Residential Mechanical Systems Programs

Exemplary Programs

Honorable Mention

Residential Mechanical Systems Programs
Exemplary Program

COOLAdvantage Program
New Jersey Board of Public Utilities, Office of Clean Energy
Atlantic City Electric
Jersey Central Power and Light Company
Public Service Electric and Gas Company
Rockland Electric

PROGRAM OVERVIEW

COOLAdvantage is a rebate program administered by the Office of Clean Energy, New Jersey Board of Public Utilities. The program works to increase the purchase and installation of high efficiency central air-conditioning, heat pump and geothermal heat pump technologies. The program requires that the mechanical equipment efficiency itself meets program performance criteria and that certain key installation practices are employed. The program also provides outreach and training to contractors regarding best installation practices and sizing.

COOLAdvantage was launched in 2001. At that time the program was administered by New Jersey's investor-owned utilities. Over the past few years the administration of energy efficiency and related clean energy programs has been transferred to the New Jersey Board of Public Utilities via its Office of Clean Energy. While this office now administers COOLAdvantage, day-to-day program management is provided through New Jersey's seven investor-owned utilities. Selected contractors are included to process applications, conduct quality control inspections and as train technicians.

The objective of the COOLAdvantage Program is to improve the energy efficiency of new electric central air conditioners and heat pumps. The program promotes both the sale of qualifying energy-efficient equipment and improvements in proper system sizing and installation best practices that affect operating efficiency. To this end, the program provides rebates towards the purchase and installation of energy-efficient electric central air conditioners or heat pumps.

Central air conditioner rebate amounts are based on the unit's seasonal energy efficiency ratio (SEER) and energy efficiency ratio (EER). Rebates also are contingent upon providing documentation that the proper installation requirements have been met. Both the condenser and coil must be replaced or installed as a matched set as rated in the Air-Conditioning and Refrigeration Institute certified performance criteria. Rebates will be processed only if the installing contractor submits documentation that the air conditioner or heat pump has been properly sized and installed.

The program also provides contractor training offered through the Eastern Heating and Cooling Council. This portfolio of available training includes North American Technican Excellence (NATE) training and certification, *Manual J, Airflow and Charging* as well as other related contractor training.

PROGRAM PERFORMANCE

In 2006 the COOLAdvantage trained over 1060 HVAC technicians in courses covering air conditioning, air flow/charging, NATE refresher, ACCA Manual J and ACCA Manual D. Additionally, the Program achieved a milestone of greater than 5,000 technicians trained since inception of the Clean Energy Program (Years 2001-2006).

The table below summarizes recent program accomplishments:

Year	Participants	Annual Energy Savings (GWh)	Demand Reduction (MW)
2004	17,325	15.5	13.1
2005	17,710	15.0	12.7
2006	13,241	11.5	9.6

LESSONS LEARNED

This program has a long history in New Jersey, consistently raising the bar on HVAC efficiency requirements. Over that time the program has developed a strong awareness among trade allies, most notably manufacturers, distributors and contractors, who look to the program to guide the definition of high efficiency equipment and installation practices through the ever increasing program criteria. As these trade ally businesses have national and regional scope, the effects of the program go beyond state borders. Such things as product inventory selection and technician training are driven indirectly by the program.

The program has been supported through strong customer service efforts provided by each of the participating utilities in the past. Now, a single Clean Energy Programs Call Center provides direct customer support with on-line access to application status.

The program's requirement for best practice installation practices has helped to increase the quality of installations both in and out of the program by providing outreach and training to contractors. The COOLAdvantage Program was an early adopter of installation practice requirements including proper sizing, proper refrigerant charge and airflow. These same requirements are now common components of many other similar programs within the region and nationally.

PROGRAM AT A GLANCE

Program Name: COOLAdvantage

Targeted Customer Segment: Residential home-owners purchasing new central air conditioning or heat pump systems.

Program Start Date: 2001

Program Participants: 13,241 in 2006

Annual Energy Savings Achieved: 11.5 GWh in 2006.

Peak Demand (Summer) Savings Achieved: 9.6 MW in 2006

Other Measures of Program Results to Date: Program to date has trained over 5000 HVAC technicians in proper sizing and installation practices.

Budget: $14 million for 2007

Funding Sources: Systems benefits charge (SBC) – New Jersey Clean Energy Programs

Best Person to Contact for Information about the Program

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Residential Mechanical Systems Program
Exemplary Program

Cool Homes
Long Island Power Authority

PROGRAM OVERVIEW

Cool Homes offers financial incentives to homeowners and contractors for installation of high-efficiency, and properly sized and installed, central (split) cooling systems. These incentives are accessed through a network of approved participating contractors, who have received specialized training using the CheckMe! Quality Installation Verification (QIV) system.

Cool Homes began in 1999. Like many other programs of this type, the program prescribes performance requirement for qualifying high-efficiency cooling equipment that is over and above the minimum industry offerings. Verification of rated efficiency has been accomplished by a requirement that all equipment be rated and listed by the Air-Conditioning and Refrigeration Institute (ARI) and has been a feature of the program from the onset. In 2001 the program added a requirement that cooling loads and equipment size for all installations must be determined using the current version of Manual J made available by the Air-Conditioning Contractors Association (ACCA).

The program also features a robust quality assurance (QA) program that provides actual versus reported verification for equipment and equipment sizing, as well as provisions to ensure correct installation. The experience and analysis of the QA field inspection results illustrated the need for some type of QIV service. The QA efforts revealed that despite requirements for properly sized and energy-efficient equipment, poor quality installations were resulting in less than expected overall operating efficiencies.

From the onset it was realized that the actual operating efficiency of split systems may differ, and in most cases be lower, from the rated efficiency of the equipment. This less than rated operating efficiency is, in almost all cases, due to improper installation and in-field commissioning. As these split systems are essentially charged and commissioned in the field, most of the factors that contribute to operating efficiency are dependant on the installation contractor properly matching the refrigerant charge and the airflow over the indoor coil. Studies have shown that 82% of residential split A/C units are improperly charged, and it was determined that Cool Homes should institute a QIV system.

In 2006 CheckMe! services were introduced to the Cool Homes Program to further enhance the quality of the installation and increase the overall installation efficiency and cost-effectiveness of the program relative to incentives and avoided costs. With the inclusion of CheckMe!, the program now incorporates all necessary elements for assuring cost-effectiveness and realization of savings, namely:

- Verification of rated efficiency through ARI,

- Equipment sizing verification through ACCA Manual J,
- QIV through use of the CheckMe! System, and
- Regular QA inspections.

KeySpan Energy provides implementation and program management services for Cool Homes. Optimal Energy is a contractor to provide technical support and on-going cost screening of measures. Conservation Services Group is a contractor to provide quality assurance (QA) and training for installation contractors.

PROGRAM PERFORMANCE

Since its inception, Cool Homes has resulted in over 29 GWh and 43 MW of annual savings with the installation of approximately 40,000 qualifying central A/C units. Since inception the cumulative savings for the program are over 119.5 GWh and 168.4 MW. LIPA estimates that the quality installation practices can yield 23-38% energy savings per unit in 2006 depending on the SEER of the unit installed; such practices similarly are estimated to yield 18-40% demand savings (kW) per unit.

With strong initial participation in the program, it became evident that demand for energy efficient units was greater than expected. Due to this high demand, the focus of Cool Homes shifted to increasing the quality of installation, rather than increasing the number of participants.

LESSONS LEARNED

LIPA is on the cutting edge and leading the way for other programs with its QIV approach for residential split-system air conditioning units. Although the program has periodically increased the program's eligibility requirements, the demand (kW) and energy (kWh) savings per installation have increased with every such ratcheting up of new requirements. Thus while participation (as measured by number of units) has decreased over time in response to these stricter requirements, the overall program savings have remained fairly consistent. For example, the energy savings for the 2006 program year were near the savings for the 2001 program year (3,211 and 3,740 MWh respectively), despite 5,300 fewer participants.

The program continues to evolve and change in response to changing conditions and new opportunities. The latest significant change is underway as Cool Homes is being integrated with LIPA's Home Performance with ENERGY STAR Program (a residential comprehensive retrofit program) throughout 2007. This innovative approach is expected to result in comprehensive home efficiency improvements by offering incentives to homeowners that will encourage them to not only replace A/C systems with high efficiency systems, but also upgrade the shell of the building through increased insulation, duct sealing, and air infiltration reduction. The Cool Homes contractors will be expected to provide their customers with an information packet regarding the Home Performance program. The packet will contain general Home Performance information tailored to the Cool Homes customer perspective (i.e. highlight the benefits of Home Performance to A/C customers). In addition, the homeowner will receive a coupon (a $500 value

paid directly to the homeowner) that may be redeemed with the Home Performance contractor. If the homeowner elects to have Home Performance work completed, the referring Cool Homes contractor will be eligible to receive 2% of the value of the Home Performance work as incentive for making the referral. As part of the program integration, it is now a requirement that every A/C installation conducted through the Home Performance program, be Cool Homes compliant. This may be accomplished either by the Home Performance contractor using a Cool Homes contractor to complete the installation or that they themselves become one.

This integration of Cool Homes and LIPA's Home Performance with ENERGY STAR® programs is expected to increase the overall participation and effectiveness of both programs through leveraging of resources. It is this and further integrations that are expected to result in streamlined, comprehensive program offerings, allowing multiple points of entry. Another innovation for 2007 is the inclusion of high-efficiency ductless "mini-split" systems that now are eligible for incentives when installed by participating contractors. These systems are inherently efficient due to lack of distribution losses.

The Cool Homes program has successfully achieved a shift toward a focus on quality. This shift, obtained only through a careful balance of maintaining sufficient production levels to build demand, consistently increases the standard by which the work is performed.

PROGRAM AT A GLANCE

Program Name: Cool Homes

Targeted Customer Segment: Residential homes with split-system central air conditioners.

Program Start Date: 1999

Program Participants: 40,000 units since program start

Annual Energy Savings Achieved: 29 GWh annual savings in 2006; 119.5 GWh cumulative savings.

Peak Demand (Summer) Savings Achieved: 43 MW annual peak demand reduction in 2006; 168.4 MW cumulative savings for the program

Budget: $3.8 million (2007 budget)

Funding Sources: LIPA Clean Energy Initiative

Best Person to Contact for Information about the Program

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Residential Mechanical Systems Programs
Honorable Mention

Air Conditioning Installer Information and Training Market Transformation Program
Oncor Electric Delivery

PROGRAM OVERVIEW

The goal of the Oncor Electric Delivery Air Conditioning Installer Information and Training Market Transformation Program is to promote the sale and installation of high quality, energy-efficient air conditioning systems that operate efficiently in accordance with manufacturers' specifications. The program pays participating HVAC contractors a financial incentive of $300 for each qualifying system in either the residential new construction or residential replacement markets. Participating HVAC contractors also receive program-sponsored training, ongoing technical support, sales and marketing resources, feedback on the performance of their installations via the program's validation process, and an individually numbered certificate of installation for each address.

The Oncor Electric Delivery Air Conditioning Installer Information and Training Market Transformation Program employs several specific strategies and provides unique services to participating HVAC contractors. The program services include:

- *Financial incentives to HVAC contractors for the sale and proper installation of ENERGY STAR qualified air conditioning systems:* The program pays participating HVAC contractors a financial incentive of $300 for each qualifying system in either the residential new construction or residential replacement markets. Multiple qualifying systems installed at the same address may be submitted.

- *Turn-key support for participating HVAC contractors through sales/marketing tools, training and other resources.* To participate in the program, each HVAC contractor must successfully complete a required program-sponsored technical training course. The program has offered several courses, covering new and replacement HVAC installation, system design, duct sealing and sales training for high efficiency equipment. To meet the needs of the Texas air conditioning industry, several training courses have been conducted in both English and Spanish. Contractors also receive sales and marketing resources to help them promote and sell the benefits of a quality system installation. The program provides an individually-numbered certificate for each address, providing the contractor with unique third-party credibility in the eyes of the homeowner or homebuyer. Upon request by the contractor, program staff conducts sales training sessions for the sales staff of the contractor's homebuilder clients. Participating contractors are also listed on the Program's consumer Web site, www.saveuenergy.org.

- *Ongoing feedback about the performance of their installed systems:* Contractors submit key technical performance data for each system submitted to the program. The data for

each system is validated by an independent program validator, who is also a licensed HVAC contractor who operates outside the market area. The validator provides valuable feedback to the contractor regarding the data submitted and works individually with contractors when the data indicates that improvements in installation practices are needed.

- *Three levels of HVAC system validation by a qualified third-party validator.* As described earlier, a full review of each system's technical data is performed on all submitted systems. An additional on-site validation is performed on 20% of the systems submitted to the program. For each system selected for this additional validation, the program validator visits the job site to perform either (1) a visual inspection to confirm model numbers and proper duct sealing along with an evaluation of duct sizing, or (2) comprehensive diagnostic testing on a completed, fully operating installed system to measure total delivered Btu/hour and field-measured true power demand (Watts) and to compare these results to properly adjusted manufacturer's cooling performance data. Duct leakage is measured to ensure that it meets program requirements.

Oncor Electric Delivery first implemented the Air Conditioning Installer Information and Training Market Transformation Program in 2003. The program rollout followed a baseline study that was conducted in 2002 to determine current air conditioner installation standards and practices and to identify practices that, if modified, would improve the overall efficiency of HVAC systems throughout the service territory, resulting in lower peak demand and energy savings. Results of the study identified the need for consumer education, training for contractors, certifying qualifying contractors, best-practices incentives and the implementation of a formal program.

PROGRAM PERFORMANCE

Program market impacts of 8.9 MW were reported in 2006, based upon a market effects study of both participating and non-participating air conditioning contractors. The market effects were derived by combining study results with deemed savings methodology and installation data from units reported in 2006. Therefore, the market impact savings include units whose installation was influenced by the program, but were not submitted for incentive payments.

A total of 41 HVAC technicians successfully completed the 2006 program-sponsored training programs. Approximately 3,000 qualifying HVAC systems were accepted into the 2006 program. Working through participating contractors who operate in the residential new construction market, the program also recognized 14 homebuilders who actively promoted the benefits of a quality HVAC installation in their homes.

LESSONS LEARNED

The Oncor Electric Delivery Oncor Electric Delivery Air Conditioning Installer Information and Training Market Transformation Program is one of the few programs in the country that fully

addresses the impacts of not only energy-efficient HVAC equipment, but also the impact of the installation by the contractor.

The Program has continued to innovate and expand its procedures and services to meet the needs of participating HVAC contractors. For example, a procedural change was made to allow for partial verification of the contractor's submitted data for residential new construction at the rough-in stage, instead of delaying this until the final system start-up. This change helped minimize incorrect model numbers and address information earlier in the process and actually increased participation by contractors.

All of the Program's training courses have been approved for continuing education credit by the North American Technician Excellence (NATE) organization. The ongoing innovation of this program has been recognized by the Air Conditioning Contractors of America (ACCA) as being a significant influence on the development and introduction of its new Quality Installation (QI) national ANSI standard.

Since its inception in 2003, the Program has significantly enhanced its validation procedures to include comprehensive HVAC system performance testing on a selected number of submitted systems. The program has also expanded the range of training courses offered to participating HVAC contractors.

PROGRAM AT A GLANCE

Program Name: Oncor Electric Delivery Air Conditioning Installer Information and Training Market Transformation Program

Targeted Customer Segment: Residential HVAC suppliers and contractors

Program Start Date: 2003

Program Participants: 41 HVAC installers received training in 2006. About 3000 systems were accepted into the program in 2006.

Annual Energy Savings Achieved: 10.386 GWh in 2006

Peak Demand (Summer) Savings Achieved: 8.9 MW in 2006

Other Measures of Program Results to Date: 14 homebuilders recognized for promoting quality, efficient HVAC systems and installation.

Budget: $1.1 million in 2006

Funding Sources: Legislative funding—collected via distribution utility rates

Best Person to Contact for Information about the Program

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Residential Mechanical Systems Programs
Honorable Mention

Refrigerant Charge and Air-Flow Tune-Up Program
Pacific Gas & Electric

PROGRAM OVERVIEW

The Pacific Gas and Electric Company Refrigerant Charge and Airflow (RCA) Program uses verified service providers (VSPs) to recruit and train licensed C-20 air conditioning contractors to perform refrigerant charge and airflow tune-ups on residential and small business central air conditioning systems. This service, not widely provided before the advent of PG&E's program, can significantly increase the efficiency of air conditioning units, helping to lower energy costs and extend the life of the equipment.

Central air conditioning systems are major energy consumers that can account for a significant portion of summer energy bills. With an optimized cooling system, customers can save hundreds of dollars a year. To keep the cooling system operating at peak performance, it is important to have the system inspected every year by a licensed contractor and have the system recharged and the airflow checked as part of the tune-up.

Developed as a pilot program in 2004 and 2005 and formally rolled out in 2006, the RCA Program delivered thousands of documented and verified charge and airflow tests and corrections to residential and small commercial customers using licensed and trained contractors or technicians located throughout the PG&E service territory. The program is facilitated via incentives and rebates given to the VSP, contractor/technician, and customer.

A tune-up of an air conditioner includes:

- Checking of the unit refrigerant charge, fixing of all leaks, and recharging the system
- Checking of the cooling fan blades on the outside condenser coil unit and cleaning to be sure they are straight and free of debris
- Cleaning and lubricating the air conditioner indoor and outdoor coils and related equipment, including indoor and outdoor fan blades and checking the drive belts for wear and proper tension
- Testing of the air temperature difference between return and supply air

Without the intervention provided by the RCA program, this service is not a standard offering of most HVAC contractors, even though it offers significant energy savings potential. The PG&E RCA Program provides in-field training and upstream incentives to air conditioning and heat pump contractors throughout our service territory.

PG&E contracts with VSPs, who are qualified to recruit and train contractors to provide refrigerant charge and air flow tune-up and who validate the contractors' work and provide quality assurance. By increasing the number of trained technicians and making information

readily available about this test, the RCA program seeks to transform the market so that checking RCA becomes standard a part of routine maintenance for all air conditioners.

PG&E offers an incentive of $50 to $150 to contractors for each RCA tune-up they perform. This incentive allows contractors to offer this valuable service to end-use customers at a discounted price. Incentives are paid upon PG&E's receipt and approval of charge and airflow test-in and/or test-out results submitted by the VSP.

The program provides the contractors with an incentive option in reaching out to customers for enhancing the operation of the customer central air conditioning equipment. By having the work performed it increase the energy customers are saving thus reducing their electric consumption.

PROGRAM PERFORMANCE

In 2006 the RCA Program achieved savings of approximately 13.4 MW and 7.9 GWH. This is a high saving achievements during the program's first year. 2007 savings look equally promising. Through early December the program has achieved energy savings of more than 13.9 MW and 11.2 GWH

Since its inception in 2006, it has serviced more than 125,000 units. More importantly, it has played a major role in educating licensed C-20 HVAC contractors about the value of refrigerant charge and air flow tune-up, and the service's visibility and availability has increased significantly. As the program grows, RCA testing and recharging services will become a routine component of air conditioning maintenance services, resulting in significant customer energy and cost savings.

The RCA Program is one of the most cost effective programs in the PG&E portfolio. On average, 2007 costs are $0.49 per kWh for residential and $0.55 per kWh for businesses. This is a market transformation program which is more costly than a customer rebate program.

LESSONS LEARNED

This program is quite unique among utility energy efficiency programs. PG&E was one of the first utilities in the nation to offer contractor training and incentives for refrigerant charge and airflow tune-ups. Several other utilities have since adopted the PG&E program model to provide this service for their customers.

The RCA program helps consumers add value and save money through improved maintenance of their central air conditioning systems. The improved maintenance in this program also potentially extends the life of the equipment. Therefore the benefits of this program include lower customer operating costs, improved customer comfort, faster cool-down of conditioned spaces, life extension of the cooling system equipment and significant energy savings for the utility and the State of California.

PROGRAM AT A GLANCE

Program Name: Refrigerant Charge and Air Flow Tune-Up Program

Targeted Customer Segment: Residential and small commercial customers with central air conditioning/heat pump equipment.

Program Start Date: 2006

Program Participants: 125,000 units to date

Annual Energy Savings Achieved: 7.9 GWh in 2006 and 11.2 GWh in 2007

Peak Demand (Summer) Savings Achieved: 13.4 MW in 2006 and 18.9 MW in 2007.

Budget: $15 million, 2006-07

Funding Sources: California ratepayers through Public Goods Charge (PGC) funds

Best Person to Contact for Information about the Program

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