Designing an Early-Replacement A/C Rebate Program for High Energy Savings

Mike Schifman, Kansas City Power & Light, Kansas City, Missouri

ABSTRACT

Traditional residential air-conditioning rebate programs provide rebate incentives after equipment failure. This design, while easy to administer, provides low energy savings to the utility. In contrast, early-replacement incentive programs provide high energy savings by providing customers with instant-rebates to upgrade the efficiency of older A/C and heat pump systems before they fail. KCP&L's unique design provides utility-sponsored HVAC contractor training and paid incentives to recommission and upgrade older working equipment using a paperless in-field quality control system to verify proper refrigerant charge and airflow. KCP&L gains additional energy savings through the addition of compact fluorescent bulbs (CFLs) for customers that participate in the program. With a high focus on customer satisfaction, quality service, and verifiable energy savings, the management of early replacement incentive programs can be complex, but will provide many opportunities to reach customers in new ways and build strategic relationships with trade allies.

The Cool Homes program offers a unique design to effectively reduce energy consumption and gain measureable, cost-effective energy savings that provide immediate impact to the utility. The year-round program design offers HVAC contractors a unique sales tool to help increase business during shoulder seasons. As a result of the program's training requirement, contractors have increased their knowledge of system refrigerant charge and provided uniform services to customers regardless of the equipment.

Background

Most homeowners are unaware their system is running below optimum operating conditions until it malfunctions, resulting in wasted energy and inefficient cooling. Air conditioning equipment consumes a large amount of electricity during KCP&L's summer peak season and, as such, their use and operation can negatively impact the KCP&L electrical grid if the equipment operates below its intended efficiency rating.

It is well known that substantial benefits and energy savings can be gained from the early replacement of AC units. However, these benefits are not realized when HVAC contractors use unconventional methods to set the refrigerant charge on systems. Studies by Proctor Engineering Group have demonstrated that heating and cooling contractors improperly set refrigerant charge on residential systems over 65% of the time. (Proctor & Downey, 2002) Other factors such as ductwork, airflow, and equipment sizing add to the problem when contractors install new equipment. The effect of these unconventional methods can greatly impact the efficiency of air conditioning equipment over time.

KCP&L understood that in order to effectively design a program that captures the energy savings potential of replacing older cooling equipment, it must provide a uniform method for ensuring proper installation and commissioning of high Seasonal Energy Efficiency Ratio (SEER) replacement systems.

The Cool Homes program was created as a residential central air-conditioning and heat pump rebate program designed to reduce excess energy usage during the peak summer months and cut carbon dioxide emissions through the maintenance and early retirement of inefficient central air conditioning equipment. KCP&L issued a Request for Proposal in 2005, evaluated the bids, and selected Conservation Services Group (CSG) to administer the Cool Homes program.

Program Design Overview

The Cool Homes Program was designed to achieve three objectives: (1) Improve the operating efficiency of single and multi-family homes with central air cooling systems, (2) Reduce energy consumption for single and multi-family homeowners through the tune-up and early replacement of working inefficient cooling equipment, and (3) Achieve market transformation through HVAC contractor training.

KCP&L gains energy savings through various improvements to the efficiency of residential air cooling equipment. These improvements may be in the form of a tune-up or early replacement of an older, inefficient system. Through the Cool Homes program, residential customers are encouraged to have existing cooling systems evaluated, and if feasible, brought back to factory specifications (re-commissioned), or replace less efficient, working, central cooling systems with high efficiency central cooling systems before failure (i.e. early replacement).

The Cool Homes design combines "quality" installations of high efficiency cooling equipment and recommissioning services with compact fluorescent lights (CFLs) presented in an integrated fashion to produce energy savings:

1. Early retirement is intended to target replacement of SEER 6 to 8 equipment currently operating at an Energy Efficiency Ratio (EER) of 8.0 or below and replaced with new equipment rated at a Seasonal Energy Efficiency Rating (SEER) of 14 and above using quality installation practices.
2. Proper sizing and commissioning (charge and airflow) of new systems and recommissioning of existing systems using CheckMe!®, a process developed by Proctor Engineering Group.
3. Customers who request and receive a cooling system evaluation using CheckMe!® receive a FREE 6-pack of varying wattage compact fluorescent lamps CFLs.

To reach and motivate customers, the Cool Homes program employs two complementary marketing strategies: First, the vendor employs data mining techniques and building science analysis of KCP&L customer electric usage records to identify residential customers with a high probability of operating very inefficient central air conditioning equipment. The program personally contacts these customers using direct mail, telemarketing, and other methods, and connects them with a participating Cool Homes HVAC contractor of their choice. A second program strategy is to work with participating contractors to identify their own customers who would be good prospects for high efficiency cooling systems.

Addressing Market Barriers with Education

Certain barriers exist to the adoption of energy efficiency HVAC measures, including lack of financial resources, competition for funds with other household budget items, lack of awareness/knowledge about the benefits and costs of energy efficiency measures, difficulty of finding qualified contractors, and energy saving performance uncertainties. KCP&L's program was designed to help overcome these market barriers and encourage greater adoption of energy efficiency air conditioners in the residential market.

Several barriers are addressed through the program, but the most common is the higher price of high efficiency HVAC systems. The Cool Homes program provides incentives of up to $850 to the customer, offered through HVAC contractors to mitigate the additional expense. Overcoming the challenge of selling expensive equipment is addressed through education and training of HVAC personnel and customers about the financial benefits and energy savings that come from purchasing a high efficiency system.

The second barrier is HVAC contractor participation and support. Through education, in-field sales support and incentives to HVAC sales personnel, more high efficiency systems are promoted to customers and installed correctly because the sales person is more knowledgeable and they can communicate the

benefits to the customer. Additional support is provided through manufacturer and distributor relationships that help coordinate promotions and training for the same high efficiency technologies.

The third barrier is that customers, as well as many contractors, do not maintain and test their air conditioning equipment during service or installation to insure proper and efficiency operation. This lack of knowledge and motivation to test the units causes many systems to be under- or over-charged with refrigerant or not have proper airflow. This increases the customer's energy use and energy bill, and may lead to early equipment failure. It also causes unnecessary increased load on the KCP&L system at time of peak. Direct assistance is required to make appropriate equipment improvements.

Market Transformation through Education

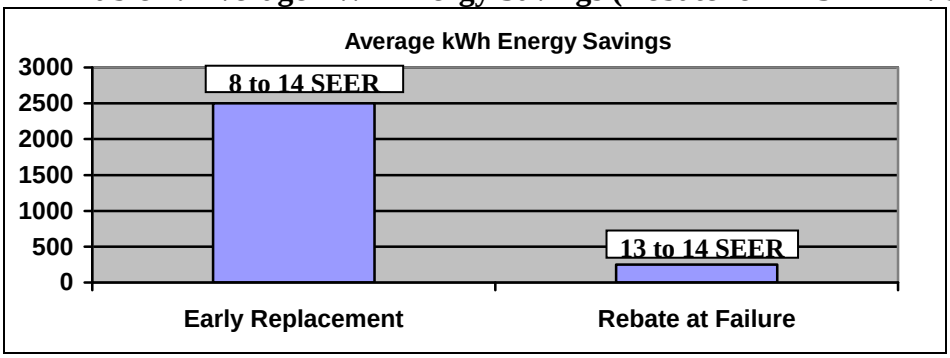
To overcome these challenges, KCP&L aims to help homeowners understand the benefit of cost and energy savings from installing high efficiency cooling equipment by providing tools to help HVAC contractors to sell above standard cooling equipment. The Cool Homes program further benefits contractors by helping to expand the level of expertise of local HVAC contractors in the areas of equipment efficiency, proper sizing, performance optimization of installed equipment, quality installation procedures, and methods for communicating and selling these benefits to residential customers. This is achieved through the training, certification, and use of Proctor Engineering Group's CheckMe!® system. Through offering this program, it is expected that, over time, contractors will provide improved service techniques without KCP&L intervention and contribute to a long term reduction in KCP&L peak.

KCP&L contributes to market transformation in other ways such as providing marketing support for contractors through the program. By providing short term incentives offered by the utility, contractors can build awareness, increase credibility for higher efficient equipment, and move the market toward accepting high efficiency equipment and their benefits, therefore adding to the potential for energy savings over time.

Early Retirement vs. Rebate at Failure

A majority of air conditioners replaced under traditional rebate programs are often times broken at the time of replacement. The energy savings attributable to these "rebate at failure" programs is calculated by the difference between a standard efficiency replacement unit (SEER 13 is standard as of January 2006) and the more efficient unit rebated. The Cool Homes program succeeds in capturing immediate energy and peak demand savings by targeting only eligible working cooling systems for early retirement-- instead of waiting until the equipment malfunctions or fails entirely, whereby the customer is forced to upgrade to a higher efficiency unit. The energy savings for early replacement is significantly greater when the program targets early replacement of equipment below a certain threshold (≤8.0 EER) instead of providing rebates for upgrading to higher SEER equipment upon failure, with few restrictions. This is shown in Table 1 below.

Table 1: Average kWh Energy Savings (Rebate for 14 SEER A/C)



Ensuring the Efficiency of Cooling Equipment

HVAC contractor personnel often fail to correctly install or maintain systems. In fact, up to ninety-five percent of residential and non-residential air conditioners have been found to not be performing to their original energy efficiency design specifications due to incorrect refrigerant charge, low evaporator coil airflow, duct leakage, or faulty diagnostic equipment. In large part, these failures are due to lack of training and lack of an effective mechanism for checking to ensure the system is functioning properly. There are substantial energy savings and peak reductions associated with ensuring air conditioners and heat pumps are installed and serviced in accordance with manufacturer's specifications.

HVAC contractor personnel receive little training due to the cost of lost production time and limited availability of energy efficiency related training. The limited training they do receive does not concentrate on correct system sizing, proper refrigerant charge and airflow, duct leakage, or energy efficiency measures. In many cases, the most common training contractors receive on the job is geared solely toward troubleshooting new equipment as it comes into the market.

CheckMe!®

Recent studies conducted by Proctor Engineering Group, manufacturers, and others suggest that the manner in which equipment is installed may have a much greater impact on actual operating efficiency than whether or not it has a high efficiency rating. The CheckMe!® system, was selected as a part of the Cool Homes design to ensure that air conditioner and heat pump commissioning consistently, effectively, and verifiably addresses the crucial factors of contractor training, equipment efficiency, and quality installation. The system used in KCP&L's Cool Homes program addresses these typical contractor problems by:

- Training each technician on manufacturers' methods in small groups (4 or less technicians).
- Incorporating manufacturers' specifications into an expert tracking system to ensure each unit is tested in the correct manner.
- Using direct contact between the technician and a phone center staffed with air conditioning and duct system experts to ensure proper testing and repair.
- Ensuring valid "test-in", valid diagnoses, and valid "test-out" through immediate checks of measured data and weekly statistical analysis of each technician's work.
- Enforcing program standards by de-certifying non-compliant technicians.
- Using a computerized expert system that is continually updated with the latest information on air conditioners and extended quality assurance processes.

On the implementation side, the on-site Cool Homes technician follows a specific procedure to test the equipment and phones the results into a hosted call center--which generally takes less than 2 minutes. At this dedicated call center, data is immediately entered into the computer expert system developed by Proctor Engineering Group to validate the efficiency of the equipment tested. The expert system immediately informs the technician of any adjustments or revisions necessary to have the installation/duct system meet the program standard. Any adjustments needed to bring the air conditioner or duct system into compliance with manufacturer standards is provided to the technician while they are at the job site. The process obtains all adjustment information and the final confirmation test information immediately from the technician and is immediately recorded into a database for program analysis and reporting

Quality Control/Monitoring

When dealing with any outside group that performs work on behalf of a utility rebate program, there is always a chance of inaccurate or fraudulent data that must be addressed. Quality control and monitoring

occurs in every step of the program's tracking system on charge and airflow optimization and technician performance, as well as random field monitoring by KCP&L and program management.

Homes eligible for receiving incentives are randomly selected and inspected for compliance to minimize fraudulent reporting. In addition, the program conducts random audits of technician paperwork using a unique ID that links them to every job performed. All new installations require that each application be signed by the technician and the model numbers for every job are confirmed as high efficient models according to Air Conditioning, Heating, and Refrigeration Institute (AHRI) standards before contractors are paid. In addition, the program utilizes statistical analysis of each technician's data to discern patterns that indicate "fudging" or "gaming" and three experts review the graphical representations of the 12 combined factors in this analysis. If any one of the experts expresses any concern, additional analysis and actions are taken to correct or remove contractors that do not adhere to program standards.

New Equipment

For new equipment to achieve proper energy savings, the Cool Homes program requires all new systems to have a matched indoor coil, proper refrigerant pressure, provide proper airflow across the coil, and be properly sized to the home using an Air-Conditioning, Heating, and Refrigeration Institute (AHRI) rating that verifies the equipment rating. There are several reasons for this:

Indoor coil - Having an indoor coil that is properly matched to the outdoor unit is critical to ensure the efficiency of the installed system. The efficiency for which both pieces of equipment are rated separately may not be achieved as a pair if they are incorrectly matched.

Refrigerant pressure - The potential energy savings of a high-efficiency system can be lost if the air conditioner is improperly charged. The results of Proctor Engineering Group's testing of more than 100,000 air conditioners and heat pumps show that systems are charged incorrectly more than 60% of the time. This is wasted energy that customers are not aware of and technicians frequently do not address.

Airflow across coil - The proper operation air conditioning systems depends upon providing the correct airflow rate through the indoor coil, usually listed by the manufacturer in cubic feet per minute (CFM) per ton of nominal capacity. Incorrect airflow and refrigerant charge level compromise the energy efficiency of air conditioners and heat pumps, causing them to operate below their designed efficiency and capacity and can render most standard tests for proper refrigerant charge invalid.

The Importance of Air Conditioner & Heat Pump Size - In the Midwest, there is a tendency for contractors to oversize equipment due to the humid and often unpredictable climate. This is further complicated by an accepted customer belief that "bigger" cooling equipment is "better" and more efficient. Often times, higher tonnage equipment that is improperly matched to the size and thermal characteristics of a home will not remain on for a long enough period of time to effectively remove the moisture in the home, leading to decreased comfort and increased equipment strain over time. The Cool Homes program provides participating contractors with training in the use of ACCA Manual J and Manual S and requires that contractors follow these procedures to ensure replacement air conditioners or heat pumps are correctly sized.

How the Cool Homes Program Works

The Cool Homes program provides both customer service and energy savings to KCP&L's customers. The process begins when the customer has expressed interest in the program, and schedules an evaluation of their central air conditioner or heat pump.

Early Replacement Incentives: (replace old cooling systems with high efficiency equipment)

After performing a series of tests to evaluate the cooling system's efficiency, a KCP&L Cool Homes HVAC contractor will determine if the equipment qualifies for KCP&L's replacement rebate. The initial CheckMe! test performed on each unit determines whether the unit is operating within manufacturer specifications. If the unit is not, it should be repaired in order for the program to claim savings. An instant rebate of $650 or $850 is available depending on the efficiency rating of the new equipment. KCP&L requires that the customer invoice must indicate the KCP&L rebate as a separate line item.

Tune-ups: (re-commission existing equipment to run as it was intended by the manufacturer)

Customers with equipment that is performing with low efficiency will receive "partial" tune-up services for free. This includes limited airflow repairs if the initial test indicates that the air conditioner/heat pump has deficient airflow and a refrigerant charge adjustment if the initial test indicates that the cooling system does not have the correct amount of refrigerant (up to 1 pound of refrigerant may be added or removed). KCP&L requires that the customer invoice must indicate the first pound of adjustment was provided free of charge to the customer. Customers may be quoted for any work above and beyond these services needed to bring the equipment back to manufacturer specifications.

Free CFL's: (reduce energy usage by replacing incandescent lights with energy savings bulbs)

Every customer who goes through the initial diagnostic visit will receive a free "variety 6-pack" of varying wattage compact fluorescent lamps (CFLs) in the mail from KCP&L, adding to the savings achieved through this program.

Customer Service & Follow-up

Within one week of the CheckMe!® evaluation, customers receive a packet from Proctor Engineering Group. This packet helps enhance the customer/contractor relationship and establishes additional contractor credibility. Within the packet is three items that contribute to the program's customer experience:

1. A Customer Certificate with printed customer and contractor information, pre-repair and post-repair test results, and a description of the work performed. This third party feedback and confirmation helps increase contractor accountability for what actually happens at the job site.
2. A Customer Education Piece that explains the value of the services performed, the importance of having similar service on all future transactions, and other suggestions to further increase and maintain the efficiency of their system.
3. A Customer Satisfaction Survey printed on an easy to complete, postage-paid postcard. This enables KCP&L to target improvements to the program while enabling valuable feedback for contractors to understand how the customers perceive the services received.

Program Goals and Savings

The Cool Homes program is designed to save at least 23,000,000 kWh over five years and reduce system peak demand by at least 12 MW on a diversified basis. It is expected to deliver over:

- 14,000 initial diagnostic services through CheckMe!®
- 7,800 corrections of charge and airflow on existing units ("re-commissioning").
- 3,500 systems replaced before failure with SEER 14.0 and above equipment.

- 71,000 ENERGY STAR® Compact Fluorescent Lamps (CFL's).

Rebates and Incentives

The Cool Homes program provides contractors with incentives to provide recommissioning and quality installation practices and customer rebates offered exclusively through participating Cool Homes HVAC contractors to help offset the early replacement equipment costs.

Customer Incentives:

KCP&L customers, who use participating Cool Homes HVAC contractors to test, repair, and/or replace working cooling systems with high-efficiency equipment rated at 14 SEER or above may be eligible for a rebate after certain criteria are met. Customers must have a central A/C or heat pump system in working condition and only systems with a nameplate or operating EER of 8.0 or less are eligible for replacement. Under the Cool Homes program, existing units that do not meet the nameplate EER threshold (8.0 EER or less) are not eligible to be replaced unless the operating EER is 8.0 or less and refrigerant charge is correct.

Rebates are applied (per cooling system replaced), toward the purchase of either a high-efficiency A/C or heat pump when evaluated and installed by a Cool Homes HVAC service contractor. Customers that qualify for the early replacement incentive may receive $650 for upgrading to an AHRI rated SEER 14 or 15 high-efficiency system and $850 for upgrading to a 16 SEER or above system.

Contractor Incentives

A key feature of the Cool Homes program design is to pay incentives directly to the HVAC contractors rather than to use a consumer rebate approach. The program achieves several benefits by giving contractors direct control of the incentives:

- ***First***, it allows the contractor to embed the incentive in the value proposition the contractor presents to the customer and to combine it with manufacturer promotions.
- ***Second***, it makes it easier for the customer to buy, as the customer need pay only the price net of rebate rather than fronting the full amount and receiving the rebate portion later.
- ***Third***, it reduces the number of payments the program makes by aggregating them at the contractor level.

The program administrator pays a $35 incentive to the contractor for each system tested using CheckMe!®, which is typically 1/3 the cost of a service visit. Contractors may also receive an additional $45 upon completion of proper airflow and coolant recharge if the system requires it. This incentive is paid only once, as the contractor is required to perform initial refrigerant charge adjustments on new installations.

To address the inefficiencies of existing equipment in the market, KCP&L customers are also allowed a one-time maintenance tune-up, even if they do not purchase a new system. If the cooling system can be brought back to manufacturers' specifications, limited services such as recharging the cooling refrigerant, providing non-ductwork airflow adjustments and basic air filter cleaning or replacement may be provided by the contractor as part of the service incentive provided by KCP&L. (If repairs are needed to service the equipment, customers will receive a quote for additional costs.)

Verified Energy Savings

Customers that participate in the Cool Homes program may be offered a tune-up during regularly scheduled maintenance contracts, as a method to acquire new business, or as part of the installation of new

equipment. The verification of proper charge and airflow contributes to the total energy savings of the program, by adding efficiency gains normally lost from installing new equipment improperly.

Contractor Enrollment

One aim of the program is to work with the local residential HVAC contractor community and determine which contractors will be most likely to succeed in this type of program environment.

Many contractors attracted to programs like Cool Homes are quality providers selling name brand equipment. They typically complain of losing business to "bottom feeders" who offer low first-cost and little else. These quality contractors typically have already demonstrated an aptitude and desire for high levels of training, adoption of new technologies and methods, and are computer savvy. These contractors may be North American Technician Excellence (NATE) certified or attend local HVAC industry organization meetings such as the Air Conditioning Contractors of America (ACCA).

Contractors who fit this profile will often already be in one of the "elite dealer networks" coordinated by major manufacturers. These networks are comprised of dealers the manufacturer recognizes for keeping their technicians' training up-to-date, and who maintain high levels of customer satisfaction. This is often tracked through independent customer satisfaction studies.

One of the lessons learned by CSG in other implementations is that it is imperative to sign-up quality technicians in a market early. To engage the HVAC contractor community early, KCP&L hosted an informational breakfast and lunch meeting in March 2007, before the start of the busy spring tune-up season in the hope that contractors could sign up for training early. The awareness created through direct mail and telemarketing to the HVAC market generated over 160 technicians from 28 companies at the introductory meeting. 155 technicians were scheduled for training and became certified. By the end of 2008, the Cool Homes program had a total of 79 companies and 305 technicians certified in CheckMe!® quality assurance.

Key Contractor Program Eligibility Requirements

During the development of the program, it was established that KCP&L's program should provide training that is actually used in the field and not quickly forgotten. A "use it or lose it" philosophy was key to developing program eligibility requirements for contractors. The theory is that any training provided by the program should be put to sufficient use as quickly as possible to reinforce the approach, justify the training investment, and warrant training for additional technicians. To that end, it was determined that contractors must commit to having each trained technician complete 10 KCP&L customer units using CheckMe!® within the first 45 days of training. The initial training is hosted free by KCP&L and is a one day commitment, covering both classroom and field instruction – up to 4 technicians can be trained at once.

Equipment Testing

One overlooked contributor to inefficient, poorly performing residential air conditioning equipment is the gauges and diagnostic equipment used to test them. As part of the training process that Proctor Engineering Group provides for the Cool Homes program, every gauge, temperature measuring device, hose and thermocouple is examined and tested during the training and required to be tested monthly.

During the training classes in 2007 and 2008 training, it was found that, on average, one out of every four technicians had inaccurate equipment! The 25% energy savings gained from testing for and eliminating faulty gauges can be truly astounding, but it could be easily assumed that a substantial loss in energy savings throughout the city could be attributed to technicians using faulty diagnostic equipment.

Mandatory Market Transformation

During 2007 and 2008, KCP&L spent considerable effort and resources reaching out to contractors and customers to make them aware of the program. Although not every contractor business could be reached, once the program had trained a majority of the contractor market, the program began receiving additional requests for training that were not a result of the original outreach.

Of those originally targeted for inclusion within the program, the contractors that chose to delay or decline participation in the Cool Homes program quickly discovered that KCP&L's rebate program made it increasingly difficult to stay competitive. In fact, several non-participating contractors approached KCP&L during the summer of 2008 only after they learned they were in jeopardy of losing a sale, and could not offer KCP&L's rebate to their customers. During 2008, KCP&L received several calls from contractors previously solicited for the program that were desperate to enroll in the program only after their customer threatened to go to a participating Cool Homes contractor instead, in order to get a rebate.

Within one year, KCP&L had enrolled so many contractors that a peak in market saturation (of participating contractors) was inevitable. The utility had introduced a program into a market that gave participating contractors a competitive edge over non-participating contractors. Market transformation was achieved by training a majority of the city's contractors because it required contractors to comply with a process that ensures the efficiency of new and existing equipment in order to be eligible to offer a rebate.

Lead Referrals to Contractors

One benefit to contractors enrolled in the program is that KCP&L distributes customer leads to participating companies that have demonstrated both a commitment to the program in terms of the volume of work done, and results achieved in 2007 and 2008.

All eligible HVAC companies that agree to participate in the lead referral process will receive leads; however, participation in the customer referral process is completely voluntary. Eligible HVAC companies that agree to accept referrals are required to agree to the following:

(1) Attempt to contact the referred customer within three business days,
(2) Provide the basic CheckMe! ® service at no charge to the customer; and,
(3) Communicate the status of the customer referral to CSG on a weekly basis in a defined format.

The program advertises the Early Retirement aspect of the program directly to segments of KCP&L residential customers in the spring and fall seasons. This marketing seeks to identify residential customers with older, inefficient systems that would be eligible for incentives and are interested in upgrading their equipment.

Leads are then distributed to eligible HVAC companies based upon a ranking system that includes the percentage of CheckMe!® jobs needing "repair" that actually get repaired, the total number of early retirement systems installed in the previous six months, the percentage of eligible early retirement units that get replaced, and the percentage of leads distributed to contractors that result in an early replacement.

To ensure fair distribution between companies, lead referrals are distributed based upon a company's rank with higher ranking HVAC companies. Higher ranking companies receive more leads than lower ranked HVAC companies do on a weighted basis. As referrals are distributed through this process, the percentage of referrals that have equipment eligible for replacement are added to the criteria so that a disproportionate number of leads are referred to contractors.

Program Startup Challenges & Lessons

Several lessons can be learned from the process of implementing an energy efficiency program. Every program is unique, and has various challenges that must be overcome during the startup and

maintenance of a multi-year program. Vendors and Program Manager within the utility each contribute to success or failure of any energy efficiency program. Success, often times, will come from the ability to anticipate challenges and address them before they occur. KCP&L, CSG, and Proctor Engineering Group each learned several lessons during the startup and implementation of the program.

Lessons Learned: Winter

After the first year startup of the program in the summer of 2007, outdoor fall temperatures dropped sharply, making it difficult to test and service air conditioning equipment even before the fall season. By October, temperatures had fallen so much that the program was set to cease for the winter season, due to the fact that systems could not be tested below 55°F degrees. KCP&L soon learned that this would greatly impact contractors who were hoping to sell replacement systems during the winter.

The program soon began hearing complaints from contractors from customers planning to wait until the spring to test their systems and get a rebate through the Cool Homes program. Because the program was designed to help contractors through the shoulder seasons and not interfere with their ability to sell, KCP&L's Program Manager decided to make swift changes to the program so that a good relationship with the contractor community could be maintained. This required a new winter policy that allows contractors to qualify older systems and provide rebates for new equipment during the winter.

To make the winter policy work, any potential contractor and KCP&L risks needed to be addressed. Contractors required timely reimbursement for a rebate given to a customer in good faith, which the program would repay, and KCP&L needed a method to ensure each cooling system adhered to the guidelines established in the program and tariff, while reducing the likelihood of fraudulent activity. A new Winter Policy was established with strict requirements that allowed for work to be performed during the months of November to March. This policy proved very successful during the fourth quarter of 2007, producing a 500% increase over the previous quarter in the number of systems replaced during the final three months of the year.

About the Winter Policy Requirements

The Winter Policy under the Cool Homes Program was designed to allow for replacement of equipment under two circumstances: 1) if the equipment had already been tested under the Cool Homes Program earlier in the year, and met the EER requirement of 8.0 EER or less; or 2) the equipment had not previously been tested, the name plate information is called in for a reservation and qualifies for replacement. The nameplate information must establish that the EER of the existing equipment is equal to or less than 8.0, however, if there is no nameplate information, or it cannot be identified, the unit does not qualify under the Winter Policy.

Year round the guidelines indicate that at the time of the sale, contractors must pass along the rebate to only the air conditioning equipment portion of the invoice as line item which reads" KCP&L Cool Homes rebate". Under the winter policy, contractors must agree to return to the customer's home to properly commission the new unit during the spring months. The Spring commissioning visit must be called into a toll-free number, and in the event a unit is not properly commissioned by May 15, the contractor will be required to repay the Cool Homes Program for the rebate amount. Failure to properly commission any new units would result in termination from the Cool Homes Program. Any qualifying replacement equipment was required to have an Air Conditioning, Heating, and Refrigeration Institute (AHRI) rating of 14.0 or greater and be commissioned between April 1st and May 15th to avoid program termination.

To determine equipment eligibility under the Winter Policy, KCP&L mandated that contractors call the CSG call-center for a "reservation" during the winter months and report that a "non-dead" central air conditioning unit is being proposed for replacement in conjunction with a heating system. At the time of the

reservation phone call, Cool Homes program staff would verify nameplate information and the contractor would be informed that the unit would be subject to an on-site verification visit before installation. Before removing the old system, contractors were required to phone in the equipment information at least 48 hours prior to the removal of the old equipment to allow for this. Every system eligible during the winter policy was spot-checked to verify the existing equipment was authentic and no fraudulent activity was found.

Marketing

There are approximately 450,000 Residential Accounts in the KCP&L service territory distributed nearly equally between Kansas and Missouri, of which approximately 250,000 are single-family homes. The program's direct marketing efforts focus on targeting high-cooling intensity customers who own their own homes, and are able to afford the cost of replacing their system.

Program promotions are centered on residential customers who are likely to have inefficient cooling equipment and to HVAC contractors who are likely to adopt a combination of technical and business practices that will lead to success in the program, including direct marketing of program offerings to their customers as a tool to recruit new customers.

Marketing Materials and Contractor Portal

To be successful from the start, it is recommended that all marketing materials be developed before the program is initially offered to utility customers. Any materials developed after the program starts, make it challenging to serve contractor and customer demand. Throughout 2007, the program created materials to kick start the program such as a, Cool Homes "program" logo, packaging labels for the free 6-pack of bulbs, CFL bulb information sheets, 1-page fact sheet for consumers, event flyers, contractor solicitation letter, and web page. The second half of the startup program year focused on the remainder of start up materials for the Cool Homes program, including stationery, a more robust web page presence, a program overview tri-fold brochure as well as smaller items necessary to support internal KCP&L initiatives through year end.

To better assist the HVAC contractors enrolled in the program, an online contractor portal was launched in the third half of 2008. With the Cool Homes contractor portal, certified contractors receive access to Cool Homes sales and marketing materials, centralizing the location of all informative materials pertaining to the program, and encourages non-certified HVAC contractors to register in the program.

Phase Two of the customer portal currently scheduled for 2009, and will include the addition of an online "Print Store" to the micro-site. This will allow certified contractors to customize their Cool Homes marketing materials such as the Cool Homes customer fact sheet, new program brochure mailers and other promotional materials, and upload customer lists for customized direct mail.

Targeting the Ideal Customer

One of the most unique aspects of the Cool Homes program is the method by which customers are segmented and profiled for marketing. CSG created a logit model using KCP&L's customer electric usage data to identify customers with a high probability of operating less efficient central air conditioning equipment. The variables of the logit model include: Cooling Energy Consumption, Home Vintage, Cooling Energy Intensity, and Square Footage. These variables are shown to be good predictors of which homes will participate in Cool Homes Early Retirement. When constructing the model, the variables were not significantly correlated to each other as to cause a bias in the model. The top probabilities from a sampling of households in KCP&L's customer database were chosen and homes that were built after 1996 were removed from the final selection of the list of candidates for marketing due to having newer equipment**.**

Results of the Analysis

The results of CSG's econometric analysis on KCP&L's customer base in Kansas and Missouri found several interesting things. Among those, CSG found that age of the home was the strongest indicator of determining participation in early retirement. As the age of the home (year built) increases, so does the probability of participating in early retirement.

The next strongest indicator of participation is cooling load. As cooling load increases, the probability of participating in early retirement increases. Although, square footage has a non-linear relationship with participation, as square footage increases, so does probability of participation, but homes become less likely to participate when their size is above 5,000 square feet. When cooling load per sq ft (cooling energy intensity) is factored into the analysis, it was also found to have a positive relationship with probability of participating.

To ensure accuracy of the sample generated from the logit model, a profile was generated at the end of 2007, by analyzing the 263 homes that had already participated in the Cool Homes Program. The profile found that, on average, participant homes were different in size and cooling load than KCP&L's general population. Analysis of 2007 program participant data allowed CSG to build a household profile into the model employing the house characteristic, age of home, and electric consumption data. Households in the KCP&L territory that closely matched the profile of past Cool Homes Program participants were among the first tier of those targeted for the mailing.

After running the analysis in mid-2008 with a sample of 720 program participants using the econometric logit model, the resulting "ideal" customer profile changed as shown in Table 2 below. Homes selected by the new model suggested that the ideal target household was, on average, significantly larger, newer, used more electricity and had a higher cooling load than average homes in the sample of participants that had upgraded their system in 2007. Later, the list of target customers was further refined by running the data through a "neural network" model to identify probabilities of customer participation. A final list of target customers was identified, ranked, and segmented by tier for targeted marketing and lead distribution through the program.

Table 2: Logit Model Selection

Household Information	2007 Participant Homes Sample of 263 (Average)	2008 Logit Model "Ideal" Profile Sample of 720 (Average)
Square Footage	2,215	2,782
Year Built	1973	1986
Base Electricity Use (kWh)	10,219	11,387
Cooling Electricity Use (kWh)	3,915	4,525
Total Electricity Use (kWh)	15,735	17,338
Household Income	$50k-75k	$50k-75k
Average Age Head of Household	59	56

Overall Results and Energy Savings

Since early 2007, the Cool Homes program has grown very quickly. As of December 2008, the program has outperformed its expectations and aggressive goals. Of the 4,386 homes that had been visited since tariff approval in March 2007, CheckMe! analysis has been performed on 4,743 systems, of which 1,709 systems were recommissioned, 1,344 air conditioners and heat pumps were replaced with high efficiency units, and 4,436 homes received CFL 6-packs through the program. Based on available program tracking data, it is estimated that over 7,600,000 kWh has been saved through the program.