Delivering DSM to the Small Commercial Market: A Report from the Field on What Works and Why

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Historically, the small commercial market has been a low priority for utility program planners. High transaction costs, high turnover rates, and a lack of capital are among obstacles to this sector becoming a cost-effective DSM market. In recent years, however, program planners are increasingly turning to the small commercial market for both equity reasons and as a source of cost-effective DSM resources. Among the most effective small commercial program designs is the direct installation concept, where door-to-door canvassing, high customer incentives, and turn-key installation services are combined into an integrated program delivery strategy. The purpose of this paper is to present successful program attributes and lessons learned from recently implemented direct installation programs. The main focus of the paper is on three direct installation pilot programs implemented at Pacific Gas and Electric Company. These case studies provide a unique set of data points for comparing program costs, incentive levels, and market penetration rates for direct installation programs. The paper concludes with a set of recommendations for small commercial program design.

Introduction

The small commercial sector (i.e., 100 kW or less) poses a unique set of challenges for DSM program planners and implementors. The fact that small commercial customers account for a sizable portion of a utility's customer base, though are greatly under-represented in program participation, raises serious questions regarding program service equity and lost resource potential. This paper presents successful examples and lessons learned from a cross section of small commercial direct installation programs. Most of the information and conclusions presented in this paper are drawn from a series of three direct installation pilot programs implemented by Pacific Gas and Electric Company (PG&E) in the early 1990's.

The small commercial market has typically not been the highest priority target market for DSM program planners because resource acquisition in this sector is relatively more difficult and expensive than other sectors, such as the large commercial or institutional sectors. For this reason, many small commercial programs are implemented based on equity concerns (i.e., offering DSM programs to all customer classes) rather than their resource value. As a utility's demand-side resource acquisition program matures and remaining potential becomes more scarce, however, targeted small commercial programs become an essential element of the DSM resource portfolio.

Understanding the Small Commercial Market

The small commercial market segment is one of the most difficult segments from which to obtain DSM resources. It should be expected that the resources from this segment will cost more than resources from many other segments. That is not to say, however, that cost-effective DSM programs cannot be designed for the small commercial market.

The attributes of small commercial customers that lead to low market penetration and participation include:

- energy bills as a small portion of total operation costs,
- rent building space,
- relatively high turnover rates,
- focus on revenues and not on costs,
- lack information on DSM technologies,
- high value on time,
- many competing options for investment finds.

All of these factors leave customers feeling they don't have the time or the interest to learn about measures that will reduce their energy bills. Their lack of information creates a situation of perceived risk. Most DSM programs

attempt to provide information to customers and to "sweeten" the economics of the investment through various incentives. These programs, however, still require that the customer become involved enough to negotiate their way through a several step process. Many small commercial customers simply believe that they have better things to do with their time and their money.

To achieve a high penetration rate in the small commercial market, a program design must address the above-noted barriers. The program design must take into account these customers' low desire for involvement. The program process must be simple and efficient from the customers' perspective. The direct installation program (direct install) is the type of program design that best addresses the barriers present to the small commercial market with a track record of high market penetration.

Direct Installation Program Features

The direct install concept is a "turn-key" approach in which marketing, energy education, site-specific energy analysis, financial incentives, equipment procurement, and installation are provided. The customer can be involved every step of the way or can simply sign an approval form and pay their portion of the cost when the installation is complete. The plan is to lead the customer through each step of the process and to provide them with information and options.

Several of the key direct install attributes are discussed below to highlight some of the program design issues that must be addressed.

Cash Incentives. Incentives are used to reduce the cost of the DSM measure and therefore increase market penetration. The method for determining the amount of the measure incentive often involves one or more of the following factors:

- expected resource value of the measure,
- cost of the measure, and
- expected payback period for the customer.

Typically, the higher the incentive is in comparison to the measure cost, the higher the market penetration will be. Utilities tend to want to limit the incentive to decrease utility costs, however, and increase net program benefits from the utility and rate payer perspectives. Often, a utility will only pay a set portion of the resource value as an incentive, or will set the incentive to buy-down the customer payback period to a particular level.

Financing. Providing loans to small commercial customers to cover their portion of the DSM costs can be a positive program feature. The forms, credit reports and other associated paperwork, however, can make a loan less attractive.

A critical issue for small commercial loans is the specter of property liens. These potentially require building owners to put their assets at risk to secure a loan for their small commercial tenant. Since most small commercial customers are tenants, liens and other types of encumbrances can significantly reduce program participation.

If the incentive is high enough (70% or more), the small commercial customer will usually prefer to pay the rest of their portion and avoid the hassle associated with a loan. If the incentive is 50% or lower, providing quick and easy loans will result in higher market penetration.

Zero-interest loans tend to be very attractive to commercial customers. The present value cost of providing zero-interest financing is often less than the value that the customer places on it. For example, following are two incentive and financing options that we presented to customers in a recent focus group.

- Option 1. 40% cash incentive and a zero-interest loan for the remaining 60% of the cost

- Option 2. 50% cash incentive and a market rate interest loan for the remaining 50% of the cost.

Option 1 will tend to be less expensive for the utility than Option 2. In recent focus groups of small commercial customers, however, nearly all customers felt that Option 1 was a better value than Option 2.

Direct Install Measures. The measures included in a direct install program can be typically characterized as retrofit measures. Measures characterized as replace-on-burnout measures, such as replacing a HVAC system, are usually not included in direct install.

Retrofit measures typically included in direct install are:

- Lighting equipment (ballasts, lamps, fixtures, reflectors, lenses)

- Control measures (sensors, time-clocks, thermostats, EMS)

- HVAC tune-ups and modifications (economizers, pre coolers)

- Building shell measures (insulation, window film)

Program Marketing. The key to marketing a direct installation program is to take it directly to the customer. Our experience has shown that small commercial customers often do not respond to mail and phone solicitations. The most successful marketing approach has involved some form of door-to-door canvassing.

Equipment Procurement and Installation. A valuable attribute of direct install is that the customer does not have to find the equipment and manage the installation. The utility provides this service to the customer and can potentially reduce the equipment and installation costs by buying in larger volume.

There are two methods for procuring equipment for direct install. The first method is a centralized process in which all equipment is purchased and stored by the utility or a single contractor. The second method consists of having several installation contractors procure the equipment for each site for which they are responsible.

Often, some combination of the two procurement methods works best. With the centralized approach, the cost of the equipment is lower and it is easier to control the equipment quality. The advantage of the decentralized approach is that it uses the existing relationship between the installers and their suppliers. The cost of procuring the equipment may be lower using this approach as well.

Local contractors usually install the equipment. Several contractors should be selected as reliance on a single contractor can be risky, Criteria such as experience, staff size, and required licenses should be used to select the contractors. A training program should be developed to present installation procedures, quality control, and paper work requirements. A follow-up quality control inspection is a critical component of direct install.

Tracking and Evacuation. A program tracking and evaluation system should be set up as part of the program design. This will ensure that a timely, cost-effective evaluation will be performed. A tracking system is useful for managing program activities, accounting program costs, and providing information for future program design or program marketing activities.

A major part of any program evaluation project is to verify what was actually done at each site. Obtaining and verifying equipment both before and after the retrofit is a critical part of an evaluation. The best time to gather information for an evaluation is during the implementation of the program, and the best time to verify the accuracy of tracking information is immediately after the installation is completed.

The implementation staff should obtain customer information as part as the program marketing and analysis process. Often, the program staff will use computer databases and systems to produce customer proposals and to keep track of the status of each customer. A good tracking system fully integrates the program implementation process. The program staff should be responsible and accountable for providing accurate customer data for tracking and evaluation.

Monitoring of energy savings can be done on a systematic basis. Every twentieth or fiftieth site can be monitored to assess whether the tracking system estimates of savings are consistent. Often, low-cost monitoring, such as run-time loggers, can be used to verify key energy analysis assumptions, such as operation schedules.

Experience from Three PG&E Programs

Over the past few years, PG&E conducted three separate pilot programs aimed at developing high impact, cost-effective approaches for the small commercial market. These three contrasting program designs offer a unique and insightful view of the effectiveness of various program design features.

Commercial Energy Tune-up Program (CETU)

In late 1990, PG&E was in the process of a major ramp-up of its DSM programs in response to a statewide collaborative effort that culminated in DSM shareholder incentives. Based on PG&E's decade of previous DSM experience, they recognized the special needs and market barriers to their small commercial customers. The Commercial Energy Tune-up Program, a pilot program, tested the effectiveness of aggressive, direct-installation program techniques using the latest generation of computer tools and DSM technologies.

The program was implemented in PG&E's North Bay division (Marin County) and targeted customers with peak demand less than 100 kW. Direct mail "market softeners" and door-to-door canvassing techniques were used to market the program. In line with PG&E's DSM incentive structure, incentives were calculated on a measure-by-measure basis equal to 25% of the present value of the gross avoided costs. This incentive method pushed customers towards non-regressive strategies with the highest Lifetime Savings value.

In previous years, PG&E's small commercial program participants had primarily implemented lighting measures at the exclusion of other end-use measures. In response to

this, the CETU pilot targeted both lighting and non-lighting measures. Lighting measures focused on non-regressive technologies such as fluorescent T8 lamp and electronic ballast conversions, customized reflector kits, and hardwired compact fluorescent fixtures. Non-lighting measures included refrigerator case improvements, HVAC equipment change-outs, coil cleaning, and other equipment maintenance.

Program Results. The CETU pilot successfully tested the effectiveness of various program design features such as marketing techniques and incentive levels. Out of a total population of roughly 1400 accounts, approximately 435 customers participated in the program by having a detailed energy survey. Of these, 168 installed measures, equaling 40% of the identified savings potential from these sites. These results are summarized in Table 1.

The CETU pilot evaluated the effectiveness of several different marketing techniques. The most effective approach was the direct sales approach, either through door-to-door canvassing or in-person marketing from the PG&E representative. The results of different marketing approaches are summarized in Table 2.

Incentive levels were calculated on a measure-by-measure basis based on a percentage of the lifetime avoided cost value of the savings; thus, customers were presented with a variety of different investment options with varying incentive levels and payback periods. This provides a rich source of insights into the impact of incentive levels on measure adoption rates. As shown in Table 3, the relative size of the incentive level (i.e., the percent of the total cost covered by the incentive) appears to be more important than the payback period in the customer decision process. Regardless, the higher the incentive level, the higher the measure adoption rate.

Table 1. Summary of Pilot Results

Total Eligible Sites	1399
Total Participants	435
Site Installations	168
Estimated Program Savings	776 peak kW, 37.5 lifetime GWh
Percent of Identified Potential Acquired	40%
Average Incentive as a Percent of Measure Cost	81%
Average Savings per Site	4.6 peak kW

Table 2. Comparison of Marketing Approaches

Type of Customer Contact	# Of People Contacted	# Of Site Surveys	% Of Site Surveys	# Of Installations	% Of Installations
Direct Mail Only	520	31	6.0%	18	3.4%
Canvassing	384	292	76.0%	121	31.5%
Direct Mail & Telemarketing	483	102	21.1%	31	6.4%
Direct PG&E Contact	12	10	83.3%	4	33.3%
Total	1399	435	31.1%	168	12.0%

Table 3. Percentage of Potential Installed

		Incentive % of Total Cost				
		0-40	40-60	60-80	80-99	100
Payback (Years)	0					55.8
	1/2 or less	23.0	16.8	38.7	49.1	
	1/2 to 1	6.3	35.8	31.1		
	1 to 2	10.2	18.4	22.8		
	2 or more	5.8	20.8			

San Francisco Direct Install

From mid- 1991 to mid-1992, PG&E conducted its second small commercial Contractor-Delivered Energy Efficiency or "direct install" DSM pilot project and the Small Business Energy Tune-up. This pilot project would determine the maximum market penetration that could be achieved in the small commercial sector. To realize this goal, PG&E paid 100% of the installed cost of predetermined energy efficiency measures.

This pilot project was conducted in what was PG&E's San Francisco region, now comprised of the Peninsula and San Francisco divisions. The initial phase of this program included 400 customers who were on mailing lists provided by local merchant associations. Mailings were made to those on the lists and some of whom were members and some of whom were not. The idea was to increase merchant associations memberships by offering this program as another membership benefit for members and prospective members. Contractor representatives then canvassed all eligible customers in the targeted area. Since the mailings targeted specific geographic areas, information about the program also was spread by word-of-mouth.

For the remaining participants in the project, contractor representatives canvassed targeted business neighborhoods, making "cold calls. " Overall, this method was the most effective, minimizing transaction costs and maximizing participation rates.

To encourage comprehensiveness, eligible measures included both non-regressive lighting measures and five unique HVAC measures, including:

- Fan-off delay switch
- Motion sensor tied into the thermostat
- Non adjustable economizer control (enthalpy sensor)
- Upstream comfort sensor
- Duct sealant installation.

Unfortunately, because installed measures (rather than individual projects) were required to have a minimum TRC of 1.5, no HVAC measures were installed. (See Table 4 for program results.)

Table 4. Program Results

Site surveys	1630
Site Installations	1309
Participation rate	80%
Average incentive as a percent of measure cost	100%
Impacts:	
kW reduction:	2,464
lifetime kWh:	120,400,000

Model Energy Community Program (MEC)

The third small commercial pilot program developed by PG&E was actually part of a larger pilot program, the Model Energy Community Program. It was designed to test the effectiveness of using targeted DSM programs as a strategy for deferring capital improvements to local distribution networks. The MEC pilot program targeted an overloaded distribution circuit in PG&E's Delta district, where growing residential and commercial loads required a $130 million substation enhancement, In addition to residential and new construction programs, a small com-

mercial direct installation program was developed to obtain maximum cost-effective peak load reduction from customers within the geographically targeted area.

The MEC small commercial program benefited from the experiences of previous PG&E pilot programs. Technology selection, installation protocols, hazardous waste removal, and software implementation systems were all refined based on the results of the previous pilots. To obtain the maximum amount of cost-effective load reductions, the incentives for the MEC program were restructured in the following ways. First, incentive levels were raised to a maximum of 90% of the installed costs. The incentives were capped based on their TRC, with additional factors such as non-energy related features of the retrofit (e.g., new fixture lenses) causing the actual average incentives to drop to 84%. Second, measure and incentive cost-effectiveness was evaluated at the site level, not on the individual technology. This allowed the energy specialists to combine very cost-effective measures with higher cost, and less cost-effective measures to maximize the total savings that could be achieved from each site. This technique, called measure bundling, was later shown to increase the total amount of cost-effective program savings by more than 40%.

The MEC used the door-to-door canvassing techniques developed during the CETU program. In addition, MEC used a community-based marketing approach by relying extensively on local electricians, installers, and equipment vendors for all contracting work. In addition, public presentations were given to community groups such as the Lions Club and the local Chamber of Commerce. City Hall was used as the first lighting retrofit demonstration site, which proved to be a highly visible and accessible place to show potential participants the technology attributes.

Findings of Interest. The small commercial MEC program was a very successful high-penetration, cost-effective DSM program. More than 85% of the identified cost-effective savings potential was implemented by participants. Seventy-one percent of participants, i.e., those who received an audit, implemented measures. These measures accounted for 85% of the identified cost-effective DSM potential. (See Table 5.)

Incentive levels, Penetration Rates, and Program Costs

An important part of any direct installation program is to determine the amount of incentive that should be paid to encourage the customer to participate. Program experience shows that the amount of market penetration is primarily related to the portion of the measure cost paid by the incentive. Figure 1 shows a graph of the relationship between incentive level and market penetration for the commercial sector. The graph is a theoretical inference of the relationship of incentive levels and market penetration based on the author's in depth experience with PG&E's Direct Install programs, as well as more general reviews and informal discussions with Direct Install program managers at utilities across the country. In this example, incentive levels are defined as a percentage of the total project installation costs (labor and equipment excluding program marketing and administrative costs). Market penetration is defined as the percentage of the total economic energy savings potential realized by the program.

As the graph shows, the largest increases in penetration occur when the incentive percentage of total installed cost is between 50% and 80%. Incentives of 50% will result in market penetration around 30%, while 80% incentives will encourage two-thirds of the market to participate.

Table 5. Summary of Findings

Total Eligible Sites	594
Total Participants	461
Site Installations	328
Estimated Program savings	1,385 peak kW, 56 lifetime GWh
Percent of Identified Potential Acquired	85%
Average Incentive as a Percent of Measure Cost	84%
Average Savings per Site	4.2 peak kW

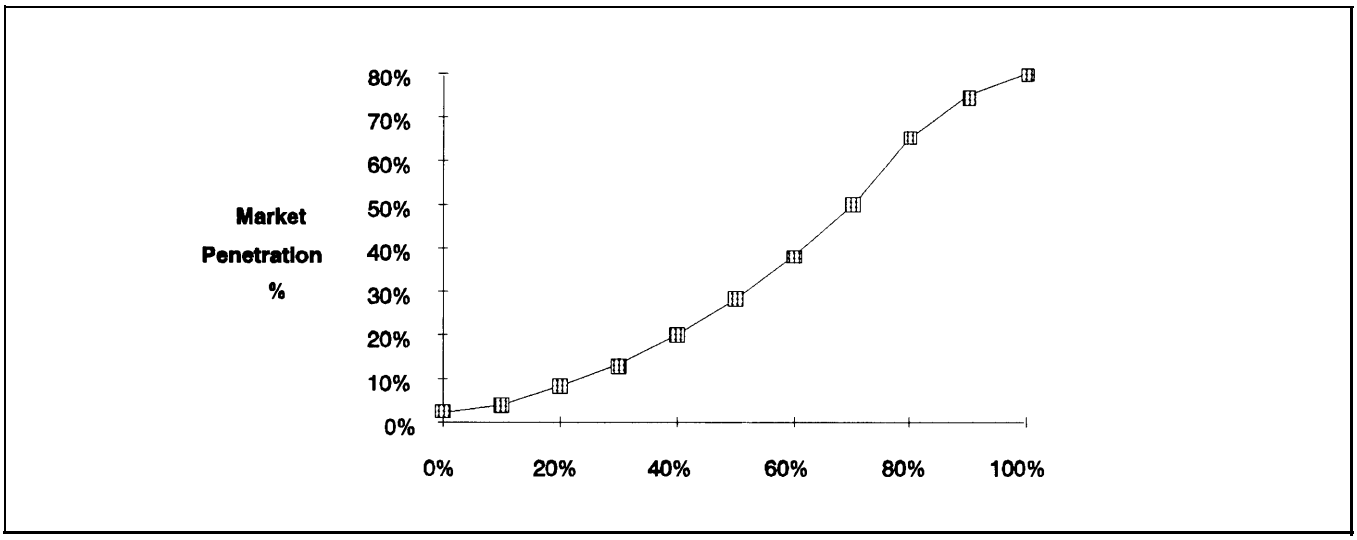

Figure 1. Market Penetration from Various Incentive Levels

The information from Figure 1 can be combined with various estimates of costs associated with a direct installation program to determine the appropriate incentive level that should be provided. Figure 2 illustrates the estimated cost per kW saved from a commercial direct installation program given different levels of incentive payments with regard to the total measure cost.

Before discussing the results of this graph, it is important to understand the basis of the program cost estimates, and some of the underlying assumptions used in this formulation. The cost assumptions are generalizations based on a review of the actual detailed program costs of the PG&E direct install pilots. While they are based on "real cost" numbers, the author has judgmentally extrapolated these costs into a theoretical model based on the following assumptions:

- The total cost of the installed measures is $1000 per kW,
- A fixed cost of $250 per kW is included for project management, tracking, customer satisfaction, construction management, and savings verification,
- An equal amount of total savings are obtained under each of the incentive levels,
- The cost of marketing ranges from $60 to $125 per potential kW, depending on the portion of incentive paid, and
- The marketing costs include energy savings analysis, proposal development and various sales activities:

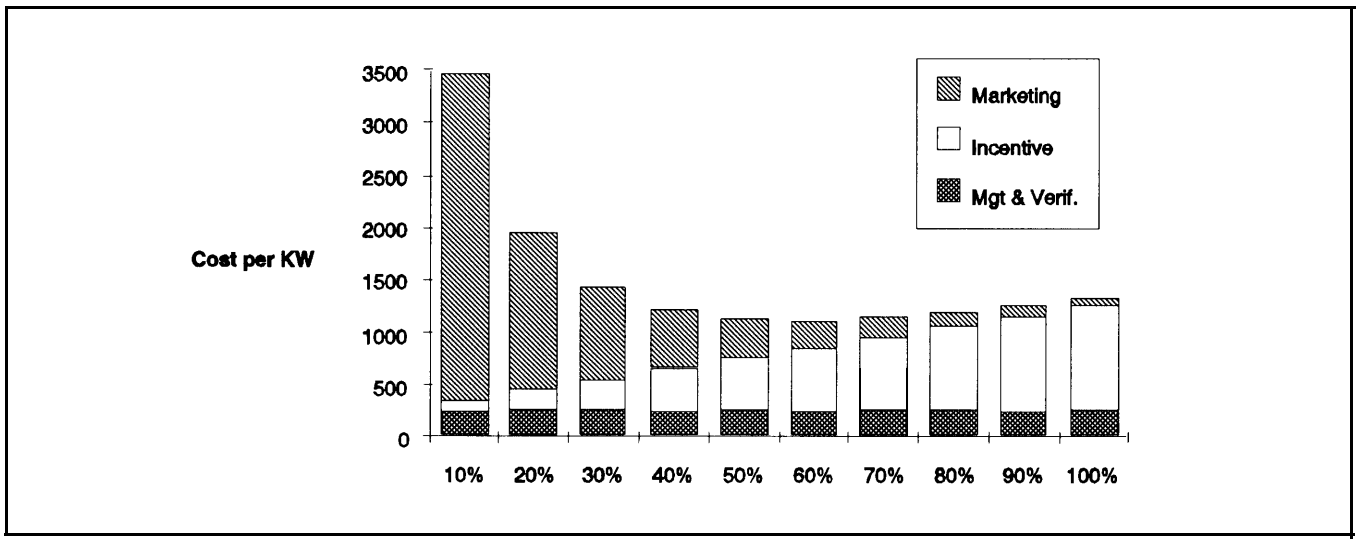

Figure 2. Direct Installation Program Costs

The cost estimates by incentive levels provide some important conclusions. First, a direct installation program does not make sense if the incentive levels are 30% or lower. Other more typical incentive program strategies work best with the lower incentive levels if lower market penetration is acceptable.

Second, the cost per kW is fairly constant for incentive levels between 50% and 80%. The higher market penetration obtained with the 80% incentive level leads to the conclusion that this level is optimal for a direct installation program.

Conclusions and Recommendations

High incentives are required to move the small commercial market. Short-term motivations and competition for capital in small businesses make high financial incentives important for motivating small customers. On the basis of our experience on this and other similar projects, customer incentives need to be at least 50% to 80% of installed cost to meet the investment criteria of small commercial customers.

Services, not just incentives, are essential to success. In addition to financial hurdles, small commercial customers seek to avoid risk and hassle. They need to be helped through the complicated and bothersome implementation process. Turnkey installation services provided by the utility, such as unbiased project analysis, vendor bid coordination, equipment selection, contract negotiations, construction management, and project supervision, are a great motivation to encourage customer participation.

Community-based approaches work. Working with local groups, such as the Chamber of Commerce and Rotary Clubs, helps get the message out to the small business community that the program is legitimate and "a good deal."

Use local trade allies. Local vendors and contractors are known in the community and are great assets for ensuring quality control and community participation. Additionally, equipment will need to be serviced locally, which is best done by local vendors.

Good tracking systems increase reliability and productivity. Small commercial implementation projects require effective tracking and task management systems to maintain control over the hundreds of elements of projects in progress at any one time. These systems must begin with good marketing information and sales tracking systems and go on to construction management, accounting, and measurement and verification of facilities.

Measure bundling increases economic program potential. Comprehensive measures should be addressed at each site to avoid cream-skimming and to minimize lost opportunities. Expensive measures should be bundled with less expensive measures to increase the total amount of cost effective DSM potential.

Program marketing materials should clearly communicate the DSM "win/win" position. The rationale for most DSM programs is very hard to communicate to customers. Customers are typically wary of "too good a deal" and frequently ask, "What's the angle?" The MEC program had a very effective marketing message: "PG&E would rather invest $50 million in your community than $100 million in a new sub-station." Customers quickly grasp that this is a win/win situation for themselves and for PG&E, and are thus more prone to participate.

Maintain a local presence. Opening an office in the community where work is being performed builds good will and shows dedication to the project. The greater the local presence, the greater the chances of success in the project.

Systematic quality control procedures are essential, Project management systems should allow systematic review and adjustment of engineering calculations, contractor bids and prices, contractor and technology performance, and field staff performance.

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