



Statewide Auto-DR Planning Meeting

Lawrence Berkeley National Laboratory
Akua Controls
C&C Building Automation
Global Energy Partners

Demand Response Research Center

November 13, 2006

Research and Project Sponsors

- California Energy Commission PIER Program
- Pacific Gas and Electric
- San Diego Gas and Electric



Presentation Overview

10:00 – 10:15	Welcome and Introductions
10:15 - 10:30	Meeting Goals and Objectives
10:30 – 11:30	AutoDR Project Background
11:30 – 12:30	2007 PG&E Program Design
12:30 – 1:00	Lunch (Provided)
1:00 – 1:30	Discussion on 2007 Programs for
Southern	California
1:30 – 2:00	Future Directions/PIER Activities
2:00 – 3:00	Next Steps
3: 00	Meeting Adjourn



Meeting Goals and Objectives

- **Provide overview of AutoDR technology, field tests, and program results**
- **Assist in AutoDR Implementation Plans**
- **Discuss AutoDR commercialization strategies**
- **Obtain feedback on research plans/priorities**



DR Research Center

Objective

to develop, prioritize, conduct, and disseminate multi-institutional research to facilitate DR

Scope

technologies, policies, programs, strategies and practices, emphasizing a market connection

Method

Partners Planning Committee, Annual R&D Plan

Stakeholders

- State Policy Makers
- Researchers
- Information and Metering System Developers
- Aggregators
- Program Implementers
- Utilities
- Industry Trade Associations
- Building Owners / Operators
- Building Equipment Manufacturers
- End-Use customers



AutoDR Project Background

- **Goals**

- Develop a low-cost, fully automated infrastructure to improve DR capability in California
- Evaluate “readiness” of (commercial) buildings and industrial facilities to receive common signals
- Evaluate capability of control shed strategies and measurement of sheds to improve future buildings



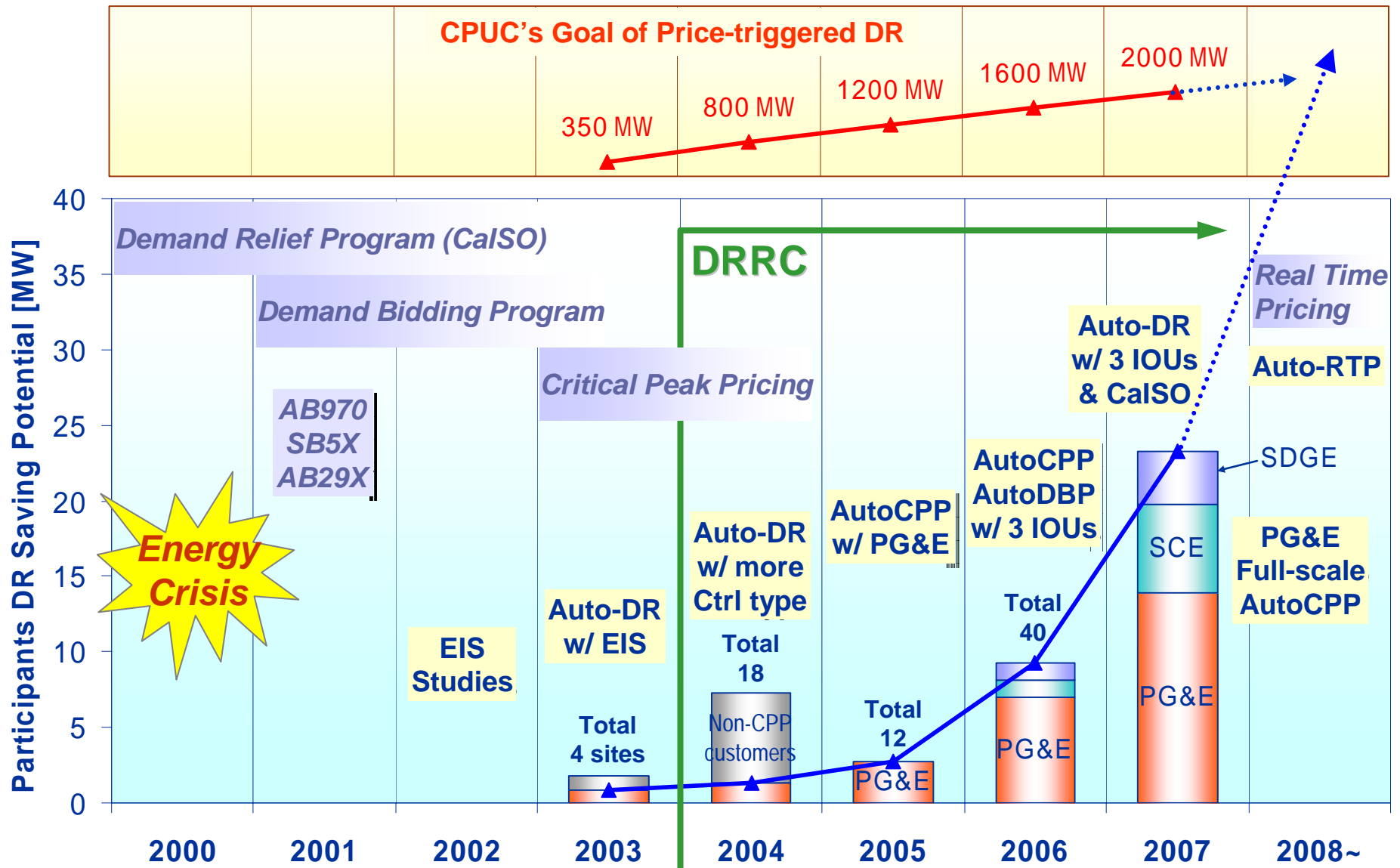
AutoDR Multi-Year Summary

- Develop Demand Response Automation Server (annually updated)
- Develop connection to Energy Management Control Systems (EMCS)
- Field Tests – Recruit sites/ 2 to 12 events per summer
 - 2003 - 5 sites – Internet link to Energy Information Systems (EIS)**
 - 2004 – 18 sites - linked to EIS and EMCS**
 - 2005 - PG&E CPP collaboration**
 - 2006 - PG&E, SDG&E, Planning with SCE**
- Evaluate with weather normalized baseline (data from Interact)
- Interview site after each event

	# Sites	DRAS	Site Communications	Utility
2003	5	Infotility	XML Gateway Software	None
2004	18	Infotility	XML - Internet Relay	None
2005	11	Akua	XML - Internet Relay	PG&E
2006	25	Akua	XML - Internet Relay - CLIR	PG&E, SDG&E
2007	200?	Akua	XML - Internet Relay - CLIR	Statewide

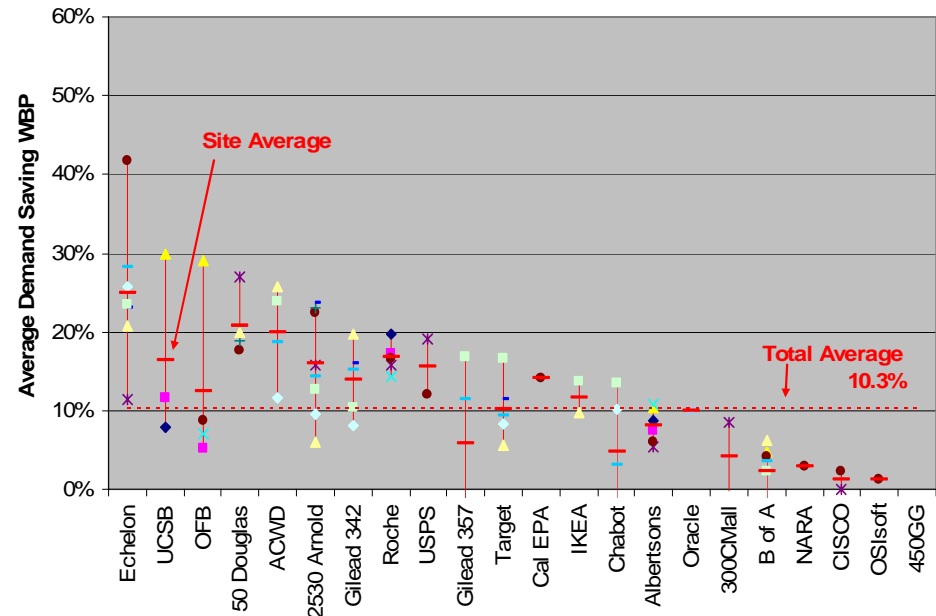
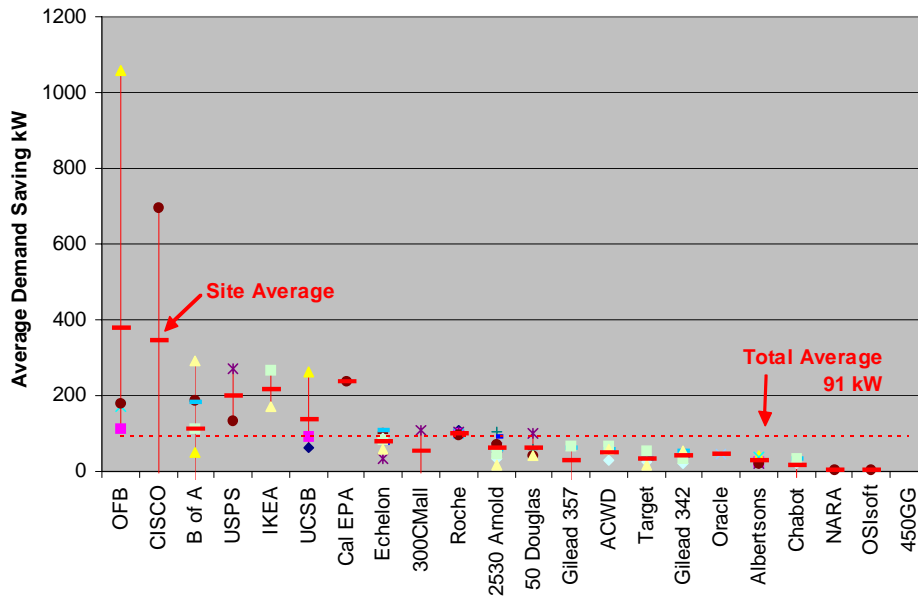


Automated DR Past, Present, and Future



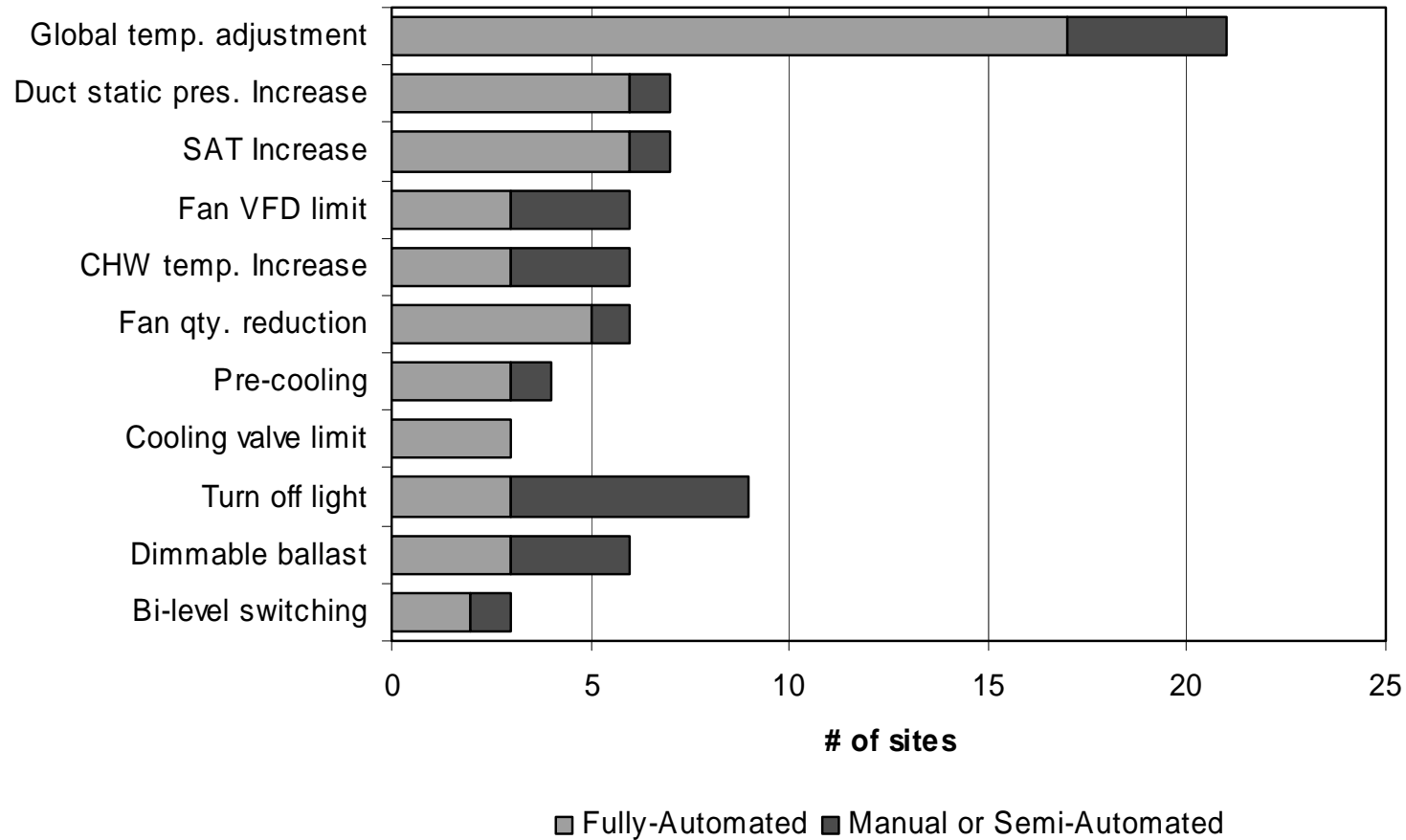
Results by Site (2003-2005)

- ❑ 22 sites evaluated over 3 years (pre-2006)
- ❑ Multiple building types, control strategies, and climates
 - Avg savings: 10% (3 hr event, 22 sites, 13 events); avg 15-min max: 19 %
 - Avg savings: 91 kW, avg max of 170
 - Avg savings: 0.5 W/sqft, avg max of 0.9 W/sqft





Strategies and Factors Influencing Savings



Building factors	System factors	Strategy factors	Weather factors
<ul style="list-style-type: none"> ▪ Building use ▪ Building size ▪ Structure type ▪ Occupancy 	<ul style="list-style-type: none"> ▪ HVAC type ▪ Efficiency ▪ Control type ▪ Commissioning 	<ul style="list-style-type: none"> ▪ Depth of control ▪ Area% controlled ▪ Curtailment duration 	<ul style="list-style-type: none"> ▪ Outside Temp ▪ Humidity ▪ Solar radiation



Report:
Guide to DR Strategies

Web:
On-Line Tutorial
<http://drcc.lbl.gov/Strategy>

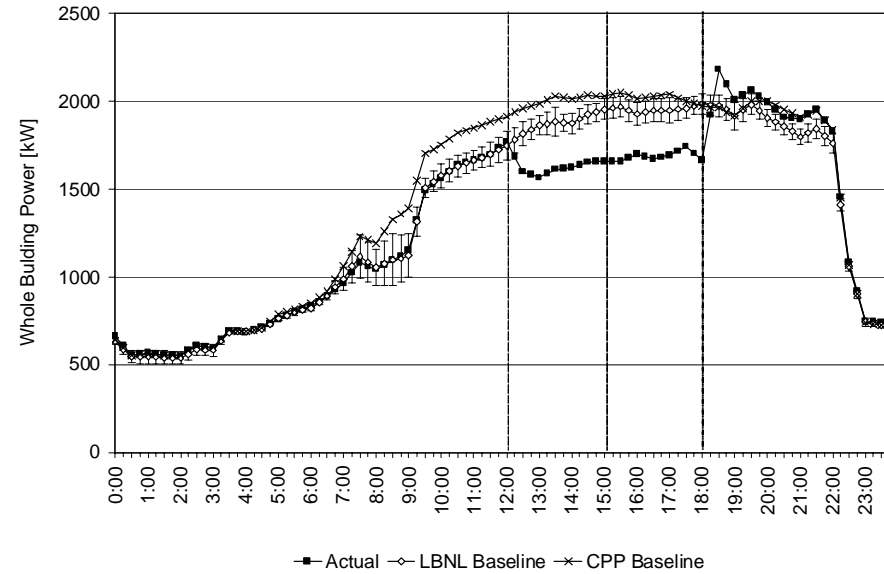


Acknowledgements	iii
Executive Summary	iv
1. Introduction.....	1
1.1. Objectives and Report Organization.....	1
1.2. Objectives and Report Organization.....	2
1.3. Building Operations and Energy Management.....	2
1.4. Terminologies and Concepts.....	5
2. Demand Response Strategy Overview	7
2.1. HVAC System	7
2.2. Lighting Systems	11
2.3. Miscellaneous Equipments	12
2.4. Advanced Control Strategies	12
2.5. Strategies Used in Case Studies.....	12
3. Demand Response Strategy Detail	15
3.1. HVAC Systems.....	15
3.1.1. Global Temperature Adjustment.....	15
3.1.2. Passive Thermal Mass Storage	18
3.1.3. Duct Static Pressure Decrease	19
3.1.4. Fan Variable Frequency Drive Limit.....	20
3.1.5. Supply Air Temperature Increase	21
3.1.6. Fan Quantity Reduction	22
3.1.7. Cooling Valve Limit	23
3.1.8. Chilled Water Temperature Increase	24
3.1.9. Chiller Demand Limit.....	25
3.1.10. Chiller Quantity Reduction.....	26
3.1.11. Rebound Avoidance Strategies	27
3.2. Lighting Systems	28
3.2.1. Zone Switching	28
3.2.2. Fixture/Lamp Switching	29
3.2.3. Step Dimming	31
3.2.4. Continuous Dimming.....	32
3.3. Miscellaneous Equipments	33
3.3.1. Fountain pump	33
3.3.2. Anti-sweat heater	33
3.3.3. Electric vehicle charger.....	33
3.3.4. Industrial process loads.....	33
3.3.5. Cold storage	34
3.3.6. Irrigation water pump	34
3.4. Non-Component-Specific Strategies	35
3.4.1. Demand Limit Strategy.....	35
3.4.2. Signal-level Response Strategy.....	36

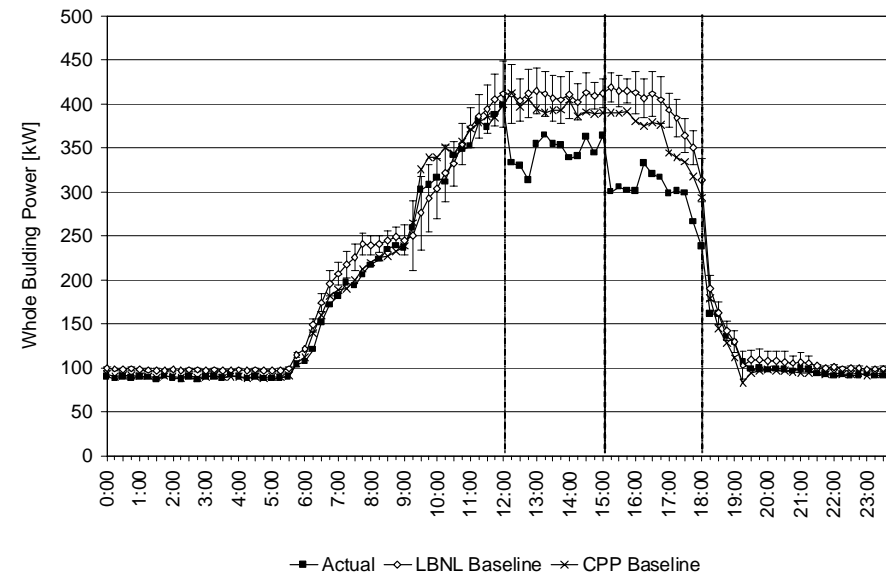
Sample Results



IKEA: Oct-13



2530 Arnold: Sep-22





2006 Auto-CPP Procedures

- 1. Develop Program (Done by PG&E and LBNL)**
 - Site Requirements/Basic Procedure – Automate CPP
- 2. Recruit Sites (LBNL and PG&E)**
- 3. Communications Systems Development (LBNL and Akua)**
 - CLIR Box Development
 - Develop and Host DRAS
 - LBNL and Akua developed and implemented at Co-Lo
- 4. Implement/Configure Communications (LBNL and Tech Coordinator)**
 - Technical assistance to connect site EMCS to DRAS
 - Technical assistance selecting & implementing shed strategies
 - Apply for \$100/kW Technology Incentives (**SLOW PROCESS**)
 - Shed event testing
 - Optimization and troubleshooting
- 5. Run Program/Evaluate Results (LBNL)**
 - Post event shed “problem” interview
 - Weekly emailed newsletter
 - Post event shed data analysis
 - Multiple baselines evaluated, Feedback provided to sites
 - Evaluate individual and aggregated sheds

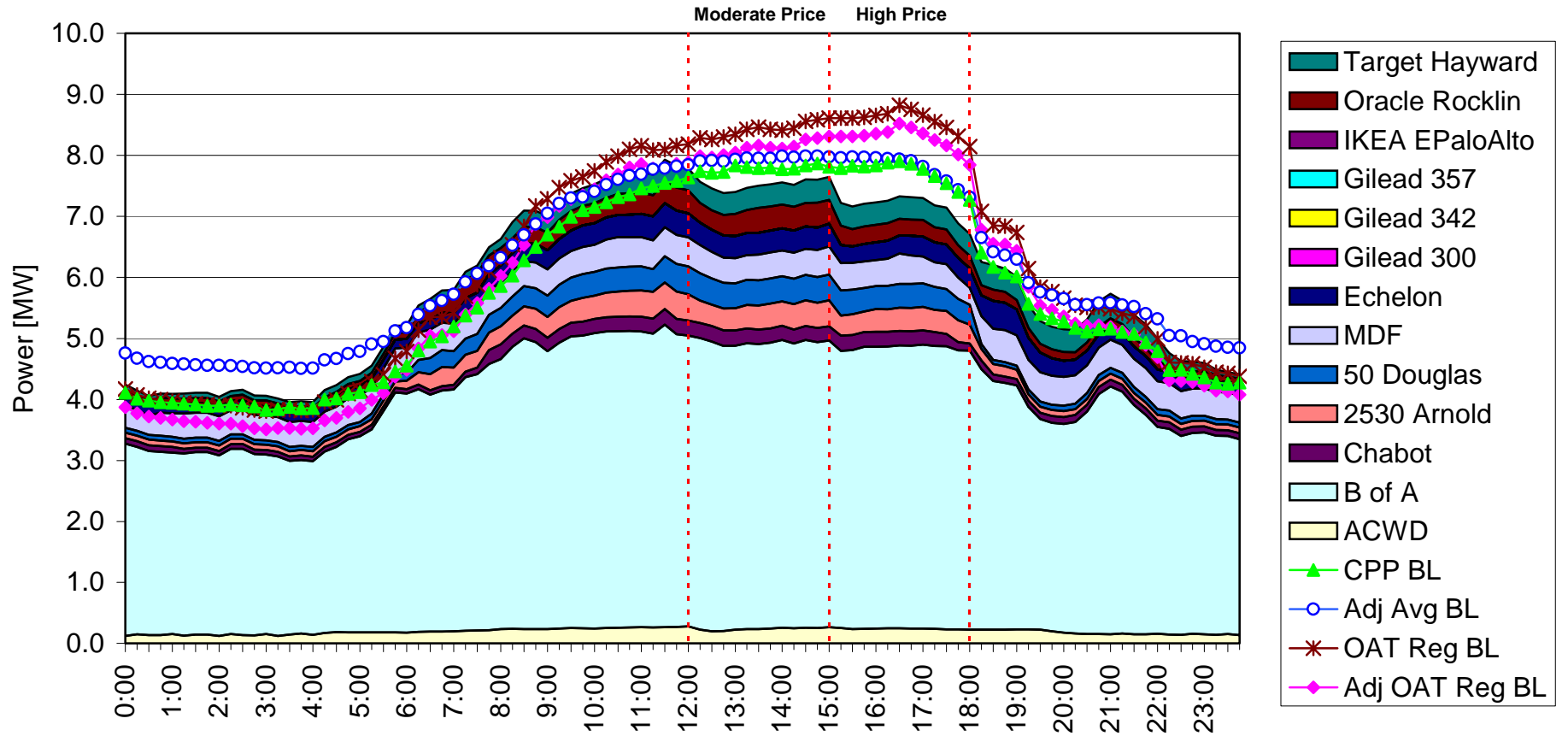


Preliminary results of LBNL / PG&E Auto-CPP Summer 2006 (High Price Period, 3 – 6 PM)

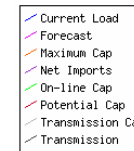
Site name	Demand Saving Achievement				# of 2006 events	Setup cost	Cost \$/kW	
	kW Avg	kW Max	% Avg	% Max			Avg	Max
ACWD	96	147	30%	42%	11	\$ 13,324	\$ 138	\$ 90
B of A	316	644	6%	12%	11	\$ 2,900	\$ 9	\$ 5
Chabot	3	148	0%	56%	6	\$ 6,010	n/a	n/a
2530 Arnold	96	168	20%	37%	11	\$ 3,500	\$ 12	\$ 6
50 Douglas	65	114	15%	27%	11			
MDF	123	322	21%	54%	11			
Echelon	98	169	23%	38%	11	\$ 3,620	\$ 37	\$ 21
Gilead 300	11	57	5%	23%	9	\$ 4,500	\$ 71	\$ 14
Gilead 342	39	101	11%	30%	9			
Gilead 357	13	163	3%	26%	9			
IKEA EPaloAlto	88	219	8%	20%	9	\$ 6,360	\$ 73	\$ 29
Oracle Rocklin	91	180	23%	34%	11	\$ 1,875	\$ 21	\$ 10
Target Hayward	65	107	16%	24%	11	\$ 3,312	\$ 51	\$ 31
Total / Avg	1105	2540	14%	32%	130	\$ 5,045	\$ 51	\$ 26

This data is based on previous 20 non-event business days OAT regression baseline model result. Morning adjustment (shift up baseline to match morning load 3 hours prior to DR operation) is applied to all sites except Museum, where applied pre-cooling strategy. The aggregated average is calculated as $\{\sum (\% \text{ saving})\}/n$. (NM, 11/06/2006)

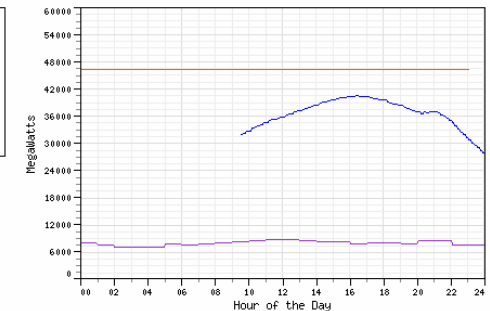
Aggregated Demand, 6/21/2006 (OAT: 97 °F) - Zone 2, 9 sites



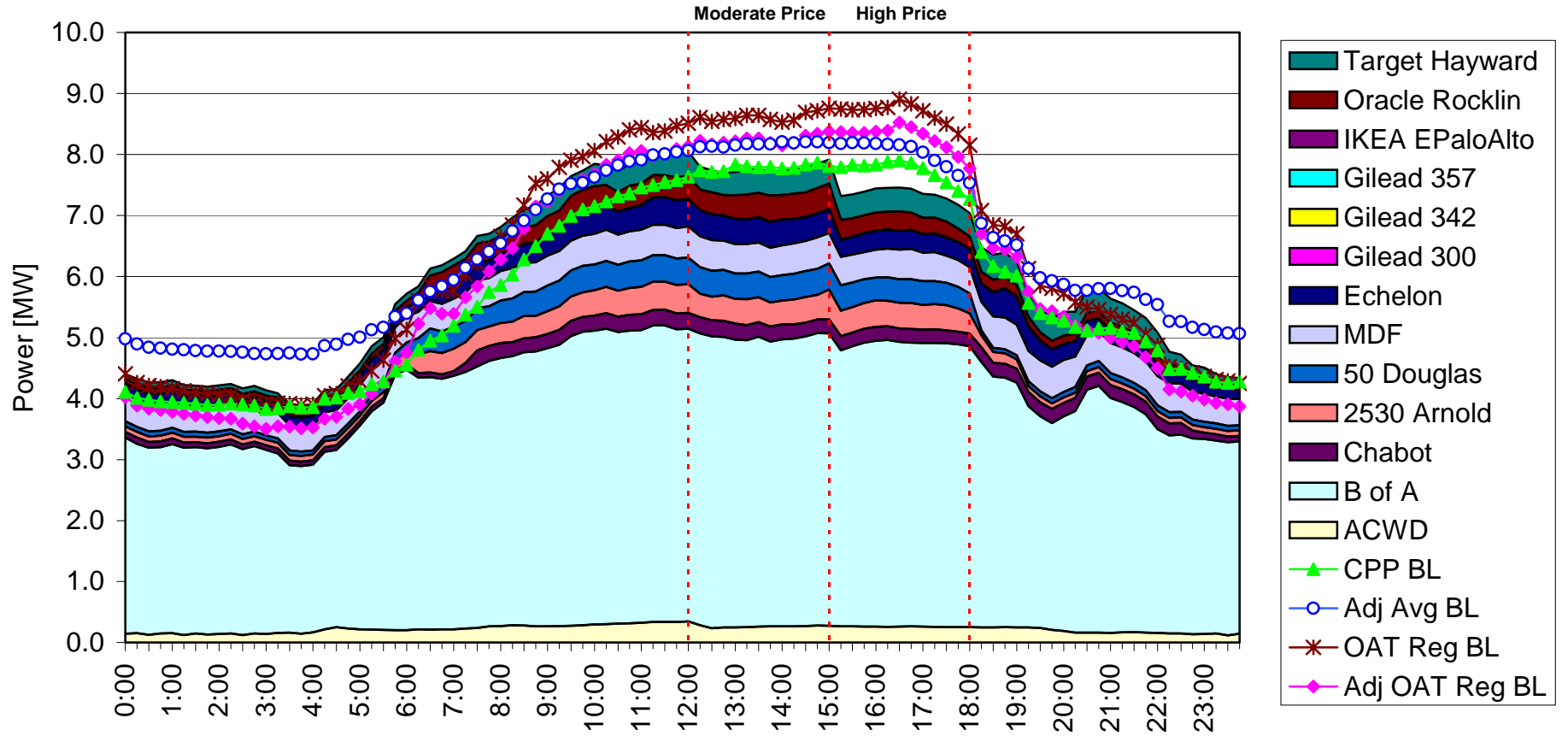
Price Level	kW		W/ft ²		WBP%	
	Max	Ave	Max	Ave	Max	Ave
Mod. Price	678	608	0.44	0.39	8%	8%
High Price	1192	1113	0.77	0.72	14%	13%



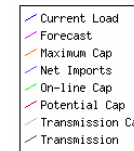
CA Electricity System Status
Wed. Jun. 21, 2006



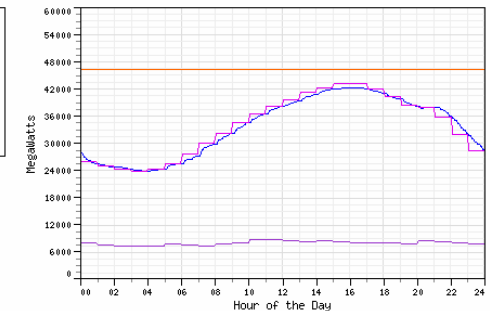
Aggregated Demand, 6/22/2006 (OAT: 99 °F) - Zone 2, 9 sites



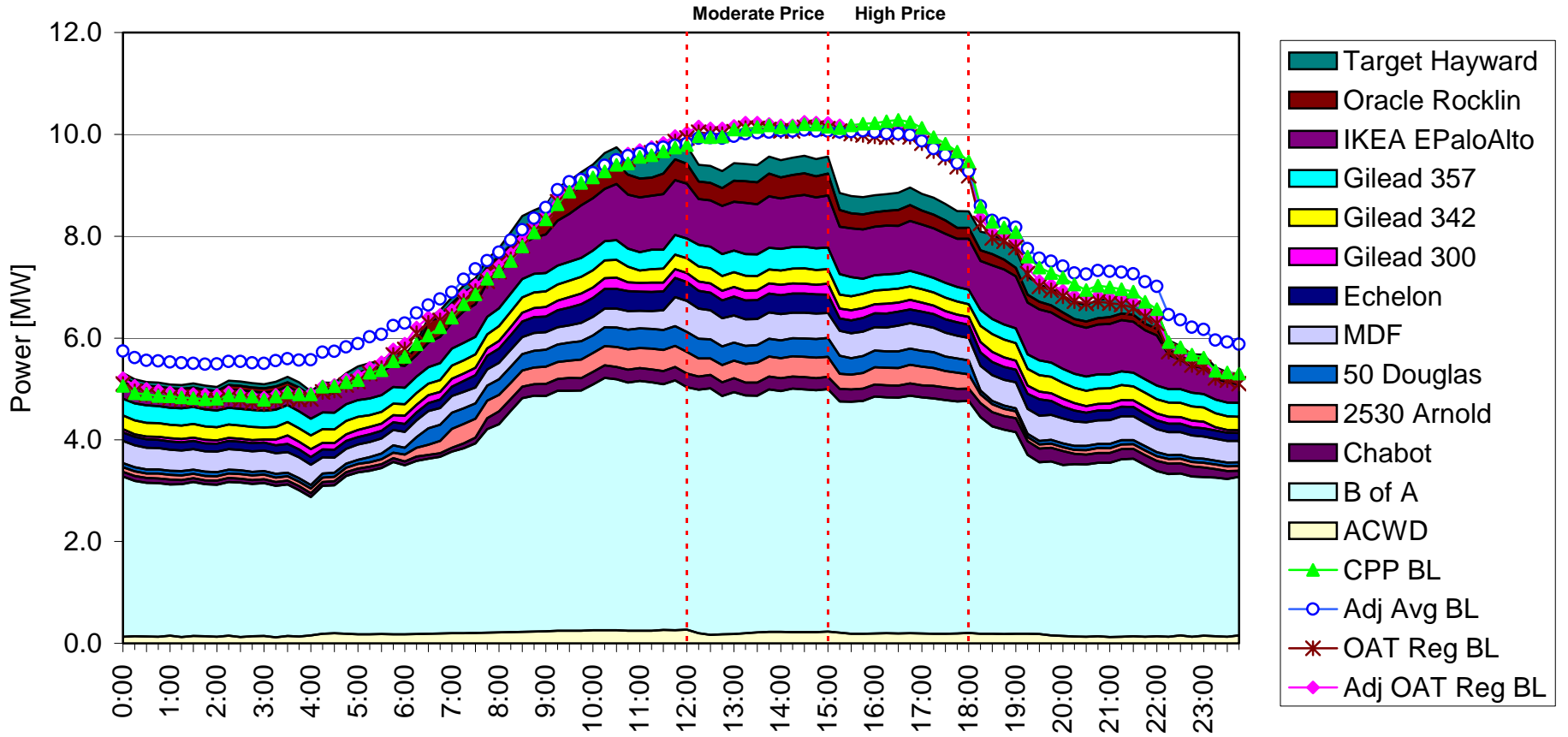
Price Level	kW		W/ft ²		WBP%	
	Max	Ave	Max	Ave	Max	Ave
Mod. Price	541	474	0.35	0.31	7%	6%
High Price	1069	932	0.69	0.60	13%	11%



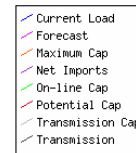
CA Electricity System Status
Thu. Jun. 22, 2006



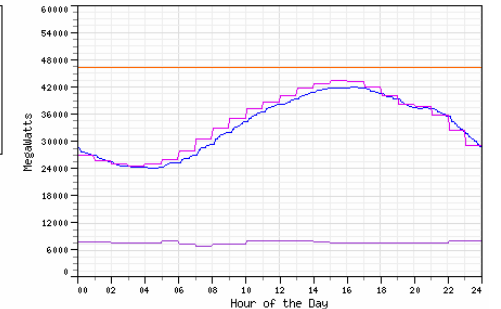
Aggregated Demand, 6/23/2006 (OAT: 84 °F) - Zone 1&2, 13 sites



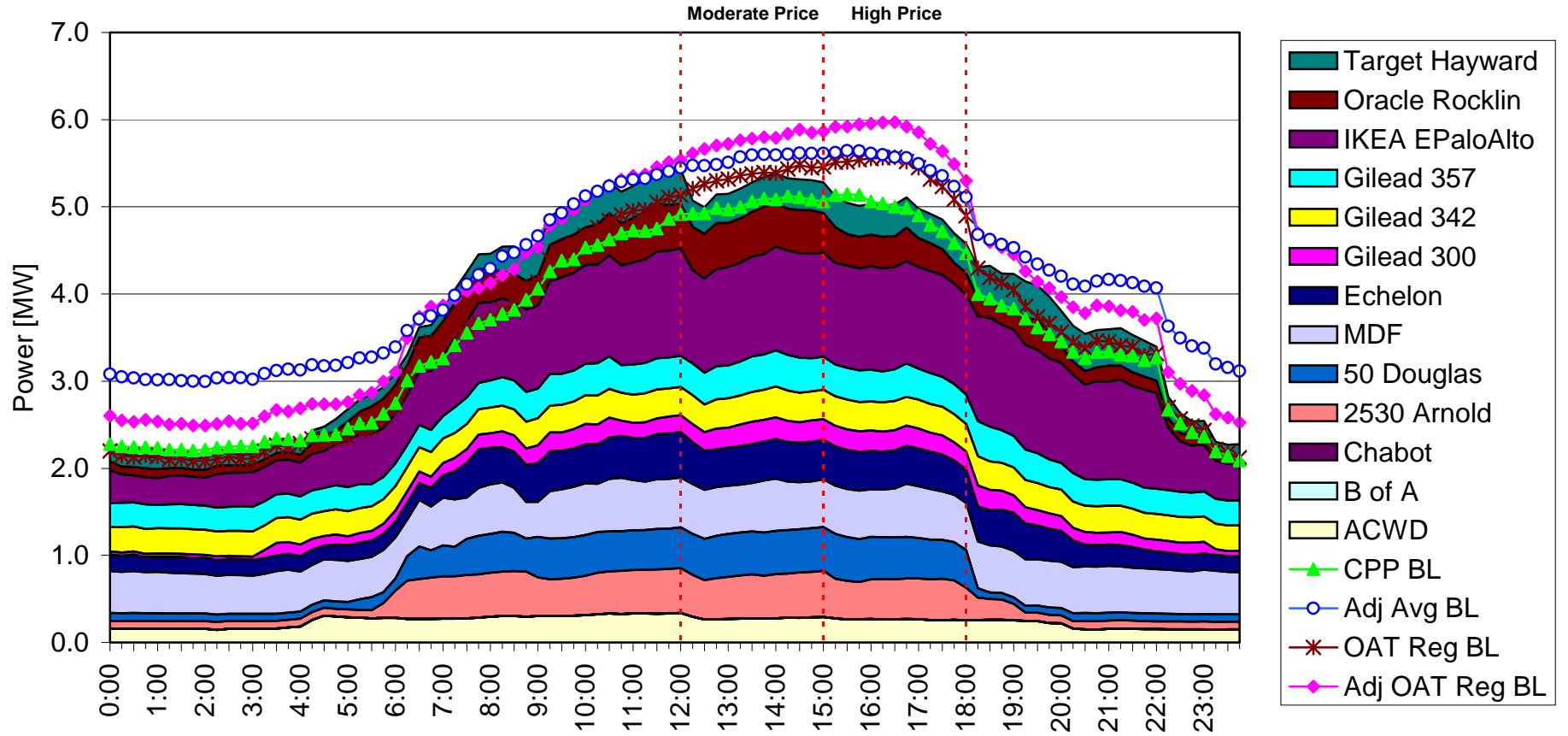
Price Level	kW		W/ft ²		WBP%	
	Max	Ave	Max	Ave	Max	Ave
Mod. Price	836	726	0.42	0.36	8%	7%
High Price	1336	1150	0.67	0.58	13%	11%



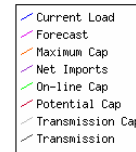
CA Electricity System Status
Fri. Jun. 23, 2006



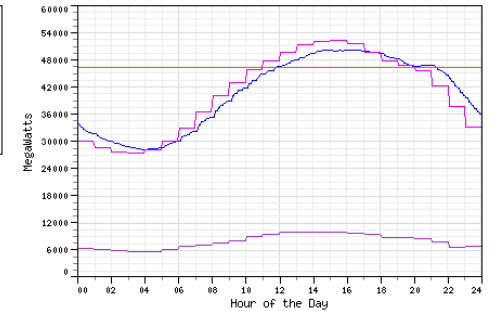
Aggregated Demand, 7/24/2006 (OAT: 95 °F) - Zone 1&2, 11 sites



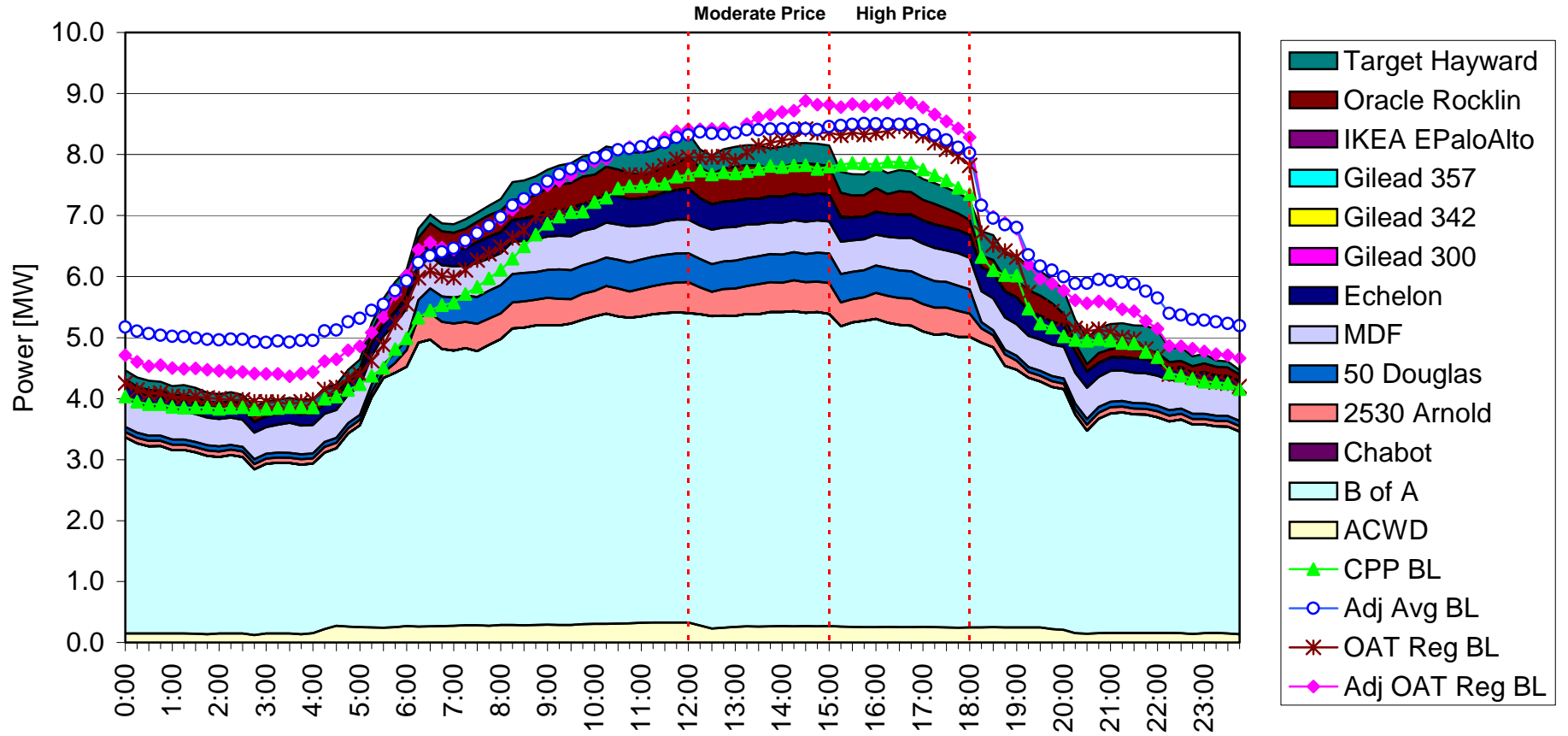
Price Level	kW		W/ft ²		WBP%	
	Max	Ave	Max	Ave	Max	Ave
Mod. Price	669	540	0.56	0.45	12%	9%
High Price	955	852	0.80	0.71	16%	15%



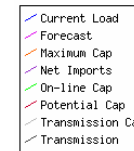
CA Electricity System Status
Mon. Jul. 24, 2006



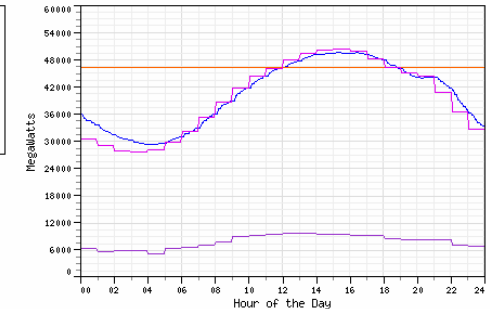
Aggregated Demand, 7/25/2006 (OAT: 101 °F) - Zone 2, 8 sites



Price Level	kW		W/ft ²		WBP%	
	Max	Ave	Max	Ave	Max	Ave
Mod. Price	689	483	0.47	0.33	8%	6%
High Price	1175	1106	0.81	0.76	13%	13%

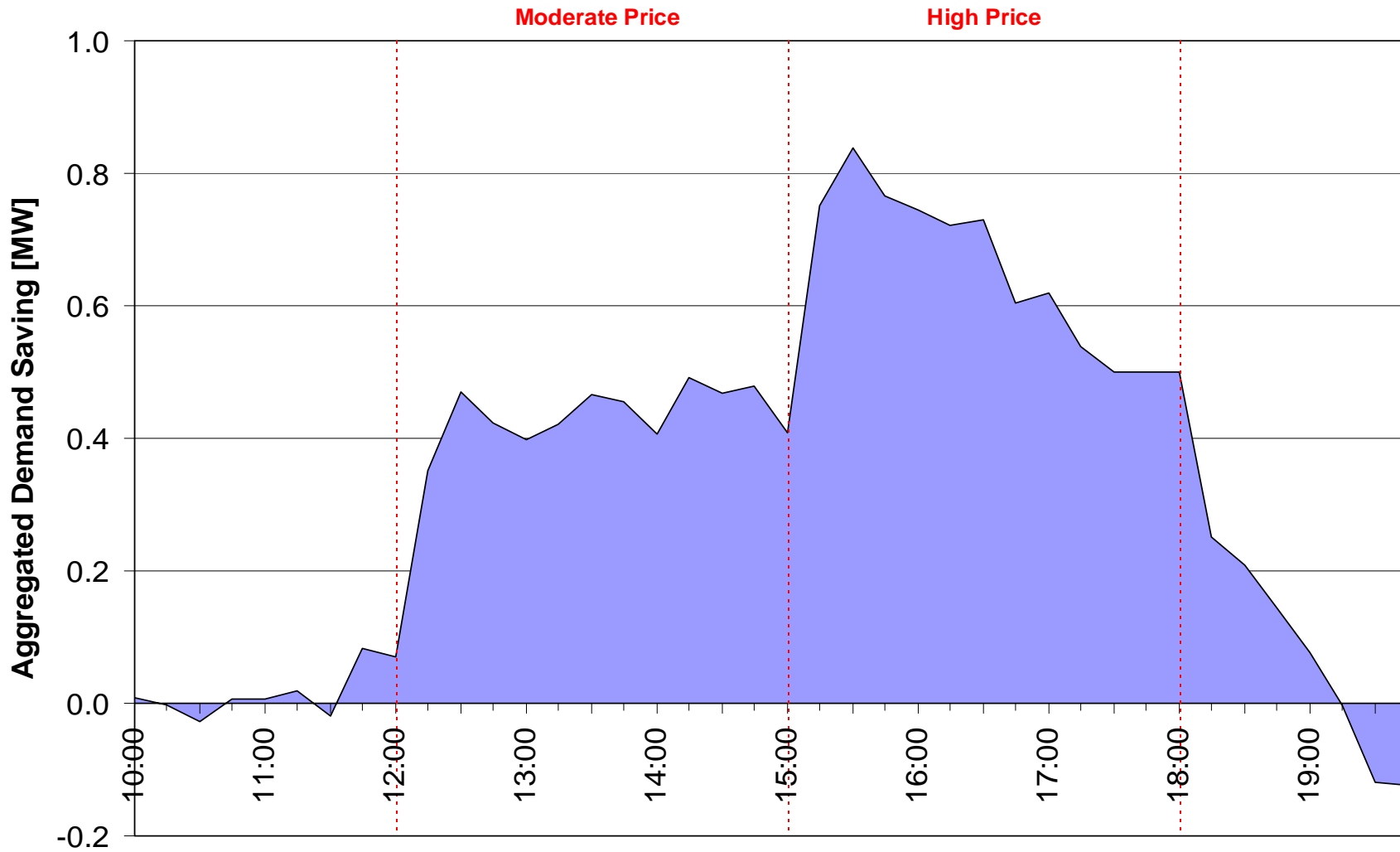


CA Electricity System Status
Tue. Jul. 25, 2006





**Aggregated Demand Saving, 7/24/2006 (Max OAT: 103 °F)
7 Buildings (Zone 2), Total 0.75 million ft²**





Feedback from Facility Managers



Site	Comfort Issues
ACWD	Some complaints of high temperature but company found innovative ways to reduce complaints. Manual pre-cooling in some zones.
B of A	Some comfort concerns
Chabot	Too cool in the morning, hot in the afternoon
Contra Costa	Occupants realized it is not getting cooler in the afternoon but no complaints
Oracle	Comfort complaints so plan to implement pre-cooling , more gradual temperature changes and changes in programming to exclude corner offices with double sun exposure
Sybase	People did not like lighting reduction and some turned zones back on as CPP days continued. (manual DR)

Site	Program/Tariff Issues
ACWD	Surprised by high utility bill .
B of A	DR savings too small
Contra Costa	DR savings too small for hassle they have endure
Echelon	DR savings too small . Realized need to refine DR strategies to avoid demand charges .

IKEA, Gilead and Target worked fine – no complaints or issues report.



What is AutoDR?

- **Enabling technology & processes**
- **Can automate any DR program**
- **Facility managers are notified, but not required for automated sheds to occur.**
- **Defines standard interfaces for many parties to use.**
 - Individual Sites
 - Multi-Site Energy Managers
 - Aggregators
 - EMCS Companies
- **Reliable, Secure, Scalable, Open**

What is NOT AutoDR?

- **Doesn't change decision making processes within utility**
- **Doesn't compete with aggregators (lowers their costs)**



AutoDR Technical Developments 2003 – present

- AutoDR was created as part of the DRRC effort to remove impediments to DR in commercial facilities. **Cost effectiveness, process development & scalability were overriding principals.**
- **Barrier:** HVAC strategies complicated and ineffective
- **Solution:** Global Temperature Adjustment (GTA) strategy.
 - Slated for Title 24 code in 2008.
 - Enable DR in commercial building at no additional cost.
 - Proven to be simple, effective & minimally objectionable
- **Barrier:** Too labor intensive
- **Solution:** Automated DR with pre-planned strategies



AutoDR Technical Developments 2003 – present

- **Barrier:** Auto-DR signal transmission infrastructure too expensive.
- **Solution:** DRAS leverages existing Internet and WAN connections in commercial buildings.
- **Barrier:** Internet signals not standardized
- **Solution:** DRRC is working with CA PCT, NIST and BACnet toward signal standardization



AutoDR Technical Developments 2003 – present

- **Barrier:** Internet signals and protocols too complicated to transfer into existing EMCS
- **Solution:** Internet relays are easily read by all existing EMCS.
 - Can be used for direct load control as well
- **Barrier:** Internet relays are difficult to configure and are **inherently insecure**.
- **Solution:** DRRC developed self configuring, secure Internet relay device; CLIR Box (Client, Logic, w/ Integrated Relay).
 - Prototyped in 2005



Background:

DR Automation Server ver. 1

- **Used in 2003 & 2004 Auto-DR Tests**
- **Served research needs**
- **No formal design process was used**
- **Limitations became apparent in 2004**
 - Not flexible
 - Not scalable
 - High latency
 - Not reliable



DR Automation Server

ver. 2 & 3



- **Used in the PG&E / LBNL pilots in 2005 & 2006**
- **Financial transactions based on the functionality**
- **Needed to meet IT industry standards for**
 - **Flexibility** - variety of Auto-DR programs
 - **High availability/reliability** – Specified Goal: 99.99%
 - **Scalability** – 100,000 +
 - **Security** - A security breach could become a major public relationship setback to the industry.



Web Browser Interface to DR Automation Server (DRAS)

What does it look like?

DR Automation Server: Summary - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.electricprice.net/pss2.website/secure/summary.jsp

DRRC pier Akuacom **DR AUTOMATION SERVER 3**

logged in as: operator | [logout](#) | [help](#)

Summary SAID Comm Dev Logs Channels Users Schedule Options About

Upcoming Automated CPP Events

DR Group	Received Event	Start	End
PGE_CPP_ZONE1	Fri Nov 10 09:22:08 PST 2006	Wed Nov 15 12:00:00 PST 2006	Wed Nov 15 18:00:00 PST 2006
PGE_CPP_ZONE2	Fri Nov 10 09:22:20 PST 2006	Wed Nov 15 12:00:00 PST 2006	Wed Nov 15 18:00:00 PST 2006

Summary

Show: All Sites Ready Sites Only

Organization	Comm Dev Name	Service Agreement Name	DR Group	Event Level	Prep. Status	Comm. Status
ACWD	ACWD	ACWD	PGE_CPP_ZONE2	normal	Yes	No
B of A	B of A	B of A	PGE_CPP_ZONE2	normal	Yes	Yes
Chabot	Chabot	Chabot	PGE_CPP_ZONE2	normal	Yes	Yes
Contra Costa	Contra Costa	2530 Arnold	PGE_CPP_ZONE2	normal	Yes	Yes
Contra Costa	Contra Costa	Martinez Detention	PGE_CPP_ZONE2	normal	Yes	Yes
Contra Costa	Contra Costa	50 Douglas	PGE_CPP_ZONE2	normal	Yes	Yes
Echelon	echelon	Echelon	PGE_CPP_ZONE2	normal	Yes	Yes
FUSD	FUSD_Cent	Centreville JrHigh	PGE_CPP_ZONE2	normal	Yes	Yes
FUSD	webservice1	Irvington High	PGE_CPP_ZONE2	normal	Yes	No
Gilead	Gilead	Gilead 300	PGE_CPP_ZONE1	normal	Yes	Yes
Gilead	Gilead	Gilead 342	PGE_CPP_ZONE1	normal	Yes	Yes
Gilead	Gilead	Gilead 357	PGE_CPP_ZONE1	normal	Yes	Yes
IKEA	IKEA	IKEA Palo Alto	PGE_CPP_ZONE1	normal	Yes	Yes
Oracle	webservice2	Oracle Rocklin	PGE_CPP_ZONE2	normal	Yes	No
Svenhard's	Svenhard's	Svenhard's	PGE_CPP_ZONE2	normal	Yes	Yes
Target	target	Target Hayward	PGE_CPP_ZONE2	normal	Yes	Yes

Done Internet

DR Automation Server: SAID - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.electricprice.net/pss2.website/secure/prepStatus.jsp

DRRC pier Akuacom DR AUTOMATION SERVER 3

logged in as: operator | [logout](#) | [help](#)

Summary SAID Comm Dev Logs Channels Users Schedule Options About

SAID Status

Select	Edit	Service Agreement Name	Comm Dev Name	SAID	DR Group	Program Participation				Technical Preparation				
						CPP contract signed	InterAct setup	e-page notification test successful	Program rate schedule effective date	Site survey	EMCS program	Server comm. test	Control test	READY
<input type="checkbox"/>		2530 Arnold	Contra Costa		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		50 Douglas	Contra Costa		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		ACWD	ACWD		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		B of A	B of A		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Centreville JrHigh	FUSD_Cent		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Chabot	Chabot		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Del Monte Lathrop	Delmonte		PGE_CPP_ZONE2	No	Yes	No	No	No	No	No	No	No
<input type="checkbox"/>		Echelon	echelon		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Gilead 300	Gilead		PGE_CPP_ZONE1	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Gilead 342	Gilead		PGE_CPP_ZONE1	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Gilead 357	Gilead		PGE_CPP_ZONE1	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		IKEA Emeryville	IKEA_Em		PGE_CPP_ZONE2	No	Yes	No	No	No	No	No	No	No
<input type="checkbox"/>		IKEA Palo Alto	IKEA		PGE_CPP_ZONE1	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Irvington High	webservice1		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Martinez Detention	Contra Costa		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Oracle Rocklin	webservice2		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	Yes	Yes	Yes	Yes	Yes
<input type="checkbox"/>		Solectron 1	solectron		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	No	No	No	No	No
<input type="checkbox"/>		Solectron 2	solectron		PGE_CPP_ZONE2	Yes	Yes	Yes	05/01/2006	No	No	No	No	No





Done Internet

DR Automation Server: Comm Dev Status - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites

Address <http://www.electricprice.net/pss2.website/secure/commDevStatus.jsp?sort=6> Go Links

logged in as: operator | [logout](#) | [help](#)

Summary SAID **Comm Dev** Logs Channels Users Schedule Options About

Comm Dev Status

Select	Edit	Comm Dev Name ▼	Channel ▼	DR Group ▼	Comm Method ▼	Event Level	Last Contact ▼	Status ▼
<input type="checkbox"/>		ACWD	CPP_Zone_2	PGE_CPP_ZONE2	RELAY	normal	Fri Nov 10 09:22:25 PST 2006	
<input type="checkbox"/>		B of A	CPP_Zone_2	PGE_CPP_ZONE2	RELAY	normal	Fri Nov 10 09:23:25 PST 2006	
<input type="checkbox"/>		Chabot	CPP_Zone_2	PGE_CPP_ZONE2	RELAY	normal	Fri Nov 10 09:23:25 PST 2006	
<input type="checkbox"/>		Contra Costa	CPP_Zone_2	PGE_CPP_ZONE2	RELAY	normal	Fri Nov 10 09:23:25 PST 2006	
<input type="checkbox"/>		Delmonte	CPP_Zone_2	PGE_CPP_ZONE2	SOFTWARE	normal	null	
<input type="checkbox"/>		FUSD_Cent	CPP_Zone_2	PGE_CPP_ZONE2	SOFTWARE	normal	Fri Nov 10 09:23:21 PST 2006	
<input type="checkbox"/>		Gilead	CPP_Zone_1	PGE_CPP_ZONE1	RELAY	normal	Fri Nov 10 09:23:25 PST 2006	
<input type="checkbox"/>		IBECS	test	OPERATOR	SOFTWARE	moderate	Tue Jun 27 16:55:05 PDT 2006	
<input type="checkbox"/>		IKEA	CPP_Zone_1	PGE_CPP_ZONE1	RELAY	normal	Fri Nov 10 09:23:25 PST 2006	
<input type="checkbox"/>		IKEA_Em	CPP_Zone_2	PGE_CPP_ZONE2	SOFTWARE	normal	null	
<input type="checkbox"/>		Richard-Zeta	test	OPERATOR	SOFTWARE	moderate	Thu Aug 10 17:28:02 PDT 2006	
<input type="checkbox"/>		Safeway	CPP_Zone_2	PGE_CPP_ZONE2	SOFTWARE	normal	null	
<input type="checkbox"/>		Svenhard's	CPP_Zone_2	PGE_CPP_ZONE2	RELAY	normal	Fri Nov 10 09:23:25 PST 2006	
<input type="checkbox"/>		Sybase	CPP_Zone_2	PGE_CPP_ZONE2	SOFTWARE	normal	null	
<input type="checkbox"/>		Target_2006	CPP_Zone_2	PGE_CPP_ZONE2	SOFTWARE	normal	Thu Oct 12 11:20:15 PDT 2006	
<input type="checkbox"/>		UCMerced	test	OPERATOR	SOFTWARE	moderate	Wed Sep 13 17:11:36 PDT 2006	
<input type="checkbox"/>		[LBNL-Test 211]	CPP_Zone_2	PGE_CPP_ZONE2	RELAY	normal	Fri Sep 29 11:38:48 PDT 2006	
<input type="checkbox"/>		chevron	CPP_Zone_2	PGE_CPP_ZONE2	SOFTWARE	normal	Fri Nov 10 09:23:54 PST 2006	
<input type="checkbox"/>		demo	test	OPERATOR	SOFTWARE	moderate	Wed Oct 25 12:19:55 PDT 2006	
<input type="checkbox"/>		echelon	CPP_Zone_2	PGE_CPP_ZONE2	SOFTWARE	normal	Fri Nov 10 09:24:02 PST 2006	
<input type="checkbox"/>		enncean	test	OPFRATOR	SOFTWARE	normal	Thu Nov 09 17:01:02 PST 2006	

Internet

Target

Control Auto-CPP Opt Out (NORMAL) Forced Moderate Forced High

Upcoming Automated CPP Events for PGE_CPP_ZONE2

Received Event	Start	End
Fri Nov 10 09:22:20 PST 2006	Wed Nov 15 12:00:00 PST 2006	Wed Nov 15 18:00:00 PST 2006

Communication

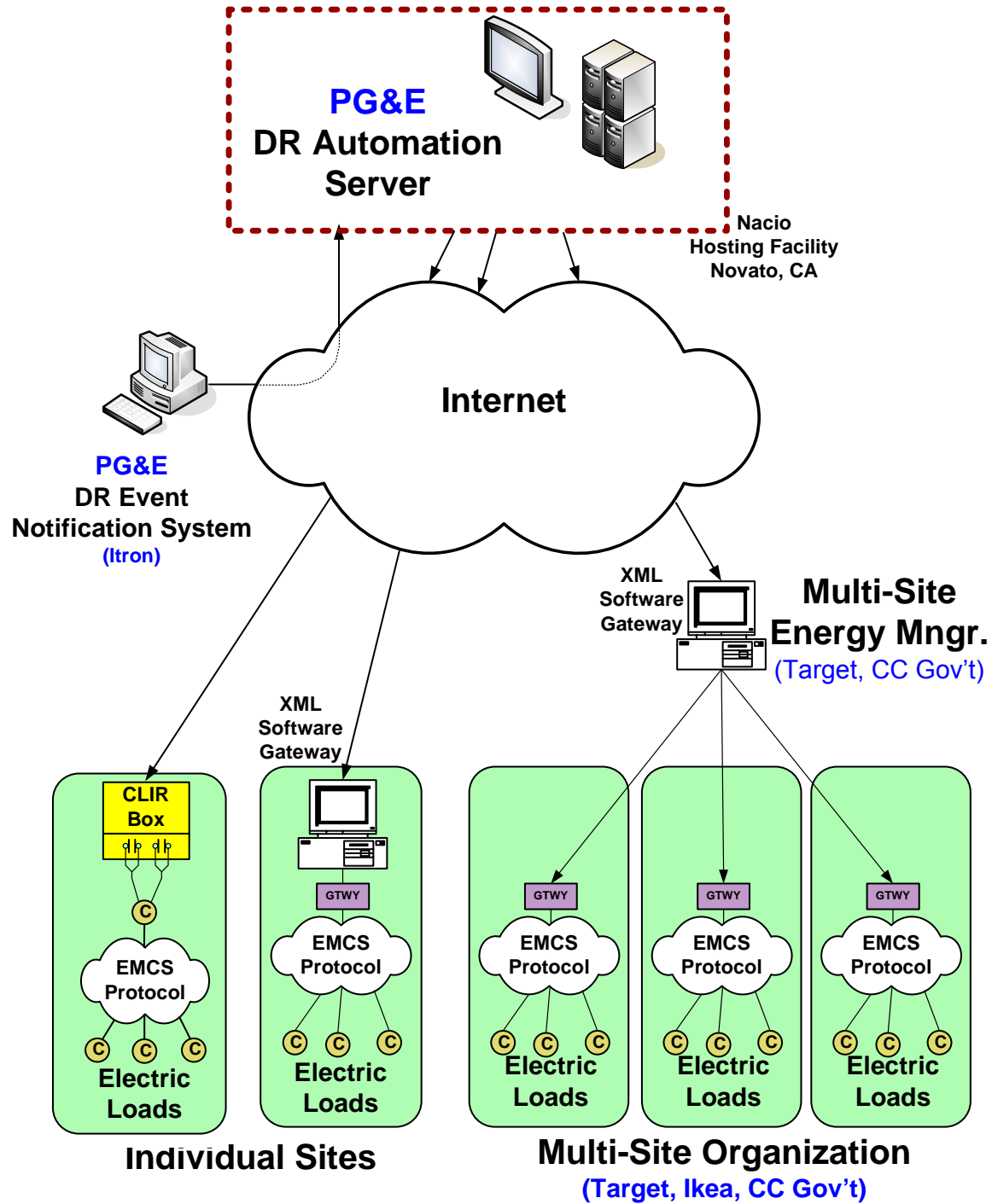
Comm. Method	SOFTWARE
Event Level	normal
Last Contact	Fri Nov 10 09:24:55 PST 2006
Comm. Status	
Event Pending	NONE

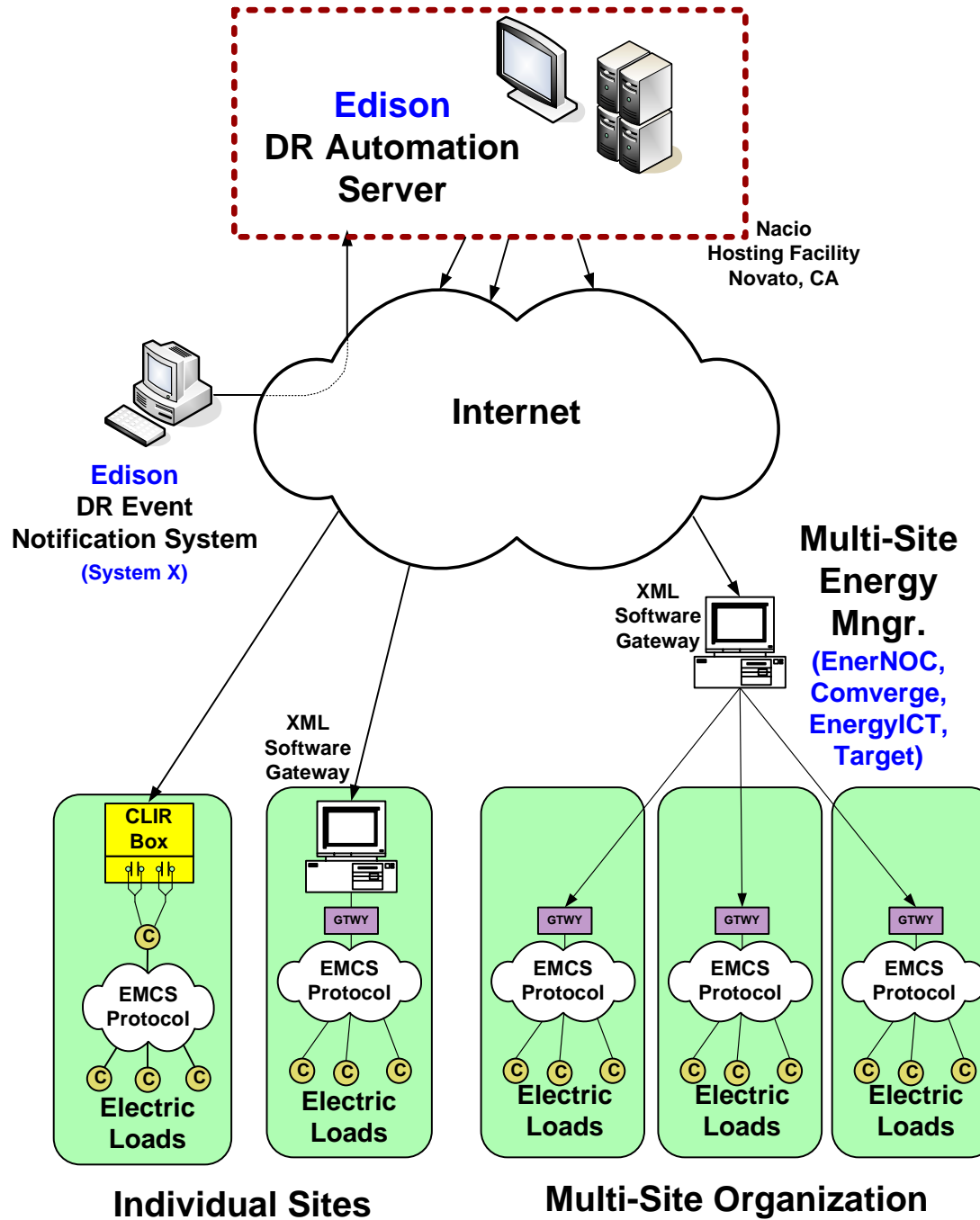
Preparation Status

CPP Program	CPP sign-up	InterAct setup	Notify test	Activate
Target Antioch	Yes	No	Yes	05/01/2006
Target Bakersfield	Yes	Yes	Yes	05/01/2006
Target Hayward	Yes	Yes	Yes	05/01/2006

Technical Prep	Site survey	EMCS program	Server comm. test	Control test
Target Antioch	No	No	No	No
Target Bakersfield	No	No	No	No
Target Hayward	Yes	Yes	Yes	Yes

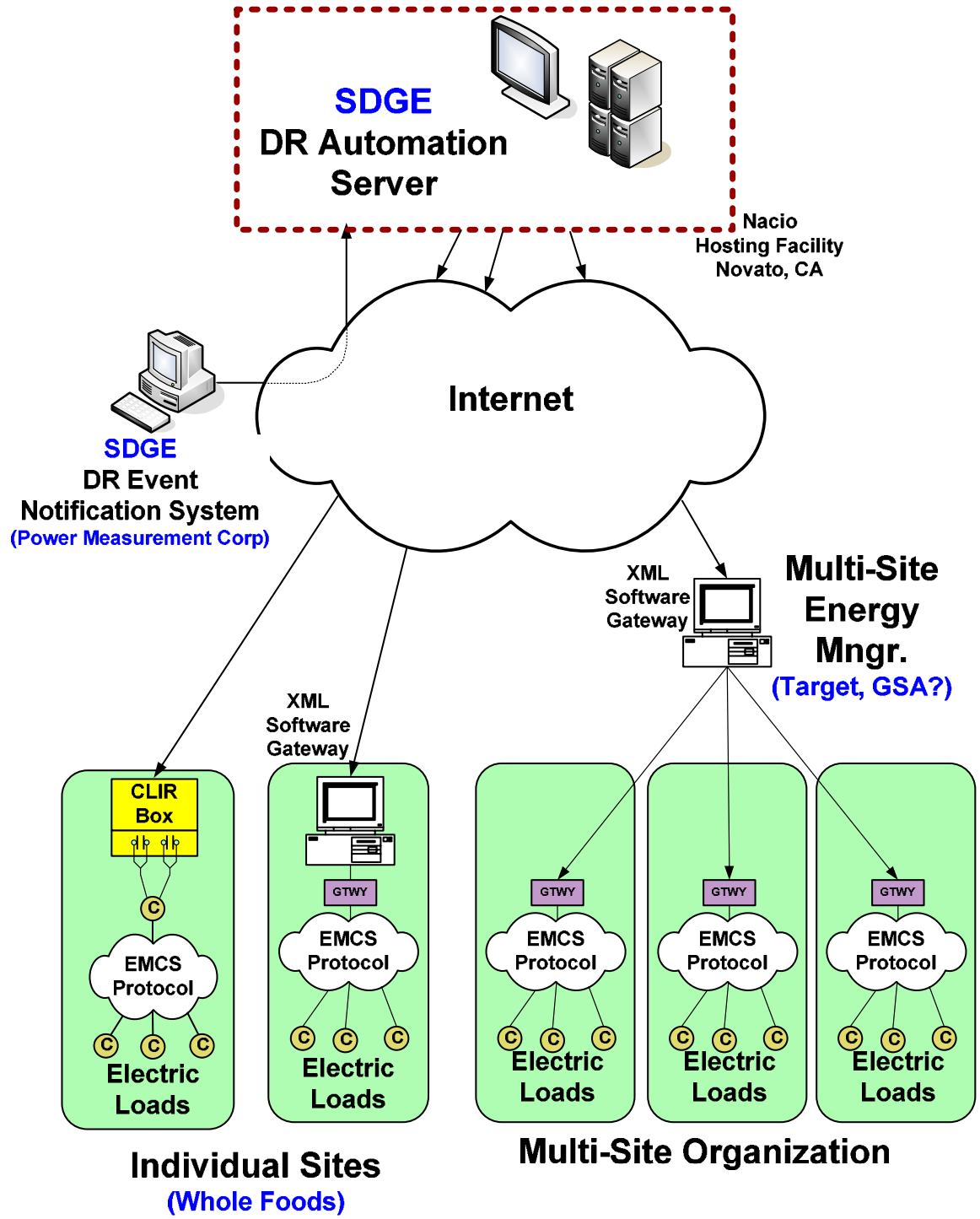
[LBNL Auto-CPP Newsletters](#)





Individual Sites

Multi-Site Organization



Individual Sites
(Whole Foods)

Multi-Site Organization



Nacio Inc. Hosting Facility (aka: Server Farm)



Nacio Facilities

Multi-Layer Physical Security

- Intrusion (5 layer)
- Fire
- Earthquake

Redundant:

- Internet Feeds
- Power-Supplies, Generators
- HVAC
- Servers, RAID arrays

24/7 Staffing

- Network Management “hooks”
into DRAS Application



Nacio Co-Location





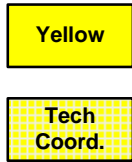
Nacio Control Center





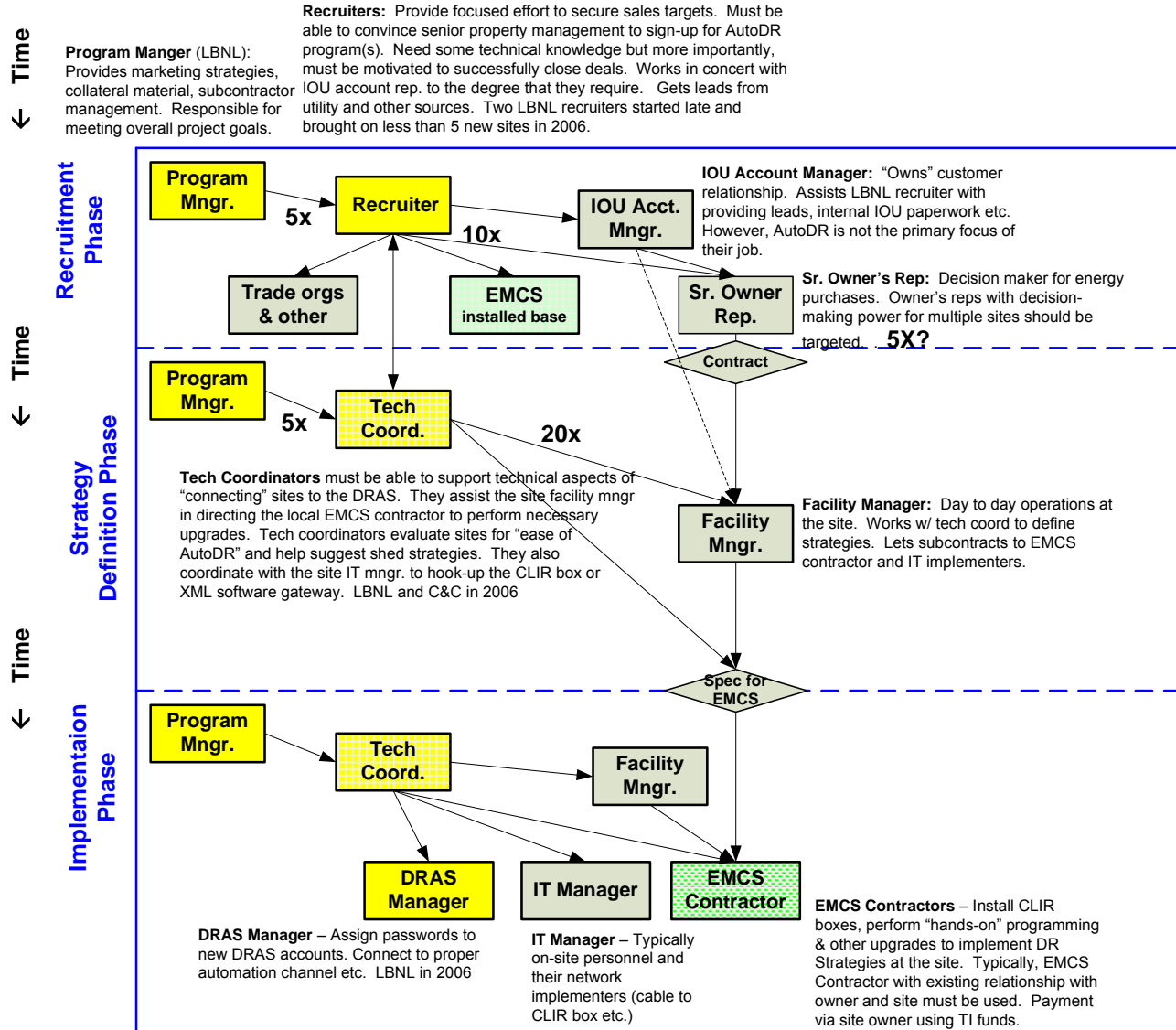
AutoDR 2006 Task Chronology 2 MW (13 sites)

Figure Version 9-20-06



Performed by LBNL in 2006

Performed by LBNL and C&C Automation in 2006

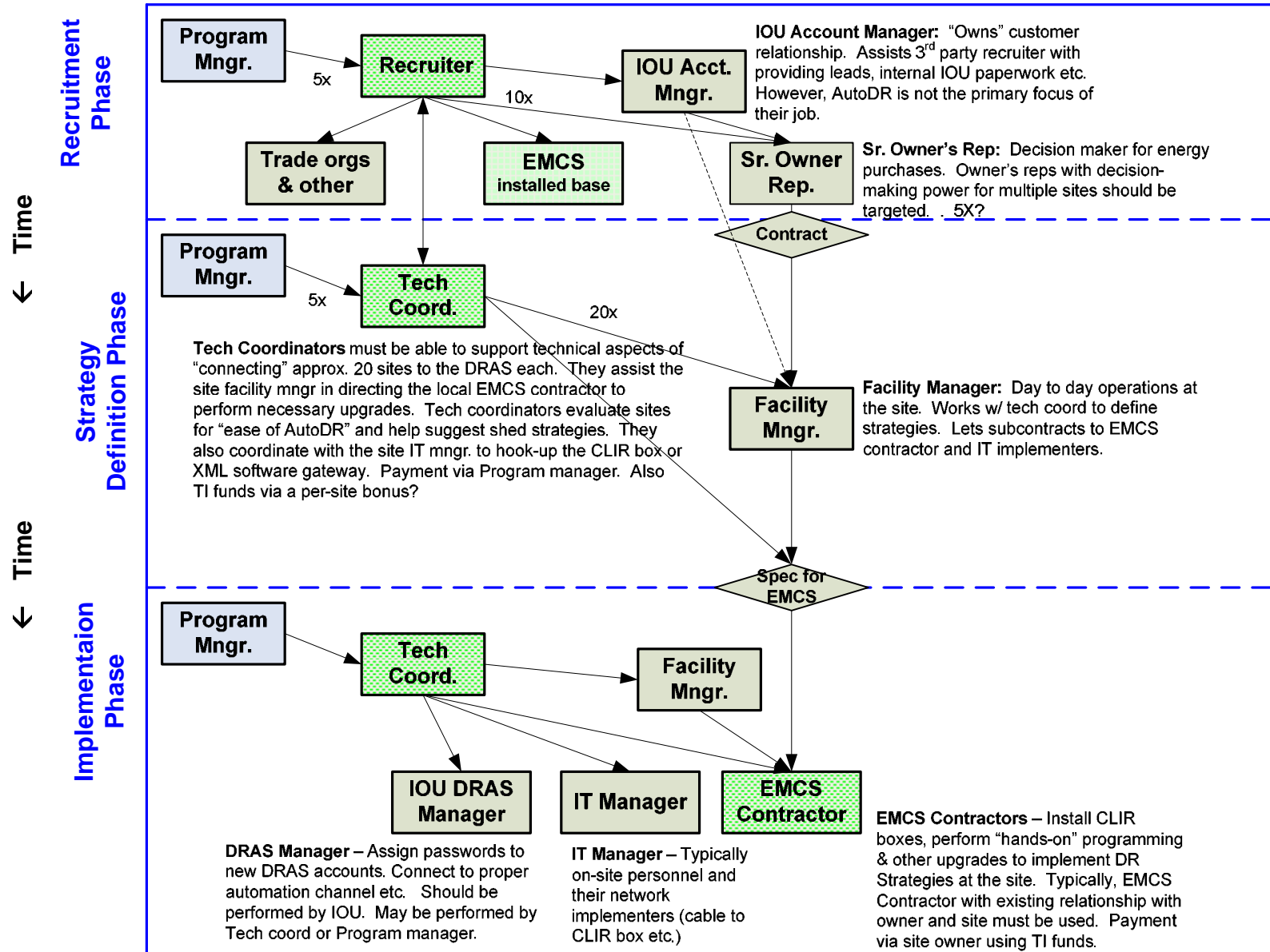




AutoDR 2007 Task Chronology 15 MW (~ 200 sites)

Program Manger (3rd Party): Provides marketing strategies, collateral material, subcontractor management. Responsible for meeting overall project goals.

Recruiters: Provide focused effort to secure sales targets. Must be able to convince senior property management to sign-up for AutoDR program(s). Need some technical knowledge but more importantly, must be motivated to successfully close deals. Works in concert with IOU account rep. to the degree that they require. Gets leads from utility and other sources. Each recruiter must contact about 100 sites and close about 20 deals.





AutoDR Implementation 2007

- **Ready for deployment**
- **Technology**
 - Effective
 - Secure
 - Reliable
- **Processes**
 - Well defined
 - Scalable
- **Standard Interfaces**
- **Designed for flexibility**
 - Multiple programs
 - Multiple user types

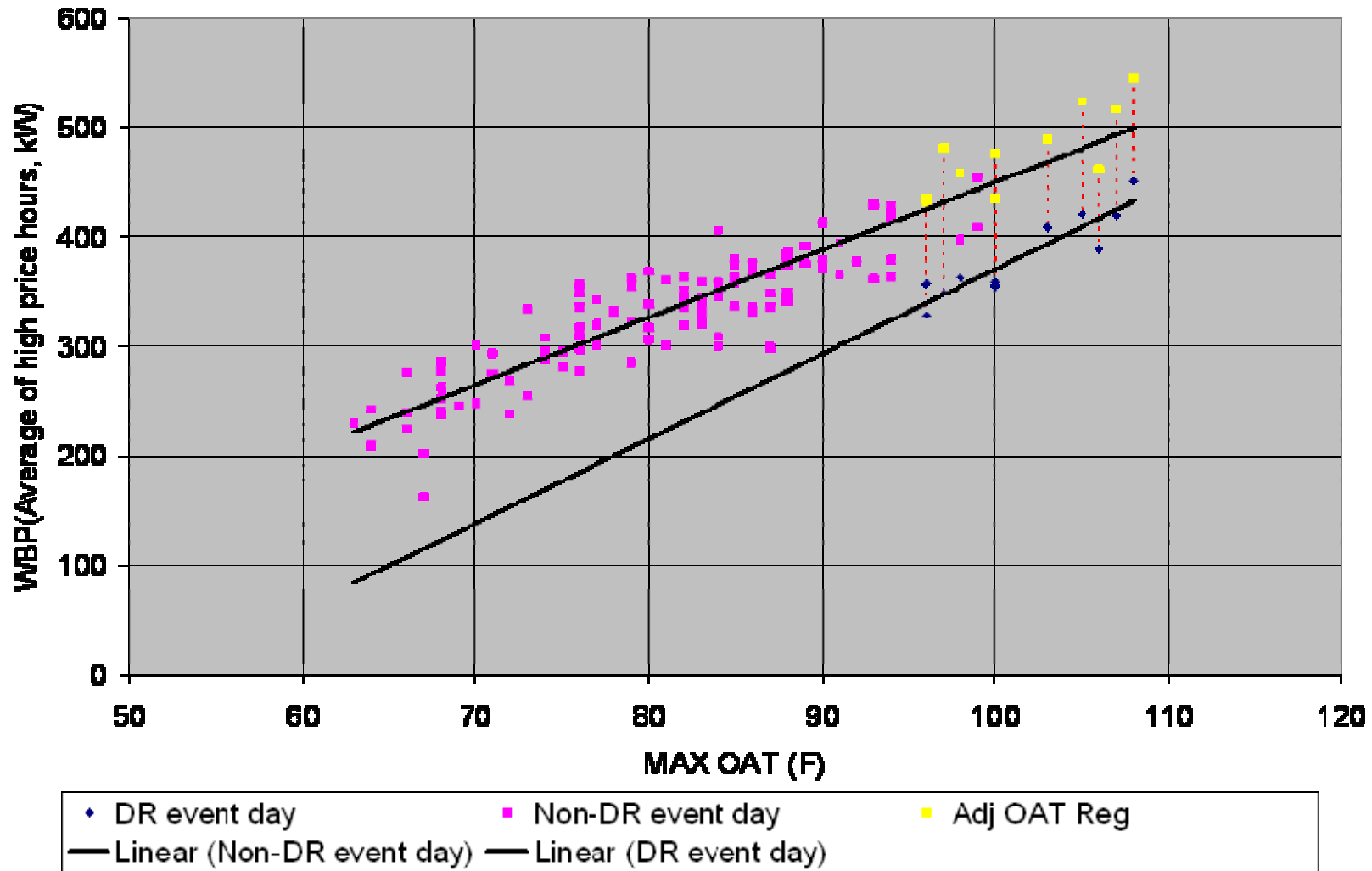


Future Directions/PIER Activities

- **Research Topics**

- Analysis of sheds by building type, end-use, market segment, climate
- DR shed prediction tools and guides
- Improving links between efficiency and DR
- Economic analysis
- DR Automation System enhancements
 - Retail Chains, property managers etc. would like a statewide view the DR status of all of their stores

Compare/Confirm Field Data with HVAC Theory

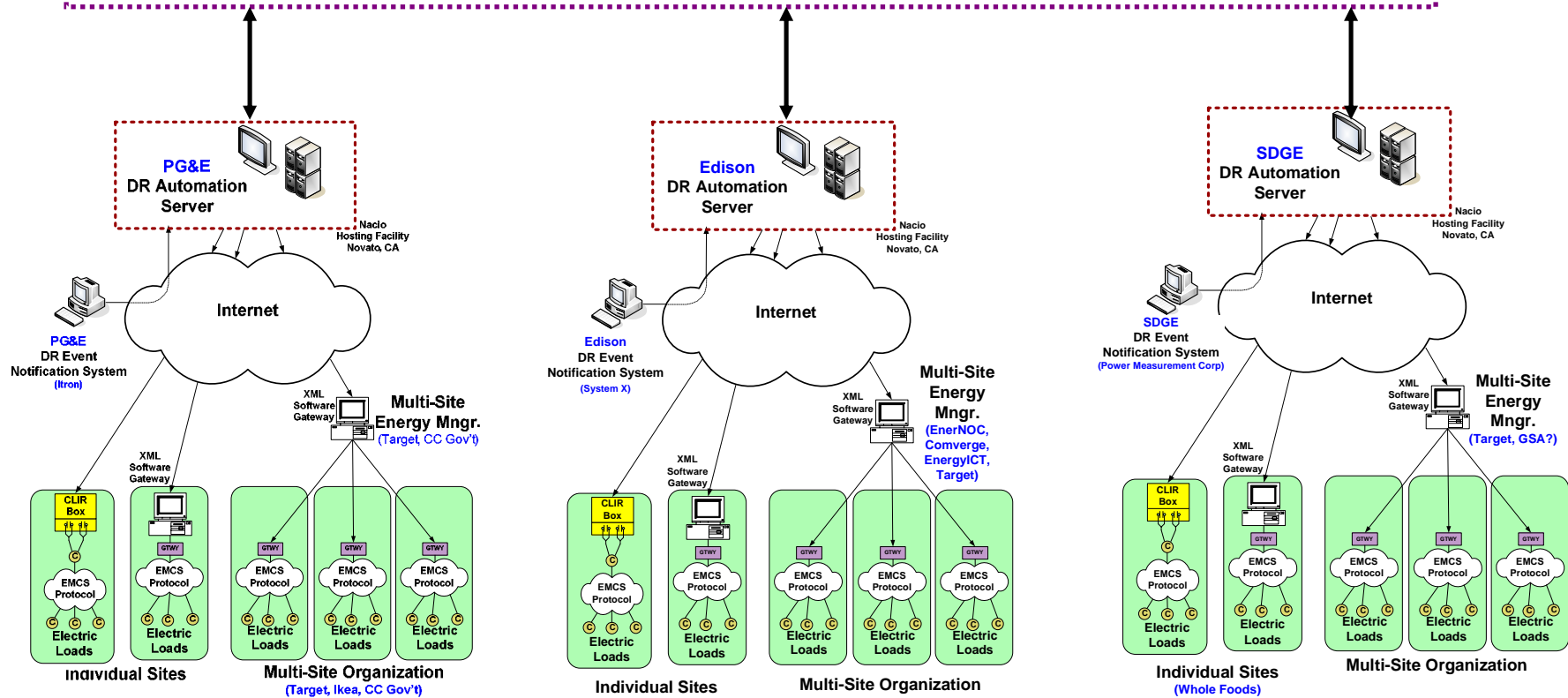


Research for 2007

Statewide Views:

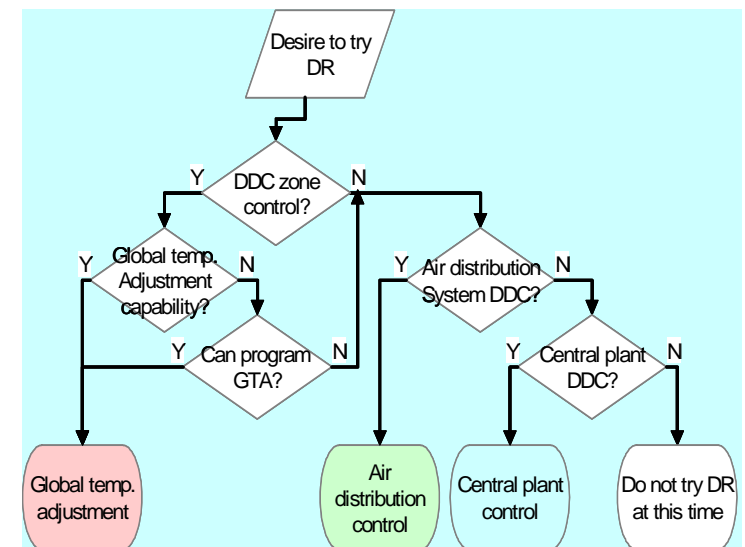
Trans-Utility Energy Manager

- Retail Chains, Gov't Bldgs, Property Managers



Linking DR and Energy Efficiency

- ❑ **Ideal start - good commissioning, retro-commissioning, advanced/new controls**
 - ❑ **HVAC - Direct digital control (DDC) global temperature adjustment**
 - In process for Title 24 2008
 - Closed loop
 - ❑ **Lighting Continuum - Zone Switching, Fixture Switching, Lamp Switching, Stepped Dimming, Continuous Dimming**
 - ❑ **Maybe you “can” use a strategy every day?**

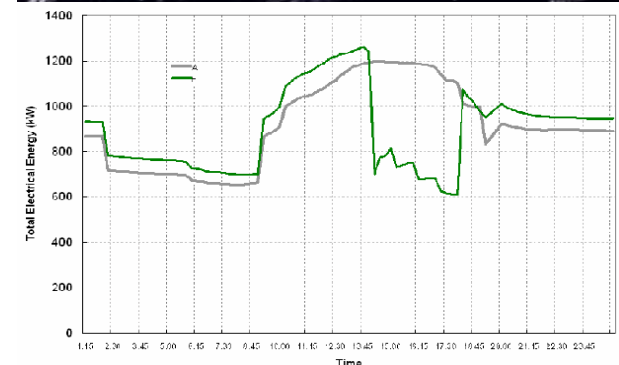


Best Practices in New Construction

- ❑ Objective – Embed DR strategies in advanced controls
- ❑ New York Times Building designed for efficiency simulated to develop DR strategies
 - Efficient features: Integrated movable, Shading & dimming, Under floor air systems
 - Commissioning in mockup
- ❑ Demand Response Strategies
 - Dimming lights beyond daylighting,
 - Reset zone temperatures (gradient)
 - Reduce perimeter fan speed

Predicted Annual Savings from 400 kW Shed

Program	Predicted Annual Savings*
Independent Capacity Program	\$17,632.00
Emergency DR Program	\$1,440.00
Distribution Load Relief Program	\$1,600.00





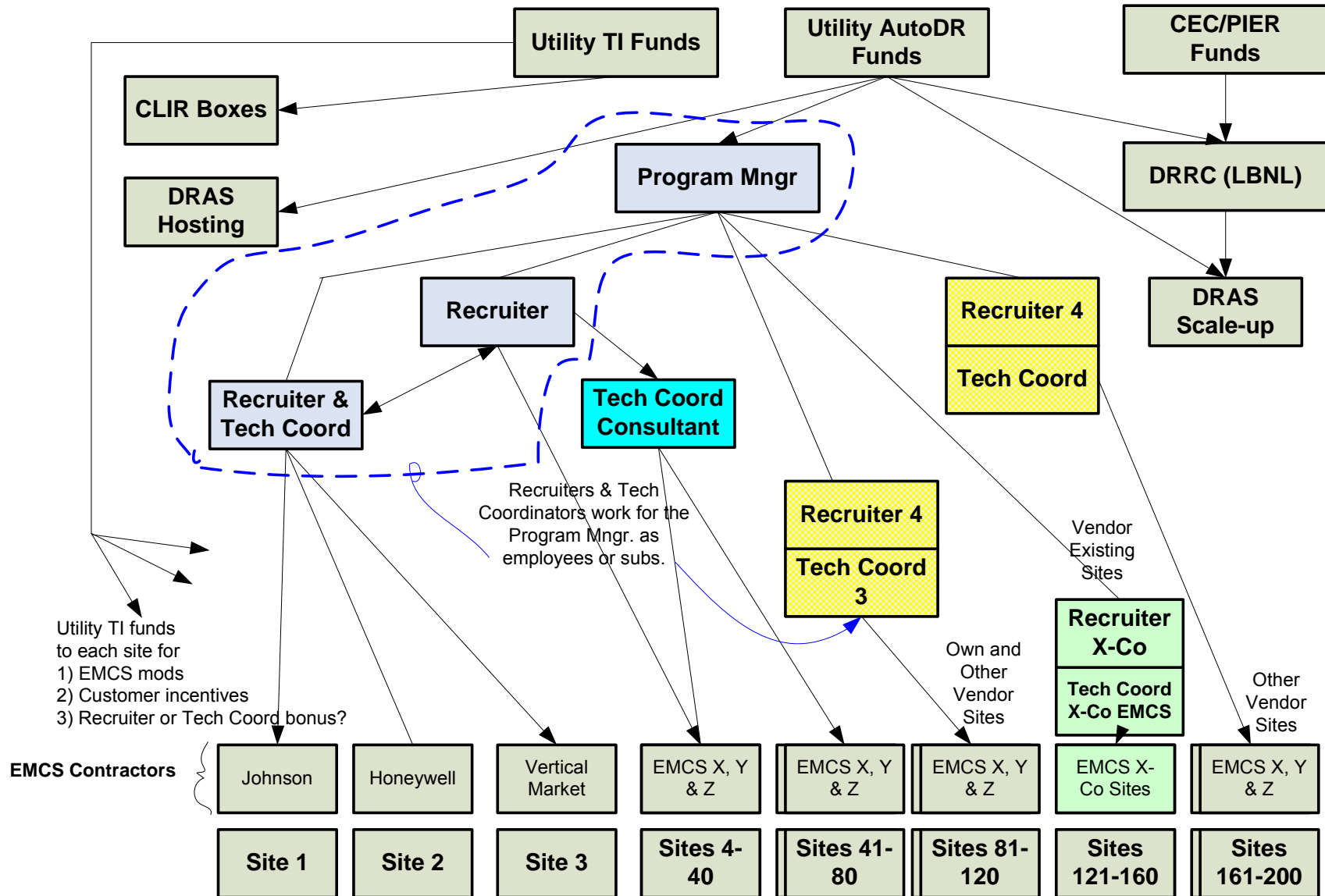
Questions???
Comments???



PG&E AutoDR 2007 Funding Flow 15 MW (~ 200 sites)



Figure Version 9-20-06





Automated DR Definition

- **Automated Demand Response** for commercial and industrial facilities can be defined as fully automated DR initiated by a signal from a utility or other appropriate entity and provide full automated connectivity to customer end-use control strategies.
- **Signaling** – The AutoDR technology should provide continuous, secure, reliable, two-way communication with end-use customers to allow end-use sites to be identified as listening and acknowledging receipt of DR signals.
- **Industry Standards** - Automated DR consists of open, interoperable industry standard control and communications technologies designed to integrate with both common energy management and control systems and other end-use devices that can receive a dry contact relay or similar signals (such as internet based XML).
- **Timing of Notification** - Day ahead and day of signals are provided by AutoDR technologies to facilitate a diverse set of end-use strategies such as pre-cooling for "day ahead" notification, or near real-time communications to automation "day of" control strategies. Timing of DR automation server (DRAS) communications must consider day ahead events that include weekends and holidays.