

Opportunities Found (and Taken): SMUD's Refrigerator Program

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The Sacramento Municipal Utility District's "Conservation Power Plant" programs have been evolving since their inception in late 1990. One of the cornerstones of this ambitious effort has been its Refrigerator Programs: Refrigerator Rebates, Trade-ins and the Second Refrigerator Round-up.

This paper delineates the structure of the program from rebate levels and program delivery systems, to trade-in recycling activities. Information from evaluations and internal audits, as well as inquiries from interested agencies (i.e., Federal and California EPA, the California Integrated Waste Management Board, the Department of Toxic Substances Control and the California Energy Commission) regarding program components, has provided input to the evolution of these programs.

The author will share observations regarding the impacts this dealer-driven program has had on the Sacramento community; and environmental benefits and issues raised by the current recycling process for trade-in units.

The SMUD Refrigerator Programs have evolved from initial implementation through multiple design changes. Many lessons have been learned, some through steady successes, some through "do better next time" failures, and everything in between. Although the programs have been considered successful throughout more than three years of operation, there are still improvement *opportunities to be found and taken*.

Introduction

SMUD's Refrigerator Programs

SMUD's Refrigerator Programs, implemented in October 1990, encourage customers to replace units that have some remaining useful life with new, more efficient units. Retail and wholesale dealers of refrigerators within the SMUD service territory, who have signed a "Dealer Participation Agreement," offer these incentives to SMUD customers at the time of sale. The incentive levels have been established each year at levels which encourage customers to purchase the most efficient unit available at the time.

The trade-in incentives further persuade the refrigerator owner to accelerate a planned replacement. Units that might otherwise have been sold, moved to the garage or donated to another District customer are instead completely removed from service. Participating dealers agree to retrieve the customers old trade-in at the time their new unit is delivered.

The 2nd Refrigerator Round-up Program targets those customers who are not in the market for a new refriger-

ator (or those who are purchasing a non-rebate eligible refrigerator), but who have a second refrigerator which they use little or only intermittently. Offered as a pilot program in 1993, it is expected to provide a steady opportunity for savings through the remainder of this decade.

Once the trade-in units are delivered to SMUD's recycling facility, staff recovers and recycles the CFC-12 liquid refrigerant, dismantles the unit, and sells the remaining box as scrap metal.

Refrigerator Rebate

SMUD provides incentives for customers to purchase refrigerators which exceed the Federal Appliance Standards by a specified percentage (see Table 1). Customers are eligible for the rebate if they trade-in their old refrigerator. Exceptions are made for customers new to the area, moving into a newly constructed home, or changing a residence within the District.

Table 1. SMUD Program Incentive History

Incentive Levels	1990-1 ¹	1992 ¹	1993 ²	1994 ²
10%	\$50	N/A	\$50	N/A
15%	\$75	N/A	\$75	\$25
20%	\$150	\$50	\$100	\$50
25%	N/A	\$50	\$125	\$75 ³
30%	N/A	\$100	\$175	\$75 ³
40%	N/A	\$175	N/A	N/A
Trade-ins (up to two)	\$100	\$100	\$100 ⁴	\$100 ⁴
Round-up (up to two)	N/A	N/A	\$25	\$25

- 1 % exceeding 1990 Federal Appliance Standard.
- 2 % exceeding 1993 Federal Appliance Standard.
- 3 Must be CFC-free.
- 4 \$25 paid for second trade-in unit.

Trade-In Incentive

Any older, frost-free refrigerator, manual-defrost refrigerator, or freezer may qualify for a trade-in allowance. The unit must be a minimum of 12 cubic feet in capacity, and it must be in running condition. As noted earlier, the trade-in must be provided in conjunction with the purchase of a rebate qualifying refrigerator. A trade-in allowance of \$100 is paid for the first trade-in and \$25 for a second trade-in for single residence customers. In addition, SMUD also pays the dealer \$25 to pick-up each refrigerator and deliver it to SMUD for recycling.

2nd Refrigerator Round-Up

For the 2nd Refrigerator Round-up Program, customers who are not buying a new efficient refrigerator can contact a SMUD contracted freight company to pick-up their old unit. A \$25 incentive is offered for up to two refrigerators that a customer may wish to turn-in. The refrigerator must, however, meet the same eligibility criteria as the Refrigerator Trade-In Program. The freight company will make all of the arrangements for pick-up of the unit with the customer, verify the old unit is in running condition, assist the customer in filling out the “Round-up” application, and deliver the unit to SMUD’s recycling facility.

Recycling

The Refrigerator Rebate and Trade-in Program began in October of 1990. At the onset of the program, a review of options available to SMUD for recycling was completed. It was determined that recycling of units traded-in would be done by SMUD staff at a District developed facility, rather than turning them over to one of the available local disposal sites. SMUD’s objective was to achieve its energy savings goals while disposing of these refrigerators in the most environmentally safe and sound manner available at the time. In the SMUD recycling operation, the freon (CFC-12) is evacuated, placed in suitable canisters and then sent for recycling. After the oil is drained from the compressor and the capacitors removed from the motors for proper disposal, the remainder of the unit is sold for scrap. More than two tons of scrap metal are recycled annually providing a revenue offset to program costs.

Benefits

SMUD’s progress toward the “Conservation Power Plant” 650 MW goal through DSM activities has been greatly enhanced through the successes of the combined Refrigerator Programs. Benefits in the form of positive community presence and the reduction of CFC’s released to the atmosphere can also be counted.

Savings

The combined refrigerator programs are accredited in the *Demand-Side Management Resource Plan* with providing 10.5 MW of capacity savings and 95 GWH of energy savings through the program activity represented in Table 2 (1990-1993). The 1994 Refrigerator Program is expected to account for 15% of the capacity savings and 23.7% of the energy savings of all of the SMUD Energy Efficiency Department Programs. While the program hasn't reached all of the 416,000 residential customer base, it has made a contribution to reducing the 2150 MW (average) summer peak demand.

Community

The Refrigerator Rebate and Trade-in Program is operated through a number of local appliance dealers who advertise the availability of SMUD's incentives on specific models. Point-of-purchase materials, which are provided to participating dealers by SMUD, are intended to assist the dealers in promoting the program, as well as to bring SMUD visibility in the community.

In our regular meetings with participating dealers, the comment has often been made that the District's energy efficiency programs have either helped to keep their doors open during the recession or represented a substantial portion of their business. Several appliance dealers have specifically indicated that refrigerator sales generated through our year-round program have carried their firms or appliance divisions through the recession.

A recent technical report titled, "*The Economic Impact of SMUD's Conservation Power Program*," completed by the California State University Sacramento-Real Estate & Land Use Institute of the School of Business Administration substantiates this observation. Quoting from their report: "SMUD's Conservation Power Program does con-

tribute to economic well-being of the Sacramento region by redirecting utility expenditures toward the community This new capital creates a one-time stimulative impact upon households and businesses in the local economy." Sacramento and the surrounding areas have benefitted in many ways due to this effort. Perhaps the most visible are the 878 jobs brought to the community in support of the Conservation Power Program (250 at SMUD).

Environment

The first refrigerator was dismantled for recycling at the SMUD recycling facility in March, 1991. Since that time over 64,525 have been recycled. Approximately 100 refrigerators can be recycled per day by our staff of six. A significant amount of the energy savings represented earlier can be attributed to the permanent removal of these trade-in units from the SMUD service territory. SMUD is not only providing energy savings for our community through this program, but it is also providing the community with a safe, sane alternative for the disposal of these units.

In addition to the savings provided through the trade-in portion of the program, the recycling activity has created interest and commendation from many sectors. The Federal Environmental Protection Agency has referred utilities and waste management groups considering similar activities to the SMUD recycling program as an operating model to follow.

Program Issues

Deterioration of Efficiency

In a SMUD report, "*1991 & 1992 Trade-in Refrigerator Metering Project*" (March 1993), prepared by Willem Bos of SMUD's Resource Planning and Evaluation

Table 2. SMUD Refrigerator Program Activity

Incentive	1990-91	1992	1993	Totals	1994 Goal
Rebates	26,823	24,601	18,344	69,768	21,150
Trade-ins	18,416	23,918	19,733	62,067	21,000
2 nd Refrigerator Round-up	N/A	N/A	971	971	3,000

Department, it was found that the tested energy use for older refrigerators was much higher than when they were new, as projected by their labels. A test group of 79 randomly selected trade-ins showed an estimated annual consumption ranging from 2100-2600 KWH, depending upon size. The consumption of trade-ins tested was 50% higher than those units were rated when new (for units where ratings were available). Conversely, when newly purchased refrigerators were tested prior to entering service at various SMUD facilities, the label consumption indicated was not substantially different than the tested results. In the absence of evidence to show the unit had been damaged, it appears that mechanical wear and tear (basically use and age) of the compressor motor accounts for the substantial increase in the consumption that occurs as refrigerators age.

Free Rider Issue

SMUD, along with other utilities, has attempted to encourage manufacturers to bring more efficient models into the marketplace by periodically raising minimum rebate requirements and maximum efficiencies eligible in the program. As a result, a large number of higher efficiency units have been available in our service territory throughout the program. It is quite probable that many of them would not have been offered to our customers in the absence of utility rebates. This, added to the fact that SMUD has a trade-in program which also drives participation, leads staff to believe that the number of "free riders" are minimal.

Allegations of Program Misuse

Staff has occasionally received allegations of program abuse, either by customers or dealers. Every concern raised has been thoroughly investigated with the expectation that the information would be turned over to appropriate authorities if criminal activity was found. While the programs have been occasionally misrepresented in advertising, the vendors have quickly responded to requests that they change the ad to properly represent the SMUD programs. To date, all allegations made have been investigated and resolved.

CFC-11

One thing SMUD does not handle in our recycling process is disposal of the CFC-11, which has been used as a blowing agent for refrigerator insulation. It has been estimated that 70% of the original CFC-11 used remains in the foam, and that it is released to the atmosphere when the foam is crushed or shredded. At the onset of the program and periodically since then, SMUD has evaluated the costs and benefits of recycling the CFC-11 in the foam, either by expanding our current process or contract-

ing to have it done. This continuing evaluation has led SMUD to be active in the legislative aspects of this issue.

We are aware that CFC-11 has been classified as a hazardous waste by the California Department of Toxic Substance Control (CDTSC). Implementation of state law AB1760, the Metallic Discards Law, on January 1, 1994 has heightened our concerns regarding this matter. The California Integrated Waste Management (CIWM) Board recommendation regarding their position on CFC-11 in their "Metallic Discard Management Plan" was to follow the U.S. EPA's ruling and not require separation of insulating foam from a refrigerator prior to it being deposited in a landfill. SMUD is basing its position to continue not removing foam insulation on the following quote from the Plan: "The U.S. EPA has ruled not to require the removal of foam insulation containing CFC-11 due to significant technical and practicable uncertainties and problems. (Federal Register Vol. 58, No. 92, Page 28702)."

SMUD has requested that the CDTSC officially exempt CFC-11 in foam insulation as a hazardous waste, for the same reasons that the U.S. EPA has done so. An additional request was that the exemption remain in effect until such time as a low cost foam insulation disposal process becomes available. This may allow utilities to cost effectively pursue energy savings available in refrigerator trade-in programs (something they must do) while encouraging the complete recycling of CFC's contained in refrigerators. The CDTSC is currently considering SMUD's requests. Additionally, SMUD's environmental staff is participating in the task force working with the state agency to develop the Metallic Discard Management Plan.

While the SMUD program has been occasionally criticized for not removing and recycling the CFC-11 in the foam insulation, the fact remains that an opportunity to make a positive effort was identified and taken. SMUD wishes to continue its recycling efforts and will closely follow not only the interpretation and enforcement issues related to California and Federal law, but also development and implementation of any new cost effective opportunities in the recycling field.

Building Tomorrow: SMUD's Paths to Energy Efficiency

The Sacramento Municipal Utility District's long range resource plans predicts that its refrigerator programs will provide energy and capacity savings through the year 2000. New efficient and CFC-Free refrigerators will quickly make inroads into the marketplace, due in part to market pull programs like the Super Efficient Refrigerator

Program (SERP). This market transformation will likely be reflected in continued need for environmentally safe and cost effective means for disposal of inefficient refrigerators containing CFC's.

SMUD, in effect, began building tomorrow with the implementation of its Conservation Power Plant Programs. The Refrigerator Rebate, Trade-in and Round-up Programs as well as its recycling effort are clearly some of SMUD's "paths to energy Efficiency."

Acknowledgments

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