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Emerging Technologies Program

Application Assessment Report #0510

Evaporative Cooling Market Assessment

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I. Executive Summary

Advanced evaporative cooling, when deployed in areas with hot dry climates, offers the promise of significant energy savings over alternative heating, ventilation, and air conditioning (HVAC) systems. Yet interest in Pacific Gas and Electric (PG&E) Company's rebate program for advanced evaporative coolers has declined since it was launched in 2002, during the California energy crisis. This report, Evaporative Cooling Market Assessment, was undertaken to provide advice on improving the rebate program's effectiveness. Research into past studies and interviews with a variety of groups resulted in findings about the evaporative cooling market and PG&E's rebate program and some recommendations.

Evaporative Cooling Market—Key Findings

- Evaporative Coolers (ECs) hold great promise for energy savings in northern California. They use approximately 50% less energy than air conditioning, and with new advances in design can effectively cool a house on all but the very hottest and most humid days. Nevertheless, sales have been flat. Eighty percent of all sales for ECs nationwide are for replacement units while the adoption rate for central AC continues to increase briskly.

- ECs face a number of significant challenges, including:
  - Image—They are still referred to as "swamp coolers," in reference to the unpleasant, swampy odor associated with poor water maintenance.
  - Few customers have practical experience with how effectively ECs can cool.
  - Aesthetics—ECs are viewed as unsightly, with many communities prohibiting roof top installations through the adoption of restrictive covenants, conditions, and restrictions (CC&Rs).

- EC customers are highly price-sensitive. Traditionally they have been of middle- to low-income, include renters and homeowners, are likely to live in older homes, in mobile homes or be retirees on a fixed income. The main reasons they install EC over air conditioning (AC) is to reduce their upfront investment and to reduce their ongoing monthly energy bills.

- "Big Box" retail stores, including Home Depot and Lowe's, have a tremendous impact on the market and sell 65-80% of all ECs. They overwhelmingly carry and sell Aspen-type units, favoring items that are proven biggest sellers. Due to low demand, they currently carry few, if any, EC systems that qualify for PG&E's rebate.

PG&E Evaporative Cooling Rebate Program—Key Findings

- PG&E's rebate program is much more selective than programs run by other utilities with the result that the overwhelming majority of customers do not buy products eligible for a PG&E rebate. The current rebate program probably does not positively affect technology adoption.

- PG&E restricts rebates to rigid media, roof-mounted systems. Such systems represent the 'Cadillac's' of EC systems in a market where most EC buyers are choosing the least expensive option. In contrast, other utilities, such as PacifiCorp and Xcel, provide rebates for any kind of EC, including those that use thin Aspen pads and those that are window-mounted.

- The systems that meet PG&E requirements are much more expensive than those that qualify in other geographies. Survey respondents repeatedly noted that the PG&E rebate does not provide enough of a financial incentive to adjust for the price premium and installation. Furthermore, to assume that an installation will qualify for a rebate is risky, since 40% of customers that applied for rebates in 2004 had their applications rejected.

- The current rebate has a very low participation rate. Less than .5% of EC customers in PG&E territory have received a rebate.

Recommendations—Strongly consider revising the rebate program to include:

- A special incentive to encourage current Aspen roof-mounted EC users to upgrade to rigid media systems. Due to the increase in weight and size of the system, one estimate is that it costs about $800 more to go from Aspen pads to rigid media. The rebate amount would need to be larger than current levels to incent this change in purchasing behavior.

- A special rebate to encourage central AC users to install EC. PG&E should consider actively marketing to this segment.

- Reduce the price of qualified rebated units by minimizing the required extras such as ducting and the water management system. Each of the additional requirements has technical merit but add to the cost and complexity of the system and further discourage participation. Alternatively, PG&E could encourage distributors to package these items with EC units and increase the amount of the rebate to cover their costs and installation fully.

- Simplify the rebate process by streamlining the rebate form, clarifying rules, and reducing the amount of information needed to qualify. Make the risk that an applicant's rebate application will be rejected very low.

- The rebate program would also benefit strongly from better outreach and education through public relations and advertising.

- Invest in demonstrations of working EC units at major home and garden shows.

- Distributors and installers have great influence on which systems customers choose. The margins on EC are significantly lower than margins on AC. To compensate for this difference, and also to boost the sales of qualifying units, PG&E should consider

replicating PacifiCorp's strategy of offering an incentive SPIF (Sales Promotion Investment Fund) to retailers and installers that actively sell and install qualified EC units.

II. Study Background

Advanced Evaporative Cooling, when deployed in areas with hot dry climates, offers the promise of significant energy savings over alternative HVAC systems. For the purpose of this report, the term "Evaporative Cooler" (EC) uses the definition commonly used by the market and includes any type of evaporative cooler with the exception of portable units on wheels. Window-mounted units are considered permanent and are included in the definition of evaporative coolers. This category broadly includes coolers with Aspen-type pads or rigid media-type pads and can be window-mounted, roof-mounted, wall-mounted or side-mounted.

Note that this definition differs from PG&E terminology. According to PG&E terminology, "Advanced Evaporative Coolers" are those that achieve .85 or better evaporative effectiveness. Typically, these units use a rigid media. They are also commonly referred to as "two stage" or "single inlet" units. PG&E does not provide rebates for window-mounted units or units that use Aspen pads.

The term "swamp cooler" is a pejorative term commonly used to describe any type of cooler (Aspen pad or rigid media) that uses water for cooling.

PG&E has supported a rebate program for advanced evaporative coolers since 2002 when California was experiencing an energy crisis. At that time, the program met with some success, but interest has diminished over time.

The program rules were initially more liberal, with rebates offered for many types of installations. For example, today's rebate requires units to be ducted. However, the exact definition of "ducted," such as if it includes a minimum required length for ducting, is ambiguous. This has created confusion in which distributors and their customers are unsure about what will qualify for rebates.

In 2004, PG&E issued 282 rebates, and rejected 180 applicants, or close to 40% of all those that applied. These numbers fall significantly below the 1,000 rebates per year needed to meet PG&E's rebate goal. They also fall far short of the subjective goal for the rebate program: "To transform the market to the point where rebates are no longer needed to sustain sales momentum."

The potential impact of installing evaporative coolers (EC) over air conditioning (AC) to address the residential market could be significant. Customers using EC consume approximately 50% less energy than customers using AC.

Other utilities have seen much higher levels of participation for rebates supporting evaporative coolers. At this low level of participation, PG&E is questioning whether rebate resources could be better invested in other more promising technologies.

Figure 1: Potential Savings with EC over AC in Climate Zone 13 (Fresno)

	Potential Reduction in Energy Consumption if EC was Used	Potential Reduction in Energy Consumption at Peak if EC was Used
Households with no cooling today	N/A	N/A
Households with no cooling today who plan to install AC	2,713 kWh/yr	2.99 KW
Households with old style swamp coolers that could upgrade to EC	394kWh/yr	.07 KW
New homes that will have AC and could substitute EC	1,381kWh/yr	1.64 KW
Households with both AC and EC and use EC on all but the hottest days	1,077 kWh/yr	0 (assumes that they run AC on peak hottest days)

(Existing homes are assumed to be 1500 sq. ft. or smaller. New homes are assumed to be 1860 sq. ft. or larger) Source: LBNL Draft Evaluation Report Number 59269, The Performance of Evaporative Coolers in California Climates

The installation of central AC within California has significantly increased over the last 20 years. According to the 2004 California Statewide Residential Application Saturation Study (RASS), "Air conditioning is the peak driver of energy use in California…Air conditioning has grown overall with the biggest change in the type of systems installed. Room and evaporative units are going out of favor while central systems are present in 77% of most dwellings." The RASS study shows that for homes built from 1975-1983, 54% had central AC, and 11-12% had EC or room AC. By contrast, in 2001-2003, 77% of homes had central AC, while 1% had EC or room AC.

Central AC has also come down significantly in price. Installing a new system in an existing home can cost up to $10,000; however; for a home built with air-conditioning-ready ducts and furnace, costs start at about $3,000. Within the San Jose area, builders charge from $2,000-$9,000 for optional cooling systems, depending on the size of the house. (Source: San Jose Mercury News, 29 July 2006.)

PG&E has determined that EC could work well in zones with hot, dry climates. This includes zones 2, 4, 11, 12, 13, and 16. Coincidently, these zones, including the Central Valley, are where California is experiencing the highest per capita growth.

III. Study Objectives

The broad objective for this study was to provide advice on what action should be taken with respect to PG&E's rebate program. Specifically, the study was to answer the following questions:

a. What is the market size for ECs?
b. What are the major market trends?
c. What rebate programs are being run in other states?
d. What are the strategies for growth?
e. How are products distributed and sold?
f. What is the market share of the various distribution channels?
g. How do the various channels differentiate themselves and attract customers?
h. How do customers make decisions on which product to buy?
i. What is the profile of the "typical" customer?
j. Who are the main installers and contractors?
k. How are units maintained and service addressed?

(Note: this study did not compare the financial investment in this program versus other program options available to PG&E.)

IV. Methodology

A project team was formed that included an outside consultant (Cindy Anderson of Anderson & Associates), and PG&E staff from Customer Market Assessment Program, Emerging Technologies Program, and Mass Market Program. The project team met every two to three weeks and directed the research.

The project consisted of 3 phases:

Phase I included a review of published reports from programs run in other areas and of past research performed by PG&E. The Consultant also interviewed PG&E experts and visited the PG&E testing facility in Stockton. As part of Phase I, team members visited Big Box retailers to see how evaporative coolers were marketing and displayed.

Phase II consisted of one-on-one telephone interviews with respondents representing the following groups:

- Manufacturers
- Distributors
- Installers
- "Big Box" Retailers
- Other Utilities
- Local governments

Interviews were scheduled by appointment and lasted 30 minutes to an hour. Respondents were offered a $50 contribution to be made in their honor to a charity of their choice (three options were provided.)

Phase III consisted of data analysis and reporting.

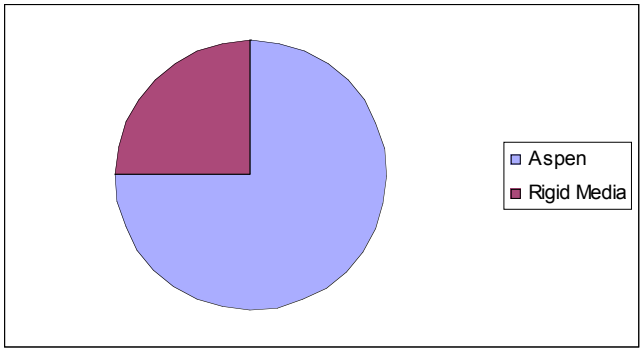
V. Findings

A. Sales Volumes

Sales figures include both Aspen and rigid media-type units, and all types of mountings except "portables." The numbers are not publicly available and were pieced together using information provided by multiple interviews.

- The total US market for EC units is $100-200M. Of that, 30% are rigid media and 70% are Aspen-type coolers. (One Big Box retailer estimates the market to be $150M retail, $100M wholesale.)

Figure 2: Total US Market for EC ($150M) By Type of Pad



Source: Respondent Interviews

- At least 50% of all residential EC units are window-mounted. Of the window units, 80% are Aspen-type products and 20% are rigid media. Of the roof-mounted units, 70% are Aspen-type media, and 30% are rigid media. As a result, only 15% of all evaporative coolers sold in the US are both roof-mounted and use rigid media pads. Both are currently required to qualify for PG&E's rebate.

- According to one of the leading manufacturers, the total U.S. EC market is 300,000 units, not including portables. Estimates are that 40,000 of those EC units are sold in PG&E territory. Of the 40,000, 15% or 6,000 use both rigid media pads and are roof-mounted.

- This same leading manufacturer estimates that only 3-4% of its sales in PG&E's territory are single inlet (rigid media) and qualify for rebates. Aspen-type units are sold by both retailers and installers (contractors). However, only installers typically carry the more expensive rigid media products that potentially qualify for PG&E's rebate. According to the manufacturer, "Most of the units on the PG&E rebate list are not available for purchase within PG&E's territory." This trend is also true with other manufacturers. Less expensive Aspen-type products are sold through Big

Box Retailers. More expensive and higher quality rigid media-type products are sold through distributors and installers.

- A different manufactuer confirmed these observations. This manufacturer sells units all of which qualify for PG&E rebates. It estimated that it is capturing 5-7% of the market in PG&E's territory "because we are not in the retail outlets."

B. Why Customers Choose Evaporative Coolers

According to the installers surveyed, most customers know they want EC over AC before they call. EC customers tend to be very price-sensitive and are focused on the upfront costs of the equipment and the reduced operating costs of the energy used over time. Most have experience with a previous EC or have seen them at a show, a friend's house, etc.

There are few new units being installed by any of the installers surveyed. According to a leading manufacturer, "The typical cooler customer is a replacement customer ... Among ducted, roof-mounted products, 80-90% are replacement units."

Another manufacturer noted: "In California, new construction uses AC. California is a replacement market (for ECs)."

Concern over the environment does not seem to be a motivator for most buyers.

A small, but growing segment, estimated to represent 5-10% of existing sales, install ECs to augment existing air conditioning. On most days, they run their EC systems instead of turning on their more expensive to operate AC. AC is only used on very hot or humid days when EC cannot meet their cooling needs. These buyers are primarily motivated by a desire to reduce their monthly operating costs.

C. Customer Profile

Most supplier respondents agreed that the average EC customer is generally very price-sensitive, and as a result, they typically favor cheaper, Aspen-type products over more expensive rigid media ECs. The general consensus, both among the Big Box retailers, and the smaller distributors, is that price is the main motivator that determines the preference for Aspen-type ECs over rigid media.

According to respondents, the typical EC customer is less affluent (less than $50,000 annual family income). They live in an older home which they may own or rent. They are also often retirees living on fixed incomes. One Big Box retailer described its target buyer as historically being from "the lower end of the economic scale, renters, or customers living in older homes."

D. Market Trends

Almost everyone interviewed (manufacturers, distributors, and installers) agreed that the overall trend for EC sales is flat. The only exception to this is within specific segments. For example, Big Box retailers indicated that sales of portable units, which can be used outside or in a garage, are on the upswing.

Most respondents strongly reiterated the view that builders will not put ECs into spec homes over concern that AC has become a mandatory requirement for buyers. Utilities in two states indicated they have tried to work with builders, but have been unsuccessful. The general consensus is that builders feel it is too risky to build an expensive home without AC.

Another issue strongly limiting the growth of ECs is the use of restrictive CC&R's or "Beauty Covenants". Many communities, especially new ones, do not permit any roof-mounted items, whether AC or EC units. Many manufacturers offer side-mounted units; however, the side mounting requires additional ducting and adds to the expense.

One manufacturer said: "Beauty covenants are an issue. Developers perceive that roof-mounted equipment is a problem. Also, a lot of builders have gone to tile roofs…Ducting for AC is cheaper (than for EC). The equipment costs have come down making AC more competitive with EC. Installers make more money with AC. I don't know of a builder in California putting on EC."

Respondents reported that some high-end homeowners with central AC install window ECs to reduce monthly energy costs. This is a potentially important target segment for reducing overall energy demand.

Respondents identified some growth in the use of ECs for small commercial areas including shops and workshops

E. Margins for Evaporative Coolers

Respondents reported that margins for ECs are low and AC is up to 50% more profitable. They believed that the high price of ECs results in lower profit margins, as does the cost of freight and complexity of installation.

Only one manufacturer claimed that they were able to increase margins by offering unique, high-end options. This manufacturer believes margins will continue to increase in the future as they focus on projects for multiple units.

F. Distribution and Channels

1. The Role of "Big Box" Retail

"Big Box" retailers have had tremendous impact on the EC market. Recent estimates are that 65-80% of all EC units are sold through Big Box stores.

Manufacturers, local distributors and installers repeatedly noted that Big Box retail has has dominated their market and narrowed profit margins. One noted that homeowners prefer to buy directly from Big Box outlets rather than purchase through contractors because the price is so attractive. Some distributors have responded by selling products not carried by the Big Box stores.

Big Box stores compete mainly on price and all have made the decision to carry primarily Aspen-type units. They report that due to the difference in price, Aspen-type units sell much better than rigid media units. Very few rigid media systems (less than 10%) are sold by Big Box stores. Within the PG&E territory, currently one Big Box chain carries one rigid media system, although customers can special order them.

The Big Box retailers believe their customers prefer Aspen-type units mainly because they use them as replacements. Consequently, there is no need for ducting. For the same reason, they think their customers prefer window-mounted units. The stores also feel that the difference in efficiency between Aspen and rigid medium products is not obvious to customers.

By contrast, manufacturers of predominantly high-end systems have opted not to sell through Big Box stores. They noted their decision has significantly affected their access to sales volumes because they believe they can provide better service and installations.

Manufacturers do train staff in Big Box stores, but because staff turnover is high, continuity becomes a continuing issue. At several Big Box stores, the Project Team was repeatedly given misinformation including being told that there was no difference in energy consumption between AC and EC, and that EC units caused roofs to cave in. They were strongly encouraged by sales staff to purchase AC over EC.

Nevertheless, the Big Box stores expressed support for participating in a PG&E rebate program, and even in engaging with PG&E in a pilot that involved local media and an advertising campaign. Each company, however, had its own preferences for a rebate program:

- Rebates must be processed by the company's own rebate clearinghouse system
- PG&E must guarantee that funds are available to support a rebate

- Turn the rebate into a point-of-purchase program

2. The Role of Distributors

Distributors sell products to installers and directly to homeowners. They generally avoid competing head-on with the Big Box stores by selling products that those stores do not carry.

These distributors typically earn a larger percentage of their total revenues from EC sales. In addition, a larger portion of those sales involve what would be considered "qualifying units" by PG&E's definition. They may also provide installation services in addition to selling directly to homeowners.

3. The Role of Installers

Although not documented by a specific study, Big Box stores believe that most systems they sell are installed by their customer. Since the majority of ECs are sold by Big Box retail, it is therefore reasonable to assume that many EC customers install their own systems.

In contrast to the self-install option, professional installers are available that specialize in EC installation. Installers tend to install more upper-end units, including rigid media, roof-mounted systems. They do an excellent job of packaging the cooler with all the auxiliary pieces needed.

The installers interviewed for this study confirmed that the EC customer is price-sensitive. Among their sales, the portion that qualified for PG&E rebates ranged from 8% to a majority in the case of one company. The price premium for EC system plus full installation was reported on the order of 60-100% more for rigid media versus Aspen-type ECs.. Installers stated that they sell service, but that service is not typically purchased at the time of the initial sale. Instead, customers may sign a service contract after a service incident.

Several installers noted they got great results from demonstrating higher-end EC units at the Home and Garden Show on the Fresno fairgrounds. The show, gave them a stage to display the units' effectiveness at cooling while advertising the installer's expertise and service offerings.

G. Rebate Programs Run by Other Utilities

As part of this study, respondents were contacted at utilities serving Texas, Nevada, Utah, Colorado, and California. Outside of PG&E, only Utah and Colorado were found to be running active programs.

Figure 3: Comparison of PG&E Rebate Program with Programs at Other Companies

Company	Rebate Amount	Num. Rebates Awarded '04	Rebate for Rigid Media	Rebate for Aspen Media	Rebate for Roof-mounted	Rebate for Window-mounted	Min CFM Required	Other Required Equipment?
PG&E	$300 Level 1	282	Yes	No	Yes	No	2,500	Must be ducted for whole house, two fan speeds, requires water quality system, multi function manual control switch or thermostat
	$500 Level 2							
	$100 additional for pressure relief damper							
Rocky Mountain Power (PacifiCorp)	$100 replacement	1,067	Yes	Yes	Yes	Yes	Unknown	None
	$300 new installations	623						
	$500 premium whole house ducted installation	1						
	$25 programmable thermostat							
Xcel Energy	$200 new or replacement	3000	Yes	Yes	Yes	Yes	2,500	None

PG&E's program is much more stringent than programs run by the other companies. PG&E does not offer rebates for window-mounted coolers or for Aspen-type coolers. Both of the other companies currently running programs provide rebates for any type of evaporative cooler as long as it is "permanently mounted." This is strictly interpreted to mean any cooler that is not on wheels.

PacifiCorp

PacifiCorp offers a rebate through subsidiary Rocky Mountain Power in Utah. (http://www.rockymtnpower.net/coolcash) The program was launched in 2003 and has been "holding steady". PacifiCorp is very interested in stemming the movement toward new air conditioning. They have an average annual load growth of 2% and peak growth at over 5%. Virtually all new residential construction in Utah is for large homes that include central AC.

Pacific Corp has not been successful in encouraging developers to deploy EC in spec homes. In an effort to stem the conversion to AC for existing homes, PacifiCorp pays $100 to customers who replace an existing system, $300 for new systems, and $500 for whole-house ducted systems. In addition, the dealer is paid a SPIF of $25-50 for each unit. About two-thirds of the rebates paid out are for replacement units.

PacifiCorp offers rebates for both rigid media and Aspen-type coolers, either roof-mounted or window units. The units cannot be portable (on wheels). The utility is considering increasing the dollars available for dealer SPIFs in the hope of encouraging dealers to push EC over AC. The utility noted the importance that dealers and installers, responsible for selling 75% of units, play in customers' decisions to install EC systems: "We decided to make it easier for dealers."

Figure 4: Cool Cash Program — Rocky Mountain Power

Evaporative cooling	
Replacement installation:	$100
First-time installation:	$300
Premium whole house ducted installation:	$500
ENERGY STAR® programmable thermostat	$25
Central AC	
15.00+ SEER & 12.5+ EER:	$300
Properly sized AC units:	$ 50
Properly installed AC units:	$ 50
ENERGY STAR® programmable thermostat	$25

Respondents highlighted a number of issues specific to Utah that has affected the success of Rocky Mountain Power's rebate program. For one, utility rates in Utah are low so there is not that much justification to save money on monthly bills by using EC over AC. Since EC units are being replaced with AC, the Commission is very willing to rebate for sustaining the EC base. To date no builders have been willing to risk building new spec communities using EC.

PacifiCorp perceives its program to be somewhat successful and intends to continue to fund it. Also, there is concern that stopping the program would send the wrong message to the market.

Figure 5: Rebate Results for Rocky Mountain Power

Type	2003	2004	2005	2006 (YTD)	Total
New	698	623	398	104	1,823
Replacement	909	1,067	742	247	2,965
Premium	NA	1	2	1	4
Totals	1,607	1,690	1,142	352	4,791

Xcel Energy
Xcel Energy in Colorado awarded three thousand $200 rebates for ECs last year and expects to do the same this year. The program is considered successful in meeting the rebate goals. Before the program was adopted, a pilot was run focusing on rebates for system installed in new construction. It was not considered successful. According to the utility, the market considers central AC to be the standard for new construction and EC is a hard sell. Today Xcel Energy offers rebates for any cooler, Aspen or rigid media that is 2500 CMF and is permanently installed. They pay rebates for window units, but not units that are on wheels.

Xcel estimates that 70% of the rebated units are purchased at Big Box stores and large hardware chains. Most Xcel customers install the systems themselves. The company does not track how many units are purchased for replacement or as new systems. There are no additional funds paid to EC dealers.

The program is advertised through newspaper ads, and is also part of a larger program, "Get Paid for Staying Cool". Customers are described as middle-class homeowners who live in older homes. Xcel Energy believes these customers choose evaporative coolers, first, for the energy savings, and second, for the environmental benefits. (http://www.xcelenergy.com/XLWEB/CDA/0,3080,1-1-2_738_18787-11864-2_171_256-0,00.html)

Nevada Power
Nevada Power looked at a rebate program, but concluded that Nevada, and Las Vegas in particular, was too hot for the technology. They do not have a rebate program.

City of Austin
The city of Austin considered a rebate program but determined that their climate was too humid to support adoption.

Southern California Edison (SCE)
Southern California Edison is currently refocusing their program to emphasize energy efficient AC. They have not decided whether to bring out a new rebate program for EC. They do not currently have an EC rebate.

H. Community Programs

The City of Boulder has made a concerted effort to encourage citizens to deploy EC technology. Both new construction and remodels require builders to incorporate a number of "Green Points" based on the size of the project. Installing EC instead of AC earns 6 points. The program has been in effect since 1996 and has been revised several times. The city estimates that about 12% of projects submitted for approval include EC. (http://www.bouldercolorado.gov/files/PDS/codes/1002_web.pdf)

The City of Boulder allows roof-mounted ECs provided they do not interfere with neighbors' "solar access plane." Unlike many other upscale communities, Boulder has not instituted "beauty covenants" prohibiting roof-mounted structures.

One EC manufacturer is underwriting a pilot study in Boulder in which builders will install EC in new construction. The hardware is being funded by the manufacturer and the labor by the homeowners. The program will feature aesthetically pleasing EC designs such as side-mounted units. The manufacturer hopes to highlight these homes with strong outreach efforts involving public relations and customer visits.

A city official noted that many cities have contacted Boulder for information about its program, but to the best of the city's knowledge, no others had actually adopted similar programs.

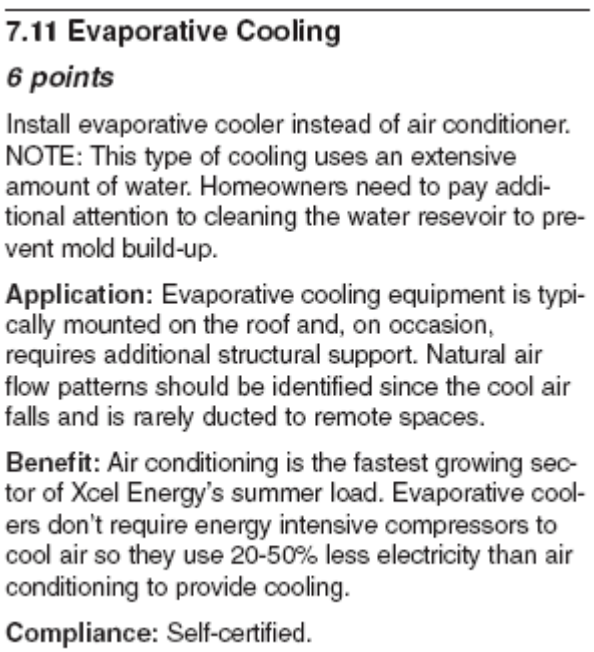
Figure 6: City of Boulder Green Points Program

Table 1: Point Requirements

Project Description	Thresholds	Points Required
New construction	Up to 1,500 sq. ft.	50 points
New construction	1,501 to 2,500 sq. ft.	65 points
New construction	2,501 sq. ft. or greater (each additional 50 sq. ft.)	65 points, plus 1 point for each additional 50 sq. ft. area up to a maximum of 100% of all available Green Points
Interior remodel	500 to 1,000 sq. ft.	10 points
Interior remodel	1,001 to 2,000 sq. ft.	15 points
Interior remodel	2,001 sq. ft. or greater	25 points
Additions	500 to 1,000 sq. ft.	25 points
Additions	1,001 to 2,500 sq. ft.	50 points
Additions	2,501 sq. ft. or greater (each additional 50 sq. ft.)	50 points, plus 1 point for each additional 50 sq. ft. area up to a maximum of 100% of all available Green Points

Source: Green Points Program Guidelines, May 2004

Figure 7: Description of City of Boulder Green Points for Evaporative Cooling



7.11 Evaporative Cooling

6 points

Install evaporative cooler instead of air conditioner. NOTE: This type of cooling uses an extensive amount of water. Homeowners need to pay additional attention to cleaning the water resevoir to prevent mold build-up.

Application: Evaporative cooling equipment is typically mounted on the roof and, on occasion, requires additional structural support. Natural air flow patterns should be identified since the cool air falls and is rarely ducted to remote spaces.

Benefit: Air conditioning is the fastest growing sector of Xcel Energy's summer load. Evaporative coolers don't require energy intensive compressors to cool air so they use 20-50% less electricity than air conditioning to provide cooling.

Compliance: Self-certified.

Source: Green Points Program Guidelines, May 2004

I. Issues with the Current PG&E Rebate Program

The major issue described by survey respondents is that the PG&E program does not rebate coolers that use Aspen technology or are window-mounted.

From a practical perspective, this restriction means that 85% of the EC units sold today cannot be eligible for rebate. It should be noted that neither of the other two utilities that offer rebates include this prohibitive restriction on cooler types and installation locations.

Rigid media coolers are more expensive than Aspen-type coolers, both to buy and to install. The Granger catalog shows the flowing prices:

4500 CFM Aspen style cooler: $549
4800 CFM 8" rigid media style cooler: $772

This is a difference of $223, or 40%, in price.

According to a manufacturer, single outlet or rigid media coolers are generally at least $200 more expensive than comparable Aspen-type products. Beyond the price of the units, the installation is also more expensive. One respondent noted that a typical roof-mounted Aspen-type cooler installed runs $1,400-1,600 for a 2,000 square foot house. By contrast, a rigid media unit would be at least $1,900

to $2,400. The extra expense is due to several factors: the units require a bigger stand, installation equipment that can manage the extra weight, and a special contractor who can handle the more sophisticated electronics. Compared to the cost, a $300 rebate is not significant, according to the respondent.

The respondent from one Big Box store suggested introducing a rebate program for rigid media window or wall-mounted units. He believes the window market is growing because roof-mounted system are comparatively difficult to install and maintain: "The roof-mounted business is flat and dying. It is all replacement. There is no new business. The growth is in windows and portables."

The next major issue cited by respondent is the expense that the additional equipment required by PG&E's program adds to the price.

One installer feels that the extra equipment required by PG&E's rebate program makes it prohibitively expensive for customers. For example to meet the rebate requirements, a typical cooler for a 1,500 square foot house installed by the distributor would require the following:

Unit	$995
Auto drain	175
Water manager	215
Thermostat	160
Up ducts (@150/piece)	750
Labor	380
Total	$2,675

On average, the installer estimates that high-end EC systems including installation run $2,500. Most customers are not willing to pay for the required extra equipment required to get a rebate of $300-$500.

Another respondent, a distributor, made a similar observation. "People around here are very price-sensitive. It's not like the Bay Area. You need to make it easy for the consumer to get the rebate. Currently, it is way too difficult. The gap between the price for a product that can get a rebate, and a product that does not qualify is too large…The year with the first rebate I sold 290 rigid media units…I will sell 140 rigid media units this year. I could sell 3 times that with a good program. I could sell units at $799 with a $300 rebate or with a $200 rebate. You can get people to buy better units with the right rebate. When PG&E requires the ducting and the up ducts, etc., it gets to be too much."

This issue of the PG&E rebate requiring extra expense is especially true for the manufactured homes market.

This special niche market is serviced by one of the survey respondents, an installer. The installer's preferred EC unit is lightweight, which is needed for the roofs of manufactured homes, and can be installed by one man versus two.

Although the preferred EC unit itself qualifies, very few customers receive the PG&E rebate according to the installer. (By PG&E records, 2 customers qualified in 2004.) The installer explains: "The PG&E rebates require too many extra parts to be reasonable for mobile homes. Mobile parks do not want water on the ground and on our preferred product we use a bleed off. PG&E won't accept it ... PG&E requires an automatic water manager. This means that we need to run PVC piping to run the water out, which means an additional $150 for parts and labor…In a mobile home you can't have water draining within the park; you have to pipe it out."

The installer estimates it costs customers at least $300 in additional costs and labor to qualify for the rebate. Most of the company's customers decide it is not worth it: "The rebate forms are readily available, but the water issue really trips us up and keeps us from it. The additional parts are too expensive for most of my customers."

Respondents noted they would like to see the EC rebates be more straightforward and predictable, similar to rebates on other household appliances.

"The first year PG&E offered the rebate was great. (PG&E) offered a $300 rebate for the Mastercool and Breezair. The only requirement was that you had to use a bleed off…so it was easy to qualify. It was just like any other program like for a washer or dryer. With the EC rebate today, you need an inspection, a thermostat, and a bunch of other parts. It is too expensive and difficult for most people. You have to get a permit, which means you need a licensed contractor to install it. You have to buy the other bells and whistles. Before you know it you have spent an extra $600 to get $300 back." — Distributor.

"Make the program very simple. They (the customer) can send in a receipt, similar to other rebates. It should be a short, one page form. Currently the customer has to send in a bunch of stuff that has noting to do with the coolers and is too confusing." — Installer.

Another issue raised was concern that customers would expect a rebate, and then, for reasons outside of the control of the distributor or installer, be rejected.

In fact, records show that in 2004, PGE paid out 282 rebates and rejected 180. Surveyed installers seem to be confused about which installations should qualify and which would not. As a result, they are reluctant to tell customers about the rebates or to advertise them.

"Contractors are afraid to present the rebate program for fear of making a mistake that results in the homeowner not getting it. The homeowner should also be better educated. The contractor shies away (from telling them about the rebate)… The biggest problem today is the administration of the program. We don't have the time to do it and it is too hard. You will only get the contractors to do it if it is bullet proof." — Distributor.

One respondent mentioned that contractors do not want to itemize every item they install because they don't want to show their markups.

They want to put together packages. He recommended that PG&E should develop a simple Excel file to fill out and make the paperwork streamlined and easy. He also suggested that PG&E should consider providing a rebate for the installer. (This is done in the form of a dealer SPIF by PacifiCorp). He felt that if the installers got part of the rebate they would be more incented to push qualifying EC installations.

Lack of continuity from one year to the next is also detrimental to a successful program.

Distributors and installers noted that the rules for the PG&E program kept changing, making it difficult for them to respond and order intelligently. Since the EC season is so short, forecasting accurately is essential, especially given the thin margins. Distributors and installer cannot afford to get stuck with excess inventory, making it essential that rebates are announced and documented before equipment orders are placed.

J. Findings from the Glacier Consulting Group Report on the Rebate Participant Study

The Glacier Consulting Group was hired to survey PG&E customers that received rebates and to identify market segments that would be receptive to further marketing efforts. Glacier conducted over 200 interviews drawn from a list of 800 customers who received PG&E rebates over 4 years. Unfortunately, this group is probably too small and atypical of the general market to be considered representative of the typical EC customer. Over the lifespan of the current rebate program, only one half of one percent of California's EC customers have qualified for rebates.

The rebate customers surveyed tended to be better educated, more affluent, and much more likely than the general EC population to use a contractor to install their systems. Two-thirds (64%) of the Glacier customers bought their system through a full-service contractor who also installed their systems. In the general market, 65-80% of ECs are bought through Big Box, "do-it-yourself"-type stores. Most of those customers do not use contractors.

Although the results should not be interpreted as representative of the broader market, there are some useful and interesting findings from the study:

- The bulk of the rebate recipients (72%) purchased their system to replace an existing Aspen-type evaporative cooler. Twenty-one percent of the customers had an existing AC system.

- The customers were motivated by a desire to reduce their cooling costs. This was especially true for customers with AC who hoped to use EC whenever possible.

- The satisfaction rate among EC customers was very high, with 89% being "highly satisfied" with their new EC system. Among customers who already had AC, 100% were "highly satisfied" by their EC systems. All said that EC has allowed them to delay or avoid using their central AC.

- PGE rebate customers noted the new systems were significantly better than the old Aspen-type models. They required less maintenance, were quieter, produced less odor, added less humidity, and did a more effective job at cooling.

- Glacier identified three market segments:

    1) Customers that replace existing Aspen coolers with rebate qualifying, rigid media coolers. These customers represent 51 % of the customers who received rebates
    2) Customers that had both AC and existing Aspen coolers and wanted to replace their Aspen cooler with qualifying rigid media systems. These customers represented 21% of customers that received rebates.
    3) Customers with AC only who installed EC to reduce their monthly cooling costs. These customers also represented 21% of customers that received rebates.

- Information on operating costs was the most important factor for customers in making the decision to install an evaporative cooler

K. Recommendations on Modifying the Rebate Program

1. Use the rebate program to target customers who currently have roof-mounted Aspen units to encourage them to upgrade to rigid media.

Since most ECs are purchased to replace existing units, this segment would be a natural target to engage. The rebate must be significant enough to cover the additional expense (estimated to be $800 by one respondent) of upgrading to rigid media.

2. **Carefully examine the feasibility of providing rebates for window-mounted rigid media units.**

   Window units currently represent 50% of the total market. Most respondents believe that customers that want to reduce their reliance on AC, are more likely to purchase a window unit than a ducted roof-mounted unit. Given the many communities with restrictive CC&R's block roof rigid media window units seem like a low cost, easy way to wean customers off AC.

   There is concern based on historical experience that customers might install window units in bedrooms and violate fire code. This is a serious issue that needs to be vetted by PG&E legal staff. The other utility companies surveyed provide rebates for window-mounted units.

3. **Not surprisingly given their vested interests, many respondents strongly encouraged PG&E to modify its program to include Aspen-type units.**

   Although not as efficient as rigid media, Aspen-type units use significantly less electricity than air conditioning. They currently comprise 75% of the market and excluding them makes it difficult to achieve the targeted rebate goals. Also, all of the other companies that provide rebates for EC offer rebate for Aspen-type units.

   Conversely, PG&E does not want to encourage "free ridership" and reward customers that would buy Aspen-type products anyway. It is unclear what effect providing a rebate for Aspen-type coolers would have on the energy usage in PG&E territory and therefore, is not recommended at this point in time.

4. **Reduce the price of rebated products by minimizing the "extras" required to qualify.**

   EC purchasers are price- sensitive buyers. The addition of water managers, thermostat, ducting, etc., makes the initial purchase price prohibitive for many buyers. Other utilities surveyed do not require these items.

   If a decision is made that these "extras" are truly essential, ensure that the rebate covers their entire cost including labor for installation, and provide education for distributors and customers on what exactly is needed for a unit to qualify. Currently, 40% of submitted rebate applications are being rejected which means there is too much risk for a price-sensitive customer to buy the more expensive rebated product. The program needs to be consistently enforced year-to-year so that distributors and customers are not surprised by unexpected program changes.

5. **Develop a marketing program and advertising/press campaign to show the economic benefits of using EC instead of AC to reduce monthly PG&E bills.**

   Make EC the technology of choice for environmentally aware Californians. Use the rebate to encourage AC owners to install EC for most of their cooling needs with AC relegated to a secondary role to augment EC when needed. This message will be even more appealing after Time of Use rates are widely in effect.

   "People will use EC over AC when there is a choice…When I had an EC unit in Phoenix, my electric bill was $100/month versus over$300/month with AC...During the California brown outs we could not sell them fast enough. People had AC and did not want to use them. They put in window units instead." — Manufacturer/

   "Given the cost of new homes, people expect central AC. After the fact, once they start getting their utility bill, they may look at EC." — Distributor.

6. **Simplify the rebate program so it is less complicated to submit the necessary paperwork.**

   Provide a preprinted form so the installer/distributor can give it directly to the customer already filled out.

7. **Investigate providing a SPIF for the dealers/installers.**

   Given the low margins on ECs, an economic incentive is needed to encourage retailers/installers to push EC. The PacifiCorp program includes a SPIF and the company is currently considering increasing its amount.

8. **Increase consumer awareness of the rebate program, its benefits, and options.**

   This could be done through public relations success stories, stuffers in bills, Web announcements and descriptions, advertising, community outreach, etc.

9. **Educate customers on how to maintain their EC systems.**

   This is important to ensure the systems continue to cool sufficiently. It is also needed to end the association of advanced evaporative coolers with earlier "swamp coolers."

10. **Fund display units at home shows and other forums.**

The home show in Fresno was mentioned by several respondents as being a very effective arean for marketing ECs and associated services. Prospective customers need to see and feel evaporative cooling to understand how effective it can be as a substitute for air conditioning. PG&E should set aside funds for demonstration units. The output of the units themselves will provide the most powerful advertising possible.

“If I sell one (Breezair EC) in a neighborhood, I will get 12 referrals.” — Installer.

Appendix I: Qualifying Equipment for Rocky Mountain Power's 2006 Cool Cash Incentive Program

save energy | save money

Stay cool with up to $300 in cash incentives for installing an evaporative cooler

Our 2006 Cool Cash Incentive program offers residential customers incentives for installing qualifying high-efficiency cooling equipment.

_ Only certain models are eligible. Visit our Web site for a list of qualifying evaporative coolers: **rockymtnpower.net/coolcash.**

_ A cash incentive of $300 is available for eligible customers who purchase and install a qualifying evaporative cooler for the first time in their home. For customers that are replacing an existing evaporative cooler, a $100 cash incentive is available.

_ Qualifying equipment must be purchased and installed prior to requesting incentive.

_ Units purchased or installed prior to January 1, 2006 are not eligible.

_ Incentives are also available for the purchase and installation of qualifying high-efficiency central air conditioning systems. See the contact information below or contact your local dealer for more information.

_ Incentives are available for a limited time only, so act now.

For more information and complete eligibility requirements

_ Visit a local retailer

_ Visit our Web site at **rockymtnpower.net/coolcash**

_ E-mail us at **coolcash@rockymtnpower.net**

Appendix 2: Xcel Energy Program

Evaporative Cooling Rebates

Evaporative Cooling Rebates by *BudgetSmart from Xcel Energy℠* help make purchasing a high-efficiency evaporative cooler (a.k.a. swamp cooler) more affordable with a cash rebate of up to $200. You'll increase your home's energy efficiency and keep cool and comfortable all summer long. Look for your rebate check approximately six to eight weeks after we receive your completed application.

Rebate Schedule

ISR Air Flow Rating	Rebate
≥ 2,500 CFM	Up to $200*

* Rebates will be either $200 OR the purchase price of the evaporative cooling unit as shown on the receipt - whichever is less.

How do I get a rebate?

Purchase a qualifying unit from a participating evaporative cooling retailer between January 1, 2006 and December 31, 2006**. Most participating retailers have rebate applications. If not, you may download an application or call **1-800-824-1688** to request for #1524. Either way, please be sure to keep a copy for your records. Limit one rebate per household. You must purchase and install your evaporative cooling unit prior to submitting the rebate application.

*** Customers are NOT REQUIRED to purchase a qualifying unit from a participating evaporative cooling retailer or dealer to be eligible for a rebate. However, participating dealers are familiar with program requirements and typically have rebate applications available.*

Who is eligible to participate?

This rebate offer is only available to our Colorado residential electric customers residing in one of the following counties:

> Adams, Alamosa, Arapahoe, Boulder, Broomfield, Chaffee, Clear Creek, Conejos, Costilla, Denver, Douglas, Garfield, Gilpin, Jefferson, Lake, Larimer, Logan, Mesa, Morgan, Park, Rio Grande, Saguache, Summit, Weld.

Does my unit qualify for a rebate?

Evaporative coolers must be new and have a minimum Industry Standard Rating (ISR) airflow of 2,500 CFM (cubic feet per minute). It must be a permanently installed direct, indirect or two-stage evaporative cooling unit.

Portable coolers or systems with vapor compression backup are not eligible, nor is used or reconditioned equipment. View our list of qualifying equipment.

Please note: Rebate quantities are limited, and applications will be honored on a first-come, first-served basis. Rebates are not offered for ancillary equipment such as hoses, drain pans, etc. Xcel Energy reserves the right to end this program or withdraw this rebate offer at any time.

Questions?

Call our Customer Contact Center at **1-800-824-1688** Monday - Friday between 8 a.m. - 5 p.m., or contact us.

Appendix 3: PG&E Program

Pacific Gas and Electric Company®

Ducted Evaporative Cooling System (DECS)

Rebates for 2006 are now available. Beginning January 1, rebates for most products highlighted in the "For Your Home" section are available to both residential and business customers. Specifications may vary based on account type (i.e. residential, small business or large business). The specifications below are for residential customers. If you are a business customer, see the Business Rebate Application Package. Be sure to download the 2006 Energy Efficiency Rebate Application Package and read all the information carefully before submitting your application.

Rebate and product information:

There is a **$300** (Level 1) **or a $500** (Level 2) rebate offered for a DECS. An additional **$100** is offered if a new pressure relief damper(s) is installed. DECS efficiently deliver air 5-10 degrees cooler to the house and add less moisture or humidity than a conventional evaporative cooler. This system offers a great energy savings alternative compared to the conventional air conditioning.

To qualify:

- Must have electricity delivered by PG&E to the installation address.
- This ducted evaporative cooling system must:

1. Be permanently installed, move at least 2,500 cubic feet of air per minute (CFM) at 0.1 inches static pressure, provide whole house cooling, and should automatically exhaust the air via pressure relief dampers into the attic, then to the outside, usually through attic vents,
2. Come from the manufacturer with a cellular, rigid media or equivalent media, certified by the manufacturer to achieve an evaporative effectiveness of:
    - 0.85 or better for the Level 1 ducted evaporative cooling system, **OR**
    - 0.95 or better overall system efficiency for the Level 2 ducted evaporative cooling system
3. Have at least two (2) fan speeds and operate with the media wet or dry,
4. Have UL-recognized electrical components,
5. Come with a water quality management system that provides positive removal of sump water on a regular interval (a bleed system is not allowed),
6. Have a single-duct or multi-duct distribution system, **and**

7. Have either a multifunction manual control switch or an automatic thermostat specifically designed for evaporative cooling.
8. When an automatic thermostat is used, new pressure relief dampers, which can also qualify for an added rebate when they are installed with a new Level 1 or Level 2 ducted evaporative cooler, must be installed.

Follow manufacturers' and all applicable building code requirements for construction and venting. If new pressure relief dampers are installed, they must be indicated on your proof of purchase.

Check with your local building department for any specific requirements related to this product. If you use a contractor for this project, you may want to contact the Contractors State License Board (CSLB) for licensing requirements at 1 (800) 321-CSLB, or at www.cslb.ca.gov.

How to participate:

I. View the list of Level 1 or Level 2 evaporative cooler models to verify that the DECS you are selecting qualifies for this program.

II. Purchase and completely install a qualifying model from a retailer or contractor, then:
- Sign up for My Account and apply online with e-Rebates, **OR**
- Download and complete the application package, **OR**
- Call the Smarter Energy Line (SEL) at 1 (800) 933-9555 to request an application package.

III. **Sign** and **submit** the **original** application form(s) and all required documentation.

To verify funding availability and for questions, please call our SEL at 1 (800) 933-9555.

Helpful Information:

- Energy-Efficient Ducted Evaporative Cooler Technical Sheet
- Other Rebates for our Residential Customers

Funding is limited. This offering shall at all times be subject to change or termination without prior notice. This offering is funded by California utility customers and administered by Pacific Gas and Electric Company under the auspices of the California Public Utilities Commission.

Appendix 4: Questionnaire for Manufacturers

Questionnaire for EC Study, April 2006, PG&E
For Manufacturers:
(Interviews done by preset appointment only)

- I am a marketing consultant doing a study for PG&E on the EC market.
- This information will be used by PG&E so please do not give me information that you do not want shared with PG&E. It will not be shared with anyone outside of PG&E.
- We will make a $50 contribution to a charity of your choice to thank you for your participation in this study

Company Name

Contact

Title

Physical Address

Email

Date

1. What products do you sell in PG&E territory?
2. Who is your target customer? What are your major markets?
3. Who are your best customers, both in PG&E territory and in other locations?
4. How are you selling your products?
5. How many are you currently selling per year? (in total, in PG&E territory) How does that translate into dollars?
6. What percent of the market do you believe your products represent in PG&E territory?
7. How profitable are your evaporative cooler products?
8. What is the trend in your sales in PG&E territory?
9. What are your forecasted sales for 2007? 2008?
10. What about that market makes it your best?
11. Who are your best distributors/installers?
12. How do you get information to your customers?
13. Who do you perceive are your biggest competitors?
14. What is your strategy going forward within PG&E territory to increase your market penetration?
15. Are you familiar with the PG&E rebate program for ECs?
16. What could PG&E do to help your marketing efforts?
17. If you could change one thing about this market, what would that be?

Would you like your $50 contribution made to:

- Habitat for Humanity
- Ronald MacDonald House
- American Cancer Society

Thank you for your participation. Your input is greatly valued.

Appendix 5: Questionnaire for Distributors

Questionnaire for EC Study, April 2006, PG&E
For Distributors:
(Interviews done by preset appointment only)

- I am a marketing consultant doing a study for PG&E on the EC market.
- This information will be used by PG&E so please do not give me information that you do not want shared with PG&E.
- We will make a $50 contribution to a charity of your choice to thank you for your participation in this study

Company Name

Contact

Title

Address

Date

18. What EC products do you distribute in PG&E territory?
19. Why do you carry these products?
20. Who are your target customers?
21. How do you find customers?
22. How are you selling your products?
23. How many are you currently selling per year? How does that translate into dollars?
24. What percent of your business is comprised of sales of ECs?
25. How profitable are ECs compared with other products you sell? (what are your profit margins)
26. What are your major markets for ECs/AC?
27. What percent of the market do you believe your company represents?
28. What is the trend for your sales in PG&E territory?
29. What are your forecasted sales for 2007? 2008?
30. Where are your best markets? Who are your best customers? Why?
31. What about that market makes it your best?
32. Who are your best installers?
33. What is your strategy going forward within PG&E territory to increase your market?
34. How do customers decide which product to buy?
35. How do you address maintenance?
36. Are you familiar with the PG&E rebate program for ECs?
37. What could PG&E do to help your marketing efforts?
38. If you could change one thing about this market, what would that be?

Would you like your $50 contribution made to:

- Habitat for Humanity
- Ronald MacDonald House
- American Cancer Society

Thank you for your participation. Your input is greatly valued.

Appendix 6. Questionnaire for Installers and Principals of Businesses

Questionnaire for EC Study, April 2006, PG&E
For Installers and Principals of Businesses:
(Interviews done by preset appointment only)

- I am a marketing consultant doing a study for PG&E on the EC market.
- This information will be used by PG&E so please do not give me information that you do not want shared with PG&E.
- We will make a $50 contribution to a charity of your choice to thank you for your participation in this study

Company Name

Contact

Title

Address

Date

39. What EC products do you install in PG&E territory?
40. Why have you selected these products?
41. Who are your target customers?
42. How do you find customers?
43. How are you selling your services?
44. How much is your revenue per year for ECs?
45. What percent of your business is comprised of sales/installation of ECs?
46. How profitable are ECs compared with other products you install? (what are your profit margins)
47. What are your major markets for ECs/AC?
48. What percent of the market do you believe your company represents?
49. What is the trend for your sales in PG&E territory?
50. What are your forecasted sales for 2007? 2008?
51. Where are your best markets? Who are your best customers? Why?
52. What about that market makes it your best?
53. Who are your best installers?
54. What is your strategy going forward within PG&E territory to increase your market?
55. How do customers decide which product to buy?
56. How do you address maintenance?
57. Are you familiar with the PG&E rebate program for ECs?
58. What could PG&E do to help your marketing efforts?
59. If you could change one thing about this market, what would that be?

Would you like your $50 contribution made to:

- Habitat for Humanity
- Ronald MacDonald House
- American Cancer Society

Thank you for your participation. Your input is greatly valued.