

Process Evaluation of Three Gas Utility Commercial Industrial Demand Side Management Programs

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INTRODUCTION

Colonial Gas Company (Colonial or the Company) is a regulated natural gas distribution utility with headquarters in Lowell, Massachusetts. The Company serves customers located in 24 municipalities located northwest of Boston (Lowell Division) and on Cape Cod (Cape Cod Division). The combined natural gas distribution service areas of the Company cover approximately 622 square miles. Of its more than 132,000 customers, approximately 90% are residential accounts. The Company's 1993 consolidated operating revenues from gas sales were derived 64% from residential customers, 33% from commercial and firm industrial customers, and 3% from interruptible industrial customers.

Colonial launched its Partners in Energy Efficiency (PIE) Demand Side Management Programs in 1992, beginning with the residential program. In 1993 the PIE program was expanded to include commercial and industrial customers. This paper presents the draft results of process evaluations of Colonial's Commercial Industrial PIE programs. The evaluations were conducted by Tellus Institute, in the spring of 1995. In addition to the process evaluations of the residential and commercial industrial PIE programs, Tellus also conducted implementation analyses for the residential and large commercial industrial programs, and implementation and impact analyses for the small and medium commercial industrial programs.

APPROACH

The process evaluations of each component of the Commercial Industrial PIE programs included:

- Review of Program Materials,
- Customer Surveys, and
- Interviews with Administrative and Implementation Staff

The objective of the process evaluations was to identify mechanisms by which high quality gas saving measures can be more efficiently delivered to program participants. The process evaluation activities are mutually informative. By combining information gathered by several methods, from several sources, the process evaluations aimed to generate a holistic evaluation of the PIE programs, based upon multiple perspectives. The customer survey component of the process evaluations examined behavioral issues that impact program savings, such as free riders, free drivers, measure persistence and snap-back. Behavioral factor results were used to adjust gross savings estimates for the small and medium commercial industrial components of the program.

SMALL COMMERCIAL INDUSTRIAL PROGRAM

The small commercial industrial PIE program began in 1993. Small C&I customers are on Colonial rate classes G-41 and G-51 with an average annual consumption of less than 1,800 Mcf in the Cape Division, and less than 3,250 Mcf in the Lowell Division. The small C&I program is prescriptive in nature, consisting of three steps: 1) Energy assessment; 2) Installation of selected measures; and 3) Quality control (QC) inspection. Table 1 lists the fourteen gas saving measures are offered through the small C&I program. Customers receive a 100% subsidy for the installation of recommended measures. The maximum Colonial contribution per customer is \$30,000.

Typically, participants in the small commercial program have learned of the Partners in Energy Efficiency Program through direct contact with Colonial Gas personnel, or through word of mouth from other program participants. During the first one and a half years of program operations there has not been a need for general marketing efforts to recruit program participants.

Table 1 Measures Offered Through the Small C&I PIE Program

Insulation:	Heating System Controls:	Air Infiltration Devices:	Hot Water Saving Devices:
Roof	Boiler Tune-up	De-stratification Fans	Hot Water Tank Wrap
Floor (Basement Ceiling)	Heating System Vent Stack Damper	Caulking and Weatherstripping	Low-Flow Showerhead
Wall	Electronic Pilot Light		Faucet Aerator
Heating System Pipe	Automatic Boiler Reset Control		
Heating System Duct			

The program materials reviewed for the small C&I program included customer information packages, program training manuals and program data and tracking forms. Audit forms for the small C&I program were revised in October, 1994, providing additional entry spaces for information on gas end uses, building shell characteristics, and the estimated quantity of each measure eligible for program installation.

Customer Survey

The customer survey for small and C&I customers was conducted over a 3 week period, between March 24 and April 14, 1995. A total of eighty small customer surveys were completed. The surveys were administered to customers who had completed the installation phase of the program. Non-participant surveys were not conducted at this time, since the C&I programs have been marketed to selected market segments.

The survey results indicate that participants in the small C&I program have a high degree of satisfaction with the PIE program, with program auditors, contractors, and quality control inspectors. For all questions concerning satisfaction with these categories the lower bound of the 95% confidence interval for the mean response lies above 4.0 (where 5 is very satisfied and 1 is not at all satisfied).

Customer satisfaction with the individual measures offered through the small commercial component of the PIE program is also generally high. For eight of the fourteen program measures the lower bound of the 95% confidence interval was higher than 4.0. For six of the measures, the lower bound of the 95% confidence interval is lower than 4.0. Results for the group of measures having a potential satisfaction rating of less than 4.0 are summarized in Table 2.

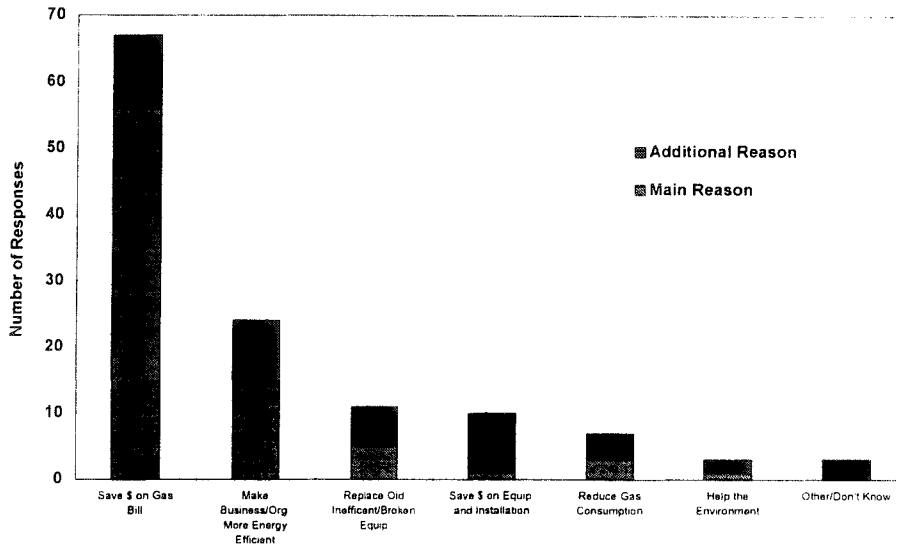
Table 2 Summary Statistics for the 6 Measures with Least Favorable Customer Satisfaction

Customer's satisfaction with installation of..	Mean	S.E.	95% C.I.	N
heating system duct insulation	4.1	.46	3.18-5.02	10
hot water reset	4.5	.5	3.5-5.5	4
heating system vent stack damper	2.0	1.0	0.0-4.0	4
boiler tune-up	4.33	.67	2.99-5.67	5
electronic pilot light	3.67	.4	2.87-4.47	17
caulking and weather-stripping	4.4	.22	3.96-4.84	22

Four of the measures listed in Table 2 (duct insulation, hot water resets, electronic pilots, and caulking & weather-stripping) are individually responsible for 5% to 8% total adjusted gross program savings, while the other two (vent dampers, and boiler tune-ups) combined represent less than 3% of the total.

Customers were asked the main and other reasons, why they participated in the program. The predominant reason, was to save money on gas bills. Information on what factors motivate customer participation is useful for the development of promotional materials, and for gauging how well the program is focused on meeting customer expectations and objectives.

Figure 1 Why Did Small C&I Customers Participate?



Participants who received each program measure were asked if they were planning to install any program measures before they became aware of the PIE Program. Those customers planning to install a measure prior to learning about the program were asked further questions to determine when, and how much, of each measure they had been planning to install. Free riders were defined as customers who were planning to install the same amount, or more, of a measure, sooner, or at the same time, as they did through program participation. Partial free riders were defined as those who were planning to either install less of a measure, or install the measure at a later date than they did through the PIE program. The free rider data for the small C&I program are presented in Figure 2 and Table 3. The free rider adjustment factor recommended in Table 3 is based on the assumption that one half of the partial free riders are counted as free riders.

Participating customers were asked if, since September 1992, they had installed any of the measures offered by the program, but not through the program. Those customers who have installed measures, but not through the PIE program, or another DSM program, constitute the population from which a subset of free drivers can be defined. Free drivers have installed a measure not through the PIE or another DSM program, and would not have installed the measure if the PIE program did not exist. Thus, a conservation measure installed without participation in the program, but not attributable (in some way) to the PIE residential program, is not properly classified as a free driver impact. Neither are measures installed as part of another conservation program. Survey results show that for three measures, faucet aerators, boiler tune-ups, and hot water tank insulation, there have been more measures installed outside of the program than through PIE program participation. This suggests that free driver impacts for these measures may be high. However, since the commercial industrial survey was administered only to program participants, it is not possible to estimate the number of non-participant installations attributable to spillover or market transformation effects. Until information is gathered from the non-participant market the free driver impacts of the small C&I program cannot be estimated.

Figure 2 Small C&I Program Free Ridership Estimates

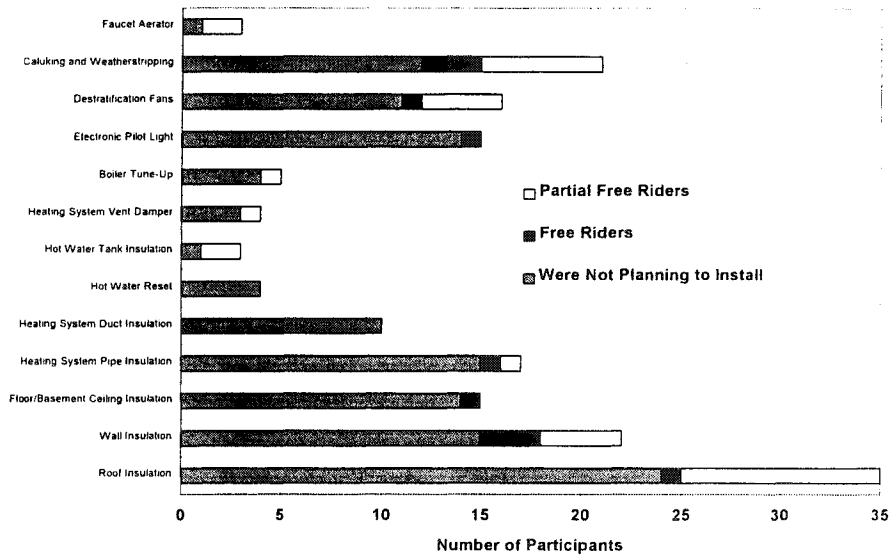


Table 3 Small C&I Program Free Ridership Estimates

Measure:	Free Rider Estimate:	Partial Free Riders:	Recommended Adjustment
Roof Insulation	3%	28%	17%
Wall Insulation	13%	17%	22%
Floor/Basement Ceiling Insulation	7%	0%	7%
Heating System Pipe Insulation	5%	5%	8%
Heating System Duct Insulation	0%	0%	0%
Hot Water Reset	0%	0%	0%
Hot Water Tank Insulation	0%	67%	33%
Heating System Vent Damper	0%	25%	13%
Boiler Tune-Up	0%	20%	10%
Electronic Pilot Light	6%	0%	6%
Destratification Fans	6%	25%	19%
Caulking and Weatherstripping	14%	27%	27%
Faucet Aerator	0%	67%	33%

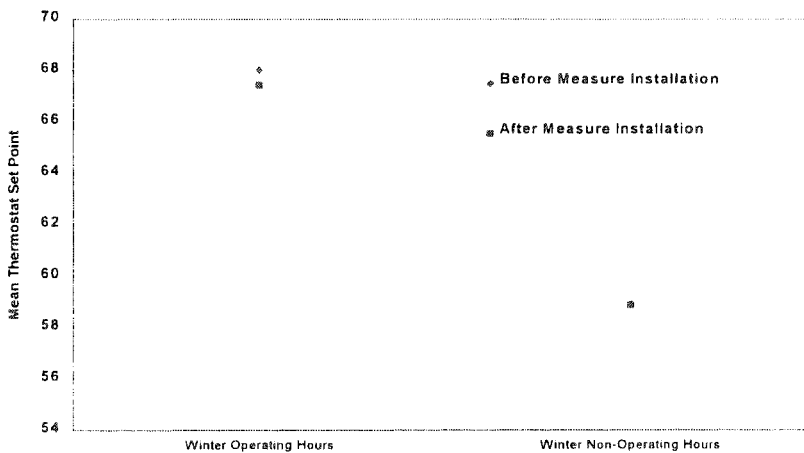
The survey results indicate high short term measure persistence, as summarized in Table 4. With the passage of time measure persistence will naturally decrease, and monitoring should be continued, particularly for measures that are easier for customers to change. Based on the survey results, conservative estimates of near term persistence of 97.5% for the top group, 93% for the middle group, and 66% for the bottom group of the measures listed in Table 4 were recommended.

Table 4 Small C&I Program Measure Persistence

Percent Still Installed:	Measure:
100%	Roof Insulation Wall Insulation Floor or Basement Ceiling Insulation Heating System Pipe Insulation Heating System Duct Insulation Hot Water Reset Destratification Fans Faucet Aerators
90% to < 100%	Electronic Pilot Light (93%) Caulking and Weatherstripping (95%)
< than 90%	Hot Water Tank Insulation (66%) Heating System Vent Stack Damper (75%)

Figure 3 illustrates survey results indicating that customers are not setting thermostats to higher levels after program participation. The survey results do not suggest that savings estimates for the small commercial industrial program should be adjusted to account for snap-back effects.

Figure 3 Pre and Post Installation Thermostat Set Points (mean), All Participants



Participants in the small C&I program were asked how likely they would have been to participate in the program assuming a range of subsidy levels from 10% through 90%. The mean response (with 1.0 for not at all likely and 5.0 representing very likely) for each subsidy level is graphically represented in Figure 4. The results indicate that some cost sharing by participants may be feasible, particularly if subsidies are kept above the 70% level.

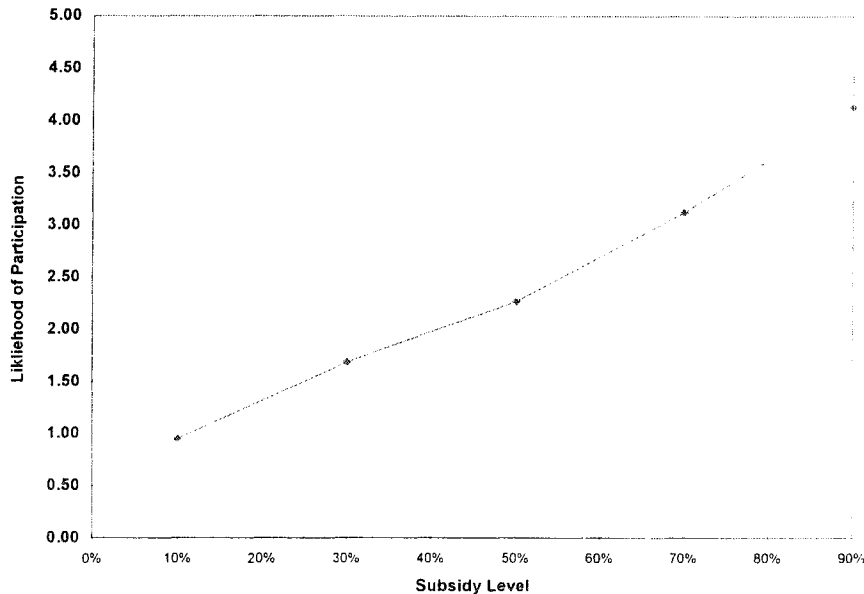
Interview Summaries

Interviews were conducted with three groups, other than customers. These were Colonial staff, administrative vendors, and program contractors.

Colonial staff reported that from the start of the small program the administrative vendor had trouble developing and maintaining an adequate database. After one year of program operations, in part due to database problems and inaccurate tracking of the potential number of measures to be installed, it became apparent that the program was not fully reaching the MCF savings goals. At this time, targeted telemarketing, to customers who had received information packages but who had not contacted the administrative vendor, was initiated. These phone calls

indicated that some customers had inquired about further program participation (either through mail or by phone) but not all of them had heard back from the administrative vendor.

Figure 4 Small C&I Program Likelihood of Participation & Subsidy Levels



After slightly more than one year of program operations (October 1994) the administrative vendor for the small and medium C&I program was changed. At this time, Colonial decided to internalize most of the database management functions previously handled by the administrative vendor. A new contractor was hired to conduct program audits, a function that had previously been handled by the administrative vendor.

Colonial staff suggested that some cost sharing may be implemented for the small commercial program. The staff doubted that expanded general marketing will be needed for the small C&I program, suggesting that if a general mailing for the program were produced the program would be quickly over-subscribed. Colonial staff also think that participating customers are very satisfied with the program, since they are receiving valuable energy conservation measures for no cost. Colonial staff think that program administration and delivery are operating smoothly, and the most significant problems with the management of the program's database have been addressed.

The program's current administrative vendor noted that the program is well constructed for the small C&I market because: the process is simple (i.e. there are no calculated energy savings); and the subsidy is 100% of the measure cost. The administrative vendor thinks that customers would be much less likely to participate if there were any decrease in subsidy levels. The administrative vendor mentioned several barriers to program participation, noting that some customers do not participate in the program because of the requirement for participants to submit a 1099 tax form, which reports the value of the measures installed to the Internal Revenue Service. Other barriers mentioned were unlined chimneys (preventing the installation of vent stack dampers), and pre-existing wall insulation (preventing additional installation of blown-in insulation).

Contractors noted that, prior to the change in the program's administrative vendor, payment for work completed under the PIE program was not always timely, sometimes taking up to three months. These payment delays were a major concern for contractors, but the situation is much improved under the new administrative vendor. Contractors also noted that the program provides a significant educational benefit for small commercial customers, who tend to have very limited knowledge about, or access to information on, energy efficiency technologies. The contractors think that the educational benefits of the program may produce significant market transformation impacts.

Contractors suggested that the program's energy auditors need to be more aware of the fact that when pipe or duct insulation is to be installed above a drop ceiling, or in facilities with a ceiling height greater than twelve feet, there are significant additional labor costs, and under these conditions the recommended measures are not always appropriate. The contractors also noted that the work generated by the program is often very sporadic, and if possible, they would like to see the flow of work be more even.

The QC vendor stated that there do not appear to be any big lost conservation opportunities, and no measures need to be dropped from the program. The QC vendor suggested that the cost-effectiveness of each measure be re-evaluated from time to time. The QC vendor thinks that customer's are very satisfied with the measures installed through the program. The QC vendor also noted that existing levels of energy efficiency, particularly in public buildings, tend to be very low, and that the energy saving opportunities in the target markets for the small and medium C&I programs are substantial. During program start-up the QC vendor conducted in-progress site visits. Once they became familiar with the various program installation contractors, the QC visits were scheduled for post-installation. The QC vendor has started using an infrared scanner to inspect insulation installations. The infrared scanner allows for faster and more accurate QC inspections.

Conclusions

The process analysis of the small C&I program indicates that:

- It may be possible to reduce subsidy levels. Survey and interview results suggest that subsidy levels of 70%-90% might be appropriate.
- Colonial's management of the PIE program has been responsive to problems with program design and delivery. Major changes, such as the replacement of the program's administrative vendor, have been made during the program's early years. The changes have been made while keeping the program on target, and while keeping customer and trade ally satisfaction high.
- Free rider estimates range from 0% to 33%, depending upon the measure. The simple mean of the recommended free ridership estimates is 15%.
- The short term measure persistence is quite high for most measures, the two exceptions being hot water tank insulation and heating system vent stack dampers.
- Snap back effects do not appear to be reducing estimated program savings.

MEDIUM COMMERCIAL INDUSTRIAL PROGRAM

The medium component of Colonial's PIE program is available to customers on Colonial rate classes G-41 through G-43, G-51 and G52. The total number of medium C&I customers is 419, with 210 in the Cape Division and 209 in the Lowell Division. The average annual usage of medium customers is between 1,800 and 15,000 Mcf. The medium program started in July, 1993. The program involves five steps: 1) Energy audit; 2) Evaluation of cost-effective measures; 3) Contractor quotes and selection; 4) Installation of selected measures; and 5) Quality control inspection. The program installs measures drawn from a list of twenty seven measures (Table 5). Customers pay the equivalent of the estimated first year's savings in gas costs for each measure, with Colonial subsidizing the installations up to the amount of \$30,000 for each customer.

An energy audit and modeling software tool is used in the medium C&I program to identify appropriate gas saving measures for each customer. The medium C&I Program showed a smaller rate of customers moving all the way through the installation stage of the program than the small C&I program. For example, only 51% of medium customers expressing an interest in the program had audits performed, 14% requested measure installations, and 7% had measures installed. This compares with 69%, 52%, and 46%, respectively, for small C&I program participants. In general, the measures supported in the medium C&I Program are more complex and capital intensive than the measures offered in the small C&I program. Customers are also required to bear some the measure costs in the medium program, whereas small customers receive a 100% subsidy.

Table 5 Gas Saving Measures Available in the Medium C&I PIE Program

Duct Insulation	Permanent Storm Windows	Boiler Tune-up
Interior-Exterior Rigid Board Insulation	Outside Air Reduction at Air Handlers	New Boiler
Floor Insulation	Replacement Windows	New Burners
Wall Insulation	Window Area Reduction	Electronic Pilot
Roof Insulation	Dock Seals	Turbulators
Pipe Insulation	Hot Water Reset	Stack Damper
Caulking and Weatherstripping	Domestic Hot Water Tank Insulation	Exhaust Heat Recovery
Destratification Fans	Separate Domestic Hot Water Heater	Refrigeration Heat Recovery
Storm Doors	Low Flow Water Saving Devices	Energy Management System

Customer Survey

Customer surveys were completed with 80% (eight of ten) customers who had installed gas savings measures through the medium program as of November, 1994. The participants surveyed have a high overall satisfaction with the PIE program. The mean response for overall program satisfaction was 4.3, where 1.0 represents not at all satisfied, and 5.0 represents very satisfied. Some medium customers expressed dissatisfaction with the presentation of savings and cost estimates, time lags between presentations and contractor scheduling, and time lags between installation and quality control inspections. Nevertheless, the mean scores for these factors, were all 3.5 or higher. Customers were asked the main and other reasons, why they participated in the program. The predominant reason, similar to the results for the other components of the PIE program, is to save money on gas bills.

The survey results show that there are no complete free riders in the medium program. Two customers report considering installing gas saving measures before program participation. However, because both were planning to install the measures later than they did through program participation they were classified as partial free riders. At this time, no net to gross free rider adjustments are recommended for the medium C&I program.

The short term measure persistence for the medium program is 100%. No customers reported removal of gas saving measures installed through the PIE program. Continued tracking of measure persistence will indicate whether adjustments to gross savings estimates are appropriate in the future.

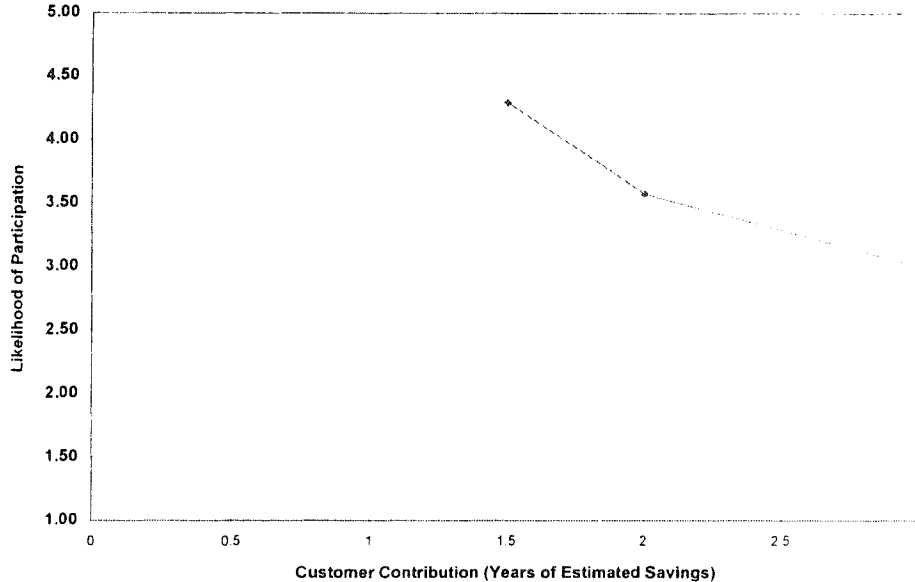
The customer survey results for the medium C&I program suggest that subsidy levels for the program might be reduced with out a significant impact on customer participation. Currently, subsidy levels are set so that the customer contribution is equal to the cost of the estimated first year gas savings. Figure 5 presents data from the survey suggesting that this payback period could be raised, even with a customer contribution equal to the estimated savings for three years the mean likelihood of participation is equal to 3.0.

Interview Summaries

At the start of the program, Colonial staff had some problems with the energy audit and modeling software used in the medium program. Some of the estimated measure savings needed to be adjusted, primarily the algorithms for water conservation measures. It was also noted that the output from the modeling software was not suitable for direct customer presentations, requiring extra time for the development of each presentation.

Colonial staff said it is necessary to continue streamlining the delivery process for the medium C&I program, noting that the average time taken for each customer to pass through the program from start to finish (commonly 3-4 months) is too long. Colonial staff noted that bringing the administrative vendor duties in-house, has helped speed up the program's delivery process. Colonial staff also noted heat recovery measures may be added to the medium program, but that properly identifying these measures would require additional audit contractor training

Figure 5 Medium C&I Program Likelihood of Participation & Subsidy Levels



The audit vendor for the medium C&I program suggested that there is a need for more customization, noting that the pre-approved list of twenty seven measures (Table 5) does not always include the most appropriate conservation measures for each customer. In particular, the audit vendor suggested a wider variety of control systems be offered, or that a standard procedure for approving customized applications be developed. The audit vendor also suggested that the time lag between audits and customer presentations could be reduced if the program auditors were given the responsibility of making customer presentations. The program auditors also think that because customers are already receiving information on estimated savings and payback periods, it should be possible to increase the level of required customer contributions. A 2 year estimated savings payback was suggested.

One installation contractor reported that medium customers are sometimes under the impression that they receive a 100% measure subsidy, similar to the subsidy for small program participants. This misconception is likely to be due to a medium customer hearing about the program informally from a small customer. Another contractor suggested that turbulators be dropped from the list of conservation measures offered by the medium program, while another contractor suggested that some measures in isolation (door sweeps in particular) are not cost-effective.

Conclusions

Recommendations for the medium C&I program are:

- At this time, due to the relatively small number of program participants for whom data is available, adjustments to the gross savings estimates to account for free drivers, free riders, measure persistence or snap-back are not recommended.
- Subsidy levels might be reduced. The survey results suggest that customers might be asked to contribute an amount equal to 3 years estimated savings. Many of the interview respondents suggested a customer contribution equivalent to a two year customer payback.
- Heat recovery measures might be added to the program, but this would be likely to require additional contractor and energy auditor training. Adding heat recovery measures might be part of a general move to offer more customized measures through the program.

LARGE COMMERCIAL INDUSTRIAL PROGRAM

Colonial offers engineering analyses and financial assistance for the installation of customized gas saving measures to its largest customers through the large commercial industrial component of the Partners in Energy Efficiency Program. The large commercial industrial program was the last component of the PIE program to be launched, starting in December, 1993. Large C&I customers are those on Colonial rate classes G-43 and G-53. There are 59 large C&I customers, with 16 in the Cape Cod Division and 43 in the Lowell Division.

There are five steps in the large C&I component of the PIE program: 1) Energy evaluation audit to identify potentially cost effective gas saving measures; 2) A detailed engineering study; 3) Solicitation of contractor quotes; 4) Installation of selected gas saving measures; and 5) Quality control inspection. Customers in the large C&I program are eligible to receive any gas savings measures found to be cost effective in the engineering study. The customer's contribution to the costs of the measure is equal to the estimated cost of two years' gas savings for each measure. Colonial subsidizes a maximum of \$30,000 of installation costs per customer. Colonial also pays up to \$7,500 for the detailed engineering analysis of each facility, with the understanding that if the customer does not install any of the recommended gas savings measures, that the customer will reimburse Colonial for one half the cost of the audit and engineering study. Only firm C&I customers are eligible for participation in the program. Interruptible or transportation only customers are not qualified to participate.

Implementation Analysis

The annual Mcf target for program savings for the large C&I program is 14,286 Mcf. The pre-approved budget for the large C&I program is \$706,000.¹ By the beginning of May 1995, one customer had progressed to the installation phase of the program, two customers had completed engineering analyses and were ready to proceed with the installation phase, and eight additional customers had completed an initial energy audit. The goal of the program in the current year is to serve an additional six customers.

The customer who has proceeded to the installation phase selected two of the three recommended gas savings measures for their facility. The estimated annualized savings from these two measures is approximately 1,400 Mcf, equal to one tenth of the program's annual goals. At one of the other facilities that has completed the engineering analysis phase of the program, the total estimated gas savings for the recommended measures is approximately 15,000 Mcf per year. A generic summary of these recommendations is shown in Table 6.

Table 6 Summary of Recommended Gas Saving Measures At One Facility

Measure	Estimated Implementation Cost (\$)	Colonial Gas Contribution	Estimated Energy Savings Mcf	Estimated First Year Customer Savings	Simple Payback (years)
A	1,500	0	2,750	19,034	0.1
B	4,250	0	112	10,495	0.4
C	114,500	0	10,670	73,867	1.6
D	9,800	0	1,050	7,265	1.3
E	2,800	844	104	878	3.2
F	26,000	16,838	662	4,581	5.7
Total	158,850	17,682	15,348	116,120	1.37

Achieving the total estimated savings from this one facility would serve to surpass the program goals for the year. However, of the measures identified, the customer indicated that at this point they are ready to proceed with measure F. This measure represents 4% of the potential savings identified at the facility. Measures A through D, represent 95% of the estimated savings. These measures have short estimated payback periods, but require a capital investment of more than \$130,000.

This example raises two questions: 1) What steps can be taken to increase the chances that customers will take advantage of highly cost-effective savings opportunities identified through the program?; and 2) How are savings from measures with less than a 2 year estimated payback, for which Colonial makes no direct measure cost contribution, treated in accounting for the progress of the program to meeting its Mcf savings targets? An

additional or alternative set of program incentives, perhaps offering customers assistance with the financing of highly cost effective measures, might increase the likelihood that the highly cost effective measures are installed, and help Colonial achieve annual savings targets more rapidly. The savings identified during the energy audit stage at another facility are presented in Table 7.

Table 7 Energy Savings Measures Identified at a Facility Audit

Measure	Estimated Implementation Cost (\$)	Colonial Gas Contribution	Estimated Energy Savings Mcf	Estimated First Year Customer Savings	Simple Payback (years)
A	38,000	27,582	608	5,209	7.2
B	22,500	17,656	386	2,422	9.3
Total	60,500	45,238	994	7,631	7.9

The customer is interested in measure A, and potentially B, but will probably not be installing either any time soon. One of the major factors contributing to this decision is that the company is a very capital intensive business, in production 24 hours a day, seven days a week, year round, except for one week at Christmas time. The facility manager, who expressed very high satisfaction with the professionalism and presentation of the Colonial program, noted that shutting down the production line for one hour costs almost ten times more than the annual estimated savings for the recommended measures.

Interview Summaries

Colonial staff think that the start up of the large C&I program has been smooth. They noted it takes much more time than originally estimated to take a large C&I customer through all stages of the program. Initial estimates were that it would take approximately 6 months, but this has proven too optimistic, as customer installations are taking more than one year, and the first installations are not yet totally completed.

Staff at the engineering firms that participate in the large C&I component noted that it has been very easy to work with Colonial staff on the PIE program. They also said the program is well designed. One strong point mentioned is that both gas and electric savings recommendations can be recommended in the engineering reports, although more detailed attention is paid to gas saving measures. Another strong point mentioned by the engineering staff is that Colonial personnel have consistently demonstrated a genuine interest in the program by being present at walk-throughs and customer presentations. The engineers suggested that loss of client momentum is the largest barrier to achieving the savings identified through the audit and engineering studies. The engineering staff noted that there is a limit to how much the auditor or Colonial, can, or should, do to continually encourage customers to move along in the program.

One engineer suggested that there is limited value of having both an audit and a separate engineering study. In his opinion, good savings and cost estimates should be produced on the first visit. He recommended that after the audit visit, the engineering staff should provide plans and specifications for bids, not merely focus on refining the energy audit numbers to produce more accurate energy savings estimates. He suggested that this would help streamline program delivery, and increase the chances that customers would continue moving through the program stages. One of the engineers thinks that at some facilities auditors are viewed as a threat, particularly by plant engineers, who may be afraid that upper management will want to know why the plant engineer had not already identified the savings potential. For this reason, it was suggested that it is always best to have some direct contact with plant owners, something usually possible only with smaller firms. It was also noted that smaller companies are less likely to have technical expertise and therefore they may be more responsive to program recommendations.

One of the engineers suggested that the program should stay focused on non-process measures, except in rare cases where the suggested process change is very simple. The engineers interviewed noted that the savings potentials identified for one large customer can easily surpass the program’s annual savings goals.

Participant Interviews

Interviews were also conducted with personnel at three facilities that have participated in the program. Based on these interviews customer satisfaction with the program is high. The customers expressed a general sense of surprise at what they consider to be Colonial offering them something for nothing. However, as stated above, only one customer has moved through to installation stage of the program. The customer interviews indicated that the customer's perception of how much Colonial is contributing to a suggested measure, is important, perhaps more important than the cost effectiveness of other conservation opportunities identified. As a result, customers may perceive relatively less incentive to install measures that have a payback of less than two years, because there is no outside contribution to the installation costs. For example, in the case described by Table 6 above, the customer is likely to proceed with the measure for which Colonial's contribution is highest, while foregoing options with a faster payback, but for which Colonial's contribution is \$0. The customer noted some concern that measures with the faster paybacks may impact personnel comfort or safety at the facility.

Another customer was upset by the fact that the bids that came in for the recommended measures were significantly lower, by approximately 50% than what had been estimated in the engineering study. In this situation the customer's contribution to the project remained relatively unchanged by the lower bid (it was still set to be equal to the cost of two years estimated savings) but Colonial's contribution decreased from the original estimate. The customer's perception was that they received less value from the program, because the relative share of total costs contributed by Colonial declined.

Conclusions

Recommendations for the Large C&I program are:

- Program incentives may need to be modified to increase the likelihood that the most cost effective gas savings identified are implemented. One possibility is for Colonial to increase the technical or financing assistance offered to customers who have highly attractive options identified. Alternatively, either separately or in combination with above, a contingency clause stating that highly cost effective measures must be installed in order for other program measures to be financially supported, could be implemented.
- Pre-participation analysis can be used to identify customers who are most likely to follow through with the implementation of gas saving measures. Relatively new, or highly capital intensive companies tend to have very limited scheduled down times during the year, and these are often already heavily booked with other maintenance or expansion activities.
- Customers and program trade allies have been impressed by Colonial's visible commitment to the program and the presence of Colonial PIE staff in the field. The customer relations benefits of this level of program participation appear to have been high.

REFERENCES

1. Colonial Gas Company, Demand-Side Management Programs Status Report and Budget Proposals, Filed with the Commonwealth of Massachusetts Department of Public Utilities, April 24, 1994.