

Residential Niche/Other Programs

Honorable Mention

Cool Roof Rebate Program..... 17-2

Residential Cool Roof Program..... 17-5

*Residential Niche/Other Programs
Honorable Mention*

***Cool Roof Rebate Program
Pacific Gas & Electric***

PROGRAM OVERVIEW

Pacific Gas & Electric established the Cool Roof Rebate Program on September 1, 2006. One of the primary goals of the Cool Roof Rebate Program is to significantly reduce peak demand in the summer for residents in warm weather climates. Participants also should achieve significant cooling energy savings. The program offers rebates to residential customers who replace roofing on their existing homes (single family and mobile) with cool roofing materials. The rebates are available to homes either with low slope or steep slope roofs. Additionally, to be eligible homes must have central air conditioning and live in climate zones 2, 4, 11, 12, or 13, as defined by the California Energy Commission.

This rebate program is available to customers who live in climate zones that require significant air conditioning in the summer months. These areas include Stockton, Fresno, Bakersfield, and other Central Valley cities. Residents in these areas also typically rely on air conditioning systems to cool their homes for much of the summer and early fall. The Cool Roof Rebate Program offers an innovative way for customers to reduce their air conditioning usage by lowering overall home temperature,

The Program is based on initial solar reflectance and initial thermal emittance values for products that are tested by the Cool Roof Rating Council (CRRC). Rebate amounts are based on the following structure as shown in the table below.

Type	Tier	Initial Solar Reflectance	Initial Thermal Emittance	Rebate
Low Slope	N/A	0.70	0.75 or greater	\$0.20/ft ²
Steep Slope	Tier 1	0.25 – 0.39	0.75 or greater	\$0.10/ ft ²
	Tier 2	0.40 or greater	0.75 or greater	\$0.20/ ft ²

PG&E expects that the typical home will experience 10% to 20% in air conditioning-related energy savings through the use of a cool roof. For many customers, that could translate into a 7% to 10% bill reduction for the whole house during the cooling season.

To promote this rebate program, the Cool Roof Rebate Program is partnering with roofing contractors to educate customers about the benefits of cool roofs. PG&E has announced the program to roofing contractors and has held a series of program launch meetings and training classes for contractors.

PROGRAM PERFORMANCE

As a relatively new program there are no impact evaluation results yet available. The California Public Utilities Commission (CPUC) released the first round of impact evaluation RFPs in early 2007. No specific dates are given as when the evaluation will be completed and the results made available to the public.

Cool roof technology has been demonstrated to provide significant cooling energy savings. On a sunny summer day, a typical roof surface can reach temperatures that are nearly 100°F above the ambient temperature. A cool roof, by contrast, stays at or near the ambient temperature due to the characteristics of its outer layer. There are many benefits to keeping the surface of a roof cooler, including air-conditioning energy and demand savings, monetary savings, increased human comfort both indoors and outdoors, and other positive impacts on urban environmental quality.

Cool Roofs are highly reflective and emissive materials that stay 50 to 60 degrees Fahrenheit cooler in the summer sun, thereby contributing to the reduction of urban heat islands and associated smog. The term "heat island" refers to urban air and surface temperatures that are higher than nearby rural areas. Many U.S. cities and suburbs have air temperatures up to 10°F (5.6°C) warmer than the surrounding natural land cover.

Cooler roof temperatures also affect temperature levels in buildings, allowing customers to significantly reduce their air conditioner use. Reducing the amount of heat that flows through a building's roof and into the occupied space below can reduce the building's air-conditioning load and thus reduce the building's energy cost. Additionally, when the cooling load is reduced, mechanical air-conditioning equipment can be downsized, which will help minimize up-front capital costs for building owners to purchase air-conditioning equipment.

LESSONS LEARNED

PG&E was the first utility in the nation to offer rebates for steep slope roofs. After PG&E introduced its Cool Roof Program design, other utilities adopted the model in their own service territories.

Since the 1970s, California has established energy efficiency standards to reduce energy consumption in buildings. The 2005 state energy standards, commonly referred to as Title 24, consider a cool roof to be the standard roof in California for new construction or retrofit of low-slope roofs on non-residential buildings. A series of energy efficiency incentive programs has been rolled out to encourage adoption of cool roofing technology. As a result, there is growing demand for cool roofing.

Although this is a relatively new program, PG&E believes there is significant potential for energy savings and wide-spread market impact in the residential sector. By working with roofing contractors, PG&E is able to educate contractors (midstream market actors) about the cool roof technology so they are better able to promote the technology to their customers.

The Cool Roof Rebate Program is part of a long tradition at PG&E of customer focused programs that increases comfort, saves the customer money, and positively impacts the environment.

PROGRAM AT A GLANCE

Program Name: Cool Roof Rebate Program

Targeted Customer Segment: Existing residential homes and buildings.

Program Start Date: 2006

Program Participants: Not available.

Annual Energy Savings Achieved: Program evaluation results not available; participants are expected to save 10-20% of cooling energy.

Peak Demand (Summer) Savings Achieved: Not available.

Budget: \$100,000 in rebates for 2007 with option to increase in 2008

Funding Sources: California ratepayers through public goods charge (PGC) funds

Best Person to Contact for Information about the Program

- Laura Chiu, Senior Product Manager
- Phone: 415-973-9143
- Email: LPC2@pge.com

*Residential Niche/Other Program
Honorable Mention*

***Residential Cool Roof Program
Sacramento Municipal Utility District***

PROGRAM OVERVIEW

The Residential Cool Roof Program follows Sacramento Municipal Utility District's (SMUD) Commercial Cool Roof program that began in 2001, which helped customers install more than 8 million square feet of cool roofs on commercial buildings. These roofs saved more than one million kilowatt hours annually, enough power to serve about 900 homes. In 2006 SMUD expanded the program to provide similar services to residential customers, but only those with flat roofs. In 2007 the program was expanded to include cool roof products for steep slope roofs as well as flat roofs.

The Sacramento Municipal Utility District provides incentives for installation of qualified roofing materials to residential property owners, which includes single family homes, apartments, and mobile homes. New construction projects are excluded. SMUD agrees to provide a list of participating contractors to its customers who are interested in the program. Contractors on this list agree to install Cool Roof products that meet minimum SMUD specifications, which include being listed on the qualifying EPA ENERGY STAR product list and meeting initial solar reflectance and initial thermal emittance standards as rated by the Cool Roof Rating Council. Below are the specific technical requirements and incentives amounts for flat and steep roofs:

- Flat slope roofs: 20 cents per sq.ft.; reflectivity >75%, emissivity >75%
- Steep slope roofs: 10 cents per sq.ft.; reflectivity >40%, emissivity >75%

An additional program requirement is that all residential mobile homes and single-family and multi-family homes must have an electrical central air conditioning (AC) system. Customers whose homes have evaporative cooling systems or wall AC units are not eligible for rebates.

Cool roofs are highly reflective and have substantial thermal emittance, which helps block heat from being absorbed through the roof and into a building. Roof surface temperatures can be reduced by up to 50 degrees. Flat cool roofs are white, while steep slope cool roof can be in any traditional roof top color. Another benefit is longer roof life because the cool roofs are protected from ultraviolet and thermal degradation.

PROGRAM PERFORMANCE

The Residential Cool Roof Program estimates the following average energy and demand savings for participants:

- Average energy cooling load savings of 20%
- Average energy cooling load savings are 0.15 kWh/year/ft².
- Average demand savings are 0.25 W/ ft².

In 2006 (first program year) the program completed 16 projects with a total area of 28,130 square feet. The average project was 1700 square feet with an incentive payment of \$350.

SMUD's Residential Services staff estimated the weighted-average annual electric-energy savings for both the low and steep slope roofs to be 505 kWh per year. These estimates were weighted for the various housing vintage and HVAC equipment types. Customer savings are less due to a heating penalty. The reflectance of the cool roof, while reducing cooling loads in summer, increases heating loads slightly in winter. Consequently, occupants will experience reduced air-conditioning bills but increased heating bills. Summer bill savings are greater than winter bill increases, resulting in a net annual energy-bill savings.

Weighted-average annual heating penalty reduction was estimated as -5.5 therms or \$6.13 additional cost for greater heating load. The weighted-average energy-bill savings, including heating penalty, were estimated to be \$88 per year. It is important to note that these are net savings. The annual net savings varied from \$179 for the homes with the low slope roofs to \$17 for the highly energy efficient homes built recently in last few years with the steep slope roofs.

LESSONS LEARNED

SMUD was the first utility in the nation to offer rebates for cool roof technologies for commercial buildings (began in 2001). In 2005 the California Energy Commission adopted new Title 24 standards for energy efficiency for new commercial buildings in California, and cool roof technology was part of the Title 24 standards for the first time. SMUD does not offer rebates for any measures that are considered "standard technology" and thus SMUD stopped offering rebates for commercial cool roof applications. SMUD's experience with the commercial cool roof technology helped influence development of these new standards. However, these new Title 24 standards for cool roofs do not apply to residential buildings, which was the impetus for SMUD to initiate the Residential Cool Roof Program.

There is a dramatic difference in energy savings between the low and steep slope cool roof applications. In general residential buildings with flat (or low slope) roofs generate much higher levels of energy savings for this program. The most important reason for this fact is that flat roof installations use cool roof technologies that have relatively high levels of solar reflectivity, such as single-ply membranes that have solar reflectivity greater than 80%. On the other hand, steep slope roof installations use cool roof technologies that have relatively low levels of solar reflectivity, such as light colored tiles, which have reflectivity of only 40%. In addition, the flat roof residential buildings are older vintage construction homes built in 1950s and 1960s, which have generally much lower energy efficiency HVAC and building code standards. Subsequently the energy savings values from the cool roof installations are much greater and more prominent in buildings that have flat roofs.

PROGRAM AT A GLANCE

Program Name: Residential Cool Roof Program

Targeted Customer Segment: Existing residential buildings—single family homes, apartment buildings and mobile homes.

Program Start Date: 2006

Program Participants: 16 projects completed in 2006.

Annual Energy Savings Achieved: Average energy cooling load savings of 20%; Average energy cooling load savings are 0.15 kWh/year/ft².

Peak Demand (Summer) Savings Achieved: Average demand savings are 0.25 W/ ft²

Budget: \$200,000.

Funding Sources: Municipal utility ratepayers.

Best Person to Contact for Information about the Program

- Misha Sarkovich, Program Manager
- Phone: (916) 732-6484
- Email: MSarkov@SMUD.org