings (A: 13-story, 264K/288K ft² (conditioned / gross), B: 9-story, 176K/200K ft², C: 4-story, 176K/220K ft², D: 6-story). bldg-D houses a large data center (1 floor) and offices. Approx 1.4 MW of WBP is for Bldg-D. Cooling is supplied from a central plant at bldg-D. However, bldg-D was not part of the load shed strategies due to the criticality of the building's operations. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Single duct Variable Air Volume with perimeter reheat |
| **Air Handler Unit** | 8 AHUs, 36 variable speed fans |
| **Cooling Plant** | (5) 750 ton chillers, (1) 300 ton chiller. Total 4050 tons. |
| **Heating Plant** | (3) 4 MBtu natural gas boilers |
| **HVAC Control System** | Tracer Summit, BACnet over IP based system with extensive electric metering, for central plant and AHUs. Honeywell for misc. fans and lightings. |
| **DDC Zone Control** | Yes |
| **Other Details** | EIS and WAN connectivity through a WebGen polling client server located in Andover, MA. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | EMCS trend at Tracer Summit. Central plant and AHU data. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay at site | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=No | |
| **Shed Strategies** | **Pre-event** | None. | |
| | **Moderate Price** | None. | |
| | **High Price** | ►Reduce DSP from 2.2" to 1.4".<br>►Lock fan VFD 3 minutes after the DSP reset.<br>►CHW setpoint increased 5 °F at the secondary loop.<br>►Lock cooling valve position at the AHU. | |
| | **Slow Recovery** | None. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | Failed (2) |
| **Sep-29** | Succeeded | **Oct-06** | No data |
| **Oct-13** | Not visible | **Oct-25** | Succeeded |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Sep-29** | **Moderate Price** | 132 | 22 | 0.21 | 0.04 | 3% | 0% |
| | **High Price** | 291 | 184 | 0.47 | 0.30 | 6% | 4% |
| **Oct-13** | **Moderate Price** | -30 | -89 | -0.05 | -0.14 | -1% | -2% |
| | **High Price** | 219 | 111 | 0.35 | 0.18 | 4% | 2% |
| **Oct-25** | **Moderate Price** | 461 | 279 | 0.75 | 0.45 | 9% | 6% |
| | **High Price** | 552 | 291 | 0.90 | 0.47 | 11% | 6% |

* Shaded value indicates that the demand shed was too small to identify.

B of A has programmed the following shed strategies on their Honeywell system;

►Turn off non-critical fans
►Turn off non-critical lights

However, the shed strategies were not automated due to the lack of an interface method between Honeywell and Tracer Summit (the Internet relay is connected to the Tracer Summit control network). While they have been successfully operating the shed strategies on the Honeywell and Tracer Summit systems on the non-automated CPP event days by manually turning on the Honeywell system, LBNL requested them to run only fully-automated strategies. As a result, the sheds shown are for the high price period between 3 pm and 6 pm.

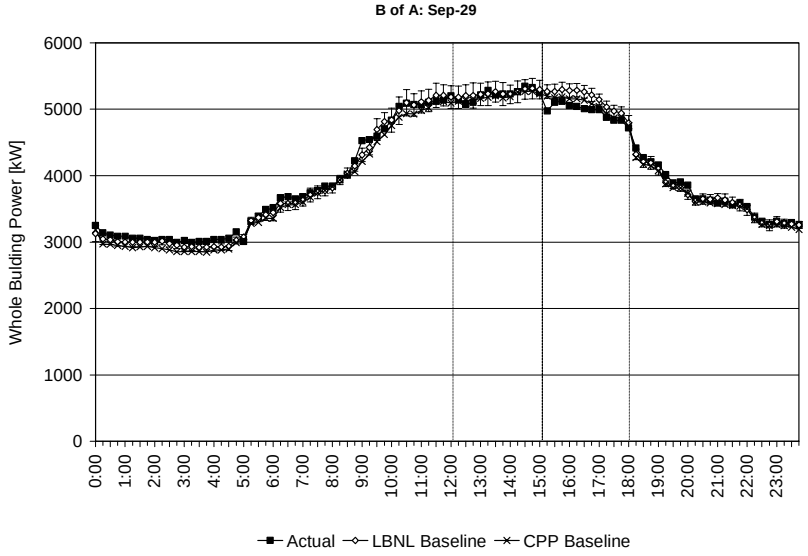
B of A had a communication trouble between the relay and the price server. They hadn't changed their network configuration, but a new gateway was installed. The gateway had the wrong configuration at the opening port, which prevented the price server from sending the control signal to the relay.

**September 22nd, 2005 (Mock CPP Event)**

B of A failed to participate in the test. When the chief engineer received the signal, the assistant chief engineer was not at the site. Since the assistant chief engineer manages the shed control, the shed control remained disabled. InterAct sends the notification e-mail to a maximum of 3 persons at the site, and usually property managers, energy managers, and chief engineers receive the notification. Personnel who actually control the shed are often not included in the e-mail list, as seen in B of A's case.

**September 29th, 2005 (Real CPP Event)**

Because LBNL requested that B of A run only fully-automated strategies, B of A only operated shed strategies for the high price period. Therefore the sheds are only shown in the high price period between 3 pm and 6 pm.

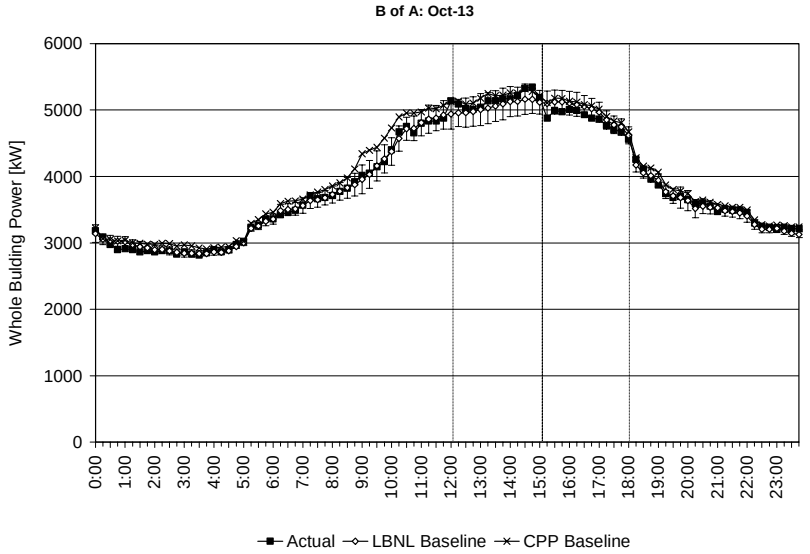



**October 6th, 2005 (Mock CPP Event)**

B of A successfully participated in this test, but the demand shed couldn't be analyzed due to InterAct data communication failures. On the survey, the engineers were willing to experiment with deeper shed strategies to achieve bigger results.

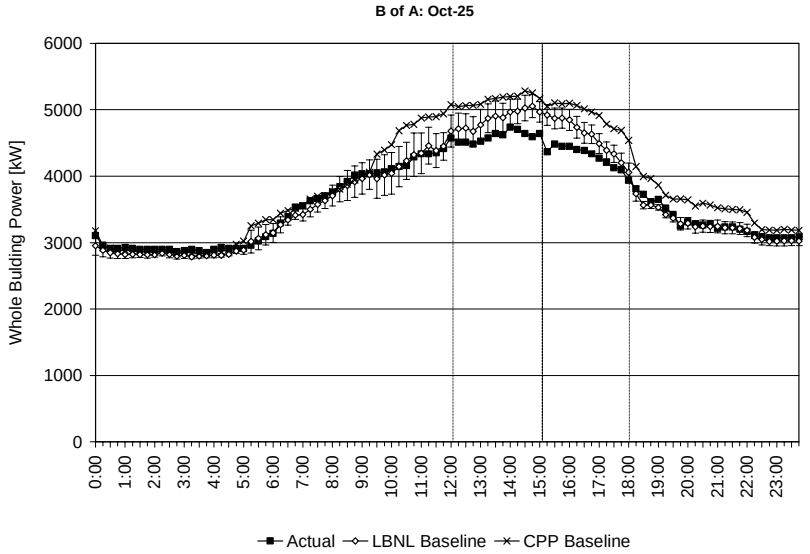
**October 13th, 2005 (Mock CPP Event)**

The test went through successfully.




**October 25th, 2005 (Mock CPP Event)**

The test went through successfully. The baseline might project a higher demand than what would be expected.




B of A usually doesn't notify their occupants about a shed event. They have had no inquiries or complaints so far regarding the tests.

After the end of the CPP program time period, B of A installed a device to interface between the Honeywell and Tracer Summit systems. They will configure their control system to automate both systems for next year.

## B.3. Chabot Space and Science Center, Building 1&2

**Site Summary**

| | |
|---|---|
| **Building Use** | Museum |
| **Industry Classification** | Museum |
| **City** | Oakland, CA |
| **Gross Floor Area** | 86,000 ft² |
| **Conditioned Area** | 86,000 ft² |
| **# of Buildings, floor** | 2-building, 2-floor |
| **Peak Load kW** | 333 kW |
| **Peak W/ft²** | 3.87 W/ft² |
| **Tenant Type** | Visitors, employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Wed-Thu:10am-5pm<br>Fri-Sat:10am-10pm<br>Sun: 11am - 5pm |
| **Non-weekday Schedule** | Mon&Tue |
| **Building Details** | Consists of 2 buildings including museum exhibit areas, auditorium, and offices. Building structure consists of high-concrete mass. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Variable Air Volume with Reheat. No global setpoint adjustment capability. Normally operates at 74 °F cooling, 72 °F heating setpoint. |
| **Air Handler Unit** | Supply fan with VSD. |
| **Cooling Plant** | Total 230 tons VFD Centrifugal chiller (approx 119 kW). |
| **Heating Plant** | Information not available |
| **HVAC Control System** | YAMAS. Viewable and controllable onsite. Data trending capability. |
| **DDC Zone Control** | Yes |
| **Other Details** | The lighting system has dimmable ballasts. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | EMCS trends collect zone conditions, AHU, and central plant data. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay at site | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=Yes | |
| **Shed Strategies** | **Pre-event** | ►Free cooling when the OAT is below 62 °F<br>►Pre-cooling until noon at 70 °F average zone temp. | |
| | **Moderate Price** | ►Drift zone setpoint to 74 °F, 4/3 °F each hour | |
| | **High Price** | ►Drift zone setpoint to 78 °F, 4/3 °F each hour | |
| | **Slow Recovery** | None. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | Not visible |
| **Sep-29** | Succeeded | **Oct-06** | Not visible |
| **Oct-13** | Succeeded | **Oct-25** | Opt out |
| **10-Nov** | - | **Nov-15** | - |

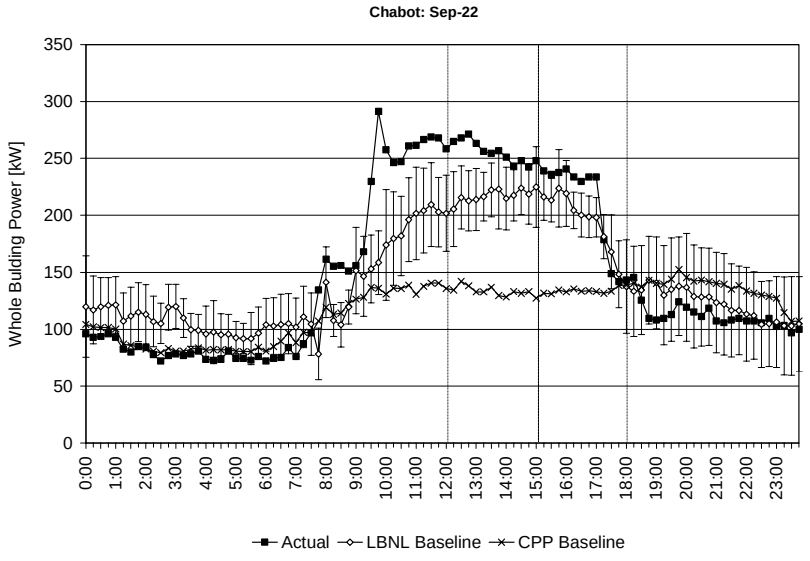
* See Section 4-1 of the main report for result definition.

| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Sep-22** | **Moderate Price** | -23 | -38 | -0.27 | -0.44 | -10% | -18% |
| | **High Price** | 19 | -16 | 0.22 | -0.18 | 11% | -7% |
| **Sep-29** | **Moderate Price** | 31 | 2 | 0.35 | 0.02 | 10% | 0% |
| | **High Price** | 88 | 32 | 1.02 | 0.37 | 28% | 3% |
| **Oct-06** | **Moderate Price** | 24 | 2 | 0.28 | 0.03 | 10% | 1% |
| | **High Price** | 36 | 23 | 0.42 | 0.27 | 15% | 10% |
| **Oct-13** | **Moderate Price** | 20 | -2 | 0.23 | -0.02 | 8% | -1% |
| | **High Price** | 42 | 33 | 0.49 | 0.38 | 19% | 13% |

* Shaded value indicates that the demand shed was too small to identify.

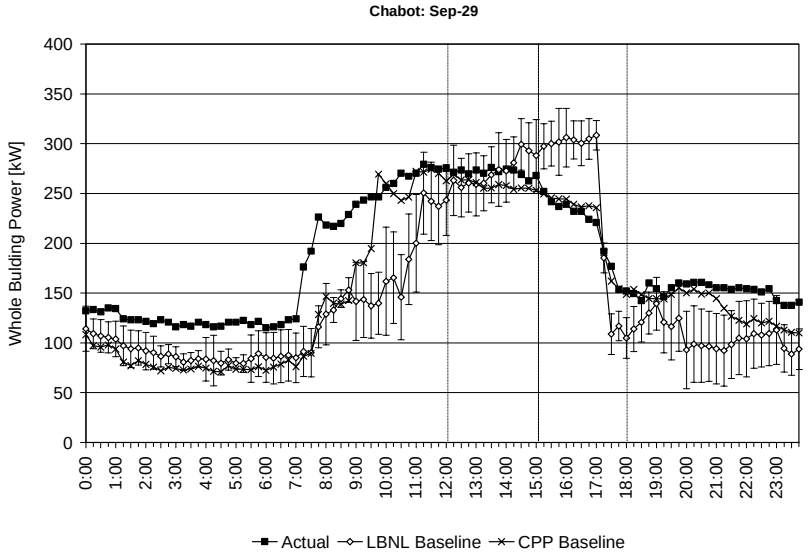
## September 22nd, 2005 (Mock CPP Event)

Precooling with linear temperature set up strategy was implemented between 12 pm to 6 pm. There were no occupant complaints. Their comments were captured by the occupant surveys conducted during the pre-cooling study (See Section 2.6 of the main report).



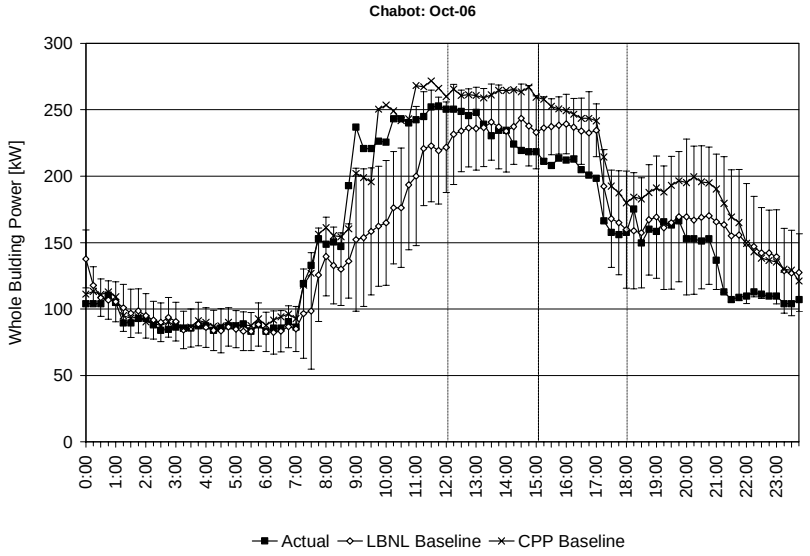
## September 29th, 2005 (Real CPP Event)

Precooling with the aggressive linear temperature set up strategy was implemented on this real event day. There were no occupant complaints. Their comments were captured by the occupant surveys conducted during the pre-cooling study (See Section 2.6 of the main report).



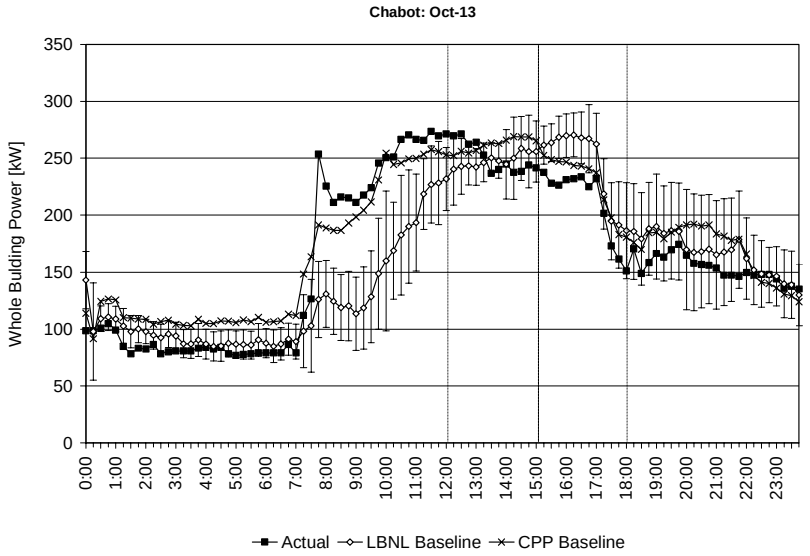

## October 6th, 2005 (Mock CPP Event)

Precooling with aggressive linear temperature set up strategy was implemented on this real event day. There were no complaints from the occupants. Their comments were captured by the occupant surveys conducted during the pre-cooling study (See Section 2.6 of the main report).



## October 13th, 2005 (Mock CPP Event)

The tests went as planned using the same strategies as implemented in the previous events.




## October 25th, 2005 (Mock CPP Event)

Since the outside air temperature was little too low, LBNL decided to have Chabot opt-out of this event, due to concerns about cold discomfort during the pre-cooling period.

## B.4. Contra Costa County, 2530 Arnold

**Site Summary**

| | |
|---|---|
| **Building Use** | Office |
| **Industry Classification** | County government |
| **City** | Martinez, CA |
| **Gross Floor Area** | 131,000 ft² |
| **Conditioned Area** | 131,000 ft² |
| **# of Buildings, floor** | 1-building, 4-floor |
| **Peak Load kW** | 528 kW |
| **Peak W/ft²** | 4.03 W/ft² |
| **Tenant Type** | County employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Mon-Fri: 5am-6pm |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | None. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Single duct Variable Air Volume with perimeter reheat |
| **Air Handler Unit** | (5) 60 ton rooftop package units with DX cooling and 8 equal compressor stages. |
| **Cooling Plant** | - |
| **Heating Plant** | Separate direct fired natural gas rooftop package |
| **HVAC Control System** | Alerton Control using BACtalk, operating on local workstations. |
| **DDC Zone Control** | Yes |
| **Other Details** | None. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | EMCS trends collect RTU parameters and zone temp. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay at site | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=No | |
| **Shed Strategies** | **Pre-event** | None. | |
| | **Moderate Price** | ►Zone setpoint increased 2 °F (76 °F to 78 °F). | |
| | **High Price** | ►Zone setpoint 4 °F up (80 °F). | |
| | **Slow Recovery** | ►VAV boxes are released one at a time over a short time interval. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Succeeded | **Sep-22** | Succeeded |
| **Sep-29** | Succeeded | **Oct-06** | Succeeded |
| **Oct-13** | Succeeded | **Oct-25** | Succeeded |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Aug-08** | **Moderate Price** | 163 | 94 | 1.25 | 0.72 | 33% | 19% |
| | **High Price** | 176 | 105 | 1.35 | 0.80 | 36% | 23% |
| **Sep-22** | **Moderate Price** | 99 | 63 | 0.76 | 0.48 | 24% | 15% |
| | **High Price** | 119 | 93 | 0.91 | 0.71 | 28% | 24% |
| **Sep-29** | **Moderate Price** | 90 | 34 | 0.69 | 0.26 | 21% | 8% |
| | **High Price** | 89 | 58 | 0.68 | 0.44 | 21% | 14% |
| **Oct-06** | **Moderate Price** | 44 | 22 | 0.33 | 0.17 | 11% | 6% |
| | **High Price** | 63 | 34 | 0.48 | 0.26 | 17% | 9% |
| **Oct-13** | **Moderate Price** | 60 | 22 | 0.46 | 0.17 | 15% | 6% |
| | **High Price** | 89 | 47 | 0.68 | 0.36 | 22% | 13% |
| **Oct-25** | **Moderate Price** | 40 | 28 | 0.31 | 0.21 | 12% | 8% |
| | **High Price** | 39 | 17 | 0.30 | 0.13 | 12% | 6% |

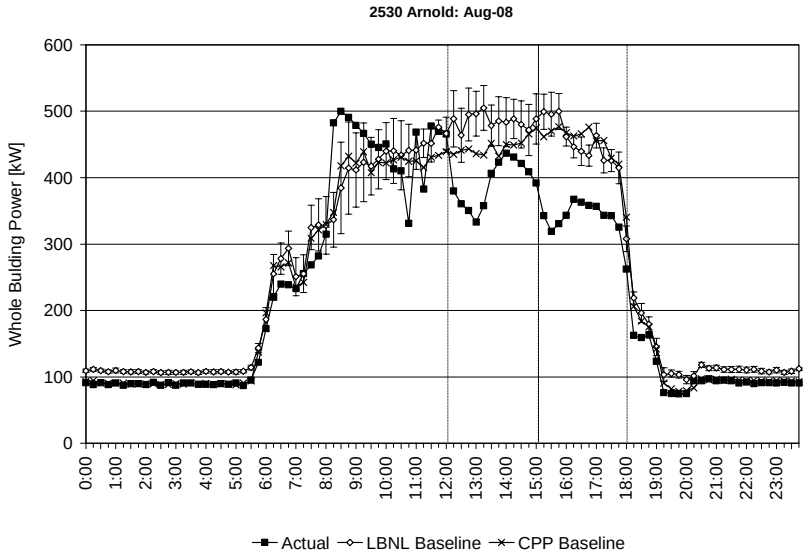
* Shaded value indicates that the demand shed was too small to identify.

### August 5th, 2005 (Real CPP Event)

2530 Arnold participated in the 2004 AutoDR tests and their Internet relay had been left in place and connected since then. With minor changes to their IT configuration, communication between the relay and the price server was reestablished. However, the relay had problems. When more than 2 relays turned on, the relay crashed and immediately returned back to the default state (all relays off). This might have been caused by a ground loop or other kind of electrical problem. Due to this problem, shed control worked for only the first 3 hours (Relay-0 on, Relay #1 off) and didn't work for the second 3 hours. The same problem happened at 50 Douglas.

**August 8th, 2005 (Real CPP Event)**

For default relay control, Relay #0 corresponds to the moderate price signal, and Relay #1 corresponds to the high price signal. During the high price period, Relay #0 and #1 both turn on. To avoid the electric problem mentioned above, LBNL created a new price channel for Contra Costa buildings which turned on only Relay #1 for the high price period. This strategy worked.

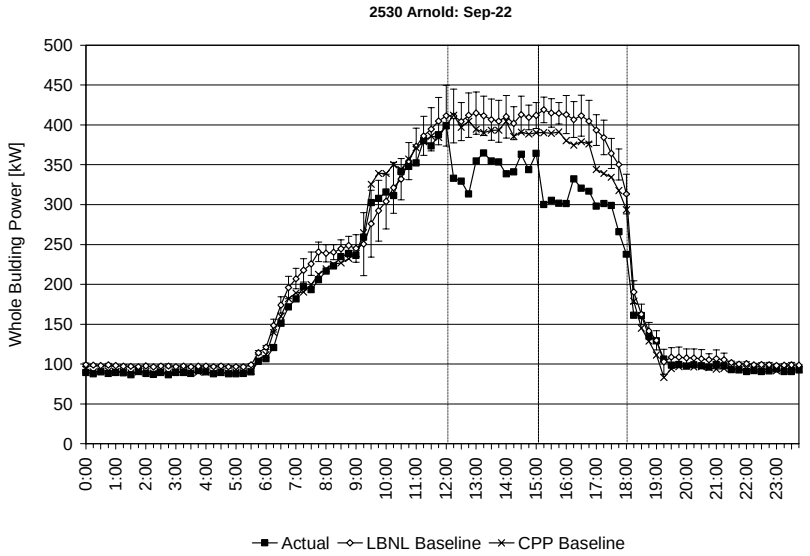



The demand shed shows a typical pattern of global setpoint adjustment strategy. The demand dropped off at noon when the zone setpoint was increased to 76 F. After approximately one hour, the demand started to increase. The zone temperature reached higher end of the deadband for the raised setpoint, and the cooling mode was activated. The zone temperature satisfied the lower deadband around 2 pm, and the demand was stabilized. This demand level is lower than the baseline because the cooling load is still lower than normal days due to the raised setpoint. During the 2004 tests, the demand didn't come back within a same price period, since each price period consisted of only 1 hour.

At 3 pm, the new price kicked in, and the demand dropped again. The dropped demand was same as that of noon drop. This means the RTU stopped operation and this load (approximately 300 kW) is the baseline load of this building. After one hour, the demand level was stabilized at a lower demand level than at the end of the moderate price period. The building didn't get a rebound peak when the event ended because the occupancy hours and HVAC operation also ended at 6 pm.

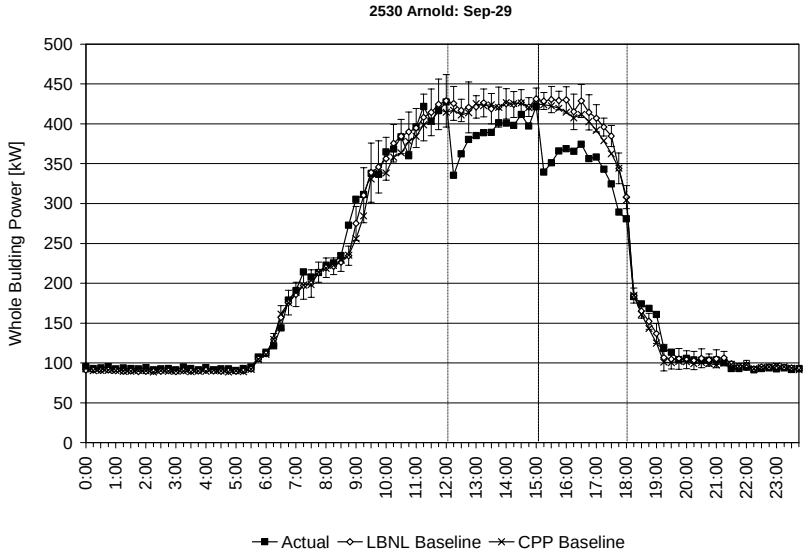
**September 22nd, 2005 (Mock CPP Event)**

The demand reduction was not as large as seen for August 8th, probably because the cooling load was smaller. The baseline load was nearly same as before (approximately 300 kW).



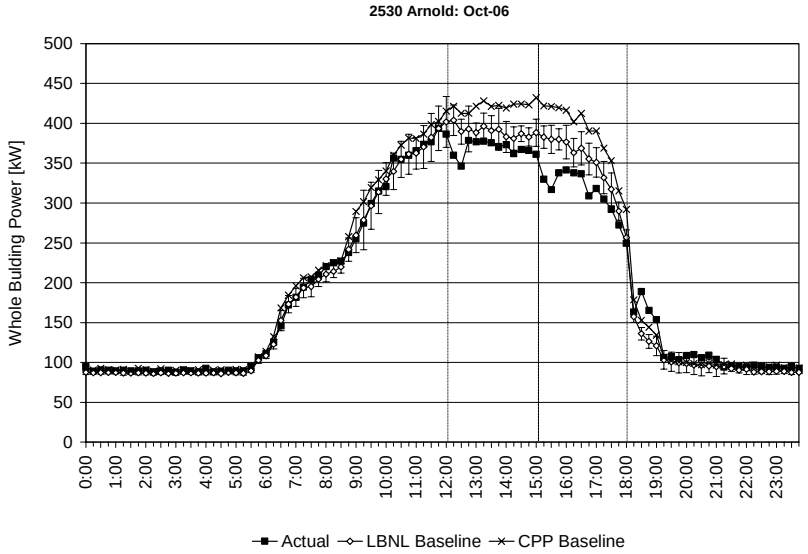

**September 29th, 2005 (Real CPP Event)**

At the end of the moderate price period, the demand came back to the baseline level.



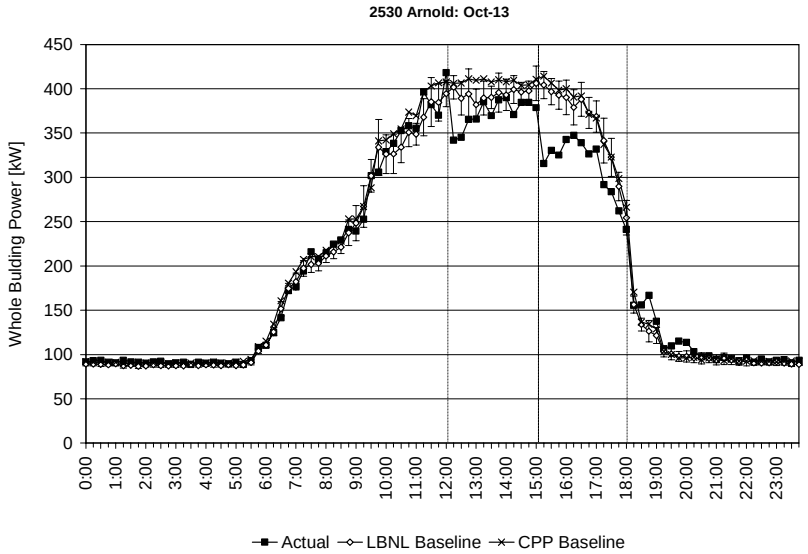
## October 6th, 2005 (Mock CPP Event)

The test operated successfully.



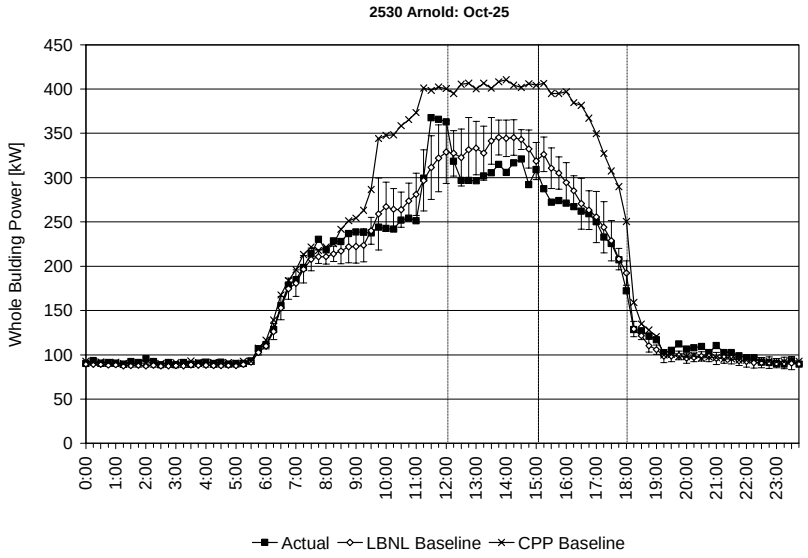

## October 13th, 2005 (Mock CPP Event)

The test operated successfully.



**October 25th, 2005 (Mock CPP Event)**

Due to the lower outside air temperature, the building was not in cooling mode in the morning. The RTU started around 11 am. Soon after the RTU started cooling, the zone setpoint was raised at noon. The raised setpoint was satisfied without cooling operation until the end of occupancy period though the original setpoint would have triggered all of the RTUs to run.



## B.5. Contra Costa County, 50 Douglas

**Site Summary**

| | |
|---|---|
| **Building Use** | Office |
| **Industry Classification** | County government |
| **City** | Martinez, CA |
| **Gross Floor Area** | 90,000 ft² |
| **Conditioned Area** | 90,000 ft² |
| **# of Buildings, floor** | 1-building, 3-floor |
| **Peak Load kW** | 422 kW |
| **Peak W/ft²** | 4.69 W/ft² |
| **Tenant Type** | County employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Mon-Fri: 5am-6pm |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | Has a building-integrated photovoltaic (PV) array with a maximum power rating of 100 kW. The array is connected on the customer side of the meter. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Single duct Variable Air Volume with perimeter reheat |
| **Air Handler Unit** | DX cooling rooftop package: (2) 75 ton with 4 equal compressor stages, and (1) 90 ton with 6 equal compressor stages. |
| **Cooling Plant** | - |
| **Heating Plant** | Each RTU has direct fired natural gas heaters |
| **HVAC Control System** | Alerton Control using BACtalk, operating on local workstations. |
| **DDC Zone Control** | Yes |
| **Other Details** | None. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=Yes |
| **Data Trending Detail** | EMCS trends collect RTU parameters and zone temp. PV submetering provided by PowerLight Corp. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay at site | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=No | |
| **Shed Strategies** | **Pre-event** | None. | |
| | **Moderate Price** | ►Zone setpoint increased 2 °F (76 °F to 78 °F). | |
| | **High Price** | ►Zone setpoint 4 °F up (80 °F). | |
| | **Slow Recovery** | ►VAV boxes are released one at a time over a short time interval. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Succeeded | **Sep-22** | Failed (3) |
| **Sep-29** | Failed (3) | **Oct-06** | Failed (3) |
| **Oct-13** | Failed (3) | **Oct-25** | Succeeded |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

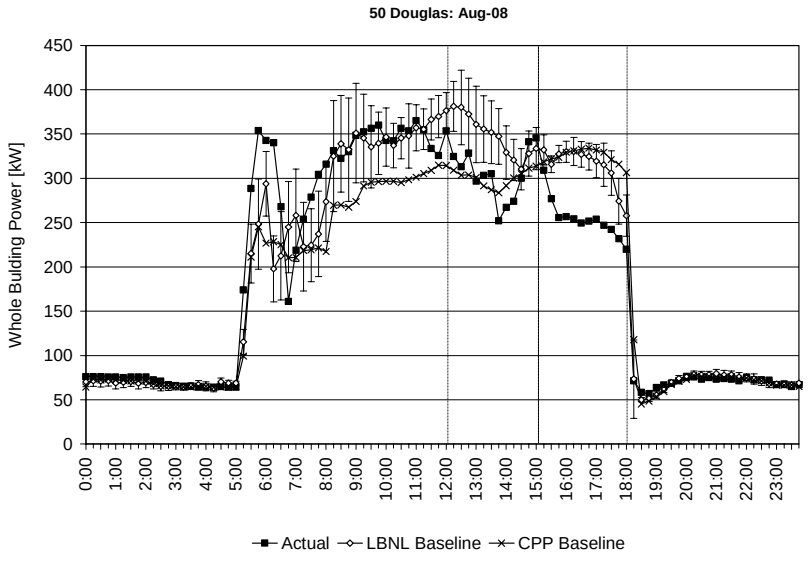
| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Aug-08** | **Moderate Price** | 95 | 43 | 1.06 | 0.48 | 27% | 12% |
| | **High Price** | 78 | 59 | 0.86 | 0.66 | 24% | 19% |
| **Oct-25** | **Moderate Price** | 75 | 41 | 0.83 | 0.46 | 30% | 17% |
| | **High Price** | 78 | 42 | 0.87 | 0.47 | 32% | 20% |

### August 5th, 2005 (Real CPP Event)

50 Douglas had the exact same relay problems as described for 2530 Arnold.

### August 8th, 2005 (Real CPP Event)

The relay trouble was avoided by applying the same method as used for 2530 Arnold. Compared to 2530 Arnold, demand dropped slowly at this building, though they have the exact same demand response strategies. The reason for this difference will be investigated. The demand peaked around 2 pm, probably because the zone temperature reached the raised setpoint. The demand dropped again to the lower level (approximately 250 kW) at 3 pm when entering the high price period. The rebound peak didn't occur because the occupancy and HVAC operation ended at the end of the CPP period.

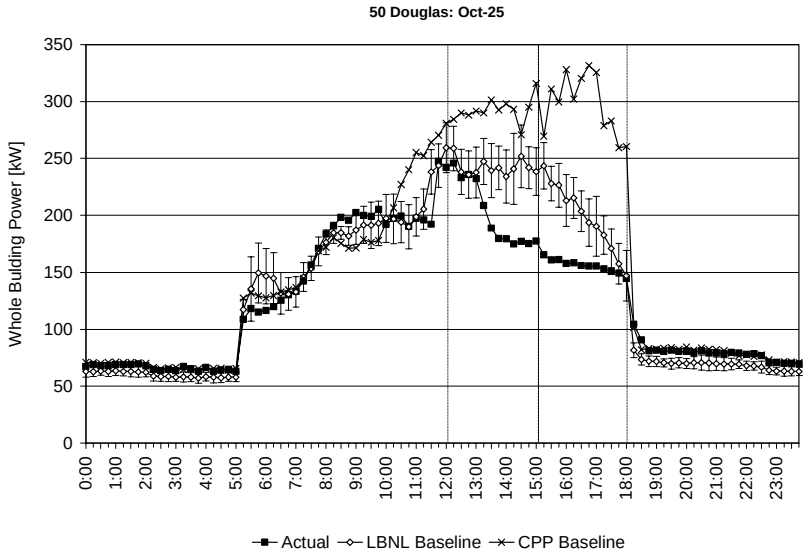



LBNL staff visited the site in the middle of August to replace the Internet relay. We found that the relay itself was working properly, but there might be an electrical problem. When the investigation was over, we determined that the relay might have been

connected loosely and one of control wiring had come off. This problem was not fixed until October 25th.

**October 25th, 2005 (Mock CPP Event)**

The engineer responded to LBNL's inquiry to check the relay connection. He found the control wiring had come off and reconnected it around 1 pm. The shed control was started around 1 pm. The cooling did not have to run until 11:30 am on this day, and cooling operations ceased when the zone setpoint increase occured.



## B.6. Echelon, San Jose Headquarters

**Site Summary**

| | |
|---|---|
| **Building Use** | Corporate Headquarter |
| **Industry Classification** | Industrial Control Manufacturing |
| **City** | San Jose, CA |
| **Gross Floor Area** | 75,000 ft² |
| **Conditioned Area** | 75,000 ft² |
| **# of Buildings, floor** | 1-building, 3-floor |
| **Peak Load kW** | 403 kW |
| **Peak W/ft²** | 5.37 W/ft² |
| **Tenant Type** | Company employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Mon-Fri |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | Echelon San Jose Headquarter was built as the company's technologies showcase. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Variable Air Volume |
| **Air Handler Unit** | Total 4,800 tons of roof-top units with VFD. One unit per floor. |
| **Cooling Plant** | - |
| **Heating Plant** | - |
| **HVAC Control System** | All the RTU and VAV are controlled with LonWorks. |
| **DDC Zone Control** | Yes. |
| **Other Details** | All office spaces are equipped with dimmable ballast lightings. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No. |
| **Data Trending Detail** | EMCS trend collects electric demand of RTU, receptacles, and total load for each floor. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay at site | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=Yes | |
| **Shed Strategies** | **Pre-event** | None. | |
| | **Moderate Price** | ►Boiler disabled.<br>►CHW setpoint raised to 50 °F.<br>►Current limiting to 70%.<br>►SAT increased from 55 °F to 65 °F for AHUs 1, 2, 3 and Lab AHU.<br>►DSP setpoint decreased from 1.5" to 1.0".<br>►Zone setpoint increased to 75 °F | |
| | **High Price** | ►Zone setpoint increased to 78 °F. | |
| | **Slow Recovery** | ►Extend shed control 2 hours (until 8 pm). | |

**Event Results**

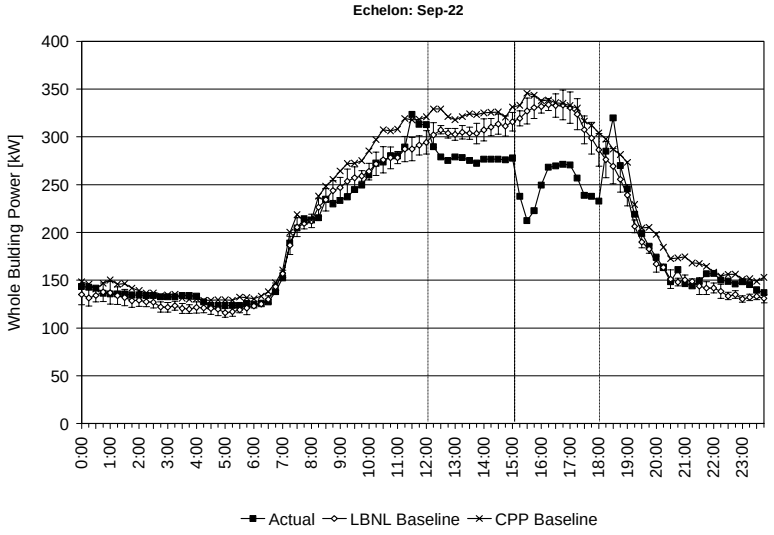
| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | Succeeded |
| **Sep-29** | Succeeded | **Oct-06** | Succeeded |
| **Oct-13** | Succeeded | **Oct-25** | Succeeded |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Sep-22** | **Moderate Price** | 38 | 29 | 0.51 | 0.39 | 12% | 10% |
| | **High Price** | 115 | 74 | 1.53 | 0.99 | 35% | 23% |
| **Sep-29** | **Moderate Price** | 42 | 32 | 0.56 | 0.43 | 12% | 9% |
| | **High Price** | 143 | 109 | 1.91 | 1.45 | 37% | 28% |
| **Oct-06** | **Moderate Price** | 72 | 60 | 0.96 | 0.81 | 20% | 17% |
| | **High Price** | 132 | 89 | 1.76 | 1.19 | 37% | 26% |
| **Oct-13** | **Moderate Price** | 49 | 35 | 0.65 | 0.47 | 15% | 11% |
| | **High Price** | 117 | 83 | 1.56 | 1.10 | 33% | 24% |
| **Oct-25** | **Moderate Price** | 45 | 33 | 0.60 | 0.43 | 16% | 11% |
| | **High Price** | 84 | 60 | 1.11 | 0.80 | 28% | 21% |

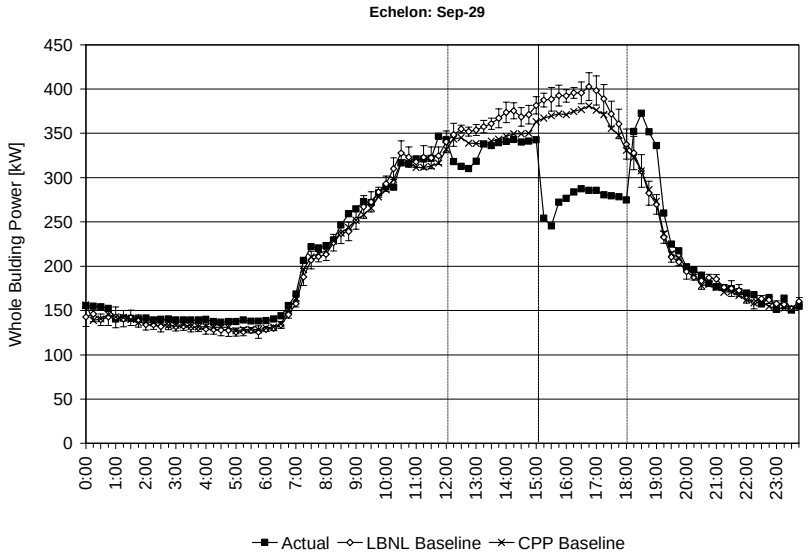
## September 22nd, 2005 (Mock CPP Event)

At 2:45 pm there was a high temperature alert for the server room. At 3 pm, the demand dropped down due to the planned demand response shutdown of one RTU. The demand came back again and consequently didn't meet the full load shed target. The goal for supply fan was to reduce it to 75% but it only went down to 90%. The cause will be investigated. One employee was concerned when the lights were dimmed, and there were complaints about offices being too dark. No feedback or complaints about the HVAC. After the end of the high price period, there was a high rebound peak caused by the HVAC operation recovery. Currently, this building doesn't have any capabilities to program slow recovery strategies.



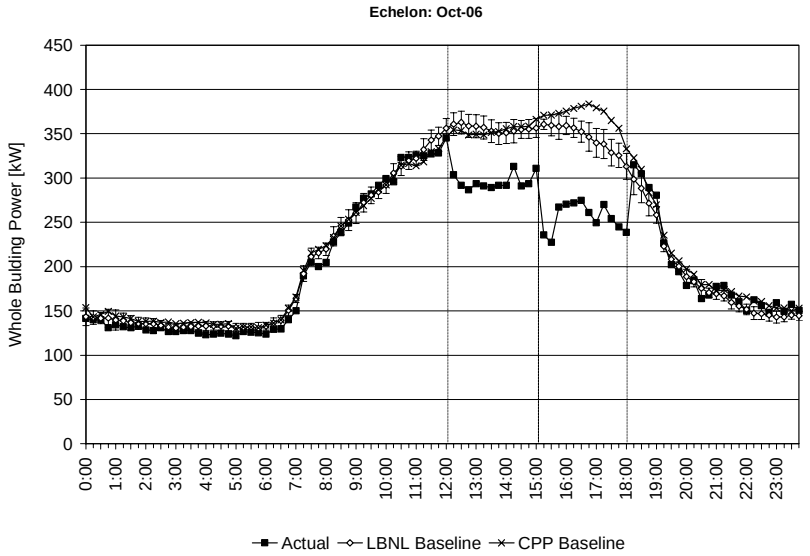
**September 29th, 2005 (Real CPP Event)**

The computer room was unoccupied, so the independent cooling unit for the computer room was helping to cool down rest of the building. This might have contributed to keep zone temperatures near their setpoint. The demand dropped down at 3 pm due to one RTU being shutdown, and slightly increased after the demand reached it's lowest level. The shutdown of the one RTU might have caused the other two RTUs to speed up slightly to adjust to the combined impact of the shutdown of the third RTU and the reduced duct static pressure. They got a high rebound peak again when the event ended at 6 pm. There were some complaints from the IT department that the lighting levels were too low. They did not customize their light levels, so the energy saving mode had been set to the default setting (maximum dimming level). They disabled the energy saving mode after 30 minutes. This impacted approximately 5% of floor area. The building operator is planning to program some VAV boxes go to unoccupied mode when the RTU is running in reduced mode in order to maintain duct static pressure during a CPP event. Currently the VAV boxes go open to the maximum setting to maintain the zone temperatures when the RTU is shut down and the system capacity is reduced.



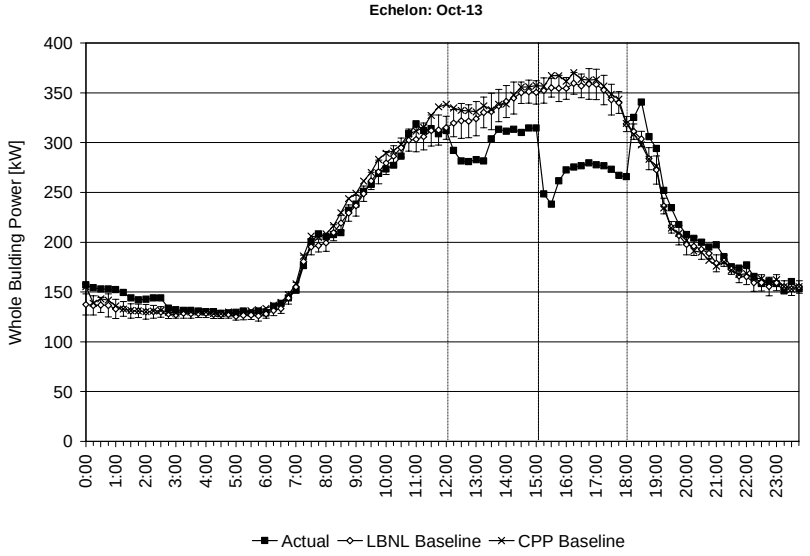
## October 6th, 2005 (Mock CPP Event)

Someone suggested to the building operator that emergency light or some other light should be on in the hallway during the shed event. No complaints relating to the HVAC systems.



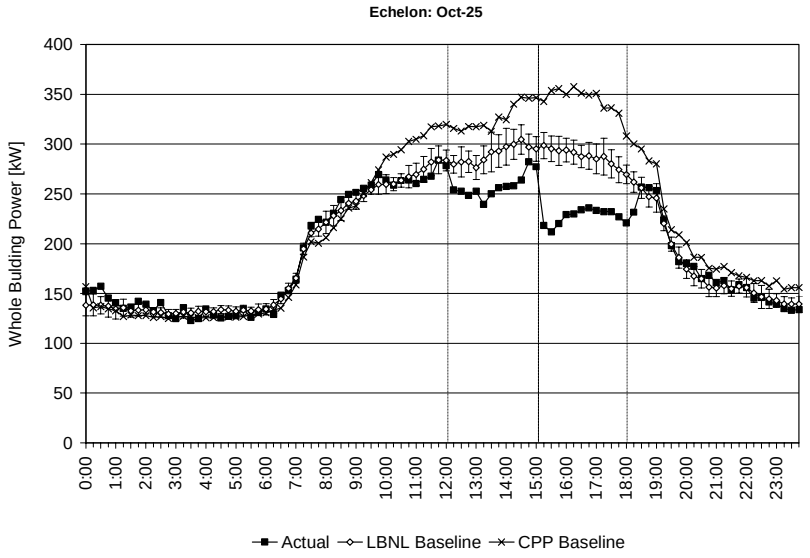

## October 13th, 2005 (Mock CPP Event)

The whole building interval meter data shows that the electric load dropped down at noon when the moderate price started, but the load came back up around 1:30 pm. The operator assumes that this was because some occupants opt-outed during the shed. The operator also noticed that the lighting was brighter than the last even. He sent out notifications out to the building occupants early in the week to guide them to adjust to the energy saving mode setting. Some occupants might configure shed-mode light level up prior to the test day and counteract potential lighting savings.



**October 25th, 2005 (Mock CPP Event)**

There was an unexplained ramping up of the load at the end of the moderate price period. It may be because the occupants started to opt out, but the building operator was not sure. Since this site always has a high rebound spike right after the shed period, the operator did manual slow recovery by ramping up the duct static pressure from 0.4 IWC to 1.5 IWC in increments of 0.2 IWC every 5 minutes. It took about 20 minutes to get back to normal. The building operator also manually ramped down the supply air temperature from 65 F to 55 F. The slow recovery operation mitigated the high rebound peak.



## B.7. Fremont Unified School District, Irvington High School

**Site Summary**

| | |
|---|---|
| **Building Use** | Highschool |
| **Industry Classification** | Highschool - public |
| **City** | Fremont, CA |
| **Gross Floor Area** | 186,000 ft² |
| **Conditioned Area** | 186,000 ft² |
| **# of Buildings, floor** | 1-building, N/A-floor |
| **Peak Load kW** | N/A kW |
| **Peak W/ft²** | N/A W/ft² |
| **Tenant Type** | Teachers, students |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Mon-Fri 7:00 a.m. to 4:00 p.m. |
| **Non-weekday Schedule** | Off |
| **Building Details** | Concrete block walls and flat roof |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Constant Volume |
| **Air Handler Unit** | Trane hot and chilled water coils |
| **Cooling Plant** | Trane Chiller - air cooled |
| **Heating Plant** | Boiler |
| **HVAC Control System** | Tracer Summit with a small percentage of pneumatic |
| **DDC Zone Control** | Tracer Summit |
| **Other Details** | None. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=Yes |
| **Data Trending Detail** | Circulation loop, room and air supply temperatures |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | CLIR | |
| **Gateway/Relay Device** | CLIR | **Client Host Location** | Novato, CA |
| **Price Client Host** | CLIR | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=Yes | |
| **Shed Strategies** | **Pre-event** | ►Precooling to 72 °F until 11:50 a.m. | |
| | **Moderate Price** | ►Raise temperature to 78°F until 2:50 p.m. | |
| | **High Price** | ►Turn off systems at 2:50pm.<br>School closes at 3pm. Office areas drift. | |
| | **Slow Recovery** | None. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | Not ready |
| **Sep-29** | Not ready | **Oct-06** | Not ready |
| **Oct-13** | Not ready | **Oct-25** | Not ready |
| **10-Nov** | - | **Nov-15** | Failed (3) |

* See Section 4-1 of the main report for result definition.

**October 15th, 2005 (Mock CPP Event only for this site)**

There are no savings reported from this test. An interview with the Syserco representative indicated that the relays were assigned incorrectly and that the pre-cooling was not activated. The Syserco representative was on site on the day of the event and at 1:30 pm changed the relay assignments. However, the strategy was not implemented until 2 pm since the time clock was reset during the relay reassignments and the strategy takes advantage of the time clock. The school closes at 3 pm so the shed strategy is terminated at 2:50 pm. Since the shed strategy did not work as planned, there were no savings for that day.

## B.8. Gilead Science, 300 Lakeside Dr.

**Site Summary**

| | |
|---|---|
| **Building Use** | Office |
| **Industry Classification** | Life Sciences Research and Development |
| **City** | Foster City, CA |
| **Gross Floor Area** | 83,000 ft² |
| **Conditioned Area** | 83,000 ft² |
| **# of Buildings, floor** | 1-building, 2-floor |
| **Peak Load kW** | N/A kW |
| **Peak W/ft²** | N/A W/ft² |
| **Tenant Type** | Company employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Mon-Fri |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | Newly constructed building. Occupancy started in Spring 2005. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Variable Air Volume |
| **Air Handler Unit** | (4) VFD AHUs.Supply air temp 55 °F. |
| **Cooling Plant** | (2) 75 ton rooftop units. |
| **Heating Plant** | N/A |
| **HVAC Control System** | Siemens |
| **DDC Zone Control** | Yes |
| **Other Details** | None. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=No EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | None. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay w/WAN | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=No High=No Notification=Yes | |
| **Shed Strategies** | **Pre-event** | ►Shed control starts at 11 am. | |
| | **Moderate Price** | ►AHU increase SAT from 55°F to 65 °F. | |
| | **High Price** | ►Same as moderate price. | |
| | **Slow Recovery** | None. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | No data |
| **Sep-29** | No data | **Oct-06** | No data |
| **Oct-13** | No data | **Oct-25** | No data |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

Although Gilead 300 signed up to be on CPP, installation of an interval meter was delayed and they were not able to start CPP by the end of October. Therefore, though Gilead 300 participated in the shed event, the demand shed analysis is not available.

The south part of Gilead 300 was 4 degrees warmer than the rest of the building, and the operator received three or four complaints calls. Since Gilead 300 is a new building, it still needs to be calibrated and commissioned.

## B.9. Gilead Science, 342 Lakeside Drive

**Site Summary**

| | |
|---|---|
| **Building Use** | Office, Lab |
| **Industry Classification** | Life Sciences Research and Development |
| **City** | Foster City, CA |
| **Gross Floor Area** | 32,000 ft² |
| **Conditioned Area** | 32,000 ft² |
| **# of Buildings, floor** | 1-building, 1-floor |
| **Peak Load kW** | 464 kW |
| **Peak W/ft²** | 14.5 W/ft² |
| **Tenant Type** | Company employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Mon-Fri |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | The building is 40% office, 60% lab space. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Variable Air Volume, Zone setpoint 70~75 °F. |
| **Air Handler Unit** | (4) VFD AHUs.Supply air temp 55 °F. |
| **Cooling Plant** | (2) 125 ton chillers. |
| **Heating Plant** | N/A |
| **HVAC Control System** | Siemens |
| **DDC Zone Control** | Yes |
| **Other Details** | None. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | None. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay w/WAN | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=No High=No Notification=Yes | |
| **Shed Strategies** | **Pre-event** | ►Shed control starts at 11 am. | |
| | **Moderate Price** | ►AHU increase SAT from 55°F to 65 °F.<br>►Zone setpoint increase to 75°F<br>(70 ~ 75 °F normal). | |
| | **High Price** | ►Same as moderate price. | |
| | **Slow Recovery** | None. | |

**Event Results**

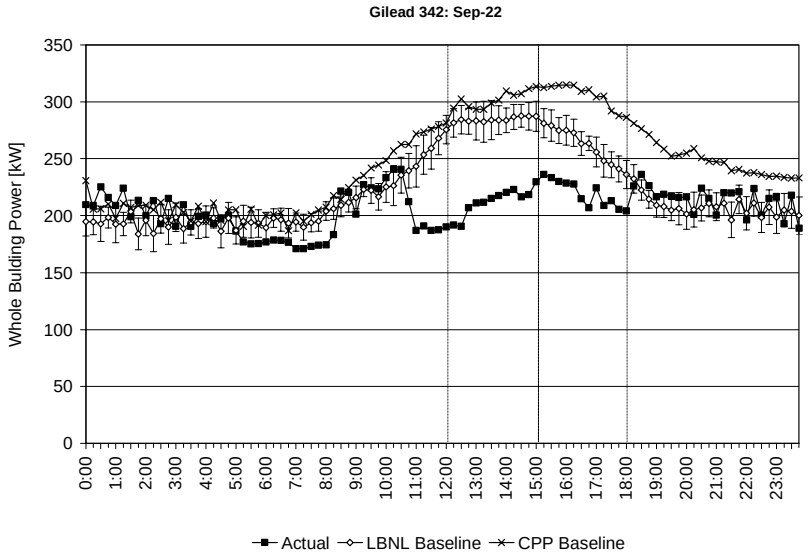
| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | Succeeded |
| **Sep-29** | Succeeded | **Oct-06** | Succeeded |
| **Oct-13** | Succeeded | **Oct-25** | Succeeded |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Sep-22** | **Moderate Price** | 94 | 72 | 2.93 | 2.25 | 33% | 25% |
| | **High Price** | 56 | 42 | 1.76 | 1.31 | 21% | 16% |
| **Sep-29** | **Moderate Price** | 73 | 45 | 2.30 | 1.39 | 19% | 13% |
| | **High Price** | 75 | 55 | 2.36 | 1.72 | 20% | 15% |
| **Oct-06** | **Moderate Price** | 45 | 24 | 1.40 | 0.75 | 16% | 9% |
| | **High Price** | 32 | 21 | 0.98 | 0.65 | 12% | 8% |
| **Oct-13** | **Moderate Price** | 55 | 32 | 1.72 | 1.01 | 19% | 11% |
| | **High Price** | 55 | 34 | 1.73 | 1.06 | 17% | 10% |
| **Oct-25** | **Moderate Price** | 80 | 60 | 2.51 | 1.89 | 30% | 22% |
| | **High Price** | 70 | 53 | 2.20 | 1.64 | 26% | 20% |

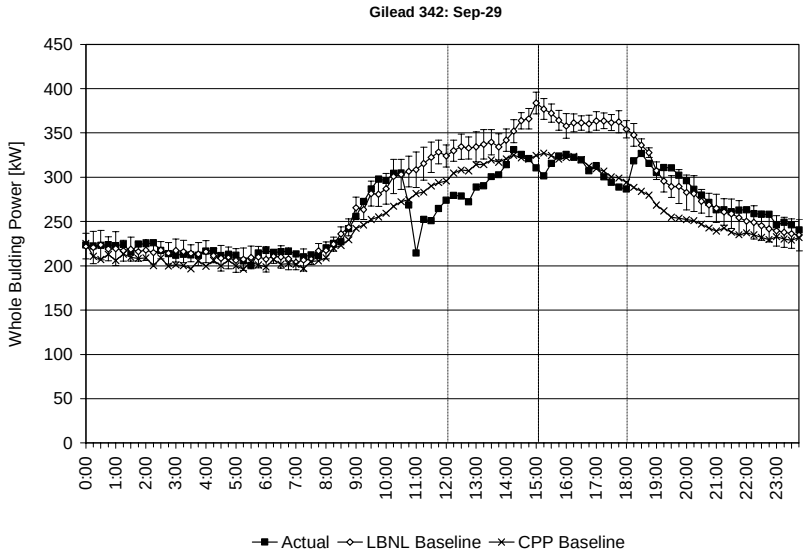
## September 22nd, 2005 (Mock CPP Event)

Gilead programmed their buildings to start their shed strategies at 11 am. Therefore, the morning adjustment reference period for the baseline is customized to between 9 am and 11 am for Gilead, while the default morning adjustment reference period was 9 am to noon for other buildings in this study. The shed control was successful.



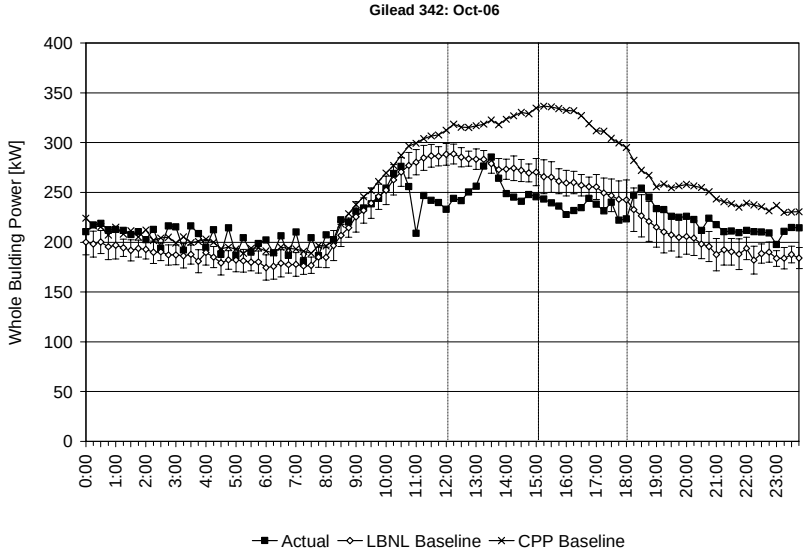
## September 29th, 2005 (Real CPP Event)

Due to its process cycle in the lab space, Gilead 342 occasionally has irregular load shapes which affect the baseline calculation.



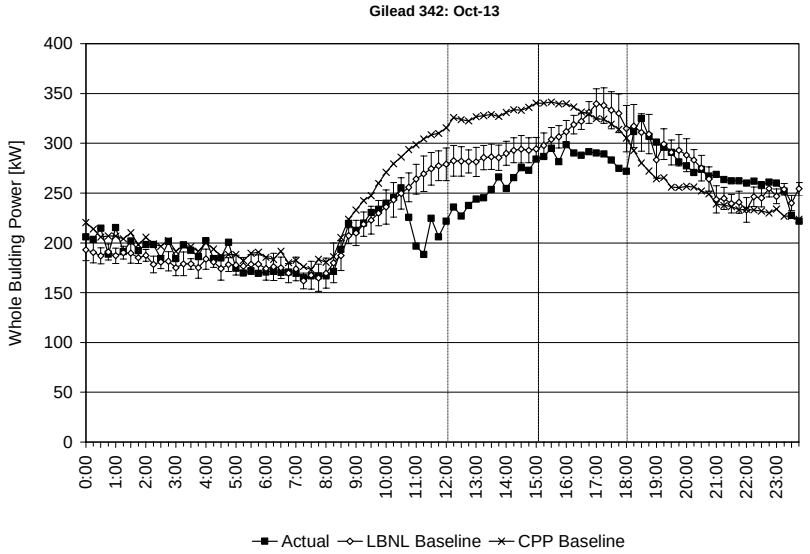

## October 6th, 2005 (Mock CPP Event)

The LBNL baseline may predict a smaller estimate than expected due to the process cycles. The building had a demand spike around 1:30 pm probably related to its process cycle.



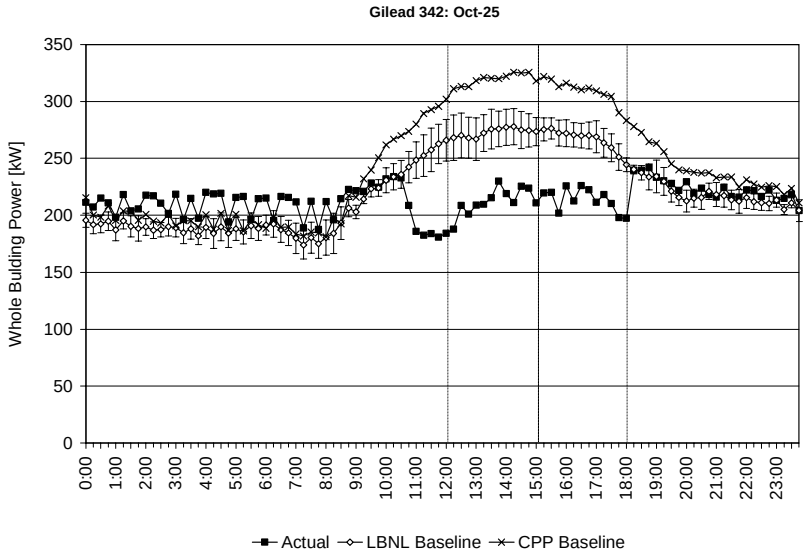
## October 13th, 2005 (Mock CPP Event)

The shed control was successful.




## October 25th, 2005 (Mock CPP Event)

The shed control was successful.



## B.10. Gilead Science, 357 Lakeside Drive

**Site Summary**

| | |
|---|---|
| **Building Use** | Office, Lab |
| **Industry Classification** | Life Sciences Research and Development |
| **City** | Foster City, CA |
| **Gross Floor Area** | 33,000 ft² |
| **Conditioned Area** | 33,000 ft² |
| **# of Buildings, floor** | 1-building, 1-floor |
| **Peak Load kW** | 664 kW |
| **Peak W/ft²** | 20.12 W/ft² |
| **Tenant Type** | Company employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Mon-Fri |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | The building is 40% office, 60% lab space. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Variable Air Volume |
| **Air Handler Unit** | VFD AHUs. Supply air temp 55 °F. |
| **Cooling Plant** | (1) 225 ton chiller<br>(1) 325 ton chiller |
| **Heating Plant** | N/A |
| **HVAC Control System** | Siemens |
| **DDC Zone Control** | Yes |
| **Other Details** | None. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | None. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay w/WAN | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=No High=No Notification=Yes | |
| **Shed Strategies** | **Pre-event** | ►Shed control starts at 11 am. | |
| | **Moderate Price** | ►AHU SAT increased from 55°F to 65 °F.<br>►Zone setpoint increased to 75°F<br>(70 ~ 75 °F normal). | |
| | **High Price** | ►Same as moderate price. | |
| | **Slow Recovery** | None. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | Opt out |
| **Sep-29** | Succeeded | **Oct-06** | Succeeded |
| **Oct-13** | Not visible | **Oct-25** | Succeeded |
| **10-Nov** | - | **Nov-15** | - |

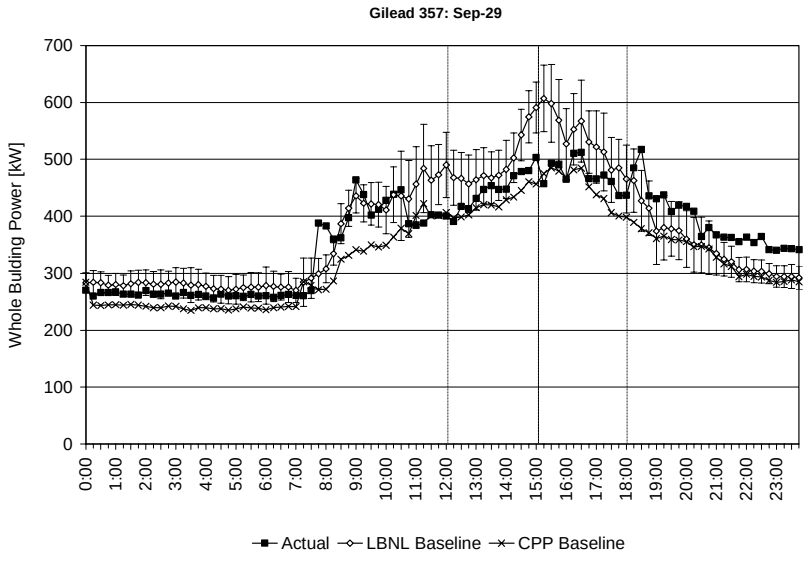
* See Section 4-1 of the main report for result definition.

| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Sep-29** | **Moderate Price** | 94 | 48 | 2.95 | 1.50 | 16% | 9% |
| | **High Price** | 150 | 62 | 4.68 | 1.95 | 25% | 11% |
| **Oct-13** | **Moderate Price** | 24 | 12 | 0.72 | 0.37 | 7% | 4% |
| | **High Price** | 119 | 68 | 3.60 | 2.07 | 26% | 17% |
| **Oct-25** | **Moderate Price** | 145 | 66 | 4.38 | 2.00 | 35% | 16% |
| | **High Price** | -11 | -40 | -0.34 | -1.20 | -3% | -11% |

* Shaded value indicates that the demand shed was too small to identify.

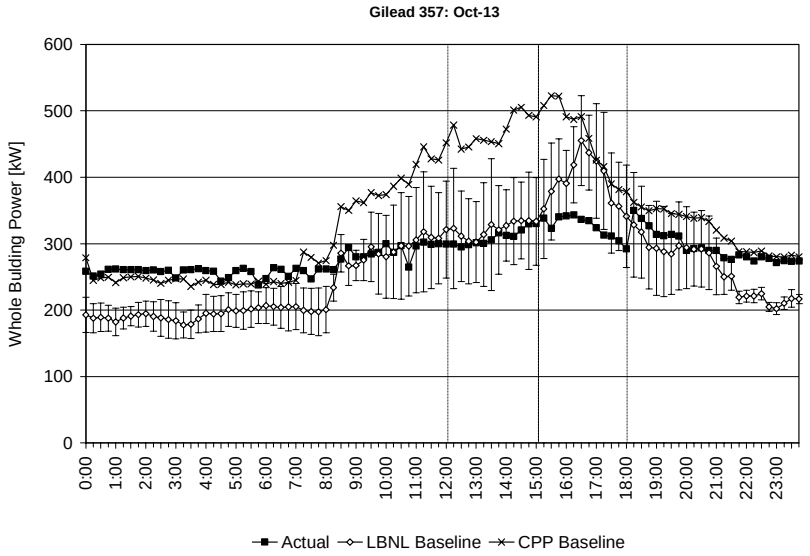
## September 29th, 2005 (Real CPP Event)

Due to its process cycle in the lab space, Gilead 357 occasionally has irregular load shapes which affect the baseline calculation.



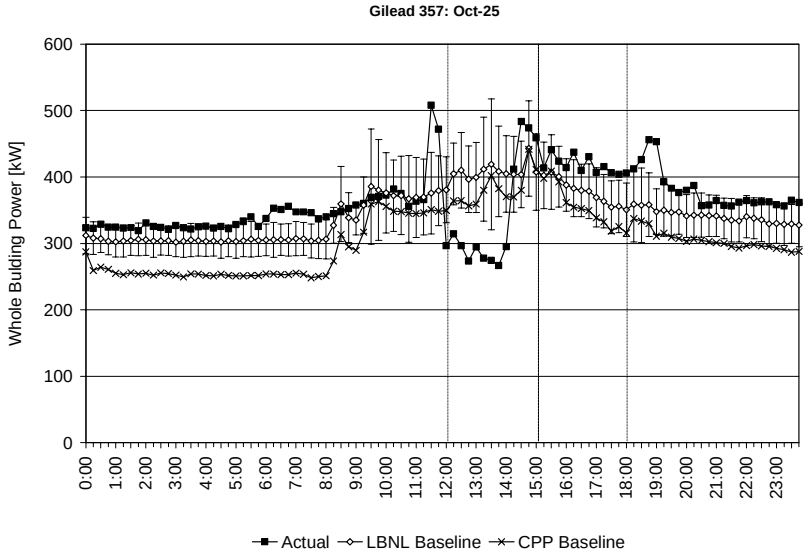
## October 13th, 2005 (Mock CPP Event)

Due to its process cycle in the lab space, Gilead 357 occasionally has irregular load shapes which affect the baseline calculation.




## October 25th, 2005 (Mock CPP Event)

Due to its process cycle in the lab space, Gilead 357 occasionally has irregular load shapes which affect the baseline calculation.



## B.11. IKEA, East Palo Alto Store

**Site Summary**

| | |
|---|---|
| **Building Use** | Retail |
| **Industry Classification** | Furniture store |
| **City** | East Palo Alto, CA |
| **Gross Floor Area** | 300,000 ft² |
| **Conditioned Area** | 300,000 ft² |
| **# of Buildings, floor** | 1-building, 2-floor |
| **Peak Load kW** | 2238 kW |
| **Peak W/ft²** | 7.46 W/ft² |
| **Tenant Type** | Customers, employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | 4am-10pm (Customers from 10am-9pm) |
| **Non-weekday Schedule** | None |
| **Building Details** | Two-story building with a large sales area on both floors with a cafeteria and a restaurant on site. Smaller office space on the second floor with larger storage spce in the first floor. The facility has an attached two-story garage. |


**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Multi-zone Variable Air Volume |
| **Air Handler Unit** | (43) Rooftop DX cooling units. DDC. |
| **Cooling Plant** | - |
| **Heating Plant** | - |
| **HVAC Control System** | NOVAR System |
| **DDC Zone Control** | Yes |
| **Other Details** | There are incandescent lights for store hours, and fluorescent lights for non-store hours. The lighting system is controlled by schedules offered by smart panels. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | The EMCS collects the following data for each RTU: percentage (supply fan, cooling stages 1 and 2, heating stages 1 and 2, damper position), space and supply air temperatures. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay at site | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=No Notification=No | |
| **Shed Strategies** | **Pre-event** | None. | |
| | **Moderate Price** | ►Zone setpoint increased 2 °F at each RTU. | |
| | **High Price** | ►Zone setpoints increased to 76 °F. | |
| | **Slow Recovery** | None. | |

**Event Results**

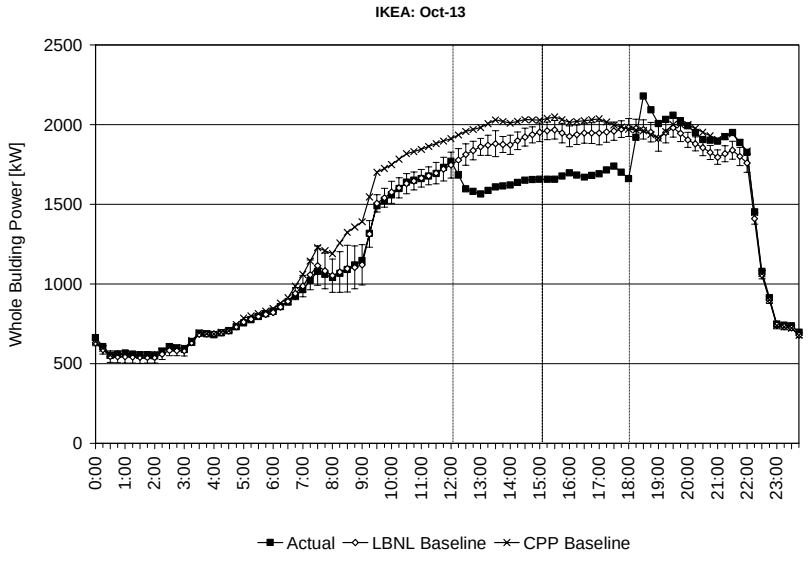
| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | Not ready |
| **Sep-29** | Not ready | **Oct-06** | Not ready |
| **Oct-13** | Succeeded | **Oct-25** | Succeeded |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Oct-13** | **Moderate Price** | 296 | 253 | 0.99 | 0.84 | 16% | 13% |
| | **High Price** | 321 | 268 | 1.07 | 0.89 | 16% | 14% |
| **Oct-25** | **Moderate Price** | 223 | 204 | 0.74 | 0.68 | 12% | 12% |
| | **High Price** | 207 | 169 | 0.69 | 0.56 | 12% | 10% |

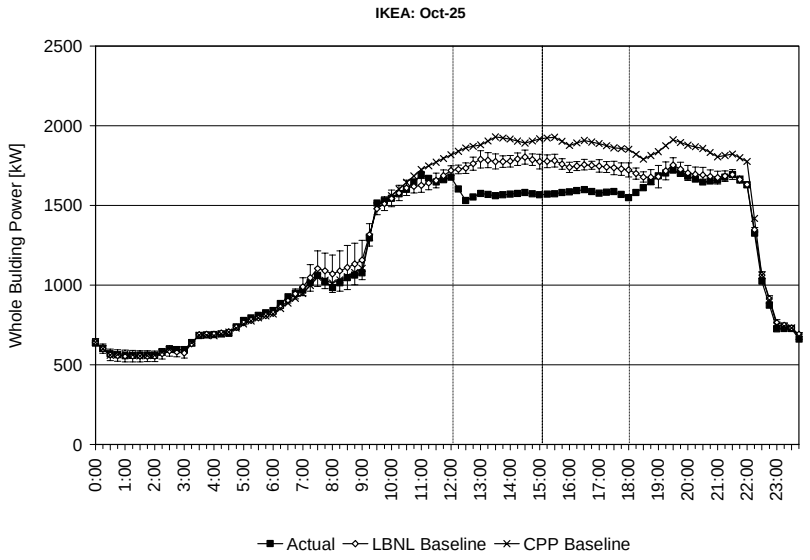
## October 13th, 2005 (Mock CPP Event)

The facility engineer received event notification directly from LBNL staff because the communication tests with PG&E had not been completed. The facility engineer observed that the setpoint adjustment strategy worked. Although the computer room and kitchen temperatures were supposed to remain unchanged, they also increased. There were complaints from the kitchen staff and alarms from the computer room. This problem was communicated to the controls vendor. For the next set of testing, the facility engineer asked not to raise the temperatures to 76 °F.



**October 25th, 2005 (Mock CPP Event)**

The facility engineer was not on site on this event day. The set point set up strategy was not changed by the control vendor prior to the event. When the kitchen staff started complaining, at about 4 pm, the controls vendor had to remotely adjust the set points to 73 °F.



## B.12. Lawrence Berkeley National Laboratory, Oakland Scientific Facility

**Site Summary**

| | |
|---|---|
| **Building Use** | Data center, Office |
| **Industry Classification** | University, research |
| **City** | Oakland, CA |
| **Gross Floor Area** | 90,000 ft² |
| **Conditioned Area** | 70,000 ft² |
| **# of Buildings, floor** | 1-building, 4-floor |
| **Peak Load kW** | 2189 kW |
| **Peak W/ft²** | 31.27 W/ft² |
| **Tenant Type** | LBNL, UCOP |
| **Facility Management** | Outsourced |
| **Weekday Schedule** | Mon-Fri: 8am-6pm |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | The building has a large data center on its first floor, and the data center load dominates whole building power (approx 1.5 MW). New computers were added in August, which will increase the demand 500 kW for the computer load and for the related cooling loads. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | (94) Variable Air Volume. Zone temp setpoint is 70 °F for data center, 72 °F for office area. |
| **Air Handler Unit** | (1) AHU for office floors (2nd to 4th floors). (3) AHU for the data center. 2000 CFM minimum. VFD. DDC. Supply air temp 55~60 °F. |
| **Cooling Plant** | (3) 800 ton Centrifugal chillers. 2 of 3 have VSD. Chilled water setpoint temp 44 °F. |
| **Heating Plant** | - |
| **HVAC Control System** | Johnson Metasys. The EMCS can be viewed/controlled/programmed offsite. |
| **DDC Zone Control** | Yes |
| **Other Details** | Lighting has bi-level switch. Requires additional device to interface with EMCS. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=Yes |
| **Data Trending Detail** | InterAct collects only WBP, and electric demand for office floors is not available. Temporary submeters were installed at the AHU for the office floors. The EMCS collects the cooling Btu supplied to the AHU. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | Relay w/WAN | |
| **Gateway/Relay Device** | ADAM6060 | **Client Host Location** | Novato, CA |
| **Price Client Host** | DRAS | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=Yes | |
| **Shed Strategies** | **Pre-event** | ►Zone setpoint -0 to 2°F decrease in the morning for pre cooling. | |
| | **Moderate Price** | ►Zone setpoint 2 ~ 6 °F up. | |
| | **High Price** | ►Zone setpoints increased a maximum of 6 °F up. | |
| | **Slow Recovery** | None. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | No data |
| **Sep-29** | No data | **Oct-06** | No data |
| **Oct-13** | No data | **Oct-25** | Opt out |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

## B.13. Oracle Corporation, Rocklin

**Site Summary**

| | |
|---|---|
| **Building Use** | Office |
| **Industry Classification** | Software publisher |
| **City** | Rocklin, CA |
| **Gross Floor Area** | 100,000 ft² |
| **Conditioned Area** | 100,000 ft² |
| **# of Buildings, floor** | 2-building, 3-floor |
| **Peak Load kW** | 808 kW |
| **Peak W/ft²** | 8.08 W/ft² |
| **Tenant Type** | Company employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Mon-Fri: 7am - 6pm |
| **Non-weekday Schedule** | Sat&Sun |
| **Building Details** | The site has two buildings. One is occupied by Oracle, and the other is leased. The interval meter is metering both buildings at once, and individual demand is not available. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | Variable Air Volume |
| **Air Handler Unit** | (10) Roof-top units<br>(6) return fans. DDC. |
| **Cooling Plant** | N/A |
| **Heating Plant** | (1) 3000 Mbtu/h gas hot water boiler . Hot water temp: 160 °F.<br>Heating lockout when OAT is over 80 °F. |
| **HVAC Control System** | Tracer Summit. Viewable onsite and offsite. |
| **DDC Zone Control** | Yes. |
| **Other Details** | N/A |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | None. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | CLIR | |
| **Gateway/Relay Device** | CLIR | **Client Host Location** | Rocklin, CA |
| **Price Client Host** | CLIR | **Client Hosted at Co-Lo** | No |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=No | |
| **Shed Strategies** | **Pre-event** | None. | |
| | **Moderate Price** | ►DSP reduced 20% at supply fans. | |
| | **High Price** | ►Zone setpoints increased 3°F. | |
| | **Slow Recovery** | None. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | Not ready |
| **Sep-29** | Not ready | **Oct-06** | Not ready |
| **Oct-13** | Not ready | **Oct-25** | Not ready |
| **10-Nov** | Succeeded | **Nov-15** | - |

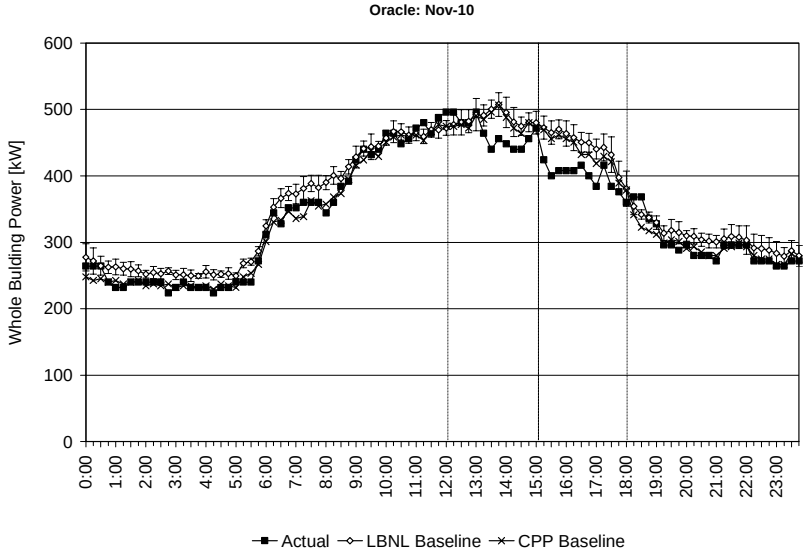
* See Section 4-1 of the main report for result definition.

| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Nov-10** | **Moderate Price** | 60 | 23 | 0.20 | 0.08 | 12% | 5% |
| | **High Price** | 65 | 45 | 0.22 | 0.15 | 14% | 10% |

Oracle was the first CLIR Box demonstration site. They have a stringent network security policy which doesn't allow the installation of an Internet relay to receive the control signal from the price server. The CLIR Box was installed on October 27th. Though it required additional configurations to access the proxy server, the connection between the CLIR Box and the price server was established without any modifications of the Oracle network.

### October 10th, 2005 (Mock CPP Event only for this site)

The shed strategy was not initiated because LBNL mistakenly configured the wrong price channel to the site. The operator noticed by checking the EMCS that the control change was not taking place, and called LBNL staff for troubleshooting at 12:30 pm. LBNL staff found the wrong channel setting and switched to a correct channel at 12:45 pm. The operator confirmed the control change right after the channel was switched. The demand dropped around 1 pm (shortly after the channel was switched). The demand increased at the end of the moderate price period, but soon dropped again when the high price period started. The demand increased again around 5 pm, but decreased shortly after that. The site didn't have a rebound peak after the end of event.



## B.14. Target, Hayward Store

**Site Summary**

| | |
|---|---|
| **Building Use** | Retail |
| **Industry Classification** | Retail store |
| **City** | Hayward, CA |
| **Gross Floor Area** | 130,000 ft² |
| **Conditioned Area** | 130,000 ft² |
| **# of Buildings, floor** | 1-building, 1-floor |
| **Peak Load kW** | 428 kW |
| **Peak W/ft²** | 3.29 W/ft² |
| **Tenant Type** | Customers, employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | Sun-Sat: 8am - 10pm |
| **Non-weekday Schedule** | None |
| **Building Details** | One-story building with large sales area supported with storage area, offices, food sales area and restrooms. |


**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | N/A |
| **Air Handler Unit** | (23) CV Roof-top units. 74 °F cooling, 70 °F heating setpoint. |
| **Cooling Plant** | N/A |
| **Heating Plant** | N/A |
| **HVAC Control System** | ALC. Controllable and programmable offsite. |
| **DDC Zone Control** | No |
| **Other Details** | 2x4 fluorescent fixtures in sales areas.Every fourth fixture is circuited together. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=Yes Submeter=No |
| **Data Trending Detail** | EMCS collects start/stop of each roof-top units. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | DRAS-WS | |
| **Gateway/Relay Device** | Canon Technologies | **Client Host Location** | Minesota |
| **Price Client Host** | Target | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=No | |
| **Shed Strategies** | **Pre-event** | None. | |
| | **Moderate Price** | ►Shut off 3 of 12 RTUs in the sales area (building has 23 RTUs total).<br>►Shut off 5 RTUs in the sales area after October 6th. | |
| | **High Price** | ►Turn off every fourth light fixture in the sales area. | |
| | **Slow Recovery** | None. | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Succeeded | **Sep-22** | Succeeded |
| **Sep-29** | Succeeded | **Oct-06** | Succeeded |
| **Oct-13** | Succeeded | **Oct-25** | Succeeded |
| **10-Nov** | - | **Nov-15** | - |

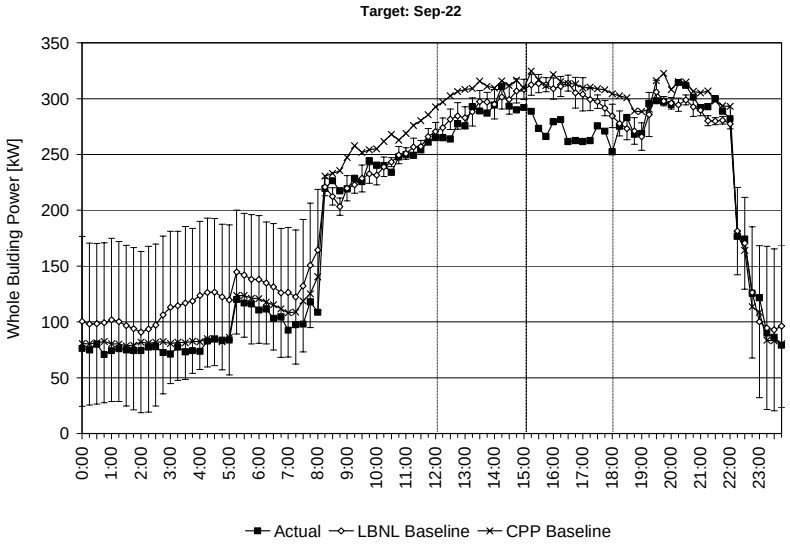
* See Section 4-1 of the main report for result definition.

| Date | Price Level | kW | | W/ft² | | WBP% | |
|---|---|---|---|---|---|---|---|
| | | Max | Ave | Max | Ave | Max | Ave |
| **Sep-22** | **Moderate Price** | 18 | 7 | 0.14 | 0.05 | 6% | 2% |
| | **High Price** | 52 | 35 | 0.40 | 0.27 | 17% | 11% |
| **Sep-29** | **Moderate Price** | 53 | 14 | 0.41 | 0.11 | 15% | 4% |
| | **High Price** | 44 | 33 | 0.34 | 0.25 | 12% | 9% |
| **Oct-06** | **Moderate Price** | 60 | 22 | 0.46 | 0.17 | 18% | 7% |
| | **High Price** | 39 | 24 | 0.30 | 0.19 | 13% | 8% |
| **Oct-13** | **Moderate Price** | 20 | 12 | 0.16 | 0.09 | 7% | 4% |
| | **High Price** | 64 | 55 | 0.49 | 0.43 | 19% | 17% |
| **Oct-25** | **Moderate Price** | 33 | 15 | 0.25 | 0.11 | 12% | 5% |
| | **High Price** | 49 | 16 | 0.38 | 0.12 | 18% | 6% |

* Shaded value indicates that the demand shed was too small to identify.

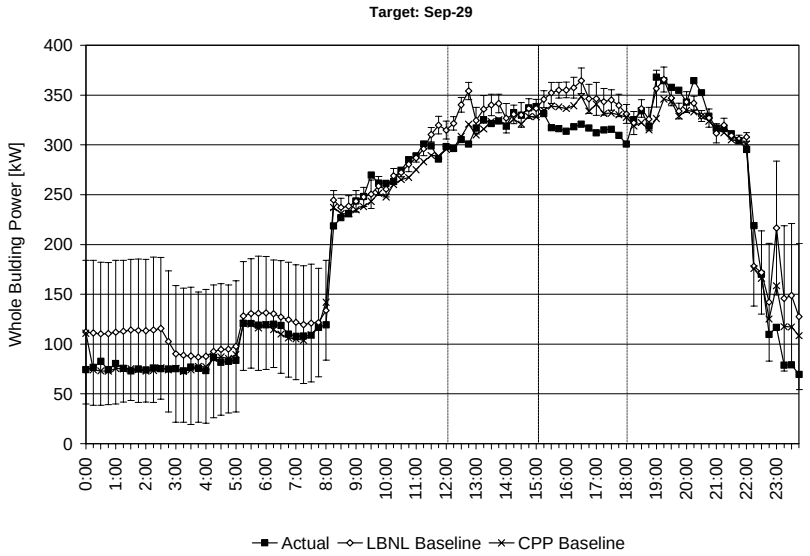
## September 22nd, 2005 (Mock CPP Event)

Due to the centralized control nature of the store, the mechanical engineers in Minnesota answered control related questions were asked to and the store leader answered comfort related questions. Three RTU out of 12 in the sales area were turned off successfully. For the first three hours, the temperatures in the store increased to 76F. When the lights were turned off for the second DR stage, the temperatures stopped rising in the store and remained at 76F for the rest of the DR shed period. The guests noticed when a quarter of the lights were off.



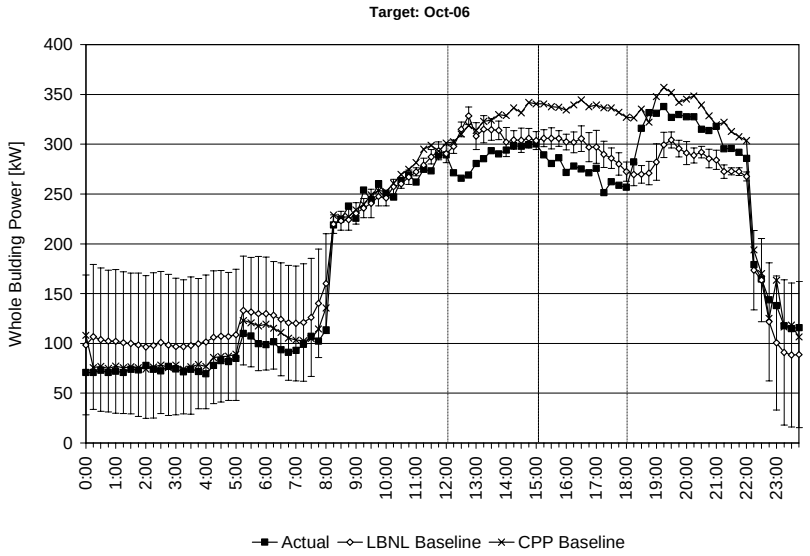
## September 29th, 2005 (Real CPP Event)

The strategy was the same as used for the previous event. However, more data was collected regarding the operation of the RTUs. The guests noticed and commented on the lighting shed.



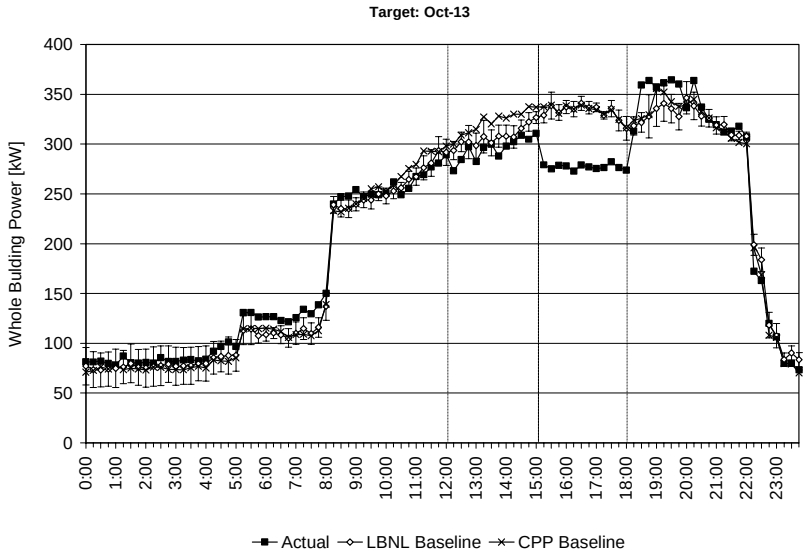

## October 6th, 2005 (Mock CPP Event)

Since shutting down three RTUs did not have demand savings impact, the site shut down two more RTUs, increasing the total number of turned off RTUs from three to five out of 12 serving the sales area. There were no complaints about temperatures or indoor air quality.



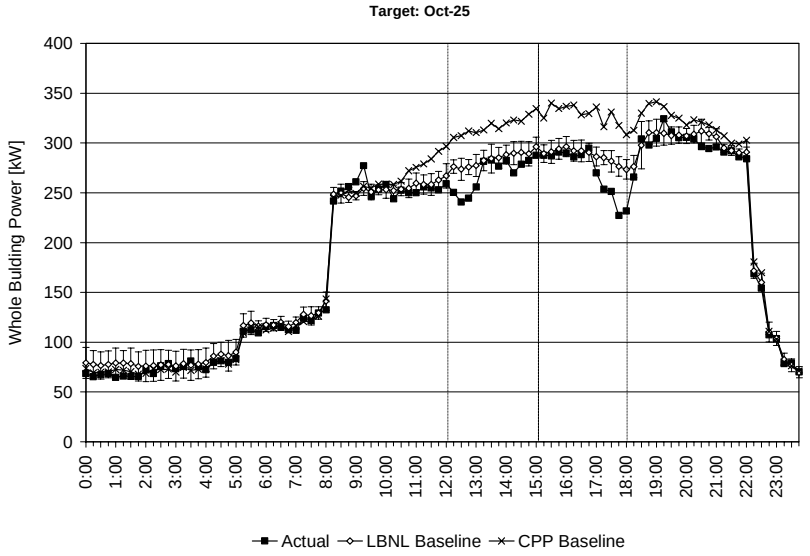
## October 13th, 2005 (Mock CPP Event)

Five RTUs were turned off. Results remain similar. There were no complaints about the temperatures, however the lighting reductions were noticeable.




## October 25th, 2005 (Mock CPP Event)

There were problems with the control strategy implementation. Some of the RTUs were not turned off for the entire duration. The lighting shed was not implemented in a consistent manner. The interview did not yield advance notice of the malfunction because the store manager was not on site during the shed period on the day of the event. The information was extracted from the trending data sent to LBNL by the mechanical engineer.




The actual CPP event days were August 8th and September 29th, the rest being mock CPP event days. Each RTU has on/off controls for two compressor settings and a fan. Since the ambient temperatures during the mock test days were rather low, many of the site's

12 sales area RTU compressors were not turned on. In fact, during the test runs, it was observed that the RTUs were not operating at full capacity, i.e. the first stage of the compressors were not operating and some of the compressor fans were turned off. Therefore, when some of the RTUs were shut down as specified for this building's strategy, the appropriate load reductions did not occur. The majority of the load reduction during Level 2 was due to lighting load reduction only.

It is important to note that RTU shutdown on the sales floor during a CPP event will be more widely accepted than shutting off lights, and real CPP demand reduction days are likely to show better results. If cooling equipment is oversized, the site might be able to shut down 50% of the units and still maintain reasonable temperatures in the store. Further tests are necessary to validate the sustainability of the DR strategy at Target.

## B.15. United States Postal Service, San Jose Process and Distribution Center

**Site Summary**

| | |
|---|---|
| **Building Use** | Postal service |
| **Industry Classification** | Postal service |
| **City** | San Jose, CA |
| **Gross Floor Area** | 390,000 ft² |
| **Conditioned Area** | 390,000 ft² |
| **# of Buildings, floor** | 1-building, 1-floor |
| **Peak Load kW** | 1676 kW |
| **Peak W/ft²** | 4.3 W/ft² |
| **Tenant Type** | USPS employees |
| **Facility Management** | Company-owned |
| **Weekday Schedule** | 24-hour / 7-day |
| **Non-weekday Schedule** | None |
| **Building Details** | Processing and distribution of mailing. 24-hour operation. |

**HVAC System Summary**

| | |
|---|---|
| **Air Distribution Type** | N/A |
| **Air Handler Unit** | CV package DX units: (12) 17.5 ton, (12) 5 ton (270 MBH) |
| **Cooling Plant** | (2) 364 ton chillers, (3) 20 HP CV CW pumps, (3) 30 HP CV CHW pumps, (1) 10 HP CV CHW booster pump, CV cooling tower: 2 |
| **Heating Plant** | N/A |
| **HVAC Control System** | Star System |
| **DDC Zone Control** | No |
| **Other Details** | Enflex was installed by Chevron Energy Solutions to enable remote DR control. |

**Data Trending**

| | |
|---|---|
| **DDC Zone Control** | InterAct=Yes EMCS Trends=No Submeter=No |
| **Data Trending Detail** | None. |

**Auto-CPP System Summary**

| | | | |
|---|---|---|---|
| **Communication Method** | | DRAS-WS | |
| **Gateway/Relay Device** | Enflex | **Client Host Location** | Kansas City, KS |
| **Price Client Host** | Chevron/Viron | **Client Hosted at Co-Lo** | Yes |
| **Price Signal Use** | | Mod=Yes High=Yes Notification=No | |
| **Shed Strategies** | **Pre-event** | None. | |
| | **Moderate Price** | ►Limit chiller demand to 80%. | |
| | **High Price** | ►Limit chiller demand to 65%. | |
| | **Slow Recovery** | ►The chiller demand limit will be increased in 5% increments with 15-30 minutes per step change | |

**Event Results**

| Event Date | Participation | Event Date | Participation |
|---|---|---|---|
| **Aug-08** | Not ready | **Sep-22** | Failed (3) |
| **Sep-29** | Failed (3) | **Oct-06** | Failed (3) |
| **Oct-13** | Failed (3) | **Oct-25** | Failed (3) |
| **10-Nov** | - | **Nov-15** | - |

* See Section 4-1 of the main report for result definition.

USPS programmed a unique chiller control strategy. There were four curtailment stages plus the default (no curtailment). When the retrieved price is equal or greater than a threshold price then the corresponding curtailment stage is selected. There are three possible scenarios based on the current curtailment stage and price signal; 1) The newly selected curtailment stage is higher than the current stage → Immediately send new curtailment stage; 2) The newly selected stage is lower than the current stage → If the current stage has been running for at least its minimum duration then reduce to the new stage, otherwise do nothing; and 3) The newly selected stage is equal to the current stage → If current stage is about to expire then extend it, otherwise do nothing.

**USPS Shed Control Configuration**

| Threshold price signal | Curtailment stage | Minimum duration | DC signal (0-10 V) | % Full load |
|---|---|---|---|---|
| 1 | 0 | 0 min | 0.0 V | 100% |
| N/A | 1 | 30 min | 2.5 V | 85% |
| 3 | 2 | 15 min | 5.0 V | 80% |
| N/A | 3 | 30 min | 6.5 V | 75% |
| 5 | 4 | 15 min | 8.0 V | 65% |

However, USPS failed on all the events probably due to an incorrectly configured gateway. The reasons the configuration couldn't be fixed by the end of the CPP period were, 1) there is no EMCS trend, which could be used to check the shed strategy failure, 2) the onsite engineers were not instructed or too busy to check the shed strategy operation, and 3) there were no control company engineers near the location, which made it difficult to troubleshoot immediately.

# Automated Critical Peak Pricing Field Tests: Program Description and Results

## Appendix C: Post-Test Survey Notes

April 6, 2006

| Alameda County Water District | | | | | |
|---|---|---|---|---|---|
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-22** | Greg Watson | Yes. By checking EMCS at 12 pm and 3 pm to see if the changes took place. | Yes. E-mail was sent to occupants the day before an event. | Yes, it seemed to work. By checking EMCS. | No operational issues and complaints. 1-2 people sitting near the window said it was warmer than usual. |
| **Sep-29** | Greg Watson | Yes. Watching it. | Yes. E-mail was sent to occupants the day before an event. | Yes. Read the meter directly at 11:30, 1, 2, 3:30. | No operational issues. No complaints. |
| **Oct-06** | Greg Watson | | | | |
| **Oct-13** | Greg Watson | Yes. building has noise reduction and can feel it. | Yes. E-mail was sent to occupants. | No. By looking at the InterAct data. | ►**Operational issues**: It looks like the global set point did not allow the rooms to go higher than 73.9F and AHU-2 still comes on after hours (due to a networking problem they think). These issues were supposed to be resolved after the control contractor's visit but seems to have resurfaced. They'll have the contractor visit again next week. |
| **Oct-25** | Greg Watson | Yes. Notification e-mail and weekly update. | Yes. | Not perfectly. Looked at the settings and trends. | ►**Operational issues**: Some of the thermostats did not register 78 degrees. ►**Occupants feedback**: People were thinking that it may be cold but it was very comfortable in the building. No complaints. |
| **Bank of America, Concord** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-22** | Bill Young<br>Jeep Freeman | No. | No. | No. | ►**Operational issues**: Their systems were disabled and they forgot to enable it for the mock event yesterday. They did not participate |
| **Sep-29** | Bill Young<br>Jeep Freeman | | | | |
| **Oct-06** | Bill Young<br>Jeep Freeman | Yes. Notification e-mail and physically watching. | No. | Yes. Watching at noon and realized that the changes took place. | No operational issues and complaints. They want to experiment with more aggressive sheds. |
| **Oct-13** | Bill Young<br>Jeep Freeman | Yes. | No. | Yes. | Implemented only automated shed. Shed was only from 3 pm to 6 pm. There was no complaint, no feedback from occupants, and no operational issues. |
| **Oct-25** | Bill Young<br>Jeep Freeman | Yes. | Don't think so. | Yes. | Implemented only automated shed. Shed was only from 3 pm to 6 pm. There was no complaint, no feedback from occupants, and no operational issues. |

| Chabot Space and Science | | | | | |
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| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-22** | Dwight Fanning | No. | Yes, they were aware about the event and the pre-and post occupant surveys. | | Condition of the building was comfy |
| **Sep-29** | Dwight Fanning | Yes. By watching the signal. | Yes, they were aware about the event. Pre/post-occupant surveys were conducted. | Don't know. | No operational issues and complaints. |
| **Oct-06** | Dwight Fanning | Yes. Notification e-mail. | Yes. Notification was sent out. | Don't know | No operational issues, no complaints as far as he knows. |
| **Oct-13** | Dwight Fanning | Yes. Notification e-mail. | Yes. | Yes. By checking setpoint change on EMCS. | No operational issues. No complaints. Survey was done to gather feedback from occupants. |
| **Contra Costa: 2530 Arnold** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-22** | Andrew Green | No, not during the event | No. | No idea yet. Check Interact data when it is available | No operational issues. No feedback from occupants so far. |
| **Sep-29** | Andrew Green | Yes. Notification e-mail. | No. They are considering employee participation for better results | No idea yet. Check Interact data when it is available | No operational issues. No feedback from occupants so far. |
| **Oct-06** | Andrew Green | Yes. Notification e-mail. | No. They are considering employee participation for better results | No idea yet. Check Interact data when it is available | No operational issues. No feedback from occupants so far. |
| **Oct-13** | Andrew Green | Yes. Notification e-mail. | No. | Don't know. | Not aware off any operational issues and complaint. Typically people complain to facilities staff and facilities let him know. He did not hear anything from facilities at this time. |
| **Oct-25** | Andrew Green | Yes. | No. | Don't know. | No operational issues. No feedback from occupants so far. |
| **Contra Costa: 50 Douglas** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-22** | Andrew Green | No, not during the event | No. | No idea yet. Check Interact data when it is available | No operational issues. No feedback from occupants so far. |

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| **Sep-29** | Andrew Green | Yes. Notification e-mail. | No. They are considering employee participation for better results | No idea yet. Check Interact data when it is available | No operational issues. No feedback from occupants so far. |
| **Oct-06** | Andrew Green | Yes. Notification e-mail. | No. They are considering employee participation for better results | No idea yet. Check Interact data when it is available | No operational issues. No feedback from occupants so far. |
| **Oct-13** | Andrew Green | Yes. Notification e-mail. | No. | Don't know | Not aware off any operational issues and complaint. Typically people complain to facilities and facilities let him know. He did not hear anything from facilities at this time. |
| **Oct-25** | Andrew Green | Yes. | No. | Don't know. | ►**Operational issues**: The operator went to 50 Douglas to fix the relay - control panel connection around 12:45 pm, and found the wire was pulled off. He fixed it, and confirmed the shed after 1 pm. |
| **Echelon** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-22** | Richard Hair | Yes. By looking at the database at 12pm | Yes. | Yes with some problems. | ►**Operational issues**: Did not meet the full load shed target. Goal for supply fan was 75% but only went down to 90%. At 2:45 there was a high temp. alert for the server room.<br>►**Occupants feedback**: One employee was concerned when the lights were dimmed and sent a message to the entire company saying "he'll get to the bottom of this".<br>►**Complaints**: There were complaints about offices being too dark. |

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| **Sep-29** | Richard Hair | Yes. By e-mail, and looking at some lights were off. | Yes. | Yes. Observing some control checkpoints, though not entirely. | ►**Operational issues**: On this day, the computer group was somehow unoccupied, so the independent cooling unit for the computer room was helping to cool down rest of the building. This might contribute to keep zone temperature near the setpoint.<br>►Echelon got high rebound peak when the event ended at 6 pm. Slow recovery strategy has to be planned.<br>►**Complaints**: There were some complaints from IT department that the lighting is too dark. They did not customize their light level, so the energy saving mode has been set to default setting (maximum dimming level). They disabled the energy saving mode after 30 minutes. This will take approx 5% of floor area.<br>►**Comments**: The operator is planning to program some VAV boxes will go to unoccupied mode when the RTU is running in reduced mode, to maintain duct static pressure during a CPP event. Currently the VAV boxes go open to the maximum setting to maintain the zone temp, when the RTU reduced the load. |
| **Oct-06** | Richard Hair | Yes. By e-mail, and looking at some lights were off. | Yes. | Yes. Observing some lights went off. Getting used to this operation as routine. | ►**Occupants feedback**: Someone suggested him that emergency light or some other light in hallway should on even during the shed event. No complaints at all for HVAC.<br>►**Comments**: The operator is aware of the rebound peak, but currently no clue for slow recovery. |
| **Oct-13** | Richard Hair | Yes. By e-mail, and looking at some lights were off. | Yes. Notification e-mail sent out to occupants. | Yes. Observing some lights went off. | ►**Operational issues**: The whole building interval meter data shows the electric load dropped down at noon when the moderate price started, but the load came back around 1:30 pm. The operator assumes that is because some occupants opt-out during the shed.<br>►The operator also noticed the lighting was blighter than last time. He sent out notification to occupants early in the week which guide occupants to adjust energy mode setting. Some occupants might configure shed-mode light level up prior to the test day.<br>►**Comments**: No change has been made for the control strategies. Slow recovery is not planned. |

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| **Oct-25** | Richard Hair | Yes. By e-mail, and looking at some lights were off. | Yes. | Yes. Observing some lights went off. | ►**Operational issues**: There was unexplained ramping up load at the end of the moderate price period. It may be because the occupants started to opt out, but he is not sure.<br>►Since this site always has a high rebound spike right after the shed period, the operator did MANUAL slow recovery by ramping up duct static pressure from 0.4 IWC to 1.5 IWC by 0.2 IWC every 5 minutes. It took about 20 minutes to get back to normal. He also manually ramp down supply air temp from 65 F to 55 F. The slow recovery operation mitigated the high rebound peak. |
| **Fremont Unified School District: Irvington High-school** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Nov-15** | | | | | |
| **Gilead Science** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-22** | Eric Giles | Yes. By checking EMCS. Also got a page from EMCS. | Yes. A message was sent out to the occupants. | Yes. Checked throughout the EMCS. | 357 Gilead opt out, since the operator didn't want to compromise their critical production without having a real event.<br>►**Complaints**: Occupants in the south part of Gilead 300 were 4 degrees warmer than in the rest of the building. No complaint for the other buildings. |
| **Sep-29** | Eric Giles | Yes. By InterAct notification e-mail and e-page. Also by monitoring EMCS and occupants feedback. | Yes. Very positive that occupants were aware of the change, even though they did not complain. | Yes for all 3 buildings. Observed EMCS interface and noticed zone temperature changes. | ►**Operational issues**: Since Gilead 300 has been occupied for only the last 3 or 4 months, the VAV boxes might not be finely tuned. This building only controls SAT, and zone setpoint remains 72 F as usual. Most VAV box opened up to maximum setting of each VAV box. South side VAV boxes setting was not enough for the situation, and the maximum setting can be raised. By monitoring the zone temperatures, the operator noticed that the south side of building 300 increased up to 78 F. The Rest of the building areas were between 72 F and 74 F.<br>►**Complaints**: Received 3 or 4 complaints calls from South side of Gilead 300. |
| **Oct-06** | Eric Giles | Yes. Notification e-mail. | Yes. | Yes. Noticed temperature changes. | No operational issues. No complaints. |

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| **Oct-13** | Eric Giles | Yes. | Yes. E-mail alert was sent to the occupants. | Yes. | All 3 buildings participated in the event. No operational issues. No complaints. The operator confused some notification e-mail as "mandatory event", and agreed to control all the buildings. |
| **Oct-25** | Eric Giles | Yes. | Yes. Occupants were aware of the test. | Yes. | No complaint, no feedback from occupants. Gilead 357 shows irregular load shape due to the production in the lab space. The production load is inconsistent, and unpredictable. |
| **IKEA: East Palo Alto** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Oct-13** | Rick Betten | Yes. Notification e-mail. | Didn't announce to the occupants. | Yes. By seeing setpoints change and space getting warmer. | ►**Operational issues**: One alarm from the computer room. ►Second floor where the show room is got hot so Rick asked C&C to not increase temperatures so high (76F) next event. ►**Complaints**: The employee in the kitchen area complained. Rick's assistant thinks that Rick is too accommodating and people like to complain to him. |
| **Oct-25** | Rick Betten | Yes. Notification e-mail. | Didn't announce to the occupants. | Yes. By seeing setpoints change and space getting warmer. | ►**Operational issues**: The setpoint for the RTUs went up. Once again it got too hot in the second floor so he called C&C and asked them to keep temperatures constant at about 4pm. The temperature setpoint adjustment was limited to 73 F for most RTUs. ►No alarms this time. ►**Complaints**: The employees in the restaurant areas on the second floor complained. |
| **LBNL: Oakland Scientific Facility** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-22** | Lyle Woods | No. | Yes, an e-mail was sent out to the occupants. | Probably. Did not check. | No operational issues. No feedback from occupants. Received an alarm at 4pm in Rm 303 for damper control alarm malfunction. It is unrelated to the event. |
| **Sep-29** | Lyle Woods | | | | |
| **Oct-06** | Lyle Woods | | | | |
| **Oct-13** | Lyle Woods | Yes. Notification e-mail. | E-mail was sent to the occupants. | Yes. It seemed to work. | Nothing out of ordinary happened. There were complaints as usual. |
| **Oracle, Rocklin** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Nov-10** | | | | | |

| Target, Hayward | | | | | |
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| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-22** | Scott Williams<br>Rita Outhabong | Yes. By watching the lights were dimmed. | No. | Yes. Monitoring during the shut downs but not come back. | No operational issues. No feedback from occupants as far as he knows. |
| **Sep-29** | Scott Williams<br>Rita Outhabong | Yes. By watching the lights were dimmed. | Yes. They are especially aware when the lights go down 25%. | Yes. By watching the lights were dimmed | No Operational Issues were experienced. No feedback from guests or workers. No complaints. |
| **Oct-06** | Scott Williams<br>Rita Outhabong | Yes. By watching. | Office staff and customers were aware of lights going down. | Yes. By watching. | No operational issues. No real complaints.<br>►**Occupants feedback**: Comments about the space being darker.<br>►**Comments**: 5 RTUs were shut down for 6 hrs. Tosh was at the site taking samples. |
| **Oct-13** | Scott Williams<br>Rita Outhabong | Yes. Onsite person receives a notification from engineering group the day before the event. | Yes. The office staff was aware but the guests were not. | Yes. By watching. | ►**Occupants feedback**: Temperature was not an issue, it is a little darker<br>►**Complaint**: There was some complaint about lighting.<br>►**Comments**: There is a by pass system with the lighting every hour should they choose to use but they have not done that yet at any time. |
| **Oct-25** | Scott Williams<br>Rita Outhabong | Yes. Notification e-mail. | When lights go dim, the guests typically notice it. | Don't know. Rita has not been to store and Tony did not check yet. | No operational issues reported so far.<br>►**Occupants feedback**: Just a few comments about lights as always. |
| **USPS, San Jose Process & Distribution Center** | | | | | |
| **Event date** | **Interviewee** | **Aware of changes?** | **Occupants aware?** | **Strategies worked?** | **Implications of Test** |
| **Sep-29** | Mel Abraham | Yes. Notification e-mail. | Yes. Occupants were told in person. | Don't know. | ►**Occupants feedback**: Some occupants said they felt little warmer. There was no complaint from occupants. |
| **Oct-06** | Mel Abraham | Yes. Notification e-mail. | Don't think so. Didn't tell the occupants at all for this time. | Don't know. | There was no complaint from occupants. |
| **Oct-13** | Mel Abraham | Yes. | No. | Don't know. | No operational issues. No complaints. |