

**SWEEP/SRP 2005 REGIONAL
COOPERATION WORKSHOP
“UPDATE ON CENTRAL AIR
CONDITIONER PROGRAMS”**

**PACIFIC GAS AND ELECTRIC’S H.V.A.C.
QUALITY INSTALLATION PROGRAM**

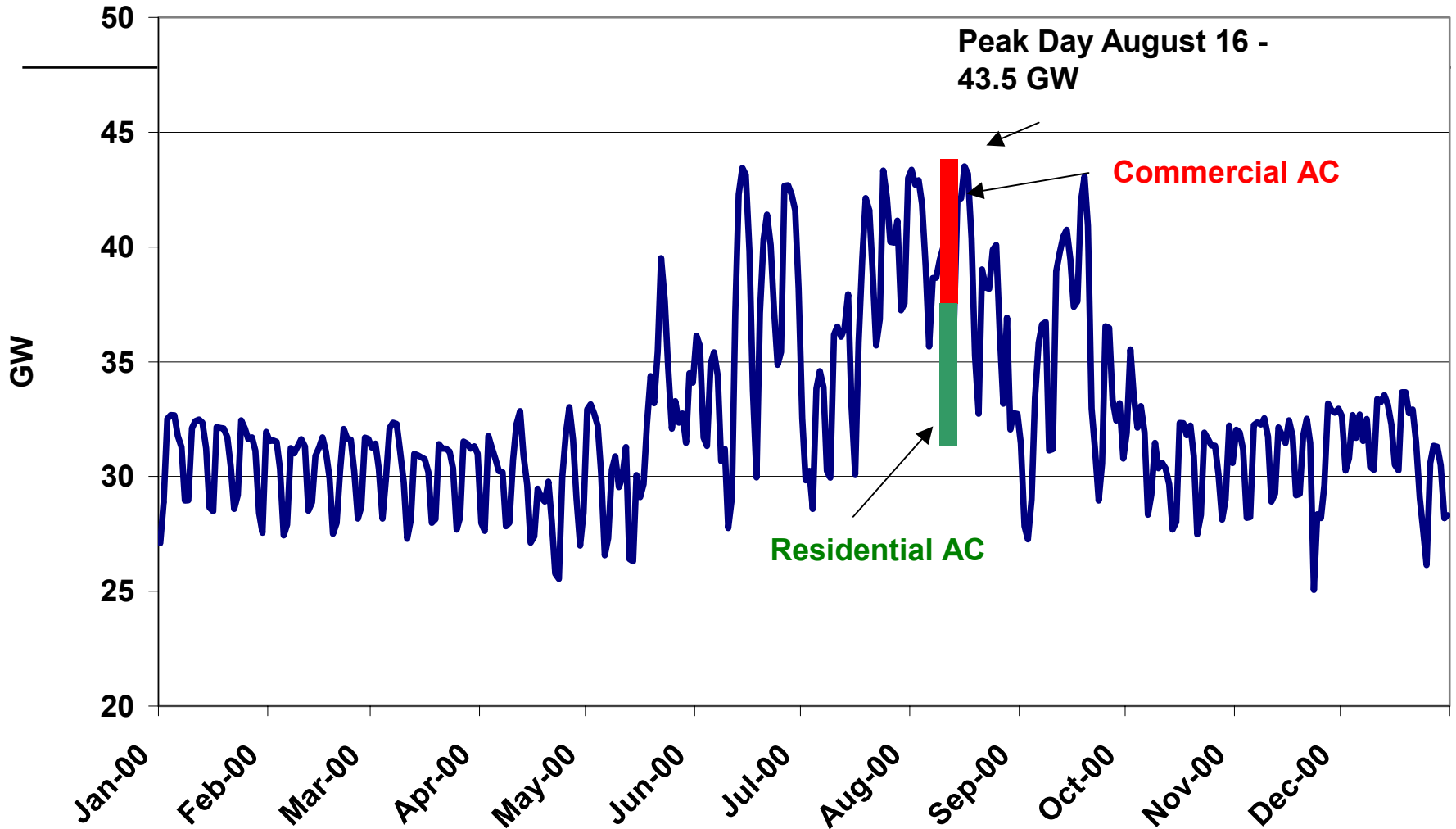
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November 4, 2005

PG&E is Committed to Energy Efficiency

- California Energy Action Plan
 - Aggressive focus on energy savings as a resource
 - Integrated energy efficiency, demand response and self-generation efforts
- 2006-2008 Energy Efficiency Program
 - Nearly a Billion Dollars, Largest Per-Capita ever
- Summer Peak Electric Profile
 - Air Conditioning a major contributor

Cal ISO Daily Peak Loads

January 1, 2000 - December 31, 2000



Air Conditioning Efficiency

- Equipment
 - Incentives for Air Handlers, High SEER/EER Systems, “Compressorless Cooling”
- Quality Installation (Q/I)
 - Critical to Delivered Efficiency
 - Up to 35% in Losses if Not Addressed
 - Past, Present and Future Programs
 - Systems Approach
 - House as a System
 - HVAC System as a System

Compiled Research: Q/I Impacts on Air Conditioning Efficiency

Installation-Related Problem	Percent of Homes with Problem	Savings Potential
Duct Air Leakage	70%	17% Ave.
Inadequate Air Flow	70%	7% Ave.
Incorrect Charge	74%	12% Ave.
Oversized by 50% or more	47%	2-10%

Field Adjusted SEER (Leon Neal, Advanced Energy)

DOE Rated SEER 13, is Really:

SEER 10.2 if Undercharged 20%

SEER 9.7 if Undercharged 20% and
Incorrect Airflow

SEER 10.3 if Ducts Leak

SEER 7.7 if Charge, Airflow and Ducts
are Issues

SEER 7.0 if Charge, Airflow, Ducts and
Oversizing are Issues

HVAC Quality Installation

The “DUCT ISSUE”

- Typical Duct Leakage is 22% of total system fan flow according to CEC Title 24 new construction assumptions based on LBNL- and Utility-sponsored research
- Duct leaks typically increase energy use from 25% to 40%
- Tight Ducts leak less than 6%

PG&E's 2000/01 Quality Installation Programs

Residential Contractor Program (RCP)

Contractor Based Delivery

- ❑ **Authorized 1-Year Program**
- ❑ Upstream focused program using contractors as the primary delivery channel
 - Duct test and seal, A/C and H/P Diagnostic and tune-up, HVAC incentive, Insulation packages, windows and lighting

PG&E's 2002/03 Equipment Based Programs

Consumer Incentive Program

- ❑ **Authorized 1-Year Program**
- ❑ Substituted a Residential Single and Multi-family based incentive program to promote high efficiency products. The upstream RCP design and quality installation program was suspended.
- ❑ Incentive protocol mirrored the CEE recommended 3-Tier level design.

PG&E's 2004/05 Combined Program

Consumer and Contractor Incentive Programs

- ❑ **Authorized as a 2-Year Program**
- ❑ **Blended Incentive Delivery:**
 - ❑ **Consumer “Downstream Incentives”**
 - ❑ Incentive for various HVAC equipment – using the current CEE product guidelines - consumer driven – delivered downstream
 - ❑ **Contractor “Midstream Incentives” (Pilots)**
 - ❑ Charge and Air-flow
 - ❑ Duct test and seal

California and Federal Standards Influence Future Program Design

- Title 24 – Residential Energy Standards, effective October 1, 2005 Climate Zone Driven
 - Focus on Existing Home HVAC “Changeouts”
 - New to HVAC Contractors
 - Market segment unfamiliar with Title 24
 - Duct Sealing Requirements
 - Third-party Verification: HERS Raters as “Special Inspectors”
 - On-Site Verification of Efficiency: Ducts, Shell Infiltration, Charge, Air-flow, Insulation

- Federal Standards
 - Minimum equipment standard 13 SEER
 - Tax Credits for high efficiency equipment:
 - ECM Furnace Fan = \$50
 - Furnace AFUE 95% or more = \$150
 - Central A/C SEER 15, EER 12.5 = \$300

PG&E's 2006 Incentive Programs

Blended Incentive Delivery (10/13/05 Draft)

- ❑ Authorized as a 3-Year Program ('06 HVAC= \$23 mil; 70% Q/I)
- ❑ **Residential Consumer Incentives:**
 - ❑ **Equipment:**
 - ❑ Gas Furnaces: 90 AFUE=\$200, 92 AFUE=\$300, 94 AFUE=\$400
 - ❑ Variable Speed Motors: \$50 (any approved furnace efficiency)
 - ❑ Packaged Terminal Air Conditioner: \$200
 - ❑ Room A/C: Recycling \$25; Qualifying Unit: \$50
 - ❑ Whole House Fans: \$100
 - ❑ Evaporative Coolers: \$300 (single stage, whole house, high efficiency)
 - ❑ **Quality Installation:**
 - ❑ Duct Sealing: Tune-Up: \$350; Retrofit with Standard Equipment: \$350, with high efficiency equipment: \$600
- ❑ **Contractor Quality Installation Incentives:**
 - ❑ Charge and Air-flow (through Verification Service Provider only)
 - ❑ Duct Test and Seal: Tune-Up or Retrofit with Standard Equipment or Retrofit with High Efficiency Equipment: \$200 (\$100 for the test in + \$100 for the test out = \$200)

Upstream Distributor Equipment Incentives (DRAFT)

- Matched, Split System, ARI Listed SEER 14, EER 12
- Climate Zones 11,12,13
- \$150 to Distributor
- \$ 24 to Contractor (to process Card)
- \$ 50 to Customer (to return Card)

kW / kWh Savings

- Refrigerant Charge and Airflow - .22 / 139
- Duct Test & Seal - .15 / 99
- SEER 14, EER 12 split w/TXV - .52 / 337
- SEER 14, EER 12 pkg. w/TXV - .51 / 661
- VSM - .26 /180
- Climate zone restrictions do apply for RCA, A/C and VSM
- If a system is installed and services are performed the savings are aggregate - example:
- Total net kWh = $139+99+661+180 = 1079$

Lessons Learned

Four Basic Areas:

- ❑ Patience
- ❑ Education and Training
 - ❑ CONSUMER
 - ❑ CONTRACTOR
- ❑ Clarification of Options
 - Better explanation in simple terms
- ❑ Follow-up and surveys
 - Timely information to adjust program
(Measurement & Evaluation)

PG&E Education and Training Programs

Web site - www.pge.com/stockton

Residential Energy Efficiency
Education and Training
Since 1978

Longest Continuously
Operating Energy Center of its
Kind in the United States



Measurements of Success

- Level 1,2,3 Evaluations
 - End course evaluation (2005 average: 87.38%)
 - Pre/Post testing (2005 Improvement 43.98%)
 - Impact studies
- Quantity Measures
 - Number of sessions (2005: 359 so far)
 - Number of participant-days (2005: 7,837 so far)
- Action Plans (2006)
- Energy Savings (No Silver Bullet, just BB's)

Energy Training Center – Stockton

Impact Study Results: 1999 - 2005

- PG&E Energy Efficiency Training Survey (March 1999)
 - 78% of attendees changed work practices in way that generating energy savings
 - 83% of attendees shared their knowledge
- Stockton Training Center – Energy Efficiency Training Study (January 2000)
 - 53.6% of respondents have changed work practices
 - 82.8% of respondents have shared knowledge with one or more professional contacts
- The Market Effects of the Energy Training Center – Stockton (December 2000)
 - *Influence of ETC on HVAC practices*
 - From 25% to over 40% of the firms reported changing their practices.
 - 70% or more cited the ETC as the main reason
- The Market Effects of the Energy Training Center – Stockton (cont'd)
 - *Influence of ETC on duct practices*
 - Between 6% and 51% of firms changed practices
 - 65% cited the ETC as the main reason
 - Evaluation of the 2002 Statewide Education, Training and Services Program (October 2003)
 - Over half of upstream market actors changed their behaviors: how they specify energy-efficient products and how their business positions itself to specify energy efficiency
 - Evaluation of the 2003 Statewide Education and Training Services Program (June 2005)
 - 64% of participants feel the course information will influence future purchase decisions
 - 8 out of 10 participants better understand how to improve efficiency more likely to specify energy-efficient options in the future

Upstream Training Influence Multiplier

Course Category	Students	#Contacts per year per student	#Customer Influence Opportunities
Energy Partners	542	250x2=500	271,000
Res HVAC	326	250x2=500	163,000
RCP	1720	250x2=500	860,000
Sierra Energy Center	150	50x1=50	7,500
Industrial Seminars	493	50x1=50	24,650
CEE Incentive Presentation	1800	50x1=50	90,000
NCEM Res Title 24	1117	250x2=500	558,500
NCEM Non-Res Title 24	859	250x2=500	429,500
CIP	79	250x4=1000	79,000
CCC/CSD	359	250x4=1000	359,000
		Total	2,842,150

PG&E Education and Training: HVAC Quality Installation Programs



PG&E Education and Training:

HVAC Quality Installation Training Programs:

- 1991-1993 Appliance Doctor and Heat Pump Doctor
- 1992 Model Energy Communities Program
- 1991-2001 Community Services Department (CSD) Weatherization Crew Training
- 1992-2001 PG&E Comfort Home Program
- 1999-2001 Residential Contractor Program
- 2001 Energy Partners Rapid Deployment Duct Testing and Sealing Training Program
- 1998-2005 CEC Title 24 Contractor Training Partnership Program

Conclusions

❑ **Benefits of Overall Design**

- **Capture all of the potential energy savings associated to the equipment and the installation.**
- **Eases the market transition to Quality Installation by providing rebates**

❑ **Training and Education**

- **Contractors**
- **Education of Consumers to Move the Market**

“If you think education is expensive, try ignorance...”