



Global Energy Partners, LLC
An Employee-Owned Company



Installation and Commissioning of Automated Demand Response Systems

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Outline

- Automated Demand Response (Auto-DR) research
- Commercialization Effort in 2007
- Technical Coordinator (TC) Concept
- Installation and Commissioning Issues
- Discussion of TC concept

A New Approach to DR – Automated Demand Response

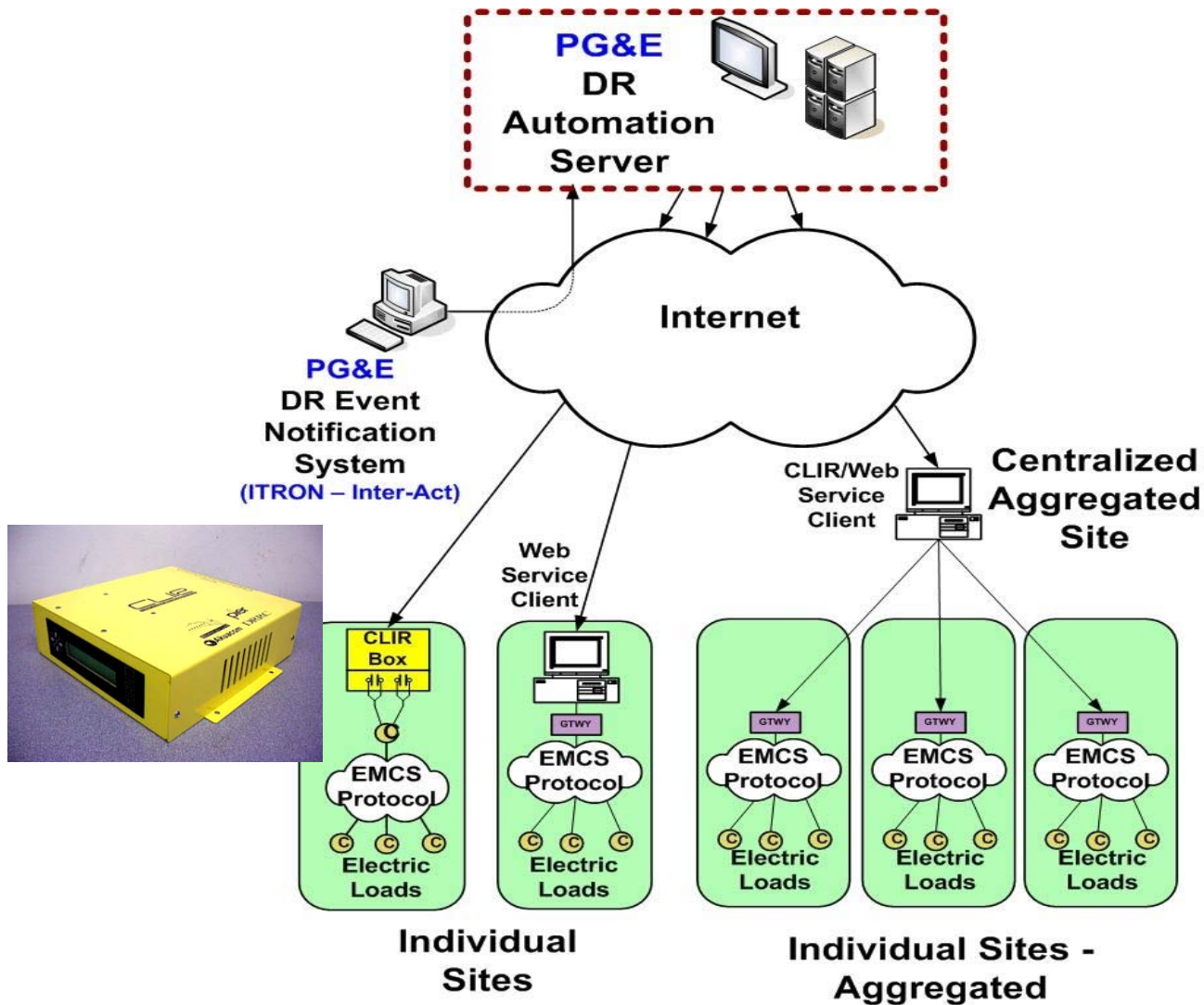
- Automated Demand Response (Auto-DR) is a communication and technology platform designed to:
 - Provide customers with automated, electronic price and reliability signals
 - Provide customers with the capability to identify and automate site specific demand response strategies
 - Put demand response on the same operational foundation as conventional generation resources.
- Auto-DR can support all DR pricing and reliability options
- Auto-DR is not a program but rather a platform for enabling existing and proven technologies

Auto-DR Multi-Year Summary

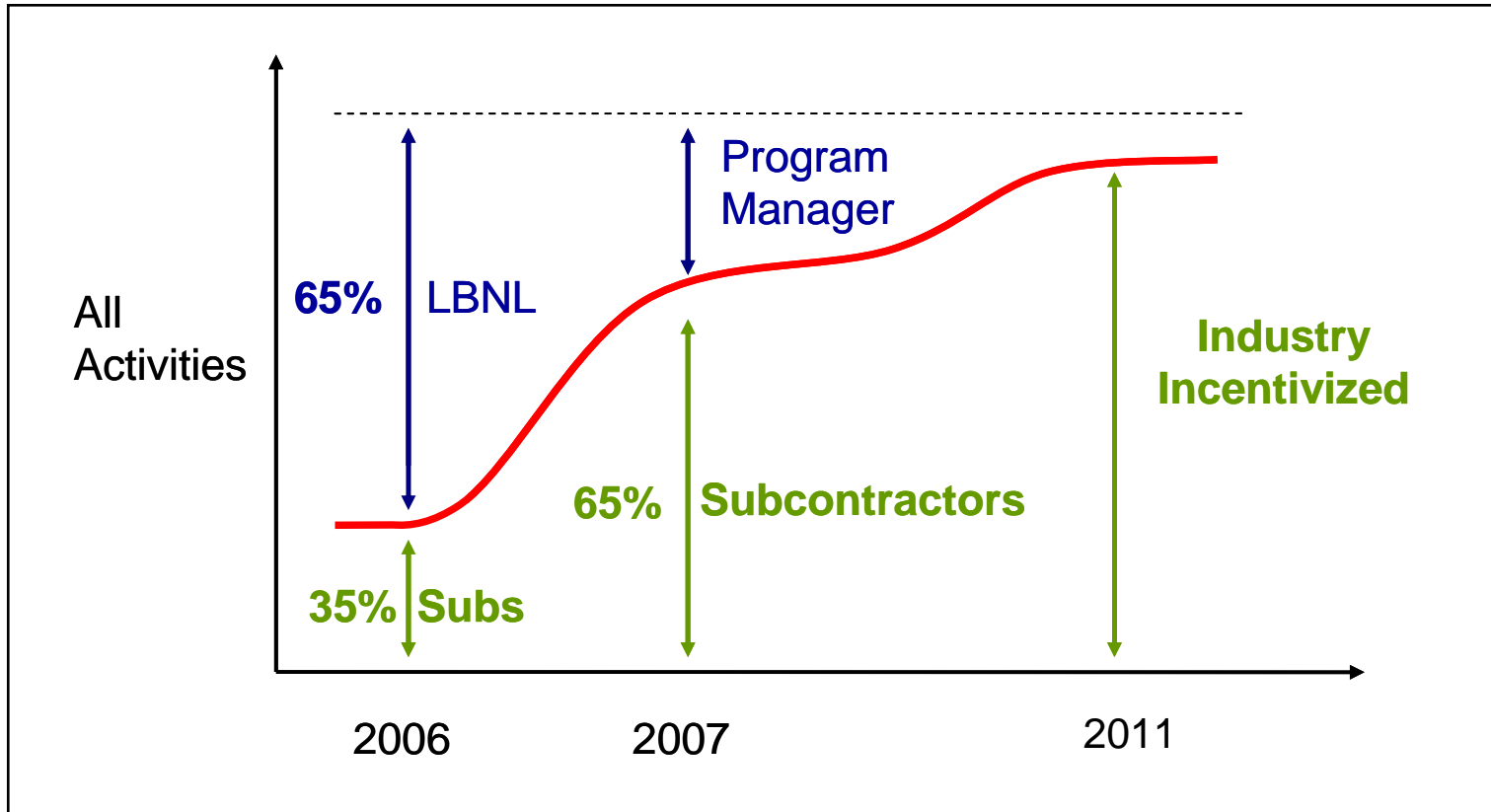
- ❑ Develop Demand Response Automation Server (annually updated)
- ❑ Develop connection to Energy Management Control Systems (EMCS)
- ❑ Field Tests – Recruit sites/ 2 to 12 events per summer
- ❑ Collect site surveys, assist in DR strategy development, conduct test events, collect EMCS and load data
- ❑ 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

Auto-DR System Architecture

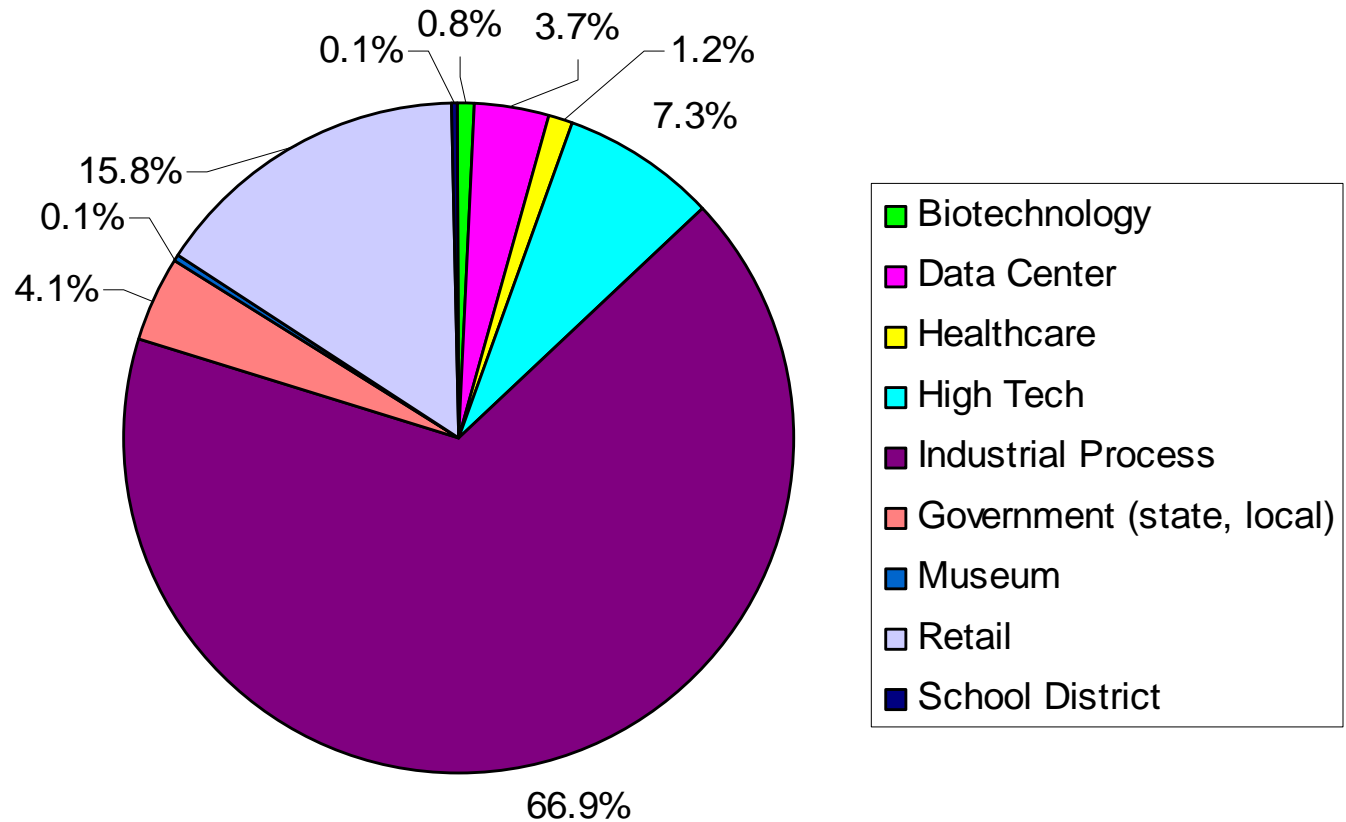


Auto-DR Commercialization Plan



PG&E Auto-DR Participant Makeup

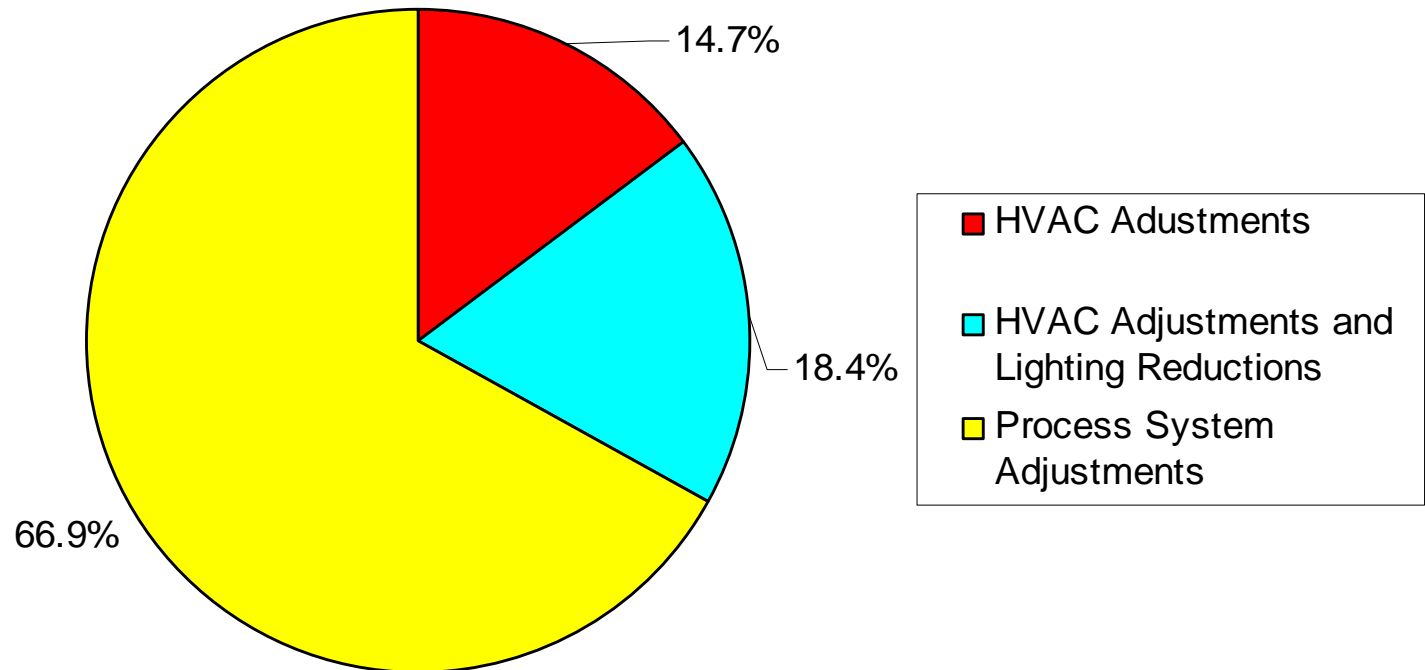
Estimated kW Demand Reductions by Industry Type



Source: Global Energy Partners

PG&E Auto-DR Participant Makeup (cont.)

Estimated kW Demand Reductions by Type of DR Measure

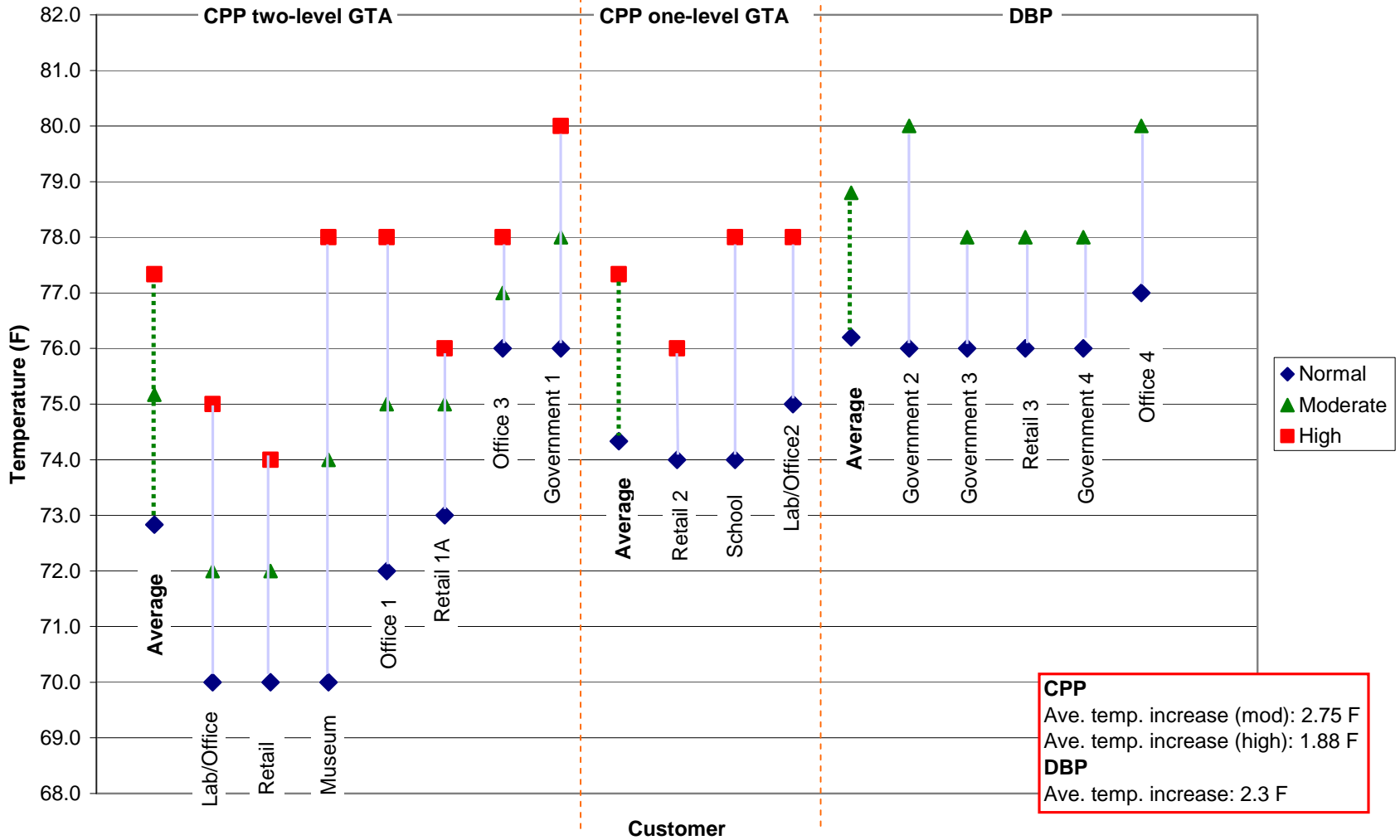


Source: Global Energy Partners

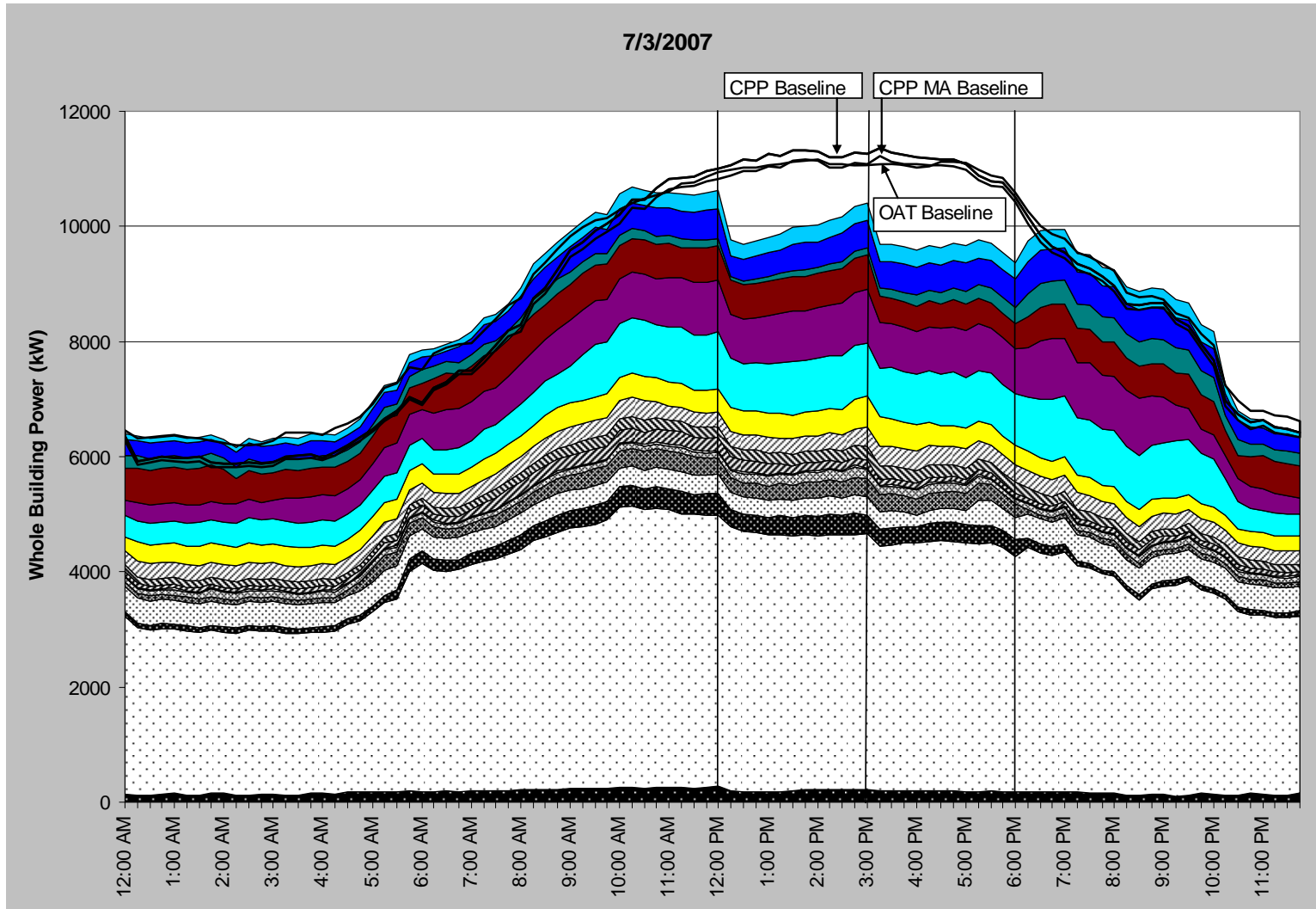
DR Strategies

	Building use	HVAC											Lighting					Other
		Global temp. adjustment	Duct static pres. decrease	SAT Increase	Fan VFD limit	CHW temp. Increase	Fan qty. reduction	Pre-cooling	Cooling valve limit	Boiler lockout	Slow recovery	Extended shed period	Common area light dim	Office area light dim	Turn off light	Dimmable ballast	Bi-level switching	Non-critical process shed
ACWD	Office, lab	X	X	X		X			X	X		X						
B of A	Office, data center		X	X	X	X			X									
Chabot	Museum	X						X										
2530 Arnold	Office	X									X							
50 Douglas	Office	X									X							
MDF	Detention facility	X																
Echelon	Hi-tech office	X	X	X			X					X	X	X	X			
Centerville	Junior Highschool	X						X										
Irvington	Highschool	X						X										
Gilead 300	Office			X														
Gilead 342	Office, Lab	X		X														
Gilead 357	Office, Lab	X		X														
IKEA EPaloAlto	Furniture retail	X																
IKEA Emeryville	Furniture retail	X																
IKEA WSacto	Furniture retail																	
Oracle Rocklin	Office	X	X															
Safeway Stockton	Supermarket																X	
Solectron	Office, Manufacture	X												X				
Svenhard's	Bakery													X				X
Sybase	Hi-tech office													X				
Target Antioch	Retail	X					X											
Target Bakersfield	Retail	X					X											
Target Hayward	Retail	X					X					X					X	
Walmart Fresno	Retail	X															X	

Global Temperature Adjustment

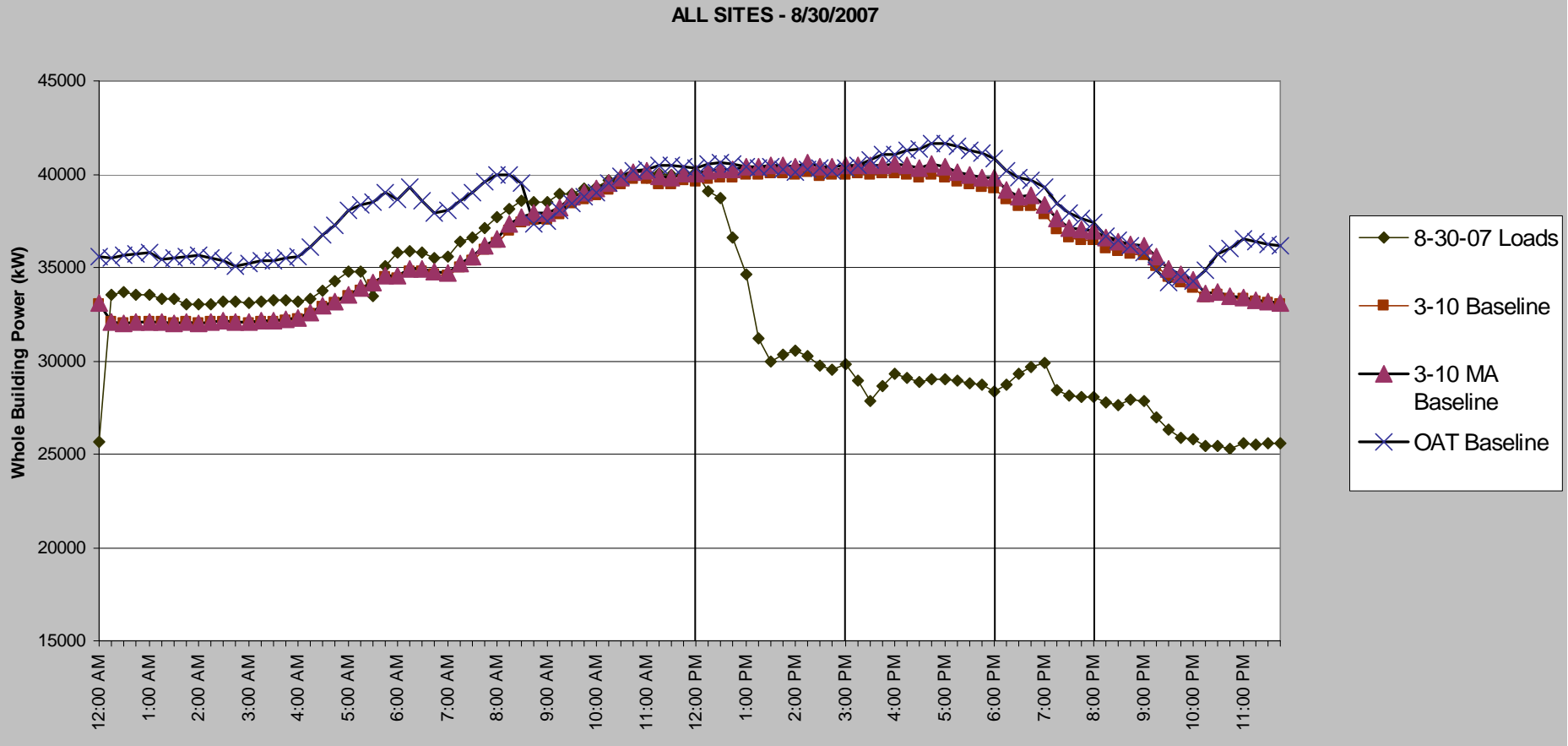


Load Shape for July 3rd CPP Event



Source: Global Energy Partners

Load Shape Impacts for August 30th Event



Source: Global Energy Partners

Technical Coordination Concept

- Initially hand-holding customers through the automation process including DR strategy development and technology integration done by LBNL researchers.
- Identified as an important role for successful commercialization.
- Control vendors identified as ideal candidates.
- Tested with the Demand Response Integration Services Company (DRISCO) concept in 2006
- Utilized in 2007 Auto-DR (Hands-on vs. Hands-off)

PG&E's Technical Audit/Technology Incentives

\$300/kW distributed as:

- Up to \$40/kW for Recruitment
- Up to \$140/kW for Installation of hardware and/or software to Auto-DR enable the sites
- Up to \$70/kW for Technical Coordination (TC)
- \$50/kW payment to the customer

The recruitment and installation costs are paid using an estimate demand reduction.

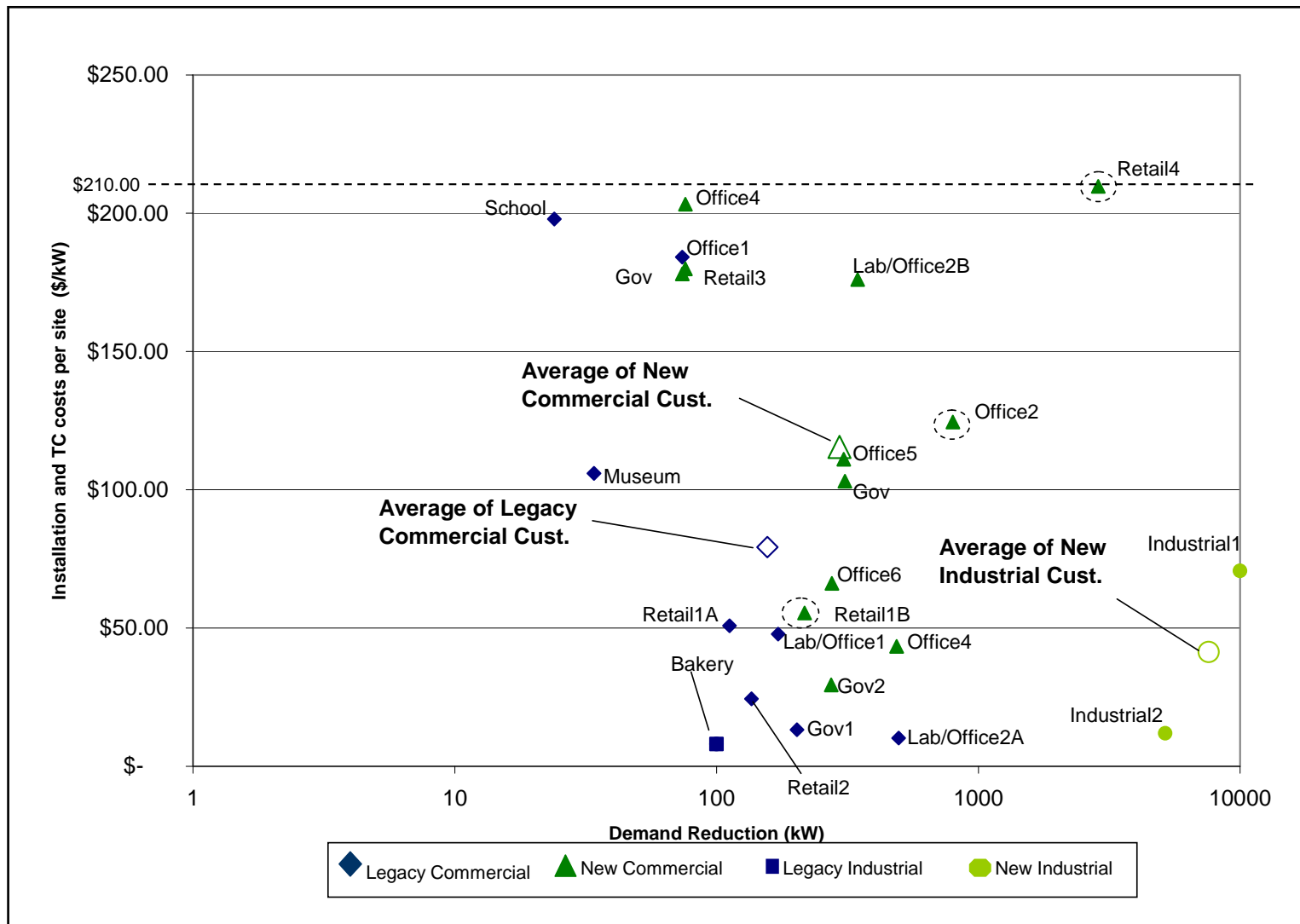
Parts of TC (30%) and customer (50%) payments are paid using their actual demand reduction.

Technical Coordination Costs for 2007 Auto-DR

TC Firm	kW Enabled	\$/kW	Number of Sites	DR Program			Client	
				CPP	DBP	CPP & DBP	CLIR	WS Client
TC1	2982	29	41	17	22	1	15	2
TC2	15175	4	3		3		3	
TC3	1568	42	13		12		3	1
TC4	2874	70	25		25			1
Total	22599	19	82	17	62	1	21	4

Customer Type	Shed (kW)	TC hours	Hr/kW
All Customers	22642	2159	0.10
New Industrial	15175	449	0.03
New Commercial	6116	1637	0.27
Legacy Industrial	100	5	0.05
Legacy Commercial	1251	68	0.05

Installation and TC Costs for 2007 AutoDR



Installation and TC Cost Summary

Customer Type	All Customers (N=82)	New Industrial (N=2)	New Commercial (N=66)	Legacy Industrial (N=1)	Legacy Commercial (N=13)
Shed (kW)	22642	15175	6116	100	1251
TC Cost (\$)	\$357,075	\$59,021	\$286,215	\$800	\$11,039
Installation (\$)	\$1,390,240	\$709,706	\$629,878	\$0	\$50,656
Av. TC \$/kW	24	5	35	8	12
Min. TC \$/kW	-	3	4	8	-
Max. TC \$/kW	70	7	70	8	47
Med. TC \$/kW	11	5	32	8	9
Av. Inst. \$/kW	69	37	88	-	67
Min. Inst. \$/kW	1	5	33	-	1
Max. Inst. \$/kW	187	68	180	-	187
Med. Inst. \$/kW	71	37	94	-	45
Av. Total \$/kW	96	41	123	8	79
Min. Total \$/kW	8	12	29	8	10
Max. Total \$/kW	210	72	210	8	198
Med. Total \$/kW	71	41	118	8	49

Conclusion – TC

- TCs have been instrumental in achieving Auto-DR goals for 2007.
- TA/TI fund distribution was sufficient to fund TC activities.
- Hands-on TC Firms' involvement in installing and configuring the Auto-DR systems may lead to efficiency in installation and reduction in overall costs. It leads to education of controls vendors in the field on DR issues and strategies.

The long term vision is to embed the automation clients into control systems and DR shed modes into new construction for inclusion in building codes.

2008 Auto-DR Expansion

- **Pacific Gas & Electric**
 - 8 MW of new goals for 2008 with \$3.5 million of new funding
 - Auto-DR to be extended to a program with aggregators
 - \$200/kW for Installations, \$60/kW to TCs and \$40/kW to Customers
- **Southern California Edison**
 - 8 MW of new goals.
 - Auto-DR to be extended to Demand Bidding program
 - Introduction of the TC concept
- **San Diego Gas & Electric**
 - No plans to work with LBNL for 2008
- **Interest from Utilities Outside of California**



DRRC
Demand Response Research Center



Global Energy Partners, LLC
An Employee-Owned Company



Thank you!

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<http://drrc.lbl.gov>