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Process and Market Evaluation of Southern California Edison's Appliance Recycling Program 2006 - 2008

A Report Prepared for
Southern California Edison

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Origins of the Study

This study was conducted at the request of Southern California Edison. The California Public Utilities Commission approved the request. Southern California Edison managed the study. It was funded through the public goods charge (PGC) for energy efficiency and it is available for download at www.calmac.org.

Executive Summary

Introduction

The Appliance Recycling Program (ARP) is available to eligible customers on a first come first served basis in the Southern California Edison (SCE) service territory.

In 2006-08, the program targeted residential customers to prevent future use through retention or transfer of inefficient but functioning (meaning still cooling) 10 to 27 cubic foot refrigerators and/or freezers. The primary goal of the program is to use monetary incentives and free pick-up to induce customers to have the appliances removed from their premises. Additional goals are to educate customers about the energy efficiency and energy savings benefits of recycling older refrigerators and freezers and the non-energy benefits from recycling in an environmentally friendly manner.

Key Goals of the Evaluation

The goals of the evaluation were to examine responses to the recommendations from the 2004-05 study, assess the effects of changes to the program including changes to the logistics system, assess changes in customer response to the program and the characteristics of the customers using the program, examine changes in customer disposal practices, examine cancellation rates and changes to the cancellation rates, assess changes in elapsed time from the request for an appliance removal to actual removal, examine the used appliance market to see if intervention in that market is warranted and if program assumptions about it are correct, and assess the opportunities for partnering with appliance dealers to reduce costs and increase the number of refrigerators being removed.

Key Activities of the Evaluation

The major activities of this evaluation included the analysis of participant data, in-depth staff and contractor interviews, a survey of 454 randomly selected participants, a survey of 400 randomly selected households that signed up for the program and then cancelled, and a survey of 400 randomly selected households from among SCE residential customers who had disposed of a refrigerator by any method since 2005. There was also a more qualitative survey of used appliance dealers, an examination of retailer refrigerator deliveries and removal, and investigation of a retailer program in another jurisdiction.

Findings of the Evaluation

The following summarize the key findings from this study.

Appliance Recycling Program Use

- The program removed 69,052 units in 2006 (86 percent were refrigerators), 60,315 units in 2007 (87 percent were refrigerators), and 90,242 units in 2008 (88 percent were refrigerators). The 50 percent increase in 2008 was largely a function of the availability of funding and more intense marketing.
- Thirty-eight percent of all units were more than 15 years old, 52 percent were 10 to 15 years old and 11 percent were less than 10 years.
- Forty-eight percent of the collected units were between 15 and 19 cubic feet and 34 percent were between 20 and 24 cubic feet. The percentage of units in the 20 to 24 cubic feet category increased between 2006 and 2008 (from 32 to 37

percent), while there was a decline in the percentage of units between 15 and 19 cubic feet (51 to 45 percent). This is in line with national trends.
- The highest percentage of units had amperages of 6 to 9.9 amperes (69 percent). This is due to larger units being collected. The percentage for this category increased from 63 to 73 percent from 2006 to 2008. This is in line with national trends.

Characteristics of Households

- Seventy six percent of participants owned their home.
- The median square footage of households participating in the ARP was 1,977 square feet. The most common size of participants' homes was in the range of 1,000 to 2,000 square feet (43 percent).
- About 42 percent of participant households had one or two residents.
- The largest percent of participants had lived in their homes for less than five years. The next highest percentage had lived in their homes for 21 years or more.
- About 34 percent of the participants had remodeled their home in the last five years.
- The most common household income category for those who participated was $25,000 to just under $50,000 (24 percent).
- The average number of refrigerators in a participant household subsequent to the removal was 1.39 and the average number of freezers was 0.38.

How the Program Is Marketed

- SCE changed its marketing strategy so that it is now using multiple channels and multiple messages.
- Forty-nine percent of participants heard of the program through the utility (31 percent came from a bill insert), 17 percent were referred to it by a friend/neighbor, 12 percent heard about it from an appliance store, and 11 percent hear of it through the media.
- There is evidence that drop mailings resulted in a response of about 1,200 new appointments per mailing.
- In the 2004-05 survey of disposers in the general population, 58 percent of the disposer households were aware of the program. In the 2009 study, 70 percent of disposers in the general population were aware of the ARP program. In other words, awareness increased primarily due to enhanced marketing.
- Among those who did not use ARP but disposed of a unit, lack of awareness was the biggest reason for not participating (29 percent), followed by disposing of the unit through the dealer from whom they bought a unit (27 percent), giving the unit away to a friend or relative (21 percent), wanting to retain the unit for future use (16 percent), inconvenience (12 percent), and the unit was not working (11 percent).
- Comparing refrigerator disposers to freezer disposers, freezer disposers were more likely than refrigerator disposers to have heard about the program from the utility (60 percent compared to 47 percent). Refrigerator disposers were more likely to have heard about the program from the appliance stores (13 percent compared to 6 percent) and referrals from friends/neighbors (18 percent compared to 10 percent).

- Customers who had heard about ARP were most likely to have heard about it from the utility but customers who disposed of a main refrigerator (44 percent) were less likely to have heard about it from the utility than those who disposed of a secondary or a spare (54 percent). Those who disposed of main were more likely to have heard about the program from an appliance store (14 percent) than those who disposed of a secondary or spare (8 percent).
- Among disposers in the general population, 97 percent of the disposers who had participated in ARP indicated that they would be very likely (87 percent) or somewhat likely (12 percent) to participate in the future. Eighty-two percent of disposers who were previously unaware of the program said they would be very likely (49 percent) or somewhat likely (32 percent) to participate in the future. Sixty-two percent of disposers in the general population who knew about the program but did not dispose of unit through the program said they were very likely to participate in the future and 30 percent said they were somewhat likely to participate.

Motivation to Participate

- Program participants mentioned the $50 incentive most frequently as the primary motivating factor (55 percent), followed by convenience (44 percent), and the environment (17 percent). In the 2004-05 study the corresponding percentages were 46 percent for the incentive, 65 percent for convenience, and 22 percent for the environment. The incentive has become more important. This may be because of the economy or because of the increased penetration of the program into the market. Only four percent of the respondents cited the importance of the savings on the electric bill even though on an annual basis the savings are typically six times as large as the incentive.
- When asked if the incentive was essential to their participation, approximately 71 percent of the respondents said that they would have participated in the ARP without the incentive compared to 81 percent in 2004-05.
- The incentive appeared to be a bigger motivator for ARP disposers of spare compared to main refrigerators (62 percent compared to 52 percent) and convenience and the environment were more important for disposers of main refrigerators.

Having a Second or Third Refrigerator

- A secondary analysis of the HEES data suggests that second and third units are relatively young, that is, less than ten years old. Second, and especially third units, are much smaller than first units with the majority of third units being the mini or very small units. This suggests second and third units are not just older refrigerators left over from earlier refrigerator transactions but may be deliberate purchases. This may explain why it is difficult to get households to give up second and third units.
- The HEES analysis also shows that 2500 square feet is the point where the percentage of 2nd and 3rd refrigerator households is greater than the percentage of single refrigerator households. Twenty-five hundred square foot households and above might be a good break point for targeting second refrigerators.

How Refrigerators are Disposed and the Penetration of the Program among Disposers

- The percentage of units captured by ARP between the 2006 study and the 2009 study has almost doubled (15 percent to 28 percent).
- From 2006 to 2009, the number of transfers being taken by dealers has increased by about a fifth from 21 percent to 26 percent.
- From 2006 to 2009, the number of units being given away to friends and neighbors has declined by about 20 percent (29 percent to 23 percent) and the number of units being sold has dropped by about 60 percent (11 percent to 6 percent). This is significant because units that are sold or given away are likely to continue to be used.
- From 2006 to 2009, the number of units being junked, taken by a recycler, or taken to the landfill has declined from 18 percent to 14 percent.
- In the absence of the program 44 percent of ARP participants would have given the unit away, 23 percent would have taken it to dump/recycler, 13 percent would have had the dealer remove it, 12 percent would have sold it, and six percent would have kept it.
- In the absence of the program approximately 64 percent of the units removed through the ARP would have remained in use, 32 percent would have been de-manufactured, and four percent are unknown.
- With the ARP, approximately 63 percent of disposed units are removed from use, while without it, only 42 percent of units would be removed from use.

Program Satisfaction

- In general, program satisfaction did not vary a great deal from the previous study. This is because satisfaction levels were already quite high. There were some changes as noted below.
- In terms of the overall service, 84 percent of 2006-2008 ARP participants were completely satisfied and 94 percent were somewhat satisfied or completely satisfied with the service.
- The overall satisfaction with the ARP sign-up experience increased between the 2004-05 survey and the 2006-08 survey with completely satisfied customers increasing from 83 percent to 86 percent.
- Customers who signed up over the telephone were more satisfied than customers who signed up online (88 percent of completely satisfied customers versus 83 percent of completely satisfied customers). This is a reversal from 2004-05 when the on-line customers were more satisfied.
- Ninety percent of customers were completely satisfied with the pick-up experience. Satisfaction with the overall pick-up experience declined slightly from 93 to 90 percent between the two program periods.
- In terms of information gaps, 31 percent people who disposed of a refrigerator but did not use the program were unaware that keeping and using an old unit could cost up to $300 a year, 18 percent were unaware of environmental effects of refrigerant, and 26 percent were unaware of the recycling process in the program.
- Ninety percent of ARP customers said they learned everything they wanted to know about the program before participating.
- At least 94 percent of the customers who signed up by telephone said that during the scheduling process the representative was polite and courteous, the

representative was able to answer all their questions, and a convenient time for pick-up could be scheduled.
- Ninety-nine percent of customers who signed up online stated that they were able to schedule a pick-up appointment for a convenient date and time, 96 percent stated that the website answered all the questions that they had, 93 percent said they received a confirmation e-mail, but only 87 percent said the website was easy to find.
- With respect to pick-up, 88 to 95 percent of the customers said the representative arrived on time, was polite and courteous, and appeared neat and professional.
- Eighty-two percent of customers remember receiving a call one to two days in advance of pick-up.
- Seven percent thought that the time between schedule and pick-up was too long.
- Five percent of respondents said they did not receive an incentive check.
- Twelve percent said that the time between pick-up and receiving the check was too long.
- Over all, the incentive appears to be the right amount.

Changes to the Logistics System

- The change to the Enerpath logistics system has significantly decreased the time from scheduling to pick-up.
- The average pick-up time was 15 days for the 2004-05 program, and less than 14 percent were picked up in under a week.
- From January 2006 to June 2007, the pick-up time was reduced to 10 days, and approximately 45 percent were picked up within 1 week.
- With the Enerpath system, the average pick-up time was reduced to seven days in the last two quarters of 2007 and five days in 2008.
- In 2008, 78 percent of units were removed within a week after scheduling and 40 percent were removed within three days.
- The Enerpath system has features that serve to enhance the overall quality of the data collected.
- The Enerpath system does need some fine-tuning, in particular, the number of categories for the age variable need to be enhanced and it might be easier to do trend analysis in the future if “birth year” rather than age were captured. It might be beneficial to scan or take a picture of the nameplate rather than a picture of the unit. However, there may be difficulties with getting a usable image and many older units do not have barcodes.

Program Cancellations and The Cancellation Survey

- During the 2006-08 program years, there were nearly 50,000 canceled orders representing 52,000 units.
- Over the three-year period, cancellations averaged 19 percent of all orders. However, the cancellation rate declined from 21 percent in 2006 and 2007 to 17 percent in 2008.
- Customers who signed up over the Web cancelled slightly more often (22 percent) than those who signed up over the telephone (19 percent).
- Customers who cancelled their unit were far likelier to have units less than 10 years of age. Fifty-two percent of cancelled units were less than 10 years (16

percent of which were less than six years of age) compared to 14 percent of all units disposed of through the program.

- There were 21 percent fewer medium sized units cancelled than were disposed of by participants. Large units made up 23.5 percent of all cancellations, but only seven percent of all units disposed of through the program.
- Cancellation survey respondents stated that the biggest reason for cancellation was that the appliance didn't qualify for the program (25 percent), followed by their deciding somebody else could use the unit (22 percent), they decided to keep it (13 percent), they couldn't meet the scheduled time (11 percent), and the recycling company didn't show up (8 percent).
- Thirty-seven percent of respondents who cancelled reported that they gave their unit to someone else, 14 percent kept the unit in use, and six percent each were sold or stolen. Therefore it is likely that at least 63 percent of units cancelled remained in use.
- Approximately 37 percent of the cancelled units were kept but not used or removed so that they likely were no longer in use (primarily through appliance dealers who took nine percent, the waste management centers that took 12 percent, and 13 percent were kept in storage).
- If the pick-up time was reduced to within a week for cancellations, 80 percent said they would not have cancelled. Reducing it further only produced small gains.
- If the incentive had been increased to $75, 70 percent of respondents said that they would not have cancelled. Increasing it to $100 and $125 only slightly increased participation.
- An important finding is that forty-two percent of respondents that cancelled were not aware of the electrical costs of old units. Awareness would have changed the decision for 71 percent of unaware respondents.
- Twenty-four percent of respondents that cancelled were not aware of the environmental harm of old units. Awareness would have changed the decision for 89 percent of these respondents.
- A combined total of forty-nine percent of the respondents that cancelled did not know one or the other of these pieces of information and three-quarters of them, or thirty eight percent of those who cancelled, said that if they had known the missing piece or pieces of information that they would not have cancelled. Again, this information might influence a substantial number of people who decide to cancel.

Potential for Removal of Units Through Retailers

- Approximately 26 percent of refrigerators leave households through the new appliance dealer channel without a program and without an incentive other than convenience and free removal.
- On eight sample days, a large new appliance dealer distribution center dispatched 887 refrigerators to a total of 871 customers. The orders included instructions to remove refrigerators at 286 (33 percent) of the 871 sites. However, 111 (eight percent) of these orders were cancelled before the removal took place so that refrigerators were removed at 175 sites (20 percent).
- Therefore, when purchasing a new refrigerator, roughly a third of customers initially arrange to have a refrigerator removed by this retailer. Before the

delivery occurs between 25 and 40 percent of these customers (8 to 13 percent of the deliveries) decide not to have the unit removed.

Program Effects on Used Appliance Dealers

- The used refrigerator market was examined to determine whether the market is large enough to warrant a direct program intervention and to confirm program assumptions. After a diligent effort, the used appliance dealer sample turned out to be small because of the challenges of locating used appliance dealers, recruiting them, and then encouraging them to participate. The following findings are useful as a general portrait of what is happening among used appliances dealers.
- The average number of refrigerators and freezers sold per year among dealers who responded to our survey was 175 and ranged from 24 to 540. The average number of refrigerators and freezers acquired per year was 179.
- Ninety-one percent of respondents accepted both pick-ups and drop-offs, and nine percent only allowed drop-offs.
- Seventy-three percent of respondents advertise in the yellow pages, 45 percent use the Internet and craigslist, 36 percent use the Penny Saver and get referrals from community waste managers, and 27 percent advertise in newspapers and get referrals from new appliance dealers.
- When a unit is dropped off, 55 percent of dealers pay the customer for the used refrigerator, 18 percent charge the customer, and 45 percent obtain units for the recycle value. On average units are acquired for $34 per unit and sold for $61 per unit.
- When a unit is picked up, 40 percent of dealers pay the customer for the used refrigerators, 20 percent charge the customer, and 30 percent obtain units for the recycle value.
- When doing pick-ups, none of the dealers accept all the units, 50 percent accept working ones, 20 percent nonworking ones, and 10 percent only accept out-of-box units.
- Three out of 11 dealers (27 percent) obtain used refrigerators or freezers from new appliance dealers and 73 percent do not.
- The used dealer pays an average of $30 per used refrigerator and sells them for an average of $72.50.
- Five dealers have arrangements with communities to handle used refrigerators and freezers and six do not have such arrangements.
- Half of the used appliance dealers buy or sell used refrigerators from multifamily operators (condos/apartments).
- Thirty-seven percent of all used refrigerators obtained by dealers are less than 10 years old. Twenty-seven percent are from 10 to 14 years old, 20 percent are 15 to 19 years old, and 16 percent are 20 years or older. In 2006, 84 percent of used units were less than 10 years old.
- Sixty percent of used appliance dealers are able to sell all the units they obtain and 80 percent say that they could sell more. Twenty percent say that they could not sell any more if they could obtain more units.
- Seventy percent of the dealers sell units through a store, 70 percent take them to a recycler, 70 percent salvage parts, 30 percent sell units to operators of multifamily units, 20 percent sell them to other dealers, 20 percent take them to

community waste centers, 20 percent sell them to brokers, and 10 percent de-manufacture them.

Recommendations

The following are recommendations for the program.

Program Overall

The program is making significant inroads into the refrigerator transfer market. **We recommend that the program be maintained at least at 2008 funding levels with additional funding to support the pilots and additional research recommended below.**

Program Design

We strongly recommend that the program showcase the Enerpath System to other program managers. It potentially represents a model that could be used to design a more general system for order taking, tracking, and rebate payments across all programs thereby providing a unified method for dealing with customers. A further advantage is that it would enable rapid exchange of data between programs and present opportunities for cross selling.

We found the data from Enerpath to be accurate, to the extent that we could evaluate, with few of the problems we have observed in the implementation of other refrigerator tracking systems. **We recommend that the number of categories for appliance age probably needs to be increased, especially above 15 years of age. We also recommend categorizing age in terms of birth year(s) facilitating comparisons across program years.**

With respect to working with new appliance dealers:

- About 32 percent of a new appliance dealer's customers who purchased a refrigerator scheduled a removal but in the end only 20 percent of the customers who purchased a new refrigerator actually had a removal. Appliance dealers have a cancellation problem that is greater than the program's cancellation problem.
- The data collected from one major distribution center suggests that as many as 80 percent of refrigerator sales actually leave preexisting units in place (100 – 20 percent removed). The actual percent is further reduced by units going into new housing or into housing without an existing unit. We were unable to determine those numbers from this sample. Even after accounting for this, there are a sizeable number of units that could be captured through dealers.

We examined another program that collaborates with new appliance dealers to remove refrigerators.

- That program uses a sticker system to mark units that are to be removed.
- There seem to be relatively few problems with the sticker.
- The program encourages retail sales personnel to promote the program. A very high percentage of the customers who chose this program indicated that they participated because of information from the sales associate.
- The issue of determining whether units are working or nonworking remains. The question is how to train the logistics teams or whether to train them at all.

- **A well-designed and monitored experiment to examine collaboration with new appliance dealers should provide additional insight and is strongly recommended. The experiments should focus on whether collaboration reduces costs while maintaining a reasonable net-to-gross ratio.**

Convenience is a major driver of participation but the importance of the direct incentive appears to have increased slightly from our 2006 findings. We think the difficult economy may have resulted in this change. **The incentive should be maintained although it does not need to be increased. We recommend promoting cost savings and the environmental benefits to increase the number of customers and reduce the number of cancellations.**

Marketing

The refrigerator recycling market can be thought of as having two target segments, 1) primary or secondary refrigerators that are replaced by the purchase of another unit and 2) second, third or fourth refrigerators in existing households that can be removed. We believe that SCE is making significant inroads in capturing refrigerators that are replaced by new units. **There is a need for continued efforts to increase the capture of second refrigerators in existing households recognizing that many of these units may be newer units and encouraging households to not retain an existing unit or purchase a second or third unit.**

As in the previous study, **we recommend additional research on households with two or more refrigerators**. We need to understand what portion of this market is made up of refrigerators and freezers that are used and useful and likely cannot be removed and what portion of these units can be targeted and removed. We also need to understand the target audiences. As yet, this market is not well understood and has not been significantly penetrated.

Among program participants, bill inserts were the most effective marketing channel and relatives and friends were the second most important. Information from appliance stores also was important for participants. Among those in the general population who disposed of a refrigerator by any method in the last four years (disposer sample), knowledge of the program had increased from 2004-05. This increased awareness probably resulted from direct mailing of letters or brochures. When compared to program participants or people who cancelled participation in the program, people in the disposer sample were more likely to say that they heard about recycling from the media (TV). Overall, for participants, participants who cancelled, and disposers, the general media, newspaper, radio, and TV, had a relatively small impact compared to the more direct utility methods. **We recommend continuing to use utility channels, direct mail, the website, and appliance stores. We recommend that SCE conduct some experiments to evaluate various marketing messages and market channels.**

Website users were more likely to cancel their appointments than those who signed up by telephone and less satisfied with the program. Aside from the lack of a personal touch, webpage access appears to be minor issue. **We recommend that an attempt be made to project a more personal touch on the webpage.**

The cancellation data bears out our suspicion that a high percentage of cancelled units are given away. It also confirmed that many of these units are younger. The characteristics of customers who cancel are also different than for participants. **These units are still worth**

removing but some refinements of message channels and tailoring of messages is likely to be needed to prevent the escape of these units.

Education and Training

The incentive is an important message but other messages such as the cost of operation and the environmental issues are important as well. People who cancelled and who were not aware of electrical costs or environmental harm said that they might not have cancelled if they had known this information. **Messages about this program should continue to highlight the direct incentive, the operational incentive, and the environmental effects.**

The range of effects could include:

- A reduction in the emissions from the generation of electricity
- A reduction in the capital requirements for electricity generation and transmission
- The effects of release of refrigerant from second refrigerators that continue to be used
- Pocket book effects
  - Incentive or capital buy down
  - Operating costs
- Convenience
- Other household effects such as increased space
- Refrigerator recycling as a lead to other energy efficiency activities

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