MEETING THE NEEDS OF THE CONSTANTLY CHANGING ENERGY INDUSTRY

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PG&E Automated Demand Response Program

Technical Coordinator Webcast

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Pacific Gas and Electric Company®

Presentation Overview

- Auto-DR definition
- Results of the DRRC pilot efforts with PG&E
- 2007 Auto-DR program summary
- Role of the technical coordinators
  - Steps in the TC process
  - Compensation for the TC firm
  - TC application procedures
- Q&A

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What is Auto-DR?

- **Automated Demand Response can be defined** as fully automated DR initiated by a signal from a utility or other appropriate entity to provide full automated connectivity to customer end-use control systems and strategies.
- **Signaling** – The Auto-DR technology should provide continuous, secure, reliable, two-way communication with end-use customers to allow sites to be identified as listening and acknowledging receipt of signals.
- **Industry Standards** – Auto-DR consists of open, interoperable industry standard control and communications technologies designed to integrate with both common energy management 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 Auto-DR 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.

Summary of Previous Efforts – DRRC/LBNL Research

Auto-DR Technology Concept – "*OpenADR*"

- Open, two-way, interoperable industry standard for automating DR
- Repeatable, reliable, secure, low-cost economic or reliability DR
- Internet based real-time link to energy management systems

Demonstrated in 40 buildings over 4-year period, under commercialization by all three IOUs for 2007

- High reliability for Auto-CPP, continued through 2006 heat wave
- Average peak reductions of 10 to 15% (3 to 6 hour events)
- Greater potential for shorter events

Challenges with CPP Economics

- Low bill savings (less than 1%, avg 3 cents/ft^2)

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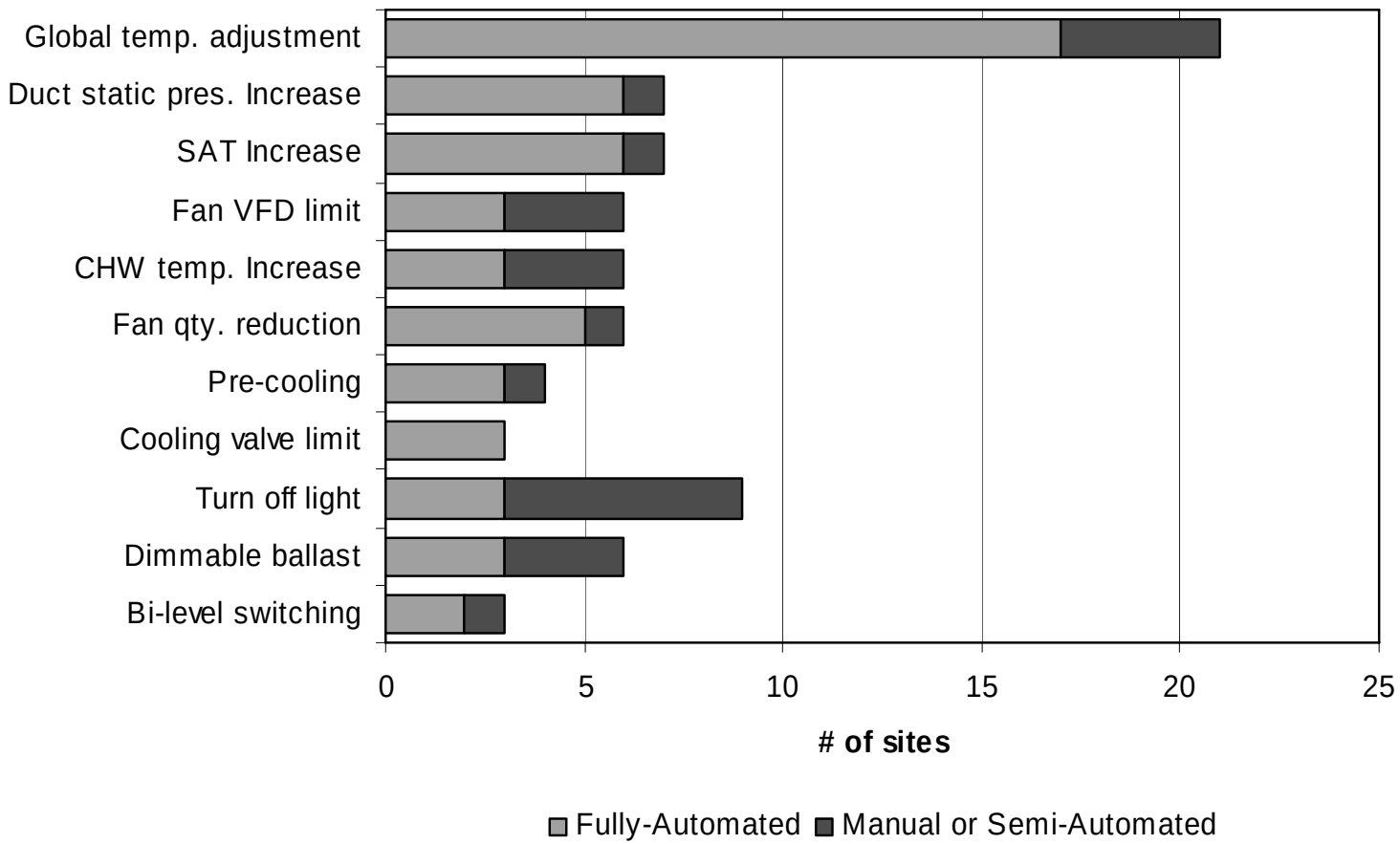
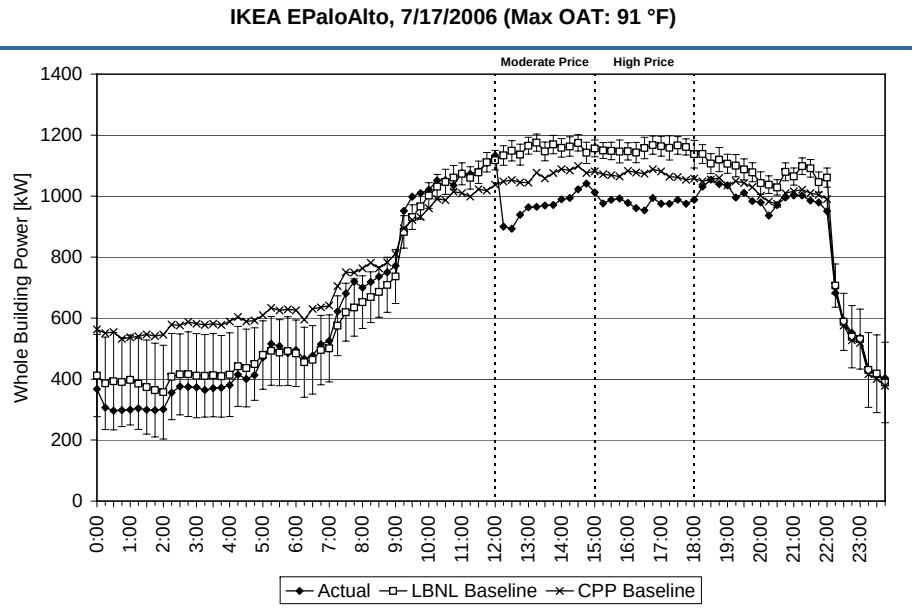
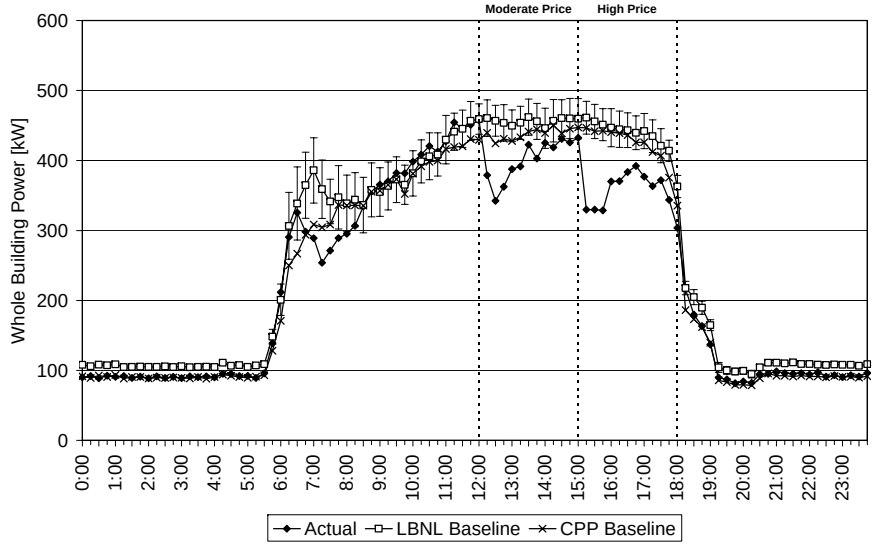
Types of Strategies and Factors Influencing Savings



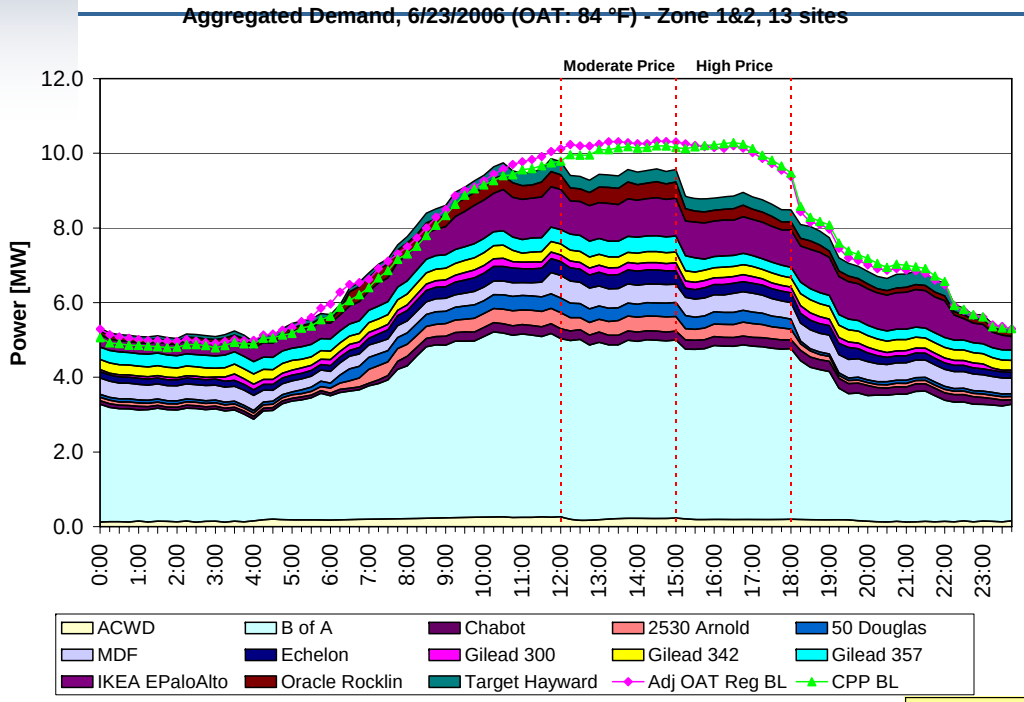
Building factors	System factors	Strategy factors	Weather factors
▪ Building use ▪ Building size ▪ Structure type ▪ Occupancy	▪ HVAC type ▪ Efficiency ▪ Control type ▪ Commissioning	▪ Depth of control ▪ Area% controlled ▪ Curtailment duration	▪ Outside Temp ▪ Humidity ▪ Solar radiation

Sample Results from 2006



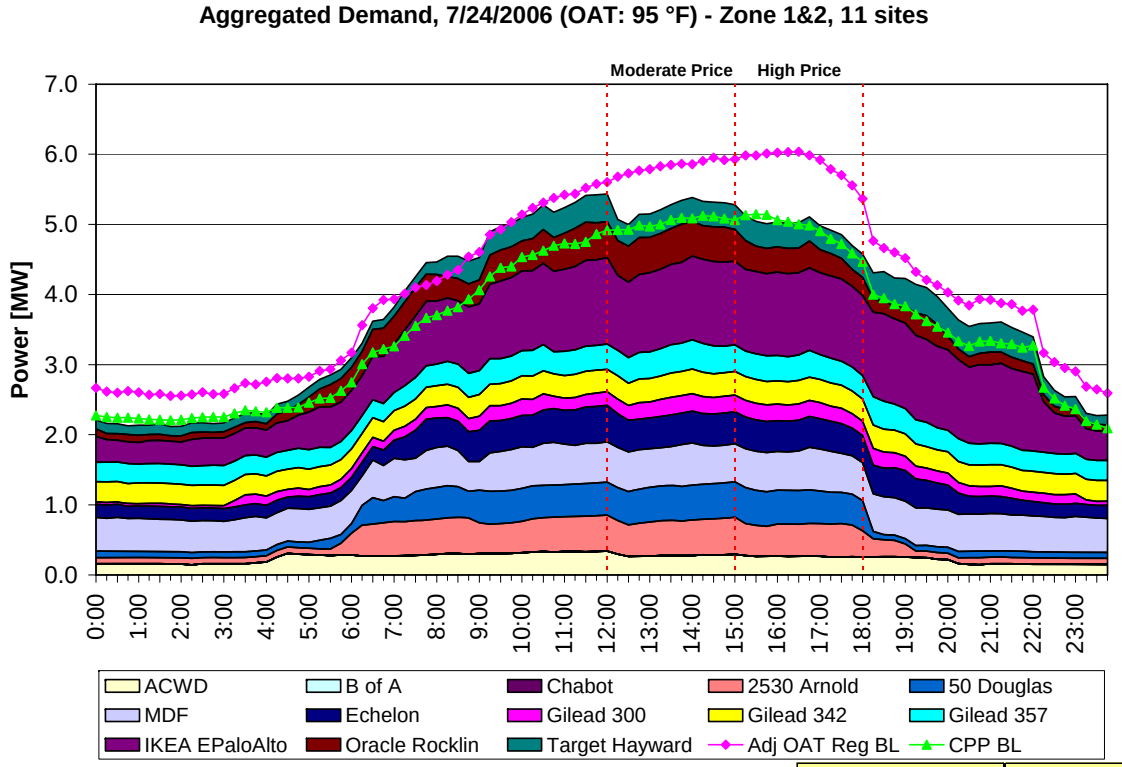


Aggregated Results – June 23, Avg Max Temp 84 F, Zone 1 and 2 OAT and CPP Baselines show similar results



	Average kW		Average %		Average W/ft²	
	Moderate	High	Moderate	High	Moderate	High
ACWD	77	95	27%	33%	1.51	1.85
B of A	337	388	7%	8%	0.48	0.55
Chabot	-36	-43	-17%	-22%	-0.42	-0.50
2530 Arnold	78	113	17%	25%	0.59	0.86
50 Douglas	59	92	14%	23%	0.66	1.02
MDF	-75	1	-17%	0%	-0.44	0.01
Echelon	29	118	7%	31%	0.38	1.57
Gilead 300	19	16	9%	8%	0.23	0.19
Gilead 342	62	77	18%	22%	1.94	2.39
Gilead 357	-14	44	-3%	12%	-0.42	1.32
IKEA EPaloAlto	137	120	12%	11%	0.46	0.40
Oracle Rocklin	23	101	5%	26%	0.23	1.01
Target Hayward	53	52	13%	13%	0.41	0.40
Aggregated	748	1172	7%	12%	0.38	0.59

Aggregated Results – July 24, Avg Max Temp 95 F, Zone 1&2 ISO Peak Day - OAT and CPP Baselines show different results



	Average kW		Average %		Average W/ft²	
	Moderate	High	Moderate	High	Moderate	High
ACWD	87	133	24%	33%	1.70	2.60
2530 Arnold	56	99	10%	18%	0.43	0.76
50 Douglas	16	57	3%	11%	0.18	0.64
MDF	72	127	11%	18%	0.42	0.73
Echelon	51	84	10%	16%	0.68	1.12
Gilead 300	20	14	8%	6%	0.24	0.16
Gilead 342	12	21	3%	6%	0.37	0.66
Gilead 357	77	35	16%	8%	2.33	1.06
IKEA EPaloAlto	82	93	7%	7%	0.27	0.31
Oracle Rocklin	33	151	6%	31%	0.33	1.51
Target Hayward	98	102	23%	23%	0.75	0.79
Aggregated	605	917	10%	16%	0.51	0.77

Note: No data from B of A

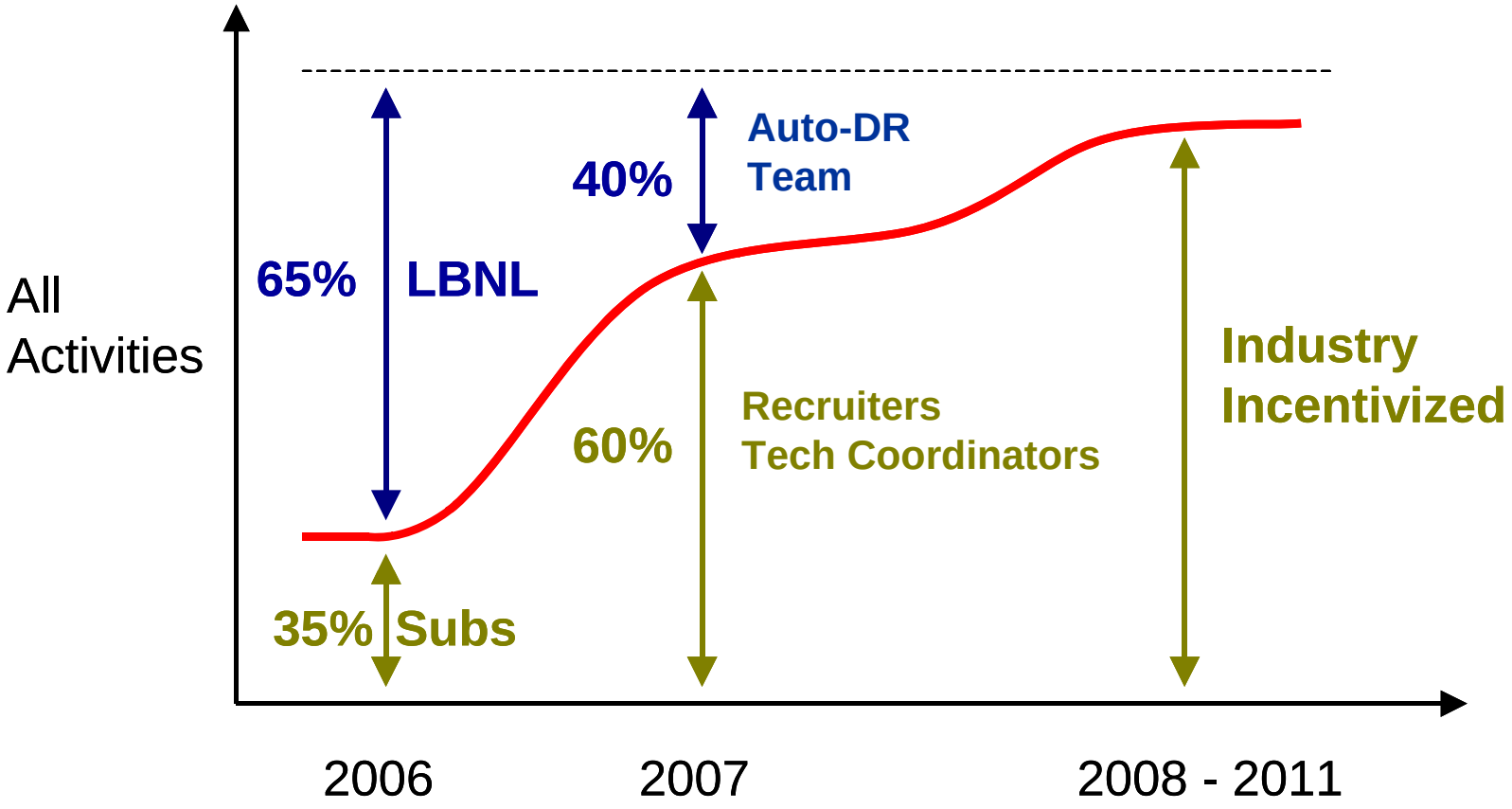
Auto-DR 2007 Program Overview

- Follows proposed plan outlined by PG&E in 8/30/06 letter to CPUC (pp 27-29) and final CPUC decision dated 11/30/06
- Program Goals:
  - Achieve peak demand reduction of 15 MW
  - Improve DR program effectiveness through automation
  - Commercialize Auto-DR program delivery
- Auto-DR program focus for 2007 limited to customers on Critical Peak Pricing (CPP) and/or Demand Bidding (DBP) programs

Auto-DR Program – Core Team

- Program administrator and prime contractor to TC firms
- Primary research, technical advisor, training, quality assurance, system validation and evaluation
- Auto-DR system architecture and hardware design and production
- Technical training, qualification, quality assurance and system validation
- Technical training and coordination

Auto-DR Commercialization Plan



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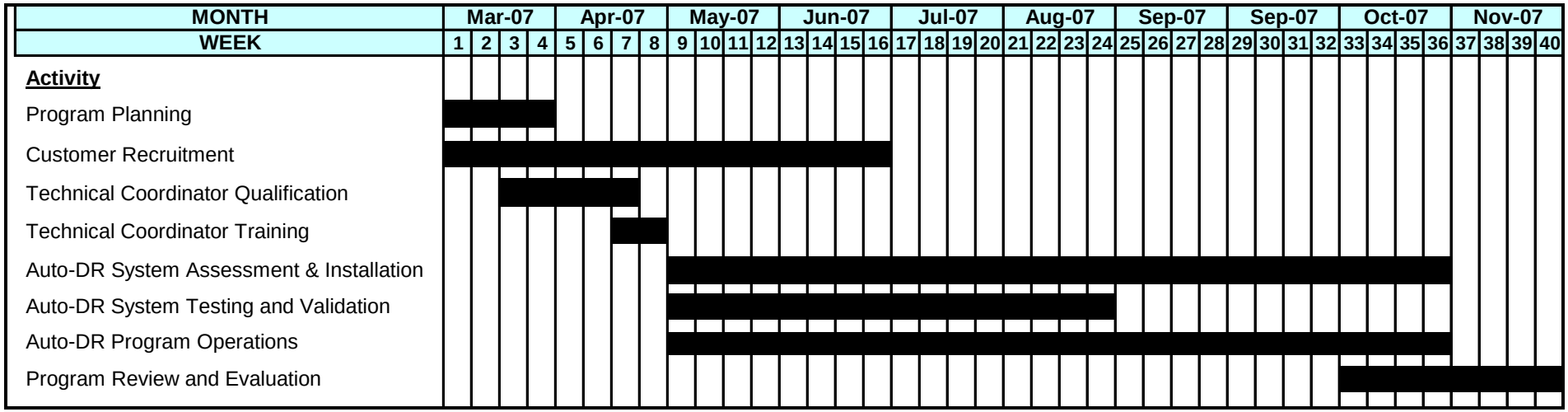
Auto-DR Program Schedule



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Role of PG&E's TA/TI Program

- Key to the success of 2007 Auto-DR program lies with the use of additional TA/TI funds as a vehicle for enhancing participation
- New program structure allows for a variety of incentives to be paid over and above the financial incentives that the customer receives through CPP or DBP tariffs
- Incentive elements include:
  - Customer recruitment
  - Technical coordination (TC)
  - Hardware (CLIR box)
  - Installation and programming
  - Customer participation incentive

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Auto-DR Program – Incentive Elements

- Customer Recruitment:
  - $40/kW
  - Recruiter paid upon delivery of signed Customer Participation Agreements (CPAs)
  - CPA includes load reduction estimate developed by GEP
- Technical Coordination (TC):
  - $70/kW
  - TC firms must be pre-qualified by GEP to be eligible
  - TC firm to be under contract to GEP
  - TC stays with customer through DR season
  - TC achieves performance milestones
- Hardware (CLIR box)
  - Free of charge to the customer
- Installation and Programming
  - $60/kW
  - Paid directly to the customer
- Customer Participation Incentive
  - $50/kW
  - Customer achieves performance milestones

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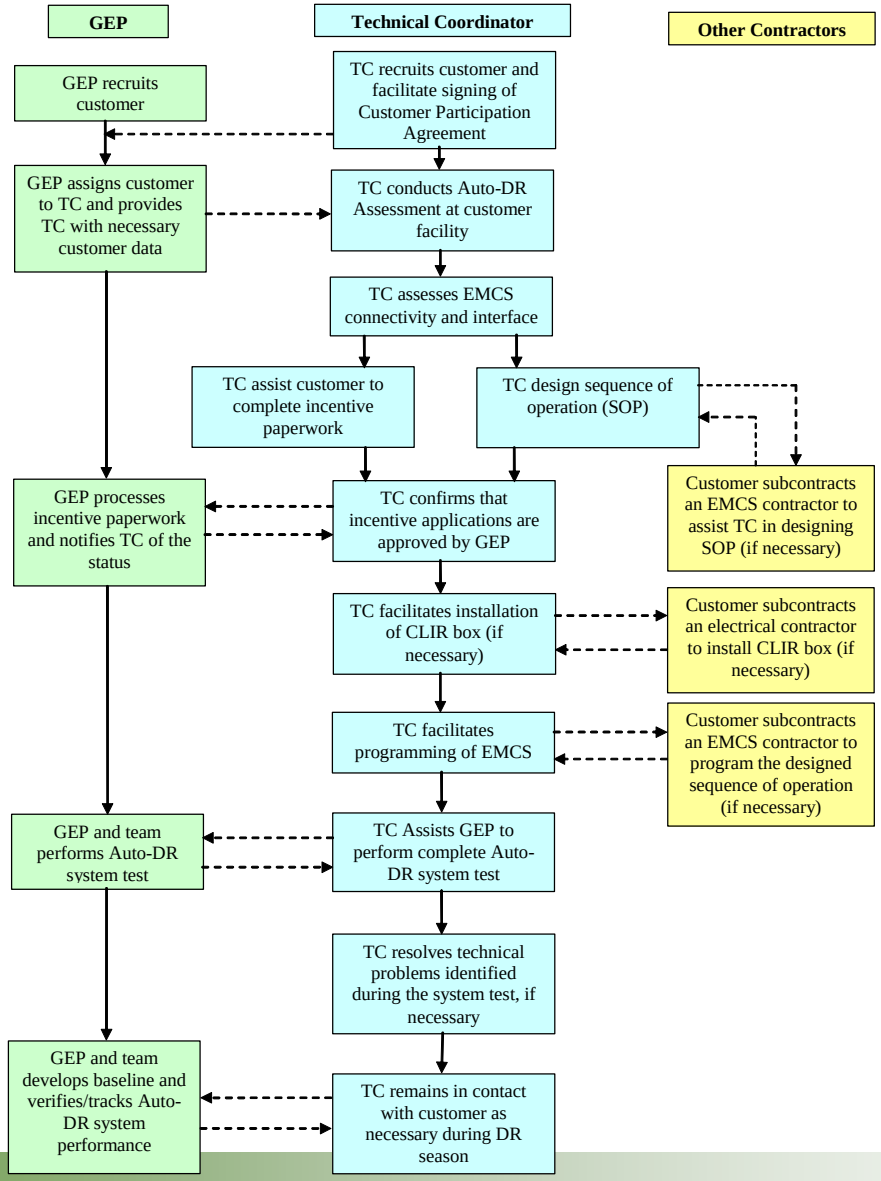
TC Process Diagram



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TC Role and Responsibilities

1. Undergo training
   - 2-day training planned for April 23-24 in San Ramon
2. Contact customer
   - GEP will assign customers to TCs (unless the TC recruited the customer) and provide TCs with information collected from the customer during the recruitment process
   - TC will contact facilities manager and explain the scope of the TC's involvement in the 2007 Auto-DR Program
   - TC will explain necessary steps to enable Auto-DR at the customer's site, including specifications for installation of the Auto-DR technology

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TC Role and Responsibilities (cont.)

3. Conduct Auto-DR assessment

- GEP will provide TC with the recommended load shed strategies and estimates of potential kW reduction
- TC will verify Auto-DR load shed strategies that are suitable for the site. TC will address the following questions:
  - Are the strategies recommended for the customer feasible?
  - Is there potential to meet the load shed objectives?
  - Are any other automated strategies suitable for the site?
- TC will verify potential kW reduction due to recommended load shed strategies
  - This may require the TC to come up with their own demand reduction estimates
- TC will assist customer to understand the recommended load shed strategies

TC Role and Responsibilities (cont.)

4. Assess EMCS connectivity and interface
   - TC will assess the EMCS connection to internet, and determine firewall/proxy considerations (if necessary)
   - TC will determine how DRAS will interface with the EMCS (via CLIR box in most cases)
   - TC will determine requirements for installing CLIR box, if necessary, including needs for contracting an electrician and/or the facility's in-house staff to perform the installation
5. Assist the customer to complete Auto-DR incentives paperwork (this activity should start as soon as possible)
   - TC will assist the customer to complete and submit all required incentives paperwork to GEP
   - The installation of Auto-DR equipment cannot proceed before the incentive applications are approved by GEP

TC Role and Responsibilities (cont.)

6. Design sequence of operation

- TC will design automated sequence that is suitable for programming into the site's EMCS in order to implement the recommended load shed strategies. If necessary, the customer will subcontract an EMCS contractor to assist the TC in the design of the sequence of operation.
- TC will test system operation and response based on designed and approved sequence
- TC will assess requirements for programming the sequence into the EMCS, including needs for contracting an EMCS programming contractor

TC Role and Responsibilities (cont.)

7. Facilitate programming of EMCS to implement the automated sequence of operations
   - TC will facilitate and assist the customer in programming the EMCS. If customer does not have in-house expertise, the customer may need to subcontract with an EMCS programming contractor (or the TC) based on the sequence of operations requirements.
   - If a programming contractor is involved, then the TC will:
     - Review required sequence of operations with contractor
     - Explain need for EMCS to interface with DRAS (typically via CLIR box)
     - Obtain proposal from contractor; check for completeness
     - Confirm method of payment to the contractor (e.g. the customer pays the contractor or GEP pays contractor directly)
     - Verify that the contractor adequately completes the task

TC Role and Responsibilities (cont.)

8. Facilitate installation of the CLIR box (if necessary)
   - GEP (through Akua) will provide CLIR box, and TC will ensure delivery of CLIR box to the customer
   - TC will facilitate and assist the customer with installation via electrician (customer's in-house staff, subcontract with TC, or another subcontractor)
   - If an electrician is contracted, the TC will verify that the electrician adequately completes the task
   - TC will confirm correct communication between the CLIR box and DRAS

9. Assist GEP to perform Auto-DR system test
   - Objective is to make sure that the automated sequence of operations was properly implemented and can deliver load reduction
   - These tests will be conducted remotely by GEP, but the TC will perform spot visits on a subset of sites during the test to verify and validate system functionality
   - If necessary, TC shall resolve technical problems identified by these tests through return visits to the customer site

TC Role and Responsibilities (cont.)

10. Remain in contact with customer and provide any necessary technical support as needed during the DR season
    - Technical problems that arise during the DR season may require the TC to make return visits to the customer site

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TC Compensation

- Compensation Amount = $70/kW
- Payments based on milestones achieved
- Performance milestones:

  #1: Upon acceptable submittal of TI customer incentive application → $20/kW estimated demand reduction

  #2: Upon successful testing of Auto-DR equipment → $20/kW estimated demand reduction

  #3: Upon successful completion of DR season → $30/kW average demand reduction based on measured performance

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TC Application Procedures

- Step 1: Submit email to Greg Wikler of GEP at gwikler@gepllc.com indicating interest in receiving the TC application package
- Step 2: TC application packages will be sent by email to interested firms on Wednesday March 21
- Step 3: Responses due to GEP on Friday March 30, 5PM PDT
- Step 4: Short listed applicants informed by Friday April 6th
- Step 5: Short listed applicant phone interviews Week of April 9th
- Step 6: Final TCs selected and informed by Friday April 13th

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Thank You!

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